

Executive summary

The STI systems' response to COVID-19 has been decisive, rapid and significant

STI systems have responded strongly and flexibly to the COVID-19 crisis. Newly funded research initiatives worth billions of dollars have been set up in record time, and research and innovation have led to the rapid development of vaccines. However, the pandemic has stretched STI systems to their limits, revealing areas that need strengthening to improve overall STI resilience for both future and present challenges, including climate change.

The COVID-19 crisis has accelerated trends already underway in STI. It has further opened access to data and publications, increased the use of digital tools, enhanced international collaboration, spurred a variety of public-private partnerships, and encouraged the active engagement of new players. These developments could speed the transition to a more open science and innovation in the longer run.

At the same time, such widespread engagement risks diverting research efforts indiscriminately away from non-COVID-19-related topics. Governments and research funding bodies need to define and communicate quickly their capacities to support research in the coming years, as well as their strategic priorities, to allow research-performing organisations to elaborate realistic long-term plans.

The effects of the pandemic, particularly lockdowns, have also disrupted the normal functioning of innovation systems, endangering key productive and innovation capabilities, especially in hard-hit sectors. On an aggregate basis, business investments in research and innovation are pro-cyclical, and thus prone to contracting in times of crisis. This crisis may be different since some of the top global R&D players are expanding their activities during the crisis. The pandemic could exacerbate existing gaps in business research and innovation activities between “leading” and “laggard” sectors, large and small firms, and geographical areas. This distributional unevenness could widen productivity gaps, deepen the vulnerability of laggards, and reduce economic resilience, and should be the target of innovation-support policies.

Beyond their research activities, scientists continue to provide expert input on public health and other policy responses to the pandemic. They have had to communicate evidence that is incomplete and changing, and to do so in ways that promote public confidence and trust. This advice has sometimes been contested, given its policy consequences. In response, governments should carefully communicate uncertainties, provide a balanced presentation of potential scenarios, and be transparent about mistakes. Governments should also draw upon multi-disciplinary advisory mechanisms to ensure they consider different types of expertise when developing policy.

Looking forward, STI policies should be recalibrated to tackle the long-term challenges of sustainability, inclusivity and resiliency

The pandemic and its effects offer a stark reminder of the need to transition to more sustainable, equitable and resilient societies. Science and innovation will be essential to promote and deliver such transitions, but the pandemic has exposed limits in research and innovation systems that, if not addressed, will prevent

this potential from being realised. Governments should rethink STI policies along several lines to deal with these limits.

First, the current crisis serves as a reminder that policy needs to be able to guide innovation efforts to where they are most needed. This has implications for how governments support research and innovation in firms, which account for about 70% of R&D expenditures in the OECD. The business R&D support policy mix has shifted in recent decades towards a greater reliance on tax compared to direct support instruments such as contracts, grants or awards. While effective for incentivising businesses to innovate, R&D tax incentives are indirect, untargeted and tend to generate incremental innovations. Well-designed direct measures for R&D are potentially better suited to supporting longer-term, high-risk research, and targeting innovations that either generate public goods (e.g. in health) or have a high potential for knowledge spillovers. Governments need to revisit their policy portfolios to ensure an appropriate balance between direct and indirect measures.

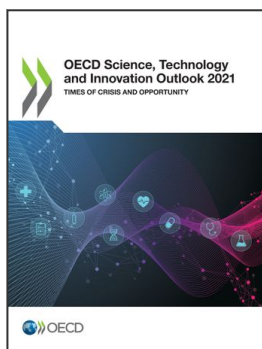
Second, the multifaceted nature of addressing complex problems like COVID-19 and sustainability transitions underscores the need for transdisciplinary research to which current science system norms and institutions are ill-adapted. Disciplinary and hierarchical structures need to be adjusted to enable and promote transdisciplinary research that engages different disciplines and sectors to address complex challenges.

Third, governments should link support for emerging technologies, such as engineering biology and robotics, to broader missions like health resilience that encapsulate responsible innovation principles. The responsible innovation approach seeks to anticipate problems in the course of innovation and steer technology to best outcomes. It also emphasises the inclusion of stakeholders early in the innovation process.

Fourth, 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 and to deal with future challenges like climate change that require science-based responses. Reforms could also help relieve the precarity of early-career researchers, many of whom are employed on short-term contracts with no clear prospect of a permanent academic position. The crisis has also highlighted the need for academia to train and embrace a new cohort of digitally skilled research support professionals and scientists.

Fifth, global challenges require global solutions that draw on international STI co-operation. The development of COVID-19 vaccines has benefited from nascent global R&D preparedness measures, including agile technology platforms that can be activated as new pathogens emerge. The pandemic has created momentum to establish effective and sustainable global mechanisms to support the range and scope of R&D necessary to confront a wider range of global challenges. However, governments need to build trust and define common values to ensure a level playing field for scientific co-operation and an equitable distribution of its benefits.

Finally, governments need to renew their policy frameworks and capabilities to fulfil a more ambitious STI policy agenda. Increasing policy emphasis on building resilience, which calls for policy agility, highlights the need for governments to acquire dynamic capabilities to adapt and learn in the face of rapidly changing environments. Engaging stakeholders and citizens in these efforts will expose policymakers to diverse knowledge and values, which should contribute to policy resilience. Governments should also continue to invest in evidence about their STI support policies with a view to improving them.



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