Department of Defense (DoD) funding workshop:

Getting your foot in the door

Presented by the Office of Sponsored Programs

& the Office of Faculty Development and Diversity

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1. Branches of the Department of Defense and their Research Mission:

1.1 Military Branches

These are specific to the military, Army, Navy and Air Force, and generally offer smaller pots of money for funding, some Multidisciplinary University Research Initiative (MURI) opportunities, as well as Summer and Young Investigator-focused programs. These branches are more focused on basic research funding, but are more broadly focused than they might seem at first glance.

Army Research Office (ARO):

The U.S. Army Research Laboratory's Army Research Office (ARO) mission is to serve as the Army's premier extramural basic research agency in the engineering, physical, information and life sciences; developing and exploiting innovative advances to insure the Nation's technological superiority. Basic research proposals from educational institutions, nonprofit organizations, and private industry are competitively selected and funded. ARO's research mission represents the most long-range Army view for changes in its technology. ARO priorities fully integrate Army-wide, long-range planning for research, development, and acquisition. ARO executes its mission through conduct of an aggressive basic science research program on behalf of the Army so that cutting-edge scientific discoveries and the general store of scientific knowledge will be optimally used to develop and improve weapons systems that establish land force dominance. The ARO research program consists principally of extramural academic research efforts consisting of single investigator efforts, university-affiliated research centers, and specially tailored outreach programs.

ARO Broad Agency Announcements: http://www.arl.army.mil/www/default.cfm?page=8

Air Force Office of Scientific Research (AFOSR):

AFOSR continues to expand the horizon of scientific knowledge through its leadership and management of the Air Force's basic research program. As a vital component of the Air Force Research Laboratory (AFRL), AFOSR's mission is to support Air Force goals of control and maximum utilization of air, space, and cyberspace.

AFOSR accomplishes its mission by investing in basic research efforts for the Air Force in relevant scientific areas. Central to AFOSR's strategy is the transfer of the fruits of basic research to industry, the supplier of Air Force acquisitions; to the academic community which can lead the way to still more

accomplishment; and to the other directorates of AFRL that carry the responsibility for applied and development research leading to acquisition.

AFOSR Broad Agency Announcements:
http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=8127

Office of Naval Research (ONR):

As the Department of the Navy's science and technology provider, ONR identifies solutions to address Navy and Marine Corps needs. Since its establishment in 1946, ONR continues to be the first place that senior naval leadership turns to for addressing emerging technology issues and challenges. The ONR mission, defined in law, is to plan, foster and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power, and the preservation of national security; and to manage the Navy's basic, applied and advanced research to foster transition from science and technology to higher levels of research, development, test and evaluation.

Science and technology investment priorities are reflected in the allocation of funds across four components of ONR's strategic portfolio, and further aligned by mapping capability gaps to nine science and technology focus areas as follows:

- Assure Access to Maritime Battlespace
- Autonomy and Unmanned Systems
- Electromagnetic Maneuver Warfare
- Expeditionary and Irregular Warfare
- Information Dominance - Cyber
- Platform Design and Survivability
- Power and Energy
- Power Projection and Integrated Defense
- Warfighter Performance

ONR Funding Opportunities: http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities.aspx

1.2 Advance Research Project Agencies:

These are a little different from the military branches, they generally offer larger pots of money, and are more high-risk, high-reward focused. They also have a few opportunities focused at social sciences and life sciences, rather than typical Engineering research. All these agencies need to be agile, their funded research has to ramp up quickly- however this makes them a less stable source of continued funding than most Federal agencies, and funding can be cut mid-project.

Defense Advance Research Projects Agency (DARPA):

For more than fifty years, DARPA has held to a singular and enduring mission: to make pivotal investments in breakthrough technologies for national security. The ultimate results have included not only game-changing military capabilities such as precision weapons and stealth technology, but also such icons of modern civilian society such as the Internet, automated voice recognition and language translation, and Global Positioning System receivers small enough to embed in myriad consumer devices.

DARPA explicitly reaches for transformational change instead of incremental advances. DARPA comprises approximately 220 government employees in six technical offices, including nearly 100 program managers, who together oversee about 250 research and development programs. DARPA goes to great lengths to identify, recruit and support excellent program managers—extraordinary individuals who are at the top of their fields and are hungry for the opportunity to push the limits of their disciplines. These leaders, who are at the very heart of DARPA's history of success, come from academia, industry and government agencies for limited stints, generally three to five years. That deadline fuels the signature DARPA urgency to achieve success in less time than might be considered reasonable in a conventional setting. At the Agency level, the DARPA Director and Deputy Director approve each new program and review ongoing programs, while setting Agency-wide priorities and ensuring a balanced investment portfolio. The DARPA funding rate is ~40-50% of proposals submitted, so once you have your foot in the door with this agency, the likelihood of achieving a successful proposal is high.

DARPA funding opportunities: http://www.darpa.mil/work-with-us/opportunities

Intelligence Advanced Research Projects Agency (IARPA):

The Intelligence Advanced Research Projects Activity (IARPA) invests in high-risk, high-payoff research programs to tackle some of the most difficult challenges of the agencies and disciplines in the Intelligence Community (IC). They are under the mission of the CIA, and have an energy-focus (similar to DoE, DARPA).

IARPA collaborates across the IC to ensure that our research addresses relevant future needs. This cross-community focus ensures our ability to:

- Address cross-agency challenges
- Leverage both operational and R&D expertise from across the IC
- Coordinate transition strategies with our agency partners

IARPA does not have an operational mission and does not deploy technologies directly to the field. Instead, IARPA facilitates the transition of research results to our IC customers for operational application.

IARPA funding opportunities: http://www.iarpa.gov/index.php/working-with-iarpa/open-solicitations

Homeland Security Advanced Research Projects Agency (HSARPA):

The Homeland Security Advanced Research Projects Agency (HSARPA) supports cutting-edge research to produce revolutionary changes in technologies, new capabilities and threat and risk assessments for the Homeland Security Enterprise (HSE).

Established by the Homeland Security Act of 2002, HSARPA uses innovation and modernization to further scientific advances and produce front-line products that support DHS components such as U.S. Customs and Borders Protection, the U.S. Secret Service, the U. S. Coast Guard, and the Transportation Security Administration, as well as state, local, and private sector entities including first responders and critical infrastructure operators.

HSARPA conducts analysis to understand these organizations' current missions, systems and processes and helps identify operational gaps where new technologies can have the most impact. Program

managers lead teams of subject matter experts to develop, test and evaluate these new homeland security technologies and capabilities.

Select areas of HSARPA focus and their initiatives include developing products that will help:

- Borders and Maritime Security Division - Prevent contraband, criminals and terrorists from entering the U.S. while permitting the lawful flow of commerce and visitors.
- Chemical and Biological Defense Division - Detect, protect against, respond to and recover from potential biological or chemical events.
- Cyber Security Division - Create a safe, secure and resilient cyber environment.
- Explosives Division - Detect, prevent and mitigate non-nuclear explosives attacks against people and infrastructure.

HSARPA funding opportunities: https://baa2.st.dhs.gov/portal/BAA/

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2. Workshop Panel Introduction

Mark Campbell: Over 20 years research experience with AFOSR, and has had previous DARPA funding.

Sylvia Ferrari: Began her research career with ONR with a Young Investigator Program (YIP) award, and has had sustained funding since then. She has served on a committee of visitors reviewing the Engineering Directorate at ONR.

Amit Lal: Program Manager at DARPA 2005-2009. Has sustained funding from DARPA, Navy and Army.

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3. How to get your foot in the door with DoD agencies

DoD agencies have a reputation for being exceedingly tough to penetrate for PIs not previously funded by DoD. For example, Amit Lal had three proposals rejected from DoD before finally having one accepted. Program Managers are extremely busy, and have been known to be unresponsive to communication (however this seems to depend on the agency). The panel discussed several ways to reach out to program managers outside of emails or phone calls. See Section 3.2 for examples.

3.1 Young Investigator Programs:

AOR, DARPA, ONR and AFOSR all have Young Investigator Programs (YIPs), which are traditionally slightly easier to penetrate than the typical research programs. Sylvia presented her research to a group of Program Managers, none of whom were interested in her specific research, but passed along her name to a Program Manager who was interested and who encouraged her to submit to YIP. It is always a good idea to contact the Program Manager prior to submitting to YIP. Young Investigators should really focus on these programs, try to find a contact in each program and really push their research. Once awarded, YIP winners may present annually at program reviews, which can be a great place to make connections with program managers for future applications.

Every year a different Program Manager runs the YIP at DARPA, so it is important for a PI to find out who is running the program this year, and what their interests are and how the PI's interests align with the Program Manager's interests.

3.2 Interactions with Program Managers:

The interaction with the Program Manager is a critical factor in gaining a lot of DoD funding. It is a relationship, and the PI has to think of it that way- keep feeding the relationship in order to maintain it and keep the pipeline of funding coming. The Program Manager becomes a manager at DoD (specifically DARPA) by pitching their idea to the program, which has to be worth in the region of $30million. If chosen, the Program Manager can then decide who they want to include in the research for their idea. They typically have a 5 year appointment to get their idea realized, so will be particularly interested in deliverables being supplied on time. This is their "baby", their big idea, and you have to convince them why you should be a part of the funded program. Program Managers at the military agencies have a more traditional programmatic role, and generally bring in subject matter experts to review the proposals, however the Program Manager retains a lot of the control of distribution of funds to specific PIs.

- Some PIs go to great lengths to interact with a Program Manager- they might travel to Washington D.C. to talk with them in person, would even show up at the door unannounced to discuss their ideas for their fit with the research program. If you do this though, be sure to be prepared- have researched their program thoroughly, and have your white paper in hand. ONR and DARPA are very close geographically, and could be visited at the same time.
- Other PIs have met Program Managers through very traditional submission of a white paper in response to a solicitation- this can be dependent of the specific preference of the Program Manager.
- Meet Program Managers at conferences and program reviews- introduce yourself and have a copy of your white paper handy for them to read.
- Unsolicited proposals- get permission to submit a white paper, or attach the white paper to an email. This will then go through several iterations, written in collaboration with the Program Manager. Very successful way of obtaining funding through DoD.
- However they meet with the Program Manager, the PI should make sure their presentation and white paper are exceedingly polished, and that they know their research and the program mission inside out.
- PIs should be on the look-out for new Program Managers, and contact them ASAP to get to know them first. It's also a good idea for PIs to check DoD budget (for example http://www.defense.gov/News/News-Releases/News-Release-View/Article/605365), to see where the funding is going for the next year and onwards. The Program Manager may not even be identified at that point, but the budget line is in place.

3.3 Other means of accessing DoD funding:

3.3.1. Summer Programs

ONR and AFOSR both have summer programs that PIs can attend (http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=9380 and http://onroutreach-summer-faculty-research-sabbatical.com/). This is a great way to get your foot in the door, get to know Program

Managers, and get your summer salary paid. During these research programs, the PI spends 6-8 weeks at one of the military research labs. This is a great way to set up initial relationships with DoD officials, and can begin a long term relationship, even with a high turnover of Program Managers. The Air Force has review programs for the summer research labs- which are also good to be involved in. Mark made an extremely good contact at the summer research lab he worked at- did his homework prior to meeting the Program Manager- read his thesis, knew his research etc., so that when he did speak with him, he was exceedingly prepared and could let him know that this own research was interesting and fit well with the mission of that particular program.

3.3.2. Through Multidisciplinary University Research Initiative (MURI) cooperation

 Funding announcements with specific topics are announced annually between July and September (http://www.arl.army.mil/www/pages/8/2016_MURI_Grants_dot_Gov.pdf). There are approximately 25 topics for which white papers can be submitted, and these change from year to year. There is a higher chance of being funded through these if you have been funded previously, however collaboration with someone on a MURI is a good way to get your foot in the door with DoD. MURIs tend to be a more "grass roots" funding mechanism. They are not generally as high-risk or novel, and are instead more focused on "bread and butter" ideas. Lots of university involvement with MURIs. MURIs are seen as an opportunity to put together a team of researchers that might never normally be put together, for instance Artificial Intelligence paired with Psychology. Funding can be up to $1.5 million/year for 3 years (with a two year added option), and typically engage 3-5 universities.

3.3.3. Through Industry partners

PIs can partner with a small business and take part in writing Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) proposals- which might only be $30,000 in funds, but will lead to bigger research grants in the future if successful. Could also cooperate with small business to submit unsolicited proposals, if they have the correct contacts. Again, this is dependent on how interested the Program Manager is in partnering with Industry. Often can be competing for research dollars with Industry- so might be advantageous to see how your research aligns with a company's interests.

3.3.4. Other funding opportunities

- Future Force Capabilities- are not advertised the way MURIs are, each may have up to $70million dedicated to them. Program Managers see these as opportunities to transition their research to real systems, but the PI has to attend meetings to hear about these types of opportunities
- Defense University Research Instrumentation Program (DURIP)- Equipment grants funded by ARO, ONR and AFOSR. - these tend to be for PIs already funded with DoD money. Provides support for equipment costing between $50K and $1.5 M that cannot typically be purchased within the budgets of single-investigator awards
- DARPA also has equipment grants but these are not provided through an open competition – need to press your Program Manager to get access to these funds

4. Writing the White Paper:

There are several recommendations from panel members for writing a successful white paper for one of the DoD agencies:

- Target what aspects of their research will contribute to novel ideas around agency missions, and make sure it is relatable to the specific agency
- Don't write the proposal like a typical NSF proposal; do not focus on scholarly impact, writing papers or basic research. Instead, the PI should focus on transitions, and what capabilities they are transferring on to the agency.
- Name a research lab people PI will connect with during project period- this is critical to not only include in the proposal, but to carry out when performing the research.
- What has been funded through the program in the past? PI should figure this out, and then explain why their research is different/novel.
- Figure out who was funded in the past, these are the researchers that the PI will be compared to in the review process, and might even be reviewers for the proposal.
- Innovative Claims is the most important section: Why is what the PI is proposing innovative? How is this different from what NSF has funded? Why hasn't anyone done this before? Not only why this is novel research, but why no-one has thought of it before the PI, is critical to writing a successful proposal.
- Proposals are typically longer than an NSF proposal, around 40 pages, however a lot of the content is boilerplate.
- PI does not submit a CV/biosketch- the PI should have done their legwork in advance to convince the Program Manager to fund them, so the Program Manager should already know who the PI is and what they have done.
- PI should ensure the proposal has future and agency-specific relevance- what are the agency-specific objectives of the proposal? Should have tangible deliverables included.
- Break down the budget by deliverables.
- Proposal should include letters if collaborating with an industry partner, or government lab. This is very important and should be prepared well in advance of the proposal deadline.
- It is advisable to have anyone you would collaborate with on the project review the proposal prior to submission.

5. DoD – isms:

AFOSR   Air Force Office of Scientific Research

ARO   Army Research Office

BAA   Broad Agency Announcement

DARPA   Defense Advanced Research Projects Agency

DoD   Department of Defense

HSARPA	Homeland Security Advanced Research Projects Agency
IARPA	Intelligence Advanced Research Projects Agency
MURI	Multi-disciplinary University Research Initiative
ONR	Office of Naval Research
YIP	Young Investigator Program