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# Effects of COVID-19 on the Federal Research and Development Enterprise

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SUMMARY

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The federal research and development (R&D) enterprise is a large and complex system that includes government facilities and employees as well as federally funded work in industry, academia, and the nonprofit sector. The nation's response to the Coronavirus Disease 2019 (COVID-19) pandemic is affecting the federal R&D enterprise, and the federal government and others are trying to address those effects. A number of congressional and other policy issues may arise as the situation develops.

Implementation of social distancing guidelines had led many laboratories and R&D projects to close. Where possible, researchers have continued to work remotely, but R&D often requires physical access to unique facilities and equipment. Institutions have faced decisions about which projects—such as research on COVID-19 itself—are sufficiently essential that they should continue.

Many scientific and technical conferences have also been cancelled, with consequences for the sharing and advancement of knowledge and for the conference organizers, which are now often faced with substantial cancellation costs. In some cases, conferences are continuing virtually.

Even for continuing R&D projects, there may be efficiency and quality impacts, additional costs, and challenges such as the closure of suppliers and service providers. Some resources dedicated to ongoing R&D are also being redirected toward work focused on COVID-19.

Other potential effects of the pandemic include unplanned costs for the shutdown and restarting of R&D projects that are suspended, delays in the availability of major new R&D equipment, the loss of anticipated revenues by some federal R&D agencies, uncertainty about the future stability of federal R&D funding if COVID-19 affects the government's fiscal situation, and impacts on the graduation schedules and career prospects of students, postdoctoral researchers, and early-career faculty whose research is interrupted.

Federal actions to date to address these challenges include a wide variety of government-wide and agency-specific policy changes to accommodate the R&D community's needs and provide agencies with additional flexibilities, as well as legislation enacted by Congress to provide supplemental funding for R&D and for R&D organizations affected by closures, and to provide new authorities to agencies.

Groups representing R&D organizations in industry and academia have proposed a variety of additional steps, including further increases in funding for the federal R&D agencies, more flexibility in the expenses that can be paid using federal R&D awards, and other support for R&D organizations in the form of loans, grants, and tax changes.

As the near-term and long-term effects of COVID-19 on the nation's R&D enterprise become more apparent, Congress may seek to monitor those effects, develop a deeper understanding of their implications, and consider whether additional legislative actions are necessary.

# Contents



## Appendixes



## Contacts

# Introduction

The federal research and development (R&D) enterprise is a large and complex system, spanning the country, that includes government facilities and employees as well as federally funded work in industry, academia, and the nonprofit sector. In FY2019, federal agencies obligated an estimated $141.5 billion for R&D, including $39.6 billion for intramural R&D and $101.9 billion for extramural R&D.[1] Its work is essential to U.S. economic prosperity, national security, health care, and other national priorities. It also plays a substantial direct role in the U.S. economy.[2] Today, the operation of the system is being affected profoundly by the Coronavirus Disease 2019 (COVID-19) pandemic and the national response to it.

This report provides an overview of how the nation's response to COVID-19 is affecting the federal R&D enterprise, how the federal government and others are addressing those effects, and issues that may arise as the situation develops. The scope of this report is limited to the effects of COVID-19 on federally funded R&D. It does not attempt to address effects on the broader U.S. R&D enterprise, the majority of which is funded by and conducted in the private sector. In addition, it does not attempt to address the federal R&D resources now being focused on understanding the science of COVID-19, developing tests and treatments, and otherwise applying R&D to address the pandemic.[3]

As the scientific, government, and public understanding of COVID-19 has grown, the national response has evolved, and it is likely to continue to evolve. The scope, scale, and dynamism of responses by the federal government, state and local governments, and the private sector are too great to catalog fully in this report. Rather, the report highlights key effects and issues of concern and provides examples of agency actions.

# Effects on R&D Institutions and Projects

Faced with the global spread of a contagious and deadly virus, U.S. institutions have taken a number of extraordinary measures. One key response has been social distancing—limiting close contacts between individuals in order to reduce opportunities for transmission of the virus. This response has led to the closure of many businesses, schools, government offices, and other institutions. Where possible, these institutions have continued to operate via telework and e-learning. Research and development activities, however, often require physical access to unique facilities and equipment. As a result, many R&D organizations—including federal facilities as well as industrial and academic laboratories supported by federal funds—have closed or curtailed operations.

[1] National Science Foundation, *Survey of Federal Funds for Research and Development: Fiscal Years 2018–19*, Table 2, February 2021, https://ncsesdata.nsf.gov/fedfunds/2018/. The cited figures include both R&D and R&D plant (i.e., facilities and equipment). Intramural R&D is conducted by federal employees using federal facilities and equipment. Extramural R&D is conducted by industrial firms, universities and colleges, other nonprofit organizations, federally funded research and development centers, state and local governments, foreign entities, and individuals.

[2] Institute for Research on Innovation and Science, "The Impact of American University Research Spending," April 2020.

[3] See CRS Report R46219, *Overview of U.S. Domestic Response to Coronavirus Disease 2019 (COVID-19)*, coordinated by Sarah A. Lister and Kavya Sekar; and a compilation of links to other CRS products related to COVID-19 at https://www.crs.gov/resources/coronavirus-disease-2019.

## Closure of Laboratories and Laboratory Activities

Closures of R&D facilities and social distancing requirements for researchers depend less on coordinated national policies than on the independent decisions of individual agencies, universities, and other institutions. For example, the National Aeronautics and Space Administration (NASA) decides the status of each of its centers separately, based on local conditions, according to a four-stage response framework.[4] At the same time, some NASA centers may be at stage 3 (open to mission-essential personnel) while others are at stage 4 (closed except to protect life and critical infrastructure). During March 2020, NASA made the decision to move to stage 3 and subsequently from stage 3 to stage 4 at different times for different centers.[5] Actions by state or local governments may be a factor in the decisions of some facilities. For example, shutdowns at Department of Energy (DOE) laboratories in California and Illinois followed statewide social distancing orders issued by the governors of those states.[6]

In some cases, specific R&D activities may be allowed to continue, despite closures, if an institution determines that the work is sufficiently important, that suspending it would be too costly or disruptive, or that it can be conducted remotely. For example, most employees of the National Institute of Standards and Technology (NIST) are on telework with limited access to the laboratories' physical facilities and only with supervisor approval. However, some NIST employees continue to work onsite to provide certain limited essential services, including the sale of Standard Reference Materials, calibration of precision instruments, distribution of time and frequency signals, and maintenance of the National Vulnerability Database.[7]

Many of these considerations for laboratories and other research facilities apply similarly to research conducted in the field.

### Identification of Essential and Critical R&D Activities

The policies guiding these decisions often use terms like *essential* or *critical*. In the NASA response framework, for example, mission-essential work includes work needed for the safety of human life or protection of property and "work that must be performed to maintain mission/project operations or schedules and cannot be performed remotely/virtually."[8] The Office of Management and Budget (OMB) has provided guidance to agencies about what travel

[4] National Aeronautics and Space Administration, "NASA Response Framework," https://nasapeople.nasa.gov/coronavirus/nasa_response_framework.pdf.

[5] See, for example, National Aeronautics and Space Administration, "NASA Administrator Statement on Agency Coronavirus Status," press release 20-027, March 14, 2020, https://www.nasa.gov/press-release/nasa-administrator-statement-on-agency-coronavirus-status; National Aeronautics and Space Administration, "March 19 Administrator Statement on Agency Response to Coronavirus," press release 20-030, March 19, 2020, https://www.nasa.gov/press-release/march-19-administrator-statement-on-agency-response-to-coronavirus; and NASA Administrator Jim Bridenstine, "March 24 Update on NASA Response to Coronavirus," March 24, 2020, https://blogs.nasa.gov/bridenstine/2020/03/24/march-24-update-on-nasa-response-to-coronavirus/.

[6] See also American Institute of Physics, "Pandemic Impacts Escalating Across Federal Labs," March 20, 2020, https://www.aip.org/fyi/2020/pandemic-impacts-escalating-across-federal-labs, which also provides examples involving several other agencies and facilities. For a snapshot of closure decisions at the DOE national laboratories, see David Kramer, "National Labs Are Forced to Adapt During Coronavirus Outbreak," *Physics Today*, March 18, 2020, https://physicstoday.scitation.org/do/10.1063/PT.6.2.20200318a/full/.

[7] The National Vulnerability Database is the U.S. government repository of standards-based data for the management of vulnerabilities in computer software and hardware. For more information, see https://nvd.nist.gov/.

[8] National Aeronautics and Space Administration, "NASA Response Framework," https://nasapeople.nasa.gov/coronavirus/nasa_response_framework.pdf.

(including travel to conduct R&D or to attend scientific meetings) should be considered mission-critical, based on a list of 11 factors, such as whether the travel is for activities essential to national security or whether it is time-sensitive.[9]

Presidential Policy Directive 21 (PPD-21) identifies the defense industrial base, including defense R&D, as one of 16 critical infrastructure sectors.[10] A memorandum from the Under Secretary of Defense for Acquisition and Sustainment identifies development and testing by Department of Defense (DOD) contractors as an essential part of this critical infrastructure.[11] Some state emergency orders have included exemptions for facilities and organizations that are considered critical infrastructure, suggesting that defense-related R&D may be allowed to continue even when other R&D is suspended. In general, however, state and local authorities—not federal agencies—assume responsibility for adjudicating claims of criticality by private-sector organizations.[12]

In some cases, the determination of whether an R&D project should continue is based on how severely it would be affected by being suspended. For example, the relative positions of Earth and Mars in their respective orbits typically create a narrow launch window for NASA science missions to Mars. If a mission misses that window, it is likely to be delayed 26 months until the next launch window. While NASA has suspended a number of other major projects, it is continuing work on the Mars 2020 mission, scheduled for a launch window that opens in mid-July 2020.[13] Other time-sensitive projects may include experiments that require continuity of data collection or that involve caring for live animals or maintaining cell cultures.[14]

University decisions about essential research functions may be informed by local conditions, federal funding agency directives, ethical considerations about the well-being of human subjects and animals in discontinued or scaled-back research, and each university's own risk management decisionmaking. Columbia University has defined essential functions to include, in addition to COVID-19 research and ongoing clinical trials, "the maintenance of equipment, laboratory resources, critical animal resources, and cell lines."[15] Johns Hopkins University has defined three tiers of its clinical research. The top, essential, tier includes trials of potential COVID-19

[9] Office of Management and Budget, "Updated Federal Travel Guidance in Response to Coronavirus," Memorandum M-20-14, March 14, 2020, https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-14-travel-guidance-OMB-1.pdf.

[10] Presidential Policy Directive 21 (PPD-21), *Critical Infrastructure Security and Resilience*, February 12, 2013, https://obamawhitehouse.archives.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil. For further information on critical infrastructure, see CRS Report R45809, *Critical Infrastructure: Emerging Trends and Policy Considerations for Congress*, by Brian E. Humphreys, and Department of Homeland Security, Cybersecurity and Infrastructure Security Agency, "Defense Industrial Base Sector," https://www.cisa.gov/defense-industrial-base-sector.

[11] Ellen M. Lord, Under Secretary of Defense for Acquisition and Sustainment, "Defense Industrial Base Essential Critical Infrastructure Workforce," Memorandum for the Space Industrial Base, March 20, 2020, https://media.defense.gov/2020/Mar/22/2002268024/-1/-1/1/DEFENSE-INDUSTRIAL-BASE-ESSENTIAL-CRITICAL-INFRASTRUCTURE-WORKFORCE-MEMO.PDF.

[12] For more information, see CRS Insight IN11284, *COVID-19: State and Local Shut-Down Orders and Exemptions for Critical Infrastructure*, by Brian E. Humphreys.

[13] Jeff Foust, "Coronavirus Pauses Work on JWST," *Space News*, March 20, 2020, https://spacenews.com/coronavirus-pauses-work-on-jwst/.

[14] For a selection of examples, see "When Coronavirus Closes Your Lab, Can Science Go On?," *New York Times*, March 23, 2020, https://www.nytimes.com/2020/03/23/science/coronavirus-closed-labs.html.

[15] Columbia University, "COVID-19 (Novel Coronavirus): Frequently Asked Questions Relating to Research," updated March 27, 2020, https://research.columbia.edu/covid-19-novel-coronavirus-frequently-asked-questions-relating-research#/text-14638.

treatments and trials that address certain acute, life-threatening conditions such as Huntington's disease. Only trials in this tier can continue normally, including enrolling new patients.[16] According to the Association of Public and Land-Grant Universities, research functions that some (but not necessarily all) universities have identified as essential include[17]

- COVID-19 related research;
- activity that if discontinued would generate significant data and sample loss;
- activity that if discontinued would pose a safety hazard;
- activity that maintains critical equipment or core facilities;
- activity that maintains critical samples, reagents, and materials;
- activity that maintains animal populations;[18]
- activity that maintains critically needed plant populations, tissue cultures, or other living organisms;
- activity in support of essential human subjects research; and
- clinical trial activity that if discontinued would adversely affect patient care.

Not all time-sensitive research is necessarily considered essential, however. One example of an activity that is generally not being treated as essential is agricultural research that depends on an annual planting cycle or an animal maturation cycle.[19]

## Continuing R&D Remotely

Whether researchers can continue to make progress on a particular R&D project remotely may also depend on the nature of the project. For example, researchers working remotely may be able to perform scientific computations, engage in modeling and simulation, design experimental hardware, analyze data already obtained, and prepare journal articles. In contrast, handling physical and biological samples, caring for laboratory animals, and building or operating specialized equipment likely require a researcher to be present in the laboratory. Research involving human subjects may be interrupted if those subjects are unavailable because of social distancing. In some cases, the extent to which research activities can continue may depend on the duration of the disruption; for example, analyzing data and preparing results for publication may no longer be an option once all existing data have been analyzed and written up. These factors may affect different disciplines differently; for example, research in mathematics, computer science, and theoretical physics may be more amenable to remote working than research in agricultural science, geology, or microbiology.

[16] Kelly Servick, et al., "Labs Go Quiet as Researchers Brace for Long-Term Coronavirus Disruptions," *Science*, March 16, 2020, https://www.sciencemag.org/news/2020/03/updated-labs-go-quiet-researchers-brace-long-term-coronavirus-disruptions?utm_campaign=news_daily_2020-03-17&et_rid=197056316&et_cid=3249121.

[17] Debbie Altenburg, Association of Public and Land-Grant Universities, email to CRS, March 31, 2020.

[18] Some institutions have directed researchers to reduce certain research animal populations. See, for example, David Grimm, "'It's Heartbreaking.' Labs Are Euthanizing Thousands of Mice in Response to Coronavirus Pandemic," *Science*, March 23, 2020, https://www.sciencemag.org/news/2020/03/it-s-heartbreaking-labs-are-euthanizing-thousands-mice-response-coronavirus-pandemic.

[19] Telephone conversation between CRS and representatives of the Association of American Universities, March 27, 2020.

## Cancellation of Conferences

Travel restrictions and social distancing requirements have also resulted in the cancellation of numerous scientific and technical conferences.[20] The person-to-person interactions—both formal and informal—that take place at such conferences are an instrumental mechanism for knowledge sharing, peer feedback, the ideation of new research, technology transfer, and interactions between researchers and agency program managers. Other mechanisms, such as scientific papers and electronic communications, also offer other important ways to exchange knowledge and share ideas, but they lack some of the interactive advantages of in-person conferences. Accordingly, the cancellation of scientific and technical conferences may have a detrimental impact on advances in knowledge and the benefits that emerge from such knowledge. These adverse effects apply both to federal scientists and engineers and to their counterparts in academia and the private sector who work on federally funded R&D.

The impact of cancelling conferences may be particularly significant in certain fields. In computer science, for example, papers published in conference proceedings may be as influential as journal articles, to an extent that is rare in other fields.[21]

In some cases, conferences are continuing virtually with attempts to facilitate informal interactions that would normally take place in person. For example, the annual Conference on Retroviruses and Opportunistic Infections, originally scheduled to be held in Boston in March 2020, was converted to a virtual conference, with prerecorded presentations, live webcasts, and electronic poster presentations.[22] In April 2020, the annual International Conference on Learning Representations (devoted to machine learning) plans to present papers using prerecorded videos and offer online opportunities to ask questions of speakers, see questions and answers from other participants, take part in discussion groups, meet with sponsors, and join groups for networking.[23]

Scientific and technical conferences are often run by professional societies and other organizations that rely on them for revenue. Cancellations are likely to result in financial losses for these organizations as expected revenues are not realized and cancellation costs associated with the use of hotels, meeting facilities, and other services are incurred. Such losses can be considerable for the organizations involved. The cancellation of the March 2020 annual meeting of the American Physical Society cost the society about $7 million, about 12% of its typical annual revenues; other societies have reported cancellation losses that wiped out essentially all of their financial reserves.[24] Federal agencies also run scientific and technical conferences. While

[20] For a crowd-sourced list of cancelled and postponed conferences, with additional information, see http://bit.ly/cancelledcons, coordinated by Anne Marie Gruber, University of Northern Iowa.

[21] Luis Caires, Universidade Nova de Lisboa, "Again, the Role of Conference Papers in Computer Science and Informatics," December 5, 2015, http://ctp.di.fct.unl.pt/~lcaires/papers/conferencesCS.v4.pdf; Kevin Bowyer, University of Notre Dame, "Mentoring Advice on 'Conference Versus Journals' for CSE Faculty," October 5, 2012, https://www3.nd.edu/~kwb/Mentoring_Conferences_Journals.pdf; and Ramin Zabih, Cornell University and Google Research, personal communication, March 31, 2020.

[22] Conference on Retroviruses and Opportunistic Infections Foundation, "Virtual CROI 2020," http://www.croiconference.org/virtual-croi-faq.

[23] International Conference on Learning Representations, "ICLR2020 as a Fully Virtual Conference," https://iclr.cc/Conferences/2020/virtual.

[24] Michael Moloney, American Institute of Physics, email to CRS, April 1, 2020. The 12% figure is estimated by CRS based on financial data in the American Physical Society's 2018 annual report, https://www.aps.org/about/governance/annual-reports/upload/APSAnnualReport2018.pdf.

these conferences are not generally a significant source of agency revenues, some agencies are likely to face one-time cancellation costs that may be considerable.

Researchers planning to attend conferences that have been cancelled may have incurred nonrefundable travel or lodging expenses. Some agencies have determined that awardees may charge these costs to their research awards despite regulations that would normally prohibit doing so.[25]

Some of the same considerations apply to other types of meetings. For example, some DOE scientific user facilities have cancelled or postponed their annual user meetings, limiting opportunities for facility outreach and user engagement.[26]

## Effects on R&D That Is Not Suspended

### Efficiency and Quality

Even when R&D projects can continue, restrictions may affect efficiency or quality. According to one space policy expert, "The enforced separation of people working on the same or related tasks will inject delays and miscommunications. It will certainly be an obstacle to schedules and success in activities like preparing for a launch or building an exploratory spacecraft."[27] A U.S. researcher working remotely on a particle physics experiment has described the inefficiency of guiding an on-site technician through installing a piece of electronics: "I've spent probably 3 hours over the past 24 on Skype with somebody…. He says something then points the webcam at what we're looking at, then we talk a little bit more."[28] Others note the need to devote time to emergency planning.[29]

### Additional Costs

Institutions may incur unplanned expenses even for R&D that is not suspended. For example, they may need additional computing and networking equipment and services to accommodate researchers working remotely. Janitorial expenses may increase at facilities that remain open, if additional cleaning is required to guard against the spread of infection. Prices may increase for materials and equipment that are in short supply.

### Disrupted Access to Supplies and Services

R&D at institutions that remain open may also be affected by disruptions to the supply of materials and equipment or by closures at collaborating research institutions. Laboratories have reported shortages of widely used supplies, such as RNA-extraction kits, swabs, and personal

[25] See, for example, National Science Foundation, "Frequently Asked Questions (FAQs) About the Coronavirus Disease 2019 (COVID-19) for National Science Foundation (NSF) Proposers and Awardees," April 2, 2020, https://www.nsf.gov/bfa/dias/policy/covid19/covid19faqs_proposerandawardee.pdf, question 4.

[26] DOE email to CRS, April 8, 2020.

[27] John Logsdon, George Washington University, quoted in https://www.politico.com/newsletters/politico-space/2020/03/20/space-industry-seeks-help-amid-coronavirus-pandemic-488636.

[28] John Hobbs, Stony Brook University, quoted in Kelly Servick et al., "Labs Go Quiet as Researchers Brace for Long-Term Coronavirus Disruptions," *Science*, March 16, 2020, https://www.sciencemag.org/news/2020/03/updated-labs-go-quiet-researchers-brace-long-term-coronavirus-disruptions.

[29] See, for example, Gail Dutton, "COVID-19's Impact on Life Sciences Researchers," *BioSpace*, March 17, 2020, https://www.biospace.com/article/covid-19-s-impact-on-life-sciences-research/.

protective equipment, that are in high demand for COVID-19 testing and patient care. Basic laboratory supplies such as reagents and pipette tips, when still available, may be on backorder or available only at multiples of the usual price.[30] Depending on the duration of the pandemic, NASA's plans for a 2021 launch of the James Webb Space Telescope may be jeopardized. It is to be launched from a European Space Agency spaceport in Kourou, French Guiana, but France suspended launch campaigns from the Guiana Space Center on March 16, 2020, due to the COVID-19 pandemic.[31]

## Shifts in R&D Focus

In some cases, agencies and researchers are shifting their research focus to COVID-19 related topics. The National Institutes of Health (NIH) has issued several funding opportunity announcements for researchers to submit competitive revisions or seek supplemental funding for existing projects, in order to redirect their research efforts to COVID-19.[32] Other agencies that are typically less focused on health research have also sought to shift their R&D priorities. For example, light source user facilities operated by the DOE Office of Basic Energy Sciences are used for structural biology research in partnership with NIH and universities. According to DOE, these facilities are making "every effort to give [COVID-19] researchers priority access" and "want to ensure they are doing everything possible to enable research into this virus and the search for an effective vaccine or other treatment."[33] More generally, DOE wrote an open letter to the research community asking for "ideas about how DOE and the National Labs might contribute resources to help address COVID-19 through science and technology efforts and collaborations."[34] A newly formed consortium of agencies, universities, and companies is making supercomputing resources available "to accelerate understanding of the COVID-19 virus and the development of treatments and vaccines."[35] The NASA Earth Science program has provided guidance to "investigators looking to reprioritize currently-funded efforts" and noted that an existing funding opportunity could support "investigations making innovative use of NASA satellite data to address … impacts of the COVID-19 pandemic."[36] NIST has announced a new grant opportunity under the Manufacturing USA National Emergency Assistance Program to support rapid, high-impact projects that support the nation's response to the COVID-19 pandemic. Up to $2 million is to be available to Manufacturing USA institutes under the program.[37]

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[30] Carrie Arnold, "COVID-19: Biomedical Research in a World Under Social-Distancing Measures," *Nature Medicine*, March 26, 2020, https://www.nature.com/articles/d41591-020-00005-1.

[31] Irene Klotz, "NASA Picks Top Priorities as Centers Are Shut Down," AviationWeek.com, March 27, 2020, https://aviationweek.com/shows-events/space-symposium/nasa-picks-tops-priorities-centers-shut-down.

[32] NIH, "Coronavirus Disease 2019 (COVID-19): Information for NIH Applicants and Recipients of NIH Funding," https://grants.nih.gov/policy/natural-disasters/corona-virus.htm.

[33] Department of Energy, "Structural Biology Resources at DOE Light Sources," https://www.bnl.gov/structuralbio/.

[34] Open letter from Chris Fall, Director, DOE Office of Science, March 12, 2020, https://science.osti.gov/-/media/sc-1/pdf/COVID-19-letter.pdf.

[35] COVID-19 High Performance Computing Consortium, "HPC Resources available to fight COVID-19," https://www.xsede.org/covid19-hpc-consortium.

[36] National Aeronautics and Space Administration, "Making Innovative Use of NASA Satellite Data to Address Environmental, Economic, and/or Societal Impacts of the COVID-19 Pandemic," https://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=742447/solicitationId=%7B3F3DFBFB-8FEE-F317-63FD-CB84ECA833EC%7D/viewSolicitationDocument=1/RRNES_NSPIRES%20note_v4.pdf.

[37] NIST, https://www.nist.gov/news-events/news/2020/03/nist-funding-manufacturing-institutes-support-pandemic-response; and email communication between CRS and NIST, March 30, 2020. For more information, see https://www.grants.gov/web/grants/view-opportunity.html?oppId=325811.

# Other Financial and Infrastructural Effects

## Shutdown and Restart Costs

Suspending research may result in additional costs for activities such as animal care, maintenance of cell cultures and biological samples, and safe storage of hazardous materials. Restarting research, when conditions permit, may also incur costs for staff time and supplies to bring experimental equipment back to operational status, reestablish laboratory animal populations, or replace masks and other personal protective equipment that was donated to hospitals and first responders during the pandemic. The extent to which these costs may be covered out of existing federal research awards is not yet clear.

## Auditing Issues

There may be future auditing issues for federally funded research that is redirected to address COVID-19, or for federally funded researchers who incurred costs to shut down and restart their projects or donated personal protective gear that had been paid for out of grant funds. Even if these changes had the support of the federal funding agency, the time-sensitive circumstances may mean that not all approvals were adequately documented to satisfy auditing requirements. The flexibilities provided to funding agencies in these circumstances (see "Federal Actions to Date" below) may not yet be aligned with corresponding flexibilities for accounting and auditing.

## University-Based Shared Research Infrastructure

There are specific challenges for shared university research infrastructure, including core facilities—specialized laboratories with unique instruments and capabilities that provide services to an institution's researchers[38]—as well as animal care facilities and clinical trial infrastructure. These facilities are typically supported mostly through user fees, often paid from federal funds that are supporting a user's research. They are widely used: one university reported that a majority of its grant-funded research in FY2019 relied in part on core facilities, while a majority of its NIH-funded research made use of shared animal care facilities.[39] Much of this infrastructure has closed, creating uncertainty about funding for shutdown and restart costs as well as continuity of pay for technical staff. Some facilities remain open to support research that is continuing, but open facilities may face their own financial challenges in continuing to operate, as the fees that usually support them are likely to be reduced by the suspension of research by some of their users.

## Delayed Availability of Major R&D Equipment

Planned R&D may be delayed by interruptions in the development or manufacturing of major equipment. NASA, for example, has suspended work on the James Webb Space Telescope,[40]

[38] Examples include nanofabrication laboratories, clean rooms, facilities for genetic characterization using the polymer chain reaction (PCR), and facilities for imaging using nuclear magnetic resonance (NMR).

[39] Jay Walsh, Vice President for Research, Northwestern University, telephone conversation with CRS, April 6, 2020.

[40] Jeff Foust, "Coronavirus Pauses Work on JWST," *Space News*, March 20, 2020, https://spacenews.com/coronavirus-pauses-work-on-jwst/. Some contractor work on JWST is continuing for a few additional days (see Jeff Foust, "Limited work continues on JWST," *Space News*, April 2, 2020, https://spacenews.com/limited-work-continues-on-jwst/).

which had been scheduled for launch in March 2021, and on the Space Launch System rocket and Orion crew capsule, needed for its plans to land humans on the Moon in 2024.[41]

## Loss of Revenues by Federal R&D Agencies

Some federal laboratories engage in R&D activities under a Work for Others (WFO) or similar agreement. Using a WFO, a federal agency, federal laboratory, or company can pay to have R&D conducted by another federal laboratory. This often enables access to unique facilities, equipment, and personnel. While the cancellation or suspension of WFO projects due to the COVID-19 response may reduce costs to the sponsoring organization, it may simultaneously reduce revenue that would otherwise have supported the staff, facilities, and equipment of the laboratory that was to perform the work.

According to the Government Accountability Office, from FY2008 through FY2012, DOE performed about $2 billion worth of R&D annually under WFO agreements, accounting for 13%-17% of total DOE laboratory revenues. Most of the work (88%) was performed for other federal agencies.[42] NIST conducted $94.4 million in research, development and supporting services for other federal agencies in FY2019.[43]

NIST certifies and provides more than 1,300 Standard Reference Materials (SRM) that are used to perform instrument calibrations, verify the accuracy of specific measurements, and support the development of new measurement methods. NIST SRMs are used by industry, academia, and government to facilitate commerce and trade and advance R&D. NIST revenues from SRMs in FY2019 were $21.8 million. NIST also provides calibration and testing services for industry, academia, and government; its FY2019 revenues for these services were $33.5 million.[44] As of the date of this report, NIST continues to provide SRM and calibration services, but it is unclear how long NIST will be able to provide these services if the pandemic continues for an extended period.

## Future Availability of Federal Funding

As some agencies and researchers shift their R&D priorities to respond to the COVID-19 pandemic, the funding available for R&D on other topics may be reduced, at least in the near term. More generally, the federal funding needed for the national response to COVID-19 may reduce the overall federal resources available for R&D. While supplemental appropriations already enacted include additional funds for R&D and institutions that conduct R&D, increased federal spending to address the pandemic, coupled with decreased federal revenue associated with potential economic contraction, may lead to a future fiscal environment with constrained spending across the government. These outcomes may not be clear for some time, however, and may depend on a host of independent decisions by agencies and Congress.

[41] Mike Wall, "NASA Suspends Work on SLS Megarocket and Orion Capsule Due to Coronavirus Outbreak," Space.com, March 20, 2020, https://www.space.com/nasa-suspends-sls-orion-work-coronavirus.html.

[42] U.S. Government Accountability Office, *National Laboratories: DOE Needs to Improve Oversight of Work Performed for Non-DOE Entities*, GAO-14-78, October 25, 2013, p. 9, https://www.gao.gov/products/GAO-14-78.

[43] Department of Commerce, *National Institute of Standard and Technology/National Technical Information Service, Fiscal Year 2021 Budget Submission to Congress*, February 2020, https://www.commerce.gov/sites/default/files/2020-02/fy2021_nist_ntis_congressional_budget_justification.pdf, p. NIST-149.

[44] Ibid.

## Impact on Students, Postdoctoral Researchers, and Early-Career Faculty

University research typically involves postdoctoral researchers (postdocs), graduate students, and sometimes undergraduate students in addition to faculty members. Even if the nature of a particular research project qualifies it to continue despite COVID-19, many universities are limiting the continued participation of postdocs and students. Cancelled or suspended research may be of particular concern to these groups. Continuing to work remotely may also be more challenging for students, postdocs, and early-career faculty who have families, as their children are more likely to be young than those of more senior researchers. Failing to complete a project on time may delay the completion of a degree or make it difficult to demonstrate research success when applying for a job or seeking tenure. Cancelled conferences are also a particular concern for postdocs, students, and other early-career researchers, who often rely on conferences to meet more senior scientists, present their work, and find jobs. In some circumstances, there may be uncertainty about continuity of pay for students employed as research assistants or teaching assistants.

Because there are disparities between disciplines in the extent to which research can continue while working remotely, students and postdocs in different disciplines may find disparities in how their careers are affected. Disparities may also arise between students and postdocs whose experiments can be suspended and restarted and those whose experiments must simply be abandoned and begun afresh.

To the extent that research disruptions, delayed graduation, or difficulty obtaining in-field employment discourage students and early-career researchers from continuing in their field of research, those outcomes could create challenges for the future science and engineering workforce. Continued travel restrictions may also affect the enrollment of foreign science and engineering students in U.S. universities in the 2020-2021 academic year. As well as potentially creating financial challenges for some universities, reduced international enrollment could have long-term workforce consequences, given that many foreign students in science and engineering remain in the United States after graduation.[45]

# Federal Actions to Date

On March 9, 2020, OMB authorized federal agencies to provide certain short-term relief from administrative, financial management, and auditing requirements for grantees involved in research related to COVID-19.[46] On March 18, four organizations representing universities and other research organizations wrote to OMB requesting the expansion of these flexibilities to all research grants.[47] On March 19, OMB provided relief for "an expanded scope of recipients affected by the loss of operational capacity and increased costs due to the COVID-19 crisis."[48]

[45] CRS telephone conversation with representatives of the Association of American Universities, April 6, 2020.

[46] Office of Management and Budget, "Administrative Relief for Recipients and Applicants of Federal Financial Assistance Directly Impacted by the Novel Coronavirus (COVID-19)," Memorandum M-20-11, March 9, 2020, https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-11.pdf.

[47] Association of American Universities, Council on Government Relations, Association of Public and Land-Grant Universities, and Association of American Medical Colleges, letter to OMB, March 18, 2020, https://www.cogr.edu/sites/default/files/Joint%20Association%20Letter%20to%20OMB%20On%20M-20-11%20Expansion.pdf.

[48] Office of Management and Budget, Administrative Relief for Recipients and Applicants of Federal Financial Assistance Directly Impacted by the Novel Coronavirus (COVID-19) Due to Loss of Operations," Memorandum M-

The **Appendix** summarizes OMB's government-wide administrative actions, extensions of authorities, and guidance. It also provides a link to a compilation maintained by the Council on Governmental Relations (COGR) of guidance from federal agencies, academic institutions, and other organizations, as well as frequently asked questions about how federal agencies that fund R&D are implementing the OMB-directed flexibilities.

Some agencies have compiled special guidance for awardees. For example, an NIH webpage provides information on changes to proposal submission and award management, updated policies on clinical trials and animal welfare, and revised procedures for peer review.[49] The National Science Foundation (NSF) has issued guidance for contractors operating NSF-funded facilities.[50] COGR has compiled links to such guidance, sorted by agency, along with links to institutional guidance from a long list of individual universities.[51]

Some agencies have extended the due dates for research proposals,[52] announced that they will accommodate applications received late,[53] or reduced the institutional approvals required for an initial proposal.[54] While these accommodations provide additional flexibility for researchers, delays in receiving and acting on proposals may result in delays in issuing awards.

Some agencies have announced accommodations for existing awardees, such as no-cost extensions of awards, extensions of financial and other reporting deadlines, changes to the allowability of cancellation fees and costs resulting from the pausing and restarting of research, and allowing the continued payment of salaries and benefits out of grant funds.[55] While these steps give researchers additional flexibility, they may create challenges once research resumes. For example, grant funds that have been spent on cancellation fees, activities required for the suspension of research, or researcher salaries while research is suspended necessarily reduce the balance of funds subsequently available to complete a research project. No-cost extensions extend

20-17, March 19, 2020, https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-17.pdf.

[49] National Institutes of Health, "Coronavirus Disease 2019 (COVID-19): Information for NIH Applicants and Recipients of NIH Funding," https://grants.nih.gov/grants/natural_disasters/corona-virus.htm.

[50] National Science Foundation, "NSF Guidance for Major Facilities and Contracts Regarding COVID-19," https://www.nsf.gov/news/special_reports/coronavirus/NSF%20Guidance%20for%20Major%20Facilities%20and%20Contracts%20Regarding%20COVID-19.pdf.

[51] Council on Governmental Relations, "Institutional and Agency Responses to COVID-19 and Additional Resources," https://www.cogr.edu/institutional-and-agency-responses-covid-19-and-additional-resources.

[52] See, for example, National Aeronautics and Space Administration, "COVID-19 Impact to NASA SBIR/STTR Program," https://sbir.nasa.gov/content/covid-19-impact-nasa-sbirsttr-program; and National Science Foundation, "Impact on Existing Deadline Dates," March 26, 2020, https://www.nsf.gov/bfa/dias/policy/covid19/covid19_deadlines.pdf.

[53] See, for example, National Institutes of Health, "UPDATE: NIH Late Application Policy Due to Public Health Emergency for United States for 2019 Novel Coronavirus (COVID-19)," March 26, 2020, https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-091.html.

[54] See, for example, National Aeronautics and Space Administration, "Exoplanets Research," solicitation NNH20ZDA001N-XRP, https://nspires.nasaprs.com/external/solicitations/summary.do?solId={FD9340AF-CB68-3F16-38EF-C9440C3F3CCA}&path=&method=init, as amended March 20, 2020, to change the required initial submission from a Step-1 proposal (which must be submitted by a researcher's Authorized Organizational Representative) to a Notice of Intent (which can be submitted directly by the principal investigator).

[55] See, for example, U.S. Army Medical Research Acquisition Authority, "USAMRAA's Supplemental Guidance on Administrative Flexibilities for Grants and Cooperative Agreements in Response to COVID-19 Pandemic," version 2, March 25, 2020, https://cdmrp.army.mil/about/covid-19/USAMRAA%20Supplemental%20Guidance%20on%20COVID-19_03.25.20.pdf.

an award's completion date; they do not provide additional funds to cover costs incurred because of delays.

Congress has already enacted some legislation with R&D-related funding and provisions in response to the COVID-19 pandemic. For example[56]

- The Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020 (P.L. 116-123), enacted on March 6, 2020, appropriated $836 million in supplemental funding for NIH, with additional transferrable amounts from other accounts. Some of the $3.1 billion appropriated to the Public Health and Social Services Emergency Fund may also be made available to the Biomedical Advanced Research and Development Authority for the development of COVID-19 medical countermeasures, such as therapies and vaccines.
- The Coronavirus Aid, Relief, and Economic Security (CARES) Act (P.L. 116-136), enacted on March 27, 2020, appropriated more than $1 billion in supplemental funding for R&D. Most of this total was for research on COVID-19 itself, including $945 million for NIH, $415 million for research, development, testing, and evaluation (RDT&E) in the DOD Defense Health Program, and smaller sums for several other agencies. The act also provided funding to several R&D agencies to offset unanticipated costs arising from the pandemic. For example, NASA received $60 million to cover the costs of mission delays caused by center closures, while the U.S. Forest Service received $3 million to reestablish experiments affected by travel restrictions.[57]
- Section 18004 of the CARES Act established a $14 billion Higher Education Emergency Relief Fund for colleges and universities. At least half of this total must be allocated for emergency financial aid grants to students. It is not yet clear how much, if any, will be available to address issues directly related to R&D.
- Section 3610 of the CARES Act authorized federal agencies to reimburse contractors for "any paid leave, including sick leave, a contractor provides to keep its employees or subcontractors in a ready state" when they are unable to work on-site due to facility closures and telework is not an option. Although this provision is not specifically directed at R&D, it could be significant for agencies such as DOE and NASA whose R&D facilities are staffed with numerous contractor employees.
- Section 12004 of the CARES Act authorized the Patent and Trademark Office to temporarily suspend, modify, adjust, or waive timing deadlines under the Patent Act and the Trademark Act during the COVID-19 emergency period.[58]

[56] For a reaction to this legislation by one major university organization, see Association of Public and Land-Grant Universities, "APLU Statement on Senate Agreement on Third COVID-19 Emergency Supplemental Bill," March 25, 2020, https://www.aplu.org/news-and-media/News/aplu-statement-on-senate-agreement-on-third-covid-19-emergency-supplemental-bill.

[57] For the purpose of the NASA and Forest Service funds, see Senate Committee on Appropriations, "$340 Billion Surge in Emergency Funding to Combat Coronavirus Outbreak," https://www.appropriations.senate.gov/imo/media/doc/Coronavirus%20Supplemental%20Appropriations%20Summary_FINAL.pdf.

[58] For an example of the use of this new authority, see U.S. Patent and Trademark Act, "USPTO Announces Extension of Certain Patent and Trademark-Related Timing Deadlines Under the Coronavirus Aid, Relief, and Economic Security Act," press release 20-05, March 31, 2020, https://www.uspto.gov/about-us/news-updates/uspto-announces-extension-certain-patent-and-trademark-related-timing.

- Section 13006 of the CARES Act gave DOD additional flexibility in the use of its other transaction authority for the development of prototypes related to COVID-19.[59]
- The CARES Act provided NIST laboratories with $6 million in additional funding, including $5 million to support and accelerate measurement science related to viral testing and biomanufacturing; $50 million for the NIST Manufacturing Extension Partnership program to help companies across the country transform operations in support of COVID-19 related needs and to foster development of COVID-19 related supply chains; and $10 million for research related activities at Manufacturing USA's National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL).[60]
- The CARES Act provided $2.25 million for the Environmental Protection Agency's Science and Technology account to prevent, prepare for, and respond to coronavirus, domestically or internationally, including $1.5 million for research on methods to reduce the risks from environmental transmission of coronavirus via contaminated surfaces or materials.
- The CARES Act provided NSF with $76 million "to prevent, prepare for, and respond to coronavirus, domestically or internationally, including to fund research grants and other necessary expenses." The Senate Appropriations Committee summary notes that $75 million is to support NSF's RAPID grant mechanism, "which will support near real-time research at the cellular, physiological, and ecological levels to better understand coronavirus," and $1 million is to assist in the administration of these grants.[61]

In the House, Speaker Pelosi has announced plans for a special committee to oversee the federal response to COVID-19, including the spending of supplemental funding provided under the above legislation.[62]

# Potential Additional Federal Actions

Several organizations from industry and academia have put forward policy recommendations to address R&D-related challenges resulting from COVID-19. Congress may also seek to take additional actions through legislation or oversight.

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[59] For more information on DOD other transaction authority, see CRS Report R45521, *Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress*, by Heidi M. Peters.

[60] Email communication between CRS and NIST, March 30, 2020. NIIMBL is a public-private partnership dedicated to advancing biopharmaceutical manufacturing innovation and workforce development.

[61] Senate Committee on Appropriations, "$340 Billion Surge in Emergency Funding to Combat Coronavirus Outbreak," https://www.appropriations.senate.gov/imo/media/doc/Coronavirus%20Supplemental%20Appropriations%20Summary_FINAL.pdf. The NSF RAPID grant mechanism supports quick-response research of up to $200,000 on natural or anthropogenic disasters and similar unanticipated events; RAPID grants have been used previously to award research grants during the Zika and Ebola outbreaks. See NSF, "Dear Colleague Letter on the Coronavirus Disease 2019 (COVID-19)," NSF 20-052, April 3, 2020, https://www.nsf.gov/pubs/2020/nsf20052/nsf20052.jsp.

[62] Lindsey McPherson and Chris Marquette, "Pelosi Wants Coronavirus Select Committee but That Requires a Vote," *Roll Call*, April 2, 2020, https://www.rollcall.com/2020/04/02/pelosi-wants-coronavirus-select-committee-but-that-requires-a-vote/; see also Quint Forgey, "Clyburn: House Coronavirus Panel 'Will Be Forward-Looking,' Not Review Trump's Early Response," *Politico*, April 5, 2020, https://www.politico.com/news/2020/04/05/trump-clyburn-house-coronavirus-panel-166064.

The Commercial Spaceflight Federation, an industry group, has asked Congress for legislation directing the Internal Revenue Service to provide for immediate refunds of accumulated research and experimentation (R&E) tax credits.[63] It argues that this would allow "continued innovation through R&D reinvestment." In many cases, under current law, companies that qualify for this credit are unable to use the full amount immediately because of insufficient tax liability or other factors; unused amounts can be carried forward for up to 20 years. The credit only applies to R&D funded by a company itself, but companies that conduct R&D with federal funding often fund their own R&D as well.[64]

Organizations representing research universities, medical schools, and teaching hospitals have asked Congress, among other steps, to give research institutions receiving federal funding additional flexibility to cover researcher salaries and benefits while their institutions are affected, to provide $13 billion in additional extramural research funding, and to allow agencies to reprogram any supplemental funds that are not spent within a year for new awards. The latter proposal, they argued, "could have a stimulative effect and help to address the nation's research competitiveness."[65]

Noting that "many scientific societies have been and will continue to be adversely impacted by meeting and conference cancellations as a result of COVID-19," the Federation of American Societies for Experimental Biology has asked Congress to include measures such as zero-interest loans and grant to associations, nonprofit organizations, and other tax-exempt organizations in future economic stimulus packages and supplemental appropriations measures.[66]

While OMB has issued guidance to agencies regarding administrative flexibilities and other issues, as described above, agency implementation of that guidance has varied. Representatives of the Association of American Universities have indicated that more uniform implementation by federal research funding agencies would reduce administrative burdens and uncertainties for award recipients.[67]

Congress may consider a variety of other legislative and oversight actions, either in the near term while the pandemic continues or retrospectively to improve the response to future crises. These might include

- seeking a clearer understanding of how federally funded R&D is being affected by COVID-19, through hearings, mandates for agency reports, support for academic studies, or mandates for reports by organizations such as the Government Accountability Office or the National Academies of Sciences, Engineering, and Medicine;

[63] Commercial Spaceflight Federation, letter to Members of Congress, March 18, 2020, https://www.politico.com/f/?id=00000170-f48e-d209-af70-fcae07800000.

[64] For more information on the research tax credit, see CRS Report RL31181, *Research Tax Credit: Current Law and Policy Issues for the 114th Congress*, by Gary Guenther.

[65] Association of Public and Land-Grant Universities, Association of American Medical Colleges, Association of American Universities, and American Council on Education, letter to Members of Congress, March 19, 2020, https://www.aplu.org/members/councils/governmental-affairs/CGA-library/association-letter-covid-19-research-relief-letter/file. The letter notes that $13 billion would be approximately 15% of FY2019 federal funding for basic and applied research.

[66] Federation of American Societies for Experimental Biology, letter to Members of Congress, March 19, 2020, https://www.faseb.org/uploadimagefolder/CustomerImages/_FOLDER_FASEBArticles/ArticleImages/img_FASEB-COVID-19-Relief-Letter-to-Congress-FINAL-03.19.2020.pdf.

[67] CRS telephone conversation with representatives of the Association of American Universities, April 6, 2020.

- directing OMB, the Office of Science and Technology Policy, or an interagency task force to develop more uniform guidance on how to identify essential or critical R&D activities, with recommendations for implementing that guidance at government laboratories, universities, companies, and other institutions involved in intramural and extramural federally funded R&D; and
- establishing a post-pandemic task force on the federal R&D enterprise to examine lessons learned from the COVID-19 pandemic and recommend policy changes to improve the national response of the R&D community in the event of future pandemics.

# Concluding Observations

Over time, the near-term and long-term effects of COVID-19 on the nation's R&D enterprise will become more apparent. Congress may monitor these effects and develop a deeper understanding of their implications for the wide-ranging national policy objectives that motivate federal spending on R&D—such as national security, economic growth and job creation, public health, transportation, and agriculture—as well as the implications for the U.S. science and engineering workforce and the education of the next generation of American scientists, engineers, and technicians.

The effects of COVID-19 on federally funded R&D, as described in this report, may adversely affect the pace of R&D generally and the pace of the innovation that builds on it. The national and global economic consequences may have implications for economic growth, the workforce, the development of new products and services, and the competitiveness of companies and nations. The extent of these effects cannot yet be known and may not be fully understood for years.

An optimist might hope for a silver lining. If the R&D community learns to overcome some of the challenges of remote working and travel restrictions, that might create future opportunities, after the COVID-19 pandemic is over, for increased workplace flexibilities and reduced travel expenses. The pandemic has also highlighted issues that Congress may seek to address in the future, such as additional R&D on cybersecurity for virtual collaboration and rural access to broadband internet for off-site work during emergencies.[68]

[68] For more information, see CRS Insight IN11239, *COVID-19 and Broadband: Potential Implications for the Digital Divide*, by Colby Leigh Rachfal.

# Appendix. Government-wide COVID-19 Related Guidance and Other Resources

## Office of Management and Budget Memoranda

OMB has issued a number of memoranda related to the COVID-19 response. These memoranda are written broadly, not focused solely on federal R&D activities. Nevertheless, elements included in these memoranda have relevant information regarding the operation of the federal R&D enterprise. The memoranda are downloadable from the OMB website.[69]

As of the date of this report, COVID-19-related memoranda include

- M-20-19 Harnessing Technology to Support Mission Continuity (March 22, 2020)

  Directs agencies to utilize technology to the greatest extent practicable to support mission continuity. The memorandum addresses a set of frequently asked questions to provide additional guidance and assist the IT workforce as it addresses impacts of COVID-19.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-19.pdf

- M-20-18 Managing Federal Contract Performance Issues Associated with the Novel Coronavirus (COVID-19) (March 20, 2020)

  Identifies certain agency actions to relieve short-term administrative, financial management, and audit requirements under 2 C.F.R. §200, *Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards*, without compromising federal financial assistance accountability requirements. These include (1) flexibility with System for Award Management (SAM) registration/recertification for applicants, (2) waiver for Notice of Funding Opportunities (NOFOs) publication, (3) pre-award costs, (4) no-cost extensions on expiring awards, (5) abbreviated noncompetitive continuation requests, (6) expenditure of award funds for salaries and other project activities, (7) waivers from prior approval requirements, (8) exemption of certain procurement requirements, (9) extension of financial and other reporting, and (10) extension of Single Audit submission.

  In accordance with 2 CFR §200.102, "Exceptions," OMB is allowing federal agencies to grant class exceptions in instances where the agency has determined that the purpose of the federal awards is to support the continued research and services necessary to carry out the emergency response related to COVID-19. The memorandum also reminds agencies of existing flexibility to issue exceptions on a case-by-case basis in accordance with 2 CFR §200.102, "Exceptions."

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-18.pdf

- M-20-17 Administrative Relief for Recipients and Applicants of Federal Financial Assistance Directly Impacted by the Novel Coronavirus (COVID-19) Due to Loss of Operations (March 19, 2020)

[69] https://www.whitehouse.gov/omb/information-for-agencies/memoranda/.

Identifies steps to help ensure safety while maintaining continued contract performance in support of agency missions, wherever possible and consistent with the precautions issued by the Centers for Disease Control and Prevention (CDC). Agencies are urged to

- work with their contractors, if they have not already, to evaluate and maximize telework for contractor employees, wherever possible;
- be flexible in providing extensions to performance dates if telework or other flexible work solutions, such as virtual work environments, are not possible, or if a contractor is unable to perform in a timely manner due to quarantining, social distancing, or other COVID-19 related interruptions;
- take into consideration whether it is beneficial to keep skilled professionals or key personnel in a mobile-ready state for activities the agency deems critical to national security or other high priorities;
- consider whether contracts that possess capabilities for addressing impending requirements such as security, logistics, or other functions may be retooled for pandemic response consistent with the scope of the contract; and
- leverage the special emergency procurement authorities authorized in connection with the President's emergency declaration under Section 501(b) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§5121-5207 (the Stafford Act).

The memorandum also provides answers to a set of frequently asked questions intended to assist the acquisition workforce as it addresses impacts due to COVID-19.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-17.pdf

- M-20-16 Federal Agency Operational Alignment to Slow the Spread of Coronavirus COVID-19 (March 17, 2020)

  Provided agencies with initial guidance, consistent with the President's Coronavirus Guidelines for America, directing agencies to take appropriate steps to prioritize all resources to slow the transmission of COVID-19, while ensuring mission-critical activities continue. The memorandum further required all agencies, within 48 hours, to review, modify, and begin implementing risk-based policies and procedures based on CDC guidance and legal advice, as necessary to safeguard the health and safety of federal workplaces to restrict the transmission of COVID-19.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-16.pdf

- M-20-15 Updated Guidance for the National Capital Region on Telework Flexibilities in Response to Coronavirus (March 15, 2020)

  Directs agencies to offer maximum telework flexibilities to all current telework-eligible employees, consistent with operational needs of the departments and agencies as determined by their heads, as well as to use all existing authorities to offer telework to additional employees, to the extent their work could be telework enabled.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M20-15-Telework-Guidance-OMB.pdf

- M-20-14 Updated Federal Travel Guidance in Response to Coronavirus (March 14, 2020)

  Advises that "only mission-critical travel is recommended at this time." The memorandum also authorizes executive branch agency heads to determine what travel

meets the mission-critical threshold and provides a list of factors to be considered in this determination.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-14-travel-guidance-OMB-1.pdf

- M-20-13 Updated Guidance on Telework Flexibilities in Response to Coronavirus (March 12, 2020)

  Encourages agencies to maximize telework flexibilities (1) to eligible workers within those populations that the CDC identified as being at higher risk for serious complications from COVID-19 (e.g., older adults and individuals who have chronic health conditions, such as high blood pressure, heart disease, diabetes, lung disease, compromised immune systems); and (2) to CDC-identified special populations including pregnant women. Further directs that agencies do not need to require certification by a medical professional, and may accept self-identification by employees in one of these populations. The memorandum also encourages agencies to consult with local public health officials and the CDC about whether to extend telework flexibilities more broadly to all eligible teleworkers in areas in which either such local officials or the CDC have determined there is community spread. Agencies are also encouraged to extend telework flexibilities more broadly to accommodate state and local responses to the outbreak, including, but not limited to, school closures. Agencies are encouraged to consider the mission-critical nature of employees' work in determining telework and leave decisions.

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-13.pdf

- M-20-11 Administrative Relief for Recipients and Applicants of Federal Financial Assistance Directly Impacted by the Novel Coronavirus (COVID-19) (March 9, 2020)

  Identifies and authorizes agency actions to relieve short-term administrative, financial management and audit requirements under 2 C.F.R. §200, *Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards*, without compromising federal financial assistance accountability requirements. Notes that OMB is allowing federal agencies to grant class exceptions in instances where the agency has determined that the purpose of the federal awards is to support the continued research and services necessary to carry out the emergency response related to COVID-19. The memorandum also notes agencies' existing flexibility to issue exceptions on a case-by-case basis in accordance with 2 C.F.R. §200.102, "Exceptions."

https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-11.pdf

## Compilation of Other Resources

The Council on Governmental Relations maintains an online compilation of guidance from federal agencies, academic institutions, and other organizations, as well as responses to frequently asked questions about how federal agencies that fund R&D are implementing the OMB-directed flexibilities. See "Institutional and Agency Responses to COVID-19 and Additional Resources," https://www.cogr.edu/institutional-and-agency-responses-covid-19-and-additional-resources.

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