Opportunities for Extramural Research Funding from the US Department of Defense

Part I: Some of the Basic Research Grants

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Federal R&D funding to universities: circa $30 billion

Clemson’s share: $56 million less a few $million to subcontractors
DOD Budget:
FY 2014 Presidential Budget (PB) Request

- DOD Research, Development, Test & Evaluation (RDT&E): $68 billion
- Science & Technology portion of this: $11.9 billion (18% of RDT&E)
DOD Science & Technology (S&T) Activities

- Basic Research (designated as MFP 6.1 or BA1): Systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and/or observable facts without specific applications toward processes or products in mind.
  - Circa 60% of 6.1 funds are extramural funds to universities
  - No publication restrictions, no review prior to publication
  - Faculty, students can be non-US citizens
    - NDSEG Fellowship program, some Young Investigator Programs are exceptions
  - Grant funding with university typically as lead or sole institution

- Applied Research (MFP 6.2 or BA2): Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.
  - Circa 10% of 6.2 funds are extramural funds to universities
  - Often includes publication restrictions, prior review of publications
  - Usually restricted to US citizens for faculty and student participants
  - Contract funding with industry or govt lab typically as lead institution

- Advanced Technology Development (MFP 6.3 or BA3): Includes all efforts that have moved into the development and integration of hardware for field experiments and tests.
  - Circa 10% of 6.3 funds are extramural funds to universities
  - Restrictions similar to those given above for 6.2 funds
  - Funding arrangement similar to that given above for 6.2 funds
What Does DOD Spend on Science & Technology?

- **Basic Research funding (6.1 funds)**
  - Extramural funding to universities: est. $1,300 million of the $2,200 million

- **Applied Research funding (6.2 funds)**
  - Extramural funding to universities: est. $500 million of the $4,600 million

- **Advanced Technology Development (6.3 funds)**
  - Extramural funding to universities: est. $500 million of the $5,200 million
DOD 6.1 Funds and Academia

- Department of the Air Force
  - Est. $350 million of $525 million to universities

- Department of the Army
  - Est. $200 million of $435 million to universities

- Department of the Navy
  - Est. $300 million of $615 million to universities

- Defense Advanced Research Projects Agency (DARPA)
  - Est. $270 million of $365 million to universities

- Defense Threat Reduction Agency (DTRA)
  - Est. $35 million of $45 million to universities

- Chemical and Biological Defense Program (CBDP)
  - Est. $25 million of $50 million to universities

- Other Office of Secretary of Defense (OSD) Defense-Wide Programs
  - Est. $125 million of $125 million to universities

- Congressionally Directed Medical Research Program (CDMRP)
  - Some portion of $580 million is basic research funding to academia
Army Materiel Command (AMC)
  - Army Research, Development & Engineering Command
    - Six Research, Development, Engineering Centers: 6.1, 6.2, 6.3, other
    - Army Research Laboratory: 6.1, 6.2, 6.3
  - Army Communications-Electronics Command: some 6.2, 6.3, other
  - Army TACOM Lifecycle Management Command: some 6.2, 6.3, other
  - Several other subordinate commands: some 6.2, 6.3, other

Army Training and Doctrine Command: some 6.2, 6.3, other
Army Special Operations Command: some 6.2, 6.3, other
Army Space and Missile Defense Command/Army Forces Strategic Command: some 6.2, 6.3, other
Army Network Enterprise Technology Command/9th Signal Command: some 6.2, 6.3, other
Army Intelligence and Security Command: some 6.2, 6.3, other
Army Test and Evaluation Command: some 6.2, 6.3, other
Army Medical Command: some 6.2, 6.3, other
Army Corps of Engineers: some 6.2, 6.3, other
Army Research Laboratory

- Army’s corporate lab for “materials technology”
  http://www.arl.army.mil

- Six Directorates: mostly intramural research
  (includes 20% of Army’s total 6.1 funding)
  - Computational & Information Sciences: 6.1, 6.2, 6.3
  - Human Research & Engineering: 6.1, 6.2, 6.3
  - Sensors & Electron Devices: 6.1, 6.2, 6.3
  - Survivability/Lethality Analysis: 6.1, 6.2, 6.3
  - Vehicle Technology: 6.1, 6.2, 6.3
  - Weapons & Materials Research: 6.1, 6.2, 6.3

- Army Research Office: extramural research funding, mostly 6.1
  (includes 65% of Army’s total 6.1 funding)
  - Ten (10) Divisions
  - Forty (40) areas/programs, each with Technical Point of Contact (TPOC)/Program Manager (PM)
Army Research Office

- Located in Research Triangle Park, NC

- Grant opportunities – Broad Agency Announcements (BAAs)
  - ARL Core BAA for Basic and Applied Scientific Research (ARO Section)
    - Standard, single-PI grants
    - Young Investigator Program
    - Research Instrumentation Program
    - Short-Term Innovation Research
  - Defense University Research Instrumentation Program (DURIP)
  - Multidisciplinary University Research Initiative (MURI)
  - Presidential Early Career Award for Scientists and Engineers (PECASE)
    (proposal by invitation only)

- 6.1 funding (FY2014 PB)
  - Defense Research Sciences – Single Investigator Basic Research: $80 million
    - Includes ARO Young Investigator Program
  - OSD University Research Initiatives:
    - DURIP: $14 million
    - MURI: $57 million
    - PECASE: $5 million
ARO Single-Investigator Proposals, ARL Core BAA

- Awards are typically single investigator, $200K-$600K over three years
- Proposal should address basic research problem of clear relevance to DOD/Army mission
- Establishing relationship with Program Manager is valuable
- Proposals accepted any time, but should target OCT 1 (FY) start
- Recommended proposal time line
  - Contact (visit, if possible) PM more than 12 months prior to start date
  - Submit white paper (mid OCT) – not required, but strongly recommended
    - Five-page limit, includes brief cost estimate, submit by emailed .pdf to PM
  - Response to white paper (DEC)
  - Submit full proposal (MAR)
    - Three-year project, no specified page limit for technical description
    - Submit through grants.gov
  - Review and notification
    - PM will use some internal, mostly external expert reviewers
  - Start project (OCT 1)
Department of the Navy

- Office of Naval Research (ONR)
  http://www.onr.navy.mil
  - Six Departments (Codes 30-35): 6.1, 6.2, 6.3, other
    - Extramural research funding
  - Naval Research Laboratory: 6.1, 6.2, 6.3, other
    - Intramural research, 20-25% of Navy’s 6.1 funding
  - Marine Corps Warfighting Laboratory

- Naval Sea Systems Command (NAVSEA): some 6.2, 6.3, other
- Naval Air Systems Command (NAVAIR): some 6.2, 6.3, other
- Space and Naval Warfare Systems Command (SPAWAR): some 6.2, 6.3, other
- Marine Corps Systems Command (MARCORSYSCOM): some 6.2, 6.3, other
Office of Naval Research

- Coordinates and executes S&T programs of Navy and Marine Corps

- Headquartered in Arlington, VA

- Six Departments
  - Expeditionary Maneuver Warfare & Combatting Terrorism (Code 30)
  - Command, Control, Communications, Intelligence, Surveillance, & Reconnaissance (Code 31)
  - Ocean Battlespace Sensing (Code 32)
  - Sea Warfare & Weapons (Code 33)
  - Warfighter Performance (Code 34)
  - Naval Air Warfare & Weapons (Code 35)

- 46 Programs
  Each with Program Officer (PO)
Grant opportunities

- Long Range BAA for Navy and Marine Corps Science and Technology
  - Standard, typically single-PI grants
- ONR Young Investigator Program
- Defense University Research Instrumentation Program (DURIP)
- Multidisciplinary University Research Initiative (MURI)
- Presidential Early Career Award for Scientists and Engineers (PECASE)
  (proposal by invitation only)

6.1 funding (FY2014 PB)

- Defense Research Sciences: circa $485 million (not all to academia)
  - Includes ONR Young Investigator Program
- OSD University Research Initiatives:
  - DURIP: $22 million
  - MURI: $82 million
  - PECASE: $8 million
Department of the Air Force

All under Air Force Materiel Command (AFMC):

- **Air Force Research Laboratory (AFRL)**: 6.1, 6.2, 6.3
  - Seven Technology Directorates: 6.1, 6.2, 6.3
    - Mostly intramural research (includes 30% AF 6.1 funds)
  - 711th Human Performance Wing
  - **Air Force Office of Scientific Research**: 6.1, 6.2, 6.3

- **Air Force Life Cycle Management Center**: some 6.2, 6.3, other
- **Air Force Test Center**: some 6.2, 6.3, other
  - Arnold Engineering Development Center
- **Air Force Nuclear Weapons Center**: some 6.2, 6.3, other
- **Air Force Sustainment Center**: some 6.2, 6.3, other
Air Force Office of Scientific Research

- Coordinates and executes AFRL’s basic research program
- Headquartered in Arlington, VA
- Five Departments/Divisions
  - Dynamical Systems and Control (RTA)
  - Quantum and Non-Equilibrium Processes (RTB)
  - Information, Decision, and Complex Networks (RTC)
  - Complex Materials and Devices (RTD)
  - Energy, Power, and Propulsion (RTE)
- 42 Programs
  Each with Program Officer (PO)
- Basic Research Initiatives on focused topics
  - Currently 13
Air Force Office of Scientific Research

Grant opportunities

- Air Force Office of Scientific Research BAA
  - Standard, typically single-PI grants
- AF Young Investigator Program
- Defense University Research Instrumentation Program (DURIP)
- Multidisciplinary University Research Initiative (MURI)
- Presidential Early Career Award for Scientists and Engineers (PECASE)
  - (proposal by invitation only)

6.1 funding (FY2014 PB)

- Defense Research Sciences: circa $373 million (not all to academia)
  - Includes AF Young Investigator Program
- OSD University Research Initiatives:
  - DURIP: $16 million
  - MURI: $73 million
  - S&E Education: $45 million (majority for NDSEG Fellowships)
  - High-Energy Laser Research: $13 million
  - PECASE: $4 million
Defense Advanced Research Projects Agency

http://www.darpa.mil

- Focused on the development of advanced technologies for use by DOD
- Located in Arlington, VA
- Organized as six Offices
  - Adaptive Execution Office
  - Defense Sciences Office
  - Information Innovation Office
  - Microsystems Technology Office
  - Strategic Technology Office
  - Tactical Technology Office
- Approximately 100 program managers (PMs)
  - One to a few active programs per PM
DARPA (continued)

- Primary focus is on applied research, proof of concept, tech transition
  - Basic research funding (6.1): $364.5 million
  - Applied research funding (6.2): $1,205.0 million
  - Advanced Technology Development (6.3): $1,223.9 million

- Funding opportunities
  - Broad Agency Announcement for each Office
  - Research program on specific topic defined by PM
  - DARPA Young Faculty Award Program

- Opportunities for basic research funding
  - Response to BAA can specify grant (may be altered by DARPA)
    - White paper, then full proposal with 30-page limit on technical section
    - Best vehicle to propose single-investigator basic research grant
    - Publication, citizenship restrictions depend on nature of work
  - Many topic-specific solicitations suitable only for contracts with industry lead, many require prototype & demo as deliverables
Young Investigator Programs

- Air Force Young Investigator Program

- FY 2014 solicitation, posting date: July 9, 2013
- Eligibility: Ph.D. received five years or less before most recent May 1
- Citizenship restriction: US citizen, national, or permanent resident
- $120K per year, three years (more for longer in some cases)
- Best proposals eligible for PECASE
- Technical focus: “major areas of interest to Air Force”
- White paper submission: email
- Solicitation posting & proposal submission: grants.gov
- 42 out of 234 proposals funded in FY 2014 competition
Young Investigator Programs

- ARO Young Investigator Program

- No specific due date for proposal (Consult with PM.)
- Eligibility: TTR faculty, Ph.D. five years or less at time of application
- Citizenship restriction: US citizen & resident alien
- $50K per year, three years
- Best proposals eligible for PECASE
- Technical focus: areas in ARO Section of ARL Core BAA
- Solicitation posted in ARO Section of ARL Core BAA
- Proposal submission: grants.gov
- Supporting letter from department chair or dean required
- xx out of xx proposals funded in FY 2013
Young Investigator Programs

**ONR Young Investigator Program**

- FY 2014 solicitation, posting date: **August 13, 2013**
- Proposal due: **January 3, 2014**
- Eligibility: TTR faculty, first position begun on or after Nov. 1, 2008
- Citizenship restriction: US citizen, national, or permanent resident
- $170K per year, three years
- Possible additional equipment funds, up to $25K/yr match other Navy funds
- Best proposals eligible for PECASE
- Technical focus: areas in S&T ONR Web site
- Solicitation posting & proposal submission: grants.gov
- 16 out of 369 proposals funded in FY 2013 competition
Young Investigator Programs (continued)

- **DARPA Young Faculty Award**
  - FY 2014 solicitation, posting date: **November 14, 2013**
  - Proposal due: **January 7, 2014**
  - Eligibility: untenured TTR faculty within five years of appointment
  - Citizenship restriction: US citizen or resident alien
  - $250K per year, two years
  - Technical focus: restricted to topics listed in solicitation
  - Solicitation posting & proposal submission: grants.gov
  - 25 out of 226 proposals funded in FY 2013 competition

- **DTRA Young Investigator Program**
  - DTRA has a YIP focused on topics related to reducing the threat from weapons of mass destruction
  - $100K per year, two years
  - DTRA BAA, Basic Research for Combatting Weapons of Mass Destruction
Defense University Research Instrumentation Program

- Equipment (instrumentation) is intended to support DOD-funded and DOD-relevant research
  - Existing DOD basic research grant almost a necessity in practice
  - Small research grant can be leveraged for sizeable DURIP award
  - Additional DOD grant proposals in the pipeline helps
  - Relationship with DOD lab or R&D Center showing path for technology transfer helps

- Proposal process
  - Equipment only (no indirect), $50K - $1.5 million
  - Single piece of equipment or “single system”
  - Project duration: one year, starting July 1
  - Highlight existing & proposed DOD-funded research that will leverage equipment
  - Emphasize necessity of equipment to take research “to the next level”

- FY 2013 DURIP: 169 out of 760 proposals funded (avg $300K)
Multidisciplinary University Research Initiative

- Large-scale basic research project on single topic
  - Topics specified in solicitation (24 in FY 2014 competition)
  - Topics contributed by AFOSR, ARO, ONR
  - Research must be multidisciplinary
  - Projects teams usually include multiple universities
  - Requires very strong team with established track record of scholarship and 6.1 DOD-funded research

- Proposal process
  - Budget proposal for five years, usually $1.25 – $1.5 million per year
    - Awards are for three years, plus two one-year options

- FY 2013: 247 white papers, 71 proposals, 22 awards (avg $6 million)
National Defense Science and Engineering Graduate (NDSEG) Fellowship Program

http://ndseg.asee.org

- Nationally competitive graduate research fellowship
  - Three-year PhD fellowship in science & engineering disciplines
  - Eligibility: US citizen, permanent resident
  - Eligibility: final year undergraduate to second year of graduate study
  - Stipend > $30K per year, tuition and fees paid by fellowship
  - Deferral/reserve year not normally allowed

- Proposal process
  - FY 2014 application deadline: Dec. 20, 2013
  - Proposed research should demonstrate sound science, relevance to DOD mission

- FY 2014: circa 2,000 applications, circa 200 awards
THANKS FOR YOUR INTEREST.

ANY QUESTIONS?

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Data Sources

- Federal R&D FY 2011 Funding pie chart

- Clemson Federal FY 2013 Research Expenditures pie chart

- DOD R&D FY 2014 Funding pie charts

- Definition of DOD Science and Technology Activities

- Other sources
Appendix: DOD R&D Expenditures at Clemson by Agency (CU FY 2013) (my estimates)

- **Department of the Air Force (Clemson prime)**
  - Air Force Life Cycle Management Center: $60,000 (2 contracts)
  - Air Force Research Laboratory: $290,000 (3 contracts)
  - Air Force Office of Scientific Research: $1,700,000 (11 grants)

- **Department of the Army (Clemson prime)**
  - Army Corps of Engineers: $510,000 (6 contracts)
  - Army Research Office: $730,000 (11 grants)
  - Army Medical Research/CDMRP: $800,000 (4 grants)

- **DARPA (Clemson prime)**
  - $55,000 (1 grant)

- **Defense Threat Reduction Agency (Clemson prime)**
  - $1,000,000 (3 grants)

- **Missile Defense Agency (Clemson prime)**
  - $300,000 (2 grants)

- **National Security Agency (Clemson prime)**
  - $40,000 (4 grants)

- **Department of the Navy (Clemson prime)**
  - Naval Engineering Facilities Command: $40,000 (1 contract)
  - Office of Naval Research: $570,000 (5 grants)

Total DOD (Clemson prime): $6,400,000
Total DOD (Clemson as subcontractor): $1,900,000