

# DAY ONE PROJECT

Enabling Federal Agencies to Tackle  
Complex Problems with the Help of  
Makers-In-Residence

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## Summary

Across the U.S., there are approximately 2,000 makerspaces and Fab Labs where makers with a broad and diverse set of skills have developed innovative approaches to solving pressing problems in their communities. The next administration should implement a Maker-In-Residence (MIR) fellowship program that allows federal agencies to leverage the incredible skills and knowledge of the American maker community to address complex problems specific to their missions.

Implementation of the MIR fellowship program would enable American makers and innovators to: (1) contribute their knowledge and unique and diverse skill sets to fulfilling the missions of federal agencies while learning first-hand about federal policy and the policymaking process, and (2) utilize their learnings to solve complex societal problems and affect policy change in their local communities.

## Challenge and Opportunity

The overall goal of U.S. federal agencies is to carry out the mission of the executive branch by delivering a government that is responsive to the needs of the U.S. populace. The challenges and problems that each U.S. federal agency faces are manifold. Federal agencies' missions include: "maintaining and strengthening the nation's economy," "creating the conditions for economic growth and opportunity," "fostering educational excellence and ensuring equal access," "strengthening the creative capacity of our communities," "prompting the progress of science," "advancing and protecting national security," and "ensuring the health and well-being of *all* Americans." This varied problem set requires an agency workforce with a diverse and nimble skillset that can rapidly adapt to changing needs, and which reflects the diversity of the American people.

The vast American maker community can provide this much-needed, flexible support. An estimated 2,000 makerspaces and Fab Labs are home to thousands of individuals with diverse skillsets and innovative approaches to solving problems.<sup>1</sup> Makers are a grassroots community of individuals with a broad range of backgrounds and expertise within design, arts, engineering, science and technology among other fields. Makers are connected by their shared passion for design, building and making things—often projects or solutions which are focused on solving specific challenges or problems. In communities across the U.S. and around the world, makers gather in makerspaces and Fab Labs where they work together and share access to tools, technology and equipment that enable them to design, prototype, and manufacture solutions. These makers and innovators recently leveraged their skills in digital design and fabrication,

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<sup>1</sup> "Why Maker Economies Need Local Support," National League of Cities, accessed November 20, 2020, <https://www.nlc.org/article/2019/06/24/why-maker-economies-need-local-support/>

sewing, product design, and engineering to respond to the PPE needs of healthcare and essential workers in their communities during COVID-19, but have historically also focused on solving challenges in education, environmental sustainability, defense, and public health.<sup>2,3,4</sup>

Given the community focus of makerspaces and Fab Labs, they are positioned as key assets for the communities across the U.S. whose needs the U.S. government aims to address. Makers' ability to harness technology and innovative thinking would be a tremendous asset in helping fulfill the missions of federal agencies and in solving the Federal Government's most pressing challenges. Their ability to think nimbly and provide tangible just-in-time solutions for complex societal problems will allow them to fill a critical role in the Federal Government workforce.

Many of these individuals have non-traditional academic backgrounds, making them less likely to do a tour of service in Federal Government through existing federal fellowship programs or more traditional government roles. Through a formal Makers-In-Residence program, federal agencies will have the opportunity to work with individuals with unique and diverse skillsets to serve the agencies' specific missions. By serving in the Federal Government for one year, Fellows would be exposed to government and policy-making processes, enabling them to take that knowledge and experience back to their home communities for implementation during their second year of the Fellowship as a trusted knowledge bearer.

Los Angeles has successfully hosted a Maker-In-Residence and Knoxville currently has a Mayor's Maker Council. The national non-profit organization Nation of Makers currently has a State-Level Champions program in which members have actively been working with local and state government agencies in a similar manner.<sup>5,6</sup>

## Plan of Action

Implementation of the Maker-in-Residence Policy Fellowship would require a public-private partnership between U.S. federal agencies and a neutral non-profit organization, such as Nation of Makers, that would manage and work closely with agencies to administer the Fellowship. These activities would include:

- Recruiting, interviewing, and hiring Maker-in-Residence fellows.
- Identifying sponsoring host offices and projects suitable for the skill sets of diverse makers.

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<sup>2</sup> "OSMS Global Impact," Open Source Medical Supplies, accessed November 20, 2020, <https://opensourcemedicalsupplies.org/impact/>

<sup>3</sup> "American-Made Challenges - Geothermal Manufacturing Prize," American-Made Challenges, accessed November 20, 2020, <https://americanmadechallenges.org/geothermalmanufacturing/>

<sup>4</sup> "The Digital Makerspace: An Open Community Creating Conservation Technology Solutions," Conservation X Labs, accessed November 20, 2020, <https://conservationxlabs.com/digital-makerspace>

<sup>5</sup> "Mayor Garcetti Launches New Initiative to Support Manufacturing in Los Angeles," Eric Garcetti, accessed November 20, 2020, <https://www.lamayor.org/mayor-garcetti-launches-new-initiative-support-manufacturing-los-angeles>

<sup>6</sup> "Mayor Mayor's Council," The Maker City, accessed November 20, 2020, <http://themakercity.org/about>

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- Administering orientation, training, professional development, and networking opportunities designed to smooth the transition of lay makers into the Federal Government and policy arenas.
- General administration of the two-year long fellowship, including the transition of MIR Fellows from federal positions into local community-oriented positions in year two of the Fellowship.

There is precedent for the use of similar models to identify talent among the public to serve the diverse needs of the U.S. Federal Government. Proven examples include the American Association for the Advancement of Sciences (AAAS) Science and Technology Policy Fellowships, which “provides opportunities to outstanding scientists and engineers to learn first-hand about policymaking while contributing their knowledge and analytical skills to the federal policymaking process” and the Presidential Innovation Fellows (PIF), which “pair[s] the innovation economy’s technologists, designers, and strategists with top changemakers in the Federal Government for year-long residencies that are rooted in cutting-edge technology and citizen needs.” A similar program, Fuse Corps, is an executive fellowship program that has worked with federal and philanthropic partners to place more than 160 fellows who are executive leaders in over 100 local branches of federal agencies to “craft new policy, roll out new public services, and improve existing programs.”<sup>7</sup> Yet while some makers may have found roles in these highly selective and coveted fellowship programs, many makers have non-traditional academic and professional backgrounds, making them less likely to do a tour of service in Federal Government through these existing mechanisms.

In addition to the federal component of the fellowship, there is a tremendous benefit to the two-year structure, which will give local agencies the opportunity to amplify and implement a wide variety of federal policies and programs locally. For example, a Maker-in-Residence at FEMA who is from California could determine how crowdsourced distributed local manufacturing power could be federally supported and formalized, perhaps through the National Voluntary Organizations in Disasters (VOADs) or as a certified FEMA Disaster Recovery Center (DRC). In year two, the MIR could be placed at the FEMA Region 9 office to execute the program, onboarding makerspaces and maker organizations within California to assist with response and rebuilding after such natural disasters such as the Blue Ridge fire.

In another example, with COVID-induced decreases in “big box” retail spending, the U.S. is experiencing an unprecedented loss of jobs and vacancies in retail spaces. In tandem, we note the value and importance of makers and small-scale local manufacturing in restoring the local supply chain during the COVID-19 pandemic and restoring trust in local economies. A MIR placed at the Department of Commerce could potentially develop incentivized programs to promote economic growth and opportunity through small-scale local manufacturing and production, bolstering the economy via the creation of new business opportunities for local makers and manufacturers. Such programs could also address systemic inequality through the

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<sup>7</sup> “FUSE Corps,” Fuse Corps, accessed November 20, 2020, <https://www.fusecorps.org/about/>

creation of equitable small-batch manufacturing opportunities for underserved communities, communities of color and low-income workers. In year two, the MIR could then be placed locally at their Chamber of Commerce to execute a “Main Street” revitalization plan—contributing to the vitality of their local economy.

In the area of education, we know that exposure to maker education in formal learning environments creates opportunities for American youth to continue to lead the way as global problem-solvers in a world with an increasing number of needs and challenges. Maker education, which places students at the center of their learning, can additionally be responsive to all students’ needs and creates equal opportunities for success and educational excellence. Given the transformative potential of maker education, a possible role for a maker-in-residence at the Department of Education could be to collect data on making in education, surveying formal programming such as Career and Technical Education (CTE) programs, and collecting best practices to guide policy recommendations and education reform. The MIR could then be placed in a local Educational Service Center to help to implement maker education at the local and district level. These are but a few of the many ways that makers can provide critical support and expertise to guide policy and practice.

The Maker-In-Residence program would leverage the Intergovernmental Personnel Act Mobility Program, which provides for the temporary assignment of personnel between the Federal Government and state and local governments, colleges and universities, Indian tribal governments, federally-funded research and development centers, and other eligible organizations.<sup>8</sup> Funding for the Maker-In-Residence program could consist of a cost-share between the host agency and the external partner or fully-funded by the agency or external partner.

## Conclusion

The Maker-In-Residence program is a powerful and effective way to grow the capacity for federal agencies to develop innovative solutions to some of the most pressing domestic and global challenges facing the U.S. The program will embed creative, highly-skilled individuals who might otherwise be overlooked through existing channels for entering into public service while enabling local communities to benefit from the experiences of these Makers-In-Residence—a win-win at both the federal and local levels.

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<sup>8</sup> “The Intergovernmental Personnel Act Mobility Program,” OPM.gov, accessed November 20, 2020, <https://www.opm.gov/policy-data-oversight/hiring-information/intergovernment-personnel-act/#url=Overview>

## Frequently Asked Questions

### 1. What are the unique characteristics and skillsets that makers can offer to the Federal and local government?

The “maker mindset” can be defined as nimble and responsive out-of-the-box critical thinking, curiosity, innovation, collaboration, problem solving, and communication. Most notably, makers are known for nimbly finding innovative solutions to pressing problems using unique and unconventional solutions, which would serve as an asset to the diverse problem set faced by federal and local governments. A primary example of this can be seen in the ways in which makers across the U.S. and around the world rapidly mobilized to develop innovative solutions to the lack of PPE in their communities during the COVID-19 pandemic. The Open Source Medical Supplies 2020 Community Impact Report indicates that makers have designed, produced and distributed more than 48 million units of PPE globally, including face shields, gowns and respirators.

### 2. Why are makers not able to use existing mechanisms (AAAS S&T Policy Fellowship, Presidential Innovation Fellows, traditional employment) to secure positions within the Federal and local government?

While some makers come from Science & Technology, Corporate, Big Tech, startups and academic backgrounds, many makers have non-traditional academic and employment backgrounds, making them less likely to do a tour of service in Federal Government through existing federal fellowship programs or more traditional government roles. This is because existing programs often have rigorous academic or professional experience requirements. Makers have unique and much needed skillsets by federal agencies but their experience and capabilities may not be recognized through the application and screening process for these programs. A maker may have graduate student or Ph.D.-level knowledge and skills about a particular topic or issue, but may not meet the education requirements, making them ineligible to begin with.

### 3. What types of roles and responsibilities do you envision makers fulfilling at federal agencies? How will their presence help fulfill the mission of the U.S. government?

As stated above, there are multiple use cases for makers helping to fulfill the mission of nearly every federal agency. Some additional examples include:

Agency: Small Business Administration (SBA)

Mission: To maintain and strengthen the nation’s economy by enabling the establishment and vitality of small businesses and by assisting in the economic recovery of communities after disasters.

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Topics/Use Case: Makerspaces as vessels for workforce development—addressing the skills gap and launching new small businesses to promote economic growth and recovery. In 2019, the SBA launched the Makerspace Training, Collaboration, and Hiring (MaTCH) Pilot Competition, a competition that seeks to address the job skills and placement gap faced by U.S. businesses by providing funding to create or expand programs within existing makerspaces that offer job-specific and soft skills training.<sup>9</sup> A potential role for a maker-in-residence at SBA could be to develop programs and funding opportunities to support makerspaces that offer job skills training and entrepreneurship programs.

Agency: Institute of Museum and Library Services (IMLS)

Mission: To advance, support, and empower America’s museums, libraries, and related organizations through grantmaking, research, and policy development.

Topics/Use Case: IMLS funds important work to advance research, promote professional development, and support promising practices for makerspaces and maker programming nationwide. Since 2011, IMLS has invested over \$10 million in grants supporting learning through making in museums and libraries, greatly broadening access to and participation in the maker movement for rural and urban communities across the United States. With this foundation in place, potential roles for a maker-in-residence at IMLS could be to a) develop and support programs to create additional makerspaces within libraries and museums, with a focus on underserved and rural communities, and b) create a national community of practice for libraries and museums engaging in making, collating best practices to guide policy and practice.

Agency: Department of Energy (DOE)

Mission: To advance U.S. national security and economic growth through transformative science and technology innovation that promotes affordable and reliable energy through market solutions.

Topics/Use Case: Makers are innovators, and as such are excellent sources of ideas and solutions for some of our most difficult problems. For the past two years, Nation of Makers has served as a Power Connector for the American Made Challenges (Solar and Geothermal Prizes), harnessing the potential of the maker movement to catalyze American-led energy innovation. A potential role for a maker-in-residence at DOE could be to bolster and scale up this potential across energy sectors.

Agency: National Science Foundation (NSF)

Mission: To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes.

Topics/Use Case: Given the incredible role of makers in the American innovation ecosystem, including their roles in education, workforce development, and STEM education, the National Science Foundation has supported the maker movement through

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<sup>9</sup> “The Makerspace Training, Collaboration, and Hiring (MaTCH) Pilot Competition,” SBA.gov, accessed November 20, 2020, <https://www.sba.gov/match>.

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research and support of the work that makerspaces engage in these areas. A potential role for a maker-in-residence at NSF could be to survey and collate the investments in making that NSF has made, collecting and disseminating best practices derived from rigorous research, fostering relationships between community makers and academic researchers, and providing a research agenda for NSF's continued support of the maker movement.

Agency: National Aeronautics and Space Administration (NASA)

Mission: Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and bring new knowledge and opportunities back to Earth. Support growth of the Nation's economy in space and aeronautics, increase understanding of the universe and our place in it, work with industry to improve America's aerospace technologies, and advance American leadership.

Topics/Use Case: One problem identified by NASA is that current spacecraft have minimal space for astronauts to live and work, leaving very little room for anything else. Aboard spacecraft, plant growing environments must be small, placing limits on the amount of food that can be produced. Nation of Makers has partnered with Fairchild Tropical Botanical Garden and Moonlighter Miami FabLab (a makerspace) to seek new designs and strategies from makers to make better use of the available growing space throughout the life of the plants. Given the success of this program, a potential role for a maker-in-residence at NASA might be to survey opportunities for makers to contribute innovative solutions to aerospace challenges, and to create prize challenges and other incentive programs to leverage this potential.

Agency: National Endowment for the Arts (NEA)

Mission: To strengthen the creative capacity of our communities by providing all Americans with diverse opportunities for arts participation.

Topics/Use Case: A crucial aspect of the maker movement is its relationship with creativity and the arts. Makers make and create diverse opportunities for art engagement and expression. A potential role for a maker-in-residence at the NEA could be to develop and support programs that create explicit arts opportunities within makerspaces, and maker opportunities within traditional arts spaces (such as the Moonshot Studio in the Kennedy Center).

Agency: Department of Defense (DOD)

Mission: To provide combat-credible military forces needed to deter war and protect the security of our nation.

Topics/Use Case: All of our U.S. defense branches have implemented maker programming. Perhaps the most iconic is the Marine Maker program, designed to "pair the training and tools of the Maker movement with the Marine Corps' culture of 'adapt and overcome'... to catalyze the initiative and experience of Marines to design and



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fabricate solutions to a myriad of future unknowable problems.”<sup>10</sup> A potential role for a maker-in-residence at the DOD could be to identify opportunities to expand the training of our military forces to include implementation of maker mindsets and adaptable toolsets to develop the most resilient and capable war force.

Agency: Health and Human Services (HHS)

Mission: To enhance the health and well-being of all Americans, by providing for effective health and human services and by fostering sound, sustained advances in the sciences underlying medicine, public health, and social services.

Topics/Use Case: Makers innovate across many sectors, including healthcare. In addition to the heroic efforts of makers to produce over 16 million pieces of personal protective equipment during the COVID-19 pandemic, makers have been innovating with healthcare systems and beyond for years, coming up with just-in time innovations to improve patient care; for example, in the *Maker Nurse* program.<sup>11</sup> A potential role for a maker-in-residence at HHS could be to identify opportunities and create programs to harness the potential of makers to support healthcare innovation.

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<sup>10</sup> “The Corps Challenges Marines to Make Their Future,” DON Innovation, accessed November 20, 2020, <https://www.secnv.navy.mil/innovation/Pages/2017/01/MarineMaker.aspx>

<sup>11</sup> “Maker Nurse,” Maker Nurse, accessed November 20, 2020, <http://makernurse.com/>

## About the Authors



**Dorothy Jones-Davis** is the Executive Director of Nation of Makers, a national nonprofit whose mission is to support the full range of organizations that impact makers, by encouraging connections, broadly sharing resources, facilitating funding opportunities, engaging in policy development, and advocating for the maker movement. As a Ph.D-level neuroscientist, Dorothy previously worked at the Foundation for the National Institutes of Health (FNIH) where she created and managed public-private partnerships in Neuroscience between the NIH, FDA academia, non-profit, advocacy organizations, and industry partners. Prior to that role, she served as an AAAS Science and Technology Policy Fellow in the National Science Foundation's (NSF) Directorate for Engineering, was a co-founder and co-producer of the National Maker Faire and the DC Mini Maker Faire, a researcher at the University of California, San Francisco and a lecturer at San Francisco State University.



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## About the Day One Project



The Day One Project is dedicated to democratizing the policymaking process by working with new and expert voices across the science and technology community, helping to develop actionable policies that can improve the lives of all Americans, and readying them for Day One of the next presidential term. For more about the Day One Project, visit [dayoneproject.org](http://dayoneproject.org).