

B20 ITALY



Health & Life Sciences

POLICY PAPER 2021



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Foreword by the Taskforce Chair

Health as a prerequisite for growth

The Covid-19 pandemic is an unprecedented health and social challenge but it has also brought opportunities to improve the world we live in. This means that we must prioritise health and place it at the very center of social and economic planning for the future.

The life sciences community, academia and industry, reacted quickly to the crisis by producing vaccines, treatments, and diagnostic tools in a timeframe that would have been previously unthinkable.

The B20 Task Force on Health and Life Sciences has created a valuable space for discussion between the stakeholders and governments of G20 countries and I have had the privilege of working with four exceptional Co-Chairs; Werner Baumann, CEO of Bayer; Sir Mark Caulfield, Chief Executive Officer of Barts Life Sciences; Geoff Martha, Chairman and CEO of Medtronic; and Leon Wang, Executive VP International and China President of AstraZeneca. This policy paper is the result of overseeing six months work, with over 90 delegates from 20 different countries, and the results will hopefully go beyond the recommendations.

Our ambition is to initiate a change of mindset in how we all look at scientific research and healthcare. This goes far beyond the pandemic, which has shown us how the results of 'no action' multiplies costs, when issues are not addressed immediately. We have tried to clearly summarise and bring balance into our findings and make the paper accessible to anyone interested in the future of health. We must see Covid, not simply as a problem to be solved, but as a game-changer. In less than a year, the fight against the virus has made it possible to make widespread use of the mRNA technology that is currently used to produce effective vaccines. In the future, this can be used to combat the great killers of our time, such as cardiovascular diseases, tumors, and autoimmune diseases. This also applies to many other innovations that have experienced accelerated development during the crisis.

The pandemic has also highlighted the need to develop and expand access and use of health data to benefit patients. The technological and regulatory means to monitor, share and analyze big health data in real-time is an infrastructure that we must continue to develop - not only for diagnosis, but also to provide effective, targeted and sustainable therapies, in line with the recommendations in this document.

Today health must be seen as the primary smart investment for all countries, whether with developed economies, economies in transition, or major developed economies. This is acknowledged by WHO, recognizing that health has a substantial impact on economic, social, and global aspects of our society. The ability to ensure optimal levels of health makes it possible to increase the well-being and therefore the productivity of a country and to create a real social elevator for communities, as well as for individuals. Investing in health generates opportunities for growth, employment, sustainable development and equality. A worldwide aging population where, for the first time in history, most people can expect to live to 60 and beyond, brings challenges that include increased incidences of chronic diseases and multi-chronic conditions. The advent of new pathogens, the emergence of new pandemics, and equality of access to



treatment, represent a global challenge for all countries. Governments need to reorganize current healthcare models and look at healthcare spending as an opportunity for growth and innovation. The global pandemic has shown how health policies impact immediately and profoundly on parallel and transversal economic areas. We must learn from this and remember that health policies made today and following interventions, will affect our medium and long-term future. If health is an investment, global health policies must be developed logically, moving from tracking costs, to measuring value by innovative healthcare solutions and procedures.

In this scenario, it is essential to incorporate the ability to respond effectively to current, emerging, and future health needs, but above all, to respond to new pandemic events in international macroeconomic assessments, and in individual countries. Responsiveness to emerging health needs must also be improved through the development of new therapeutic and interventional solutions, by activating new production and local chains. It is also essential to encourage the development of a system of rules that motivates research and development and, at the same time, provides access to innovative solutions for the patient. Without forgetting the role of training and education policies, this will help produce an increasingly resilient workforce and also encourage cross-fertilization and innovation between different training programs, in science, social sciences and the humanities, bringing cultural and multidimensional change, that not only involves medicine, but also the economic and social sciences.

This approach must guide G20 Government Strategy in Health & Life Sciences, directing investments in strategic areas, ranging from basic to applied research, through to the development and manufacturing of innovative solutions capable of generating value for global health. Health expenditure must be linked to an investment strategy that fosters cooperation between public and private investment, as well as the health and the Life Sciences supply chain, enhancing the impact of health policies and aimed at the industrial supply chain, in the social and economic spheres.

Without a long-term vision and strong collaboration between healthcare systems and industry, it will become increasingly complex to respond effectively, not only to extraordinary events, but also to the great challenges of our time. If neglected, we risk not only severe recession, but also the loss of our health, social and economic stability and opportunities for growth.

Sincerely,

Sergio Dompé

Chair of the B20-Taskforce on Health & Life Sciences

President of Dompé Farmaceutici S.p.A

Remarks from the Taskforce Co-Chairs

Why Health & Life Sciences Matter



Werner Baumann
Chairman of Bayer AG

“Reaching from a pandemic to climate change or food insecurity, the progress in biotechnology has the potential to tackle the global challenges of our time. We now need to ensure that the benefits of science reach everybody – not just the developed world. The B20 report offers a policy roadmap to advance the bio-revolution over the coming decade”.



Sir Mark Caulfield
Chief Executive of
Barts Life Sciences

“The major advances made globally to meet the challenges of the pandemic show the dramatic pace of life sciences innovation that is possible from strong public – commercial – patient partnerships. These recommendations highlight the potential for new opportunities from data sharing and life science innovation to accelerate health benefits for patients. I hope the G20 will adopt these principles and foster a global culture of life sciences without borders that recognize that every life is precious”.



Geoff Martha
Chairman and Chief
Executive Officer
of Medtronic

“We’re committed to creating more accountable, more equitable, and sustainable approaches for patients everywhere. Unleashing the power of technology via policies that accelerate innovation and enable access and sharing of healthcare data will have a profound impact on outcomes and overall costs of care. We look forward to working with the G20 to improve healthcare for all”.



Leon Wang
Executive Vice-President,
International
of AstraZeneca

“This report sets a clear pathway for G20 policymakers to build more resilient and sustainable healthcare systems. Key to this is cementing the partnership working between government and industry we have seen accelerated by the pandemic and which we have long been a champion for at AstraZeneca”.

Executive Summary

Recommendation 1: Promote the strategic use of science, technology and data

G20 Members should promote pro-innovation health ecosystems reflecting the rapid pace of scientific discoveries and advances in biological sciences to boost public trust in science and new technologies through the development of appropriate regulatory frameworks that will unleash the full potential of science, technology and data.

Policy Action 1.1: Develop and monitor national plans to support the uptake of technologies

G20 Members should design policy frameworks that accelerate ecosystems for digital health, Biopharma and MedTech, adopting an investment mindset towards health, strengthening the use of technology, considering the overall impact of health policies and monitoring these plans through a set of specific Key Performance Indicators (KPI).

Policy Action 1.2: Develop coherent regulatory frameworks and establish dialogues for areas of emerging technology to strengthen scientific research and the innovation environment

G20 Members should commit to accelerate pro-innovation regulation and generate Life Sciences and MedTech innovation ecosystems that reflect the rapid pace of biotech and MedTech revolution, considering carefully designed incentives, securing proper Intellectual Property Rights (IPR), promoting partnerships and a convergence in regulatory requirements and technical standards, focusing on workforce lifelong education.

Policy Action 1.3: Design supportive legal frameworks for data sharing and protection, customized to the healthcare sector; and promote digitization of Health Systems

G20 Members should focus on removing existing national legal framework hurdles and set clear guidance on data sharing to improve diagnosis, treatment, care coordination, etc. between all actors in health ecosystems and between Health Systems, in compliance with privacy and security legislation. Furthermore, the G20 Members should promote the harmonization and standardization of health data to ensure systems interoperability.

Recommendation 2: Assess and measure Health as an investment and foster the transition to Value-Based Healthcare (VBH)

G20 Members should regard health as a strategic asset for national investment, measuring and optimizing its return, sustaining the shift from volume to value-based healthcare, focusing on better access, overall, holistic outcomes and net value that benefits the patient, rather than the short term cost.

Policy Action 2.1: Establish governance models and policy structures to evaluate, identify and replicate successful VBH models

G20 Members should foster the transition to VBH by defining, implementing, monitoring and rewarding quality of care standards and patient care pathways, through metrics which consider a broader societal perspective, adopting VBH contracts, promoting the digitization of health data and facilitating sharing.

Policy Action 2.2: Integrated care pathways to improve patient outcomes

G20 Members should promote the development of multidisciplinary approaches to care, guaranteeing better care integration and coordination in or-

der to extend access to care, improve care pathways effectiveness and experience, increasing the efficiency of Health Systems.

Policy Action 2.3: Place greater emphasis on early diagnosis and prevention

G20 Members should focus on greater prevention, early screenings, timely diagnosis, larger immunization campaigns and the promotion of wellness initiatives, etc. through new technologies that contribute to improving patient outcomes and the sustainability of Health Systems.

Recommendation 3: Build resilient and sustainable Health Systems

G20 Members should strengthen Healthcare Systems pandemic preparedness, promoting new partnerships, connecting health policies with industrial activities and production for sustainability, supporting the development of resilient health and life sciences supply chains and promoting a One Health approach.

Policy Action 3.1: Promote new partnerships to collectively learn from COVID-19 and jointly take actions that will improve system resilience and sustainability

G20 Members should promote new partnerships to foster collective learning and responses to health challenges, as COVID-19 reveals unmet needs and also address chronic and acute diseases, ensuring academia and the public and private sectors all contribute to their resolution to improve the resilience and sustainability of Health Systems.

Policy Action 3.2: Strengthen crisis preparedness and response

G20 Members should support global collaboration on the creation of international benchmarks for crisis preparedness, definition of emergency protocols to reduce the development and go-to-market time for treatments, adoption of early warning systems, surveillance mechanisms and dynamic risk monitoring models.

Policy Action 3.3: Build resilient supply chains through diversification and regulatory cooperation

G20 Members should collaborate with industry and develop a multilateral policy framework to increase security of supply, inputs and end products to strengthen the overall resilience of strategic supply chains.

Policy Action 3.4: Drive environmentally sustainable Health Systems

G20 Members should adopt a broader perspective while defining national health-related policies considering the nexus of population health and wellbeing, sustainable development, environmental conservation, climate change, disaster risk reduction, gender equality and poverty alleviation, targeting better worldwide socio-economic conditions.

Introduction

Bio-Revolution and Tech-Innovation

Brings Breakthroughs in Prevention, Early Detection and Treatment

For almost two years the global community has been fighting an unprecedented pandemic. COVID-19 has shown the universal value of health in ensuring quality of life, socio-economic development and individual freedom. The pandemic has made it clear that we must improve our pandemic preparedness and retain our newfound capabilities, focusing on bringing the energy of Life Sciences innovation to developing sequencing capabilities, diagnostics preventative measures and therapies.

Our minds are inevitably focused on escaping this crisis. However, this vitally important task should not obscure the reality of broader public health challenges, such as the burden from missed oncological and cardiorespiratory screenings in 2020-21 and the potential pandemic of widespread antimicrobial resistance (AMR).

Structural Reform to Meet Health System Challenges

The pandemic has strengthened the need to renew key elements of our Health Systems. Urgent structural changes (e.g. in demographics and chronic care) have been made to respond to emergent epidemiological trends and to ensure the rapid flow of innovation in Life Sciences and Medical Technology reaches and benefits people worldwide. To respond to this global threat to humanity, industry and Governments are working together to create new healthcare capacity (intensive care), new non-invasive approaches with early discharge and new diagnostic systems. Furthermore, they have streamlined regulation of innovative adaptive trials that could provide new life-saving therapies (e.g. dexamethasone) in months, which would previously have taken years. Public-private partnerships have been built on a thriving vaccine innovation ecosystem and extensive research conducted over decades to create novel vaccines, which Health Systems are now deploying at a scale we have never seen before.

The accelerated pace of innovations during COVID-19 demonstrates the true value of leading-edge healthcare and must be considered a global strategic asset that all countries should invest in.

“As countries move forward post-COVID-19, it will be vital to avoid cuts in public spending on health and other social sectors. Such cuts are likely to increase hardship among already disadvantaged groups, weaken health system performance, increase health risks, add to fiscal pressure in the future and undermine development gains”¹.

Health as a Strategic Asset and Investment

Investing in Life Sciences and Medical Technology means investing in health, wealth and the future of our nations. As ageing populations with multi-morbidity challenge our ability to provide care, we must shift from responding to disease towards prevention and more effective integrated care. This is valid both for healthcare and for the innovative, structured and diversified Life Sciences and Medical Technology sectors. Both are vital for health system resiliency and will generate new industries as well as high quality jobs and translate into tremendous economic benefits and growth, in addition to their positive impact on health and food security. For instance, Biotech applica-

¹ WHO, WHO urges countries to build a fairer, healthier world post-COVID-19 (2021)

tions could create 2-4 \$/tn in direct annual economic impact (2030-2040)². If it is to become the norm for children born today to become centenarians, we must prioritize investment into prevention programs and appropriate therapies that reduce pressure on healthcare and welfare systems.

The concept of value is even more true regarding vaccinations, as this public health intervention intrinsically provides broad value that goes beyond individual benefits. Research has shown that vaccinations can drive health-related and care-related productivity gains (due to avoided diseases and need for care), community externalities, including the protection of the non-vaccinated, improvements in social responsibility and cohesion that can lead to wider economic benefits by promoting workforce productivity. To prepare for future pandemics, policies supporting a sustainable innovation ecosystem are needed. In the case of AMR (often called the silent pandemic), urgent policy action is needed to revitalize the insufficient antibiotic pipeline, together with reimbursement reforms to support access. Moreover, investment in healthcare leveraging digital tech facilitates the distribution of scarce competences and skills, enabling a broader access to high quality treatments. The level of competencies employed and developed in the Life Sciences sector drives the reskilling and up-skilling of the workforce with a positive global impact. These innovations working together contribute towards creating healthier, more prosperous societies and the achievement of Sustainable Development Goals.

Revolutionary Innovation Brings Breakthroughs in Prevention, Early Detection and Treatment of Diseases

Technology is already transforming the way we manage health, but much more can be done. As demonstrated by breakthroughs in vaccine technologies, R&D in the Life Sciences industry is a central factor in helping the world recover from COVID-19. The speed of the scientific response is a "Bio Revolution" in the Life Sciences, based on the converging worlds of genes, cells and data. In healthcare, this Bio Revolution opens the way for new approaches and advanced therapies to diseases such as cancer, high blood pressure, diabetes, stroke and cardiovascular diseases, Alzheimer's disease and Parkinson's disease that compromise the lives of many people. This shift holds the potential to help patients stay active and healthier longer, monitor general well-being, improve physical health, support mental health and detect early signs of disease, as well as increase economic value, investment in jobs and the growth that is generated by the Health and Life Sciences sectors.

Our aim is not just to treat symptoms, but to develop curative therapies. It is estimated that 45% of the world's diseases could be addressed with new treatments, vaccines, interventional therapies and diagnostics (especially, if fueled by biotech innovations that are already conceivable today). Progress is within reach and in the last 20 years partnerships to advance public health have enabled immense improvements. For example, the Bill & Melinda Gates Foundation has shown substantial progress can be made in fighting infectious diseases and many other health challenges. Innovation needs not only consistent funding (Gates has donated 7,8 \$/bn, including more than 2 \$/bn for work combating HIV/AIDS, tuberculosis (TB) and malaria) but also needs to apply new metrics and business techniques to ensure maximum impact from the funding.

From new treatments, to digital solutions, to medical devices and vaccines - technology has a critical role to play in addressing the cost of health. For example, diagnostics and sensors enable us to better predict and prevent di-

² *The Bio Revolution Innovations transforming economies, societies, and our lives – McKinsey (2020)*

sease, helping to improve patient outcomes and reduce the cost of care. The extraordinary advances in R&D and digitalization, allow us to measure and store healthcare data digitally, enable personalized care, as well as streamline Health Systems management to help both patients and clinicians monitor health and identify issues quickly. Appropriate use of data for medical care can save lives. Technologies empower individuals to understand their own health and can facilitate communication between healthcare professionals and patients, offering new ways to seek and receive care in all environments. This means that technological innovations can become central to reducing costs of both chronic and acute diseases and contribute towards long-term sustainability and the resilience of Health Systems.

Value-Based Healthcare

A Framework for Sustainable Adoption, Use of Innovation and managing healthcare as an investment

The ongoing pandemic has underscored the importance of new organizational models and the imperative to shift to value-based healthcare (VBH). Under great financial strain, the need to improve the efficiency and governance of Health Systems and support healthcare professionals and patients is clearer than ever. But it is also clear that in order to fully understand the beneficial impact of healthcare innovations, a holistic approach to value over multiple time horizons needs to be applied. The pandemic has shown that the health of our populations is an investment. It should be measured this way both for the assessment of technologies, and from a national accounting point of view, including the impact on the Life Science and Medical Technology sectors' competitiveness and value creation. As we move into a world where the true personalized care paradigm becomes a reality and in a digital world, where the data patient outcomes can be more accurately tracked and measured, this shift in thinking about value becomes more pressing. This does not necessarily mean more money into the system, but better targeted and more efficient spending to improve people and patient outcomes. As a model in which clinicians are empowered to select appropriate people-centered care pathways and data is used strategically to measure the different pathway outcomes, VBH offers a way forward. This shift holds the potential to improve integrated people-centered health care to increase focus on prevention, as well as to increase economic value, investment in jobs and the growth that is generated by the Health and Life Sciences sectors.

Strengthening Strategic Sectors and Technology is Crucial to Building Health System Resiliency

COVID-19 has rightly focused our minds on the urgent challenge of pandemic preparedness and response. As we recover from the crisis, policymakers will inevitably wish to shift gears from crisis-mode thinking towards a long-term vision of resilient and sustainable Health Systems. Accelerated routes to investigate and adopt Research and Technology has been a key asset in the fight against COVID-19, so we must maintain momentum to build resilience and sustainability that will ensure we better prevent, predict and act early on disease. This will enable us to manage costs, relieve pressure on healthcare professionals, and absorb peak demand in future crises. Furthermore, innovation in healthcare fuels economic dynamism across G20 Members as the MedTech, Pharma, Biotech, Digital Tech, and healthcare industries are among the largest sources of R&D and job growth in G20 Members, increasingly interconnected with deep supply chains drawing in thousands of large,

medium and small suppliers across the G20. Moreover, the R&D expenditures are pivotal for an open innovation network of universities, medical research Centers and technology start-ups.

We are convinced, however, that no investment can be made or secured without proper Intellectual Property Rights (IPR), sustainable incentive systems and industrial policies, are fundamental and must be maintained to foster a Life Sciences eco-system to deliver innovation and improve patient outcomes across the world. Furthermore, if it is true that the future of work will be data-centric, technology-based and digital, the Science, Technology, Engineering and Mathematics (STEM) workforce needs a fuller set of skills following the Social Sciences, Humanities and the Arts for People and the Economy (SHAPE) framework to truly thrive and address the broader impact of technological innovation. Finally, the innovation coming from Life Sciences can help us combat hunger, advance climate resiliency and decarbonize the planet, namely by reducing the carbon footprint of Health Systems but also by promoting a healthy population, a healthy economy and a healthy environment.

G20 Ongoing Collaborative Private and Public Stakeholders Forum

COVID-19 posed unprecedented challenges, empowering the G20 to erect pillars on which to base the evolution of the Health and Life Sciences systems, through the promotion of structural changes to ensure valuable care for all people. Health should therefore be a permanent item on the G20 Agenda, and the G20 should establish a permanent Health and Life Sciences Meeting to ensure continuity of work and track progress of past decisions on health taken by the B20/G20.

We Offer Three Recommendations

This paper distils the challenges and opportunities outlined above into three core recommendations for G20 leaders, centered on:

- promoting the strategic use of sciences, digital tools and technology;
- fostering the transition to Value-Based Health Care (VBH);
- building resilient and sustainable Health Systems.

Our recommendations are designed to shape a new model for a permanent strategic dialogue between Institutions and Stakeholders aimed at a shift in mindset towards valuing health as a strategic asset. To unleash this value, we need progressive policy frameworks, unlocking the benefits of technology and innovation for humanity. To achieve this, a methodology of impact assessment of any healthcare policy on access to therapies and effects on jobs and investments in Life Sciences companies should be adopted. Bold new partnerships that cut across the public and private sectors, academia and civil society will be essential to achieving these shifts, and to maximizing the impact of innovation to support healthy populations, economies and environments, whilst maintaining public trust.

Our recommendations are weaved together in an overarching narrative aiming to show how reaction to the COVID-19 pandemic is presenting us a unique opportunity to permanently adopt the more efficient, agile and effective approach which has enabled us to counter an unprecedented health and economic crisis. Therefore, to attain their full potential, the actions we present should be considered as a solid and articulated line of work, rather than a list from which to select individual points.

Recommendation I: Promote the strategic use of science, technology and data

G20 Members should promote pro-innovation health ecosystems reflecting the rapid pace of scientific discoveries and advances in biological sciences to boost public trust in science and new technologies through the development of appropriate regulatory frameworks that will unleash the full potential of science, technology and data.

Policy Actions

1.1 Develop and monitor national plans to support the uptake of technologies – G20 Members should design policy frameworks that accelerate ecosystems for digital health, Biopharma and MedTech, adopting an investment mindset towards health, strengthening the use of technology, considering the overall impact of health policies and monitoring these plans through a set of specific Key Performance Indicators (KPI).

- G20 Members should foster the development of digital health hubs, designed to support innovation through incentives and public-private partnerships, and involving start-ups, SMEs, and large companies;
- G20 Members should activate national investment plans to support and incentivize access to Digital Health, Biopharma and MedTech innovation. Investment may be needed in training and upskilling of workforce, diagnostic and treatment infrastructure, and foundational science and technology research;
- G20 Members should activate key local context assessments, regulatory, access and policy frameworks to bridge the gap between the development of new therapeutic and diagnostic solutions and the Health System's needs;
- G20 Members should actively monitor emerging needs for scientific and technical competencies across the Healthcare and Life Sciences sector and they should accordingly innovate, update and invest in education programs for health and research professionals to drive competitiveness and change.

1.2 Develop coherent regulatory frameworks and establish dialogues for areas of emerging technology to strengthen scientific research and the innovation environment – G20 Members should commit to accelerate pro-innovation regulation and generate Life Sciences and MedTech innovation ecosystems that reflect the rapid pace of biotech and MedTech revolution, considering carefully designed incentives, securing proper Intellectual Property Rights (IPR), promoting partnerships and a convergence in regulatory requirements and technical standards, focusing on workforce lifelong education.

- During G20 cycles, the G20 Presidency should request a joint ministerial meeting on Health inviting their industry organizations counterparts, to advance coordination on risks, regulations and policy implementation, together with Economy, Industry and Foreign Affairs Ministers;
- Members should consult with industry to explore more permanent structu-

res for fostering dialogue on Health innovation. This may include the Global Innovation Hub for Improving Value in Health; G20 Members should ask the Organization for Economic Co-operation and Development (OECD) to produce a report on how to better and systematically structure as well as simplify international health regulation to ensure more regulatory consistency, flexibility and support for innovation;

- Members should commit to accelerate pro-innovation regulation that reflects the rapid pace of the scientific discoveries and generates Life Sciences ecosystems to fully tap its potential. This may include ad hoc regulation on specific public health priorities aimed at ensuring fast time to market to innovative therapeutic solutions while preserving Health Systems' affordability and sustainability (e.g. Italian Funds for Innovative Drugs); promotion of digital health applications and innovative solutions to monitor, manage and deliver healthcare services to the population, in order to help boost healthcare and create the jobs of the future.

- G20 Members should support Health Systems related digital access to improve overall global R&D infrastructure and access to prior technology as well as share a balanced international and local vision regarding an effective protection of Intellectual Property Rights in Health and Life Sciences. These measures should promote and incentivize innovation preserving and advancing social and economic welfare as well as maintaining patent pools, such as the Medicines Patent Pool, to improve access to health innovations in developing Countries;

- G20 Members should incentivize investments through tax benefits, facilitation of approval processes, market predictability, programs and political initiatives/funding for innovation and production in the healthcare industry;

- G20 Members should report on the progress against previous commitments related to innovation such as on the development and implementation of pull incentives to tackle the increased threat posed by antimicrobial resistance (AMR) as well as solutions to support sustainable access as contained in previous G20 statements.

1.3 Design supportive legal frameworks for data sharing and protection, customized to the healthcare sector; and promote digitization of Health Systems – G20 Members should focus on removing existing national legal framework hurdles and set clear guidance on data sharing to improve diagnosis, treatment, care coordination, etc. between all actors in health ecosystems and between Health Systems, in compliance with privacy and security legislation. Furthermore, the G20 Members should promote the harmonization and standardization of health data to ensure systems interoperability.

- G20 Members should promote standards including a minimum, and meaningful, data set to be collected across different Countries, interoperability of health data systems, and good practices among its members for digitization of health records and connected care solutions;

- G20 Members should develop legal, regulatory frameworks and standards for cybersecurity, maintaining patient safety and privacy while protecting intellectual property, to make health-related data records interoperable, taking into account the diversity of sources in the Health Systems;

- G20 Members should improve, address and regulate high privacy as well as

security standards for data flows, to ensure social acceptance and promote health applications as well as data pools;

- G20 Members should enable pooling of relevant information and health records to respond to the need of high-quality health data, supporting national and international research open to Public-Private Partnerships and to high quality research programs;
- G20 Members should define national strategies to adopt the enabling infrastructure necessary for connected care solutions in healthcare (e.g. digital applications, high standards of fast internet and mobile coverage like 5G, etc.), raising awareness among health professionals partnering with scientific societies, education institutions, media and telecommunications industry to develop national based projects;
- G20 Members should strive to make connected care solutions a driver for patient engagement and monitoring starting from national pilot projects on prevention, primary and home care with involvement of socio-economic sector, and targeting frail patient groups considering specific programs for elderly and vulnerable people, as well as establishing follow up programs for chronic diseases and multi-factor cases;
- G20 Members should develop national Key performance Indicators (KPIs) to monitor Health Systems digitalization, data hubs and data interoperability and readiness for connected care solutions.

Recommendation 1: Key Performance Indicators (KPIs)³



Availability of new drugs (NAS/NMEs/NTBs) and devices approved by EMA/FDA/EU Competent Authorities

Number of new drugs (as New Active Substances (NAS), New Molecular Entities (NME) under New Drug Applications (NDA), or as New Therapeutic Biologics (NTB) under Biologics License Applications (BLA)) approved by EMA and FDA; as well as number of new medical devices in the top two risk categories approved by FDA and European Notified Bodies



Health data sharing intensity

This indicator looks at the extent to which national health datasets may be shared with domestic and international stakeholders. The indicator value is 100% when all national health datasets may be shared with all stakeholder groups.

Context

Innovation in Healthcare and Life Sciences is gaining momentum, with synergies between R&D and new technologies feeding the pipeline, enabling the development of new vaccines, therapies and diagnostic solutions to healthcare needs. This is thanks to cooperative, collaborative, multi-sectoral and multinational approaches. Furthermore, the growth in Public-Private Partnerships in reaction to the pandemic has significantly accelerated the development and execution of clinical trials, both for drugs and vaccines, shortening the time between the development and availability of innovations.

³ Please refer to the section "Annex 1 | Key Performance Indicators (KPIs)" for more details regarding the explanation and calculation methodology of the Key Performance Indicators (KPIs).

Therefore, it is strategically vital that the elements that enabled this acceleration in studies becomes the “new normal”. In parallel, there is a global and growing interest in Biosciences, to improve human health, food production and guarantee environmental sustainability.

Leveraging technology across the Life Sciences and medical technology value chain can revolutionize the way we deliver healthcare to patients, either by developing new treatments, better using existing ones, or shifting the setting of care towards less intensive options. From basic research in Life Sciences to the use of AI in R&D for more precisely targeted and effective treatments, to the creation of new devices that help patients track, and clinicians treat, diseases; science and technology enable Health Systems to provide better and appropriate care, to manage their costs and outcomes. This is more pressing given the trending demographic challenges and increased risk of developing, often concomitant, age-related diseases. The Bio revolution and new health technologies are a great opportunity for people care and should not be regarded as a driver of costs to Health Systems, but as a way of reducing the costs driven by disease and directing resources better through redesigned care pathways. The impact on the broader economy is also clear; growing high-tech industry to support growth and jobs.

COVID-19 has demonstrated vividly the economic and societal importance of Health Systems. While chronic diseases have received less immediate attention, they too have a vast importance that can only be addressed through the strategic use of science and technology across Health Systems. To enable the use of technology, there is an imminent need to speed up the creation of interoperable health digital infrastructures on a national and international level to allow health data to flow within Health Systems. These infrastructures are a prerequisite for digitalization to ensure broader access to care with no regard to citizens’ social ranking, income or location⁴.

Policymakers have a key role to play here in designing regulatory and policy frameworks that support the strategic use of sciences and technologies to achieve these objectives. It is thereby important to address data privacy and data security while keeping data flow open to relevant public and private stakeholders, as the safe use of health data is critical for the development of new therapies and improving care. By strategic use, we mean delivering more effective and sustainable care; with greater impact on societal goals; contributing to system resilience. In order to unleash the full potential of science and technology, it is crucial to accelerate pro-innovation ecosystems that also reflect the rapid pace of scientific discoveries and boost public trust in science and new technologies.

Longer life spans as well as better diagnostics are increasing the burden of chronic diseases such as Parkinson’s and Alzheimer’s. More than 10 million people worldwide are living with Parkinson’s (4% diagnosed before 50) while Alzheimer’s accounts for up to 70% of the 50 million people suffering from dementia and now considered a pandemic registering 10 million new cases every year. Treatments so far have been symptomatic but Life Sciences and digitally enabled collaborative approaches are opening the way to life changing treatments. As Parkinson’s is caused by the loss in the brain of dopamine producing cells, Bayer’s Cell and Gene Platform approach is targeting its root cause with two approaches. AskBio’s adeno-associated virus (AAV)-based gene therapy introduces a functional copy of a defective gene into

Example 1 | Gene, cell therapies open the way to life changing treatments for Parkinson’s and Alzheimer’s as well as oncology patients

⁴ This issue is addressed in the Digital Transformation Policy Paper, Recommendation 1, Policy Actions 1.1 and 1.2

the patient's cells harnessing the brain's own cellular machinery to provide continuous production of GDNF, a protein promoting dopamine production. **Bluerock**'s cell therapy uses authentic dopaminergic neurons as therapy. Cell therapies also offer promises to disrupt cancer care, including the treatment of mesothelin overexpressing tumors as ovarian, lung and pancreatic cancers as well as mesothelioma (340,000 new cases a year with more than 2 million patients in the United States alone). Bayer entered in a collaboration with **Atara Biotherapeutics** on the development of next generation, mesothelin-targeted CAR-T cell therapies for solid tumors. Mesothelin overexpression can be found in many tumors including ovarian, lung and pancreatic cancers as well as mesothelioma.

For the complete case studies please refer to the Annex: Bayer's Cell and Gene Platform; Atara Biotherapeutics.

Example 2 | E-health and AI improve diagnostics, counselling and less invasive treatment expanding care despite the COVID-19 pandemic

The COVID-19 pandemic has upset screening and check-up schedules for a great number of patients, including the elderly, those in need of regular monitoring. E-health is proving effective in providing remote monitoring and counselling, as well as in improving care and efficiency. **Medtronic**'s PillCam™ colon capsule offers a minimally invasive, digitally enabled solution to diagnosing colorectal cancer, the third most commonly occurring cancer in men and the second most commonly occurring cancer in women with over 1,8 million new cases in 2018. In 2021, in partnership with the UK's National Health Service, PillCam™ was deployed to meet the demand caused by thousands of cancelled or delayed colonoscopies. In the US the FDA permitted home delivery of the PillCam™ small bowel capsule for the duration of the public health emergency. In addition to COVID-19, one of the main challenges in diagnostics is linked to the growing ratio between the number of radiological exams required and the number of radiologists and imaging specialists. This translates into increasing workloads for radiologists, shorter exams reading time and higher probability of errors. New technologies are powerful tools to help address this trend in diagnostics, such as **Siemens Healthineers** AI-Rad Companion, an AI-powered and deep learning algorithms augmented workflow solution which helps to reduce the burden of basic repetitive tasks and increase diagnostic precision when interpreting medical images. Remarkable impacts in prevention and rehabilitation are being registered by **Movendo Technology**'s **Hunova**, a robot revolutionizing the outcome of many orthopedic, neurological, geriatric and pediatric diseases. Hunova interacts with the patient monitoring 130 biomechanical and neurological parameters and acquiring 19 thousand data. Machine learning and AI techniques highlight the patient's risk of accidental falls, health status and deficient functions and assign an intervention plan. Also transforming today's healthcare are **Huma**'s Remote Patient Monitoring Program and **Brave Health**'s mental and behavioral health platform. **Boston Scientific** is up to date with the use of apps for care coordination simplification and inpatient process standardization (e.g. myTAVI and myPCI), or with platform (**AskAngie**) connecting physicians with a catheter lab to setup clinical applications and remote assistance in real time, which is COVID-19-proof. **AstraZeneca** developed a digital patient platform, called **Connect360**, which brings together patient information, patient data and monitoring and communication with Health Care Professionals (HCPs) into a single platform. **Connect360** links diagnostic technology with a smartphone app to monitor patient's adherence to treatment, demonstrate correct usage of the medicine and remind patients to take their medication to prevent exacerbations.

For the complete case studies and more materials please refer to the Annex: PillCam by Medtronic, AI-Rad Companion by Siemens Healthineers, Remote Patient Monitoring by Hunova, Brave Health; myTAVI, myPCI and AskAngie by Boston Scientific, Connect360 by AstraZeneca.

To promote the strategic use of sciences, technology and data, G20 should:

Policy Action 1.1: Develop and monitor national plans to support the up-take of technologies

G20 Members should design policy frameworks that accelerate ecosystems for digital health, Biopharma and MedTech, adopting an investment mindset towards health, strengthening the use of technology, considering the overall impact of health policies and monitoring these plans through a set of specific Key Performance Indicators (KPI).

Building a consistent and coherent national plan means designing policy frameworks that accelerate supportive ecosystems for digital health, Biopharma and MedTech. This involves adopting an investment mindset towards health and strengthening the use of technology to improve prevention, prediction, early detection and treatment of disease. This must be underpinned by technology assessments that reflect the full humanistic, economic and social cost of disease (or non-adoption of technology).

In the People's Republic of China, Huawei launched an innovative AI-Assisted screening system, allowing a rapid diagnosis of COVID-19 by analyzing the lesions in tomography scans of a patient's lungs. The system has proved effective both in terms of timeliness and accuracy. In a pandemic period, which caused a significant decrease in the number of in-person doctor visits, in the UK, Roche and Moorfields Eye Hospital launched the **Home Vision Monitor App**, a mobile application which allows patients suffering from eye diseases (e.g. neovascular age-related macular degeneration) to remotely monitor their condition from their smart devices and test for changes in their vision function once or twice weekly. The potential of this solution is significant as Roche is part of INSIGHT, the health data research hub for eye health in the UK building one of the world's largest data resources in ophthalmology, with the aim to transform how eye diseases are diagnosed and managed through advanced analytics. Smartphone and mobile apps could also represent powerful tools to improve health screening for diseases such as Alzheimer's. In this sense Biogen is working on a new virtual study to be launched in collaboration with Apple that plans to investigate the role Apple Watch and iPhone could play in monitoring cognitive performance. The collaboration will aim to identify digital biomarkers to help monitor cognitive performance over time and identify early signs of decline including Mild Cognitive Impairment (MCI). The fully virtual study will explore the subtle changes in behaviors of those people that could be predictive of MCI, even before any symptoms are visible to the person, family and/or circle of friends. Digital biomarkers derived from everyday use of consumer smartphones and smartwatches are an example of emerging digital health technologies that may one day help healthcare providers accelerate diagnosis of cognitive impairment, a process that today currently can take up to 2 to 3 years.

For the complete case studies and more materials please refer to the Annex: AI-Assisted Screening System by Huawei, Home Vision Monitor App by Roche & Moorfields Eye Hospital, the potential of digital biomarkers in Alzheimer's disease by Biogen.

Example 3 | Smart screening and mobile apps boost patient health

Furthermore, national plans should also capture the impact of health policies on access to care, on Life Sciences economic sectors competitiveness, investments and jobs. These plans should be monitored through a collectively adopted set of KPIs that track levels of technological adoption among G20 Members and their impact on improving outcomes for patients and Health Systems.

SDGs impacted:



G20's 3Ps impacted:



Policy Action 1.2: Develop coherent regulatory frameworks and establish dialogues for areas of emerging technology to strengthen scientific research and the innovation environment

G20 Members should commit to accelerate pro-innovation regulation and generate Life Sciences and MedTech innovation ecosystems that reflect the rapid pace of biotech and MedTech revolution, considering carefully designed incentives, securing proper Intellectual Property Rights (IPR), promoting partnerships and a convergence in regulatory requirements and technical standards, focusing on workforce lifelong education

To take advantage of the advances in science and its potential support in tackling global challenges, G20 Members should commit to accelerate pro-innovation regulation and generate Life Sciences and MedTech innovation ecosystems that reflect the rapid pace of the biotech and MedTech revolution.

Strengthening scientific research means considering carefully designed incentives that are vital to encouraging investments and the uptake of new technologies. Partnerships are key to the discovery, development and most effective use of health technology. Bold new partnerships which span private and public sectors, academia and geographies are needed. Some of the most exciting developments are happening at the nexus where multiple academic disciplines meet. More can be done to facilitate this through investment in multidisciplinary centers. Promising partnerships have emerged (see Example 3) and should be scaled up to other geographies and areas of healthcare. New areas, like the development of biologics (i.e., cell and gene therapies) and the application of AI technology to diagnosis and treatment, need both robust social dialogue around their risks and opportunities, and regulatory frameworks that support their unique development pathways and defend the intellectual property that underpins them. To leverage the potential of global R&D and integrated supply chains, global alignment and convergence in regulatory requirements and technical standards are needed. Plurilateral institutions such as the International Conference on Harmonized Standards (ICH) and national regulators must maintain their speed of working towards coherent acceleration of innovation. Emergency protocols and procedures should be put in place to further accelerate development and regulatory timelines for medicines and vaccines in case of a future public health emergency and/or pandemic⁵.

⁵ This issue is addressed in the Action Council on Sustainability & Global Emergencies Policy Paper, Recommendation 2, Policy Action 2.3.

Moreover, it is important for G20 Members to focus on skills policy and investment in Science, Technology, Engineering and Mathematics (STEM) and encourage lifelong education among industry professionals, physicians, patients and caregivers.

Finally, no investment can be made or secured without proper IPRs, that are fundamental and must be maintained to foster a Life Sciences ecosystem that can deliver innovation and improve patient outcomes across the world. In other cases, still fundamental scientific and economic challenges exist that are preventing progress. For example, the world agrees on the significance of the challenge posed by Antimicrobial resistance (AMR), responsible for 700.000 deaths annually, but action plans tailored to individual countries and progress on creating effective pull incentives for antibiotic R&D and establishing antimicrobial surveillance and stewardship programs are still deficient.

From China to Europe, network innovation and cooperative research are accelerating research and improving patient care and underscore the importance of public-private partnerships able to engage and protect patients. In China, AstraZeneca, together with the government and in partnership with over 200 technology companies, runs its **Innovation Center** in charge of re-assessing patient pathways and designing new solutions to facilitate patients' access to information, screening, early diagnosis, treatment and follow up. Launched at the onset of the COVID-19 pandemic, **Exscalate4CoV (E4C)**, a public-private consortium composed of 18 partners backed by the EU, has combined the most powerful European computing centers (CINECA, BSC, JÜLICH) together with laboratory and clinical skills in order to identify potentially effective treatments against the SARS-CoV-2 virus. On the dementia front, the **Davos Alzheimer's Collaborative (DAC)**, convened by the World Economic Forum in 2020 launched a six-year, 700 \$/mIn plan to diversify innovation leveraging global collaboration to accelerate drug development; create global clinical trials slashing the cost and time to bring new treatments to patients as well as better preparedness of Health Systems and faster diagnosis.

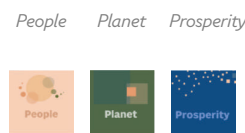
For the complete case studies please refer to the Annex: Innovation Centers by AstraZeneca; Exscalate4CoV; DAC.

Example 4 | Public-Private-Patient partnerships step-up search for new drugs, disease management, remote tech-support and personalized medicine

SDGs impacted:



G20's 3Ps impacted:



Policy Action 1.3: Design supportive legal frameworks for data sharing and protection, customized to the healthcare sector; and promote digitization of Health Systems⁶

G20 Members should focus on removing existing national legal framework hurdles and set clear guidance on data sharing to improve diagnosis, treatment, care coordination, etc. between all actors in health ecosystems and between Health Systems, in compliance with privacy and security legislation. Furthermore, the G20 Members should promote the harmonization and standardization of health data to ensure systems interoperability

National authorities should focus on the hurdles and parameters for clinical data and set clear guidance on data sharing, for both public and private research, as well as for improved diagnosis, treatments and care coordination, built around a healthcare-specific stakeholder dialogue. It is critical that data can be shared effectively across actors in a national healthcare ecosystem and between Health Systems, in compliance with privacy legislation. Therefore, the development of Codes of Conduct (e.g. like the European one), determining which actor and under what terms, access and use health data, is necessary. Furthermore, a genuine commitment to raising the level of harmonization and standardization of data to promote interoperability of Health Systems is also crucial⁷. This collaboration is required to enable standards for interoperability across data sources, from research to clinical trials and beyond, taking into account the diversity of sources in the Health Systems: hospital records, payer records, public databases (such as cancer registries) and others. As in every other domain in which personal data is collected and shared, there are important privacy and security concerns in the generation of digitalized health data. Also, the frameworks for data sharing need to distinguish healthcare data from technical data and ensure quality, safety and safeguarding of intellectual property, legal frameworks for sharing of data on human pathogens and associated information. Appropriate solutions are required in this area, customized to the specifics of healthcare data.

Example 5 | Safe sharing of patient data improves diagnostics and treatments

Safely sharing clinical data and the results of clinical research has proven effective in cutting costs and time of treatments, with the potential to optimize public health development in the future. **Project Data Sphere**, an independent and non-profit initiative of the CEO Roundtable on Cancer's Life Sciences Consortium enables researchers to download, share, integrate and analyse patient-level data from Phase III cancer clinical trials conducted by academic researchers or pharmaceutical companies. Through the collaboration of 24 countries and backed by the EU, the **1+ Million Genomes** project aims to have at least 1 million sequenced genomes available by 2022. Once pooled with Europeans' health data, genomics will boost the development of more targeted personalized medicines, therapies and interventions, also enabling better diagnostics. From cancer, to rare diseases, neuro diseases and prevention, genomics could soon greatly improve health conditions of EU citizens. In the UK, **Huma** developed several applications to monitor and keep track of COVID-19 spread and other diseases like Pulmonary Arterial Hypertension (PAH). Foundation Medicine Inc., (part of Roche Group.), is pioneering progress in personalized oncology, through its **Comprehensive genomic profiling (CGP)** supporting physicians in their clinical decision-making process. Secure data from CGP tests are stored in a database (FoundationCORE). More than 450,000 profiles in a structured format can be leveraged to develop next generation treatments, creating a valuable resource for biopharmaceutical companies and academic researchers across the globe.

⁶ This issue is addressed in the Digital Transformation Policy Paper, Recommendation 2

⁷ This issue is addressed in the Digital Transformation Policy Paper, Recommendation 2, Policy Action 2.3.

For the complete case studies and more projects please refer to the Annex: Project Data Sphere; 1+ Million Genomes; Remote monitoring for COVID-19 patients, BreeConnect by Huma, Digital Data collection for monitoring COVID-19 spread by Huma and Comprehensive genomic profiling by Foundation Medicine Inc and Roche

SDGs impacted:



G20's 3Ps impacted:



Recommendation 2: Assess and measure Health as an investment and foster the transition to Value-Based Healthcare (VBH)

G20 Members should regard health as a strategic asset for national investment, measuring and optimizing its return, sustaining the shift from volume to value-based healthcare, focusing on better access, overall, holistic outcomes and net value that benefits the patient, rather than the short term cost.

Policy Actions

2.1 Establish governance models and policy structures to evaluate, identify and replicate successful VBH models – G20 Members should foster the transition to VBH by defining, implementing, monitoring and rewarding quality of care standards and patient care pathways, through metrics which consider a broader societal perspective, adopting VBH contracts, promoting the digitization of health data and facilitating sharing.

- G20 Members should put in place policy mechanisms and governance structures to identify, share, and replicate successful VBH), Value Based Funding (VBF) and Value -Based Procurement (VBP) national programs. The goal should be to identify the core elements in the successful models, including the best care pathway, the data and analytics used to evaluate implementation of the model and the results achieved, and the payment or incentive model to reward good results. Policy mechanisms should aim to create the conditions for spreading the models across the system. These policy measures should include increasing accountability for delivering VBH, with appropriately resourced agencies who can monitor and act on quality standards and have the data and power to act on wasteful spending;
- G20 Members should commit to a work plan to establish globally accepted standards of data in order to leverage outcomes based on Real World Evidence (RWE) for a uniform quality assessment and as a metric for setting reimbursement criteria;
- G20 Members should drive the adoption of a broader VBH approach in reimbursement systems for healthcare providers, sharing a common ground across Health Systems of clear and measurable KPIs;
- G20 Members should mandate that the Health System enhances equity. For example, a great proportion of caring for the elderly and sick falls on women, thus perpetuating and widening the inequality gap as the populations grow older.

2.2 Integrated care pathways to improve patient outcomes – G20 Members should promote the development of multidisciplinary approaches to care, guaranteeing better care integration and coordination in order to extend access to care, improve care pathways effectiveness and experience, increasing the efficiency of Health Systems.

- G20 Members should share best practices and experiences in the development of integrated primary care networks, frameworks for boosting the ac-

cessibility and clinical value of patient-clinician interaction, especially through the greater use of telehealth and health monitoring systems;

- G20 Members should commit to working with industry and academia to explore novel and flexible ways to assess and pay for healthcare goods and technologies to support more patient-centered models of care;
- G20 Members should enable more extensive patient-clinician interaction. Digital technologies can also help improve a patient's access and quality of care through telehealth systems. Easy access to discussion with a clinician from home can lower the barrier for patient access for large segments of the population, including in under-served areas and among the elderly, or mobility-impaired populations;
- G20 Members should foster digital technology being used to monitor outcomes of patient care, to identify and address variations in quality and results in different settings and systems, and to determine which treatments and care pathways are more effective for care of patients. Data collection is key to measure outcomes achieved and the cost incurred relative to a baseline case.

2.3 Place greater emphasis on early diagnosis and prevention – G20 Members should focus on greater prevention, early screenings, timely diagnosis, larger immunization campaigns and the promotion of wellness initiatives, etc. through new technologies that contribute to improving patient outcomes and the sustainability of Health Systems.

- G20 Members should identify new strategies and solutions to create an integrated network of primary care (particularly focused on greater prevention, early screening, and timely diagnosis), hospital care and home care providers to improve patient management and healthcare services;
- G20 Members should promote the definition of protocols that leverage the new digital solutions (e.g. wearables, app integrated with small scanning device) that encourage the delivery of care directly at home to foster prevention through more sustainable solutions;
- G20 Members should promote the use of incentives (e.g. training programs, certifications, and tax reliefs) for those companies that launch prevention campaigns to promote healthy habits and lifestyles or Patient Support Programs, including digital solutions, to improve disease management;
- G20 Members should invest more to include immunization across the life course and prevention on top of their policies to improve resilience, employment, social outcomes and economic growth;
- G20 Members should promote and incentivize Wellness driven initiatives to provide individuals with preventive services for their physical and mental wellbeing.

Recommendation TWO Key Performance Indicators (KPIs)⁸

KPI

Expenditure on preventive care as % of total healthcare expenditure

Share of total health expenditure on preventive care related to total health expenditure (considering all financing schemes: Government/compulsory, voluntary healthcare payment, household out-of-pocket)

Context

Health should be regarded as a strategic asset for Nations to invest in and, as with any investment, it is critical to be able to measure and optimize return⁹. To do so effectively requires taking account of the following: being sick is much more expensive than appropriately treating diseases, healthy people are more productive to contribute to economic prosperity, a vibrant Life Sciences economic sector is essential to fuel economic growth, create jobs and attract investments. For example, in 2016 there were 18 billion hours of unpaid care by 15 million caregivers, valued at 230 billion. COVID-19 has highlighted once more the colossal cost of disease, confirming that investments in health can yield highly positive welfare benefits. For example, data reveals that on average 1\$ invested in health will yield 2-4\$ in return. In the Italian context, a recent study shows that for every 1€ invested in pharmaceutical clinical studies, this benefits our NHS by 2,77€, constituted by the fees that are paid to hospitals by companies and by the averted costs for the NHS to treat patients that are shouldered by companies. Moreover, chronic diseases, such as diabetes and obesity, account for 60% of deaths worldwide and are leading contributors to the growing healthcare crisis. This should compel us to move from measuring inputs and designing incentives for Health Systems around the volume of care to determining the value of care.

A focus on overall, holistic outcomes and net value, rather than short term cost, is what a truly value-based healthcare (VBH) model should do moving forward.



Example 6 | Measuring the performance of the Health Economy in Germany

The Healthcare Economy (HE) has a profound impact on both the Gross Domestic Product (GDP) and employment in Germany. In terms of contribution to the GDP, every 8th euro of Gross Value Added (GVA) created in the German economy in 2019 was generated by the Health Economy. In terms of employment, every 6th job in 2019 was created in the Health Economy. Overall, accounting for spillover effects, every 5th euro and 4th job in Germany were associated with the HE. Alternatively viewing these results, for every 1 euro in the HE, there is an additional 0,82 euros spillover effect for the whole economy, and for every 2 jobs in the HE, there is an additional job created for the whole economy. In the table below, the impacts of the HE in Germany are presented at the country level, as compared to the impacts at the EU and Global levels. A 2019 study from EFPIA shows that for one person employed in the pharmaceutical industry in Europe, there are three more jobs created directly and indirectly.

⁸ Please refer to the section "Annex I | Key Performance Indicators (KPIs)" for more details regarding the explanation and calculation methodology of the Key Performance Indicators (KPIs).

⁹ McKinsey (2020) Invest 1\$ in known health improvements, get up to 4\$ back in GDP

*Why Measure Health Investments - ROI in Germany, EU, Global**Indicate results of impacts of the HE on GDP in the German, Global and EU Economies in 2020*

	Germany	EU	Global
 Gross value added	Every 8th euro In the total economy is linked to the Health Economy*	9,6% Share of Health Economy in the overall EU** economy	9,3% Share of Health Economy in the overall global economy***
 Employment	Every 6th euro In the overall economy is linked the Health Economy*	12,5% Share of the Health Economy labor force in the overall EU** economy	200m Jobs in the global economy***

* Germany: Every 8th euro of GVA and every 6th job is created in Health Economy (every 5th euro and 4th job was linked to the HE).

** EU: The HE made up to 0,6% of the EU's GDP and up to 12,5% of the EU labor market in 2020.

*** Global: The GVA share of the global HE in total economy was 9,3% and contributed to 200 million employees.

Source: G20HDP, WifOR Institute, Prof. Rifat A. Atun, Harvard University; The economic and societal footprint of the pharmaceutical industry in Europe, EFPIA 2019.

To achieve the goal of improving the value of care, we urge G20 leaders to pursue the following recommendations:

Policy Action 2.1: Establish governance models and policy structures to evaluate, identify and replicate successful VBH models

G20 Members should foster the transition to VBH by defining, implementing, monitoring and rewarding quality of care standards and patient care pathways, through metrics which consider a broader societal perspective, adopting VBH contracts, promoting the digitization of health data and facilitating sharing.

To foster the transition to VBH, it is essential to define, implement, monitor and reward quality of care standards and patient care pathways, which are known to deliver effective care. Specifically, economic assessments need to be reformed and assessed across the healthcare delivery system based on contribution to defined care standards.

To ensure effectiveness of investments and cost drivers in the health system, metrics should be developed considering a broader societal perspective. This means, assessment of the full humanistic, economic and social costs of disease (value of health), with emphasis on improving economic assessments to properly identify GDP impacts. This should include measuring productivity gain for patients and caregivers including paid work (productivity), unpaid productivity and consumption effects.

Modern national accounting models are crucial for tracking costs and benefits with a multi-annual and holistic approach. Value-based contracting, impact investments, and other models will also be key to accelerating the transition to VBH.

A key enabler for the successful delivery of VBH is the ability to identify and measure the outcomes that matter most to patients and Institutions. Core to this is the collection and use of high-quality Real-World Evidence (RWE) including patient reported indicators and clinical medical records to support better understanding of the patient journey.

Another key enabler is the digitization of clinical medical records and frameworks. Appropriately sharing access to the records is also essential to designing VBH models and measuring their success, in other words to ensure the accountability of stakeholders to a value-based proposition.

VBH depends on data. Sharing of data can be achieved by federated pipeline connections between datasets in different jurisdictions and will accelerate translation and transformation into patient benefit worldwide. The data enables shifting from an up-front promise to achieve better results in relation to cost, to real-time verification of whether those promises are met.

There is also scope within this approach to harness the potential of the cooperative business model, which is a reliable organizational tool that protects healthcare workers, strengthens Health Systems, and contributes to achieving Universal Health Coverage, especially in mid and low-income countries.

Example 7 | How VBH solutions improve care and clinical effectiveness as well as costs ratio of procurement

Bits and sensors have opened the way to a new generation of indicators and metrics to gauge the effectiveness of a treatment or the quality of care. This advancement enables more accurate Value-Based Healthcare (VBH) Models and approaches, with benefits both for the patient and for the sustainability of the system. **Diabeter**, a Dutch-certified clinic network owned by Medtronic has pioneered a new value-based diabetes care model for pediatric type 1 diabetes patients in the Netherlands. An IT platform makes real-time patient data available to a multidisciplinary team of diabetes care specialists and patients via e-dashboards, personalized emails and physician alerts. This coordinated data sharing allows for timely adjustments to therapy that – in turn – optimize results that matter to the patient. Following the positive results, Zilveren Kruis, Netherlands' largest health insurance provider, recently implemented a value-based payment model that shares the benefits from better health outcomes and lower healthcare costs for its patients. Similarly, **Roche** has launched in Denmark a partnership between the Herlev Gentofte Hospital and its genomic division Foundation Medicine to compare treatment outcomes and costs for non-clear cell renal cancer patients. By investigating the clinical impact of targeted immunotherapy through genetic profiling and personalized medicine, also combined with AI, allowed medical teams to compare the holistic value of different treatment options paving the way for future procurement negotiations on precision medicine. A VBH approach has been recently adopted by **Boston Scientific** related to chronic pain, which in addition to being one of the most impacting diseases in terms of both disability and healthcare resources consumption, includes some effective treatments, such as spinal cord stimulation (SCS,) which are under-adopted due to cultural limits, lack of knowledge and economic constraints. Through VBH implementation in Hospital Pain Therapy departments in Italy, it has been possible to guarantee the best innovative care strategy based on spinal cord stimulation for chronic pain patients and ensure the sustainability of the National Healthcare Services without compromising the quality of care delivery. A value-based approach has also been adopted in Italy by ESTAR, Tuscany's central purchasing agency that sees **Medtronic** assume the risk of any ineffectiveness of its Cryoballoon ablation therapy used to treat atrial fibrillation, an irregular rhythm of the heart. By engaging in value-based procurement, payers, providers, and governments can realize cost savings for themselves, while also delivering improved outcomes for the patients they serve. For the complete case studies and more projects please refer to the Annex: Diabeter by Medtronic, VBH for non-clear cell renal cancer patients by Roche, VBH for chronic pain by Boston Scientific, Cryoballoon by Medtronic.

SDGs impacted:



G20's 3Ps impacted:



Policy Action 2.2: Integrated care pathways to improve patient outcomes

G20 Members should promote the development of multidisciplinary approaches to care, guaranteeing better care integration and coordination in order to extend access to care, improve care pathways effectiveness and experience, increasing the efficiency of Health Systems.

A multidisciplinary approach to care can help patients move progressively through a clinical experience to positive outcomes, ensuring active and independent ageing of the population. Better integration and coordination will not only improve the patient experience but can help to reduce the cost of healthcare and improve overall efficiency. Improved coordination between primary and specialized care is essential to improve the effectiveness of managing diseases, as is the ability to provide specialized care in community settings. Overcoming silos in care pathways has the potential to extend access to care, improve population health, and increase the efficiency of Health Systems.

The imperative to rethink the paradigms underlying healthcare management and a value-based vision focusing on care needs, is accelerating the integration of care pathways and a smarter use of data. In **Humanitas**, a highly specialized teaching and research hospital located in Milan, Italy, a review of the bariatric surgery clinical path led to the definition of relevant new outcomes such as reduction of comorbidities as diabetes. The result is better outcomes in post-surgery where 77,5% of patients had no pain, death dropped to 0 and readmission to 0,4%. In the UK, a value-based healthcare approach in secondary case setting has been implemented by **Johnson & Johnson** and **Barts Health NHS Trust**, focusing specifically on a patient pathway for elective orthopedic surgery. The patient pathway optimization, through clinical best practices standardization, process variation reduction and staff engagement increases, led to improved clinical outcomes, savings in bed days, increased surgical utilization and generated extra operating theatre time and the opportunity to schedule additional procedures and improve productivity and income. **HeartLogic**, a **Boston Scientific** validated diagnostic tool for heart failure, has been proven to preventively detect 70% of heart failure events, with an average advance of 34 days, thus bringing to less than 2 alarms for episodes of destabilization of heart failure that could occur within a year. Solutions such as **HeartLogic** represent innovations capable of positively contributing to good health, both through the prevention of critical issues and the reduction of hospitalizations, and with the overall care of the patient who is ensured effective care, continuous monitoring and assistance towards a good quality of life. Similarly, **Medtronic** developed **Solitaire**, a device which has revolutionized stroke care, the second leading cause of death worldwide killing about 5,5 million people annually. The revascularization device can be navigated endovascularly through blood vessels in the body into the brain to capture and remove the clot, thus restoring full blood flow immediately, providing physicians improved delivery performance. About 61% of the treat-

Example 8 | Data and patients' needs guide an efficiency revolution

ted patients showed an almost complete return to functional independence. With innovation outcomes are improved, cost savings are achieved and the economic burden avoided.

For the complete case studies and more projects please refer to the Annex: VBHC bariatric surgery by Humanitas Research Hospital, Delivering patient pathway optimization by Johnson & Johnson and Barts Health NHS Trust, HeartLogic by Boston Scientific, Solitaire by Medtronic.

SDGs impacted:



G20's 3Ps impacted:



Policy Action 2.3: Place greater emphasis on early diagnosis and prevention

G20 Members should focus on greater prevention, early screenings, timely diagnosis, larger immunization campaigns and the promotion of wellness initiatives, etc. through new technologies that contribute to improving patient outcomes and the sustainability of Health Systems.

While there is a general understanding that preventing disease is better than treating it, concrete actions need to be taken to shift mindsets and modes of operating within Health Systems. Central to the shift to Value-Based Health Care (VBHC) will be a focus on greater prevention, early screening and timely diagnosis, facilitated by the strategic use of new technologies. This has a material impact on improving people and patient outcomes, allowing diseases to be prevented or detected and treated early, and contributes to the overall sustainability of Health Systems. The Decade of Vaccine Economics (DoVE) Project calculated that if we take into consideration the averted costs of illness by vaccination there is a return on investment of 21\$ for every dollar invested, and if we also capture the benefits beyond costs averted, together with economic productivity, a 54\$ return on every dollar invested in vaccine programs can be estimated. Prevention is key to allow the sustainability of Health Systems and investments have to increase to guarantee that the population receive vaccination for all vaccine preventable diseases, have access to oncology screenings and chronic diseases are controlled. The need to prevent all preventable diseases and disabilities should lead to a consideration of health spending in prevention as an investment to be increased by all countries to maintain a healthy and productive population and reduce healthcare and welfare costs. Life-course immunization and health promotion must be extended empowering young and older people to maintain a healthy life and improving confidence in vaccines and regular screenings. Governments should include immunization across the life course and prevention on top of their policies to improve resilience, employment, social outcomes and economic growth. By empowering the patient to better know and manage their own health, these technologies help slow the advancement of diseases, in particular chronic conditions such as diabetes, cardiovascular conditions and Alzheimer's Disease, that otherwise become more severe over time leading to more expensive interventions and health consequences for the patient. Another key element connected to prevention and a healthier lifestyle is wellness. This rapidly expanding approach is enabling governments to enhance economic development, providing individuals with additional me-

ans to improve their overall mental, physical and aesthetical health. Wellness is becoming an extremely important driver for foreigners to visit other countries and is providing individuals with a successful alternative and preventive solution to better manage, control and cure health conditions.

Preventive screenings, physical and mental health monitoring based on digital technologies and platforms and encouraging the move to a balanced diet are the building blocks of future Healthcare. Closely connected with prevention is the area of well-being, as a complex combination of a person's physical, mental, emotional, and social health factors, with the potential to limit the impact on healthcare expenditure. **BioBeats**, has developed and validated a holistic wellness tool for mental health which combines measures of activity, sleep, heart rate and self-reported wellbeing using phone and wearable data, to continuously measure user wellness. The tool can be used to promote healthy lifestyles and improve wellbeing by employers, health systems, insurance companies, or directly by customers. **Lyfebulb** is a patient engagement platform bridging the gap between patients and the healthcare industry, empowering patients to get their voices heard and allowing Health Systems to better assist them in their journey. **Onegevity Health** has a “precision wellness” approach based on a multi-omic artificial intelligence (AI) platform providing user-friendly, at-home tests, products, and digital health services such as Gutbio, a microbiome test for gut health, Agebio, which reveals the body's biological age and Onegevity which focuses on “precision wellness”. **COVID-19 Severity Risk Score** is a personalized and highly accurate assessment, developed by Huma in partnership with Johns Hopkins University, of an individual's risk of developing severe complications for COVID-19. Combining 31 criteria and risk factors associated with COVID-19 it empowers people to make informed decisions based on their risk profile creating a more resilient population and it can be used to screen participants for clinical trial enrolment. Based in Argentina, **Mantra Beauty**, provides regular and trustable information on good habits and the importance of self-care for healthy skin and general well-being. Its 2020 “Sun Damage Awareness Campaign” against skin cancer reached more than 100.000 followers (80% between 25 and 44) drawing in 60% to use sun protection and 29% to book their first online meeting with a dermatologist.

To learn more about successful case studies, please refer to the following cases in the Annex: BioBeats by Huma, Lyfebulb, Onegevity, COVID-19 Severity Risk Score by Huma, Mantra Beauty.

Many private organizations, such as insurance companies, are pioneering “win-win” solutions to lower both customer health risks and costs. The Health Check-up Discount offered by Dai-ichi Life a Japan-based life insurance company, offers customers with favourable health check-up results a further discount on their premiums. What makes this unique is that Dai-ichi Life gives discounts to all of the customers who provide the health check-up results regardless if the result is good or bad. Similarly, Neo First Life offers an industry-first product using “Health Age” to calculate the premiums instead of actual age, as a customer's health status does not always have a relationship with a customer's actual age. The product re-calculates the premium every 3 years based on the customer's health check-up result and offers a reduced premium for a younger health age. Following an analysis of health and medical big data on over 10 million insurance policies using the latest technology Dai-ichi Life and Neo First Life derived that people who undergo

Example 9 | AI and digital platforms engage patients in a “win-win” loop of healthy lifestyles, better prevention and reduced costs for all

Example 10 | How healthier lifestyles are promoted by data driven incentives and business initiatives

health check-ups are 10 less likely to require payments for major diseases and 30 less likely to require payments due to death, compared to those who do not undergo health checks. These findings enabled them to develop a mechanism that predicts customer's chances of getting diseases from health check-up results. In 2002 Technogym launched the Wellness Valley project to create the first Wellness Community in the world in Emilia Romagna, Italy - an entire territory that has made wellness development a strategy by creating a model of social innovation that focuses on people and their health and promotes constant improvement in quality of life. Thanks to more than 70 best practices (e.g. educational programs for childhood obesity, free physical activity in public parks for active aging, prescription of physical exercise for chronic diseases prevention, etc.) the initiative has positively impacted on the health of the local population. The sedentary population of Wellness Valley is less than half of the national average; risk of disability due to chronic diseases and number of people hospitalized are both lower than the national average. For the complete case studies and more projects please refer to the Annex: Health Check-up Discount by Dai-chi Life Insurance Company and Health Age Insurance by Neo First Life, Wellness Valley by Technogym.

SDGs impacted:



G20's 3Ps impacted:



Recommendation 3: Build resilient and sustainable Health Systems

G20 Members should strengthen Healthcare Systems pandemic preparedness, promoting new partnerships, connecting health policies with industrial activities and production for sustainability, supporting the development of resilient health and life sciences supply chains and promoting a One Health approach.

Policy Actions

3.1 Promote new partnerships to collectively learn from COVID-19 and jointly take actions that will improve system resilience and sustainability

– G20 Members should promote new partnerships to foster collective learning and responses to health challenges, as COVID-19 reveals unmet needs and also address chronic and acute diseases, ensuring academia and the public and private sectors all contribute to their resolution to improve the resilience and sustainability of Health Systems.

- G20 Members should foster cooperation among Ministries connecting health, agriculture, education, infrastructure, and finance policymaking to address common Planetary Health challenges through regulation, investments and Public Private Partnerships (PPPs).

3.2 Strengthen crisis preparedness and response

– G20 Members should support global collaboration on the creation of international benchmarks for crisis preparedness, definition of emergency protocols to reduce the development and go-to-market time for treatments, adoption of early warning systems, surveillance mechanisms and dynamic risk monitoring models.

- G20 Members should devise positive incentives for countries to build more preparedness and resilience, as well as surveillance mechanisms, for example, access to development funding, foreign aid, or favorable interest rates from capital markets or regional banks (e.g. European Central Bank);

- G20 Members should promote the incorporation of economic and social impact of pandemics in national macroeconomic risk assessments, to drive policymaking and investments in preparedness;

- G20 Members should define national preparedness plans, incorporating flexible manufacturing capacities and setting up public programs to incentivize strategic productions to readily supply medical countermeasures to ensure supply chain, research activities and healthcare services continuity, and vaccination pathways simplification;

- G20 Members should invest in digitalization to improve early warning systems e.g. for rise in demand of medical products monitoring (for example through using the 2D-matrix codes & serialization) and in streamlining regulations for sharing of data e.g. faster sharing of information on human and animal pathogens to accelerate R&D of medical countermeasures.

3.3 Build resilient supply chains through diversification and regulatory cooperation

– G20 Members should collaborate with industry and develop

a multilateral policy framework to increase security of supply, inputs and end products to strengthen the overall resilience of strategic supply chains.

- G20 Members should ensure resilient supply chains, through the alignment of international standards and should strengthen coherence through multilateral or plurilateral organizations such as for example World Trade Organization (WTO) for trade rules, World Health Organization (WHO), Pharmaceutical Inspection Co-operation Scheme (PIC/S) and International Council on Harmonisation (ICH) for technical standards in clinical trials and manufacturing, digital health, and biotech innovation/ Cell & Gene Therapy (C>). To facilitate exchange on this point B20 should encourage a joint meeting of G20 health and trade ministers with B20 presence during the Italian G20 presidency to discuss resilient supply chains and the simplification of trade regulation around health care;
- The Organization for Economic Co-operation and Development (OECD) should also be assigned to host regular roundtables on supply chain resiliency for essential products and business critical functions, including need for a skilled and trained workforce in a government-industry-partnership format to educate, discuss best practices and develop joint recommendations and toolboxes for OECD Members, affiliated organizations and G20;
- G20 Members should collaborate with industry to build mechanisms for avoiding trade restrictions on goods and personnel or bottlenecks among member states, and to establish consultation and rapid-response mechanisms for detecting and addressing supply chain concerns among G20 Members;
- G20 Members should promote collaborative approaches to strengthen the participation of low and middle-income Countries in global value chains.

3.4 Drive environmentally sustainable Health Systems. – G20 Members should adopt a broader perspective while defining national health-related policies considering the nexus of population health and wellbeing, sustainable development, environmental conservation, climate change, disaster risk reduction, gender equality and poverty alleviation, targeting better worldwide socio-economic conditions.

- G20 Members should promote partnerships for change, bringing together academia and the private and public sectors to act in the main areas of opportunity as identified in local or international assessments of health system resilience and sustainability through One Health's three axis approach: people, animals and environment;
- G20 Members should promote Science Technology Engineering Mathematics (STEM) careers and encourage lifelong education in Social Sciences, Humanities and Arts for the People and the Economy (SHAPE) sciences among students as well as industry professionals, physicians, patients and caregivers through policies and incentives for education and training through a system open to public-private partnerships;
- G20 Members should commit to net zero CO2 emission targets and create clear and publicly accessible roadmaps to achieve targets together with the healthcare industry;
- G20 Members should work on identifying and addressing key trends in the

demographic change, as stressed in previous G7/G20 Presidencies, to prepare Health Systems and Social Security Plans for future challenges related to sustainability and population health status;

- G20 Members should set the Worldwide Research priorities considering the increase of incidence and prevalence of chronic, infectious, and debilitating age-related diseases.

Recommendation 3: Key Performance Indicators (KPIs)¹⁰

Average of 13 International Health Regulations (IHR) core capacity scores, SPAR version

Percentage of attributes of 13 core capacities that have been attained at a specific point in time. The 13 core capacities are: (1) National legislation, policy and financing; (2) Coordination and National Focal Point communications; (3) Surveillance; (4) Response; (5) Preparedness; (6) Risk communication; (7) Human resources; (8) Laboratory; (9) Points of entry; (10) Zoonotic events; (11) Food safety; (12) Chemical events; (13) Radio nuclear emergencies.



Context

While health is almost always ultimately the responsibility of national governments, its challenges are often international in nature. As we have seen pandemics spread across borders, supply chains for critical medical technologies are global, and scientific research is among the most international of disciplines.

COVID-19 has emphasized the ways in which policymakers can be drawn into thinking nationally in a crisis, but also shown the limitations of this approach. Building resilient and sustainable Health Systems is not just about preparing for future pandemics or environmental risks. It is about redesigning our health policies to overcome structural and governance challenges. Innovative treatments for chronic, deadly and high prevalence diseases, will require infrastructural investments and a new paradigm focused on prevention and early detection supported by digital solutions.

To build more resilient and sustainable Health Systems, the G20 should:

Policy Action 3.1: Promote new partnerships to collectively learn from COVID-19 and jointly take actions that will improve system resilience and sustainability¹¹

G20 Members should promote new partnerships to foster collective learning and responses to health challenges, as COVID-19 reveals unmet needs; and also address chronic and acute diseases, ensuring academia and the public and private sectors all contribute to their resolution to improve the resilience and sustainability of Health Systems.

COVID-19 has revealed that many Health Systems face similar challenges with regards to their ability to withstand shocks, but also with regards to their ability to answer unmet needs and to address chronic and acute diseases¹².

¹⁰ Please refer to the section "Annex I | Key Performance Indicators (KPIs)" for more details regarding the explanation and calculation methodology of the Key Performance Indicators (KPIs).

¹¹ This issue is addressed in the Action Council on Sustainability & Global Emergencies Policy Paper, Recommendation 2, Policy Action 2.2.

¹² OECD (<https://www.oecd.org/health/healthcarecostsunsustainableinadvancedeconomieswithoutreform.htm>)

New partnerships are needed to promote collective learning and action with a focus to address these challenges, and to ensure academia, public and private sectors all contribute to their resolution.

Such collaborations are required both at national and international levels. At a local level, rapid assessments of country and region-specific opportunities (or gaps) to improve resilience to shocks and to more effectively address diseases will be important to foster and enable support with relevant tools and frameworks.

Example11 | How partnerships build resilience against global health shocks

Cooperative and collaborative partnerships, including multi-sectoral ones, from public-private to public-patient-private, are emerging as key to ensuring resilience against pandemics and global health shocks in general. The Partnership for Health System Sustainability and Resilience (PHSSR), launched by the London School of Economics (LSE), the World Economic Forum (WEF) and AstraZeneca, has eight Organisation for Economic Co-operation and Development (OECD) countries as protagonists and has produced a pilot study aimed at mapping the factors that ensure resilience and sustainability to Health Systems, with particular reference to the SARS-Cov2 pandemic. A series of recommendations and a preliminary assessment have been identified. Since 2000 Gavi, a global public-private partnership of key UN agencies, governments, vaccine industry, private sector and civil society has vaccinated +822 million children through routine programs; +1,1 billion vaccinations through vaccination campaigns, +14 million future deaths prevented, 255 million future disability adjusted life years (DALYs) averted as a result of vaccination with Gavi supported vaccines from 2016-2019, 495 vaccine introductions and campaigns. COVID-19 is also being countered with the first multilateral and multisectoral end-to-end global vaccine collaboration mechanism (COVAX) launched in April 2020 to bring together governments, global health organizations, manufacturers, scientists, private sector, civil society and philanthropy, with the aim of providing innovative and equitable access to COVID-19 diagnostics, treatments and vaccines. COVAX has so far shipped over 48 million COVID-19 vaccines to 120 participants.

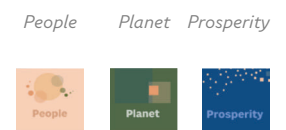
To learn more about successful case studies, please refer to the following cases in the Annex: “Partnership for Health System Sustainability and Resilience” (PHSSR) by the World Economic Forum, London School of Economics and AstraZeneca, COVAX by CEPI, Gavi, WHO and UNICEF.

On an international level, quantitative metrics should be devised allowing for international benchmarking of Countries’ health system resilience and sustainability. Such a global index would be instrumental to direct global and local resources towards where the largest opportunities (gaps) exist. International mechanisms could incentivize collective action supporting the strengthening of Health Systems.

SDGs impacted:



G20's 3Ps impacted:



Policy Action 3.2: Strengthen crisis preparedness and response¹³.

G20 Members should support global collaboration on the creation of international benchmarks for crisis preparedness, definition of emergency protocols to reduce the development and go-to-market time for treatments, adoption of early warning systems, surveillance mechanisms and dynamic risk monitoring models.

Global collaboration on the creation of international benchmarks for crisis preparedness is essential in order to avoid different standards being adopted in different countries and to harness global capabilities and data sources. Emergency protocols also need to be devised to reduce the time taken to develop, evaluate and approve vaccines and therapies for emergency use¹⁴. At the same time, it is fundamental to establish early warning systems (EWS) or surveillance mechanisms for early detection of disease emergence/re-emergence (e.g. abnormal mortality and morbidity in livestock and/or wildlife populations, unusual cases of an illness in human populations, increased purchase of antibiotics or flu medicines, increased internet searches on certain clinical signs and therapeutics, etc.). Dynamic risk monitoring is also a priority to be addressed through cross sectoral data integration and analysis (e.g. for demand-rise in medicinal products to enable a quicker reaction and the prevention of shortages in pandemic, or crisis settings) and the sharing of data on both human and animal pathogens to accelerate R&D of medical countermeasures.

A new generation of AI driven alert system use known geographical hot-spots for early detection of viral transfer in human and livestock populations to prevent further virus transmission at the local level. Chinese tech giant **Huawei** launched an artificial intelligence pig farming project, that will help farmers, in China, to better track the health of their livestock. A facial recognition system can identify individual pigs and other technologies monitor the pigs’ weight, diet and level of exercise, allowing farmers to constantly monitor animals and detect threatening diseases in time. In Norway, **Stingray** developed a unique system targeting and kills lice on salmon and trout with a laser while also monitoring their health and growth 24/7. Stingray’s solution combines stereo machine vision, advanced software and high-precision laser to target and kill parasites that infect farmed fish, as well as monitoring growth via biometrics application. **Visio.ai** Vision Suite platform combines AI and live camera streams for real object-detection to automatically detect livestock, track animal movements or behaviors across multiple locations and monitor their health and wellbeing.

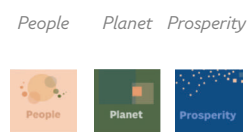
For the complete case studies and more projects please refer to the Annex: Huawei, Stingray, Visio.AI.

Example 12 | From pigs to salmon, AI monitors livestock and prevents pandemics

SDGs impacted:



G20's 3Ps impacted:



¹³ This issue is addressed in the Action Council on Sustainability & Global Emergencies Policy Paper, Recommendation 2, Policy Actions 2.1 and 2.2.

¹⁴ This issue is addressed in the Action Council on Sustainability & Global Emergencies Policy Paper, Recommendation 2, Policy Action 2.3

Policy Action 3.3: Build resilient supply chains through diversification and regulatory cooperation¹⁵.

G20 Members should collaborate with industry and develop a multilateral policy framework to increase security of supply, inputs and end products to strengthen the overall resilience of strategic supply chains.

This should be addressed through diversification, incentives, alignment of international standards, trade facilitation at borders for goods and personnel, dataflow across borders, non-proliferation of export restrictions, elimination of customs duties on medical goods and the access to components and raw materials. Risk-reaction and product specific mitigation plans in industries are key and need to be better recognized and understood by policy makers. Governments and the Life Sciences industry should also partner up to ensure a better understanding of global supply chains.

Example 13 | Preventing supply chain disruption to protect global health

Since 2020, COVID-19 has revealed the way unilateral government reactions and export restrictions hinder increasingly globalized healthcare and Life Sciences supply chains. New solutions preventing disruptions that could affect patients and communities combine smart solutions with new organization models. Resolution, developed by **Johnson & Johnson**, is an end-to-end touchless supply chain solution driven by Radio-frequency identification (Rfid), automatically managing the procurement of medical devices in the operating room, tracking consumption for individual patients or surgical procedures and controlling warehouse movements. As demand for respiratory ventilators skyrocketed during the first wave of COVID-19, the world’s largest medical device company, **Medtronic**, faced new trade restrictions among G20 countries that impeded the scale-up of production and disrupted supply chains for more than 1500 components of its ventilators provided by 100 suppliers in 14 different countries. The solution involved persuading governments to remove those restrictions and tapping into the engineering and manufacturing capacity of suppliers across the globe.

To learn more about successful case studies, please refer to the following cases in the Annex: Resolution by Johnson & Johnson, Ventilator Global Supply Chain by Medtronic.

SDGs impacted:



G20's 3Ps impacted:



Policy Action 3.4: Drive environmentally sustainable Health Systems.

G20 Members should adopt a broader perspective while defining national health-related policies considering the nexus of population health and wellbeing, sustainable development, environmental conservation, climate change, disaster risk reduction, gender equality and poverty alleviation, targeting better worldwide socio-economic conditions.

A more collaborative and transdisciplinary approach is urgently needed to successfully address the health challenges of today and tomorrow. A “One

¹⁵This issue is addressed in the Trade and Investment Task Force Policy Paper, Recommendation 1 and 2, Policy Actions 1.1 and 2.3 and in the Finance and Infrastructure Task Force Policy Paper, Recommendation 3 Policy Action 3.4

Health” approach, including human health as well as animal and environmental metrics needs to be incorporated in defining national policies. It will be crucial to consider the nexus of population aging, health and wellbeing, sustainable development, environmental conservation, climate change, disaster risk reduction, gender equality and poverty alleviation, targeting better worldwide socio-economic conditions. Furthermore, G20 Members should work in identifying opportunities to integrate sustainability considerations more actively into Health and Life Sciences policies (e.g. tax benefits, facilitation of approval processes, support programs and political initiatives, etc.) including the use of clear reference frameworks and incentives. Training and education programs should also be aligned to a Social Sciences, Humanities and Arts for the People and the Economy (SHAPE) approach to include these areas as enablers for the progress of society and economic development.

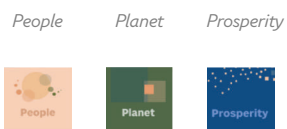
Example 14 | Adopting a One Health approach to pursue progress in favor of people, communities and the environment

A One Health approach and a focus on sustainability issues are current concerns for all organizations that are keen to prove they can deliver greater benefits to society with fewer costs for the environment - in line with net zero targets and Environmental, Social and Governance (ESG) standards of the Life Sciences industry, Governments and Health Systems. Embracing a B Corporation business model, Italy’s **Chiesi Farmaceutici** has adopted a dual purpose, pursuing financial objectives as well as the progress of society - including shareholders, people, communities and the environment. As a certified B Corp, the company has taken tangible actions to measure, reduce and offset CO2 emissions, increase the use of renewable energy, adopt a sustainable chemistry approach and map the waste produced by industrial processes to define best management. They have committed to achieving Carbon Neutrality by 2035, well before the second half of this century - a target set out in the Paris agreement. With a similar goal **Boehringer Ingelheim** (BI) is fully committed to fighting Foot & Mouth disease (FMD) and limiting achieving the negative economic impact, significant cost to farmers and their local communities, as well as the threat to food security. BI has created 17 national and regional FMD vaccine banks, protecting countries from outbreaks and their consequences. They have also invested in the construction of a biosafety level-3 site for the manufacture of FMD vaccines in France. Their One Health approach is not limited to FMD, but also focuses on the control of rabies, through preventive vaccination of stray dogs, offering potential for savings in human health expenditure. Recently BI supported a rabies project in Pakistan, which vaccinated stray dogs. Following vaccination, dogs were given an identification collar showing that they had been vaccinated and were safe. For the complete case study, please refer to the Annex: B Corporation certification by Chiesi Farmaceutici, Foot & Mouth Disease (FMD) and Rabies Management by Boehringer Ingelheim

SDGs impacted:



G20's 3Ps impacted:



Annex I | Key Performance Indicators (KPIs)

In the Policy Paper some Key Performance Indicators (KPIs) have been identified, subdivided by the recommendations to which they refer. The goal of the KPIs is to monitor the progress of the G20 countries in line with the suggestions formulated by the Task Force and outlined in the Policy Paper.

The KPIs are calculated using data currently collected by international organizations (e.g. WHO, OECD, etc.) and it's proposed to use specific targets for 2024 as outlined below.

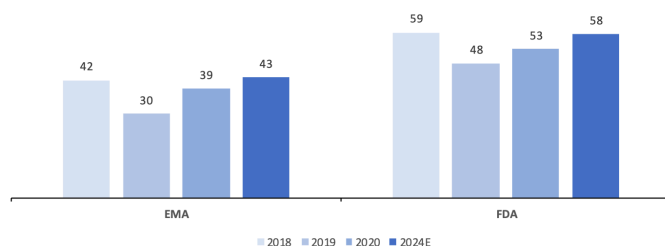
It should be noted that regarding to Recommendation #2 ("Assess and measure Health as an Investment and Foster the transition to Value Based Healthcare"), no relevant information has yet been collected related to VBH. Some initiatives have been recently launched by leading international institutions, - e.g. Patient-Reported Indicator Surveys (PaRIS) by OECD, Global Coalition for Value in Healthcare by World Economic Forum (WEF) - but they are still underway and/or no numerical evidences are available, so it is suggested that future developments be monitored.

The individual KPIs identified are detailed below:

1. Recommendation 1: Promote the strategic use of science, technology and data

KPI Title	Availability of new drugs (NAS/NMEs/NTBs) approved by EMA/FDA
KPI Description	Number of new drugs (as New Active Substances (NAS), New Molecular Entities (NME) under New Drug Applications (NDA), or as New Therapeutic Biologics (NTB) under Biologics License Applications (BLA)) approved by EMA and FDA.
KPI Data source	European Medicines Agency / Food & Drug Administration
KPI Baseline	2020 Data
KPI Target (2024)	+10% increase over 2020 Baseline

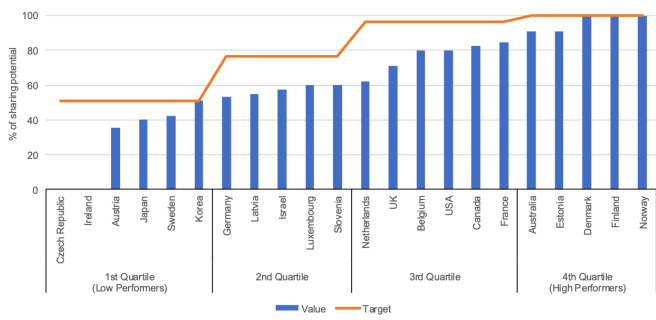
Example | Availability of new drugs (or other therapies) approved by EMA/FDA or other institutional bodies)



KPI Title	Health data sharing intensity (Link)
KPI Description	This indicator looks at the extent to which national health datasets may be shared with domestic and international stakeholders. The indicator value is 100% when all national health datasets may be shared with all stakeholder groups. National health datasets surveyed by the OECD contain personal data on hospital and mental hospital in-patients; emergency health care, primary care, and formal long-term care data; prescription medicines data; cancer, diabetes, and cardiovascular disease registry data; and mortality data. Not all countries have national health

datasets covering each of these areas. Domestic stakeholders include healthcare providers; the government; universities and non-profit research centres; and for-profit businesses. International stakeholders include foreign governments, universities and non-profit research centres. Maximum (100%) sharing potential is achieved when all of the national health datasets present in a country are shared with all stakeholders. A % of sharing potential of less than 100% indicates that one or more of the health datasets present in the country does not allow sharing with stakeholders. A % of sharing potential of 0 indicates that no sharing of the health datasets present is permitted. Sharing does not necessarily imply fully open access to a dataset; sharing is usually subject to privacy protections such as de-identification and stakeholders must apply and be approved to access a dataset.

KPI Data source	OECD
KPI Baseline	2020 data
KPI Target (2024)	Breakdown of countries into quartiles - Target for 1st Quartile (Low performers) is the highest performer using the latest data - Target for 2nd Quartile is the average of the 3rd Quartile using the latest data - Target for 3rd Quartiles is the average of the 4th Quartile using the latest data as of June 2021. - Target for 4th Quartile (High performers) is the highest performer using the latest data

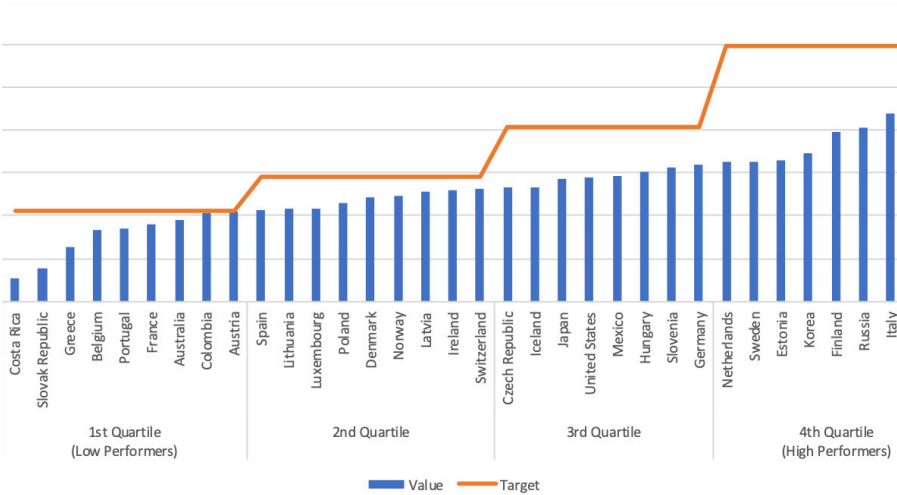


Example | Health data sharing intensity (2020)

2. Recommendation 2: Assess and measure Health as an Investment and Foster the transition to Value Based Healthcare

KPI Title	Expenditure on preventive care as % of total healthcare expenditure
KPI Description	Share of total health expenditure on preventive care related to total health expenditure (considering all financing schemes: Government/compulsory, voluntary healthcare payment, household out-of-pocket)
KPI Data source	OECD
KPI Baseline	Latest data (2018 or nearest year)
KPI Target (2024)	Breakdown of countries into quartiles - Target for 1st Quartile (Low performers) is the highest performer using the latest data - Target for 2nd Quartile is the average of the 3rd Quartile using the latest data - Target for 3rd Quartiles is the average of the 4th Quartile using the latest data as of June 2021. - Target for 4th Quartile (High performers) is the highest performer using the latest data

Example | Expenditure on preventive case as % of total healthcare expenditure 2018 or latest data)



3. Recommendation 1: Build resilient and sustainable Health Systems

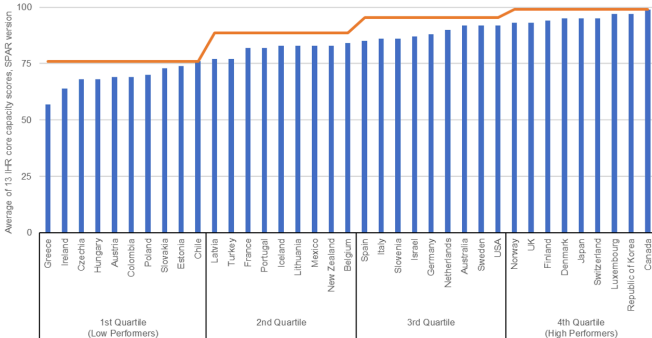
KPI Description Percentage of attributes of 13 core capacities that have been attained at a specific point in time. The 13 core capacities are: (1) National legislation, policy and financing; (2) Coordination and National Focal Point communications; (3) Surveillance; (4) Response; (5) Preparedness; (6) Risk communication; (7) Human resources; (8) Laboratory; (9) Points of entry; (10) Zoonotic events; (11) Food safety; (12) Chemical events; (13) Radionuclear emergencies. The Expected frequency of data dissemination is Biannual (Six months)

KPI Data source WHO

KPI Baseline Latest data (2019)

KPI Target (2024) Breakdown of countries into quartiles
 - Target for 1st Quartile (Low performers) is the highest performer using the latest data
 - Target for 2nd Quartile is the average of the 3rd Quartile using the latest data
 - Target for 3rd Quartiles is the average of the 4th Quartile using the latest data as of June 2021.
 - Target for 4th Quartile (High performers) is the highest performer using the latest data

Example | Average of 13 International Health Regulations (IHR) core capacity scores, SPAR version 2019)



Annex II | Case studies

Rec.	Policy Action	Company	Case study	Description
1		Bayer (Cell and Gene Platform)	New treatments for neurodegenerative diseases	<p>Bayer is advancing two product candidates to treat Parkinson's disease (PD), in a cell and a gene therapy approach. These employ intervention mechanisms fundamentally different to the current standard of care that address the symptoms and become less effective with disease progression. Since the current standard of care discovery in 1955, innovation in the area has been limited. The cell and gene candidates now target the disease at its root cause, they aim to go beyond symptomatic treatments. As PD is caused by a loss of nerve cells in the brain responsible for producing dopamine resulting in a loss of control over body-movements, the gene and cell therapies aim to regenerate the midbrain neurons or re-innervate the affected regions so as to restore damaged motoring functions. Concretely, AskBio's adeno-associated virus (AAV)-based gene therapy approach introduces a functional copy of the defective gene into cells. It delivers a glial-derived neurotrophic factor (GDNF) that harnesses the brain's own cellular machinery to provide continuous production of GDNF. BlueRock's cell therapy uses authentic dopaminergic neurons as therapy. The company has demonstrated that they can manufacture these authentic midbrains dopaminergic neurons and reverse the motor-control deficit in animal models after implanting them. Both companies are recent Bayer acquisitions to Bayer's Cell and Gene Platform. For Parkinson patients and their families, a successful treatment would be life changing. Affecting more than 10 million individuals worldwide, Parkinson's disease is the most common neurodegenerative movement disorder in the world. In the U.S., there are approximately 60,000 new Parkinson's disease diagnoses per year. The vast majority of patients are diagnosed between the ages 60 and 70, and incidence increases with age. The cardinal features of the disease include resting tremor, rigidity, slowness of movement and postural instability. The product candidates for Parkinson's disease are also a great example for the benefits of cross-industry collaboration and how biotech, pharma and Med-Tech innovation enable truly new paths and curative treatments. The GDNF gene therapy investigational agent will be delivered via a novel, image-guided neurosurgical delivery technology in an effort to optimize the precision, safety and efficiency of gene transfer within the brain. The protocol uses intraoperative magnetic resonance imaging (iMRI) technologies to precisely target the therapy to a collection of specific nerve cells in a brain region.</p>
1		Atara Biotherapeutics		<p>Bayer entered in a collaboration with Atara Biotherapeutics on the development of next generation, mesothelin-targeted CAR-T cell therapies for solid tumors. Mesothelin overexpression can be found in many tumors including ovarian, lung and pancreatic cancers as well as mesothelioma. Atara's R&D thus offers potential for transformative benefit in an area of high unmet medical need: The number of mesothelin overexpressing tumors has been estimated to be about 340,000 new cases a year with more than 2 million patients in the United States alone. As mesothelin overexpression plays an active role in both malignant transformation of tumors and tumor aggressiveness, these cancers have short survival times and the need for transformative therapies is particularly high. CAR-T therapies have the potential to provide a meaningful clinical benefit and disrupt cancer care. These therapies are human T-cells engineered by introduction of a chimeric antigen receptor (CAR) that has the ability to recognize the cancer cells. The engineered CAR-T cells targeted to mesothelin can recognize and eliminate the abnor-</p>

mal mesothelin expressing cancerous cells from the patient. The licensed technology leverages a novel, proprietary Epstein-Barr Virus (EBV) T-cell platform combined with next generation CAR-T technologies targeting mesothelin to improve efficacy, persistence, safety, and durability of response. The collaboration includes two development candidates: One next generation allogeneic CAR- T-cell immunotherapy (BAY3491688 / ATA 3271), and the other an autologous version (BAY3491689 / ATA2271), for the treatment of mesothelin-expressing tumors such as malignant pleural mesothelioma and non-small-cell lung cancer. Atara is a pioneer in T-cell immunotherapy with an industry-leading manufacturing facility. In March 2021, the autologous program BAY3491689 / ATA2271 reached the milestone of first patient dosed in a Phase 1 clinical study.

1	Medtronic	Non-Invasive Screening for Colon Cancer (PillCam™)	<p>PillCam™, created by Medtronic, is an easy-to-swallow pill – the size of a vitamin – that can help physicians diagnose gastrointestinal diseases, including colorectal cancer. It’s the second deadliest cancer worldwide, with 935,000 deaths reported in 2020. Yet, it remains preventable – 90% of patients can beat it when caught early. PillCam™ capsule endoscopy has the potential to improve the patient experience and lessen the burden on Health Systems as an alternative to more invasive, often more expensive, traditional procedures. The pandemic resulted in a significant drop in elective GI procedures – such as upper and lower endoscopies – so Medtronic partnered with regulators, Health Systems, and other industry leaders like Amazon to ensure that diagnostic testing – with the potential to save lives – was no longer delayed. In the UK, the PillCam™ colon capsule helped meet the demand caused by thousands of cancelled or delayed colonoscopies, with a minimally-invasive test that visualizes the colon; and in the U.S., the PillCam™ small bowel capsule was permitted by the FDA to be delivered directly to patients’ homes using Amazon’s broad delivery network for the duration of the national public health emergency. Digital transformation will further revolutionize this device. In the future, advanced AI algorithms trained on hundreds of thousands of anonymized images will create PillCam™ Genius – an intelligent capsule endoscopy device – allowing for pattern identification to detect GI disease, such as colorectal lesions. These algorithms, currently in development, will enhance physicians’ ability to diagnose and direct their treatment – faster – in order to improve patient outcomes. With more data, AI will only get more accurate – highlighting why access to data is paramount to creating disruptive solutions for healthcare.</p>
1	Siemens Healthineers	AI-Rad Companion	<p>The AI-Rad Companion* is a family of products which offer diagnostic aid for radiologists providing augmented workflows that support radiologists in their diagnostic task interpreting medical images using artificial intelligence and deep learning algorithms. It is intended to be used by a radiologist concurrently with original images from modalities such as Computer Tomographs (CT), Magnetic Resonance Imaging (MRI) scanners and digital X-ray devices before a final decision is made on a case. Automatic post-processing by the AI-Rad Companion can help to manage the workload of the radiologists and improve the workflow efficiency. For example, the AI-Rad Companion Chest CT, automatically performs measurements and prepares results for reports – helping radiologists manage their workload. It automatically highlights abnormalities, characterizes anatomies, and measures both when they’re relevant. The quantitative outcomes delivered by the AI-Rad Companion Chest CT do have an impact on clinical outcomes, as the inter-reader variability reduces. In some countries, the number of radiology examinations is skyrocketing, while the number of radiologists and imaging specialists is</p>

not keeping up with the trend. The result is a dramatically increased workload for radiologists. With shorter reading time, the error rate may rise. The retrospective error rate among radiological exams is 30%. Cutting in half the interpretation time of radiologists increases the interpretation error rate percentage by 16,6%. Cancer cases are expected to surge between now and 2030. That means radiotherapy departments will see a huge rise in the number of patients requiring their support. To manage these challenges, the healthcare workforce needs to be able to treat more patients, more efficiently. For innovations such as the AI-Rad Companion to work properly around the world, radiologists and hospitals require access to high-quality, standardized imaging data that can be exchanged between interoperable modalities from different vendors and access to high speed internet. Policy makers should work with the healthcare industry to enable interoperable data access in and between countries. In addition, the use of AI requires, among other things, up-to-date cybersecurity infrastructures in hospitals and other healthcare institutions to ensure data privacy and security.

1	Brave Health	Mental and behavioral health platform	Brave Health has been able to give concrete answers to mental and behavioral health problems and help afflicted patients to conduct a stable and disorder-free life through a telehealth platform, able to make treatments available to more people, when and where they need it. Brave Health in fact is a virtual clinic, currently serving some US areas, that provides telehealth-enabled counselling, rehabilitation, psychology, and drug management, as well as medication-assisted care. It treats a wide variety of mental health and substance abuse disorders and allows patients to receive unique evidence-based and highly personalized care plans, supported by qualified personnel (licensed physicians, nurse practitioners, therapists, counsellors, etc.).
1	Movendo Technology	Hunova	Hunova is a robot for sport and health, created by Movendo Technology, which thanks to AI and big data, is changing the way of rehabilitation and prevention. In fact, the robot isn't limited to facilitating the patient rehabilitation process, but also allows to measure, predict and prevent many orthopedic, neurological, geriatric and pediatric diseases with important benefits also in the sports. The visit with Hunova lasts 20 minutes, during which the robot interacts with the patient also through gaming, monitoring 130 biomechanical and neurological parameters and acquiring 19 thousand data. Information is then processed with machine learning and AI techniques at the end of which the robot will tell the patient if and why it is at risk of accidental falls, highlight health status and deficient functions, assign an intervention plan, choosing from 200 exercises and 30 rehabilitation protocols ("Silver Index"). To date, the robot also works to treat physical damage left by COVID-19.
1	Huma	Remote Patient Monitoring platform	Huma, a global health tech company based in London (United Kingdom), and Discover-NOW, a health data research hub led by Imperial College Health Partners, are powering remote care for people living with Type 2 Diabetes. Huma has developed a Remote Patient Monitoring (RPM) platform that enables the continuation of patient monitoring while patients are at home, and the education to help those living with chronic/long-term conditions to better understand and manage their health. Through remote monitoring and group video consultations, patients are seen more regularly, and their data is reviewed more frequently, without increasing costs. Data collected through the Huma platform is utilized to further understand, optimize and improve patient pathways.

1		Boston Scientific	myTAVI, myPCI, AskAngie	Ask Angie is a merged reality technology, developed by Boston Scientific, that virtually connects physicians with a catheter lab to expert support. In addition to live support, Ask Angie provides clinical applications, setup, and troubleshooting for many devices and procedures. The greatest advantage and tool that Ask Angie enables is the fact that it creates safe, timely and accurate support to HCPs from manufacturers without risk of infection in a COVID-19 period in which reps have difficulties to reach their clients under COVID-19 restrictions. Also, it increases operational efficiencies by optimizing procedure times and minimizing errors.
1		AstraZeneca	Connect360	In order to improve severe asthma patient adherence to a medication and ultimately secure better patient outcomes, AstraZeneca developed a digital patient platform called Connect360. Connect360 brings together patient information, patient data and monitoring and communication with HCPs into a single platform. Connect360 links with diagnostic technology and a smartphone app to monitor patient's adherence to treatment, demonstrate correct usage of the medicine and remind patients to take their medication to prevent exacerbations.
1	1.1	Huawei	AI-Assisted Screening System	The Patient Screening system for COVID-19, developed by Huawei, is an AI program specifically designed to recognize COVID-19 in CT scans of lungs. To create a database of images, doctors mark and label the tell-tale lesions caused by COVID-19-induced pneumonia in CT scans, providing the information that allows the algorithm to learn to identify and recognize similar patterns in other CT scans. The system has proven very effective in diagnosing the disease quickly – up to three days faster than manual methods – and far more accurately – with a 98% accuracy rate. Designed to adapt to the type of data it receives, the AI program can be fed new information on changing or evolving symptoms, allowing it to diagnose future mutations of the SARS-CoV-2 virus. Huawei CLOUD has already deployed the AI-Assisted Patient Screening system in 60 hospitals across the globe, including Malaysia, Thailand, Italy, and Ecuador. Beyond the current COVID-19 crisis, the system could prove immensely useful in fighting other infectious diseases.
1	1.1	Roche & Moorfields Eye Hospital	Home Vision Monitor App	Home Vision Monitor App is a mobile application, launched by Roche together with Moorfields Eye Hospital for a pre-commercial trial, that allows patients, suffering from eye diseases such as neovascular age-related macular degeneration, to remotely monitor their condition from their smart devices, to test for changes in their vision function once or twice weekly. The care team can remotely monitor each patient's disease progression and detect those who need clinic visits. Roche is a founding member of INSIGHT—the health data research hub for eye health in the United Kingdom, which aims to build one of the world's largest data resources in ophthalmology. When this data is combined with advanced analytics, the result can transform how eye diseases are diagnosed and managed. Data from INSIGHT are already being used to understand the impact of COVID-19 on patients with these conditions. In addition to helping ensure patients with life-threatening or chronic diseases receive uninterrupted care, a team of Roche data scientists and epidemiologists created a novel data and analytics tool to develop an understanding of the relationship among mobility, infection and morbidity of SARS-CoV-2. This tool is being made available to local hospitals and testing facilities to enable them to allocate resources more effectively.
1	1.1	Biogen	The potential of digital biomarkers in Alzheimer's disease	Alzheimer's disease is a progressive neurodegenerative disease that leads to cognitive impairment, functional disability and eventually death. It is the 3rd leading cause of death in developed coun-

tries (according to the WHO), and the only top 10 causes of death without a preventative or curative treatment, or one that slows its progression. As a Pioneer in Neuroscience pushing science towards novel approaches for previously intractable neurodegenerative conditions, Biogen remains committed to furthering Alzheimer’s disease research and development, aiming to help address the unmet needs in this devastating condition, with an emphasis on early-stage disease. Although Alzheimer’s disease is usually diagnosed in people aged 65 and older, and although the main risk factor for developing Alzheimer’s is ageing, Alzheimer’s disease is not a normal part of ageing. As the proportion of people aged 65 and older is forecasted to increase, the number of people living with Alzheimer’s disease and dementia – currently 10 million in Europe – is projected to double by 2030. The costs of dementia in Europe are estimated to increase to more than 250 €/mln by 2030, 2 \$/tn worldwide. Alzheimer’s disease operates out of sight – slowly developing over years to cause injury to the brain. It can be present for decades before it is even suspected. The build-up of toxic plaques in the brain can begin 10-20 years before the first symptoms appear. Even then, it often goes undetected for far too long. As such, and in addition to clinical development, Biogen is working to improve screening and develop advanced technologies and digital tools to improve the timely detection of the earliest signs of Mild Cognitive Impairment (MCI) of those developing Alzheimer’s disease. One example of Biogen’s digital research efforts includes a new virtual study to be launched in collaboration with Apple that plans to investigate the role Apple Watch and iPhone could play in monitoring cognitive performance. The collaboration will aim to identify digital biomarkers to help monitor cognitive performance over time and identify early signs of decline including MCI. The fully virtual study will explore the subtle changes in behaviors of those people that could be predictive of MCI, even before any symptoms are visible to the person, family and/or circle of friends. Digital biomarkers derived from everyday use of consumer smartphones and smartwatches are an example of emerging digital health technologies that may one day help healthcare providers accelerate diagnosis of cognitive impairment, a process that today currently can take up to 2 to 3 years.

1	1.2	AstraZeneca	Innovation Centers, China	<p>One promising model for integrating digital technology in order to improve healthcare delivery is the Wuxi Internet of Things Innovation Centre in China. Run by AstraZeneca together with local government and in partnership with over 200 local and international technology companies, since 2017 the Innovation Center has coordinated stakeholders in order to re-evaluate the patient pathway and design solutions that integrate the latest technology innovation in order to make it easier for patients to access information, screening, diagnosis, treatment and follow up. The result is 14 disease management solutions that are now being implemented in hospitals across China and have already helped over 10 million patients access ameliorated care, whether it be through remote diagnosis using AI-empowered screening, improved asthma case at hospitals by enabling technology to help patients self-manage their treatment, or digitally equipped ambulances to connect with patients sooner and transmit their data to hospitals in order to reduce waiting times. This Wuxi collaboration model offers a glimpse of what is possible when all stakeholders in the healthcare space collaborate together, beginning with a focus on truly understanding what care looks like to a typical patient and how that can be improved at every juncture of the process. The center that was initially launched in Wuxi is now being replicated in other parts of China, and has attracted the interest of stakeholders in other parts of the world to replicate the partnership model and explore how the solutions themselves can be applied in other settings.</p>
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1	1.2	A multidisciplinary European research-based consortium composed by 18 institutions	Exscalate4CoV (E4C)	<p>The EXSCALATE4CoV (E4C) project is a public-private consortium composed of 18 partners and supported by the Horizon 2020 program of the European Union, which aims to combine IT, laboratory and clinical skills to identify potentially effective treatments against the SARS-CoV-2 virus. Using the IT resources currently available in the three most powerful European computing centers (CINECA, BSC and JÜLICH), the project aims to select, from over 500 billion molecules, the most promising treatments against coronavirus both to enhance the design of new drugs, both to identify, among the drugs already available or in development for other pathologies, those that show promising potential in the fight against the coronavirus. Recently, the consortium's activity has achieved a first result, identifying raloxifene, a generic drug widely used for the treatment of osteoporosis, a drug potentially capable of having effects against SARS-CoV-2. However, the Consortium's work did not end here and last November in Italy the most complex supercomputing experiment ever carried out in the world was carried out to study the interaction of over 70 billion antiviral molecules with the proteins of the SARS virus. Cov-2.</p>
1	1.2	World Economic Forum	The Davos Alzheimer's Collaborative (DAC)	<p>The Davos Alzheimer's Collaborative, convened by the World Economic Forum, was created as a global effort to build a global response to the growing Alzheimer's disease pandemic. Its practical approach in the context of dementia will allow the acceleration of progress in three areas: 1) global cohort development to increase discovery of targets for drug development with associated biomarkers; 2) global clinical trials to reduce the cost and time to bring new treatments to market; and 3) Health System preparedness to advance Health System readiness in the fields of detection, diagnosis, infrastructure, and access. This approach will help governments reduce the burden of such diseases in both developed and developing nations. Since its conception at Davos 2020, DAC has gained support for a six-year, 700 \$/mln plan to accelerate and diversify innovation in Alzheimer's disease.</p>
1	1.4	European Commission	1+ Million Genomes	<p>The European Union has launched the "1+ Million Genomes" initiative, which is a cooperation mechanism involving 24 countries aiming to create a framework that will enable linking, access, and analysis of genomic and health data in Europe, both inside and across national boundaries. Genomics in fact has the potential to revolutionize healthcare in many ways. It could lead to the development of more targeted personalized medicines, therapies and interventions. It could also enable better diagnostics, boost prevention and make more efficient use of scarce resources. From cancer, to rare diseases, neuro diseases and prevention, genomics can greatly improve health conditions of EU citizens. Equally important, genomics has the potential to improve the effectiveness, accessibility, sustainability and resilience of Health Systems in the European Union. To create this framework with its focus on more than one million genomes, new ways of collaborating are needed and various areas of activity are at the core of the initiative's work: work organization, implementing personalized healthcare in Health Systems in cost-effective and efficient ways, ethical, legal, and social issues, health and phenotypic data, good genomic practice and standards, and infrastructure and interoperability.</p>
1	1.4	CEO Roundtable on Cancer's Life Sciences Consortium	Project Data Sphere	<p>The Project Data Sphere, an independent and non-profit project of the CEO Roundtable on Cancer's Life Sciences Consortium, created to develop and implement initiatives for the reduction of cancer risk, diagnosis access to the best available treatments and support for the discovery of new and more effective anticancer therapies. The project revolves around a web-based platform for accessing open-</p>

source data. Through this site, researchers can download, share, integrate and analyse patient-level data from Phase III cancer clinical trials conducted by academic researchers or pharmaceutical companies. It is a model that could increase the knowledge of a large community of scientists from different fields and promote crowd-sourced solutions to important clinical problems. To date, Project Data Sphere has successfully housed more than 150 datasets from over 100,000 cancer patients and provides community access to these data. Data has been accessed nearly 20,000 times and has supported 81 publications to date. The data have also supported the development of multiple new tools that will aid product development in different cancers.

1	1.4	Huma	Remote monitoring for COVID-19 patients	In 2020 the UK's NHS teamed up with Huma to provide remote monitoring for COVID-19 patients. The solution comprises a smartphone app (Medopad) for patients, a web-based portal for HCPs, companion medical devices like digital thermometers and pulse-oximeters. The app allows patients to record the symptoms and physiological parameters such as heart rate, blood pressure, oxygen saturation, body temperature, etc. simply by remaining at home under the remote supervision of their care team. This not only avoids unnecessary travel and exposure, but also helps Health Systems manage capacity. Care teams are able to configure thresholds for alerts. They can use the flagging system to identify COVID-19 patients' health deterioration or improvement and adjust their care plan accordingly. The solution was tested as a pilot in 5 healthcare facilities and allowed to achieve: an average of 32 minutes saved per patient in one healthcare facility, an average of three minutes saved per 'hot hub' patient per day, a 5% 28-day readmission rate for Medopad patients vs 8% for non-Medopad patients, 100% Medopad patient recovery rate in primary care vs 87% for non-Medopad patients.
1	1.4	Huma	BreeConnect	BreeConnect is a smartphone application, developed by Huma and Bayer, with the goal to constantly support people affected by Pulmonary Arterial Hypertension (PAH) to monitor and keep track of their medication doses and to maintain a healthy quality of life. BreeConnect connects to a patient's BreeLib® nebulizer and can track the patient's medication dose against their prescribed medication regimen. Moreover, this application allows people to monitor their overall physical activity and health related quality of life for a complete understanding of their current health state. The information stored by the application is automatically shared with the care team that can further analyze the health status of the individual.
1	1.4	Huma	Digital Data collection for monitoring COVID-19 spread	Cambridge MRC Epidemiological unit is partnering with Huma to collect an array of digital data across the cohort to monitor the spread and impact of COVID-19 across a well-studied and deeply phenotyped group of individuals. By combining existing rich Fenland data such as WGS, multi-omics, blood-based biomarkers, functional assessments, imaging, lifestyle and many other clinical parameters, from the Fenland study that investigates the interaction between environmental and genetic factors, with prospectively collected digital data alongside 2-monthly COVID-19 serological testing. The ultimate objective is to create an integrated data framework to enable machine learning driven analytics to identify novel digital biomarkers.
1	1.4	Foundation Medicine Inc & Roche	Comprehensive genomic profiling	Comprehensive genomic profiling (CGP) tests, developed by Foundation Medicine Inc and Roche, broadly analyze the tumor genome to identify clinically relevant genomic alterations and genomic signatures to help physicians in deciding on the most appropriate treatment choices for each individual patient. Where permissible, the de-identified / pseudonymized data

from Foundation Medicine's clinical CGP testing is stored in Foundation Medicine's FoundationCORE®. One of the largest databases of real-world comprehensive genomic profiling results in oncology, FoundationCORE® currently includes more than 450,000 genomic profiles in a structured format. This data can be leveraged to inform the next generation of treatments, creating a valuable resource for biopharmaceutical companies and academic researchers across the globe.

2	2.1	Medtronic	A VBHC Model for Diabetes Management (Diabeter)	Diabeter, a Dutch-certified clinic network owned by Medtronic has pioneered a new value-based diabetes care model for pediatric type 1 diabetes patients in the Netherlands. Each clinic in the network is organized as an Integrated Practice Unit (IPU), where a multidisciplinary team of diabetes care specialists is responsible for the full cycle of care for an individual patient. An IT platform developed by Diabeter makes real-time patient data available to the care team and patient via e-dashboards, personalized emails and physician alerts. This coordinated data sharing allows for timely adjustments to therapy that – in turn – optimize results that matter to the patient. The Diabeter network has grown to include 2,000 patients across five locations and is a top performer when compared to other clinics of at least 100 patients. Diabeter's success in helping patients reach their target HbA1c number (the key outcome measure for patients with diabetes) has led to a lower hospitalization rate than other Dutch pediatric diabetes clinics and less direct annual costs for individuals. As a result of these savings, the Netherlands' largest health insurance provider, Zilveren Kruis, implemented a value-based payment model that shares the benefits from better health outcomes and lower healthcare costs for its patients. The World Economic Forum recently selected Diabeter as a Global Innovation Hub.
2	2.1	Roche	VBHC for non-clear cell renal cancer patients	In 2018 Roche launched in Denmark a partnership between the Herlev Gentofte Hospital and its genomic division Foundation Medicine Inc to compare treatment outcomes and costs for non-clear cell renal cancer patients. Clinicians and researchers investigate the clinical impact of targeted immunotherapy through genetic profiling and personalized medicine. Roche and FMI use gene-profiling technologies combined with artificial intelligence to support treatment decision-making. For each patient measures include quality of life as well as costs relative to the episode of care. All treatment options including those not provided by Roche are evaluated with the same methodology. Through this VBHC approach medical teams are learning how to compare the holistic value of different treatment options paving the way for future procurement negotiations on precision medicine.
2	2.1	Boston Scientific	VBHC for chronic pain	Chronic pain is one of the most impacting diseases in terms of both disability and healthcare resources consumption. In addition, some effective treatments such as spinal cord stimulation (SCS) are under-adopted due to cultural limits, lack of knowledge and economic constraints. Boston Scientific supported Hospital Pain Therapy departments in Italy through the implementation of a Value Based approaches to optimize processes of care i.e. eliminating redundancy or un-useful treatments and to implement SCS treatment in the best possible way taking into consideration both clinical and organizational appropriateness. VBHC implementation has a positive impact on several areas such as clinical outcomes maximization, patient quality of life restoration thanks to pain reduction and discontinuation of drug consumption, hospital and NHS important reduction in the expenditure related to chronic patient management. Through VBHC implementation it has been possible to guarantee the best and innovative care strategy based on SCS for chronic pain patients as proper and ensure the sustainability of the NHS without compromising the quality of delivered care.

2	2.1	Medtronic	Value Based Healthcare Procurement (Cryoballoon)	Medtronic recently signed the first value-based procurement agreement in Italy with the central purchasing agency in the Tuscany region (Estar). Under the agreement, Medtronic assumes the risk of any ineffectiveness of its Cryoballoon ablation therapy used to treat atrial fibrillation, an irregular rhythm of the heart. For each repeat ablation procedure, Medtronic will provide a free Cryoballoon kit, up to a maximum of 15% of the number of patients treated in 12 months. By engaging in value-based procurement, payers, providers, and governments can realize cost savings for themselves, while also delivering improved outcomes for the patients they serve.
2	2.2	Humanitas Research Hospital	VBHC bariatric surgery	In Humanitas, a highly specialized teaching and research hospital located in Milan (Italy), in 2015 a multi-disciplinary team reviewed for the first time the bariatric surgery clinical path, involving directly the patients and their caregivers. This led to the definition of relevant new outcomes like for example pain after surgery and the reduction of comorbidities, such as diabetes, that weren't considered and measured before. This review resulted in better outcomes in post-surgery where 77,5% of patients had no pain, the death rate was down to 0 and the readmission decreased to 0,4%. It also resulted, in the medium run, with no diabetic patients in 81% of the sample and no night apnea in 76% of the cases.
2	2.2	Johnson & Johnson	Delivering patient pathway optimization at Barts Health NHS Trust	A VBHC approach to address Triple Aim (increase efficiency, reduce costs and increase patient satisfaction) in secondary case setting has been implemented by Johnson & Johnson and Barts Health NHS Trust, focusing specifically on a patient pathway for elective orthopedic surgery. The patient pathway optimization, through clinical best practices standardization, process variation reduction and staff engagement increase, allowed to improve clinical outcomes (e.g. Oxford Hip scores and Oxford Knee scores), save bed days, increase surgical utilization and generate extra minutes operating theatre time to schedule additional procedures and realize associated productivity and income gains.
2	2.2	Boston Scientific	HeartLogic	HeartLogic, a Boston Scientific validated diagnostic tool for heart failure, together with the adoption of diagnostic algorithms and sensors capable of recording physiological variables is able to detect early warning signs of a potential worsening of heart failure. The HeartLogic index aggregates measurements from multiple sensors placed on the device (heart tones, chest impedance, respiration, night rate and activity) and reflects changes over time in the data compared to the corresponding baseline values. Heart Logic has been shown to preventively detect 70% of heart failure events, with an average advance of 34 days, thus bringing to less than 2 alarms for episodes of destabilization of heart failure that could occur within a year. Solutions such as HeartLogic represent innovations capable of concretely contributing to good health, both through the prevention of critical issues and the reduction of hospitalizations, and with the overall care of the patient who is ensured effective care, continuous monitoring and assistance and a good quality of life.
2	2.2	Medtronic	The Solitaire™ device	Stroke is the second leading cause of death worldwide killing about 5,5 million people annually. The Solitaire™ device, a Medtronic Med Tech innovation, has revolutionized stroke care. The revascularization device provides physicians improved delivery performance. The Solitaire™ device can be navigated endovascularly, through blood vessels in the body, into the brain to capture and remove the clot, thus restoring full blood flow immediately. The prime study of the device, that led to the FDA approval, showed that in 68,7% of patients the large vessel is completely open and that in 89% of the patients the large vessel is at least 50% open. Furthermore, 60,8% of the treated

patients showed an almost complete return to functional independence. With innovation, outcomes are improved, cost savings are realized and economic burden avoided.

2	2.3	Huma	BioBeats	<p>BioBeats, a Huma company, has developed and validated a holistic wellness tool for mental health which combines measures of activity, sleep, heart rate and self-reported wellbeing using phone and wearable data, to continuously measure user wellness. These measures are crucial in identifying mental deterioration early and support patients to maintain quality of life and sustain lifestyle change. The product also provides tailored wellness activities and educational resources. In addition, the product offers customized wellness activities and educational resources. The tool can be used to promote healthy lifestyles and improve wellbeing by employers, healthy systems, insurance companies, or directly by customers. This solution provides a constant monitoring of an individual's mental health state and is able to identify possible issues that might arise in order to prevent further mental deterioration.</p>
2	2.3	Lyfebulb	Evolution and effectiveness of patients' journey	<p>Lyfebulb is a patient engagement platform that bridges the gap between patient communities and the healthcare industry, bringing insights and solutions from patients to industry and empowering patients to get their voices heard by those who can bring revolutionary products to market. This care management approach would allow Health Systems to better assist patients throughout their journey. It would create a more tailored and successful experience that would constantly improve due to the insights and solutions received by patients.</p>
2	2.3	Onegevity	AI platform for patients' empowerment	<p>Onegevity Health is a consumer health intelligence company that combines a unique multi-omic artificial intelligence (AI) platform and machine learning with user-friendly, at-home tests, products, and digital health services. The mission of Onegevity is to use an all-in-one platform to empower individuals seeking better health with the best science from personalized health research, a platform that targets underserved, wide-spread chronic health issues across patient populations. Onegevity provides patients with advanced at-home tests, such as Gutbio, a microbiome test that uses cutting-edge sequencing and AI to provide an in-depth look at your gut health, Agebio, which reveals the body's biological age vs chronological age, and provides personalized recommendations (e.g. lifestyle, sport, food, supplementation) from a scientifically validated blood panel, to keep the body healthy for longer. The Health Intelligence Platform translates a wealth of complex health information obtained from the tests into actionable insights on how to optimize health and wellness. The platform also leverages the billions and trillions of data points collected on other individuals similar to the person who's using the service, so that she/he can optimize their health using the collective intelligence of the Onegevity community. Onegevity focuses on "precision wellness". Through the at-home tests the system identifies patterns of variation associated with diminishing wellbeing and uses machine learning to address the results with actionable solutions for diet, nutrition, and lifestyle measures. The solutions are individual lifestyle recommendations intended to restore altered patterns to an increased state of thriving.</p>
2	2.3	Huma	COVID-19 Severity Risk Score	<p>COVID-19 Severity Risk Score is a personalized and highly accurate assessment, developed by Huma in partnership with Johns Hopkins University, of an individual's risk of developing severe complications for COVID-19. This tool combines 31 criteria and risk factors associated with COVID-19 and empowers people to make informed decisions based on their risk</p>

profile creating a more resilient population and can be used to screen participants for clinical trial enrolment. This tool enables individuals to better acknowledge their singular situation and better prevent them from increasing the chances of developing severe complications.

2	2.3	Mantra Beauty	Improving health habits to prevent skin diseases by providing trustable information	<p>Mantra Beauty, a small/medium enterprise based in Latin America with headquarters in Argentina is committed to the prevention of skin diseases and to improving the health's habits of clients. The company provides regular and trustable information on good habits and the importance of self-care for healthy skin and general well-being. With this innovative approach, Mantra seeks to build a long-term relationship of trust with the Mantra's community, "Mantra Lovers", while contributing to the SDG 3 by promoting healthy lives and well-being for everyone. In 2020, Mantra launched their "Sun Damage Awareness Campaign" in social media, which included recommendations provided by Board Certified Dermatologists specialized in skin cancer with the objective of incentivizing the regular use of sun protection regularly, as the principal factor to prevent skin pathologies. The campaign reached more than 100.000 followers around different countries of Latin America and according to a survey conducted by Mantra among its clients' base, 60% begun using sun protection on a daily basis after the campaign. Moreover, 39% started a skin care routine and 29% booked their first online meeting with a dermatologist. Around 80% of responders are between 25 and 44 years old, meaning that they are in a crucial stage of their lives to improve health habits and prevent skin diseases in the future.</p>
2	2.3	Dai-chi Life Insurance Company	Health Checkup Discount	<p>Health Checkup Discount is a life insurance industry-first system, created by Dai-chi Life Insurance Company in Japan, that offers a discount simply for submitting the results of a health checkup when buying a life insurance policy, and approximately 80% of policies so far have had the "Health Checkup Discount" applied. The discount does not reward only healthy people, but all policyholders who get a health checkup, creating the opportunity for customers to become aware of their health, including the importance of early detection and early treatment of diseases and improvement of lifestyle habits. Through this system, about 40,000 Total Life Plan Designers reach out to customers and encourage them to have a health checkup, which translates into a greater number of customers promoting their health. Behind the Health Checkup Discount is an idea that undergoing a health checkup is the first step toward good health. In fact, data shows that relative to people who do not undergo health checkups, those who do are 10% less likely to require payments due to the three major diseases (cancer, acute myocardial infarctions, and strokes) and 30% less likely to require payments due to death. This data was derived following an analysis of big data on over 10 million insurance policies of Dai-ichi Life using the latest technology.</p>
2	2.3	Neo First Life	Health Age Insurance	<p>Neo First Life is a Japan-based life insurance company that offers an industry-first product using "Health Age" to calculate the premiums instead of "Actual Age." "Actual Age" has been traditionally used to calculate insurance premiums in the Life and Medical insurance industry. However, a customer's health status does not always have a relationship with their actual age, as it is affected by their daily lifestyles. The developed product re-calculates the premium every 3 years based on the customer's health checkup result and offers less premium for less health age. Neo First Life developed a unique mechanism that predicts a customer's chance of getting diseases from health checkup results through 10 million health and medical big data analyses.</p>

2	2.3	Technogym	Wellness Valley	<p>The Wellness Valley is the first international District for knowledge in Wellness and the Quality of Life and the first example of a Wellness Community in the world. The project involves the whole region of Romagna and was launched publicly in 2002 Technogym. The Wellness Valley is a social innovation model which focuses on people and their health and promotes well-being for everyone at all ages by creating an environment that supports and encourages healthy lifestyle choices. The Wellness Valley project leverages the human, economic and social capital of Romagna and networks the excellences to produce innovative projects and initiatives that bring wellness into the lives of thousands of people, with benefits at both an individual and a collective level. The initiative involves over 250 public and private stakeholders, including institutions, municipal administrations, schools, companies, medical doctors, research centres, health authorities, the university, sports and cultural associations, gyms, spas and hotels. Over the years more than 70 best practices have been developed in the Wellness Valley which make this territory a true living lab and demonstrate how it is possible to create a "Wellness Ecosystem": from the educational programs against childhood obesity to free physical activity in public parks for active aging, from the prescription of physical exercise for the prevention of chronic diseases to the promotion of lifestyle events up to active holiday packages that combine movement, food and wine, nature, art and culture. Today the Wellness Valley is regarded as an international benchmark for the realization of effective, inclusive and sustainable integrated Health Systems.</p>
3	3.1	World Economic Forum, AstraZeneca and London School of Economics	Partnership for Health System Sustainability and Resilience (PHSSR)	<p>The Partnership for Health System Sustainability and Resilience (PHSSR), an initiative launched by the London School of Economics (LSE), the World Economic Forum (WEF) and AstraZeneca, whose goal is to contribute to the preservation and improvement of global health in the long term, by improving understanding and enabling actions to be taken towards sustainability and resilience of the health system on a global basis. The initiative, which sees eight OECD countries as protagonists, produced a pilot study, aimed at understanding the factors that ensure resilience and sustainability to Health Systems, with particular reference to the SARS-Cov2 pandemic. Thanks to the use of a framework to measure the resilience and sustainability of Health Systems with reference to 5 domains (governance, financing, personnel, drugs and technologies and provision of health services), a series of recommendations and a preliminary assessment have been identified. application of the framework, identifying the areas in which this can be strengthened.</p>
3	3.1	CEPI, Gavi, WHO and UNICEF	COVAX	<p>Gavi, a global public-private partnership was defined in 2000, to bring together the best of what key UN agencies, governments, the vaccine industry, private sector and civil society had to offer in order to improve childhood immunization coverage in poor countries and to accelerate access to new vaccines. Gavi represents the sum of its partners' individual strengths, from WHO's scientific expertise and UNICEF's procurement system to the financial know-how of the World Bank and the market knowledge of the vaccine industry. By pooling demand for vaccines from the world's poorest countries, securing long-term funding and shaping vaccine markets, GAVI accelerates access to life-saving vaccines in the countries that need them the most. Since its foundation, GAVI has defined five-year strategic plans, identified a set of mission indicators and a set of specific strategic indicators to measure the effectiveness of its actions. Overall, since 2000 GAVI has achieved the following objectives: +822 million children vaccinated through routine programs; +1,1 billion vaccinations through vaccination campaigns; +14 million future deaths prevented, 255 million future disability adjusted life years (DALYs) averted as a result of vaccination</p>

with Gavi supported vaccines from 2016-2019, 495 vaccine introductions and campaigns. The importance of partnerships is also crucial at a time when the COVID-19 pandemic is spreading and there is a race to find a cure. In fact, to prevent economically richer countries from hoarding most of the available vaccine doses at the expense of poorer nations, an ad hoc program (Covax), co-led by CEPI, Gavi, WHO and UNICEF, was launched in April 2020. Bringing together governments, global health organizations, manufacturers, scientists, private sector, civil society and philanthropy, with the aim of providing innovative and equitable access to COVID-19 diagnostics, treatments and vaccines. COVAX has so far shipped over 30 million COVID-19 vaccines to 54 participants.

3	3.2	Huawei	Animal health monitoring for pandemic prevention	Huawei, the Chinese tech giant, launched an artificial intelligence pig farming project that will help farmers in China, to better track the health of their livestock. The technological innovation consists in facial recognition that can identify individual pigs and other technologies that can monitor the pigs' weight, diet and level of exercise. These technologies will allow pig farmers to constantly monitor their animals and detect threatening diseases in time. These innovative solutions revolutionized the concept of livestock and animal monitoring and the early detection of possible threatening conditions. These intelligent technologies for agriculture and aquaculture will allow a more controlled environment for animals where they can healthily grow. It will also reduce global costs of prevention. These innovations will definitely help with prevention of future pandemic scenarios.
3	3.2	Stingray	Animal health monitoring for pandemic prevention	Stingray, a Norwegian company, developed a unique and innovative system that targets and kills lice on salmon and trout with a laser while also monitoring their health and growth 24/7. This innovative patented solution, using an image-based louse counting, provides a better overview of the parasite infection. Stingray's technology combines stereo machine vision, advanced software and high-precision laser to target and kill parasites that infect farmed fish, as well as monitoring growth via biometrics application.
3	3.2	visio.ai	Animal health monitoring for pandemic prevention	Viso.ai is a tech company that developed a computer vision platform called Vision Suite. This platform, through the adoption of AI technology, uses camera streams for real object-detection in many fields, as well as in agriculture and farming. With visual Deep Learning it is possible to automatically detect livestock, track animal movements or behaviors across multiple locations. This will allow us to constantly monitor animals' health and wellbeing.
3	3.3	Johnson & Johnson	Resolution	Resolution is an innovative end-to-end touchless supply chain solution driven by Radio Frequency Identification technology for seamless order and inventory management. It reduces the risk associated with processing error from the check and replenish process by delivering an automated solution. It automatically manages the procurement of medical devices in the operating room, tracks consumption for individual patients or surgical procedures and controls warehouse movements. It fits perfectly in support of the current need to increase remote control, reduce contacts between staff and free up resources to devote to patient care. Resolution enables efficiency and cost saving through the entire healthcare value chain.
3	3.3	Medtronic	Ventilator Global Supply Chain	Medtronic, the world's largest medical device company, has more than 48,000 suppliers across 135 countries. The most complex Medtronic ventilator contains more than 1,500 components. More than 100 suppliers in 14 different countries build the parts. As the global pandemic brought unprecedented ventilator demand, two constraints hindered the rapid

quintupling of production. First, government-imposed export restrictions blocked key components. Second, some key suppliers in G20 countries lacked capacity to rapidly scale production. Medtronic and its suppliers organized intensive advocacy to ease government export restrictions and keep facilities operating as essential businesses. Medtronic scoured the globe for additional suppliers with the engineering skill, quality systems, and manufacturing capacity for components for life-saving equipment. The additional suppliers came from diverse places, from the U.S. to Vietnam. Going forward, the keys to greater supply chain resiliency are:

Measures by companies to ensure less dependence on a few suppliers, new approaches to inventory management, re-evaluation of contractual structures, consideration of logistics service providers as partners, rethinking sourcing and make or buy decisions, and supply chain digitalization

Measures by governments, especially the global leaders of the G20, to avoid trade restrictions and competitive national supply chain retrenchment, which risks weakening the supply chain for all; and Dialogue between industry and governments on the actual supply chain situation and measures to help reduce potential choke points or exposures.

3	3.4	Chiesi Farmaceutici	B Corporation Certification	<p>In today's environment adopting sustainable models, more respectful of the environment, is an imperative for all organizations, a prerequisite for continuing to operate on the market. In such a context act B Corporations, i.e., companies that together form a global movement whose aim is to spread a more evolved business paradigm. Worldwide, certified B Corporations stand out because they go beyond the profit goal and continuously innovate to maximize their positive impact on employees, the communities in which they operate, the environment and all stakeholders. In fact, the B Corporations company voluntarily and formally chooses to simultaneously produce social and environmental benefits while achieving its profit results. In the Life Sciences sector, one of the main groups that has chosen to embrace this cause is Chiesi, adopting a business model with a dual purpose, which pursues financial objectives and the progress of society in favor of all shareholders, people, communities and of the environment. Furthermore, as a certified B Corp, Chiesi is called upon to measure the impact of its actions every year in order to pursue and achieve the dual purpose. With specific reference to issues, for example, Chiesi has taken tangible actions to measure, reduce and offset CO2 emissions (-11% 2019 vs 2018), increased the use of renewable energy (4,5x 2019 vs 2018), adopted a sustainable chemistry approach and mapped the waste produced by industrial processes to define the best management (-21% 2019 vs 2018), committed to achieving Carbon Neutrality by 2035, well before the 2050 target set out in the Paris agreement.</p>
3	3.4	Boehringer Ingelheim	Foot & Mouth Disease (FMD) and Rabies Management	<p>Beyond the economic impact of an FMD outbreak, there is a significant cost to farmers and their local communities as well as to local food security. During the last FMD outbreak in the UK for example, the mental and emotional effects of culling some 6,5 million animals were far-reaching and constituted significant social trauma, in addition to the important corresponding environmental footprint. BI manages 17 national and regional FMD vaccine banks insuring countries against such outbreaks and their consequences. Boehringer Ingelheim works with the respective national disease control authorities to model and plan optimal vaccination programs in the event of an outbreak. Boehringer Ingelheim is investing 230m euro in a biosafety level-3 production site in France for the manufacturing of FMD vaccine. Since the sixties of the last century, Boehringer Ingelheim has been a partner to institutions, health authorities and veterinarians for the control of rabies. Globally,</p>

Boehringer Ingelheim has the largest footprint within the industry for rabies control both in pets and in wildlife with nearly 100 million vaccine doses administered annually. Rabies is a classic One Health example in the sense that preventive vaccination of stray dogs offers significant potential for savings in human health expenditure. The cumulative cost of post-exposure prophylaxis required for human victims of dog bites in an endemic geography tends to be much higher than the cost of preventive rabies vaccination programs for dogs. An example in action here is a project in Pakistan where stray dogs are first vaccinated against rabies, and then marked with a collar that identifies them as safe.

Schedule of Taskforce Exchanges

#	Date	Location	Theme
1	21/22 01.2021	Remote	Inception Meeting
2	23/02/2021	Remote	Conference Call I
3	23/03/2021	Remote	Conference Call II
4	27/04/2021	Remote	Conference Call III
5	01/06/2021	Remote	Conference Call IV

Distribution of Members

Country	#	Country	#	Country	#
Italy	30	United Kingdom	4	Mexico	2
Germany	7	Russia	3	Australia	1
USA	6	Argentina	3	Uruguay	1
France	6	Brazil	3	South Africa	1
Switzerland	5	Japan	3	Portugal	1
Turkey	5	Saudi Arabia	2	Canada	1
China	4	Spain	2	Belgium	1

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