OECD STI OUTLOOK 2021

TIMES OF CRISIS AND OPPORTUNITY

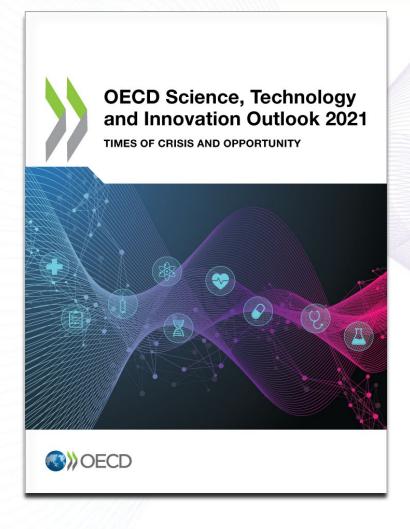
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OECD STI Outlook 2021



- An OECD flagship publication
- Published every 2 years, since the mid-1990s
- Asks: "What's new in the field of science, technology and innovation policy?"
- 2021 edition focuses on COVID-19
- Provides an international review based on latest policy information and indicators
- Based on work of the Committee for Scientific and Technology Policy (CSTP) and its working parties – the EC and most EU Member States are members
- Draws upon OECD STI statistical and qualitative data infrastructures



OECD STI Outlook 2021 – the narrative



Unprecedented mobilisation. Public research funders, private foundations and charities have set up an array of newly funded research initiatives worth billions of dollars in record time



Science and technology offer the only exit strategy from COVID-19. The pandemic has underscored more than in other recent crises the importance of science and innovation to being both prepared and reactive to upcoming crises



The pandemic has stretched research and innovation systems to their limits and exposed gaps and weak spots. There is an opportunity to reorient STI policies and direct science and innovation towards sustainable and inclusive futures

The STI system response to Covid-19 has been decisive, rapid and significant



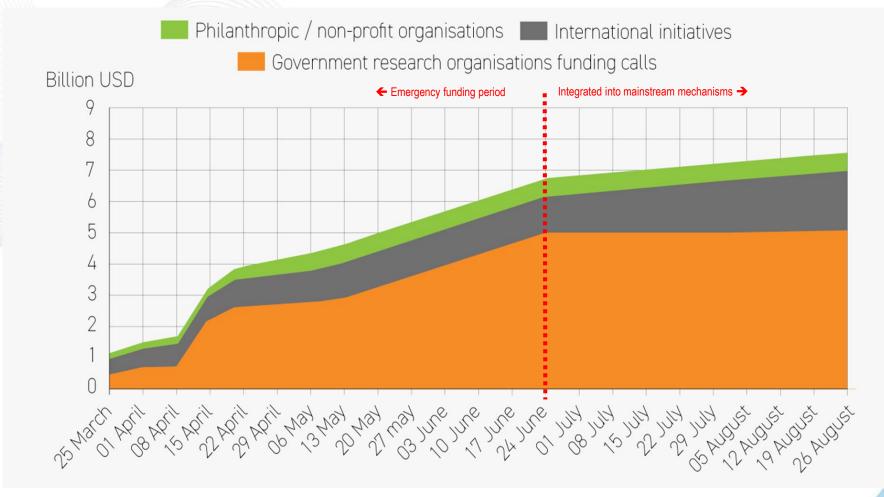


Research funding response to COVID-19

Evolution of COVID-19 research funding programmes and pledges

Funding for research and innovation has been supported by active government interventions around the world

But there are risks of indiscriminate diversion of research efforts

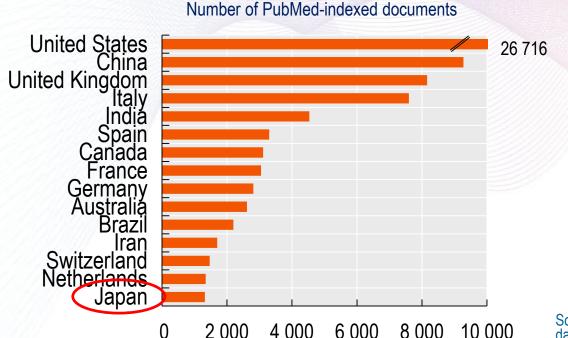




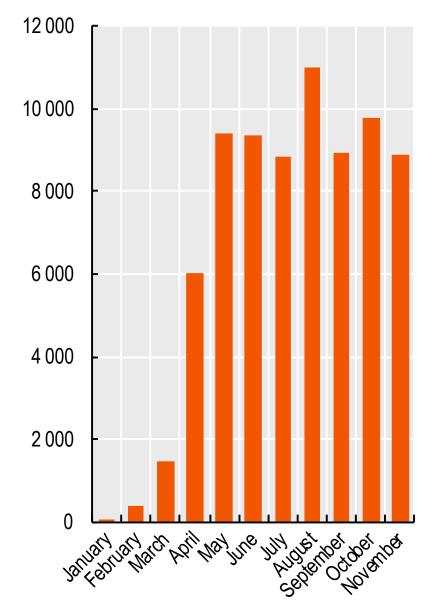
Research performers' response to COVID-19

Trends in COVID-19 biomedical and life sciences research publications, 1 Jan to 30 Nov 2020

The COVID-19 pandemic has triggered an unprecedented mobilisation of the scientific community



Number of PubMed-index ed documents, whole counts



Source: OECD calculations based on US National Institutes of Health PubMed data, https://pubmed.ncbi.nlm.nih.gov/, (accessed 30 November, 2020).



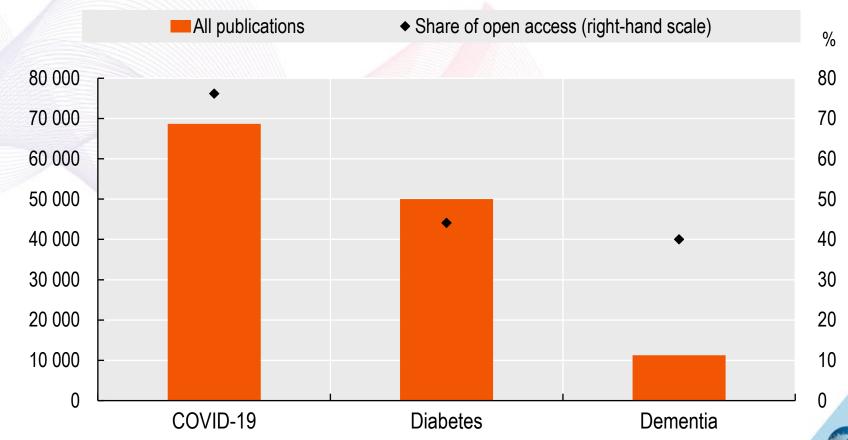


COVID-19 is an accelerator of trends already underway

76% of COVID-19 scientific publications are open access, c.f. diabetes (43%) and dementia (40%)

This, along with other changes, could accelerate the transition to a more open science in the longer run

Open access of COVID-19, Diabetes and Dementia publications, January-October 2020



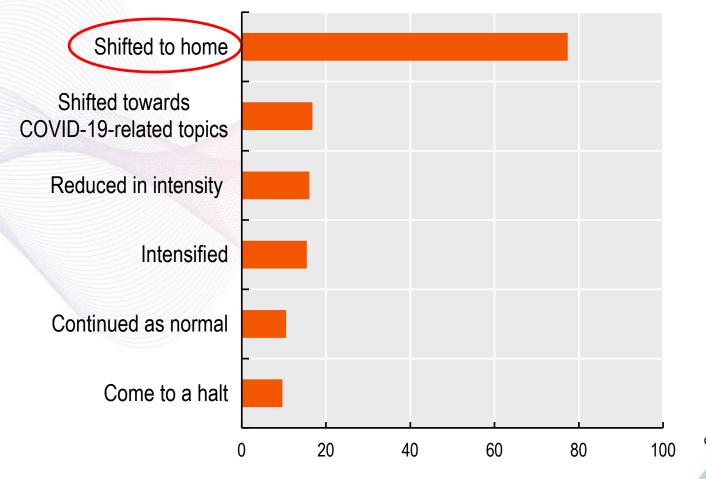




COVID-19 as an accelerator of trends already underway

 Research and innovation activities have been severely disrupted by lockdowns and social distancing measures

Current impact of COVID-19 on scientists' work



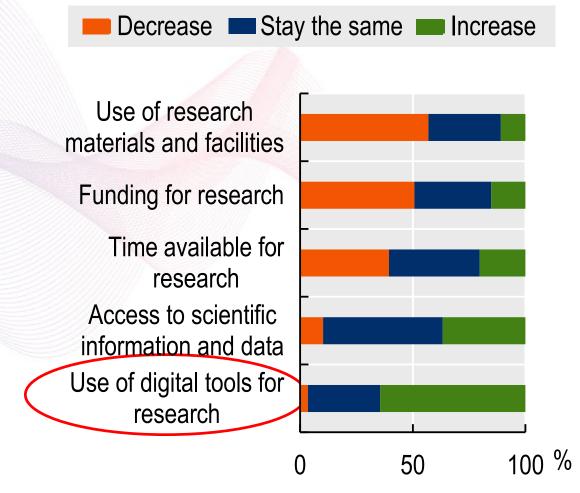




COVID-19 as an accelerator of trends already underway

- Research and innovation activities have been severely disrupted by lockdowns and social distancing measures
- Digital tools and open-data infrastructures have allowed scientists to continue to function outside their usual laboratory or field environments

Impact of COVID-19 on scientists' work

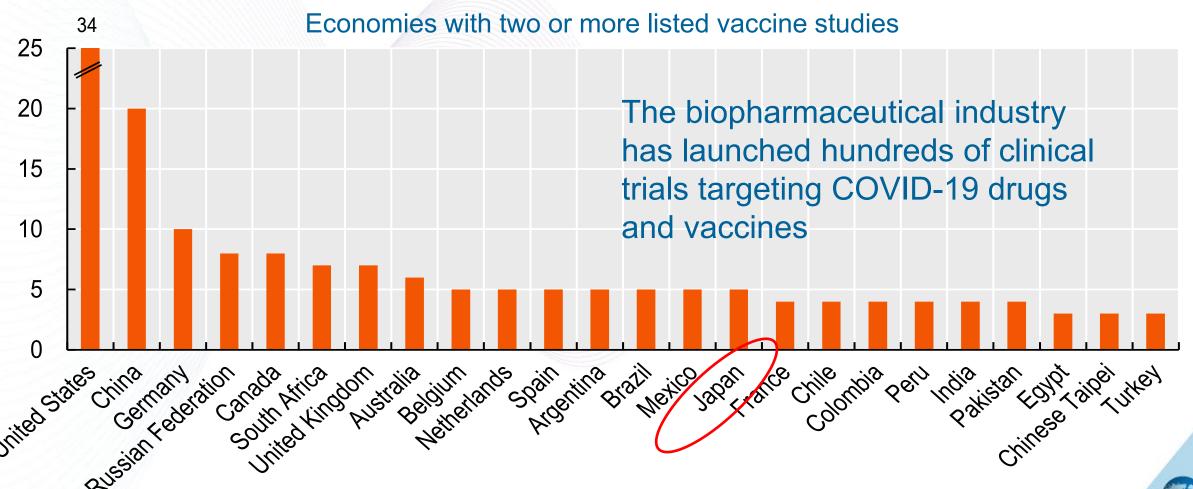






Business innovation response to COVID-19

Registered COVID-19 vaccine studies by economy

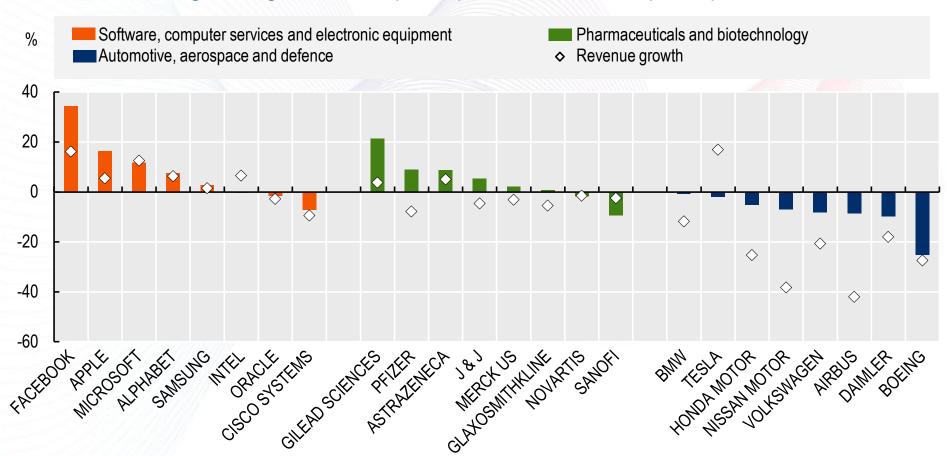




Business innovation response to COVID-19

R&D expense and revenue growth in selected companies

Percentage change between April-September 2019 and April-September 2020



Heterogeneous impact with R&D performance in the digital sector thriving and activity in R&D-intensive manufacturing sectors falling (e.g. automotive, electronics)





Are we facing a turning point for STI policy?

Digital technologies have mitigated effects of lockdowns

STI has proven an essential element of the resiliency countries have shown in the crisis up until now

There is unprecedented rapid development of vaccines

Could STI do even more to enhance societal and economic resilience?

There are other challenges, too, notably the climate emergency, that require STI to embrace a sustainability agenda

However, there are long-standing problems in STI systems that hinder their abilities to address challenges like COVID-19 and climate change

Does COVID-19 offer a disruptive moment for these problems to be addressed more aggressively by STI policy?



Looking forwards, to tackle the challenges of sustainability, inclusivity and resiliency, governments will need to reorient their STI policies

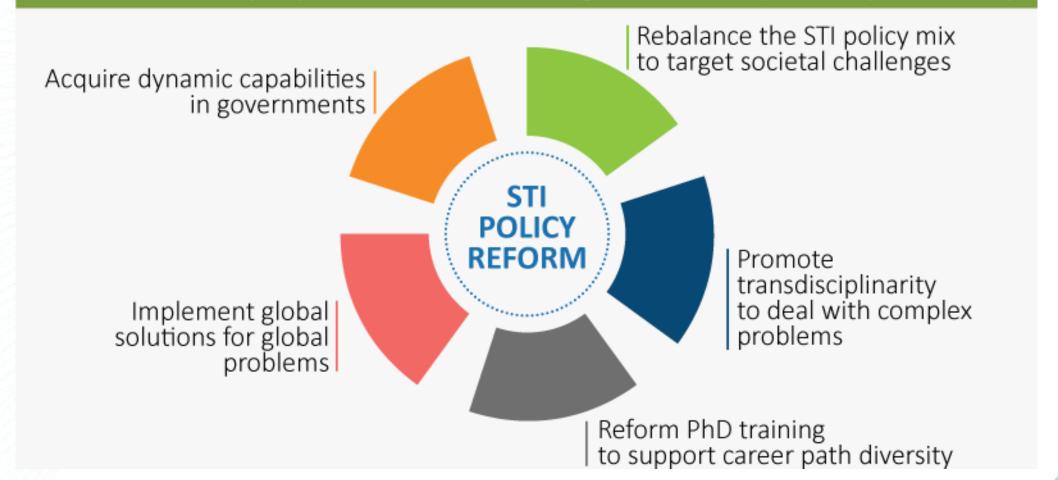




The need to reorient STI policies

The pandemic is an opportunity to reorient STI policies and trajectories

Main elements of STI policy reform to tackle the challenges of sustainability, inclusivity and resiliency





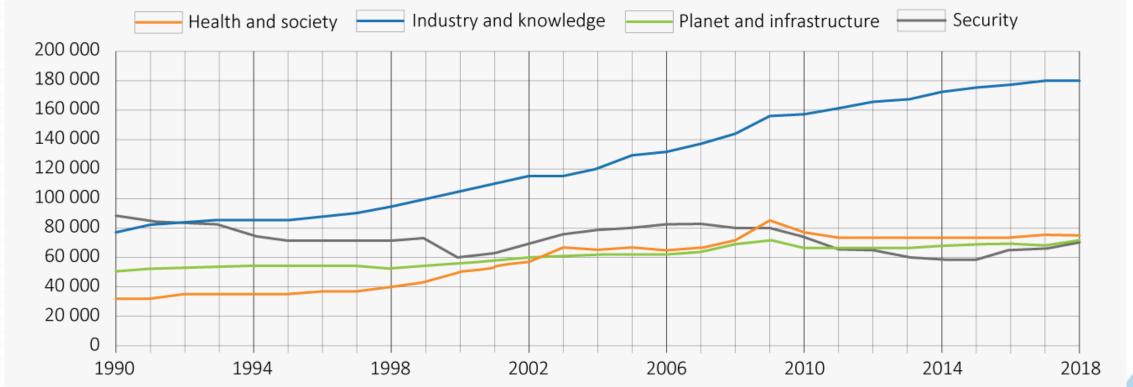


The need to redirect govt support to societal challenges?

Much of the growth in govt spending on R&D over the last two decades has been directed towards industrial R&D (through tax incentives) and research in universities

Estimates of total government support for R&D by SDG-related cluster categories, 1990-2018

Million constant USD PPP prices





Source: OECD (2020). "OECD Main Science and Technology Indicators. R&D Highlights in the February 2020 Publication", Directorate for Science, Technology and Innovation. www.oecd.org/sti/msti2020.pdf.

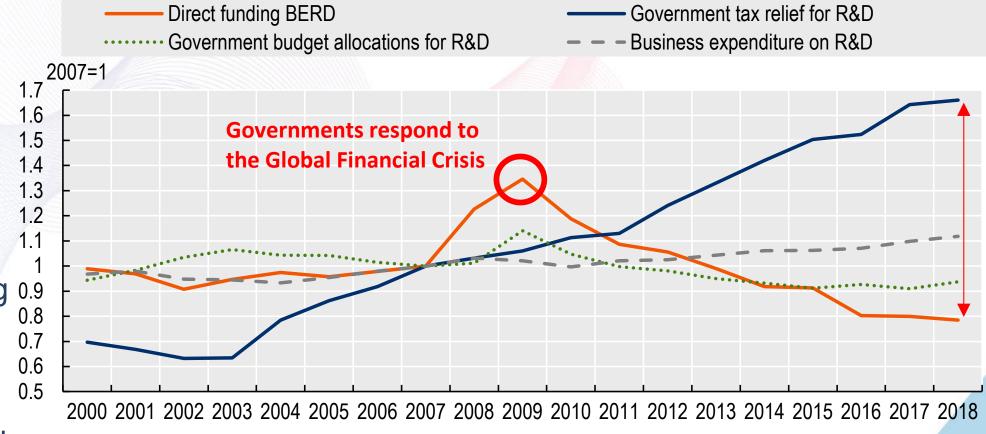


Moving towards a more targeted policy mix

Tax incentives have grown in the OECD while direct measures have declined

Govt spending on R&D will also need to be defended

Shift in business R&D support policy mix OECD area, 2000-19



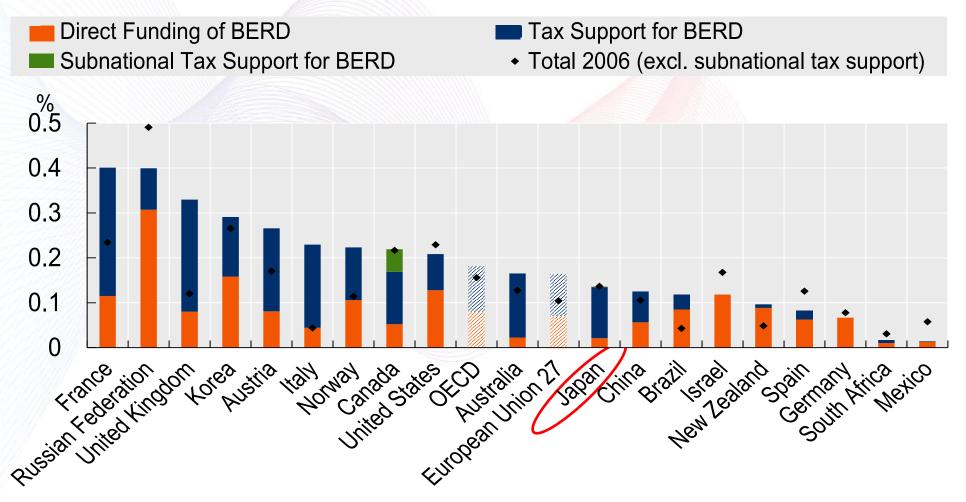






Japan's policy mix is quite dependent on tax incentives

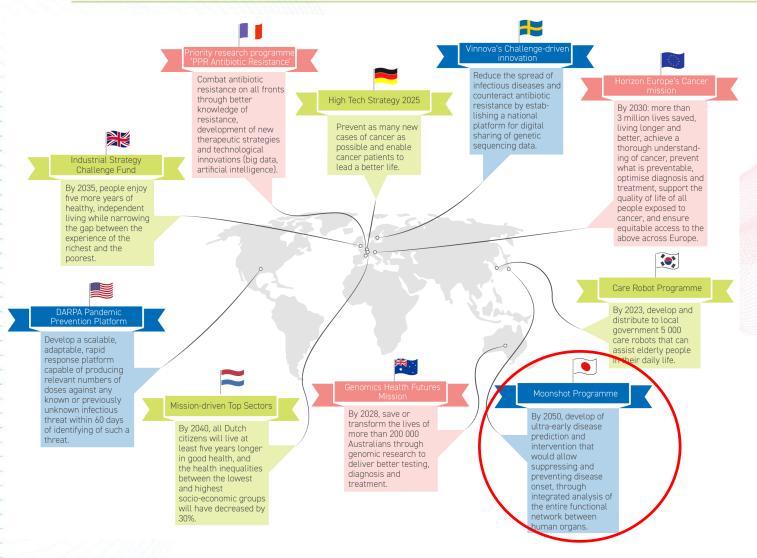
Direct government funding and government tax support for business R&D (BERD) 2018 and 2006







We need systemic policies to solve systemic problems



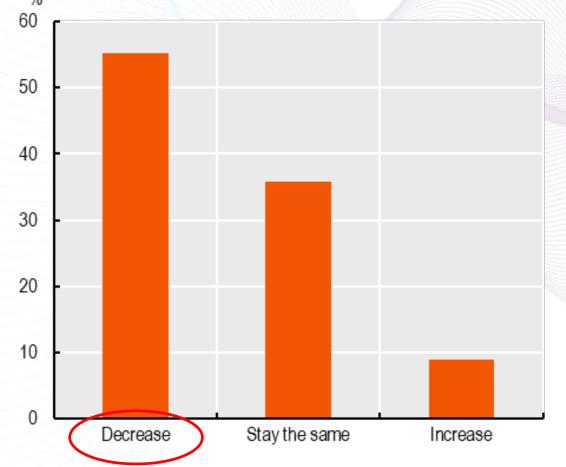
- There has been a recent surge of mission-oriented innovation policies, with different missions and designs
- One common principle: better targeted and coordinated interventions across all silos, for enhanced impact
- Japan is among the most advanced countries in implementing missionoriented innovation policies

Source: Online Mission-oriented innovation policy (MOIP) toolkit, https://stip.oecd.org/stip/moip



Reforming research careers to support diverse pathways

% of scientists who experienced or expect change in their job security and career opportunities due to the current pandemic crisis



Reforming PhD and post-doctoral training to support a diversity of career paths is essential for improving the ability of societies to react to crises like COVID-19, and to deal with longer-term challenges like climate change that require science-based responses

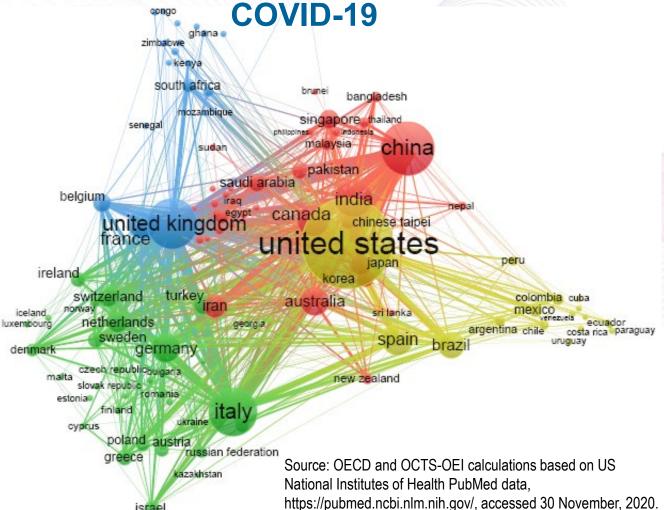
OECD Science Flash Survey 2020, https://oecdsciencesurveys.github.io/2020flashsciencecovid/, accessed on 12 October 2020





International science collaboration has been critical

International scientific collaboration on



Science depends on the global knowledge commons for progress

A lot of international scientific cooperation on COVID-19 has been initiated by researchers themselves, and has built on existing ties

Research links between China and OECD countries have grown strongly in recent years, and this is reflected in patterns of COVID-19 co-publication

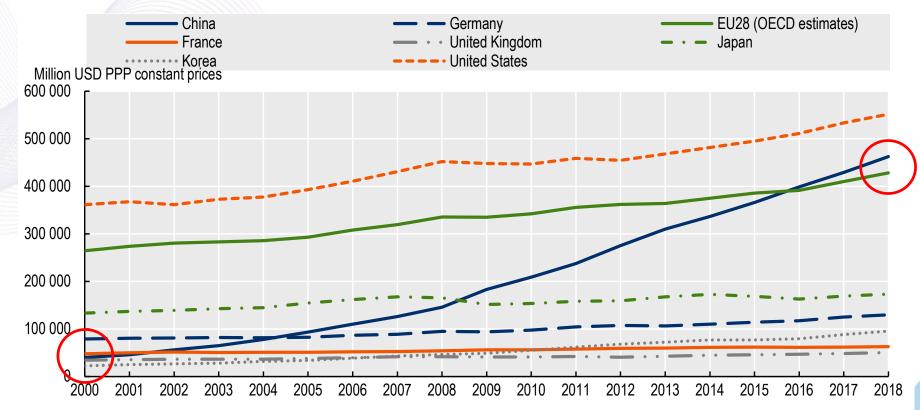


The ascendency of China

The prominence of China in these links is hardly surprising

China has become the world's secondlargest R&D performer – 80% of the expenditure of the United States in 2018

Gross Domestic Expenditure on R&D (GERD), 2000-18



But there are concerns about a lack of reciprocity in these relationships that threaten their future



Source: OECD MSTI 2020/1, Aug. 2020



Acting globally to solve global problems is critical

The ACT-Accelerator is driving unprecedented collaboration



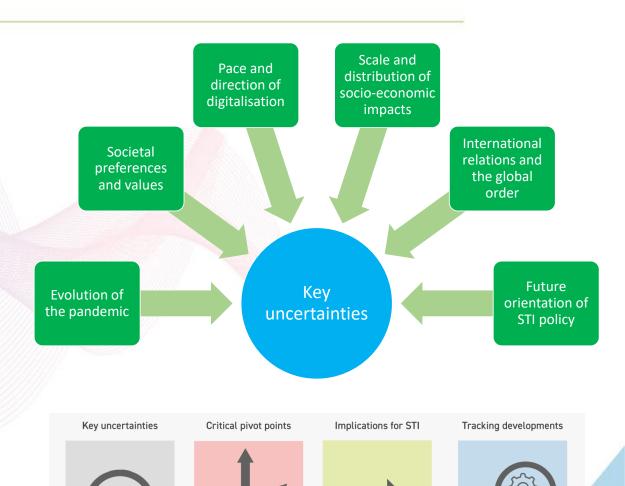
- Just as the pandemic is a global problem, it requires global solutions involving international STI co-operation and collaboration
- The impressive speed on vaccines has built on nascent global co-operation to develop new technology platforms to tackle emerging disease . . . and years of basic research funding
- There are surely lessons for tackling other global challenges





Building dynamic capabilities in government to meet the challenges ahead

- Many key uncertainties remain over the next few months and years
- Governments will also need to prepare more effectively against future shocks
- An increased policy emphasis on building resiliency => requires increased policy agility => and means governments need to possess the dynamic capabilities to adapt and learn in the face of rapidly changing conditions





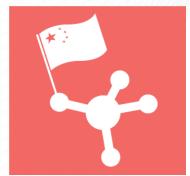
OECD STI Outlook – take-away messages for Japan



Government support to STI will need to be more directed to deal with the sorts of challenges we face: furthermore, the science system needs to support more high risk / high reward research to foster breakthroughs



Global co-ordination will need ramping up to tackle these challenges: Japan can adopt leadership roles in developing the necessary international arrangements, incl. building institutions, collaborative technology platforms, etc.



Relations with China: China cannot be excluded from these international arrangements, but collaboration should ensure core values, such as openness in science, academic freedom, and research ethics are respected



Special focus: STI governance to meet the challenges of resilience and just transitions



Starting question...

Overarching question:

What needs to happen for STI systems, and the STI policies that influence them, to be on track to contribute to a "just sustainability transition" characterised, for example, by net zero carbon emissions and the preservation of biodiversity?



- We're not starting from scratch, we're already on certain pathways, some sustainable, many not
- We're talking about long-term targets and pathways, though the need to reorient now is urgent
- Such reorientation probably implies greater directionality in STI policy, but how to achieve this is challenging
- There are also enormous co-ordination challenges associated with STI system reorientation





Follow-up question...

- How 'ready' are STI systems and STI policies to contribute to resilience and net zero and other sustainability targets as part of a "just transition"?
 - Production and consumption systems display stability and lock-ins, but transitions will likely need to destabilise many of these to reach net zero targets
 - The contributions of STI depend in large part on developments in other policy fields
 - Net zero and other sustainability targets associated with just transitions are global in scope and require global action
 - They are also local, and there's scope for experimentation and learning at multiple governance levels

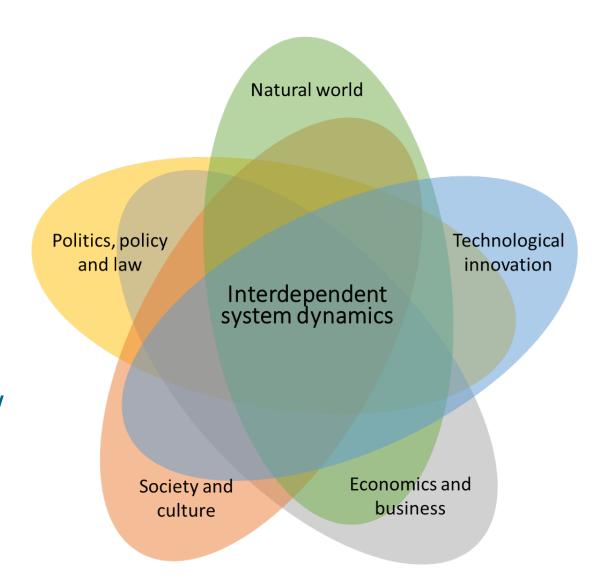




These are STI governance challenges

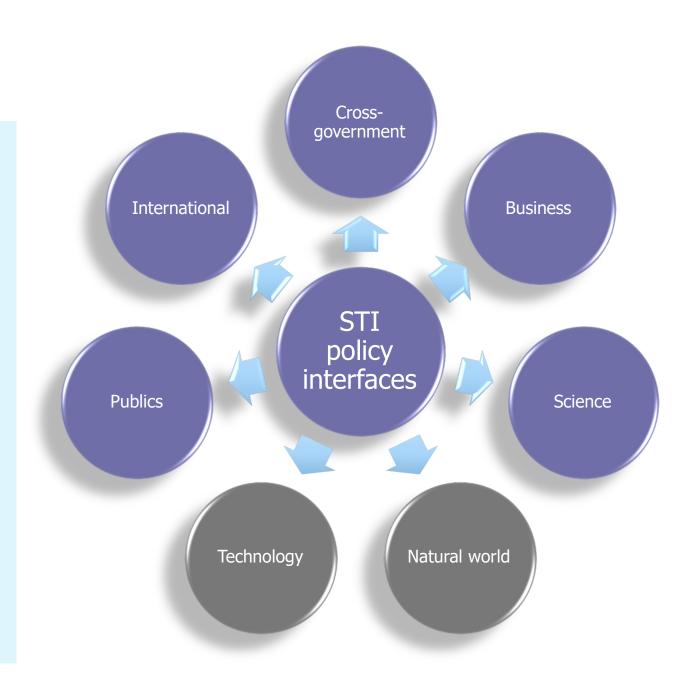
Challenges of directionality

- Our models and frameworks for thinking about direction-setting
- Oirecting what?
- Our How detailed and at what level?
- Interdependence with other systems
- Complexity and uncertainty
- Who we involve in direction setting and how
- Tension between meeting short-term and long-term agendas
- Co-ordination challenges at multiple STI policy interfaces



STI policy interfaces

- Resilience and sustainability transitions depend on mobilising a range of different actors
- The natural world and technology also have their own dynamics
- Interfaces reveal important differences in framings, institutions, interests and practices that need to be somehow mediated

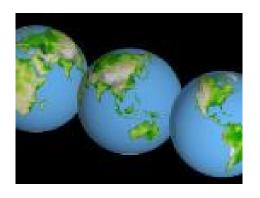


What we need to do in STI policy

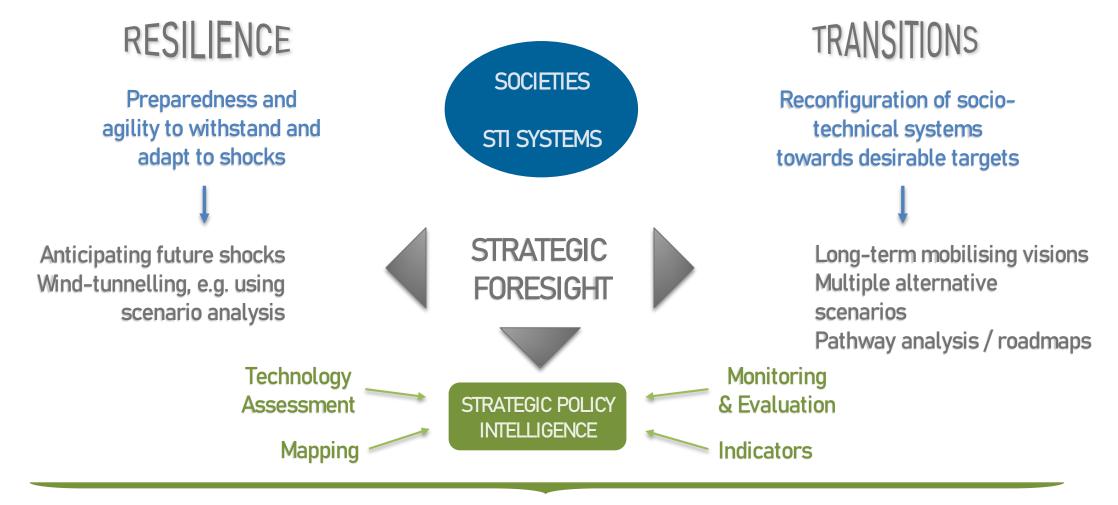
- 1. Positioning STI and STI policy in rapidly emerging and wide-ranging national, international and local narratives on sustainability transitions and resilience
- 2. Laying out the implications of a focus on transitions and resilience for **STI practice**, notably with respect to the activities of innovative firms, of the public research system, their interactions, and their engagement with society at large
- 3. Laying out the implications for **STI policy and governance**, including its rationales, objectives, instruments and target groups
- 4. Developing the knowledge base, frameworks, institutions, learning networks, and capabilities to design and implement STI policy mixes and governance arrangements that contribute to sustainability transitions and resilience







Strategic foresight and the twin goals of resilience and transitions



RESOURCES

Funding
Political support
Data and tools

CAPABILITIES

Futures literacy
Dynamic capabilities
Absorptive capacities

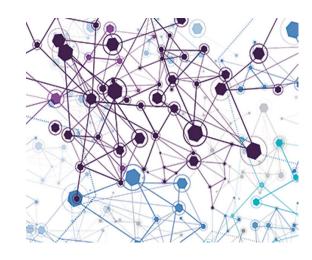
INSTITUTIONS

Organisations
Knowledge infrastructures
Education and training



What should we do?

- To reiterate: we're not starting from scratch
- Different countries have different institutional setups, specialisations, resources and policies to build upon and adapt => no one-size fits all
- Still, there is scope for international learning
- While the need for action is urgent, much adjustment is required – in terms of policy frameworks, institutions, practices and capabilities – which will take time to develop
- While states will need to play more active and directive roles, they will still chiefly act an enablers, with society and business playing leading roles

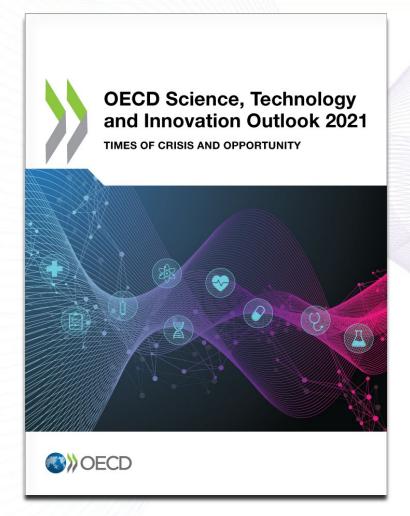








Learn more in the 'dual format' OECD STI Outlook









| What's at stake?

Researchers are the most important resource of research systems, and, as in other areas of activity, people are a key determinant of performance. The quality of the research produced depends mostly on the expertise and skills of the researchers, both individually and collectively, at the conditions diven to them to perform their work.

Many OECD countries are preoccupied with the future of academic research careers. Their concerns relate to the deterioration of working conditions of many researches, lack of diversity in terms of gender and representation of different groups in society, unequal opportunities in access and advancement in careers, and detailing capacity of research systems to struct the best national and international talent.

The move away from core basic funding to project-based funding is making research systems increasingly dependent on a cohort of junior staff employed on casual contracts. Furthermore, the context for funding and the development of research assessment regimes puts emphasis on the short-term output of research, which places immense pressure on early career researchers to publish.

The traditional academic career path can no longer absorb the increasing number of doctorate holders in many systems, which is heightening career competitiveness to extreme levels and contributing to greater precarely. A possible solution is to prepare doctorate holders for diverse careers beyond the traditional academic career path may take

The CECT Global Soence Form is undertaking a project on reducing the precarity of research careers. Its main objective is to identify policies are procured that could apport better strategic planning and management of research careers in the public socious promoting inclusion and diversity, with the contractive procured procu

The Research Precariat can be defined as the population of researchers with a doctoral degree that hold temporary positions

Book

Website online: oe.cd/sti-outlook





Also multi-lingual summaries, presentation, blog . . .





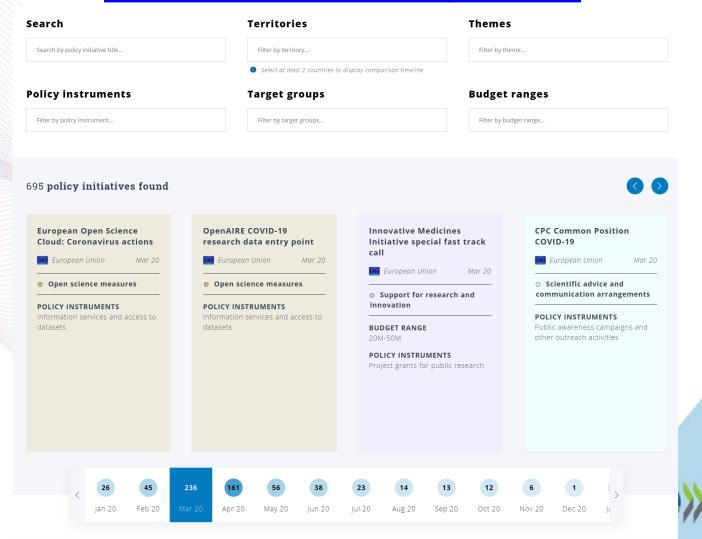


STIP COVID-19 Watch: Stay informed on countries' STI policies to tackle COVID-19



- Get the latest information on STI policy responses to the crisis across
 +40 countries and the EU, with timelines and other interactive charts
- Featuring information on 700 STI
 policy initiatives targeting scientific
 advice and communication,
 collaboration mechanisms, new
 funding initiatives, impacts on the
 STI system, etc.

https://stip.oecd.org/covid/



THANK YOU!

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