December 7, 2021

Reasons for optimism after a difficult year
By Bill Gates

When Paul and I were starting Microsoft, we had a vision that personal computers would one day play a significant role in people's lives. But I don't think either of us ever foresaw a future where they would be your only connection to the world. Like many people, there were entire days this year when the only human interaction I had was through a screen.

The result has been the most unusual and difficult year of my life. (I suspect a lot of the people reading this might say the same.) 2020 had a brief period of relative normalcy before COVID-19 upended everything. In 2021, the pandemic has dominated our lives since day one. We've all had to adapt to a "new normal," although what that looks like is different for every person. For me, the result has been a year spent mostly online.

I had stretches of time without any face-to-face social interaction. If I had a break between meetings, I'd walk around my yard just to see something different. After work, I'd play bridge with friends online or hang out with them over video chat. Once I got vaccinated, I started having some small in-person get-togethers, but my social life is still a lot more digital than it used to be.

It's been a strange and disorienting experience. My personal world has never felt smaller than it did over the last twelve months.

At the same time, this year was a reminder that our world is more connected than ever. 2021 was full of monumental events with global repercussions, including extreme weather events, the ongoing effects of the pandemic, and America's withdrawal from Afghanistan. Every time you looked at the news, you were reminded of just how significantly something happening on the other side of the world could affect you at home. (Just look at how one container ship stuck in the Suez Canal for a week caused shipping delays around the world.) It's never been clearer that tackling big problems requires people working together across borders and sectors.

(Left) People rest in a cooling center in Portland, Oregon, during a heatwave in June. (Kathryn Elsesser/AFP) (Right) A large cargo ship became lodged in the Suez Canal, halting global commerce for six days in March. (Songphol Thesakit/Getty Images)

Collaboration has been a constant theme with my work this year. The foundation continues to take up the bulk of my time, and I'm blown away by the amazing progress made by our team and our partners in 2021. Most weeks, we have a virtual get-together with everyone who's working on our COVID response. Each meeting focuses on a different topic, like disease modelling or vaccine distribution. It's inspiring to hear how groups are working together to find solutions.

Although COVID-19 has been a huge focus, the foundation continues to make progress in other areas. Our U.S. Program is working with partners to help students and teachers navigate the strange new world of pandemic-era education, and my colleagues working on gender equality are fighting for a more equitable global recovery. The global health and development teams have found creative ways to protect advancements on diseases like polio, TB, and HIV and continue progress in reducing childhood mortality. (This year's Goalkeepers Report outlines how the pandemic hasn't set us back as badly as feared.)

One of the most exciting things that happened was WHO approval of the first malaria vaccine. Malaria kills nearly 650,000 people every year—more than half of them children under five—and remains one of the leading causes of death in low-income countries. We funded late-stage clinical development of the vaccine between 2001 and 2015 and continue to support research into how to optimize its effectiveness. This new vaccine is giving us insights into how to develop second-generation vaccines and preventative tools that can be used on all ages, are even more effective, and can help us reach the goal of eradication.

This year also saw the start of a new chapter in my climate work. I released my book *How to Avoid a Climate Disaster* and launched the Breakthrough Energy Catalyst and Fellows programs to support financing, producing, and buying new clean-energy technologies. The reason I felt confident enough to expand our efforts so significantly was the incredible progress I've seen from Breakthrough Energy Ventures, where we are now supporting over 70 amazing companies.

I've been working on climate and energy issues for a long time, but the area has become a bigger part of my focus over the last twelve months. I also found time to work on some non-foundation and non-climate-related areas, like Alzheimer's research and expanding free educational resources for teachers.

Even though I think the things I've been working on are by far the most interesting part of my year, I know a lot of people are curious about a subject closer to home: my divorce. Melinda and I continue to run our foundation together and have found a good new working rhythm, but I can't deny that it's been a year of great personal sadness for me. Adapting to change is never easy, no matter what it is. I've been impressed by how resilient my loved ones—especially my kids—have been in this challenging time.

My family also experienced a lot of changes beyond what you probably saw in the news. My oldest daughter, Jenn, got married this fall, and her wedding was the highlight of my year. Our youngest, Phoebe, graduated from high school and went off to college. Since my son Rory is also away at school, that means I'm officially an empty nester. The house is a lot quieter without a bunch of teenagers hanging around all the time. I miss having them at home, even if it is easier to focus on reading a book or getting work done these days.

2021 has been a year of big transitions for me, but it hasn't changed why I love the work I do. As it comes to a close, I wanted to sit down and write about four things that are top of mind heading into 2022: the latest progress toward ending the COVID-19 pandemic, why decreased trust in institutions might be the biggest obstacle standing in our way, what the climate conversation can teach us about making progress, and how the rapid digitization brought on by the pandemic will shape our future.

Why I'm hopeful the end of the COVID-19 pandemic is finally in sight

In my previous end-of-year post, I wrote that I thought we'd be able to look back and say that 2021 was an improvement on 2020. While I do think that's true in some ways—billions of people have been vaccinated against COVID-19, and the world is somewhat closer to normal—the improvement hasn't been as dramatic as I hoped. More people died from COVID in 2021 than in 2020. If you're one of the millions of people who lost a loved one to the virus over the last twelve months, you certainly don't think this year was any better than last.

Because of the Delta variant and challenges with vaccine uptake, we're not as close to the end of the pandemic as I hoped by now. I didn't foresee that such a highly transmissible variant would come along, and I underestimated how tough it would be to convince people to take the vaccine and continue to use masks.

I *am* hopeful, though, that the end is finally in sight. It might be foolish to make another prediction, but **I think the acute phase of the pandemic will come to a close some time in 2022**.

(Left) A barista announces the reopening of her coffee shop. (Getty Images) (Right) Employees practice safety procedures at Suvarnabhumi International Airport in Thailand. (Lillian Suwanrumpha/Getty Images)

There's no question that the Omicron variant is concerning. Researchers—including a network called GIISER that is supported by our foundation—are working urgently to learn more about it, and we'll have a lot more information (like how well vaccines or previous infection protect you against it) soon. But here's what we do know: The world is better prepared to tackle potentially bad variants than at any other point in the pandemic so far. We caught this variant earlier than we discovered Delta because South Africa has invested heavily in genomic sequencing capabilities, and we're in a much better position to create updated vaccines if they're needed.

It's troubling any time a new variant of concern emerges, but I'm still hopeful that, at some point next year, COVID-19 will become an endemic disease in most places. Although it is currently about 10 times more lethal than flu, vaccines and antivirals could cut that number by half or more. Communities will still see occasional outbreaks, but new drugs will be available that could take care of most cases and hospitals will be able to handle the rest. Your individual risk level will be low enough that you won't need to factor it into your decision-making as much. It won't be primary when deciding whether to work from the office or let your kids go to their soccer game or watch a movie in a theater. In a couple years, my hope is that the only time you will really have to think about the virus is when you get your joint COVID and flu vaccine every fall.

Now that we're starting to move toward the end of this pandemic, I've been spending a lot of time thinking about what went right and what went wrong over the last two years. We can learn important lessons from the world's COVID-19 response that will make us better prepared next time.

Even though the pandemic has dragged on longer than anticipated, a lot has gone well. To start, **the progress we've made on vaccines is remarkable**. The world has never made and distributed a vaccine for a disease faster than it did for COVID-19. The fact that we had one—let alone multiple!—vaccines during the first year of the pandemic is miraculous. That success is a tribute to how many candidates the world had in the pipeline. Vaccine development relies on a little bit of luck, and we hedged our bets by trying so many different approaches.

I think **mRNA vaccines will ultimately be seen as the most consequential breakthrough of the pandemic.** Proving that mRNA works as a vaccine platform has been a massive gamechanger—not just for this pandemic, but for the next one too. Now that mRNA is well established, we'll be able to develop safe and effective vaccines super-fast in the future.

We also learned a lot about nonpharmaceutical interventions (or NPIs) that will inform disease response moving forward. NPIs include things like mask mandates, quarantine procedures, and travel restrictions. The last two years have given us the opportunity to see how effective different strategies are against a respiratory disease like COVID. Next time, the world will be ready to deploy cheap and easy tools like masks much quicker, and governments will have a greater understanding of when and how to deploy more burdensome strategies like lockdowns.

(Top left) A community health worker speaks with families about COVID-19 prevention in Afghanistan. (Top right) Students participate in an outdoor class in India. (Majority World/Getty Images) (Bottom left) A sign urges drivers to stay home during the early days of the pandemic. (Asurobson/Getty Images) (Bottome right) Catholic nuns prepare face masks for community distribution in Lusaka, Zambia.

Although stopping a pandemic is something that ultimately falls on systems and governments, **the last two years have shown us that individuals can make a real impact.** We've seen incredible people from around the world step up to do heroic work protecting their communities—from teachers who took time to drop off class materials on their students' doorsteps to health workers who went house to house making sure everyone had the opportunity to get vaccinated. I wrote a separate post profiling several of those heroes from the African continent. You can read about them here.

One area that's been a mixed bag is **therapeutics**. Up until the last couple of months, I was disappointed by the lack of progress we'd made on the treatment front. Remdesivir is expensive, and it just didn't have that big an effect. Dexamethasone is cheaper and helped a bit, but not enough to make a huge dent in stopping disease early. Monoclonal antibodies—which I was quite optimistic about at one point—were too complicated logistically to get out and save that many people earlier in the pandemic, and they weren't very effective against variants.

The reason I'm now feeling much better about therapeutics is the recent news about two new antiviral drugs. These are the therapeutics we needed in 2020. One of them—a drug called molnupiravir from Merck—just got the seal of approval from the FDA for people at high-risk last week. It significantly reduces your chances of being hospitalized or dying from COVID-19 (although not as much as we'd initially hoped), it's relatively cheap to make, and it's an oral medication that's easy to distribute.

Earlier this year, before we knew the drug worked, the foundation supported an effort to streamline the process of producing molnupiravir in order to bring costs down. Merck is letting generic manufacturers make this simplified formulation, which will make the drug accessible to a lot more people. We also recently committed $120 million to making sure the drug is available in lower-income countries where it will save a lot of lives. I just wish it had come along sooner.

The area I see as the biggest disappointment is **the inequity of vaccine allocation**. This is something I've written about at length and something I'm going to keep talking about any chance I get, because it didn't have to be this way. The world has done an outstanding job manufacturing and distributing billions of doses of vaccine, but the fact that so few people at high risk in low-income countries have received them is unacceptable. It just doesn't make sense that so many low-risk people got vaccinated before we reached everyone who's older or had an underlying medical condition. Moving forward, we need to change how the world allocates doses and find ways to ramp up manufacturing even faster, including by expanding global vaccine-making capacity and helping more countries develop, manufacture, and approve vaccines themselves.

The other area where there is huge room for improvement is in **finding ways to combat disinformation.** As I mentioned, I thought demand for vaccines would be way higher than it has been in places like the United States. It's clear that disinformation (including conspiracy theories that unfortunately involve me) is having a substantial impact on people's willingness to get vaccinated. This is part of a larger trend toward distrust in institutions, and it's one of the issues I'm most worried about, heading into 2022.

Declining trust makes it harder to tackle big challenges

I've had a lot of people ask me recently if I'm still optimistic about the future. While the answer is yes, being an optimist doesn't mean ignoring problems. I am deeply troubled by one challenge in particular.

The pandemic has been a massive test of governance. When the pandemic finally comes to an end, it will be a tribute to the power of global cooperation and innovation. At the same time, this era has shown us how declining trust in public institutions is creating tangible problems and complicating our efforts to respond to challenges. Based on what I've seen over the last

couple of years, I'm more worried than I've ever been about the ability of governments to get big things done.

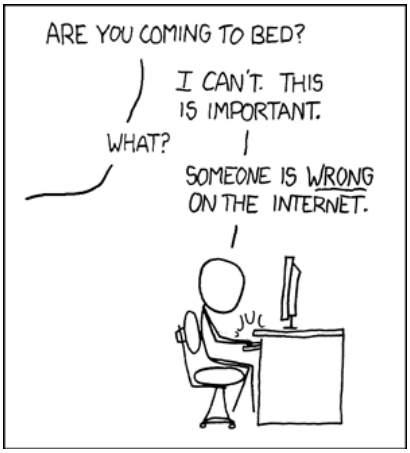
We need governments to take action if we're going to make progress on challenges like avoiding a climate disaster or preventing the next pandemic. But declining trust makes it harder for them to be effective. If your people don't trust you, they're not going to support major new initiatives. And when a major crisis emerges, they're less likely to follow guidance necessary to weather the storm.

This decline in trust is happening all over the world. The 2021 Edelman Trust Index shows worrying drops across the globe. Part of it is understandable: Any time you have a really big crisis like a pandemic, people look for someone to blame. Governments are an obvious target.

But this trend toward less trust in government didn't start in 2020. The pandemic only made clearer what had already been happening.

So, who or what is to blame? It's clear that increased polarization is a significant driver. This is especially evident here in the United States, although we're far from alone. Americans are becoming more divided and more deeply entrenched in their political beliefs. The gap between the left and the right is becoming a gulf that's harder and harder to bridge.

There are many reasons for this growing divide, including a 24-hour news cycle, a political climate that rewards headline generation over substantive debate, and the rise of social media. I'm especially interested in understanding the latter, since it's the most technologically driven.



(xkcd.com)

Digital communication has profound benefits in terms of helping people collaborate, stay in touch, and share things with each other. But social media has played a huge role in spreading misinformation that makes people suspicious of their governments. Social media feeds have become so personalized that you don't see factual information if it doesn't align with your profile.

I believe that governments need to regulate what you can and can't use social media for. In the United States, this topic has raised a lot of free speech questions. But the reality is that our government already has all sorts of norms around communication.

You can't slander someone or trick them out of their money by promising something you don't deliver on. Network TV shows can't show explicit sex scenes or use certain profane language before 10 p.m., in case children are watching. These rules exist to protect people. So why couldn't our government create new rules to protect them from the most tangible harms created by social media? They wouldn't be easy to enforce, and we'd need public debate about exactly where the lines should be, but this is doable and really important to get done. A video falsely claiming that the COVID-19 vaccine makes you infertile should not be allowed to spread widely under the guise of being news.

As people become more polarized on both sides of the aisle, politicians are incentivized to take increasingly extreme positions. In the past, if you didn't like the way a government agency was operating, you'd run on a platform of fixing it. Today, we're seeing more people get elected on the promise of abandoning institutions and norms outright.

When your government leaders are the ones telling you not to trust government, who are you supposed to believe? This creates a compounding effect where people lose confidence in government, elect politicians who share their distrust, and then become even more disillusioned as their leaders tell them how bad the institutions they now run are.

This is usually where I'd lay out my ideas for how we fix the problem. The truth is, I don't have the answers. I plan to keep seeking out and reading others' ideas, especially from young people. I'm hopeful that the generations who grew up online will have fresh ideas about how to tackle a problem that is so deeply rooted in the internet.

This problem requires more than just innovation to solve, although there are some steps we can take (especially around e-governance and making data more available to the public) to make modest improvements. There are all sorts of ways that great scientific ideas get published and tested. For great political ideas, the pathways are not as clear. Thinktanks and academics can point in the right direction, but at the end of the day—in a democracy at least—it seems to me like you need to pick the right leaders and give them the space to try new ideas.

What we can learn about progress from the climate conversation

There's a phrase we like to use at the foundation: Progress is possible, but not inevitable. Change happens because groups of people get together and decide to make things better. It might not happen as quickly as you want or need it. But if you have enough smart, thoughtful, and passionate people pushing for it, progress will eventually come.

I was reminded of this at the recent COP26 climate conference in Glasgow, Scotland. The climate conversation is often singled out as an area stymied by disagreement. In the past, there was a lot of debate about whether we had all the tools we needed to solve this problem. Now, there's a lot more agreement that we have some of what we need, but not all of it—and that we need to prioritize closing that gap if we're going to avoid a climate disaster.

I was blown away by the enthusiasm and intense engagement in Glasgow, especially compared to the last major COP conference in 2015. Everywhere you looked, you saw leaders from around the world—including lots of government officials and CEOs—eager to make real commitments.

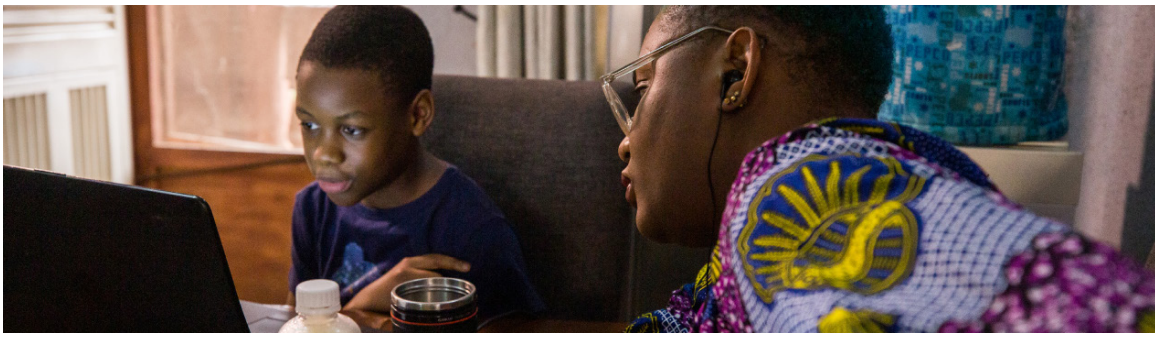
The biggest change I saw compared to 2015 was the focus on innovation. There is now a broad understanding that innovation needs to be at the forefront of any plan to get to zero emissions by 2050. The private sector is playing a central and necessary role alongside governments and nonprofits. It was encouraging to hear leaders from various industries that need to be part of the transition—including shipping, mining, and financial services—talk about their practical plans to decarbonize and to support innovation.

I spent a lot of time at the conference talking to people about how new green technologies need to be affordable enough for the whole world to use them. If we're going to scale the innovations that get us to zero, we need to reduce the cost difference between things that emit greenhouse gases and things that don't. I call this difference the Green Premium, and addressing it needs to be an essential part of any climate plan.

I was also excited to see so much attention paid to adaptation. We will lose the global fight against poverty if we don't help the world's poorest adapt to climate change, especially subsistence farmers who rely on the food they grow to feed their families and are the most at risk. Even if the world hits its goal of net-zero by 2050, we'll still experience significant warming. That will create huge problems for people in low- and middle-income countries unless we take steps now to help them, such as developing new crops that are more productive and can withstand weather changes.

In short, this conference made it clear that the world is engaged and making progress. The result was a number of important concrete steps, like new commitments to investing in clean technologies, pledges to cut methane emissions and end deforestation by the end of the decade, and the creation of a coalition that will help farmers adapt.

None of this happened by accident. The improvements made over recent years are a testament to the activists, elected officials, business leaders, philanthropists, and engaged citizens fighting to move climate change up the global agenda. We still have a lot more work to do—even if every commitment made at the COP is fulfilled, we still won't hit our target of limiting global warming to less than 2 degrees—and I hope the world builds on the progress made in Glasgow. But I'm optimistic that we have the momentum necessary to avoid a climate disaster.



2021 gave us a preview of our more digitized future

Even after this pandemic ends, it's clear that much of the digitization it brought on is here to stay. The last two years have led to monumental leaps forward in how we use technology, accelerating changes that would've taken years—if not a decade or longer—otherwise. We've seen rapid, widespread adoption of services that already existed, like ordering groceries online or having meetings over video chat. And we've seen the creation of new innovations that I think only represent the tip of the iceberg of what's to come in the years ahead.

Digitization is here to stay, but the technologies we're using will continue to get better over time. We're just at the start of how software will enable innovation. The more we use digital tools, the more feedback we get about how to make them better. It'll take at least a decade to understand the full scope of the pandemic's impact on digitization, but I predict we'll see big changes in three areas.

The first and perhaps most significant is office work. The pandemic has revolutionized how companies think about productivity and presence in the workplace. The boundaries between once-discrete areas of work—brainstorming, team meetings, casual conversations in the hallway—are collapsing. We're starting to see structures evolve that we thought were essential to office culture, and those changes will only intensify in the years to come as businesses and employees settle into new permanent ways of working.

I'm really excited about the potential for experimentation. Expectations around what productivity looks like have been upended. I see lots of opportunity to rethink things and find out what is working and what isn't.

For example, there has been a lot of debate about whether companies should stay completely remote, plan a full return to the office, or find some compromise between the two. Although most companies will likely opt for the hybrid approach, there's a good deal of flexibility around what exactly that approach might look like. What if your employees set their own schedule? Do you have people work from the office on Mondays and Fridays, or do you ask them to work remotely on those days knowing that traffic might be worse around the weekend?

I don't see any reason why companies need to make firm decisions right away. As the pandemic ends and things start to become more normal, this is a great time to take an A/B testing

approach to remote work. Maybe you have one team try one configuration while a different team tries another, so that you can compare the results and find the right balance for everyone.

(It's worth repeating that I'm talking about office jobs. The pandemic disrupted work in virtually every industry. There are huge sectors of the economy where things won't change as much or will change in different ways from what I'm describing here.)

I'm also really interested in how technology can create more spontaneity with remote work, moving forward.

This is the biggest thing you lose when you're not in the office. Let's say you used to work in an open space with six other people. You could look up at any time and see what they were up to. You could tell whether they felt like talking, giving you advice, or just taking a break to chat about nonwork stuff. That kind of spontaneous interaction stopped when many of us began working from home—you aren't exactly going to have an unplanned conversation with a colleague about your last meeting in your living room. But there are a lot of innovations in the pipeline to replicate that experience at home.

If you had a second screen that was very cheap and a physical place to put it, you could have a feed of all six of you sitting in your home offices working. You could look at the screen to see what everyone is doing (except when someone wants privacy and turns the camera off). When someone seems like they're free to talk, you could just click on their video, zoom in, and start chatting. This isn't radically different from how collaboration tools work today, and it's something we have the bandwidth and software power to do now.

I think we'll soon start to see an even bigger shift. People shouldn't assume that the quality of the software that lets you have virtual experiences will stay the same. The acceleration of innovation is just starting.

Within the next two or three years, I predict most virtual meetings will move from 2D camera image grids—which I call the *Hollywood Squares* model, although I know that probably dates me—to the metaverse, a 3D space with digital avatars. Both Facebook and Microsoft recently unveiled their visions for this, which gave most people their first view of what it will look like.

The idea is that you will eventually use your avatar to meet with people in a virtual space that replicates the feeling of being in an actual room with them. To do this, you'll need something like VR goggles and motion capture gloves to accurately capture your expressions, body language, and the quality of your voice. Most people don't own these tools yet, which will slow adoption somewhat. (One of the things that enabled the rapid change to video meetings was the fact that many people already had PCs or phones with cameras.) Microsoft plans to roll out an interim version next year, which uses your webcam to animate an avatar that's used in the current 2D setup.

I had a lot of fun trying out a 3D avatar earlier this year.

There are a ton of companies working on 3D avatars, and I recently had the opportunity to test out some of their prototypes. I was super impressed by what I saw. One of the biggest improvements over what we use now is the use of spatial audio, where speech sounds like it's actually coming from the direction of the person talking. You don't realize how unusual it is to have meeting audio only coming from your computer's speaker until you try something else. There's still some work to do, but we're approaching a threshold where the technology begins to truly replicate the experience of being together in the office.

The second area where we'll see the lasting effects of digitization is education. Unlike offices, schools will go back to only in-person instruction except maybe for some limited remote options for older high school students. What will change, though, is how we use digital tools to enhance the way kids learn.

The ability of new digital education tools to transform the classroom is, of course, dependent on kids having access to technology at home. The access gap has narrowed since the start of the pandemic and will continue to narrow, but a lot of kids still don't have a decent computer or reliable, fast internet at home. Finding ways to expand access is just as important as the development of new innovations.

The pandemic accelerated the development of dynamic curricula, as more teachers had to rely on digital tools to give students assignments during the periods when schools were closed. We're starting to see that curriculum become more responsive as demand goes up, and it will only become more tailored to the individual needs of students and teachers in the years ahead. The intention is that these new tools will supplement classroom learning rather than replace it. (If there's one thing the last two years made clear, it's that many kids—especially younger ones—don't do well sitting in front of a screen doing classwork all day.)

If you're a student, you'll be able to get feedback from the software while you do your homework online. The content will be more interactive and personalized to you, helping you focus on areas where you need a bit more help while boosting your confidence by giving you problems you're more comfortable solving.

(Left) A college student does homework on her laptop. (Carol Yepes/Getty Images) (Right) A teacher records himself explaining a math problem to his students in Jilin, China. (TPG/Getty Images)

If you're a teacher, you'll gain a deeper understanding of how your students are doing. A simple button click will show you that student X might need more help on a particular type of question while telling you that student Y is ready to take on a more advanced reading assignment.

The foundation has been working on innovative new tools like this for years, and it's been great to see so much progress made over the last two years in response to the pandemic.

Some of the biggest leaps forward have been in math curricula. A lot of kids develop a self-image of not being good at math. They struggle with problem sets that are perhaps too hard for their current skill level, and they never catch up as classes become more advanced. It's a big problem that I'm optimistic we can solve with technology.

The foundation is working with partners on new curricula that help kids become more confident in their math skills. I'm so excited about this work—and have so much to say about it—that I wrote a separate post detailing some of the most promising examples. You can read it here.

The final area where digitization is here to stay is in health care. Telehealth isn't new, but its popularity during the pandemic was. Over the last two years, we've seen more people opting for virtual appointments instead of in-person care. The technologies that facilitate these appointments are already getting much better, and I expect huge improvements over time.

Although some medical fields have gone back to mostly in-person visits, one area that I predict is forever changed is behavioral health. Virtual appointments have so many upsides that I think the new model is here to stay.

Seeing your therapist is a lot less time-consuming and easier to fit in your day when you only have to turn your laptop on. Sessions can be as long or as short as needed—a 15-minute session might not feel worth it if you have to go to a doctor's office, but it makes a lot more sense from home. Plus, many people feel more comfortable in their own spaces than in a clinical setting.

Other types of doctor's visits might become more flexible as new tools emerge, too. Right now, when it's time for your annual physical, you probably need to go into your doctor's office to get your vitals taken and your blood drawn. But what if you had a device at home that your

doctor could control remotely to test your blood pressure? What if he or she could look at data collected from your smart watch to see how you're sleeping and what your active heart rate is? What if you could get your blood tested at a convenient place in your neighborhood—maybe at your local pharmacy—that sends the results directly to your doctor? What if you could keep seeing a primary care physician you like even if you moved to another state?

(Left) Health workers pose with a robot that helps with consultations, therapies, and mental health evaluations of COVID-19 patients. (Claudio Crus/Getty Images) (Right) A dad checks his daughter's temperature while a doctor watches over a video call. (Maskat/Getty Images)

These are all real possibilities in the future, and I'm curious to see how they transform health care. Beyond the technology and privacy limits, there are also regulatory hurdles we need to figure out before digital health care becomes truly mainstream. Some states still make it hard to see patients virtually in a different state because of how licensing currently works.

As unbelievable as it sounds, we're only starting to see how digitization is going to change our lives. There is so much potential for technology to create more flexibility and options for people. I'm hesitant to suggest that anything about the COVID-19 pandemic has been positive. But when we look back at this period, I suspect history will view it as a time of terrible devastation and loss that also sparked lots of massive changes for the better.

Reasons for optimism in 2022

My work has always been driven by a simple idea: The world can get better. A big setback like the pandemic makes it harder to believe that progress is possible. I'm still optimistic, though, about our ability to build a world where everyone has the chance to live a healthy and productive life.

But that ability is dependent on whether we can stop the next pandemic. We can't afford to repeat the suffering of the last two years. The world had a chance to invest in the tools and systems that could've prevented the COVID-19 pandemic, and we didn't take it. Now is the time to learn from our mistakes and take steps to prevent this terrible experience from ever happening again.

The good news is that the world no longer needs to be persuaded that stopping a pandemic is important. I'm hopeful that we'll see broad support for pandemic preparedness efforts, and I plan on spending a lot of time advocating for them. **This is the biggest and most important thing I'm going to work on in 2022.** I'm currently writing a book that will come out some time next year, which lays out my plan for making sure that COVID-19 is the last pandemic.

I think we'll see plenty of other reasons for optimism in 2022 as well, especially on the innovation front. I expect lots of progress as R&D that was put on hold by the pandemic picks up steam.

One of the things I'm most excited to track is the clinical trials for a promising new HIV preventative called islatravir. Today, you can reduce your risk of getting infected by either taking a pill every day or what's called "on-demand prophylaxis." Although both current options provide terrific protection, the former relies on the ability to take it regularly, and the latter requires planning ahead.

Islatravir is a pill that you take just once a month. The first results from the Phase II trials were released this summer, and they're terrific so far. I look forward to seeing more next year, as well as following progress on Phase III trials. Our foundation helped fund a Phase III trial of the drug in Africa, which started in early 2021 and will study how effective the drug is for young women for the next several years.

Another area to watch for in 2022 is Alzheimer's diagnostics. Huge progress has been made on this front recently, and there's a decent chance that the first affordable, accessible blood test for Alzheimer's will get approved next year. Although this won't be a game changer yet for people who have the disease—which currently has no cure or even a way to slow it down—this test will accelerate progress in the quest for a treatment breakthrough.

I'm also looking forward to continuing the work of Breakthrough Energy Ventures, Catalyst, and Fellows to make clean-energy innovations more available and affordable for everyone. They're enabling breakthroughs across a broad range of areas, many of which are still years away. One area where we might see some real progress soon is in making green hydrogen fuels more affordable. This would be a huge step forward, because hydrogen fuels would enable long-duration energy storage and could be used to run things like large planes and industrial processes.

Settling into a new normal

I've never been a big New Year's resolution person. I don't have any specific goal in mind for 2022 (although I guess I still have a couple more weeks to think of one). But what I do hope is that next year is a lot more settled than this one.

Human beings are naturally resistant to change. Whether it's the massive global upheaval of the last two years or transitions closer to home, it's never easy to adjust to new ways of living.

I think 2022 will be a year when many of us finally settle into a post-pandemic new normal. For me, that will mean going into the office a bit more as COVID cases hopefully go down. I want to find a new rhythm at home now that all three of my kids have moved away and my day isn't as structured around finding time to spend with them. I'm looking forward to spending more time engaging with people through my blog and other channels. I'd like to keep up my COVID-era habit of watching lots of educational videos on YouTube and subscription services like Wondrium, because they're a really great way to learn about obscure topics. (I now know more about glassmaking, birdwatching, and the history of American Samoa than I ever expected.)

I hope you and your loved ones also find a way to create new routines. There's no question that the pandemic will create huge, lasting changes that will take years to fully understand, which can feel scary. One of my favorite authors, Yuval Noah Harari, once wrote that, "people are usually afraid of change because they fear the unknown. But the single greatest constant of history is that everything changes."

The world has adapted to big disruptions before, and we'll do it again. In the meantime, I wish you a very happy holiday season.