

Opening the Door for Innovation in Government Procurement through Intrapreneurship

Ruth Siboni¹ and Saad Ansari²

¹Life Scientist, Space Life and Physical Sciences Research Division, National Aeronautics and Space Administration; ² Associate Consultant, McKinsey and Company.

Corresponding author: ruth.siboni@nasa.gov

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The federal government is constantly looking for ways to streamline processes that allow the government to buy innovative products and services from the private sector. Small businesses and start-ups often serve as the cradle of such innovation. Over the past two years, the authors identified and compared novel strategies used by various agencies to facilitate small businesses engagement. Representative programs discussed in the article include the General Services Administration's IT Schedule 70 program and FAST lane Initiative, the National Aeronautics and Space Administration's Software Catalog, the Department of Energy's Small Business Vouchers pilot program, and the Department of Defense's Innovation Unit Experimental (DIUx) program and Robotics Fast Track program, among several others. The authors propose that the civil servants who run these programs are "intrapreneurs" who use intra-agency procurement/contracting knowledge and entrepreneurial drive as a means of facilitating public-private partnerships. The authors also interviewed directors and officers from accelerator and incubator programs to understand what prevents members of the small business/start-up community from applying for government contracts. Interviewees ranged from mission-driven spaces that primarily fund social entrepreneurs (including Tumml, Halcyon, and Worker's Lab) to government-oriented accelerators that are specifically aimed at connected entrepreneurs with federal agencies (including Decode42, PeaceTech Lab, and In-Q-Tel). These interviews illuminated a disconnect between the needs of start-ups and small businesses--- quick funding during seed stages and opportunities to grow the company--- and the key benefit that a government contract provides: a stable influx of money and opportunities for repeat contracts, but only after a lengthy, slow, and uncertain contracting competition process. This article discusses the main problem areas in small business engagement and offers recommendations.

I. Introduction

To efficiently fulfill their missions, federal agencies need to access technological innovation. Small businesses¹, especially start-ups, are crucial drivers of innovative technologies; indeed, the top one percent of high-impact patents are twice as likely to originate from small rather than large businesses where impact is defined by growth, originality, and citation impact.² Despite their promise, the public

sector tends to work with small businesses less regularly than with bigger companies. While small businesses make up 99.7% of U.S. employer firms, they comprise only 25% of contracts with the federal government, indicating that the government is losing out on innovative technologies that would either help achieve its central mission, depending on the agency or simply make general government administration more efficient.³

For the federal government to effectively buy and adopt new technological products from small companies, that buying process must be an easy and trustworthy experience for small companies. To do this, the government must address three challenges that have eroded trust within the small business community and put roadblocks in the purchasing process: high costs along the procurement “pipeline” (the chain of events that federal agencies follow to buy from a company), unclear and misunderstood intellectual property (IP) requirements by government partners, and cultural risk-aversion by government employees.

Luckily, progress is imminent, thanks in large part to federal government “intrapreneurs.” Intrapreneurs—a term was first coined by Gifford Pinchot in 1984—describes people that behave like entrepreneurs while working *within* a large organization.⁴ In the case of the government, intrapreneurs have quietly and incrementally innovated on procurement processes, which are the key interface between business and government, to facilitate contracting with small businesses. In 2017, we interviewed offices across the federal government that had adopted innovative strategies, to improve interactions with start-ups. Primary research was gathered from numerous interviews with contracting officials and program managers in several federal agencies including the Defense Advanced Research Projects Agency (DARPA), National Institutes of Health (NIH), and the Department of Homeland Security (DHS) that we collated into themes and recommendations. We also interviewed several incubator and accelerator programs to better understand the needs and goals of startups interested in working with a government partner. We present a new model for bringing innovation into government procurement by internal incremental innovation to facilitate purchasing from small companies. Three key areas for incremental innovation have the largest impact: the procurement pipeline, intellectual property, and a culture of risk-aversion. We briefly describe these three challenges and provide recommendations to inform stakeholders—including legislators, agency leaders, procuring officers, auditors, and private companies—of best practices and lessons learned help to create meaningful government/start-up

partnerships. Our findings suggest that these changes will make procurement more efficient, particularly from small businesses.

II. Streamlining the Procurement Process for Start-ups

The federal government has developed procurement processes optimized for dealing with big companies, big contracts, and big oversight.⁵ The resulting transaction costs, in terms of time and money, are high at every step of the procurement process. Most big companies hire entire teams of experienced former government employees to navigate this process.⁶ Resource-limited start-ups cannot afford the time, effort, and financial cost at each step along the procurement process, and instead often opt-out of working with the government for opportunities in the private sector. To highlight four common issues that consistently lead to the prevention or dissolution of partnerships between the government and start-ups, we chose one traditional procurement process as an example, described from the point of view of a small business.

i. Procurement step one: awareness of the government opportunity

Once the government identifies a problem that necessitates the procurement of an innovative solution, the traditional next step is either to post the opportunity on a public website such as FedBizOpps or to search for vendors through the U.S. General Services Administration (GSA).⁷ Neither of these options are likely to lead to proposals from start-ups because start-ups have trouble identifying the opportunity. Start-ups are generally unfamiliar with the FedBizOpps website and find it challenging to navigate the site.⁸ Furthermore, opportunities with special requirements or restrictions (i.e., those involving security and/or requiring a clearance) run an even greater risk of being inaccessible; for example, a recent policy directive requires that government IT contractors will be favored if they offer “shared” services (i.e. cloud-based services that include email, cloud, and cybersecurity services), which favors existing IT contracts that already offer some of the services to agencies.⁹ If a government employee searches for vendors through GSA, she will find that available vendors are mostly large businesses that understand federal procurement

processes. Even when small companies attempt to become a GSA-approved vendor, it is a hurdle because the standard approval processes are complicated and often biased against young companies as described in greater detail below. As a result, small businesses and start-ups are less likely to go through the process of becoming an approved vendor and become aware of burgeoning procurement opportunities.

ii. Procurement step two: submitting a successful proposal/ engaging the Agency

The next step to securing a government contract in this example is to submit a successful proposal as a response to the FedBizOpps opportunity in step one. In responding to an interesting opportunity, companies familiar with procurement directly contact the government agency, sometimes informally through known contact networks, to market their capabilities and gain a better understanding of how to craft their proposal.¹⁰ Small companies are less likely to be aware of this possibility and even less likely to have relationships with influential agency contacts. Small businesses are encouraged to contact the small business office of the agency in question to identify the relevant point of contact and can be bounced around before finding the appropriate government employee.¹¹ Without prior knowledge or contacts, small companies are at a disadvantage when responding to an opportunity because they must spend more time and effort crafting a successful proposal.

iii. Procurement step three: Identifying a method of payment

To initiate the purchase of the proposed work requires the small company to identify a method of payment, broadly called a contracting vehicle, which the government can use to pay the company. Companies adept with procurement processes often have existing contracts that can be quickly used to pay for the new proposed work. Since small companies generally do not have such contracts, they need to identify the appropriate contracting mechanism to pay for the work.¹² Finding an appropriate mechanism can expend quite a bit of time and requires 1) making new relationships with government employees that have the authority to make purchases, 2) understanding the complicated

processes, and often 3) waiting while a new purchasing method is created that can be used to purchase the proposed technology. Often the best option for a small company is to use an existing mechanism held by a prime contractor. This mechanism poses its own set of complications.

iv. Procurement step four: execution of contract through a prime contractor

A prime contractor, also known as an overhead contractor, has the ability to execute a subcontract for the type work in the original proposal.¹³ This contractor is an entirely new entity and adds additional confusion and cost to the small business because prime contractors are required to vet interested companies equally and objectively without input from the government. To finalize the contract, the start-up would need to engage with the prime contractor by establishing a new relationship, potentially submitting a proposal to the prime to compete for an opportunity, and paying a fee to the prime for subcontract management.

This sort of lengthy and non-transparent procurement process is detrimental to both the government customer and start-up supplier: it prevents the government from quickly acquiring alternatively designed, priced, or produced technologies, or acquiring these technologies at all. Start-ups waste valuable time and resources chasing opportunities, and private investors may become impatient. To address the challenges above, we make the following recommendations to federal agencies wishing to contract with small businesses:

1. Leverage flexible payment mechanisms for research and prototyping

If no product exists to solve the identified need of the government agency, it may be beneficial for the agency to pay for research and prototyping, and bypass steps one and two above, using a flexible payment mechanism or program. For one, agencies with extramural R&D budgets above \$100 million are required to participate in the Small Business Innovation Research (SBIR) program to fund commercialization-oriented research by small businesses.¹⁴ The products that result from later stage SBIR projects (i.e. phase three commercialization projects) can be directly

purchased without running a competition, like in step one, to save months of time for the government and the start-up.¹⁵ Another payment option for approved agencies is the Other Transaction Authority, which provides an alternative to traditional procurement contracts, grants, or cooperative agreements.^{16,17} The two most common types of Other Transactions (OTs) are used to pay for research and prototyping work, and allow greater flexibility in purchasing processes because Federal Acquisition Regulations do not apply.¹⁸ This flexibility allows agencies to run more start-up friendly competitions outside of FedBizOpps, and also allow for greater flexibility when negotiating with small companies.¹⁹

2. Create a repository of available payment mechanisms, and support offices that provide advice
The identification of appropriate payment mechanisms, as detailed in step three in the example above, is often a time-wasting step in the purchasing process. One simple improvement is to build a repository of mechanisms (i.e. contracting vehicles) that government agencies can employ, complete with all essential tactical information and the ability to provide ratings by previous users. Some innovation hubs (e.g. U.S. Department of Defense's Defense Innovation Unit Experimental or GSA's 18F) are informally providing this service by offering procurement advice and "how-to" guides.²⁰ For example, the GSA's 18F office helps other federal agencies build, buy, and share easy-to-use digital services; furthermore, it helps solve any technological glitches that arise during the digital contracting process.²¹ Programs like 18F should be scaled across other agencies so they can disseminate purchasing advice and directly serve more federal agencies.

3. Use the prime to save time
DARPA has successfully used prime contractors, like those in step four above, to increase the speed, efficiency, and quality of purchasing by building programs centered on primes. Two retired programs, the cyber and robotics fast track programs, paid for desired work through primes by first contracting a well-connected prime with lower overhead rates to find, vet, and subcontract small companies with potentially useful technologies.^{22,23}

Those small companies, who now have a single point of contact within the prime, compete to do work for DARPA and are quickly paid through the prime if selected.

4. Avoid complications by purchasing "off-the-shelf" solutions

The private sector offers many tested and proven "off-the-shelf" solutions for government needs. For example, the government is roughly ten years behind the private sector when it comes to computer-based systems and it would be extremely inefficient for every agency to custom build internal information technology (IT) systems.²⁴ For internal activities removed from the core mission, off-the-shelf systems should be purchased that can be easily scaled and maintained. Furthermore, the rise of open-source software over the past decade, which often allows customization by users, has reduced the need for building IT systems from scratch.²⁵ These simple, "off-the-shelf" purchases will leave more funding available for the creation of custom systems for externally facing, core mission-driven activities.

III. The Intellectual Property Barrier Deterring Start-up – Government Partnerships

There are two main ways in which the government engages the intellectual property of private businesses. One way, which is more straightforward, is simply to purchase a product that is already on the market, available for purchase (off-the-shelf, see above). Generally speaking, this is performed through the GSA schedule system. GSA schedules are acquisitions vehicles that allow government agencies to purchase often needed products from a list of pre-approved vendors. These types of purchases do not carry unique IP terms—any patented products are simply being purchased by the Government, and thus the IP rights to the product remain with the vendor.

In the event the government wishes to have a product tailor-made to solve its problems it must implement a series of IP rights under either a cooperative agreement or a Cooperative Research and Development Agreement (CRADA).²⁶ CRADA agreements are available for all national labs that wish to engage in R&D with a private sector company, while cooperative agreements are

available for any agency that is willing to engage in joint research (national lab or not). Under the terms of the Bayh-Dole Act, rights to inventions that are conceived or actually reduced to practice under a cooperative agreement allow the contractor to take title to the invention.²⁷ The only excepted agencies to this requirement are NASA and DOE, as they are considered “title-taking agencies” and thus require that any invention be titled to them in exchange for a Non-Exclusive, Royalty-Free (NERF) license to the contractor. In most other cases, it is the other way around—the government is allocated a non-transferable NERF license to use the invention for government purposes, but the invention remains titled to the contractor. Importantly, however, the government has very rarely invoked its right to a government use license.²⁸ IP terms in a CRADA are typically very similar but can be negotiated with more flexibility.

One of the biggest barriers preventing start-ups from entering into partnerships with the government is the uncertainty about whether government IP requirements will impose undue restrictions. Start-ups and their angel investors or venture capital backers commonly fear that government partnerships will result in the development of a new product to which they have limited rights, or worse—that the rights to their main marketable product may be, in some part, transferred to the government itself during the time of the contract. The three terms which are of the most concern include:

1. Reporting requirements

Inventions created under the terms of a cooperative agreement or CRADA must be reported to the agency and a patent application must be filed for that invention. This concern is particularly poignant for companies that rely on trade secrets related to the invention.

2. March-in rights

The government is allowed to require a contractor to license an invention to another entity, or to deliver title to the Government, ONLY IF the contractor fails to exploit the invention within a reasonable time. These rights are rarely, if ever, invoked.

3. National manufacturing preference

Neither the contractor, nor any potential licensees, may grant an exclusive license unless the licensee agrees that any product embodying the invention will be manufactured substantially in the United States. This requirement is only problematic, of course, to small businesses looking to manufacture primarily overseas.

While it is undeniable that small businesses wishing to partner with the government must carefully examine their IP limitations in the context of these requirements, agencies and contracting guidelines can vary and sometime these clauses can be negotiated. Therefore, the best way for the government to diffuse unfounded fears concerning IP is to provide potential business partners clear IP terms early in the negotiation process. An examination of two successful partnership programs—run by the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA)—demonstrate the value of providing proper legal communication and training, a strategy which increases trust in the government partner and prevents miscommunication or mismanaged expectations.

The DOE’s Small Business Vouchers pilot program, launched in late 2015 by the Office of Energy Efficiency and Renewable Energy, was created to speed up research and development for Government buyers by connecting interested small businesses with DOE National Laboratories.²⁹ To reach this goal, the program has refined and simplified existing legal contracts to make in-person meetings with government attorneys unnecessary. By tapping into some of the important resources that the National Laboratories can provide, DOE is helping small business scale materials and gain access to costly but necessary equipment. To make the process as seamless as possible, DOE simplified the terms usually required by a standard CRADA, and then added a NERF clause that allows companies to commercialize any invention they create despite its licensed use by the DOE. The CRADA allows each party “the first option to elect to retain title to any of its Subject Inventions and that election shall be made,” while the NERF clause states that “the government retains a nonexclusive, nontransferable,

irrevocable, paid-up license to practice or to have practiced for or on behalf of the United States every Subject Invention under this CRADA throughout the world.”³⁰ Therefore, the start-up is allowed to retain title (despite the fact that DOE is usually a “title-taking agency”) and the Government can use the invention for its own purposes globally. Furthermore, the terms allow an option for businesses to negotiate an exclusive license at the end of the engagement. By simplifying contractual obligations and clearly explaining these terms as part of the frequently asked questions page, the Small Business Vouchers program has assuaged small company IP fears without having to provide face-to-face time with government attorneys. This benefits the government by reducing the amount of time that each attorney or legal adviser spends answering questions for each interested business and benefits the businesses by allowing more ultimate flexibility in any resulting IP rights.

In addition to clarifying IP terms during joint development of innovation, agencies also have an opportunity to form relationships with small businesses by making existing government-funded technology more readily accessible for licensing and use. NASA, for example, has solidified its relationship with the private sector through the online publication of the NASA Patent Portfolio and the NASA Software Catalog.³¹ With these platforms, NASA has created two user-friendly, easy-to-navigate, and consumer-centered websites that allow small businesses to browse NASA-owned innovations that are available for no cost licensing. Interested businesses discuss the relevant IP implications with “NASA New Technology Representatives”, who are personally available to answer any legal or business questions that may arise during the development of their new product or during any negotiations. This increases trust in the working relationship between the business and NASA and incentivizes the business to build on existing technology such that innovation increases without the expenditure that would usually come from “reinventing the wheel.” In addition, businesses that license government technology are incentivized to work with the same agency in the future, given that the creators of the technology (and therefore, the experts possessing relevant “know how”) reside

within the agency, and are available to either answer questions/troubleshoot or collaborate on future projects.

The fear that federal agencies will “steal” start-up IP is not warranted and originates from a perception of possible IP entanglements. Simple legal maneuvers can assure private partners that their preexisting IP is off limits to a government partner, and IP created under a government contract can sometimes be negotiated.³² The primary interest of most Government agencies is to seek a private partner that can modify an existing technology (or create a wholly new technology) to fit an agency need. It is nonetheless important for agencies to create a clear line of communication about their IP and contractual policies with their private partners, whether this means providing small businesses with a very clear and exhaustive FAQ webpage (as DOE has with its Small Business Voucher program) or providing direct access to trained representatives or legal teams (as with the NASA patent portfolio). Therefore, our IP recommendations include:

1. Designate a small business representative

In addition to posting opportunities on internet platforms, it is important that agencies that wish to reach out to the small business community actively do so through a physical representative. While this may be unfeasible for agencies that cannot afford to create a new position for private sector outreach, it is important to at least designate these duties to an existing employee, including direct contact with incubators, accelerators, and small businesses. Again, fair competition regulations may prevent certain agencies from selectively choosing certain incubators/accelerators over others; because of this, private sector outreach should remain targeted to national business conferences, so-called “innovation weekends,” or even academic events which attract burgeoning student entrepreneurs. Agency-specific representation at these events is important because it increases much-needed visibility of the government as the consumer, while also providing a point of contact that may streamline communications between companies and the bureaucracy. It is important that these designated individuals be knowledgeable, welcoming, and able

to manage expectations of potential partner companies.

2. Provide clear intellectual property terms

It is crucially important that agencies clarify their intellectual property terms early in the process of interacting with a start-up. This can be accomplished by assuring that contractual IP terms are simple and easy to understand (both in the expectations of both parties, the needs of the government agency, and how the declared terms protect the interests of the start-up), and additionally by publishing such terms in public materials (websites, print materials for business outreach, etc.). Contracts should address outright confusing terms, defining for the business what IP rights must be transferred to the government in a project, and which ones remain with the business. Y-Combinator, an accelerator based out of Mountain View, CA, has provided an example of clear and concise IP terms in its Simple Agreement for Future Equity (SAFE) for start-ups and their investors.³³ While a SAFE agreement is not suitable in all situations and should not replace proper legal counsel during agreements about IP assets, the simple structure allows businesses to use it as a starting point in the course of seeking funding. Government agencies could stand to learn from this idea—if most transactions involving IP transfer/licensing with the government will ultimately require due diligence by agency counsel anyway, having simple documents to serve as a starting point for potential licensees and collaborators may increase the likelihood they remain engaged.

IV. The Culture Problem: Risk Aversion and Fearing the Unknown

The government is a large entity that employs over four million people. As such, it possesses a culture similar to that of any other large company, and this culture is in direct contrast to the culture of start-ups. In the federal government, failure is not tolerated from Congress or the public. Rules and procedures have been established to centralize decision-making and minimize exposure to risk, but which also limit agility. By contrast, start-up culture embraces a willingness to take risks to either succeed or fail quickly. Since procurement processes

are embedded within government culture, many of the challenges in procurement with small business partners are a result of engrained cultural differences.

Typical procurement processes are opaque, time-consuming from proposal to contract, require terms that bias toward larger companies, and result in contracts that lock in suppliers. These institutional processes are widely accepted as the norm by risk-averse employees. Contracting officers are often siloed and removed from “big-picture” conversations about the main agency mission. This limits their capacity to select a new, and possibly better-suited, business for the agency mission and instead promoting the choosing of widely-used and accepted businesses with predictable performance. Taken together with the fact that small businesses are less known to contracting officers than large companies due to being comparatively young and un-established, it is unsurprising that their products and services are less likely to be selected.

While procurement processes are often initially tied to Congressional mandates and regulations, processes are commonly “tweaked” and further developed at the agency or sub-agency level. This means that federal government intrapreneurs must develop nuanced, agency-specific processes to transcend through the “red tape.” In doing so, intrapreneurs are more likely to face cultural barriers rather than legal barriers. One barrier derives from the hierarchal organizational structure of Government and centralized decision-making: the need to find a champion for change within agency leadership. Rarely does one person have the authority, expertise, and incentive to change existing processes. Fortunately, some recent pilots have promoted intrapreneurship and others have made small changes to processes to begin to shift the procurement culture within the Government. For example, the newly formed Federal Acquisition Innovation Labs (AILs), have encouraged intrapreneurship by creating safe spaces for experimentation and changing the conversation around IT procurement.³⁴ Non-leadership individuals have been empowered to suggest and pilot innovative ideas that may speed procurement processes to gain quick successes that can be scaled.

The AILs have also provided a venue for internal training to spread the quick successes and lessons learned, and the implementation of proven start-up practices like the agile/lean methodology to slowly shift culture.

The progress made toward opening government procurement to start-ups can thus far be measured by the ease with which start-ups can participate. In time, we will see whether the recent pilots that shift procurement culture toward risk acceptance are institutionalized and lead to increased government procurement from start-ups. To facilitate the process, we make the following recommendations:

1. Start small, gain quick successes, and scale fast!

The same agile and lean methodologies from start-ups can be applied to making changes to government procurement. We recommend agencies carry out small pilots to try out new ideas. Successful pilots can help convince skeptics and can be scaled where appropriate.

2. Express needs in terms of problems/outcomes instead of solutions/requirements

The usual process of procurement is to define the solicitation by the solution requested and the related requirements. By design, the wording of the solicitation is narrow, such that only a handful of suppliers are eligible, and typically there is a bias against small businesses. If solicitations specify the problems to be solved and the outcomes expected, smaller companies will not be immediately disqualified. Additionally, small companies will gain the impression that the government sees them as valuable partners and may be more willing to apply.

3. Empower personnel lower down the chain of command and integrate contracting personnel in mission-critical decision-making

Providing institutional cover and empowering contracting officers to take risks will help remove the incentive for procurement staff to select well-known, established companies for contracts. Breaking down siloes to include contracting officers in conversations that are mission-critical will strengthen the incentive to contract the best performer.

4. Differentiate suggestions from regulations

Government decision-makers tend to impose restrictions that are derived from tradition rather than commonly known laws or regulations. One of the first steps to streamlining procurement and working with start-ups is to differentiate suggestions (which can be customized and streamlined) from regulations (which may be less flexible). The U.S. Department of Health and Human Services (HHS) Buyer's Club recognized this and sought to find innovative strategies to use old regulations and laws, rather than assume there is an essential problem within those laws.³⁵ As the new practices are validated, they can first be disseminated internally through informational webinars and then circulated more widely in the federal government through training courses offered by entities like the Federal Acquisition Institute. Entities like the HHS Buyer's Club also tackle risk-aversion resulting from the frequent rotations of staff by providing successful examples of intrapreneurship and training resources.

5. Leverage existing training resources and requirements

The Defense Acquisition University and Federal Acquisition Institute offer numerous courses aimed toward enabling the inclusion of small businesses and implementation of agile practices.³⁶ The procurement lessons learned should be shared, when applicable, through these platforms to maximize impact. Since civilian contracting officers are required to take 40 hours of training every two years, progress can be made by encouraging (or even requiring) staff to take courses aimed at small business contracting and engagement.

6. Bring together contracting officers to consolidate steps

An excellent example of this can be seen in the Making It Easier (MIE) interface, launched in April 2016 by the U.S. General Services Administration (GSA).³⁷ MIE is an effort to meet the speed of IT and supply government purchasers with the most innovative solutions for GSA's IT Schedule 70, which is the largest IT acquisition vehicle in the U.S. government. The MIE initiative includes the [IT Schedule 70 Roadmap](#) that explains the contracting process in plain language, a [standardized welcome](#)

package for new contractors, the [FAST Lane](#) initiative to reduce the processing time of contract modifications and new offers, a [Startup Springboard](#) to get companies less than two years old on the schedule, and a contracting [forecast tool](#).³⁸ The FAST Lane initiative was initially created because IT Schedule 70 was losing suppliers due to the slow contracting process. GSA streamlined processes by assessing each potential contracting scenario and consolidated the process into a set number of steps to reduce the time to add a new supplier from 110 to within 45 days and to allow the modification of contracts in 48 hours instead of two weeks.³⁹ The MIE initiative is a prime example of speeding up processes and making GSA's IT Schedule 70 acquisition vehicle more attractive to start-ups.

V. Conclusions

As described in this article, there are numerous strategies and pilot programs that have been developed across several federal agencies to better buy from, and engage, small businesses. These mechanisms have demonstrated that simple techniques, including the creative use of broad agency authorities such as Other Transaction (OT) Authority, policies tailored per office such as through the GSA IT Schedule 70 Making It Easier, and delegated-to-the-bottom management structures such as DARPA's use of a prime contractor, can increase government procurement from start-ups. The above recommendations are meant to inform stakeholders—including legislators, agency leaders, procuring officers, auditors, and private companies—of best practices and lessons learned help to create meaningful government/start-up partnerships.

In the 2013 article, "Unleashing Breakthrough Innovation in Government," Sahni, Wessel, and Christensen posited that there are four basic conditions that must be present in a government organization to allow for the adoption of innovative practices: the ability to experiment and to phase out outdated infrastructure, the presence of feedback loops, budget constraints for end-users, and

incentives for product improvement.⁴⁰ Though the article relies entirely on municipal, service-oriented case studies (that is, innovative and improved systems for providing public services such as transportation and public waste management), the authors suggest that these principals hold true for all times that the government is seeking to make or buy innovative products, at any level of government. While we agree with the findings of Sahni, et. al, we found a different mechanism for incorporating innovative technologies, particularly from small businesses, into government. In our model, government "intrapreneurs" following the five Sahni conditions incrementally innovate in three areas essential to procurement: procurement costs, intellectual property, and culture. These areas allow for the purchasing of frontier technologies from small companies.

Government procurement is not just about the short-run product benefits. The government is better positioned than the private sector to invest in slow-maturing, potentially risky businesses and products. Such investments from the government effectively "de-risk" newer technologies and ease the way for adoption in the private sector—much of the initial iPhone technology was formerly government funded technology, for instance.⁴¹ Since newer companies lack conflicts of interest in potential contract opportunities, contracts with these types of partners can be easier to implement and execute. Finally, the government has a duty to be a good steward of taxpayer dollars and small businesses often offer the most cost-effective solutions due to lower overhead costs. To make buying from small businesses easier, federal agencies should create effective contracting vehicles for start-up partnerships. Facilitating contracting between the government and small businesses is a win-win-win as the government finds the best solutions to meet needs, small companies secure stable customers, and public dollars are efficiently spent on technologies that also help the private sector.

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Ruth Siboni is a civil servant for NASA, where her role has transitioned from Presidential Management Fellow at Headquarters to life scientist at Ames Research Center focusing on science policy in the Space Biology division. Prior to her current position, she was a National Science Foundation EAPSI Fellow at Osaka University Medical Hospital in Japan. She received her doctorate in molecular biology from the University of Oregon, where she was a Technology Entrepreneurship Fellow.

Saad Ansari is a strategy consultant and was recently a lecturer at the University of Chicago's Harris School of Public Policy for the course "Defense and Diplomacy." As a former Obama appointee, he served as advisor to the Under Secretary of the Navy and worked on stability operations policy and Detroit revitalization. He received his MA from Yale University and has led two startups.

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