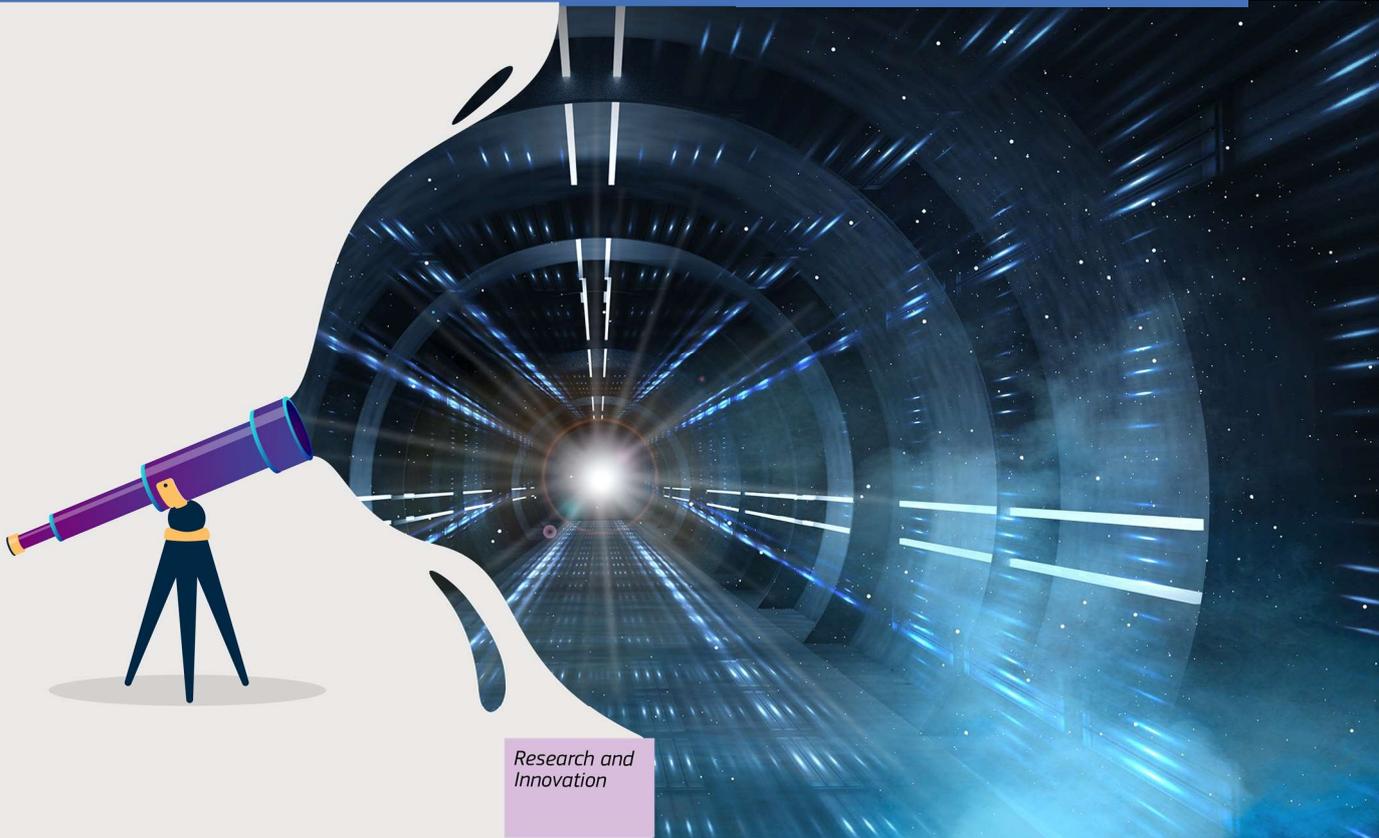




European
Commission

FORESIGHT

**The scientific, technological
and socio-economic
conditions of the end
of the COVID 19 crisis**



*Research and
Innovation*

The Scientific, Technological and Societal Conditions for the End of the COVID-19 Crisis

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The Scientific, Technological and Societal Conditions of the End of the COVID-19 Crisis

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FOREWORD



The coronavirus pandemic has changed the world as we know it. Europeans and European businesses are finding their resilience tested to the limit. Importantly, for us at EU level, resilience is not only the ability to withstand and cope with challenges but also to learn, transform emerge stronger and “bounce forward” better.

The pandemic has demonstrated the extent to which our species depends on good science and the importance of this good science for our recovery to a sustainable, fair, democratic and prosperous Europe. Exploring the important links between science and industry, public health and socio-economic conditions, this study illustrates the multiplicity of possible near term futures, which will define the trajectory of our longer-term development as a continent and as a Union of peoples.

The future is largely in our hands, shaped by our knowledge and our ability to combat the virus, and by what we choose to do with our knowledge: whether we will use the crisis as an opportunity to learn and adjust our systems for more resilience, or whether we will simply try to go back to the old ways that made us so vulnerable to the COVID 19 pandemic.

Foresight teaches us that the future will happen, but we have a choice over what it is like, we can debate the choices and exercise the right ones for our future and the future of our children.

The 2023 time horizon is relatively short for a foresight study, but the extent to which COVID 19 affected the world is such that it is justified to analyse possible near term scenarios, and to approach the near-term future cognisant of the responsibility that we have. We say that by 2023 we will have bounced back better, because it is our responsibility to do so. The other scenarios are there only to remind us of alternatives that we need to avoid.

Mariya Gabriel,
European Commissioner for Innovation,
Research, Culture, Education and Youth

Maroš Šefčovič,
Vice President for Interinstitutional
Relations and Foresight

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The study was carried out by Technopolis Group in partnership with Institutul de Prospectiva (IP) and implemented through a two-round Delphi survey to collect the views of individual experts on a series of statements about the future in areas relating to medicine, public health, and socio-economic conditions. The team was led by Peter Varnai (Technopolis) with the active support of Kelly Simpson (Technopolis), Paul Simmonds (Technopolis), Radu Gheorghiu (IP) and Bianca Dragomir (IP).

The work was guided by a Steering Group of the European Commission led by Dr Nikos Kastrinos (DG Research & Innovation) and was quality assured by a scientific advisory panel of three experts: Professor Dr. Matthias Weber (AIT), Dr. Kerstin Cuhls (Fraunhofer ISI) and Professor Dr. Sabine Oertelt-Prigione (Radboud University Medical Centre).

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Lastly, the views presented in the reports are the views of the authors and are not necessarily shared by the European Commission or any individual member of the steering group or scientific advisory panel.

THE SCIENTIFIC, TECHNOLOGICAL AND SOCIO-ECONOMIC CONDITIONS OF THE END OF THE COVID 19 CRISIS

EXECUTIVE SUMMARY

A short-range foresight exercise

The European Commission commissioned a foresight study to support reflections on the ongoing COVID-19 pandemic and facilitate policy discussions on the possible medium-term impacts and related opportunities. The study used the Dynamic Argumentative Delphi method to explore experts' views on specific statements about how Europe may look in 2023, in domains relating to medicine, public health, and socio-economic conditions. An analysis identified consensus views about the future (predictions that can be taken for granted) as well as divergence of views (where major uncertainties lie).

The scenarios

The key uncertainty identified is the acquired immunity of the population against SARS-CoV-2, modulated by the actions of public decision makers and the level of civic engagement. This fed into the development of five plausible but distinct scenarios as regards the possible state of affairs in Europe in 2023. The scenarios are intended to reveal interdependencies and sensitivities and are not predictions; indeed, it is highly likely that none of these perspectives will quite capture the reality of our world in 2023.

Scenario 1 describes a situation where no effective vaccine has been developed and governments continue to impose strict public health measures to control the virus. This leads to severe economic downturn, unemployment, curtailed civil liberties and geopolitical tensions. Without increased public investment, governments are stuck between a wider social and economic crisis.

Scenario 2 describes a situation where an effective vaccine eludes the world, but governments focus on keeping the economy open without much regard to public health conditions. Governments borrow and invest heavily in struggling businesses as well as new technologies, including low-carbon energy and digital future. These initiatives however fail to deliver real changes on the ground as consumer confidence fades. Prioritising economy ultimately leads a delay in economic recovery.

Scenario 3 demonstrates that even a partially effective vaccine can lead to protective immunity in the population if coordinated approaches are followed and citizens cooperate with governments. This is achieved at a huge public health cost, but the economy can open up and a reasonably swift economic recovery follows. The legacy of the pandemic in health and social inequalities

are however slower to revert to pre-pandemic levels. Europe settles into a 'new normal'.

Scenario 4 describes a missed opportunity to capitalise on new and effective vaccines due to lack of coordination and piecemeal immunisation programmes. This prevents a timely return to public health and safety and restarting the economy. Citizens are confused and prolonged public health measures are needed to safeguard the population.

Scenario 5 describes a situation where effective vaccines are developed early, and large-scale immunisations eliminate community transmission with the EU by 2023. This is achieved through transparent and evidence-based communication and citizens active engagement. The pandemic triggers a profound rethink in the way we live and work in Europe. On the social front, health and social inequalities become the target of policy action, while on the economic front, actions focus on a more active commitment to creating a greener and more sustainable future. A new pan-EU epidemic preparedness plan is adopted and overall, governments and citizens are better prepared to face any potential new public health threats.

Policy implications

The report concludes with key lessons and implications of these scenarios which are hoped to support policy makers in planning for exiting from the pandemic and economic and societal recovery:

1. **Vaccines are not enough.** An effective vaccine and vaccination programme appear necessary (in the absence of effective antivirals and other treatment options) however a new vaccine is not sufficient to quickly overcome the health crisis and its consequences. Governments will need to pursue a much broader policy agenda, and the need for transparent and evidence-based communication will continue to be critical to secure public trust and facilitate cooperation by the majority of the population with the tough measures necessary for rebuilding.
2. **The need for preparedness.** It is clear that some existing trends have been accelerated by the crisis. Understanding the costs and benefits of such trends is very important. Unemployment, health outcomes, equality and discrimination are worsening, and are expected to continue to worsen towards 2023. Should these trends not be mitigated by strong policy responses, we would expect to see widespread unrest and social dislocation. This would be a failure of governance both at national and EU levels.
3. **Public health versus economy is a false dichotomy.** The real world is more complex than a yes or no answer to the question of priorities: public health or the economy. Population health underpins economic recovery and the economic situation and outlook have important health implications. Prioritising the economy at the expense of public health can reduce public

support for governments, increase citizens' fears, undermine consumer confidence and ultimately (and paradoxically) delay economic recovery.

Equally, supporting individuals and protecting jobs and businesses during the pandemic will require mobilisation of public finances on a scale that has rarely been seen before and may have implications that will extend over many decades. The alternative, however, would be a much deeper and wider recession, which would likely result in an even larger cost to economy and society over the longer term. Therefore, investing in public health systems consistently will bolster human and economic well-being; the alternative, ignoring public health considerations is a recipe for disaster.

4. **Learn and adapt the EU R&I systems.** COVID-19 should be considered as a fire-drill forced upon us. The results have shown that we need to adapt our models of addressing both technological and socio-economic challenges. The role of science in policy making has been demonstrated and will likely be reinforced going forwards. Moreover, one should build research and innovation systems in Europe that are better prepared for future pandemics and other crises. The pandemic has also shown that competitive structures involving alliances of public and private actors with a strong orientation towards a common goal or mission can produce the results effectively and rather quickly. The lessons from this experience should be applied in the missions of Horizon Europe.
5. **Collaboration at EU scale will unlock the future.** As the scenarios developed here reveal, where national actions are prioritised over and above cooperation in Europe, Member States cannot reap the benefits of an open and functioning internal market, whilst individually, no country can be safe from future pandemics and the planetary emergency. The pandemic has confirmed the critical importance and power of collaboration: sustainability and resilience will require scale and coordination at EU-level.

INTRODUCTION

This foresight study was commissioned by the European Commission in June 2020 to support reflections on the ongoing covid-19 pandemic and facilitate policy discussions on the possible medium-term impacts and related opportunities.

Technopolis group in partnership with Institutul de Prospectiva designed and implemented the study through a two-round delphi survey that aimed to collect the views of individual experts on specific statements about the future in areas relating to medicine, public health, and socio-economic conditions, covering the broad areas of unemployment and inequality; environment, mobility, lifestyle and place; and economic / industrial organisation and eu policy.

This report is based on the analysis of the expert views and supporting arguments which helped the study team to develop five plausible scenarios about how Europe could look like in the year 2023. An accompanying data report contains the methodological approach, the profile of respondents to the Delphi survey and the 78 individual statements with their scores and over 600 associated arguments.

The following section starts with a brief discussion about the context for the future where experts overwhelmingly expressed a consensus view and areas where uncertainties lie and which served as basis for the five scenarios. These scenarios are then described in some detail before we conclude the report with possible implications for Europe.

While none of the scenarios for 2023 are predictions or alternative futures, it is hoped that this analysis will contribute to a clearer understanding of potential risks and opportunities for policy makers. The choices we make in the coming years will no doubt shape our future health and wealth well beyond 2023.

EUROPE IN 2023: FIVE SCENARIOS

Background to the crisis

On 31 December 2019 pneumonia with an unknown cause was reported to the WHO China Country Office. China released the genetic code of a new coronavirus on the 11 January 2020. At that time, it was unclear if there is any human-to-human transmission and the number of cases was less than 100. If we fast forward to October 2020, there were over 44 million confirmed cases globally with over 1 million deaths.¹

COVID-19 has led to a global public health crisis within a couple of months, changed the course of lives for billions with ensuing social and economic damage. The spread of the virus caught Europe unprepared in March 2020 and,

¹ <https://www.ecdc.europa.eu/en/covid-19/situation-updates>

without much scientific evidence, preparedness or roadmap for such a situation, political leaders of EU Member States made impromptu decisions. Life as we knew it ground to a halt as many countries went into lockdown, and 'social distancing' became the harsh reality of everyday life.

Soon after this traumatic experience, policy makers started to coordinate efforts and plan for the immediate future, considering all available (and frequently updated) scientific evidence they had at their disposal. The European Commission coordinated a common European response to the coronavirus pandemic, with the aim to reinforce the national public health sectors and mitigate the negative socio-economic impacts of the crisis.² By July 2020, EU leaders agreed on a recovery plan, with substantial financial investments, that should support an exit from the crisis and lay the foundations for a fairer and more sustainable Europe.

Scenario development

Experts assessed a set of preconceived statements about the future according to their likelihood, changes expected, or time of realisation and they provided arguments for their assessments. In some cases, this led to consensus views about the future that we may interpret as things that we can 'take for granted' – whether it is similar or very different from pre-pandemic levels seen in 2019. In other cases, experts' views varied significantly, and we interpreted this as 'uncertainty' surrounding a certain phenomenon.

The statements about the future were organised in three domains that were later combined in scenario development:

The first domain is about medical science, epidemiology and pharmaceutical innovation, which inform on availability of diagnostic tests, treatment options and vaccines in the future. It also includes broad views about the evolution of the SARS-CoV-2 virus itself, however, this study did not explore in detail the various possible options for virulence, transmission, seasonality, interaction with other pathogens and antigenic evolution (mutation).

The second domain is about public health – enforcement of control measures and compliance by the population. This involves capacity and capability to implement effective community mitigation strategies and deploy the new knowledge and evidence continuously emerging from science.

The third domain is about the socio-economic consequences and opportunities of the pandemic-induced crisis, as a result of science and personal behaviour as well as new resolute actions (or non-actions). The impact may manifest itself in all areas: in some cases, existing trends could be reversed, reduced or accelerated, in others entirely new phenomena could emerge.

² <https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/>

Science, behaviour, consequences: building the scenarios

In all scenarios, the new coronavirus is not eradicated globally by 2023, perhaps never. The SARS-CoV-2 virus becomes endemic and in most scenarios EU citizens need to live with this virus in 2023 as they do with many others.

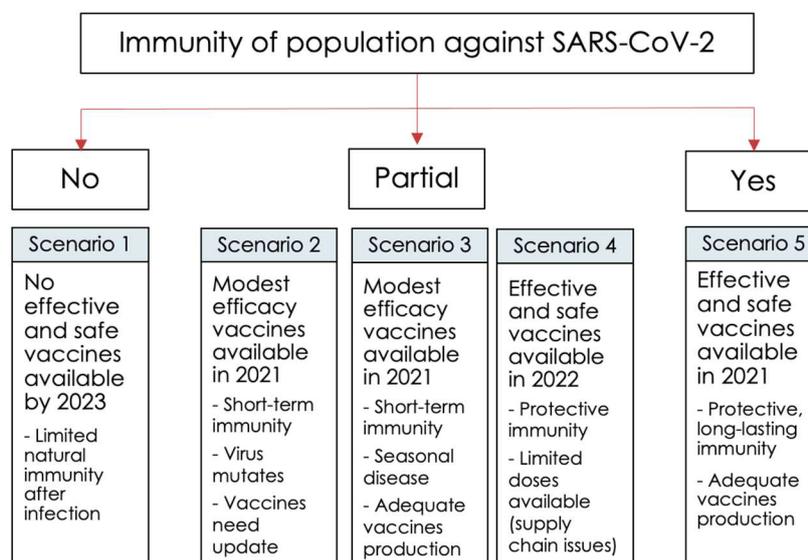
For science to be able to provide evidence about the scale of infection in the population, effective diagnostic test must be available and accessible. There is a common view that by 2021/2022 safe, reliable and cheap tests will be available for individuals to test infection and immunity, enabling the tracking and tracing of cases and ensuing (supported) isolation.

Antivirals (both newly developed and repurposed medicines) and other treatment options will become available in the coming years thanks to a better scientific understanding of the disease. By 2023, these new therapies will lead to therapeutic improvement and reduced mortality and morbidity but no cure of the disease.

These point to the need for effective vaccines to be available and deployed in the population. However, there are considerable uncertainties about the timing, effectiveness and production capacity of these vaccines in the coming years. While the majority of our experts expect that new vaccines will become available by 2021/2022, a significant minority puts this date to 2023 or even later. This and other uncertainties around the persistence of protective immunity (and the evolution of the virus itself) lead to questions about the potential for re-infection and the need for repeated vaccinations. The key uncertainty is therefore the acquired immunity of the population against SARS-CoV-2 and hence we consider immunity as the 'game changer' to develop our scenarios (

Figure 1).

Figure 1: Key uncertainty about immunity acquired by the population by 2023



We considered three broad categories regarding the potential for the population to acquire protective immunity by 2023:

- No protective immunity in the population due to the lack of effective vaccines developed by 2023
- Partial immunity in the population due to a number of factors: either because of the limited effectiveness of the first vaccines developed in 2021 or that the effective vaccines developed in 2022 are not available in sufficient quantity
- Full immunity in the population as a result of effective vaccines developed in 2021 and made available to the population at large

Public health response and citizens' behaviour

COVID-19 has shown that the negative impacts of a pandemic are costly in many ways. Experts expect therefore that the capacity of healthcare systems across Europe will increase by 2023, compared to pre-pandemic levels seen in 2019, along with the increased use of health services, partly due to the backlog of routine care created by the pandemic. In addition, COVID-19 has also showed the potential of digital health and automation of public health systems and this will lead to renewed efforts to establish common standards for health data interoperability across Europe.

Nevertheless, there is a widespread expectation that the burden on health systems will be rather high in 2023, stemming from an increase in non-communicable diseases, mental health conditions and post COVID-19 complications. Health inequality will also increase, reversing positive trends seen before the pandemic. Control measures of COVID-19 disproportionately impact those already in the vulnerable category. In addition, the negative effects of the economic crisis (e.g. stress), following the public health crisis, will exacerbate health inequalities in years to come.

As a result of learning from the current crisis, the majority of experts indicated that it is rather likely that public health crisis management will form an essential part of governments' cross-functional crisis management by 2023. However, different national priorities cast uncertainty around the coordination and implementation of a pan-European pandemic preparedness plan by 2023. Equally, some EU governments would wish to exert control over their national production and strategic medicines stockpile, preventing the development of a centrally coordinated approach in Europe.

Public health measures by public decision makers and compliance by the population are expected to shift substantially over the course of the coming years. By 2023, there will be differing practices in operation, largely dependent on the availability of an effective vaccine and trust built between governments and citizens (Figure 2). Interestingly, relatively few experts considered the risk of vaccine hesitancy as a potential barrier to COVID-19 vaccination uptake in Europe.

Figure 2: Public health measures and citizens' behaviour drive evolution of different scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Public decision makers	<p>Strict public health measures applied</p> <ul style="list-style-type: none"> - Physical distancing, masks, lockdown - Track&Trace system enforced 	<p>Economy prioritised over public health</p> <ul style="list-style-type: none"> - Limited phys. distancing, no lockdown - Track&Trace system enforced - Low vaccine uptake 	<p>Large-scale immunisation programme reduced community transmission within EU</p> <ul style="list-style-type: none"> - Pan-EU cooperation - Repeated vaccination means huge public cost 	<p>Priority immunisation of frontline workers & vulnerable</p> <ul style="list-style-type: none"> - National actions - Piecemeal immunisation - Limited phys. distancing, no lockdown 	<p>Large-scale immunisation programme eliminated community transmission within EU</p> <ul style="list-style-type: none"> - Pan-EU cooperation - No special public health measures required
Citizens' behaviour	Citizens' resistance increases	Citizens' fear increases, lose public trust	Citizens cooperate	Citizens confused	Citizens cooperate

Building on the scenario framework introduced based on immunity of the population, we further qualified these based on public health considerations:

- Where no effective vaccines are developed by 2023, strict public health measures continue to be applied by governments, increasing citizens resistance to compliance
- Where vaccines are developed by 2021/2022, various public health measures and immunisation strategies are considered along with citizens' behaviour and response
- Where effective vaccines are available and taken up by the population, no special measures are expected to be in place in 2023.

Socio-economic consequences and opportunities

The study explored a diverse set of statements about possible socio-economic consequences and opportunities of the COVID-19 crisis. Some of the key themes, both related to consensus and uncertainties, stemming from the experts' opinions are summarised below. This is a synthetic view of the empirical data which aims to describe the balance of opinion rather than any particular scenario.

Global trade levels between the EU and the rest of the world will decrease by 2023 as compared with the situation before the pandemic. Global supply chains will be shortened and some level of reshoring of industrial production will take place. There is an expectation of increased efforts to secure Europe's strategic autonomy in key sectors and critical technologies. Yet, there is great

uncertainty around the level of future R&D investments and entrepreneurship in Europe.

EU governments will prioritise national and regional economic needs in their recovery plans, without any clear direction as to the emergence of a stronger multilateral system of global governance. While the World Health Organisation and the World Trade Organisation may forge stronger links in their regulatory structures reflecting the interdependencies of public health and global trade, the 'power and importance' of the WHO is uncertain.

Traditional decision-making structures will continue to dominate European policy but populist parties and identitarian movements use increasingly and skilfully social media to manipulate public opinion while avoiding a real debate. Opinions vary about the likelihood that science will play a substantially bigger role in policy-making in the future.

General unemployment levels will noticeably increase in the medium term, falling most heavily on the lower skilled and young people in particular. There is an expectation that Europe will see the 'gig' economy becoming slightly more important in 2023. On the other hand, graduate unemployment while not expected to be long-lived, fresh graduates will find their careers are set back for some years. Many instead will choose to stay in education for longer.

The crisis will trigger an economic restructuring with shrinking demand in some sectors and rising in others. There is a widespread expectation that air travel and transport will continue to be depressed beyond 2023 with subdued work-related and leisure travel. The tourism and traditional hospitality sector will in particular be under pressure. A step-change will take place in the retail sector with a large share of businesses moving permanently online. The provision of online education in the EU will also be significantly increased. Hence there is widespread support for rethinking access to digital infrastructure, which is increasingly seen as an essential utility. New investments will diminish the digital divide that exists between rural and urban areas and prompt more people across Europe to move from large cities to the countryside to live and work there.

There is no confidence that in the medium-term European governments will be able to reduce or eliminate the many structural inequalities that exist across Europe. There is a pretty much universal view that Europe will see an increase in extreme poverty by 2023. There is also an expectation that this will affect the already disadvantaged and vulnerable disproportionately. The COVID-19 crisis will have worsened discrimination slightly in the medium term. New types of socially disadvantaged groups will appear across Europe, for example many people will face working poverty. In the economic downturn, gender equality across EU labour markets may also slightly worsen. Diversification of disadvantaged groups will complicate both the analysis of political pressures and articulation of government responses.

The great majority of our experts view the COVID-19 crisis as a trigger to build back a better Europe, with governments putting the environment at the heart of their recovery plans and committing to a climate-neutral future. Many of the changes that need to be made concern slow-changing systems: economic and social institutions, infrastructures and natural habitats and ecosystems. These fundamentals cannot be transformed in two or three years, however, the nature

of our collective engagement with these phenomena will be evident in 2023 and will be a strong signal about whether we have learned the governance lessons of the pandemic and how prepared we are to act on those lessons.

In the next section, we construct five alternative 2023 scenarios from the above reflections around key parameters, aiming to emphasise the particularities of each of the five scenarios

Scenario 1: COVID-19 triggers fractures along societies' most active fault lines

The premise

There is no vaccine available and no lasting immunity has developed in the population by 2023. COVID-19 remains a widespread threat to public health and governments across Europe continue to impose strict restrictions on people and organisations with the increasingly elusive slogan to 'eliminate the disease'. With accurate diagnostics widely available, continued testing and re-testing of the population has become the norm. The 'track and trace' system has received a strong mandate from governments and together with law enforcement, these new authorities effectively control the lives of citizens and businesses' freedom to operate. The extent of the controls and the unforgiving nature of their enforcement has pitched citizens against citizens, citizens against governments and governments against governments.

The synopsis

Physical distancing measures and face covering have changed the way we interact socially. Unpredictability has become part of daily life and citizens had enough of it. An increasingly large part of the society is resisting and do not comply with the periodic lockdown demands of governments. Decision makers missed the opportunity to explain the rationale for their choices, communicate transparently and inclusively, thereby alienating parts of the society, especially the younger citizens of Europe. A lack of trust between citizens and governments thus becomes entrenched, and tension is high within the population.

The economic crisis is severe and has spread across many industries with general unemployment levels sharply increased. It impacts particularly lower skilled and younger people. They together form a new coalition against government measures and their regular protests often get out of control and disrupt peaceful way of life. They blame the old and the vulnerable, often those from ethnic minority groups, for their economic situation. Inter-generational solidarity has vanished. Levels of social discrimination, racism and xenophobia have become rife. Populist and extreme rhetoric has intensified in the mainstream political discourse in Europe.

Meanwhile, richer people have escaped the dense and troubled urban areas and chose the countryside where the public health situation and quality of life are relatively unharmed. With COVID-19 accelerating private investment in digital infrastructure, the new rural residents can continue their work remotely and take advantage of a variety of online services to maintain their wellbeing, from telemedicine to online shopping, education and entertainment. Governments

recognise the need for equitable access to internet, but they are too busy with managing the economic and social crisis and are rather powerless in the face of increasing inequalities.

The uncertainty, social and physical isolation and the general economic crisis have led to a wider health crisis in Europe, including a tsunami of mental health issues that had not been recognised and acted on early enough in the pandemic. The pandemic essentially curtailed the provision for routine health services for non-communicable diseases and this again hit the vulnerable and disadvantaged socio-economic groups the hardest. The economic crisis has prevented governments to expand health system capacity and reduced R&D budgets. As a result, health and medical research and the wider public health system have not been able to keep up with existing and emerging health risks.

COVID-19 has caused EU governments and investors to prioritise their limited financial support for existing businesses and jobs. Levels of new business formation and entrepreneurship levels therefore fell, and Europe's international comparative advantage have been lost in key areas. In particular, travel and hospitality, real estate, manufacturing and traditional retail were among the hardest hit sectors. In contrast, the digital sector has taken advantage of the new surge in demand and invested heavily in new platforms, products and services. The impact is most acutely felt in the retail sector where the uncertainties created by the pandemic and government responses caused a very large share of businesses to move permanently online.

While conflicts within Member States and in some cases across the continent occur, the EU as a whole has stuck together to avert the negative effects of the rise of global geopolitical conflicts and shortages revealed during the COVID-19 crisis. The impact of the crisis on global trade has pushed EU governments to come together to ensure strategic industries are re-shored and safeguard critical supply chains against short term shocks. A coordinated European approach has therefore been created to minimise future risks and support struggling Member States during the long-lasting pandemic.

The overall crisis has made it difficult for governments to develop and implement policies that would progress environmental standards required of remaining businesses. This lack of vision compounded by the low level of funds available in the public and private sector prevented new technologies to emerge. The green sustainability revolution, which had long been discussed and planned for, is thus delayed again. Nonetheless, the EU overall managed to marginally reduce its pollution and greenhouse gas emissions by 2023, compared to pre-COVID levels, but this was an 'unintended effect' of the major economic downturn. The real targets of a climate neutral roadmap for Europe however have been pushed back almost a decade.

The final word

Governments feel trapped in a never-ending public health crisis that demands restrictions that damage the economy profoundly and fuel ongoing societal conflict. Citizens are desperate to move away from uncertainty and regain their personal freedom. Without a credible forward-looking strategy, governments just wait for the emergence of a vaccine against COVID-19 so that they can break the deadlock and Europe can exit from the crisis.

Scenario 2: An open economy is the best solution?

The premise

An effective vaccine eludes the world. Vaccines that were developed in 2021 provide only partial protection against the SARS-CoV-2 virus and the acquired immunity quickly wanes. This situation is exacerbated by the emergence of various new variants of the virus, requiring scientists to redouble efforts to continue the quest for an effective vaccine. Citizens believe that vaccination is not worthwhile if it provides only low levels of protection against specific variants. COVID-19 thus remains a widespread threat to public health. However national governments are reluctant to follow public health advice of imposing lockdown, given the wider, long-term consequences of the stringent measures that had been proposed previously. Instead, they promote a society and economy that remain largely open for business.

The synopsis

The inability to eradicate the disease has led to a situation where governments accept the endemic condition and prioritise a fully functioning economy. Burden on public health systems has increased substantially as a result, which governments aim to address through increased resourcing on the one hand and various service innovations and automation on the other.

However, at times and in areas, especially in densely populated urban settings, where infection rates rise, people's fear rises in tandem. Citizens adapt their risk management strategies and voluntarily self-isolate if they possibly can, choosing to live on their savings, without much financial support. Poor and vulnerable communities feel particularly helpless, and governments are unable to minimise the immediate social consequences.

Employers accept and promote teleworking, in the hope that this newly discovered flexibility does not reduce staff effectiveness, but it helps downsize office spaces and reduce real-estate costs. Public investment into extended and enhanced digital infrastructure has transformed the countryside. Professionals have moved to rural areas seeking safer environment and better quality of life. This however further increased a mismatch in unemployment levels across communities and the inequality between the poor and vulnerable and the wealthier professionals has grown.

In some Member States politicians want to protect regional and national interests by restricting free movement across borders. In general, EU and international agendas are disregarded and leadership under multilateral governance structures ignored.

Governments borrow at unprecedented levels and inject large amounts of money to struggling businesses with the aim to bounce back the economy and regain normal societal functioning. Public programmes actively encourage consumption, but the noticeable health crisis has prevented consumer confidence to recover to pre-pandemic levels. While the economic recovery was slow to get underway, governments increased expenditure into R&D, especially for public health and medical research. However, the focus shifts to vaccines and antivirals and leaves behind other areas like rare diseases.

Loose monetary policies have encouraged governments to borrow and invest in new policy areas such as transitioning to a low-carbon energy future to avert the climate crisis or the wider digitalisation of Europe. These flagship policies have however failed to deliver real changes on the ground in the midst of a public health crisis.

The final word

Governments fail to recognise that without a stable public health situation and a sense of safety, large public investment programmes and early opening of the economy do not achieve their intended goal of quick and full recovery. Citizens fear increases and a large part of the population loses public trust to engage in the economic recovery.

Scenario 3: Settling into a 'new normal'

The premise

COVID-19 has developed into a winter seasonal disease. Vaccines developed in 2021 provide partial protection against the SARS-CoV-2 virus and confer short term immunity. Effective supply chains and financing mechanisms provide sufficient doses of the vaccine for Europe's citizens. Large-scale and coordinated immunisation programmes lead to protection of a large proportion of the population. Community transmission of the virus is largely eliminated by 2023. Outbreaks only happen sporadically in Europe, mostly in poorer areas, where health authorities are under greater financial pressure and public health engagement is more limited.

The synopsis

COVID-19 has shown that the negative impacts of a pandemic are hugely costly in social and economic terms and reach far beyond the realm of public health.

To open up the EU common market, Member States recognised the need for access to comprehensive and up-to-date health data for surveillance, public health response and effective treatment of COVID-19 across the borders in Europe. This requires active coordination at EU-level which in turn provides optimal solutions to all Member States. The EU has therefore strengthened its competencies and resources, particularly via the European Centre for Disease prevention and Control. A pan-European pandemic preparedness plan has been developed with the support of Member States that is backed with legal requirements, networked functioning national infrastructure, and financing of joint activities.

Overall, governments and citizens are better prepared to face new outbreaks due to learning from the COVID-19 crisis management.

Large-scale seasonal immunisation programmes however demand very substantial public resources. It is EU borrowing that supports such coordinated immunisation programmes and also allows increased investment into R&D and public health.

The COVID-19 experience has also brought public science to the attention of the general public and cemented its critical role in addressing global challenges.

There has also been a maturation of our understanding of how scientific advice should inform political decision-making and the need for the world's leaders to balance competing challenges. The public's tolerability of risk continues to be a key variable in policy making.

The great majority of people and businesses have returned to their old and many new economic activities. General unemployment levels while still higher than pre-pandemic, are on an improving trend. Some economic sectors were permanently damaged and will never return to pre-crisis levels of activity. The digital transition produced an irreversible change for many industries and high streets across Europe. These products and services are now accessed mostly online, providing new opportunities for some businesses and marking the end of a chapter for others. A period of creative destruction has seen many traditional businesses reinvent their product or service offers, while Europe's entrepreneurs are re-imagining whole industries. However, tourism, travel, and leisure have been badly affected and continue to see reduced levels of overall economic activity and with greater volatility and susceptibility to events than was the case pre-crisis.

Recovery packages have mobilised large volumes of development grants and loans to help rebuild a stronger and more resilient economy. These financial packages have allowed Europe's industries to accelerate their transition towards a low-carbon future, albeit there is still much to do, while also supporting the roll-out of digital infrastructure. Governments recognise access to computer and internet infrastructure as an essential utility and provide digital devices to young people in socially disadvantaged groups, to reduce inequalities.

Structural inequalities have been magnified however and there are evident tensions in many EU countries, with arguments within and between regions, among economic sectors and even across generations. There is also widespread disaffection among the more socially disadvantaged economic groups, including young people and the more vulnerable, that have suffered proportionately more than the wealthiest segments of society.

There has been a degree of de-urbanisation that has resulted in reduced pressures on housing and infrastructure in major cities and an injection of investment in smaller towns and villages, reducing the economic divide between town and country.

The final word

Europe has seen partial success in respect to the deployment of vaccines with some level of efficacy (greatly reduced morbidity) and the identification of proven disease-containment regimes that strike a better balance in terms of largely protecting public health while avoiding the widescale restrictions on society and the economy.

Europe's economy has largely recovered to pre-crisis levels, however, overall growth rates are still weak. The overall picture masks some stark differences with several new and emerging industries having done well while several other sectors have been badly damaged and are unlikely to recover.

There has been some progress in terms of the decarbonisation of industry and the attitudes and behaviour of Europe's citizens.

Scenario 4: The lost opportunity

The premise

A number of safe and effective vaccines are developed by 2022, but governments' vaccine nationalism, inadequate manufacturing capacity and insufficient level of uptake of vaccines lead to piecemeal immunisation programmes, preventing the return to pre-pandemic public health and safety. While priority immunisation of frontline workers and the most vulnerable have taken place, some physical distancing measures for the wider population are still required to keep the virus in check. Fragmentation of policy responses and the lack of coordinated actions across Europe delay the reopening of the economy and frustrate longer-term ambitions to build a greener, fairer society.

The synopsis

Governments have increased expenditure on health and medical research within all research, in an effort to accelerate the development of an effective vaccine available to all and to ensure public health systems are better prepared for future pandemics, medically and operationally. This has borne fruit as a number of effective vaccines have been developed. The efforts to implement immunisation programmes, contain and eradicate the virus have however proved more challenging for public health systems.

Immunity still eludes Europe and ongoing outbreaks require ongoing containment measures. National governments scramble to protect their citizens and safeguard the economy but they struggle to find a balance and act in a mutually supportive way. The disease and the uneven effects of the various control measures have reduced capacity to treat and manage other types of serious conditions and increased morbidity and health inequality.

Recovery packages have also been implemented less consistently and determinedly than was planned and are falling short of our collective ambitions. Citizens and businesses are left confused about the many different strategies of how governments plan to get a grip on the situation with opaque communication about the rationale for their decisions.

Global trade has not recovered. European industry has shortened its global supply chains and implemented some level of reshoring of production, increasing its 'strategic autonomy' in certain sectors. Elsewhere, the global crisis has brought forward the rationalisation of Europe's energy-intensive and heavy industries with a further concentration of capacity in large agglomerations of state-of-the-art facilities often outside Europe.

The pandemic has accelerated investments in automation in many areas of economic activity, both public and private, with issues of resilience being added to the list of criteria used in business cases, bringing complex changes in Europe's manufacturing and service industries.

In parallel, employers accept and promote a higher proportion of teleworking amongst their teams, which has encouraged more flexible and inclusive approaches to employment and boosted regional economies.

The digital economy has flourished, however, traditional sectors like physical retail and leisure are not expected to recover. Tourism is still haphazard with air travel and transport remaining depressed. A large share of the retail sector has now moved online. Europe's major city centres have seen a substantial reduction in activity and urban areas are beginning to be transformed into more diverse environments.

New industries have emerged, although, they are yet to overcome the losses from the crisis. General unemployment levels are still elevated compared with the situation pre-COVID-19, falling most heavily on the lower skilled and young people; graduate unemployment however bounced back quickly.

Europe's environmental performance has improved slightly with pollution and greenhouse gas emissions marginally decreased due to reduced economic activity and with some small benefits beginning to arise as recovery plans take hold. The breadth of social and economic challenges confronting governments has confounded their broader environmental ambitions, and Europe's transition to a carbon neutral economy is still many years away.

The EU-sponsored view of the future (the Green Deal) resonates with local priorities and there is a recognition that the EU level is a critical level for learning and future action, but these good intentions don't play out strongly in practice. People are confused not simply because there is a piecemeal policy across Europe, but because there are many policies and constant resets. Competing national and regional interests frustrate ambitions for greater coordination and coherence, constituting an "opportunity lost" for a more effective collective response. to take place

European governments have committed to reduce or eliminate the many structural inequalities that exist across Europe (including gender equality), which were highlighted by the pandemic, however, progress has faltered in the face of these many complex challenges that are so profound and deeply embedded in our social fabric.

The final word

Plus ça change, plus c'est la même chose!

The reasonably early success in the realm of medical research has been tempered by the challenge of implementing these measures on the ground, with improved therapeutics and accurate testing struggling in the face of uneven national delivery and widely differing public attitudes; full immunity still eludes the population in Europe.

The digital economy is one obvious winner. New industries are emerging, but slowly and are not yet in a position to make up for the reversals and rationalisation seen in many sectors.

Structural inequalities highlighted by the crisis have been accentuated, and the political response to these challenges has struggled to make meaningful progress.

The see-sawing of government policies between containment and economic renewal has blunted recovery efforts, and while the planetary emergency has

been brought to the fore, and is mainstreamed across government policy, without cooperation at European level, progress is still a matter for the future.

Scenario 5: A greener and fairer future

The premise

As a result of substantial global investment and collaborative efforts, safe and effective vaccines have been widely dispensed since 2021 through effective immunisation programmes and backed up by robust, well-coordinated national and international preparedness systems.

While the global health crisis was brought under control within a year or two, the experience triggered a profound rethink in the way we live, work, and govern public life, with citizens electing to make more time for families and leisure within their lives overall. COVID-19 also raised awareness across governments and social elites of the extent of wider inequalities and has spurred a more active commitment to creating a greener and fairer society for all.

The synopsis

The negative experiences of the COVID-19 pandemic have focused minds and European governments will adopt a pan-EU epidemic preparedness plan that will enhance our capacity to manage future outbreaks while also ensuring the regions is better placed to respond more decisively to any possible future pandemic. The EU mobilises the resources necessary to support capacity building and implementation across all Member States, working in concert with the wider global community to ensure systems are more joined up.

National governments increase their support for healthcare. Public healthcare systems expand their total capacity, partly through higher levels of investment and partly through innovation with the implementation of digital health platforms and new models of care delivery, such that authorities are better able to address the full spectrum of healthcare needs.

The evident need for and success of the global response to the crisis has underlined the potential power of global collaboration more generally and EU governments have increased their commitment to and support for international cooperation and multilateral governance in many areas, ranging from public health to climate change and security.

The success of the global scientific community in developing effective medicines and therapeutic responses has led to an increase in R&D expenditure levels more generally, and more attractive researcher careers.

The European approach to open science and public-private partnerships has been widely adopted around the world, and a collective focus on common global challenges is accelerating progress in many development areas from poverty to gender equality.

COVID-19 experience has triggered a lasting attitudinal and behavioural change among EU citizens regarding the environment and sustainability, along with a sea change in the level of support for more active intervention by governments.

Leaders have committed to rebuilding a stronger, fairer global economy that addresses the climate crisis robustly while reducing inequalities and enhancing social and economic resilience to future potential shocks.

EU governments universally commit to a climate-neutral future and make the transition to a low-carbon future the central thread of their recovery plans, with wide-ranging support available to catalyse a step change in performance across both the public and private realms.

Europe's environmental performance and its pollution / greenhouse gas emissions are improving at a faster rate than was the case pre-pandemic with unprecedented investment and concerted action on all fronts, from agriculture to industry and transport, and people are confident of achieving a region-wide transition within the medium term.

New and emerging sectors have been energised by a period of creative destruction, boosted by public and private investments, and with entrepreneurs leading the recovery. These new industries have the potential to replace all of the jobs lost during the pandemic and more.

Digital Europe has become a reality with the very great majority of Europe's citizens able to do most things online, with almost universal access to high-quality digital infrastructure. All sectors of the economy have greatly increased their online presence, with large parts of the retail sector moving fully online and working from home becoming the norm for a majority of staff in many industries.

The final word

Citizens have given their governments a mandate to reform social systems in order to increase fairness and reduce fragility. Governments have used the need to rebuild as an opportunity to transform economies borrowing heavily to dramatically escalate our response to the climate emergency and ecosystem destruction. The demonstrable success of collective action has rejuvenated multilateralism

CONCLUSIONS

In October 2020, the trajectory of the COVID-19 pandemic is still unclear and while the world has acquired many new and fundamental insights about the robustness of our governance structures, the capacity and flexibility of our public health systems and our social values and resilience, we are still very much dependent on the research community finding a way forward. There is a sense that the world is approaching an inflection point, where the results of intense scientific research efforts could provide answers to some of the uncertainties surrounding the disease and the protective immunity. This very uncertainty served as a basis for the development of five different scenarios in this study.

While each scenario reflects the broad state of affairs in Europe in 2023, it may well be the case that none describes correctly how life will actually look like then. However, one thing appears to be clear: we will not go back to a Europe as we knew it before the pandemic. There have been changes that cannot be reversed and, in fact, returning to the same 'place' would feel like a failure. The experience of living at the time of a global pandemic inevitably shapes our outlook to life and determine the choices we make (or do not make) for the future as individuals and as societies.

Policy makers across Europe should be prepared for ongoing heightened uncertainty and substantially different future situations compared to what we know today. They could use the five specific cases presented in this study and test their policy proposals against each of these in an effort to develop roadmaps and strive towards their desired future.

Based on the results of the expert survey and the scenarios developed, we drew out key lessons and implications that may support policy makers in the coming period, as they plan for life beyond the pandemic and ramp-up their efforts to bring about an economic and societal recovery.

1. **Vaccines are not enough.** An effective vaccine and vaccination programme appear necessary (in the absence of effective antivirals and other treatment options). However, a new vaccine is not sufficient to quickly overcome the health crisis and its consequences. Governments will need to pursue a much broader policy agenda, and the need for transparent and evidence-based communication will be critical to secure public trust and facilitate cooperation by the majority of the population with the tough measures necessary for rebuilding.
2. **The need for preparedness.** It is clear that some existing trends have been accelerated by the crisis: as an example, the lockdown has given a boost to all things digital and we expect the digital industries will dominate much of the economy going forward. Automation in healthcare will increase, more retail businesses will move permanently online and the provision of online education will significantly increase. Understanding the costs and benefits of the evolution of such trends is important. Unemployment, health outcomes, equality and discrimination are worsening, and are expected to

continue to worsen towards 2023. Should these trends not be mitigated by strong policy responses, we would expect to see widespread unrest and social dislocation. This would be a failure of governance both at national and EU levels.

- 3. Public health versus economy is a false dichotomy.** The real world is more complex than a yes or no answer to the question of priorities: public health or the economy. There is a symbiosis between our public health and our economic realm, in one respect, they are both 'producers of wealth' and not reasonably disassociated. Population health underpins economic recovery and the economic situation and outlook have important health implications. Prioritising the economy at the expense of public health can reduce public support for governments, increase citizens' fears, undermine consumer confidence and ultimately (and paradoxically) delay economic recovery. It is clear that achieving immunity at population scale will require huge public investment and possibly several more years of stringent and restrictive social controls, especially if new vaccines provide only partial protection and their take-up by the population is limited.

Equally, supporting individuals and protecting jobs and businesses during the pandemic will require mobilisation of public finances on a scale that has rarely been seen before and that may have implications that will extend over many decades. The alternative, however, would be a much deeper and wider recession, which would likely result in an even larger cost to economy and society over the longer term. Therefore, investing in public health and social welfare systems consistently will bolster human and economic well-being; the alternative, ignoring public health and social welfare considerations is a recipe for disaster.

- 4. Learn and adapt the EU R&I systems.** COVID-19 should be considered as a fire-drill forced upon us. The results have showed that we would need to reflect and learn and adapt our models of addressing both technological and socio-economic challenges, and their moral implications. Europe should build research and innovation systems that are better prepared for future pandemics and other crises. We can avoid single-point failures by building more distributed research networks that cut across European, national and regional levels – including traditionally, non-research active geographical areas and regulatory institutions. These will be particularly beneficial for collecting vital interoperable data and tools for more comprehensive and faster decision making in Europe. The R&I system can be regarded as a sort of 'immune system' that will 'remember' this pandemic and if that memory is kept alive with regular fire drills/ military-type exercises – through perhaps new types of research challenges – where speed and self-organisation are important aspects of scientific quality. At a different level, the R&I system should be a system that remembers the experience of the crisis and improves itself to ensure that future crises are avoided. The pandemic has showed that competitive structures involving alliances of public and private actors with a strong orientation towards a common goal or mission can produce the results effectively and rather quickly. The

lessons from this experience should be applied in the missions of Horizon Europe.

5. **Collaboration at EU scale will unlock the future.** As the scenarios developed here reveal, where national actions are put over and above cooperation in Europe, Member States cannot reap the benefits of an open and functioning internal market, whilst individually, no country can be safe from future pandemics and the planetary emergency. The pandemic has confirmed the critical importance and power of collaboration: sustainability and resilience will require scale and coordination at EU-level.

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COVID-19 has led to a global public health crisis and changed the course of lives for billions with ensuing social and economic damage. The study used the Dynamic Argumentative Delphi method to explore experts' views on what Europe may look like in 2023, in domains relating to medicine, public health, and socio-economic conditions. Based on the experts' responses, the points of consensus and the areas of diverging opinions, the study developed five scenarios of exit from the crisis in 2023, associated with the relative success of efforts to develop immunity and with lessons learned as a result of those efforts. The report draws some conclusions for EU R&I policy, but together with its data annex, it can support strategic discussions across many different policy fields.



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