How should countries regulate cybertechnologies and scientific innovations going forward?

United Nations General Assembly (UNGA)

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INTRODUCTION TO THE COMMITTEE

The General Assembly (GA) of the United Nations (UN) was formed together with the United Nations in 1945, following the intentions of the Allied countries to ensure global peace after the Second World War. Its first reunion gathered 51 countries (many countries were still colonized at that time) and took place in London, United Kingdom. Nowadays, the United Nation is the planet's biggest international organization, gathering no less than 193 voting members and 2 observer members (Vatican City or Holy See and Palestine). The main purposes of the United Nations today remain to ensure global peace and security, friendly relations between nations, harmonize nations and achieve international cooperation in order to achieve a respectful development.

FLAG OF THE GENERAL ASSEMBLY: United Nations website

The General Assembly of the United Nations is gathered each year in session from September to December, and later, when needed. The 2023-2024 session will be the 78th.

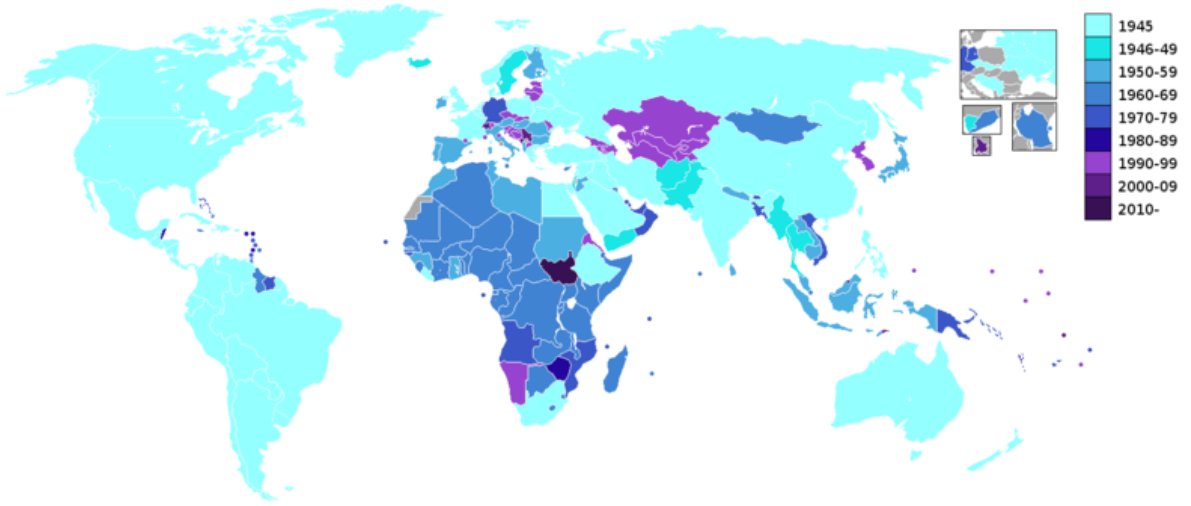
The headquarters of the United Nations are located in New York, in the United States of America, but the organization has other offices across the world, in Nairobi (Kenya), Vienna (Austria), Geneva (Switzerland), and the Hague (Netherlands), where the headquarters of the International Court of Justice (ICJ) are located.

HALL OF THE GENERAL ASSEMBLY:

United Nations website

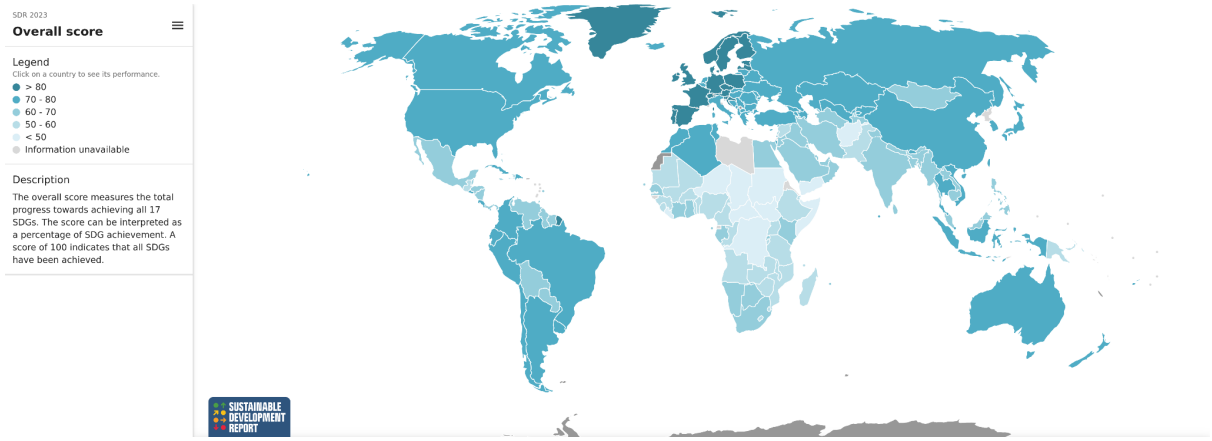
There are six main organs composing the United Nations, including the General Assembly, the Security Council, the Economic and Social Council or the Secretariat. The United Nations also operates throughout the globe through specialized agencies (WHO, UNESCO, IMF, UNHCHR, overviewing the Human Rights Council), programs (the United Nations Environment Program), or other bodies (International Labour Organization, for example). The General Assembly itself is composed of six committees, dealing with diverse matters, and holds sovereignty over most of these matters. The first committee handles questions related to disarmament and international security, the second deals with economic and financial questions, the third with social, humanitarian and cultural questions and the fourth with special politics and decolonization. The two following committees, the fifth and the sixth, respectively deal with administrative and budgetary matters, and legal questions. All these different intergovernmental organizations and international institutions are gathered under the term "UN system".

The United Nations General Assembly, as a multilateral institution, is more crucial than ever now, in a multipolar world, facing global challenges. Currently in its 78th session, it serves as the main representative and policy-making organ of the United Nations. As per any organ of the United Nations, its functions are determined in the UN Charter (Chapter IV, articles 10-19 and 22). Besides approving the United Nations budget, appointing the Secretary General (currently António Guterres, appointed in 2017) and electing the non-permanent members of the Security Council, the General Assembly is also the overseer of every organ and other body of the United Nations, and as such, is the leading organ to make global policy regarding many fields covered by the UN system. In other words, the United Nations are governed by the General Assembly.



MEMBER STATES OF THE UNITED NATIONS AND THEIR DATE OF ENTRANCE

"Roke" with United Nations website data on Members-States



MEMBER STATES OF THE UNITED NATIONS AND THEIR SCORE OF ACHIEVEMENT OF THE SDGs

Sustainable Development Report (2023)

The main current preoccupations of the United Nations include climate change and reaching the Millennium Development Goals (now called Sustainable Development Goals or SDGs), established in 2015 and aiming to ensure sustainable development on a global scale by 2030. Their cost, estimated at $2,500 billion and the large panel of targets they determine

(169 issued by the Nairobi conference in 2015) certainly make them the toughest international challenge so far in the history of mankind.

Halfway to the due date, overall, no country has yet managed to fully reach the SDGs. Innovation, besides being part of the SDGs, can also bring new solutions to achieve all of them on time. Giving free access to knowledge and artwork, the Internet itself can help achieve several SDGs, while all cybertechnologies can bring a welcome help for global adaptation and the achievement of sustainable development. However, and as we already have seen it in the past, technology can also be a dangerous all-powerful tool of war and control, and could create new problems or make current ones more complex.

THE SDGs / Focus 2030

Even though the development of cybertechnologies is very recent (the first-ever programmable computer is barely 80 years old), their impact on the world and human lifestyle is already huge. Whether it be social media, counting over 2.5 billion users, the Internet, counting over 4 billion users, or new deep learning AI like ChatGPT, the influence of cybertechnologies on the world is tremendous. Such an impact on the planet can force us to re-define the issues tackled by some SDGs, or to help achieve SDGs more simply. In any case, it is certainly a crucial global topic nowadays.

INTRODUCTION TO THE TOPIC

In order for the subject to be correctly understood and assimilated, it is most important to assign a special meaning to the word 'regulate', which is central to this subject. For this, it is crucial to assess its links with the other words of the topic: cybertechnologies, a brand new concept whose meaning is, again, quite vague; and "innovation", a term with a vast meaning too, but in which experts agree to see something positive.

Most definitions of cybertechnologies link the word with computers, computer sciences, digital technologies and virtual space created by computer networks, and artificial intelligence. Thus, cybertechnologies are considered to be all of the above at the same time, and are very narrowly related to science.

The definition of 'innovation' given by the Organization for Economic Co-operation and Development (OECD) in its Oslo manual, is the "production or adoption, assimilation and exploitation of a value-added novelty in the economic and social spheres: renewal and enlargement of products, services and markets; development of new methods of production, and the establishment of new management systems. It is both a process and an outcome". Even if it is a very concrete and appropriate definition, the true meaning of innovation is still the object of debate among many scientists, thinkers and economists. For example, following Alan Altshuler and Robert D. Behn, innovation would include the creative uses made from an original invention, like generation, admission and realization of new ideas, products, services and processes. No matter the definition, however, there are some characteristics directly excluded from the meanings of innovation: it is not a discovery, the first idea leading to the invention, nor an invention itself, the creation of something that did not exist naturally before, but rather a new use found to a known technique or invention, leading to gains in terms of profit, production outcome and followed - in most cases - by an improvement of the quality of life.

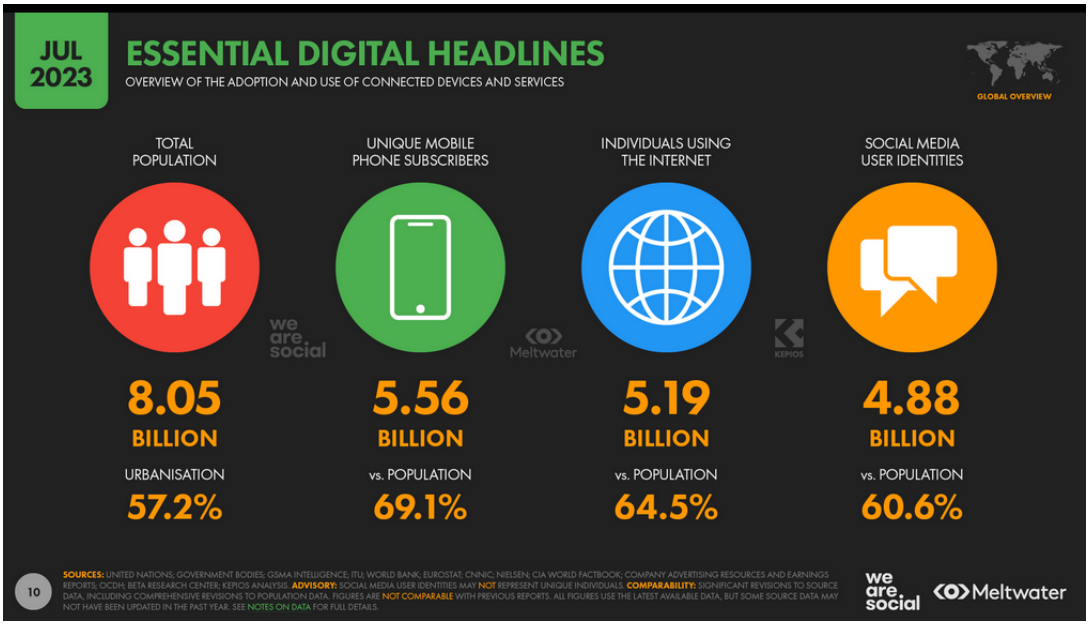
Considering this information, it would appear that the best way to understand the word 'regulate' in this topic would be to seek a way, not only to apply borders, but also to structure, to put together. This can be interesting in two ways: it is a way of linking scientific knowledge and progress in cybertechnologies, on the one hand, and intellectual property and other human rights. But the topic also discusses the necessity of applying limits to innovation and cybertechnologies, which some might see as slowing down progress, or even preventing humankind from going forward. Thus, in this topic, there is a **double debate**.

First, should countries apply limits to ever-growing scientific innovations and cybertechnologies leading humankind to move forward faster every time and, if so, how? On one hand, it is true that cybertechnologies and scientific innovations achieved so far have helped humans a lot in reaching a better understanding of the world, a different lifestyle providing more while requiring less effort and/or effort of a different type: writing, agriculture, the steam engine, power, computers are all inventions leading to major organizational changes and innovations in mankind. Laws, stable quantities of food, the birth of industry and of electricity, and lately machine-learning have dramatically changed and improved human life conditions since the dawn of time. However, this was at a cost: pollution, the alteration of ecosystems, inequality... This cost is especially high regarding cyber technologies and scientific innovations: the concentration of massive amounts of power in the hands of a few individuals with only a few companies holding an oligopoly on social media, internet technologies and research and development of new technologies. Besides, some scientific innovations were purely designed as war engines: computers at first, but also the atomic bomb and other weapons of mass destruction. Furthermore, cybertechnologies provide new ways to make war, and new areas vulnerable to crime and illegal behaviors. Still, despite the impact they can have all over the planet, regulating the development of cybertechnologies and scientific innovations might slow down many innovation and development projects , crucial to everyone, especially in the context of global

warming requiring new technologies urgently in order for mankind to confront it properly, and to transition to sustainable development.

The second issue worth discussing is that of a potential regulation of cybertechnologies: to what extent, and how, should countries favor and encourage the development of scientific innovation and generalize the use of cybertechnologies? If cybertechnologies have brought about a drastic change in the functioning of companies and societies, extending to the lifestyle of every person composing them, they also have a considerable impact and present multiple serious risks: data breaches, cyberattacks, phishing, malware, online crimes… They create threats to the right of privacy, allow hate and conspiracy theories to spread through anonymous accounts operating on social media, where they can reach a massive audience and thus have all the more dramatic consequences. Earlier this year, the massive spread of the use of artificial intelligence (AI) enhanced and worsened such threats to basic human rights. For example, it triggered a massive phenomenon of reproduction and appropriation of pieces of art by brands or other cybertechnologies users based on an AI reproduction of an already existing piece of art, recognized to belong to an artist. Such situations threaten the very basis of the right of intellectual property, supposed to guarantee the good protection and regulation of the production and use of art pieces. Scientific innovations can also cause major international disruptions with catastrophic effects and have severe consequences for human health and nature.

Such means could even later fall into the hands of terrorist groups or other criminal organizations, and be a major threat to world peace and security, and to harmony between nations. Faced with such possibilities, member-states might have to demand a lot of transparency, accountability and responsibility for innovations. However, an overbearing transparency policy can affect companies' ability to keep innovating and get profits from their innovations, which could globally lower the interest of companies in research and development, and thus radically slow the technological and scientific progress at a planetary scale. In addition, a strong legal regulatory framework for innovations, apart from potentially ensuing extra costs, can limit the ability for anyone to innovate and impact free entry to the market, causing competitive disadvantages for new actors attempting to join the market. Moreover, if fighting hate and online crime is a serious issue, it should not overstep the people's freedom of speech, a basic human right.



DATA REGARDING DIGITAL TECHNOLOGIES: DataReportal

DEFINITIONS

UN system: in addition to the UN itself, it comprises many funds, programmes and specialized agencies, each of which have their own area of work, leadership and budget. The programmes and funds are financed through voluntary rather than assessed (i.e. mandatory) contributions (Definition - UN System | United Nations)

Specialized agency: independent international organization funded by both voluntary and assessed contributions (Definition - Specialized agency | United Nations)

Internet: All the interconnected worldwide networks that enable computers and servers to communicate effectively via a common communication protocol (IP). Its main services are the web, FTP, messaging and discussion groups. (Definition - Internet | Insee)

Cybertechnology: Computer technology, especially that which involves the Internet or cyberspace. (Definition - Cybertechnology - Wiktionary)

Cyberspace: The notional environment in which communication over computer networks occurs. (Definition - Cyberspace | Oxford Advanced Learner's Dictionary)

Cyber Attack: Actions taken through the use of computer networks to disrupt, deny, degrade, or destroy information resident in computers and computer networks, or the computers and networks themselves. (https://csrc.nist.gov/glossary/term/Cyber_Attack)

Artificial Intelligence: the use of computer programs that have some of the qualities of the human mind, such as the ability to understand language, recognize pictures, and learn from experience. (Definition - Cambridge Dictionary)

Mobile connectivity: The ability to connect mobile devices, such as a handheld computer or a cellular telephone, to the network [and by extension, the Internet]. (MOBILE CONNECTIVITY)

R&D (research and development): the part of a business that tries to find ways to improve existing products, and to develop new ones. (Definition - Cambridge Dictionary)

TIMELINE

Date	Event
1872	**Electricity**: Russian Alexander Lodygin invented an incandescent light bulb and obtained a Russian patent in 1874
1885	**Automobile**:The internal-combustion engine improved, becoming smaller and more efficient. Karl Benzused invented a one-cylinder engine to power the first modern automobile, a three-wheeled car that he drove around a track.
1895	German physicist Wilhelm Röntgen discovered **X rays.**

	American Ogden Bolton, Jr. invented the **electric bicycle**.
1945	The world's first **nuclear explosion** occurred on July 16, 1945, when a plutonium implosion device was tested at a site located 210 miles south of Los Alamos, New Mexico, on the plains of the Alamogordo Bombing Range, known as the Jornada del Muerto. The code name for the test was "Trinity."
1948	The computer called “Baby” was activated, it was the first computer with a stored program that used the **binary system**, in a Manchester University laboratory.
1951	John Mauchly and J. Presper Eckert completed UNIVAC1, the first **commercial and administrative computer** produced in the United States. It was used by the United States Census Bureau for the population census.
1957	The Soviet Union (Russia and her allies) launched the **Sputnik space satellite.**
1967	Paul Baran designed a new communication network called **ARPANET** (Advanced Research Projects Agency Network), which initially provides only three services: remote login, file transfer protocol (FTP) and remote printing.
1974	**Internet**: Vinton Cerf and Robert Kahn produced the **TCP/IP** (Transmission Control Protocol/Internet Protocol), which describes how data can be broken down into smaller pieces called packets and how these packets can be transmitted to the right destination.
1989	Tim Berners-Lee invented the **World Wide Web.**
1992	The United States legalized **commercial activity on the Internet.**
1994	Japanese Masahiro Hara invented a two-dimensional barcode known as the **QR Code**.
1998	PayPal, one of the first **online payment systems**, is launched. Google is also launched the same year
2001	Apple revolutionized music listening by unveiling its **iPod MP3 music player.**
2007	Amazon.com launched its Kindle **electronic book** (e-book) reader. Apple introduced a **touchscreen cellphone** called the iPhone.
2004	A Harvard sophomore named Mark Zuckerberg launched **The Facebook**, a social media website he had built in order to connect Harvard students with one another. By the next day, over a thousand people had registered.

	Electronic voting played a major part in a controversial US Presidential Election.
2010	**3D TV** started to become more widely available.
2012	American biochemist Jennifer Doudna and French microbiologist Emmanuelle Charpentier developed **CRISPR-Cas9, a method for editing genes**—that is, making changes to DNA sequences
2016	**Tiktok** was founded in 2016 by Chinese tech company ByteDance, this short-form video-sharing site was merged with the U.S.-based mobile app Musical.ly in 2018 and became popular with American teens and young adults. The Ebola epidemic: A **vaccine** known as Ervebo, made by the pharmaceutical company Merck, was tested in a clinical trial in Guinea that was performed toward the end of the outbreak and proved the vaccine to be effective
2021	Ireland: the Health Service Executive (HSE) of Ireland suffered a major **ransomware cyberattack** which caused all of its IT systems nationwide to be shut down
2022	NASA unveiled the Space Launch System (SLS), a new **moon rocket** 15 percent more powerful than the Saturn V rocket from the Apollo era. State-sponsored **hackers** took down RuTube, the Russian version of YouTube, according to the company
2023	Microsoft announced a new version of its Bing search engine incorporating **ChatGPT, an "artificially intelligent" chatbot**, for smarter answers to search queries.

HISTORY OF THE TOPIC

Scientific innovation, cybertechnologies more recently, and in general new technologies have always been an element of power, as well as a crucial asset to countries' politics and global influence. Whether it is the invention of writing, marking the beginning of history, or the development of agriculture and hence, civilization, the role of technologies in the relationships between nations has always been central. This shows why states, no matter the historical period, have always been interested in technologies. Scientific innovation and, more recently, cybertechnologies, can help to understand why some technologies were primarily designed for a military purpose. Gunpowder, nuclear fission and even computers were created in times of war by the armies, and each of these technologies later was revolutionary to the whole society. Through diverse historic examples and facts, we will try in this section to assess the importance of scientific innovations and their impact on society.

A. SCIENTIFIC INNOVATIONS

Today still, vaccines remain the most efficient medical intervention, protecting people around the world from over 20 deadly diseases. Vaccination is an old practice: from the 15th century, in several parts of the world, some trials involved healthy people who were intentionally exposed to smallpox in order to be immune from it in the future. However, the first vaccine was developed by the Briton Edward Jenner in 1796: he observed that people exposed to the vaccinia, a quite harmless infection cows could transmit to humans, were immune to the smallpox. Hence, he decided to inoculate the virus of the vaccinia to a child, and after that the virus of the smallpox: the child did not develop the symptoms of the smallpox. The world's first vaccine was born. The way Mr. Jenner developed his vaccine remains ethically questionable, but thanks to him, the eradication of smallpox, a very dangerous and deadly disease at the time, could start. Less than a century later, French scientist Louis Pasteur developed a vaccine that could prevent the development of the symptoms of rabies after having been exposed to it, the world's second vaccine was developed. Both function by exposing people without symptoms to a weaker version of the infection in order to boost the immune reaction and allow the organism's natural defenses to counter the infection more efficiently.

Worldwide vaccination campaigns started to fight diseases that were not endemic anymore, and there are records of international campaigns against diseases since the XIX century: in 1850, 12 European states met for the first international health conference. In 1892, the conference produced an international convention on cholera, followed in 1897 by an international convention on plague. A few years later, during the First World War, in 1917, a new form of flu, particularly deadly, killed millions of people, and it was so devastating that some governments – especially the United States' - prioritized the development of a vaccine, as it devastated armies and civilians. The disease that would later be known as the Spanish flu remains one of the deadliest pandemics of recent times, that caused the death of an estimated 50 million people. The researchers needed years after the pandemic started to develop the vaccine. It was eventually provided to soldiers in 1945 and to civilians in 1946.

As we are talking about vaccination campaigns, it is necessary to consider the World Health Organization (WHO) policies. The WHO was created in 1948 by the United Nations to promote health and safety while helping the most vulnerable worldwide. The WHO started in the 1960s its first global programs to eradicate diseases on the whole planet. The first mass vaccination campaign was smallpox, eradicated in 1980. Major vaccination campaigns also took place in order to fight diphtheria, poliomyelitis, tetanus, measles, tuberculosis and pertussis.

It is estimated that, thanks to the vaccines, infantile mortality dropped by 50% over the last 30 years. However, vaccines can still gain in efficiency: ensuring their distribution to everyone can remain hard today, especially in a context of increasing defiance regarding vaccines – favored to a certain extent by overwhelming hoaxes and fake news on some social media. Despite these setbacks, vaccines remain a very active and dynamic field for scientific innovation: in 2006, the first vaccine against the human papillomavirus (HPV) was launched; it is a crucial step towards the elimination of cervical cancer, to which HPV is narrowly linked. In December 2020, not even a year after the start of the COVID-19 pandemic, the first doses of the vaccines against this new disease were delivered to vulnerable people:

developed in less than a year, the COVID-19 vaccines also represent a step forward in terms of functioning: they are the first ribonucleic acid (RNA) vaccines, intervening directly in the cells of the vaccinated individual to counter the infection. The history of this innovation shows how research can help humanity. It sheds light on the progress of institutionalization, particularly to spread its results to the populations.

Still, it also shows that scientific innovation can trigger the defiance of the populations regarding their impacts and side effects, as proven by the wave of conspiracy theories surrounding the development of RNA vaccines to fight the COVID-19 pandemic, with political movements appearing to oppose the vaccination. If such movements have existed for as long as vaccines, their size and importance was never equivalent to those opposing the COVID-19 vaccines, which can be explained by two main factors: First, the speed at which the vaccine was developed, in less than a year, an as yet never seen period of vaccine development, and second the opacity and complexity of the means of action of these vaccines of a new generation. It can explain the importance of transparency regarding innovations, brought in in some cases to save lives and protect vulnerable people.

COVID-19 vaccines also highlighted the deepening unevenness between most economically developed countries, emerging markets and least economically developed countries. Indeed, developed countries monopolized as many doses of vaccines as possible, while due to that, developing markets could not get doses for months, worsening the impact of the pandemic on their economy. To avoid this in the future, and to save and protect the lives of the people on Earth, as is the duty of the countries in the United Nations, it is thus crucial to provide a legal framework for scientific innovations.

Let us now look into a totally different domain, nuclear power, to deepen, as far as possible, our comprehension of innovation in that field. A few decades ago, the development of nuclear fission has had a tremendous impact on many fields. It was first thought possible through calculations by A. Einstein, but gained interest at the time of the Second World War, when the American army started to develop weapons using nuclear fission to induce massive explosions of unprecedented violence. It was the birth of the weapons of mass destruction (WMDs). Such weapons were at the center of the arms race between the United States of America and the Union of Soviet Socialist Republics (USSR), and were thus produced at massive scales during those times. Many countries have developed an arsenal with such weapons: France, the United Kingdom, the United States of America and the USSR, Pakistan, India, China, Israel, North Korea dispose of their own, according to the Institute of Science and International Security (ISIS), but other countries are to this day suspected of wanting their own weapons of mass destruction. Such weapons have led to a geopolitical revolution moving from open wars to deterrence. It had fundamental consequences over a new diplomacy that defends global peace and security. As a strong deterrent, they prevent direct confrontation between states in possession of WMDs, and with others.

But nuclear fission since its discovery and practical application has not only been used to produce weapons. Nuclear fission is also today a major source of electric power.Thus, today, there are 440 nuclear power reactors in the world, with 60 others in construction. 10% of the world’s electricity is nuclear, and nuclear plants are mainly located in Asia, Europe and North America. Some energetic mixes widely rely on nuclear plants, the first being France, with over 70% of the energetic production coming from nuclear plants. Such plants are sometimes regarded as crucial in order to achieve an ecological transition,

as they represent a massive energetic supply without emitting greenhouse gasses (GHGs) and there are enough nuclear combustibles to provide energy for decades.

However, criticisms have risen regarding nuclear energy. The main aspect driving concerns and critics regarding nuclear energy is safety. Over the years, serious accidents (like in Chernobyl, USSR, in 1986, due to a human mistake, or in Fukushima, Japan, in 2011, because of the preceding tsunami) have completely changed some countries' views on nuclear energy, with some slowing down the creation of new power stations and sometimes even deciding to stop using nuclear energy (Germany, for example), due to risks of nuclear accidents, irradiation and important costs. Nuclear fusion, still under development for civilian applications, could bring new perspectives to the world of nuclear energy, primarily because it would help to reduce the production of problematic nuclear waste, contaminating the environment sometimes for over 10,000 years. As there is no possibility of getting rid of such waste, progress and innovation in the area of nuclear waste handling are urgent, given the importance nuclear energy is taking in countries' power mix.

Other inventions and innovations have also brought a fundamental revolution to countries' organization and structure. Certainly one of the most recent and important technological and scientific innovations was the telephone - originally invented by Alexander Graham Bell in 1876. This new technology was further developed multiple times, but the most recent and determining one is undoubtedly the mobile phone – since the late 1990s – and soon after, of smartphones – in the early 2000s. Allowing communication from anywhere to anywhere anytime, mobile phones were a revolutionary technology and their use was generalized over the globe within a few years. This revolution of communication was strengthened when, a few years later, smartphones arrived on the market. The arrival of smartphones on the global market meant all humankind's knowledge would be accessible anywhere, anytime, from anyone's pocket.

Still, since the arrival of smartphones on the market, conspiracy theories, revisionism, fake news and other movements of pseudo-knowledge have considerably gained in importance: thanks to social media, conspiracy theories have been able to reach to a wider audience, and their impact over society has thus increased: according to the Pew research center, during the pandemic, 81% of American social media users had heard about the conspiracy that the pandemic had been planned by powerful people. Following the study, the conspiracy spread more easily through social media in the United States than on TV, radio, print or news apps or websites. Furthermore, new forms of cons have appeared and multiplied over the globe during the past two decades (phishing, for example). It highlights problematic, wrong and sometimes malevolent uses of cybertechnologies, which ease the spread of false information and knowledge all over the globe.

B. CYBERTECHNOLOGIES

The first fully programmable computer was built in 1943 by the British army. Its first purpose was to crack Lord Lorenz's code, used by Nazi Germany to encrypt its messages through the enigma system. Having succeeded, it gave a crucial – some historians even say decisive – advantage to the Allied countries in the war. If the use of the computer was first very restricted and limited to the armies and defense forces, researchers in other fields quickly understood the other applications it could have. The technology then spread over the globe, in less than 50 years. The first computer network, ARPAnet, was completed in the

1960s, and used in advanced research and strategic contexts: communication between very high levels of research or between military units. In the late 1980s, the first commercial networks were developed and accessible to the public. Tim Berners-Lee created the first World Wide Web in 1989. Since then, the number of such tools has increased and the number of their users has consistently grown, and so has the importance taken by the Internet in daily life. Some states have launched and progressed towards the digitalization of their administrations and social services.

However, the importance taken on 3by the Internet and cybertechnologies appeared most significantly between 2019 and 2021, during the lockdowns triggered by the COVID-19 pandemic. At this point, as on-site work was made impossible for many workers, some started working from their home, or from where they were staying at this point of the pandemic. Teleworking spread in a few weeks through many fields gathering dozens of millions of workers, from retailing to teaching to providing medical care, with e-shops booming, online classes and even online medical consultations. This was crucial and saved many economies from an even stronger fall back than the one they endured after the lockdowns. From this point, teleworking was normalized in many societies and many workers re-adjusted their contracts to be able to keep doing so after the pandemic.

But the importance of teleworking is not only to protect developed countries' economies. In fact, one of the most crucial lessons that the COVID-19 pandemic taught us is that the gap between developed countries capable of being vaccinated in weeks or to adapt right away to teleworking and developing countries, still running vaccination campaigns today and with little to no teleworking, is widening. Teleworking and vaccines are only two of the highlights of such growing inequalities. There are still, nowadays, major geographic disparities in the access to the Internet and technologies in general, with continents critically under-equipped compared to others. Such technological and scientific inequalities made it even more difficult for less developed countries to protect their economy and population during the pandemic, as lockdowns were more complicated to decide due to an even worse impact on the national economy.

Facebook, the first social media that quickly connected all the planet, was opened to the public in 2004. Facebook is now owned and managed by the company Meta, also owner of WhatsApp, Instagram, Oculus, and Snapchat, and currently a cybertechnology juggernaut, counting over 2.91 billion users (only on Facebook). Amazon is the online retail giant, Microsoft and Apple are the computer and electronic device giants and Google is now the Internet giant. These five companies all have a net yearly result of over US$ 100 billion. This reflects both the size and the importance that these companies have acquired on their market. Very few companies are able to compete with them with a few notable exceptions: the BATX Chinese group of companies (Baidu (browser), Ali Baba (retail), Tencent (social media) and Xiaomi (electronic devices production)), the giant microprocessors manufacturing company TSMC (Taiwan Semiconductors Microprocessors Company), and Samsung.

All these companies have a strong hold over the market and prevent other actors from joining it, as their production cost is lower and their experience superior. But the power held by the IT giants is not limited to the simple control of the market: companies like Google or Meta have access to their users' center of interests, contacts and other personal data, which they can dispose of however they want: it is possible to sell such data to companies

with goals to set personalized advertisements or content and to make it even more profitable to them. Even if minor competitors can offer stronger protection – such as DuckDuckGo – or answer for the use of the benefits of the browser – like Ecosia, for the minor competitors, such initiatives remain few, and raise questions as per their efficiency. Regional organizations, starting with the European Union have adopted strong legislation (through the General Data Protection Regulation - or GDPR) to ensure that Internet and electronic device users can control their imprint online or on these devices but such initiatives remain quite limited. Hence a new question: should there be a concrete, international legislation regarding the treatment of online data by a third party (in most cases an important private company)?

In 2022, technology tycoon founder of PayPal, Tesla and SpaceX Elon Musk bought Twitter, a social media company with over 368.4 million active monthly users, for over US$46 billion. Since then, Mr. Musk has used his control of the company to allow the former President of the United States of America Mr. Trump back on the platform. Mr. Trump's exact role in the Capitol riots on January 6th, 2021– in which social media played a crucial role – remains unclear. However, now that he has been allowed back on Twitter, Mr. Trump uses the platform to relay a populist speech, and in so doing, is turning his supporters against the federal government and institutions. As the strongest economy and military of the planet today, the United States of America are central to international relations, and the help the country can provide in facing the big challenges of the 21st century is crucial. This explains why most analysts are much concerned indeed about the populist speech of Mr. Trump and the threat he represents for American democracy. Today, his communication mainly goes through social media. This example clearly shows the duality of the question of social media: on one hand, unjustifiably restricting one's right to speech is anti-democratic and legally questionable - especially as it is a way of democratic expression in countries under an authoritarian regime, but on the other hand, a total absence of control can result in the widespread transmission of fake news, hoax, criminal, hateful content and other content threatening the public order of whole nations.

Earlier this year, ChatGPT, developed by OpenAI, was the first generative AI to reach such importance and global fame. Market experts seemed to have underestimated the impact generative AI could have, as, according to the New York Times, chip-maker NVIDIA, a company without any serious rival in the market of graphics processing units (GPUs), forecast it would generate US$11 billion in the second quarter, exceeding analysts' expectations by more than US$4 billion (GPUs are designed to power AI technologies). Specialists already compare the arrival of AI on markets to the development of the commercial Internet in the late 1990s, as major IT companies are already preparing tools using AI generative.

DISCUSSION OF THE TOPIC

A. ASSESSING THE CURRENT SITUATION AND THE RISKS

Cybertechnologies have progressed rapidly over the last two decades and their importance is still growing around the globe. It can be explained by the spread of new technological devices in most economically developed countries (MEDCs) at first. This was soon followed after by the emerging economies and their gigantic markets. There are, as of July 2023, 5.56 billion unique mobile phone subscribers, of whom 5.19 billion have access to the Internet. This accounts for respectively 69.1% and 64.5% of the global population (8.05 billion). The number of unique mobile phone subscribers has grown by 2.7% since last year, which means there are 145 million new unique phone subscribers. The number of individuals having access to the Internet has slowly but steadily increased too since 2021.

Mobile connectivity, the ability for a mobile device to connect to the Internet in this context, is subsequently growing. Most mobile connections (89.7%) now take place through broadband mobile connections, which have sustained 7.69 billion mobile connections. The number of cellular connections (Internet of Things for example) is growing too, with an increase of 1.9% since 2022. In the third quarter of 2023, the number of Internet users has grown by 0.2% compared to the second quarter. Smartphones now represent around 84% of the mobile phones in use today, and the number of smartphones in use has grown at an annual rate of 4.6%. It is estimated that on average, Internet users spend 6:40 hours on the Internet each day.

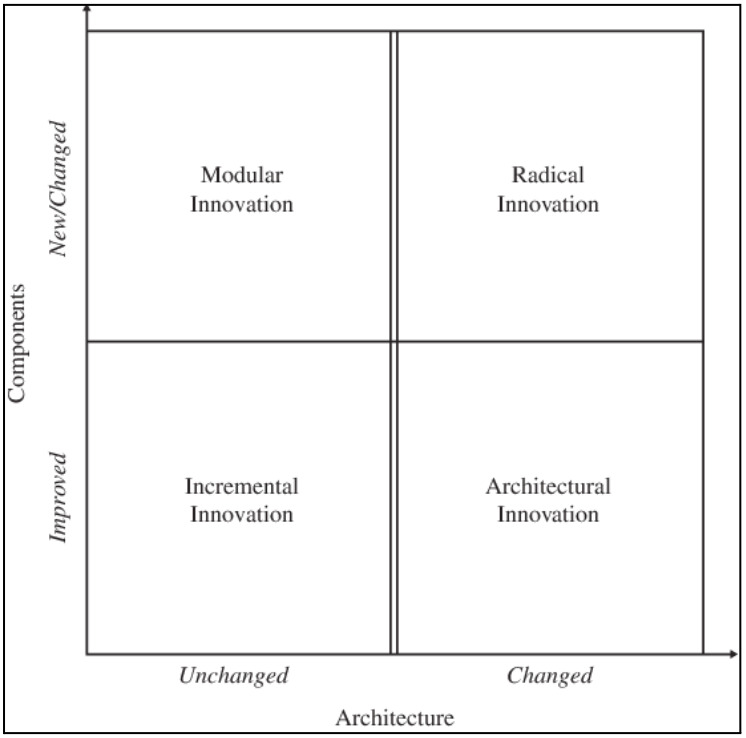
This massive spread of new devices and technologies was followed by a drastic increase in the use of digital technologies all over the planet. The number of social media users has reached 4.88 billion (all social media platforms combined), which represents 60.6% of the global population, and 93.9% of Internet users connect to social media monthly. Between July 2022 and July 2023, the number of social media users has increased by 173 million, which represents a growth of 3.7% in the number of users on those platforms. On average, social media users spend 2:26 hours on social media each day, on between 6 to 7 different social media platforms each month. 53.6% of social media users are male, and 46.4 are female, which represents over 350 millions less female social media users than male.

Consequently to such evolutions, cybertechnologies have become a crucial asset to companies' commercial strategies: ecommerce has massively developed over the last few years, gaining a particularly strong importance during the COVID-19 pandemic lockdown. 55.9% of the Internet users aged 16-64 who engage in selected ecommerce activity each week purchased a product or service online, 21,5% used an online price-comparing tool and 27.3% ordered groceries via an online store. In 2022, the amount of money spent online was estimated to be about US$3.6 trillion, representing US$873 per ecommerce shopper.

Today, most connections to the Internet network are achieved through mobile phones and smartphones - even if the desktop and the personal computer remain very relevant too. Other recent innovations, such as the public release of Artificial Intelligence software, have also completely modified the very bases of the academic systems worldwide, increasing the

risks of cheating while also questioning the authenticity of the students' work, even when not graded.

The development and the spread of cybertechnology has had a major influence over human lifestyle and habits. However, these important changes also question the ethics and rights of the people on software, mobile phones, devices connected to the Internet and other digital technology, as well as the impact they have had. First, such a massive spread of cybertechnologies has had and still has dramatic consequences on the environment: in 2023, it is estimated that the Internet will represent about 4% of the global carbon footprint which represents the emission of 97 millions of tons of CO2, while it was of 3.7% in 2021. It will be more than twice the total emissions of the entire aviation sector, or four times the total emissions of France. On average, it is estimated that each email sent emits 0.3g of CO2, but each minute, on the Internet, 500 hours of video are uploaded by users, there are 208,333 participants in videoconferences, 404,444 hours of video are streamed by users, and 347,222 stories are posted. Hence, cybertechnologies' carbon footprint is rising fast.



As we mentioned in the introduction, scientific innovations can take on several forms. The chart on the left represents the commonly admitted model designed in 1990 by Professors Rebecca Henderson and Kim B. Clark, distinguishing four types of innovation. These two academics differentiate scientific or technological innovations according to several criteria. The first is the evolution of the composition of a product (good or service) usually following two trends: the improvement of current components or the introduction of new or other components. The second criterion takes into account modifications regarding the architecture of a product: what is the good or the service composed of, made of. It can change or not, depending on the case.

REPRESENTATION OF THE HENDERSON-CLARK INNOVATION MODEL: ResearchGate

From these divisions, the model issues four different types of innovation. The first one is **incremental innovations**. Such innovations are characterized by no changes in the architecture and the sole improvement of the components of a product. As such, they often don't represent a major evolution in the history of a product, and hence, a product originally considered safe should not see its safety reduced due to incremental innovations, but rather gain effectiveness or reduce the cost of production for a company. Besides, such incremental innovations represent an economic blessing for companies and, more broadly, national economies. This is why, in most cases, except in case of a patent application for

their owner to gain intellectual property over such innovations, they are not usually narrowly regulated by the public authorities.

The second type of innovation issued by the model is **architectural innovations**. Such innovations consist in the improvement of the components and the change in the architecture of a product. They consist, most of the time, in the optimization of a product following the search of optimization and rationality of companies. Again, their impact on the national - global even in some cases, is often much more positive, and the risks they induce for consumers are not important, which is why such innovations often are not strongly regulated by public authorities. In this case, public authorities' task is often reduced to the protection of the intellectual property of the innovation through a patent.

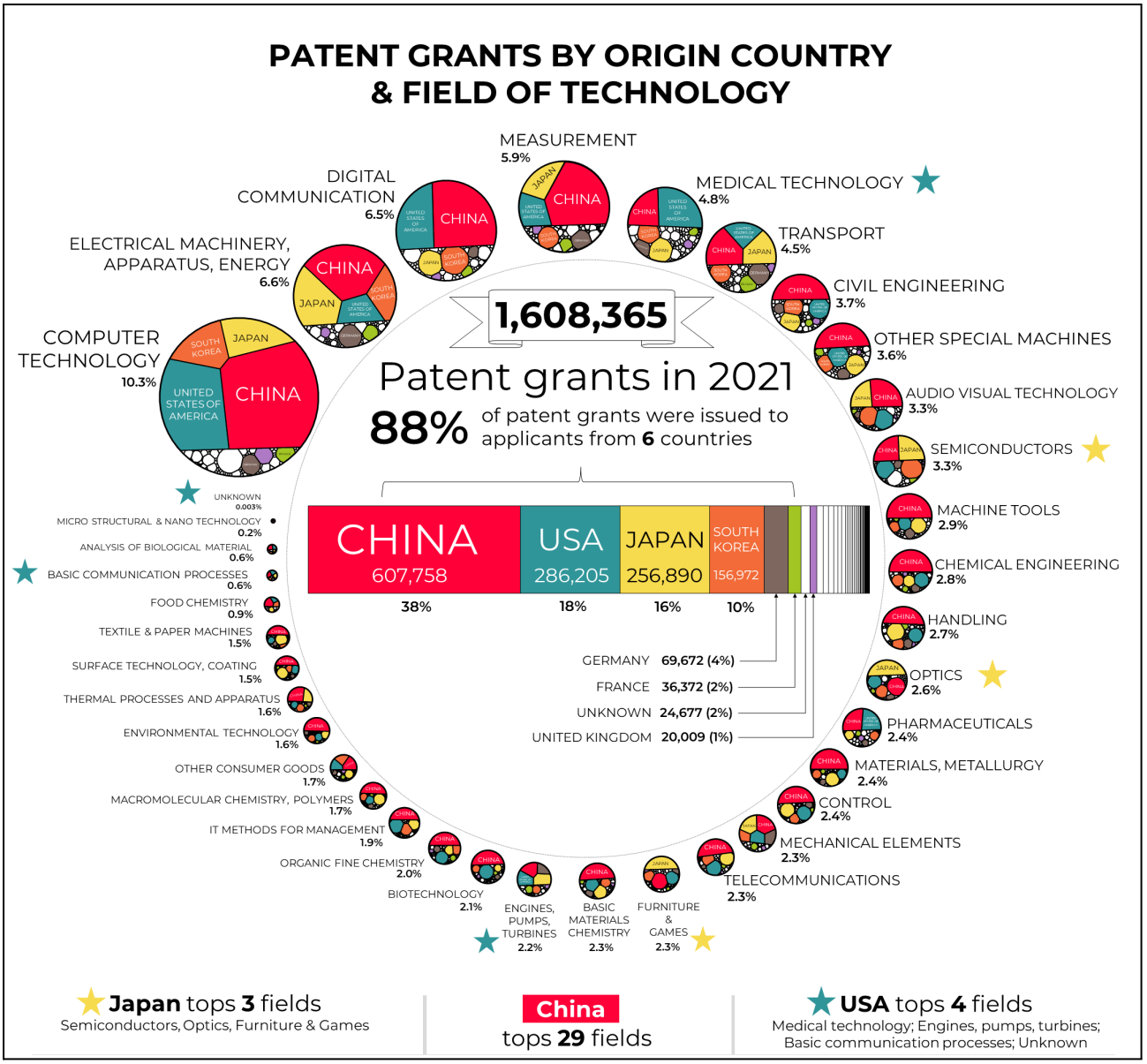
The third type of innovation identified by Henderson and Clarke is labeled as **modular innovations**. Such innovations imply changes or additions of components of the product while the architecture is not changed. As with most innovations, they represent new possible economic benefits for the company, and hence they help reinforce the national economy. However, such innovations often imply the creation or the introduction of new components on a product. Thus, besides the usual protection of intellectual property, the public authorities of the state should also ensure that the new products are not harmful for the consumers, and ensure that the health of the workers producing such products is not impacted. For example, the unregulated introduction of new additives to food could spread massive illnesses and diseases, causing more damage to the company and the national economy than anything else. In addition, one could imagine a situation in which a new material is used to build more affordable car engines limiting energy losses, and this material turns out to be oncogene. In both these cases, and even though it can mean a limitation to the company's actions and profits, the state's role would be to ensure the safety of both their population and the employees of the firm. This can be done by setting systematic compulsory tests for modular innovations, for example, assessing if any component can present harmful consequences for the consumers.

Lastly, Henderson and Clarke identify a fourth type of innovation in their model: **radical innovations**. Such innovations happen when both new components are added or replace others, and the architecture (process) of the product is changed. Such innovations, again, often imply important economic benefits for a company and can be protected through legal patents. The state's role would be to control and limit the potential risks for the civilian population due to such innovations.

However, regulating innovations limits the freedom of the economic actors. As such, it can be regarded as beyond the state's role following a liberal conception of the economy: effectively, by setting up a framework of regulations around innovation, the ease of doing business in a country can be impacted, leading to a loss of comparative advantages and of economic attractiveness of the country compared to other with less strict control. In the globalized economy, the country would be less interesting to investors, which could cause major damage to their economy as it would lead to a decrease in the economic activity, and potentially, to the reduction of growth. Hence the interest in global governance of innovations, as, by holding every country to the same laws, no country would be disadvantaged.

In fact, a global governance of innovations could help in solving a major rampant problem with innovation. As shown by the diagram below, in 2021, 6 countries represented 88% of the patent claims (so innovations and inventions). The remnant damage caused by

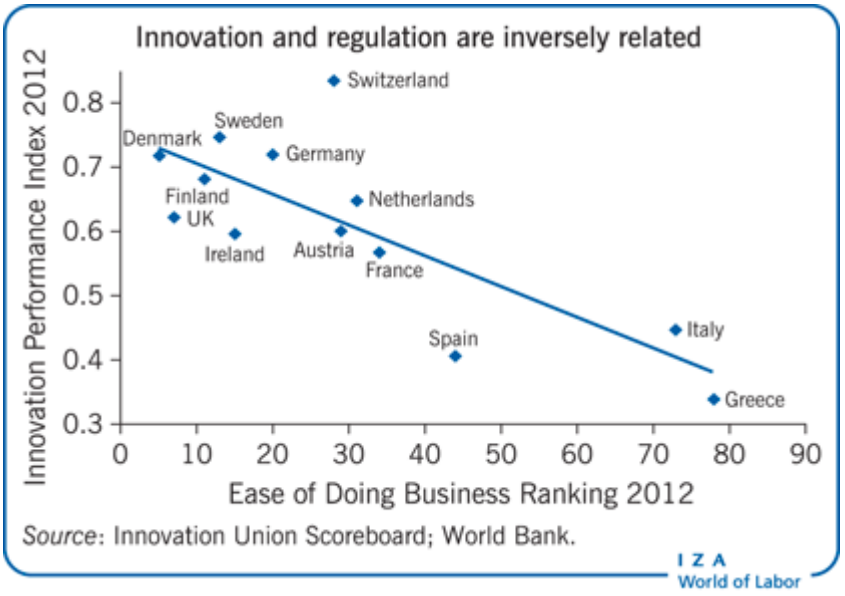
the COVID-19 pandemic is indeed the catastrophic worsening of the gap between Most Economically Developed Countries (MEDCs) and countries less developed economically, that were not capable of reacting as efficiently to the challenges introduced by the pandemic. A global governance of innovation could ensure the right to innovate for anyone anywhere, hence start to resorb this gap in the long run. Such a governance would thus reduce the major economic prejudice to less economically developed countries.



PATENT CLAIMS WORLDWIDE IN 2021: OBIS using World Intellectual Property Organization data

Still, the question of the role of the state in the economy remains, raising the questions of what should be done to protect the populations from harmful risks caused by unregulated innovations, and the risk of slowing down a country's economy through such regulations, or even, in the liberal perception, the risk of the state overstepping in the economy.

B. REGULATING CYBERTECHNOLOGIES AND SCIENTIFIC ADVANCES



CORRELATION BETWEEN REGULATIONS AND INNOVATION: IZA World of Labor

As shown by the diagram on the left, overly strong public governmental regulations regarding innovations as enforced in several European countries, reduce the country's attractiveness in hosting innovations and startups. However, even if such regulations often translate into reducing the country's comparative advantage in hosting innovations, it also is essential to the protection of the country's citizens. Indeed, as we studied it earlier, some innovations, if not properly regulated before entering the market, can just massively spread consumers' health hazards throughout the planet, and once revealed as such, have a catastrophic impact on the global economy.

What the previous diagram mostly highlights is the necessity to find a common ground between free, unlimited, unregulated, ever changing and ever growing innovations, and the protection of the populations and environments from induced hazards, sometimes severe, and preferably without having countries losing comparative advantages while trying to protect their population. In other words, the challenge in the regulation of scientific advances and innovations is the risk of severely affecting one country's economy and economic attractiveness. While it would allow a better protection of the civilian populations and sometimes of the workers, such regulations cannot happen without setting limits on the economy, and thus, potentially on the economic growth of a state.

C. DATA ON THE TOPIC: GLOBAL INNOVATION INDEX RANKING

GII rank	Economy	Score	group rank	Region rank
1	Switzerland	67.6	1	1
2	Sweden	64.2	2	2
3	United States	63.5	3	1
4	United Kingdom	62.4	4	3
5	Singapore	61.5	5	1
6	Finland	61.2	6	4
7	Netherlands (Kingdom of the)	60.4	7	5
8	Germany	58.8	8	6
9	Denmark	58.7	9	7
10	Republic of Korea	58.6	10	2
11	France	56.0	11	8
12	China	55.3	1	3
13	Japan	54.6	12	4
14	Israel	54.3	13	1
15	Canada	53.8	14	2
16	Estonia	53.4	15	9
17	Hong Kong, China	53.3	16	5
18	Austria	53.2	17	10
19	Norway	50.7	18	11
20	Iceland	50.7	19	12
21	Luxembourg	50.6	20	13
22	Ireland	50.4	21	14
23	Belgium	49.9	22	15
24	Australia	49.7	23	6
25	Malta	49.1	24	16
26	Italy	46.6	25	17
27	New Zealand	46.6	26	7
28	Cyprus	46.3	27	2
29	Spain	45.9	28	18
30	Portugal	44.9	29	19
31	Czech Republic	44.8	30	20
32	United Arab Emirates	43.2	31	3
33	Slovenia	42.2	32	21
34	Lithuania	42.0	33	22
35	Hungary	41.3	34	23
36	Malaysia	40.9	2	8
37	Latvia	39.7	35	24
38	Bulgaria	39.0	3	25
39	Türkiye	38.6	4	4
40	India	38.1	1	1
41	Poland	37.7	36	26
42	Greece	37.5	37	27
43	Thailand	37.1	5	9
44	Croatia	37.1	38	28
45	Slovakia	36.2	39	29
46	Viet Nam	36.0	2	10
47	Romania	34.7	40	30
48	Saudi Arabia	34.5	41	5
49	Brazil	33.6	6	1
50	Qatar	33.4	42	6
51	Russian Federation	33.3	7	31
52	Chile	33.3	43	2
53	Serbia	33.1	8	32
54	North Macedonia	33.0	9	33
55	Ukraine	32.8	3	34
56	Philippines	32.2	4	11
57	Mauritius	32.1	10	1
58	Mexico	31.0	11	3
59	South Africa	30.4	12	2
60	Republic of Moldova	30.3	13	35
61	Indonesia	30.3	5	12
62	Iran (Islamic Republic of)	30.1	6	2
63	Uruguay	30.0	44	4
64	Kuwait	29.9	45	7
65	Georgia	29.9	14	8
66	Colombia	29.4	15	5
67	Bahrain	29.1	46	9
68	Mongolia	28.8	7	13
69	Oman	28.4	47	10
70	Morocco	28.4	8	11
71	Jordan	28.2	16	12
72	Armenia	28.0	17	13
73	Argentina	28.0	18	6
74	Costa Rica	27.9	19	7
75	Montenegro	27.8	20	36
76	Peru	27.7	21	8
77	Bosnia and Herzegovina	27.1	22	37
78	Jamaica	27.1	23	9
79	Tunisia	26.9	9	14
80	Belarus	26.8	24	38
81	Kazakhstan	26.7	25	3
82	Uzbekistan	26.2	10	4
83	Albania	25.4	26	39
84	Panama	25.3	48	10
85	Botswana	24.6	27	3
86	Egypt	24.2	11	15
87	Brunei Darussalam	23.5	49	14
88	Pakistan	23.3	12	5
89	Azerbaijan	23.3	28	16
90	Sri Lanka	23.3	13	6
91	Cabo Verde	23.3	14	4
92	Lebanon	23.2	15	17
93	Senegal	22.5	16	5
94	Dominican Republic	22.4	29	11
95	El Salvador	21.8	17	12
96	Namibia	21.8	30	6
97	Bolivia (Plurinational State of)	21.4	18	13
98	Paraguay	21.4	31	14
99	Ghana	21.3	19	7
100	Kenya	21.2	20	8
101	Cambodia	20.8	21	15
102	Trinidad and Tobago	20.7	50	15
103	Rwanda	20.6	1	9
104	Ecuador	20.5	32	16
105	Bangladesh	20.2	22	7
106	Kyrgyzstan	20.2	23	8
107	Madagascar	19.1	2	10
108	Nepal	18.8	24	9
109	Nigeria	18.4	25	11
110	Lao People's Democratic Republic	18.3	26	16
111	Tajikistan	18.3	27	10
112	Côte d'Ivoire	18.2	28	12
113	United Republic of Tanzania	17.4	29	13
114	Togo	16.9	3	14
115	Nicaragua	16.9	30	17
116	Honduras	16.7	31	18
117	Zimbabwe	16.5	32	15
118	Zambia	16.4	4	16
119	Algeria	16.1	33	18
120	Benin	16.0	34	17
121	Uganda	16.0	5	18
122	Guatemala	15.8	33	19
123	Cameroon	15.3	35	19
124	Burkina Faso	14.5	6	20
125	Ethiopia	14.3	7	21
126	Mozambique	13.6	8	22
127	Mauritania	13.5	36	23
128	Guinea	13.3	9	24
129	Mali	12.9	10	25
130	Burundi	12.5	11	26
131	Niger	12.4	12	27
132	Angola	10.3	37	28

Source: Global Innovation Index Database, WIPO, 2023.

Note: For an explanation of classifications, see Economy profiles, endnote 1.

- High-income
- Upper middle-income
- Lower middle-income
- Low-income

- Europe
- Northern America
- Latin America and the Caribbean

- South East Asia, East Asia, and Oceania
- Northern Africa and Western Asia
- Sub-Saharan Africa
- Central and Southern Asia

WHAT SHOULD RESOLUTIONS BE ABOUT?

- Should access to the Internet or to technologies in general be considered as a human right? If so, what measures are to be adopted concretely in order to guarantee it to all the people on Earth? (creation of a programme, a fund, a specialized agency, a diplomatic union or assembly on technologies…)
- On the other hand, should the access to GHG emitting technologies be controlled and restricted in order to fight climate change more appropriately?
- What should be regarded as inappropriate online content?
- How to reconcile freedom of speech with the suppression of inappropriate content on social media, the Internet or any other virtual space?
- Should the data produced by Internet or cybertechnologies users be protected from commercial use? How to guarantee that Internet or cybertechnology users' data is protected?
- How to ensure the safety of moral and physical persons in virtual spaces?
- Should cybertechnologies be used in order to fight climate change more efficiently?
- Should genetic modifications be allowed on animals? On humans? If so, should they be limited? How?
- Should states overview scientific innovations or should they rather let companies decide freely of their own policies? If so, should there be fields remaining under states' direct control? Which?
- Should there be international cooperation on scientific innovation? Should companies be authorized to handle them or should states supervise them?
- How to sustain economic growth on a planetary scale thanks to scientific innovation?
- How to develop or protect all the states' ability to innovate?
- At a time when AI is rapidly spreading, how to protect or adapt workers' conditions?
- How to protect and guarantee the right to intellectual property? Should the right to intellectual property evolve to adapt to the new challenges brought about by new technologies or circumstances? If so, in which cases and directions?
- Should there be a global resolution on cryptocurrencies? If so, what should be its orientations and goals?
- Should there be an international convention of laws regarding cyberspace, cyberwars, digital technologies, the states' sovereignty and responsibilities regarding them and international laws to regulate them?
- Regarding such an international convention, what laws would interest the most the state you are representing?
- Concretely, what should be the role of cybertechnologies and scientific innovations in the achievement of the SDGs?
- How can we ensure that cybertechnologies do not widen the gap between developed and developing countries (and how it might even possibly help reduce it) ?

BLOC POSITIONS

Afghanistan:

The Taliban takeover in Afghanistan has raised serious concerns in the academic world about the prospects for scientists and their work in the country. Universities have been closed since the take-over, but some private universities have recently reopened. Many researchers, lecturers and students have fled or gone into hiding. Books deemed 'problematic' have been hidden or, in some cases, sent abroad to be safely kept. Women are separated and dress codes are being imposed. The public university structure in Afghanistan is quite weak and cannot meet the increasing demands for higher education. There is a lack of teachers, libraries, and digital services. Very few people have doctoral degrees (Science at Risk). The current Taliban status quo raises interesting conundrums both for the security establishment working to secure our digital infrastructure and the tech companies themselves. To engage its citizens, the Taliban has made a surprising move and turned to social media. Videos created by content creators in Afghanistan are posted to YouTube. This pro-Taliban content raises questions. Should social media platforms be categorizing the Taliban as a government or a terrorist group? Moreover, the Taliban's media strategy is based upon a narrative directed at the West and the international community. (Talibans strategy). Afghanistan's online presence and infrastructure is key to its future. It's also vital for its people as they try to stay connected to the outside world. The Taliban, which previously blocked web access to thwart what it called immorality and obscenity, recently upgraded Afghanistan's internet networks to 4G, a shift that marks the group's embrace of a Western technology that it has long railed against. Now, a few areas in the capital are connected to 4G, and the Taliban expects to work with a network provider to expand that connectivity to remote areas of the country. Most Afghans with internet access now rely on 2G technology (Internet access).

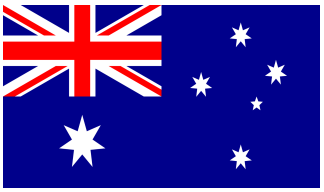
Albania:

Expenditure for scientific research and development in Albania does not exceed 0.18% of GDP, which marks the lowest level in Europe. Economic competitiveness and exports are low, with the economy still heavily skewed towards low technology. From 1993 human resources in sciences and technology drastically decreased. Various surveys show that during 1990-1999, approximately 40% of the professors and research scientists of the universities and science institutions in the country emigrated. Driving forces for the brain drain are found in the deteriorated economic living conditions, the lack of state of the art

infrastructure and funds that constitute serious obstacles for research. Albania was ranked 83rd in the Global Innovation Index in 2019 and 2020 and 84th in 2021. Until recently, R&D and innovation statistics were not collected in Albania to OECD, Eurostat or UNESCO standards. A first survey of public and academic institutes was launched earlier this year and a business R&D and innovation survey is currently underway, both with the support of UNESCO. The restrictive visa regulations also hinder scientific exchange and temporary employment abroad. The numbers of personnel in RD in Albania are about 0.2 per 1,000 population (S&T in Albania).

Argentina:

The most important aspects of science and technology in Argentina are concerned with medicine, nuclear physics, biotechnology, nanotechnology, space and rocket technology and several fields related to the country's main economic activities. Argentina is the Latin American country with the most Nobel Prize laureates; and has three Nobel Prize winners in the sciences. Argentina has its own satellite programme, nuclear power station designs (4th generation) and public nuclear energy company INVAP, which provides several countries with nuclear reactors. Four out of five Argentine adults have completed school, over a third have completed their secondary education and one in nine Argentine adults have college degrees. Likewise, Argentina has the highest rate of university students in Latin America, besides having more within the southern hemisphere with professors and institutions awarded prestigious prizes. Argentina has an advanced nuclear program, the country admitted to having the capability to produce weapons-grade uranium, a major step needed in assembling nuclear weapons (S&T in Argentina).



Australia:

For the country, cyberspace and critical technology is a foreign policy priority as it affects all aspects of international relations. As soon as it is supervised, it can benefit national security, international peace and stability, enhance economic prosperity, sustainable development and the realization of human rights and freedoms. Australia's engagement is guided by the 2021 international Cyber and Critical Technology engagement strategy (Australia policy). The government promotes international collaboration on research and sciences as well as gender equity initiatives ("DigitALL"), to engage people nationwide. Scientific research predominantly occurs in universities, and the workforce is mainly composed of research students. Thus, estimates suggest that scientific research contributes $185 billion per year to the economy and supports 1.2 million jobs. Australia contributes to the global scientific endeavor with research strengths in disciplines ranging from the health and medical sciences, to agriculture, space science and computer science (Sciences in Australia).

Brazil:

Brazil started developing aspects of a national cyber defense strategy in the 2000s but progress is likely to be slow. Since coming into office in January 2023, Brazilian President Luiz Inácio

Lula da Silva (more commonly known as Lula) and his administration have not treated cyber strategy as a top political priority. Brazilian science has systematically suffered budget cuts since 2014. This neglect enabled cyber attacks against the 2014 FIFA World Cup and the 2016 Olympic Games, both hosted by Brazil. The Lula administration has a much greater strategic and domestic political interest in specific digital policy issues. This is particularly evident in the area of countering online disinformation, misinformation, and extremism, notably how social media platforms are used both to spread disinformation and as a wider tool by domestic extreme right-wing groups, political parties, and former president Bolsonaro himself. This is a significant issue for the Lula administration's domestic policy agenda, which will be coordinated directly from the president's office (Brazil's cyber strategy under Lula). The Lula administration will also need to focus on improving education from the elementary level, which has been hit hard by the absence of coping strategies during the COVID-19 pandemic even though Brazilian public universities account for most of the national scientific production (the future of Brazilian science).

Burkina Faso:

Burkina Faso is a country plagued by violence and poverty. There is little opportunity for work in Burkina Faso outside of agriculture. The country also has recently become the victim of Jihadist attacks. Jihadists exploit the country's impoverished citizens to gain recruits. Violence and climate change contribute to the country's poverty. Despite this, the government aims to prioritize economic and scientific development in Burkina Faso. The country adopted a National Policy for Scientific and Technical Research in 2012. The goal of the project was to improve research and development. Additionally, the project hopes to improve the country's agricultural output to improve food security (Economic and scientific development in Burkina Faso). In January 2011, the government created the Ministry of Scientific Research and Innovation. A dual priority is to promote innovative, effective and accessible health systems. The growing number of doctoral candidates in medicine and related fields is a step in the right direction. Burkina Faso is a member of the Economic Community of West African States (ECOWAS). In 2011, ECOWAS adopted a *Policy on Science and Technology* (ECOPOST). This implies the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). The mission of the centre is to create favourable framework conditions for renewable energy and energy efficiency markets (Science and technology in Burkina Faso).

Central African Republic:

After years of insecurity and internal strife, authorities and scientists from the Central African Republic are again turning to nuclear and nuclear-related techniques for development (CAR opts for progress with nuclear technology). Scientists are running a laboratory on the University of Bangui campus, in the capital of the Central African Republic, using advanced nuclear-derived techniques to find a solution to one of the war-torn country's most urgent and deadliest problems: hunger. The researchers hope that combining nature with nuclear physics will enable them to develop improved crop varieties that can withstand destructive plant diseases. In fact, the Central African Republic

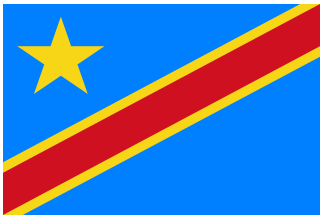
is one of the world's hungriest countries and has to tackle the issues of under-nutrition, stunted growth, low child weight and child mortality (Can nuclear technology zap hunger in CAR ?).

Chad:

Chad is grappling with security challenges associated with conflicts in bordering countries as well as the impacts of climate change, in particular accelerated desertification and the drying up of Lake Chad. To address these challenges, the Government of Chad has ratified the United Nations Framework Convention on Climate Change and the Paris Agreement. These international frameworks guide national climate action (Climate change adaptation plan of Chad). In 2015, Chad joined the Climate and Clean Air Coalition to scale up its domestic efforts to reduce short-lived climate pollutants. The average temperatures in Chad are projected to increase exponentially, which would mean lower crop yields, more strain on water resources and degraded soil and lands for farmers. Government of Chad has taken the required steps to build resilience for the current and future climatic changes and impacts. The country needs scientific innovations to tackle environmental issues. Thus, Chad started working on its National Adaptation Plan (NAP) in 2018 with full size project funding of $US 5.7 million from the Global Environment Facility and implementation support from UNDP (The journey of Chad NAP).

People's Republic of China:

In the case of China, the Science and Technology policy aims to accelerate commercialisation of technology, integrate S&T with the economy, promote its people's living and health standards, support sustainable development, safeguard national security, enhance capability and encourage the innovative passion of scientists. For example, China aims to be carbon-neutral by 2060 and to become the world leader in artificial intelligence (AI) technology by 2030 (China S&T policy). Currently the Ministry of Science and Technology of the People's Republic of China has S&T cooperation agreements with 157 countries, of which 110 are bilateral. China is already one of the world's leading research nations in AI. Stanford University's *Artificial Intelligence Index Report 2023* found that China accounted for nearly 40% of all publications in AI in 2021. Environmental research, such as projects tackling green energy and pollution, have also rapidly progressed in China (China's leading position on sciences).



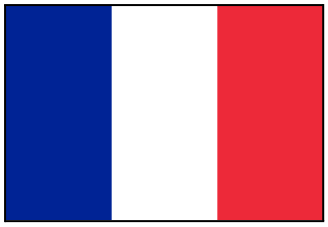
Democratic Republic of Congo:

Telecommunications is a best prospect industry sector for this country. The Democratic Republic of Congo is an untapped market with great potential for mobile telephony, Internet services providers, and other Internet Communication Technology (ICT) firms (DRC - Telecommunications). On the contrary, the pharmaceutical sector in the DRC is highly fragmented, with limited governmental oversight. There are multiple parallel pharmaceutical supply systems for public sector health facilities. The supply system for any particular public health facility depends largely on a donor

supporting the health zone within which the health facility is located. The DRC continues to be affected by outbreaks of diseases, including malaria, yellow fever, Ebola, polio, cholera, measles, and TB (DRC - Pharmaceuticals).

Ecuador :

According to recent studies, the ecosystem of technological entrepreneurship in Ecuador has increased substantially. Growth statistics in mid-2019 indicate around 159 technological ventures or national startups have surfaced across Ecuador. The significance of this number grows when one considers that more than 5 years ago, the vast majority of these companies neither existed nor were even in demand. Ecuador's technological landscape consists of ventures or startups that can be divided into the following categories, according to the service they are focused on: fintech, healthtech, agritech, tourism, e-commerce, human resources, business solutions, logistics, collaborative economics, among others. Although Ecuador's technological innovation has only sprouted within the last 5 years, that isn't to say that international actors aren't already considering opportunities in the market. Many world-famous technological ventures such as Cabify, Uber, Rappi and Glovo are already consolidating in the Ecuadorian market. Therefore, there is an environment conducive to national startup success that could also benefit international companies. The technology entrepreneurship market in Ecuador is still small compared to other countries in the region (Ecuador's technology). However, regarding internet access, digital rights organisations in Ecuador remain attentive to the state's attempts to affect telecommunications, regardless of the ideological profile of the government in power. In the past five years there have been two Indigenous protests of relevant size that have managed to have an impact on the international community. Ecuador experienced intentional interruptions in internet connectivity during the protests of October 2019, which was also pointed out by the Inter American Commission for Human Rights (IACHR). Because of these incidents, Ecuador joined the list of countries with intentional internet shutdowns (Temptation to control technology).



France:

French inventors played a pivotal role in the development of photography and the internal combustion engine; to French ingenuity the world also owes the first mechanical adding machine (1642), electric generator (1832), refrigerator (1858), and neon lamp (1910). French industry has pioneered the development of high-speed transportation systems—notably the TGV high-speed train—and French subway companies have built or provided equipment for mass-transit systems in Montreal, Mexico City, Rio de Janeiro, and other cities. France is a leading exporter of nuclear technology and has developed the first commercial vitrification plant for the disposal of radioactive wastes by integrating them in special glass and then encasing the glass in stainless steel containers for burial. In 1965, France was the third nation, after the former USSR and the United States, to launch its own space satellite. The French no longer launch their own satellites, however, preferring instead to contribute to the European Space Agency. The Académie des Sciences, founded by Louis XIV in 1666, consists of eight sections:

mathematics, physics, mechanics, astronomy, chemistry, cellular and molecular biology, animal and plant biology, and human biology and medical sciences. The Centre National de la Recherche Scientifique (CNRS), founded in 1939, counts more than 1,370 laboratories and research centers (Fr - Science and Technology).

Gabon:

The Republic of Gabon, one of the most developed countries in Sub-Saharan Africa, is particularly vulnerable to climate change. The country's coastlines, which are home to over 75% of the country's population, are at risk of flooding from sea-level rise, increased erosion, and increased storm severity. Climate change is also expected to put increasing pressure on the country's water, agriculture, and public health sectors. As one of the top five oil producers in Sub-Saharan Africa, Gabon has managed to grow its economy while maintaining a low greenhouse gas emission profile. Its vast forests, which the country actively maintains, play a major role as a "carbon sink," absorbing a total of 140 million tons of CO2 every year. Gabon became a partner of the Climate and Clean Air Coalition in 2020, underlining its commitment to combat air pollution and climate change. The law also states that hydrocarbon activities must be carried out in accordance with the principles and rules relating to sustainable development, health, hygiene, safety and the environment. Flaring and venting of gas are prohibited in the Gabonese Republic (Environment). Gabon is one of the few Francophone African countries making efforts to develop a space program. In 2010, the government established l'Agence Gabonaise d'Études et d'Observations Spatiales/the Gabonese Agency for Space Studies and Observations (AGEOS) to implement Earth observation programs on a national scale and address some of its socio-economic problems (SPACE).

Ghana:

Ghana recently announced the approval of a Ghana Space Policy and Implementation plan that will pave the way for the operationalization of the Ghana Space Agency in 2023. Though Ghana was not selected as the host of the Africa Space Center in 2019, it has continued to show leadership on the African continent in terms of advancing its deployment of space technology. Ghana's first satellite GhanaSat-1 was released from the International Space Station in 2017 mainly to observe Ghana's coastline. Ghana is seen as second only to South Africa in terms of having the most advanced satellite dish research program in Africa. Ghana is also actively pursuing improved ways to harness the power of earth observations to support planning and decision making in areas such as: weather forecasting; measuring land-use change such as deforestation; monitoring coastlines; and monitoring and responding to disasters including fires, floods and earthquakes (SPACE). Ghana was one of the first countries in Africa to connect to the Internet. Telecommunications is Ghana's main economic sector according to the statistics of the World Bank due to the country's liberal policy for information and communications technology (ICT). Among the main investment sectors, 65% is for ICT, 8% for communications and 27% is used for public administration. (Telecommunication).

India:

Modern India has had a strong focus on science and technology, realising that it is a key element for economic growth. India ranks third among the most attractive investment destinations for technology transactions in the world. With more and more multinational companies setting up their R&D centres in India, the sector has seen an uptrend in investment in recent years. India is among the top countries globally in the field of scientific research, positioned as one of the top five nations in the field of space exploration. The country has regularly undertaken space missions, including missions to the moon and the famed Polar Satellite Launch Vehicle (PSLV). India is likely to take a leading role in launching satellites for the SAARC nations, generating revenue by offering its space facilities for use to other countries. In November 2022, the Department of Science and Technology (DST) and the Centre for Science and Environment (CSE) decided to work together to build a platform to support the development of new electric vehicle (EV) batteries that meet Indian regulations (Science and Technology development in India).

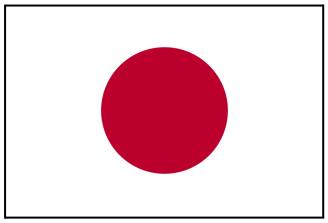
Indonesia:

Indonesia has dismantled its science ministry and created an overarching national research agency, a move some scientists worry will strengthen political control over research in a country where academic freedom is already under pressure and politics have taken an authoritarian turn. The Indonesian Parliament on 9 April approved a proposal by President Joko Widodo to eliminate the Ministry of Research and Technology (RISTEK) and create a new National Research and Innovation Agency (BRIN). Yet political influence on research is growing. The government has clamped down on unwelcome research into deforestation, forest fires, and threats to a rare orangutan population, for example. The government is also supporting an unorthodox vaccination method for COVID-19 that involves taking dendritic cells from a person's body, immersing them in viral antigens, then reinjecting them. The Indonesian Food and Drug Authority, worried about side effects and unsterile production procedures, has banned a phase 2 clinical trial of the method, developed by former Minister of Health Terawan Putranto, who also invented an unproven and potentially harmful stroke therapy (Politicized Indonesian Research).

Ireland:

The major organizations doing scientific research in Ireland are the Agricultural Institute (established in 1958) and the Institute for Industrial Research and Standards (1946). The Dublin Institute of Advanced Studies, established by the state in 1940, includes a School of Theoretical Physics and a School of Cosmic Physics. The Royal Irish Academy, founded in 1785 and headquartered in Dublin, promotes study in science and the humanities and is the principal vehicle for Ireland's participation in international scientific unions; it has sections for mathematical and physical sciences and for biology and the environment. Most scientific research is funded by the government; the

government advisory and coordinating body on scientific matters is the National Board for Science and Technology. Medical research is supported by the Medical Research Council and Medico-Social Research Board. Veterinary and cereals research is promoted by the Department of Agriculture. The Department of Fisheries and Forestry and the Department of Industry and Energy have developed their own research programs (Ireland - Science and Technology). The country has legitimately earned a reputation as an international tech hub, as epitomised by the likes of Facebook, Amazon, Apple, Netflix and Google all setting up their European headquarters in the capital of Dublin. Meanwhile, tech employment in Ireland continues to grow despite global layoffs, and new tech startup levels are at their highest number on record. The country — and in turn its tech sector — has also benefited massively from Brexit, with companies looking to do business in the EU flocking to the Emerald Isle. As the only English-speaking country in the EU, Ireland has become an enticing destination for multinational companies. In addition, the country is home to the highest number of Brexit-related financial company relocations from the UK, injecting yet more money into Ireland's thriving economy (Ireland = International tech hub).



Japan:

The nation that invented bullet trains, QR codes and android robots continues to forge ahead, advancing innovation on a global level. To create a better tomorrow for current and future generations, innovative Japanese companies are applying the latest technologies to the world's most interesting and urgent opportunities. Startups are taking the lead on driving innovation in the new economy, from rewriting social commerce to tackling climate change. Forward-looking startups like HIKKY, a Tokyo-based provider of virtual reality and augmented reality services, are creating new realms of possibility in the metaverse. Among them are new ways of working and doing business, especially as physical and virtual worlds become inseparable. Japan's mission of reducing blindness worldwide by 50% by 2025 might sound ambitious, but it has the innovation to back it up. Its patented, 3D-printed medical device, the Smart Eye Camera, uses light sources from smartphones to achieve high-resolution images on par with those achieved by professional slit-lamp microscopes, and diagnose eye diseases including trachoma and cataract. As countries around the world seek new ways of invigorating economic growth and productivity, Japan's modern infrastructure, technological know-how and highly educated labor force have created a hotspot for innovation (Borderless innovation).

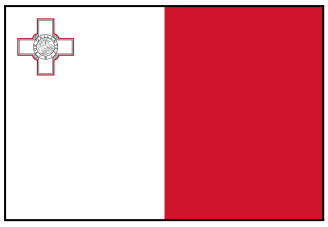
Kazakhstan:

For Kazakhstan, innovation has the potential to unleash the private sector as the country strives to build a more diversified and competitive economy. Launched by the Kazakh Ministry of Education and Science and the World Bank, and building on the impressive achievements of the Bank's Technology Commercialization Project over the past 12 years, the Fostering Productive Innovation Project (FPIP) promotes and develops commercial innovations in Kazakhstan by providing grants to entrepreneurs and start-ups seeking to improve the quality of people's lives. The

United Nations has recognized the start-up's invention as one of the world's top 20 innovative solutions. The FPIP has helped to improve the quality of scientific research in Kazakhstan and its relevance to market needs, research and development spending, and collaboration between universities and industry (Innovation in Kazakhstan). President Kassym-Jomart Tokayev held the first meeting of the National Council for Science and Technology on April 12 2023, where he outlined priorities for Kazakhstan's science and technology development. Many issues in the sphere of science that have accumulated over recent years remain unresolved in Kazakhstan. In this regard, the President urged to put this right to make Kazakhstan a prosperous country. The President emphasized that despite all the country's efforts, domestic science has not yet become the engine of national social and economic progress, stating that Kazakhstan is critically lagging in the most advanced branches of science (Science development).

Mali:

Mali has a shortage of trained scientists and technicians and relies heavily on foreign, chiefly French, assistance. A French tropical agronomy research center is located in Bamako. The National Directorship for Meteorology, also in Bamako, publishes bulletins on agrometeorology and climatology. National centers for fruit and zootechnical research are located in Bamako. A national association for mineral research and mining is located in Kati. The National Center of Scientific and Technological Research in Bamako coordinates all research activity in Mali. National schools of engineering and of medicine and pharmacology are also in Bamako. The Rural Polytechnic Institute of Katibougou provides instruction and conducts research in agronomy, agricultural economics, stockbreeding, forestry, veterinary science, and rural technology (Concentration of Sciences). Mali is a landlocked west African nation with a highly stratified climate: hot and arid in the north and wet and humid in the south. Malaria is one of the country's principal causes of death and suffering and is responsible for more than 30 percent of all outpatient hospital visits, according to the World Health Organization (Health).



Malta:

The Malta Council for Science and Technology is successfully leading Malta's Research and Innovation sector. MCST has striven to optimise its national funding programmes for research for the benefit of local researchers, as well as developing internationalisation opportunities through bilateral agreements and participation in EU programmes. The government has shown its commitment to support Malta's growth in the research and innovation (R&I) sector. In 2022, the Council has launched a €2 million fund exclusively dedicated to the Maltese space sector, which is supported by the European Space Agency. Investments in R&I are crucial in guaranteeing that the country can compete globally with a knowledge-based economy. Statistics produced by the European Centre for the Development of Vocational Training (Cedefop) indicate that by 2025 most job opportunities in Malta (around 26%) will be in the fields of science, technology, engineering and mathematics (STEM) (Malta Sciences).

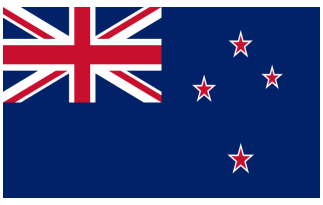
Mexico:

In regards to higher education, Mexico has established a large number of research institutions and universities, starting in 1910 with the National Autonomous University of Mexico and over the past 50 years with institutions such as the Center for Research and Advanced Studies of the National Polytechnic Institute established in 1961 and the Mexican Academy of Sciences established in 1959 (Education).Mexico's confident private sector is helping to bring vigor to the economy through technological innovation and a new focus on digitizing industries. This changing face of the Mexican economy is being driven by a tech-savvy generation of young Mexicans and a digital investment boom. This new wave has made Mexico one of the most attractive emerging markets to invest in this year. The urgency and need for investment in remote working, digital infrastructure, mobile banking and reliable communication networks due to the pandemic has given a lasting boost to an economy that now welcomes technology. The fintech sector has become an attractive option for the diversification of the economy as Mexico buys into the transformation of traditional banking (Mexico I&T).

Mozambique:

Maputo, Mozambique's bustling capital, has the potential to become one of the most innovative urban centers in Africa, especially when it comes to mobility. The city was one of the first on the continent to map the network of formal and informal public transport routes. Today, the government of Mozambique has doubled down on its efforts to improve urban mobility by creating the Maputo Metropolitan Transport Agency (AMT), which will be responsible for coordinating public transport services more consistently across the entire metropolitan area. The government also implemented innovative schemes, such as the creation of cooperatives to better manage bus operations. The metropolitan area also recently digitized part of the fare payment system. Investing in mass transit and non-motorized transport in cities can greatly improve access to jobs and social services, especially for the most vulnerable. The city's high level of cell phone penetration represented a great opportunity to rethink urban transport planning in Maputo. Specifically, they were able to get a much clearer picture of mobility patterns in the city by collecting and analyzing big data (Innovation in Transportation.) Mozambique has one of the best records of sustained economic growth in Africa, averaging a 7 percent increase in GDP per year for the last decade. However, poverty and malnutrition rates remain high while food availability is limited by low yields and inadequate access to markets. To address these issues, the government of Mozambique has launched an ambitious plan to grow its agricultural sector in an inclusive manner to reduce poverty and alleviate hunger throughout the country (Innovation in Agriculture).

New Zealand:



For a small country, the science effort that New Zealand produces is impressive. Its initiative, ingenuity and boldness see New Zealand leading the way in Antarctic research at a global level. The country is focused on delivering a science programme that is

high quality and has a high impact with the scientific community, policy makers and the public. New Zealand's Antarctic researchers are working hard to tackle the big questions relating to climate change. The answers to these questions will help navigate our way into the future (Research Antarctica). New Zealand's healthcare system is a universal public system. It is one of the top 20 healthcare systems in the world, on a par with the United States and the United Kingdom. With the 1938 Social Security Act, New Zealand brought into law universal and free healthcare. The Act requires that all New Zealand citizens have equal access to the same standard of treatment in an integrated, preventative health care system. The government pays for the majority of healthcare costs using public tax money – up to 9% of New Zealand's GDP (health).

Niger:

Niger is an African nation that shares a border with numerous other countries. It boasts a population of more than 24 million people and has a river that runs through its capital, Niamey. Niger is also among the hottest countries in the world, earning it the nickname, the "Frying Pan of the World." The Human Development Index (HDI) measures how developed a country is. It considers various factors such as income, life expectancy and education. According to this index, Niger ranked as the least developed country in the world. In 2019, Niger had an HDI of 0.394, lower than any other country. Aside from its lack of development, Niger faces other problems. Niger currently has a poverty rate of 44% and malnutrition plagues much of the country. One of the world's least developed countries is about to get a substantial technological upgrade. Following an agreement between Niger's Agency for Information Society (ANSI) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the development of an innovation and technology center has begun in the village of Sadore. That center will have technical educational opportunities as well as advanced technology and equipment. A partnership between these two has the potential to be extremely beneficial for Niger. More specifically, a collaboration to further develop food production could help alleviate Niger's malnutrition problem. Additionally, as the creation of a new innovation center proved, agricultural technology can also take a step forward and help the country along in its development (Niger development).

Democratic People's Republic of Korea (North Korea):

The North Korean government declared a pursuit of the Military-First Policy and the Ideology of Focusing on Science and Technology in the late 1990s. It thus made science and technology central to its goal of the Establishment of a Strong and Prosperous State. North Korea came to perceive science and technology as engines for promoting both nuclear armament and economic development. The switch of policy attention to science and technology has facilitated the development of some selected technology-intensive industries. In 2017, North Korea declared that it had completed the development of nuclear weapons and intercontinental ballistic missiles (ICBMs). Although North Korea's development of hi-tech arms including nuclear bombs and ICBMs appears inconsistent with its low level of economic development, it can be

understood in light of the North Korean government's emphasis on science and technology and prioritization of the allocation of resources to defense (S&T in North Korea).

Russia:

According to the report, Russia perceives itself as part of an ongoing international struggle for technological supremacy. Russia's science, technology and innovation strategy relies on pooling its limited resources towards its traditional strengths, such as nuclear technology, in addition to selected emerging technologies with national security relevance, such as quantum computing and artificial intelligence. Russia has sought to increase its technological sovereignty by controlling strategic sectors and advancing import substitution policies that aim to limit the degree of dependence on foreign technology. From a Russian point of view, its state-led approach to technology development provides a relative advantage in contrast to Western liberal democracies. The Western sanctions imposed on Russia as a result of its invasion of Ukraine will further degrade Russia's ability to develop its scientific and technological knowhow. The aim of the sanctions is to cut Russia off from the global networks and value chains of science and technology. Notably, the war in Ukraine has further accelerated the existing problem of talent brain drain away from Russia. As a result of the war, sanctions and technological decoupling from the West, Russia's dependence on China will increase substantially (Russia's great power ambitions).

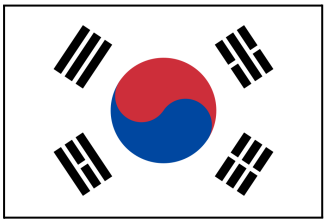
Singapore:

Singapore is one of the most wired countries and technologically advanced Information and Communications Technology (ICT) markets in the world. Singaporeans are highly digitally connected, avid users of technology and voracious consumers of data. Singapore is a mature market and an early adopter of new technologies and solutions and offers world-class ICT infrastructure and a vibrant ecosystem of technology partners. Singapore views ICT investments as a source of economic and social development and aims to be a Smart Nation. The Singapore Government plays an important role in driving demand and the adoption of technology and communications with progressive initiatives such as Smart Nation initiative, Digital Economy Framework Singapore is universally regarded as the top leading tech hub in the Indo-Pacific, a key reason why 5,400 U.S. entities are registered in Singapore. The city-state is home to many global technology firms including Google, IBM, Meta, Amazon Web Services and others, offering digital platforms and services that are key to the digital transformation of companies locally.rk, Digital Government Blueprint and Industry Transformation Map (ITMs). Singapore has built a world-class, globally competitive tech industry and continues to explore new frontiers in innovation such as cloud computing, artificial intelligence, quantum computing, data analytics and other technologies that span healthcare, security, fintech, energy, aviation, defense (Singapore technology).

South Africa:

South Africa is the strongest research player in Africa, with deep roots in astronomy, agriculture, health and social research. But the country's persistent budget and social problems have hit the research sector as well – even as the government looks to science and technology to help solve those very problems. The country has a history of performance in science and innovation: the first heart transplant in the world, the invention of the CAT scan, and soon the world's largest radio telescope. Since the end of apartheid in 1994, the country has managed to develop its research infrastructure to one that looks outwards at the same time as it tries to solve its main domestic challenges. The government has long viewed science and technology as one way to help solve some of the country's problems – through education, innovation and technological development. The university sector is of course vital to the government's plans – and also politically sensitive. When it comes to gender in research, the picture is brighter. The country has a high proportion of female researchers, accounting for 44 per cent of all researchers, which is higher than the average of many OECD countries (Sciences in South Africa).

Republic of Korea (South Korea):

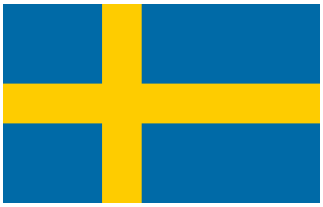


Korea has undoubtedly developed one of the most dynamic economies in the world. Having realized a successful industrialization, Korea now faces formidable challenges in science and technology. Korea has the problems of meeting competition from countries with more efficient industries as well as those with lower labor costs. Korea must muster the human capital, as well as financial and other resources for domestic R&D to maintain a continued industrial growth path, complemented by imported technology. Korea has to promote its own technological innovation with R&D efforts that are essential in meeting the constraints imposed on it in the changing global economy (Technology and development). South Korea deemed cybersecurity as a matter of national security. Although the country boasts one of the world's fastest IT infrastructures, it also has an infrastructure that is vulnerable to cyberattacks. The frequency and gravity of recent cyberattacks prompted the South Korean government to re-evaluate its cybersecurity strategy. In 2019, led by the office of the President, the Korean government announced its first National Cybersecurity Strategy. This strategy includes strengthening partnerships with foreign countries and companies and expanding investment to the domestic cybersecurity industry. In 2022, to accelerate the promotion of its cybersecurity industry, the Korean government established the "Strategic Plan to Foster Data Protection Industry" (South Korea dvp).

Sudan:

Sudan is a country with huge natural resources and this may provide a potential for a rich and diverse health research economy especially in medicine. It is important that both basic and applied medical research will be directed and prioritized according to the needs of Sudanese communities based on experiments tested in

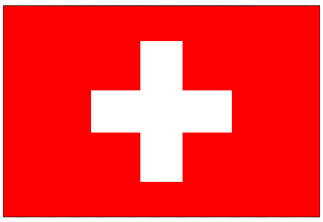
the lab and can be implemented in bedside practice. This can help in facing the health challenges associated with communicable and non-communicable disease. Research in medical education is also needed especially with an increase in the numbers of medical schools. (Health research in Sudan) Being in the central dryland of North-East Africa, the country is highly stressed by the global environmental issues of climate change, desertification, and loss of biodiversity. These problems are confounded and aggravated by economic problems, climate vulnerability, environmental degradation, management of natural resources, displaced people, and refugees from neighbouring countries. The scientific research and studies in Sudan address the country's national development plan and response mechanisms. Under the above conditions, challenges and limited resources, the scientific community at the research centres and universities have conducted scientific research and studies for the advancement of science that is directly linked to attaining the SDGs. Considerable research was conducted and is currently underway in the field of agriculture, forestry and livestock and food security and safety in terms of cultural operations, production aspects and genetic resources. In addition, environmental and sustainable management of natural resources was high on the research agenda (Sudan's policy).



Sweden:

Sweden's long-term focus on education and research has also had a major impact on the capacity for innovation. Today about one-third of the population has post-secondary education. When it comes to research and development (R&D), Sweden proves its commitment by investing, as a rule, more than 3 percent of the country's gross domestic product (GDP) in R&D. Green technology and life sciences are two fields in which Swedish researchers and companies excel. The government has created an office of life sciences dedicated to developing a national strategy for the life sciences to further promote the field. The Swedish Agency for Economic and Regional Growth also strengthens competitiveness and facilitates entrepreneurship around Sweden. In 2016, the government adopted a broadband strategy that aims to get all of Sweden connected to high-speed internet by 2025. Considering that Swedes represent just 0.13 per cent of the global population, the Nordic nation has a disproportionate amount of influence on global innovation. On several occasions, Sweden has topped the European Innovation Scoreboard, a yearly index published by the European Commission. The index assesses the strengths and weaknesses of national innovation systems and helps countries identify areas they should address. Sweden also usually achieves high rankings in innovation surveys such as the Global Innovation Index and the Legatum Prosperity Index. The World Economic Forum (WEF) has ranked Sweden as one of the most competitive countries in the world in its Global Competitiveness Report, with top grades for macroeconomic stability and innovation capability. Challenges include relatively high taxes and labor regulations. Other potentially negative factors are steep rents and a lack of housing in the bigger cities, which in some cases makes it hard for Stockholm in particular to attract young talent in competition with other European cities. High tuition fees for students from outside the European Union may also have a negative effect on Sweden's attractivity (Sweden innovation).

Switzerland:

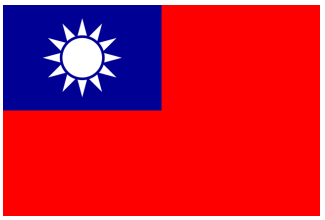


With several top-ranked universities and programmes, scientific academies and a strong relationship between the industry and scientific research, Switzerland is at the summit of scientific innovation at a European and global level. The natural sciences continue to occupy a prominent position in Swiss research today. Switzerland hosts a number of high-profile green projects, and every year the Watt D'Or is awarded to Switzerland's best sustainability projects. The world's largest particle physics laboratory, CERN, is located in Switzerland and testifies to the importance of physics. Similarly, the Integral Science Data Centre of the European Space Agency (ISDC) and the International Space Science Institute (ISSI) indicate the significance of space research in the country. In the corporate sector, major scientific fields include pharmaceuticals, chemistry, the metal industry and technology, which encompasses the electricity industry. At the state level, research is conducted in fields such as health, education, the environment, migration and security. Switzerland also has four extra-university research centers devoted to important fields. Switzerland's renowned advanced business education offerings demonstrate that business innovation is also an important facet of the country (science-in-switzerland).

Syria:

The Assad regime controls Syria's online space, endangering the privacy, freedom of expression, access to information, and personal safety of millions of Syrians. The Syrian intelligence services, especially the military intelligence, have been collecting without cause information about political opponents, members of the opposition and human rights activists. Numerous reports from Syria indicate that the government of Bashar al-Assad uses the intercepted data in part to identify, arrest and interrogate critics. Neighbouring governments engaged in the repression of domestic political dissent also purchased similar technologies. The roles of several Western companies including AREA SpA (Italy) and Qosmos (France), who have been identified as selling surveillance technology to Syria, have been the subject of inquiries in the US and France, respectively (Surveillance and Technology).

Chinese Taipei (Taiwan):



Taiwan is one of the world's leading producers of information and communication technology products. The International Institute for Management Development ranked Taiwan 7th out of 63 economies in the World Competitiveness Yearbook released in June 2022. With science and technology serving as a key driver of economic growth and national progress, the NSTC strives to advance related development by nurturing startups, promoting the nation's three science parks and supporting academic research. It also implements a range of measures and programs to foster creativity and ensure research focuses on the needs of industry. Taiwan is a leader in 5G availability, ranking fourth behind South Korea, Kuwait and Saudi Arabia, according to a report released by the U.K.-based Opensignal in March 2022. Taiwan's tech

ecosystem provides an ideal environment for global investors looking to establish a presence in Asia (Taiwan - science and technology).

Türkiye:

As the 17th biggest economy in 2018, Türkiye is one of the emerging countries in the global economy. Türkiye recently released an ambitious vision of becoming one of the top ten economies in the world in its centenary year, 2023, which requires a transformation of economic structures in the country. Hence, the government has introduced several interventions to reinforce the capacity of its higher education (HE) system, widen its science and technology capacity, and tie its science and technology policies to HE. As part of these initiatives, Türkiye has increased the number of universities, introduced the research university framework, and widened the Technopark policy. Although these policy interventions have contributed to Türkiye's progress toward its vision in science and technology, there is a considerable gap between its progress and the targeted accomplishments. Rather than quantitative expansion of the HE system, the main concern remained around the quality of the outcomes in HE and the effectiveness of science and technology policies in accomplishing Türkiye's 2023 vision (Science policy).

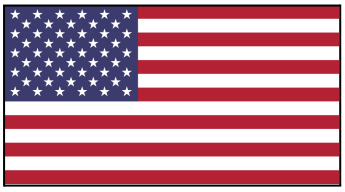
United Arab Emirates:

In recent years, the UAE government has been allocating huge budgets for the development of the education and scientific research sectors in the country. The major scientific fields in the UAE are engineering, computer science and medicine. Abu Dhabi currently invests in projects, start-ups and strategic industries, especially in the field of agricultural technology. In the field of medicine Dubai is the flag bearer and has become an international hub for the global health industry, thanks in part to the existence of the largest free trade area in the world in the medical field (UAE Science). The National Space Fund aims to build national capabilities and competencies, raise the economic contribution to diversifying the national economy, and consolidate the UAE's position in the space sector. It will be managed and supervised by the UAE Space Agency. The Fund is set up to develop the infrastructure supporting the space industry, and create an appropriate environment to attract start-ups in space. The UAE is working to deliver safe, clean and efficient nuclear energy. Nuclear reactors are destined to become the UAE's second most important source of energy in the UAE after natural gas, producing about 25 per cent of the UAE's electricity by 2020 and ensuring the continued economic development of the nation. The UAE's Telecommunications and Digital Government Regulatory Authority (TDRA) set up an ICT Fund in 2008. The primary role of the Fund is to apportion funds to projects that develop the UAE's capabilities in the field of information and communication technology (key-sectors-in-science-and-technology).

United Kingdom:

The UK has become the first country apart from the US and China whose tech ecosystem is worth more than a trillion dollars. The UK continues to hold the European crown for funding fast-growth

technology businesses, raising a near-record level of investment this year of £24bn (UK tech sector). The United Kingdom plays a leading part in the aerospace industry, with companies including Rolls-Royce playing a leading role in the aero-engine market; BAE Systems acting as Britain's largest and the Pentagon's sixth largest defence supplier, and large companies including GKN (Guest, Keen and Nettlefolds), acting as major suppliers to the Airbus project. Two British-based companies, GlaxoSmithKline and AstraZeneca, ranked in the top five pharmaceutical companies in the world by sales in 2009 and UK companies have discovered and developed more leading medicines than any other country apart from the US. The UK remains a leading centre of automotive design and production, particularly of engines, and has around 2,600 component manufacturers. Scientific research and development remains important in British universities, with many establishing science parks to facilitate production and co-operation with industry (Science and technology in the UK). However, Brexit has limited the UK's access to skilled European workers in the science, technology, engineering, and medicine (STEM) fields. Brexit has also caused problems for investment in sectors of the economy that employ a lot of workers with STEM degrees. After the vote to leave the EU, business investment in these sectors stagnated, and then dropped significantly during the pandemic and the exit from the single market (Brexit).



United States of America:

Science, technology, and innovation are cornerstones of the American economy. They are also dominant forces in modern society and international economic development. President Biden often says, "America is the only nation that can be defined by a single word: possibilities." The White House Office of Science and Technology (OSTP) works to bring that idea to life by harnessing the power of science, technology, and innovation to achieve America's greatest aspirations. The Diplomatic Security Service (DSS) leads worldwide security and law enforcement efforts to advance U.S. foreign policy and safeguard national security interests. In order to provide a secure digital environment for the conduct of U.S. foreign policy and empower the mobile diplomat, DSS established the Directorate of Cyber and Technology Security (CTS) in 2017. CTS brings together cyber, technology, and investigative expertise from across DSS to form a center of excellence that enhances our global defense-in-depth capabilities while enabling trusted innovations in technology to address emerging cyber-based threats affecting the Department's personnel, critical infrastructure, and information assets (Cybertech). U.S. government funding of space exploration has declined in recent decades, while the private sector's role has grown. In May 2020, SpaceX became the first private company to successfully ferry two NASA astronauts to the ISS, using its Falcon 9 rocket and attached Crew Dragon capsule (Space Exploration).

Yemen:

The President of Yemen, Mahdi al-Mashat, has stressed the importance of scientific plans to develop science and technology in order to promote Yemen to the ranks of developed countries. Al-Mashat pointed out that science and technology is an essential factor in the advancement of many countries of the world that have achieved self-sufficiency and built a strong and coherent economy. The president emphasised the necessity to do everything necessary to ensure that

Yemeni students studying abroad are able to return home and to help build up the country that needs their capabilities, their minds and their innovations (Authority and science).

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