University of Southern California

USC

DC Office for Research Advancement

Writing a Competitive DOE/DOD Proposal

with emphasis on computation

Dr. James S. Murday

Tel: 202 824 5863 E-mail: murday@usc.edu

40 years in S&T with Federal Agencies

FY2006 DOE Research Funding ($M)
Obligations at Universities/Colleges

		Basic Research			Applied Research					
									Envir	Defense
		OoS	Fossil		EDER	EERE	Fossil	Nuclear	Mgmt	Prog
Physical Sciences		**366**	**7**				**12**			
	Astronomy	0								
	Chemistry	65	7				12			
	Physics	301								
	Other	0								
Environmental Sciences		**61**					**15**		**10**	**2**
	Atmospheric	28								1
	Geological	31								1
	Oceanology	3								
	Other	0					15		10	
Math and Computer Sci		**34**								
	Computer Sci	19								
	Mathematics	15								
	Other	0								
Engineering		**19**			**11**	**22**	**25**	**7**		**69**
	Aeronautical	0								
	Astronautical	0								
	Chemical	0					25			
	Civil	0				5				
	Electrical	0			11	3				
	Mechanical	1								
	Metal/Materials	18								1
	Other	0				14		7		68
Life Sciences		**144**								
	Agriculture	0								
	Biological	67								
	Environmental	0								
	Medical	77								
	Other	0								
	Total	**624**			**11**	**22**	**52**	**7**	**10**	**71**

U.S. DEPARTMENT OF ENERGY

DOE's Priorities and Goals

from Dr. Patricia Dehmer's presentation to Energy Sciences Coalition, 19 May 2009

Priority: Science and Discovery: Invest in science to achieve transformational discoveries
- Organize and focus on breakthrough science
- Develop and nurture science and engineering talent
- Coordinate DOE work across the department, across the government, and globally

Priority: Change the landscape of energy demand and supply
- Drive energy efficiency to decrease energy use in homes, industry and transportation
- Develop and deploy clean, safe, low carbon energy supplies
- Enhance DOE's application areas through collaboration with its strengths in Science

Priority: Economic Prosperity: Create millions of green jobs and increase competitiveness
- Reduce energy demand
- Deploy cost-effective low-carbon clean energy technologies at scale
- Promote the development of an efficient, "smart" electricity transmission and distribution network
- Enable responsible domestic production of oil and natural gas
- Create a green workforce

Priority: National Security and Legacy: Maintain nuclear deterrent and prevent proliferation
- Strengthen non-proliferation and arms control activities
- Ensure that the U.S. weapons stockpile remains safe, secure, and reliable without nuclear testing
- Complete legacy environmental clean-up

Priority: Climate Change: Position U.S. to lead on climate change policy, technology, and science
- Provide science and technology inputs needed for global climate negotiations
- Develop and deploy technology solutions domestically and globally
- Advance climate science to better understand the human impact on the global environment

Secretary Chu stated that DOE is pursuing transformative ideas to overcome decades of "stove-piped" thinking at the agency, and will center its new research strategy on DOE's research laboratories and the nation's universities. According to the Secretary, primary elements of DOE's new strategy will be initiatives such as the Energy Frontier Research Centers (EFRCs), Advanced Research Projects Agency – Energy (ARPA-E), and Energy Innovation Hubs, all of which were briefly discussed during the hearing.

Testimony to Senate Energy Com - 21 Jan 2010

Advanced Scientific Computing Research (ASCR)

ASCR Mission: To discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena relevant to DOE.

Priorities:

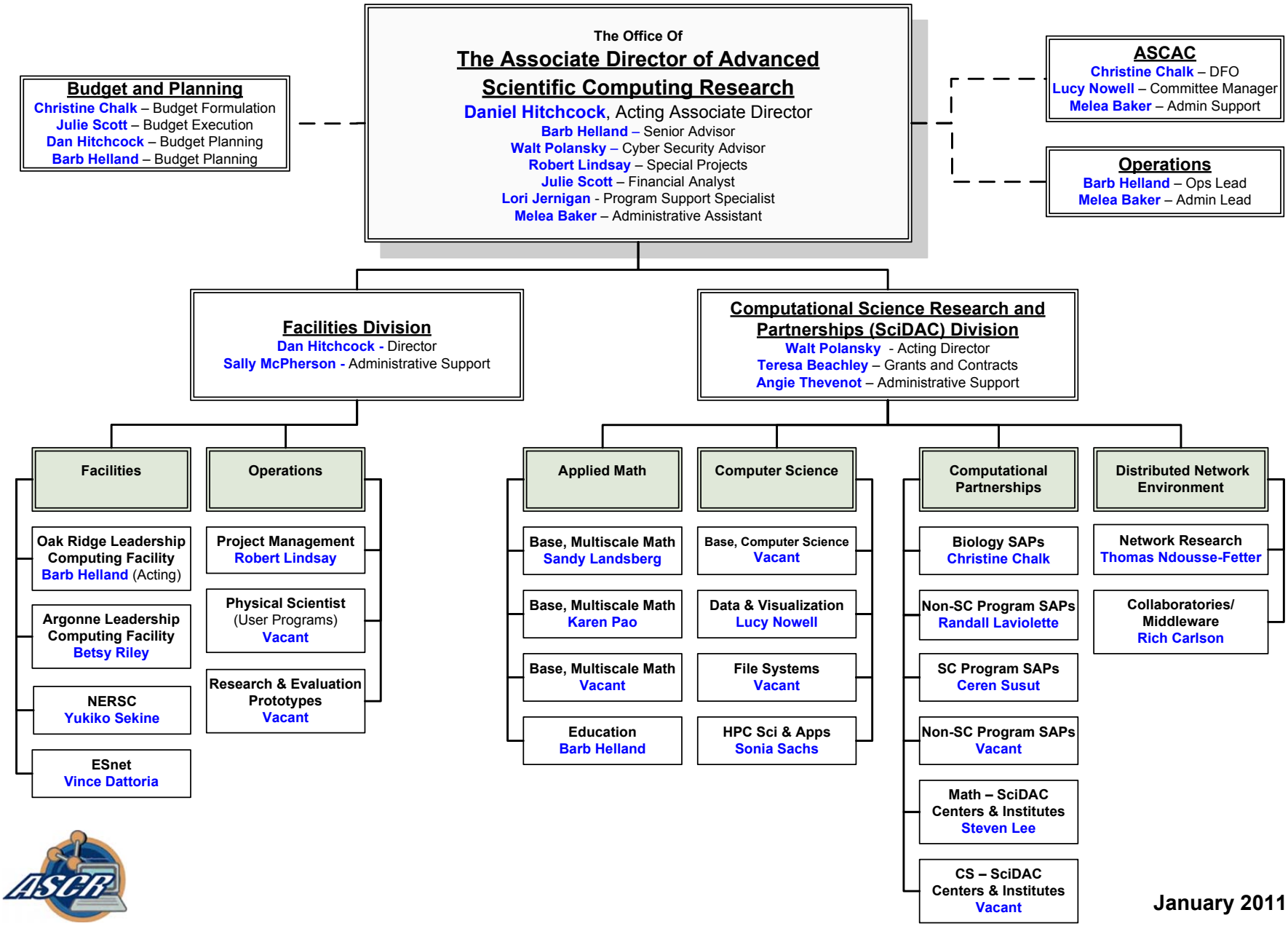
- Develop mathematical descriptions, models, methods, and algorithms to understand complex systems across wide spatial and temporal scales
- Develop the underlying understanding and software to make effective use of computers at extreme scales and to transform extreme-scale data into scientific insight
- Deliver forefront computational and networking capabilities to extend the frontiers of science
- Support mathematical and computational partnerships to advance key DOE & SC missions
- Develop networking and collaboration tools and facilities that enable scientists worldwide to work together

from Dr. Patricia Dehmer's presentation to Energy Sciences Coalition, 19 May 2009

THE OFFICE OF

ADVANCED SCIENTIFIC COMPUTING RESEARCH

Functional Organization Chart



January 2011

Acquiring Topic/Program Manager Information
Advanced Scientific Computing Research (ASCR)

Go to http://www.er.doe.gov/ascr/

Click on Research in left hand column

Click on the appropriate topic for a program description
The program manager contact information is at lower right corner

	FY10 ($M)	FY11 ($M)	FY12 ($M)	Program Manager	Email	Telephone
Advanced Scientific Computation Research Program (~25% to Universities)						
Math, Computational, and Computer Sciences Research						
Applied Mathematics	44	45	49	Dr. Steven Lee	steven.lee@	301 903 5710
Computer Science	46	47	47	Dr. Dan Hitchcock	daniel.hitchcock@	301 903 9958
Computational Partnerships (SciDAC)	50	53	60	Dr. Walt Polansky	walt.polansky@	301 903 5800
Next Generation Networking for Science	14	14	13	Dr. Thomas Ndousse-Fetter	tndousse@er.doe.gov	301 903 9960
High Performance Computing and Networking Facilities	230	261	292	Dr. Dan Hitchcock	daniel.hitchcock@	301 903 9560

U.S. DEPARTMENT OF ENERGY

Basic Energy Sciences (BES)

BES Mission: To support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support DOE missions in energy, environment, and national security.

Priorities:

- Create a new paradigm for the design of materials, especially those related to the efficient production, storage, transmission, and use of energy
- Through observation and manipulation of matter at the atomic and molecular scales, achieve mastery of material syntheses and chemical transformations relevant to real-world energy systems
- Understand and control fundamental interactions between matter and energy, especially at the nanoscale
- Conceive, construct, and operate open-access scientific user facilities to probe materials at the limits of time, space, and energy resolution

from Dr. Patricia Dehmer's presentation to Energy Sciences Coalition, 19 May 2009

Office of Basic Energy Sciences

Harriet Kung, Director

Wanda Smith, Administrative Specialist

BES Budget and Planning
Bob Astheimer, Senior Technical Advisor
Margie Davis, Financial Management

BES Operations
Kerry Gorey, Program Support Specialist
Robin Hayes, AAAS Fellow
Katie Perine, Program Analyst / BESAC
Ken Rivera, Laboratory Infrastructure / ES&H
Vacant, DOE and Stakeholder Interactions
Vacant, DOE Technical Office Coordination

Materials Sciences and Engineering Division

Linda Horton, Director
Teresa Crockett, Program Analyst
Charnice Waters, Secretary

Materials Discovery, Design, and Synthesis
Arvind Kini
Jorge Mariani, P.A.

- **Materials Chemistry**
  Dick Kelley
  Vacant
  ● John Schlueter, ANL
  ● Darryl Sasaki, SNL
- **Biomolecular Materials**
  Mike Markowitz
- **Synthesis and Processing**
  Bonnie Gersten
- **Tech. Coordination Program Management**
  John Vetrano
  Vacant

Condensed Matter and Materials Physics
Jim Horwitz
Marsophia Agnant, P.A.

- **Exp. Cond. Mat. Phys.**
  Andy Schwartz
  ● Doug Finnemore, Ames
  Vacant
- **Theo. Cond. Mat. Phys.**
  Jim Davenport
  ■ Kim Ferris, PNNL
- **Physical Behavior of Materials**
  Refik Kortan
- **Mechanical Behavior and Radiation Effects**
  John Vetrano
  ● Richard Wright, INL

Scattering and Instrumentation Sciences
Helen Kerch
Cheryl Howard, P.A.

- **X-ray Scattering**
  Lane Wilson
- **Neutron Scattering**
  Thiyaga P. Thiyagarajan
- **Electron and Scanning Probe Microscopies**
  Jane Zhu
- **DOE EPSCoR***
  Tim Fitzsimmons
  ● Helen Farrell, INL
  ● John Schlueter, ANL

* Experimental Program to Stimulate Competitive Research

Scientific User Facilities Division

Harriet Kung, Acting Director
Linda Cerrone, Program Support Specialist
Rocio Meneses, Program Assistant

Operations

- **X-ray and Neutron Scattering Facilities**
  Peter Lee
  Vacant
- **NSRCs and EBMCs****
  Mihal Gross
  Tof Carim
- **Accelerator and Detector R&D**
  Eliane Lessner
- **Facility Coordination; Metrics; Assessment**
  Van Nguyen

** Nanoscale Science Research Centers and Electron-beam Microcharacterization Centers

Construction

- **NSLS-II *****
  Phil Kraushaar
  ◆ Walter Lowe, ANL
  Vacant
- **Facilities Upgrades**
  Phil Kraushaar
  ◆ Susan Weber
  Vacant
- **Instrument MIEs******
  Phil Kraushaar
  ◆ Susan Weber
  ■ John Tapia, LANL

*** National Synchrotron Light Source II
**** Major Item of Equipment projects

Chemical Sciences, Geosciences, and Biosciences Division

Eric Rohlfing, Director
Diane Marceau, Program Analyst
Michaelene Kyler-King, Program Assistant

Fundamental Interactions
Michael Casassa
Robin Felder, P.A.

- **Atomic, Molecular, and Optical Sciences**
  Jeff Krause
- **Gas-Phase Chemical Physics**
  Wade Sisk
- **Condensed-Phase and Interfacial Mol. Science**
  Gregory Fiechtner
- **Computational and Theoretical Chemistry**
  Mark Pederson

Photochemistry and Biochemistry
Rich Greene
Sharron Watson, P.A.

- **Solar Photochemistry**
  Mark Spitler
  ◆ Margaret Ryan, PNNL
- **Photosynthetic Systems**
  Gail McLean
- **Physical Biosciences**
  Robert Stack
- **Fuels from Sunlight Energy Innovation Hub**
  Carol Bessel

Chemical Transformations
John Miller
Vacant, P.A.

- **Catalysis Science**
  Paul Maupin
  Raul Miranda
  ◆ Jan Hrbek, BNL
- **Heavy Element Chemistry**
  Vacant
  Larry Rahn
  ● Norm Edelstein, LBNL
- **Separations and Analysis**
  Larry Rahn
- **Geosciences**
  Nick Woodward
  ● Jennifer Blank, LBNL
- **Technology Office Coordination**
  Marvin Singer

LEGEND

◆ Detailee (from DOE laboratories)
■ Detailee, ½ time, not at HQ
● Detailee, ¼ time, not at HQ
◆ On detail from EM
P.A. Program Assistant

February 2011

Posted 02FEB11

DOE Office of Science
Basic Energy Sciences
www.sc.doe.gov/bes/bes.html

	FY10 ($M)	FY11 ($M)	FY12 ($M)	Program Manager	Email	Telephone
Basic Energy Sciences Program					XX@science.doe.gov	
Materials Sciences and Engineering Research Division						
Experimental Condensed Matter Physics	48	46	59	Dr. Andrew Schwartz	andrew.schwartz@	301 903 3535
Theoretical Condensed Matter Physics	30	30	47	Dr. James Davenport	James.Davenport@	301 903 0035
Mechanical Behavior and Radiation Effects	17	25	32	Dr. John Vetrano	john.vetrano@	301 903 5976
Physical Behavior of Materials	29	34	46	Dr. Refik Kortan	refik.kortan@	301 903 3308
Neutron and Xray Scattering	40	42	43	Dr. P. Thiyagarajan	p.thiyagarajan@	301 903 9706
Neutron and Xray Scattering				Dr. Lane Wilson	lane.wilson@	301 903 5877
Electron and Scanning Probe Microscopies	30	27	30	Dr. Jane Zhu	jane.zhu@	301 903 3811
Synthesis and Processing Science	21	33	25	Dr. Bonnie Gersten	bonnie.gersten@	301 903 0002
Materials Chemistry and Biomolecular Materials	57	63	65	Dr. Richard Kelley	richard.kelley@	301 903 6051
Materials Chemistry and Biomolecular Materials				Dr. Michael Markowitz	mike.markowitz@	301 903 6779
Energy Frontier Research Centers	58	78	58			
Chemical Sci, Geosci, and Energy Biosci Research Divison						
Atomic, Molecular, and Optical Science	23	26	24	Dr. Jeff Krause	jeff.krause@	301 903 5827
Chemical Physics Research - Gas Phase	52	76	67	Dr. Wade Sisk	wade.sisk@	301 903 5692
Solar Photochemistry	40	38	53	Dr. Mark Spitler	mark.spitler@	301 903 4568
Photosynthetic Systems	18	19	18	Dr. Gail McLean	gail.mclean@	301 903 7807
Physical Biosciences	17	18	17	Dr. Robert Stack	robert.stack@	301 903 5652
Catalysis Science	45	49	54	Dr. Paul Maupin	paul.maupin@	301 903 4355
Separations and Analysis	14	17	19	Dr. Bill Millman	william.millman@	301 903 5805
Heavy Element Chemistry	12	12	23	Dr. Lester Morss	lester.morss@	301 903 9311
Geosciences Research	24	51	43	Dr. Nick Woodward	nick.woodward@	301 903 4061
Energy Frontier Research Centers	42	62	42			
Energy Innovation Hub - Fuels from Sunlight	0	24	24			
Scientific User Facilities	804	847	979	Dr. Pedro Montano	pedro.montano@	301 903 2347

Biological and Environmental Research (BER)

BER Mission: To understand biological, climate, and environmental systems by exploring the frontiers of genome-enabled biology; discovering the physical, chemical, and biological drivers of climate change; and seeking the biological, geochemical and hydrological molecular determinants of environmental sustainability and stewardship.

Priorities:

- Use systems biology approaches to understand enzymatic, microbial, and plant interactions for the conversion of biomass into liquid transportation fuels
- Use advanced atmospheric measurements together with high-end computation and modeling to predict the impact of greenhouse gases on climate change
- Model and measure the fate and transport of contaminants in the subsurface environment at DOE sites to predict contaminant flows
- Develop new tools to explore the interface of biological and physical sciences

from Dr. Patricia Dehmer's presentation to Energy Sciences Coalition, 19 May 2009

Acquiring Topic/Program Manager Information
Biological and Environmental Research (BER)

Go to http://www.er.doe.gov/OBER/

Click on the appropriate Division (mid page)

Click on the appropriate topic

	FY10 ($M)	FY11 ($M)	FY12 ($M)	Program Manager	Email	Telephone
Biological and Environmental Research Program (~35% to Universities)						
Biological Systems Science Division						
Genomic Science	166	177	242	Dr. Sharlene Weatherwax	sharlene.wetherwax@	301 903 3213
Radiological Sciences	47	42	34	Dr. Arthur Katz	arthur.katz@	301 903 4932
ELSI	5	5	0	Dr. Daniel Drell	daniel.drell@	301 903 4742
Medical Applications	8	4	0	Dr. Prem Srivastava	prem.srivastava@	301 903 4071
Climate and Environmental Sciences Division						
Atmospheric System Research	26	28	26	Dr. Ashley Williamson	ashley.williamson@	301 903 3120
Environmental System Science	83	82	101	Dr. R.Todd Anderson	todd.anderson@	301 903 5549
Climate and Earth System Modeling	69	86	77	Dr. Dorothy Koch	dorothy.koch@	301 903 0105
Climate and Earth System Modeling				Dr. Renu Joseph	renu.joseph@	301 903 9237

FY 2011 DE-FOA-0000395 http://www.er.doe.gov/sc-2/early_career.htm

Office of Science Early Career Research Program

Investment in FY 2011 will bring 62 new scientists into the program

$16 million will be available in FY 2011 to fund about 60 additional Early Career Research Program awards at universities and DOE national laboratories.

Purpose: To support individual research programs of outstanding scientists early in their careers and to stimulate research careers in the disciplines supported by the Office of Science

Eligibility: Within 10 years of receiving a Ph.D., either untenured academic assistant professors on the tenure track or full-time DOE national lab employees

Award Size:

- University grants $150,000 per year for 5 years to cover summer salary and expenses
- National lab awards $500,000 per year for five years to cover full salary and expenses

FY 2010 Results:

- 69 awards funded via the American Recovery and Reinvestment Act
- 1,750 proposals peer reviewed to select the awardees
- 47 university grants and 22 DOE national laboratory awards
- Awardees are from 44 separate institutions in 20 states

FY 2011 Application Process:

- Funding Opportunity Announcement issued in Spring 2010
- Awards made in the Second Quarter of 2011

http://www.science.doe.gov/SC-2/early_career.htm

Principal DOD Basic Research Funding Offices

Service Research Offices (OXR's)	
Army Research Office (ARO)	www.aro.army.mil/
Air Force Office of Scientific Research (AFOSR)	www.afosr.af.mil/
Office of Naval Research (ONR)	www.onr.navy.mil/
Army Medical Research and Materiel Command	https://mrmc-www.army.mil
CDMRP (Congressional adds, fully open competition)	cdmrp.army.mil/
TATRC (Congressional adds, special interest)	www.tatrc.org/
Army Research Inst for Behavioral & Social Sci	www.hqda.army.mil/ari
DARPA	
Defense Science Office (DSO)	www.darpa.mil/dso/
Microsystems Technology Office (MTO)	www.darpa.mil/mto/
Information Innovation Office (I2O)	www.darpa.mil/ipto/
Transformational Convergence Technol Office (TCTO)	www.darpa.mil/tcto.html
Defense Threat Reduction Agency (DTRA)	www.dtra.mil/
CBDP (DTRA BAA for FY10)	www.dtra.mil

AMRMC	Army Medical Research and Material Command
DARPA	Defense Advanced Research Project Agency
DTRA	Defense Threat Reduction Agency
CBDP	Chemical and Biological Defense Program
CDMRP	Congressionally Directed Medical Research Program
DMRDP	Defense Medical Research and Development Program
TATRC	Telemedicine and Advanced Technology Research Center

DOD RDT&E Taxonomy - Primer

Science and Technology ($11.6B in FY10)

BA1 6.1 Basic Research (TRL 0-1)	greater knowledge of fundamental aspects of phenomena – largely use inspired
BA2 6.2 Appl Research (TRL 2-3)	determine means by which a specific need may be met
BA3 6.3 Adv Technol Development	development / integration of hardware for field expt

Development ($68B in FY09)

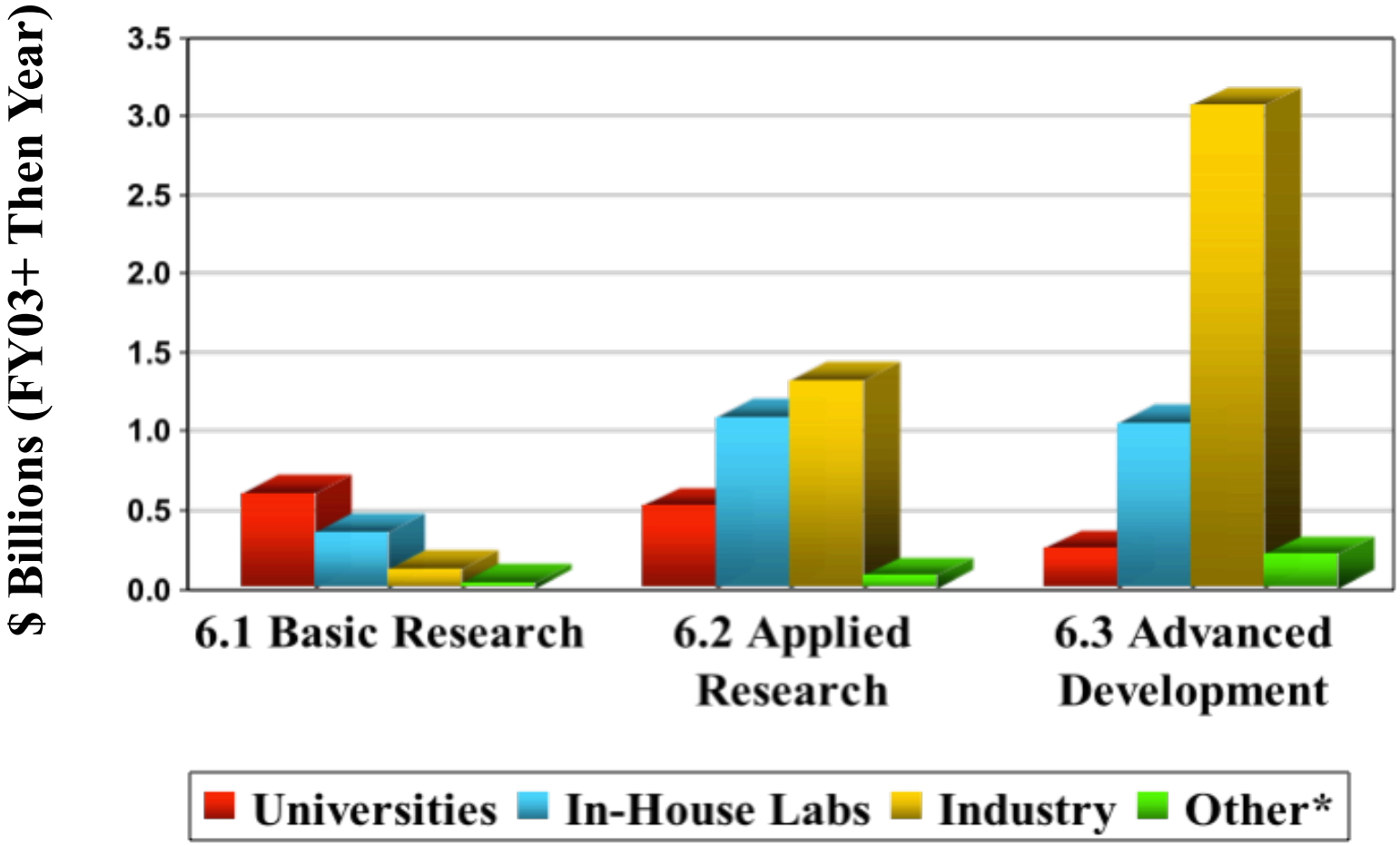
BA4 6.4 Demonstration & Validation	evaluate integrated technology in realistic environment
BA5 6.5 Engn and Manuf Development	for projects without approval for full rate production
BA6 6.6 RDT&E Management Support	program managers, ranges, test facilities,…
BA7 6.7 Operational Sys Development	support of development acquisition programs or upgrades

Congressionally Directed Medical Research

SBIR / STTR – 2.5% / 0.3% tax on R&D funding

BA	Budget Activity
RDT&E	Research, Development, Test & Evaluation
SBIR	Small Business Innovation Research
STTR	Small Business Technology Transfer
TRL	Technology Readiness Level

Recipients of DoD S&T Funds



***Includes non-profit institutions, State & local govt., & foreign institutions**

Source: National Science Foundation Report, Volume 48 (FY 2003)

From OSD R&D Overview, Dr. Lewis Sloter

Defense Research Sciences (DRS)

What: **Largest source of DOD funding for University research**

Majority invested in single investigator efforts (as opposed to URI)

OXR DRS Broad Area Announcements (BAA) are relatively generic

OXR Program Officer (PO) key to success (presuming convincing proposal)

Each PO has focused interests, coupling science with some military need

Each Service has specifically identified program interests (websites and BRP)

How Much: typically $100 – 200K/yr for three years (with continuation possible)

OXR programs typically have ~20% turn over each year

When: **Initial "white paper" useful (sometimes required)**

Proposals nominally anytime, but spring/early summer to be timely

Most funding decisions processed in fall, early winter – after appropriation bill

Where: **Mix of paper and electronic (grants.gov), see for instance http://www.onr.navy.mil/02/proposal_procedure.asp**

	FY11
Army	~$196M
Air Force	~351
Navy	~430
DARPA	~328

2008 Basic Research Plan (BRP) at http://dcresadv.usc.edu/archives/index.html

Computer, Mathematics**, and Information Sciences**

Computing and Information Sciences - ARO

Systems and Control	Randy Zachery	919 549 4368	randy.zachery@us.army.mil
Software & Intelligent Systems	Purush Iyer	919 549 4204	purush.iyer@us.army.mil
Mobile, Wireless Comms	Robert Ulman	919 549 4330	robert.ulman@us.army.mil
Info & Software Assurance	Cliff Wang	919.549.4207	cliff.wang@us.army.mil
Info & Signal Processing	Liyi Dai	919 549 4350	liyi.dai@us.army.mil

Math and **Information Sciences - AFOSR**

Complex Networks	Robert Bonneau	703 696 9545	robert.bonneau@afosr.af.mil
Distributed Intell & Info Fusion	Douglas Cochran	703 696 7736	douglas.cochran@afosr.af.mil
Dynamics and Control	Scott Wells	703 696 7796	scott.wells@afosr.af.mil
Information Operations & Security	Robert Herklotz	703 696 6565	robert.herklotz@afosr.af.mil
Math Model of Cognition & Decision	Jun Zhang	703 696 8421	jun.zhang@afosr.af.mil
Sensory Information Systems	Willard Larkin	703 696 7793	willard.larkin@afosr.af.mil
Systems and Software	David Luginbuhl	703 696 6207	david.luginbuhl@afosr.af.mil

Math, **Computers & Info Research ONR Code 311**

Autonomous Systems	Behzad Kamgar-Parsi	703 696 5754	behzad.kamgar-parsi@.navy.mi
Intelligent Systems			
Signal and Image Processing			
Command and Control	Gary Toth	703 696 4961	gary.toth@navy.mil
Computational Analysis	Reza Malek-Madani	703 696 4314	reza.malekmadani@navy.mil
Network Sensing	Rabinder Madan	703 696 4217	rabinder.madan@navy.mil
Cyber Info Assurance & Software	Ralph Wachter	703 696 4304	ralph.wachter@navy.mil
Information Integration	Tristan Nguyen	703 696 2360	tristan.nguyen@navy.mil
Mission Focussed Autonomous Control	Allen Moshfegh	703 696 0798	allen.moshfegh@navy.mil
Science of Autonomy	Marc Steinberg	703 696 0703	marc.steinberg@navy.mil

DARPA I2O next page

Computer, Mathematics**, and Information Sciences -** continued

Information Innovation Office – DARPA I2O

Data exploitation; computing	Benjamin Cutler	571 218 4243	
Computer security / network resilience	Richard Dean	571 218 4890	
Video and multimedia exploitation	Mita Desai	703 526 4165	mita.desai@darpa.mil
Reasoning, federated architectures	James Donlon	571 218 4419	James.donlon@darpa.mil
Multisensory systems, large databases	Melanie Dumas	571 218 4622	melanie.dumas@darpa.mil
Image/video processing, wireless comms	Yiftach Eisenberg	703 248 1536	yiftach.eisenberg@darpa.mil
Efficient comms, optimal control	Neil Fox		
Info technology for counter insurgency	Randy Garrett	571 218 4345	
Embodied cognition, intelligent agents	Robert Kohout	571 218 4441	robert.kohout@darpa.mil
Qualitative data collection, social relationships	Brian Lande	571 218 4438	
Processor architectures	Brian Leininger	571 218 4528	brian.leininger@darpa.mil
Speech translation, information mgmt	Mari Maeda	571 218 4215	mari.maeda@darpa.mil
Biomimetics of control and systems theory	Dennis McBride	703 526 4762	
Adaptive systems	Daniel Oblinger	703 623 2486	daniel.oblinger@darpa.mil
Computational social science	Sean O'Brien	571 218 4452	sean.p.o'brien@darpa.mil
Computer dialog, machine reading	Joseph Olive	571 218 4920	joseph.olvie@darpa.mil
Information fusion, very large data sets	Michael Pagels	571 218 4640	michael.pagels@darpa.mil
Sensor, ISR	Vincent Sabio	571 236 7991	
IT based therapeutics	Russell Shilling	571 218 4970	
New computer architectures	Howard Shrobe	703 248 1537	
Information systems security	Rand Waltzman	571 218 4812	
Information security	Peiter Zatko	703 248 1539	

Program Creation Basics

- **PM finds new technology idea(s) and links it to capability**
- **Seedling funding to explore idea and create program brief**
  - Typically $200K - $300K / 4-6 months
  - Solidify program argument, financials, milestones, phases, metrics, experimentation strategy, and program deliverable/transition/MOUs.
  - Seedling output is the newstart brief – not jumpstart technology
- **Brief to DARPA Director**
  - Repeat a few times
- **BAA construction and publication**
- **Source Selection (and possible plan revision)**
- **Contracts Awarded via an Agent**
- **Program Phase I with milestones**
- **DARPA Director Brief**
- **Program Phase II with milestones**

The Dugan Catechism – Questions to be Addressed in New Program Pitches

Need: ***What problem is going to be solved or opportunity created?***

- ***What is causing the problem? What kind of opportunity is it?***
- ***Why do we believe it's possible to do anything about it? What's the evidence?***
- ***Why now and not last year or ten years ago?***
- ***Who cares if we address this? Who will resist and why? •Why DARPA?***

Approach: How do you plan to address the key challenges?

- ***What are the program elements needed to make it possible?***
- ***What are the execution risks in the program elements?***
- ***How much effort is required in each element?***
- ***How central is integration of elements & how is it going to be managed?***
- ***How do you capture mind share, resources and catalyze/inspire a community?***

Capability: Is the solution an aspirin or a vitamin?

- ***Why is this way better than other ways?***
- ***Can we use this for other things? Think big and specific.***
- ***How much of a dent will we cause in the universe (Steve Jobs)?***

Effort: How much time and money will it take to be able to solve?

- ***How does allocation of effort reflect the risks/importance of program elements?***
- ***How will we measure progress towards solution?***
- ***How do intermediate objectives align with and drive overall program objective?***

Topic/project/effort description
Performer Name (Seedling, SBIR, Congressional, etc)

[PROJECT-NAME] ACHIEVEMENT

STATUS QUO

What is the state of the art and what are its limitations?

(DELETE THIS BOX OF TEXT AND INSERT DIAGRAM(S)

Primary answer here. Add more text as necessary.

- *First bullet.*
- *Additional as necessary.*

NEW INSIGHTS

What are the key new insights?

(REPLACETHIS BOX AND INSERT DIAGRAM(S))

First key insight. Add more text as necessary.

Second key insight. Add more text as necessary.

- Add other points as necessary.

MAIN ACHIEVEMENT:

- Placeholder explanatory text. Replace with text and diagrams as necessary.

HOW IT WORKS:

- Placeholder explanatory text paragraph. Replace with text and diagrams as necessary.

ASSUMPTIONS AND LIMITATIONS:

- Limitation or assumption.
- Another limitation or assumption.

QUANTITATIVE IMPACT

CHARACTERIZE THE QUANTITATIVE IMPACT

(DELETE THIS BOX OF TEXT AND INSERT TABLE, GRAPH, OR OTHER SUITABLE VISUALIZATION)

First item planned. Add more text as necessary.

Second item planned. Add more text as necessary.

- Add other points as necessary.

END-OF-PHASE GOAL

What are the end-of-phase goals?

(REPLACE WITH DIAGRAM/ TEXT/THRESHOLD CRITERIA)

Primary answer here. Add more text as necessary.

- *First key point.*
- *Additional as necessary.*

Budget: FY?? - $???,???

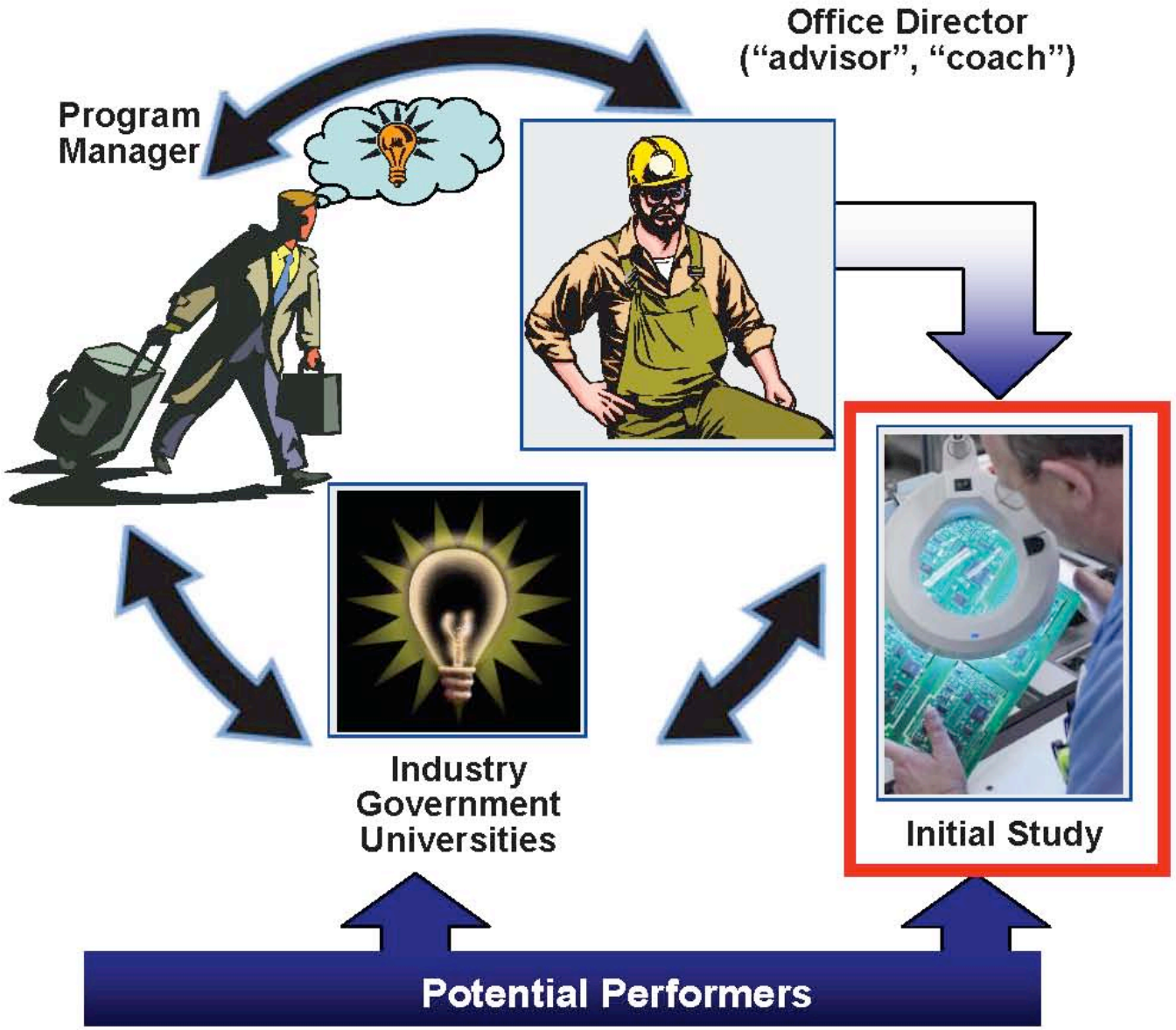
Transition Partners:

A Sentence Why It Is Important/Useful

H or A

PM Name/DSO

"Seedlings"



PMs Receive White Papers from all sources (academia, industry, national labs).

Some are passed to other PMs.

Some are read and discarded

Some are interesting to PMs

- Related to a possible future program
- Trigger interest in a future program
- Solve a key challenge emerging in an existing program

PM works with Office Director, Proposer, other PMs to refine interest, define a decisive short-term study, make funding decision

Key Step : Initial White Paper

White Paper for Seedling

Industry
Government
Universities

What is a White Paper?

The goal of a white paper is to capture the interest of a PM in your idea. Successful white papers are :

Short and Focused
Identify a Problem
Describe a Solution
Focus on Key Challenge and Effort Needed
Outline a Decisive Plan
Typical length ~ 1 year. Typical Budget ~$300K
Include some graphics, and possibly a Penta-Chart

When to Send? Anytime. We receive white papers almost every day of the year.

White Paper

Who to Send To ?

Do some homework :

- Read statements on PM web pages
- Read program descriptions
- Ask Friends and Colleagues with DARPA Funding

Make contact

- We attend conferences
- We (often) read email and answer the phone
- Ask for an appointment when in DC.

Don't be shy

- Find us at meetings
- Resend emails if ignored
- Ask about workshops
- Contact our administrative support people
- Don't be shy

DOD Young Investigator/Young Faculty Programs

What: Outstanding new faculty members at institutions of higher education, to support their defense related research, and to encourage their teaching and research careers

Army, AF, Navy must be US citizen / permanent resident
DARPA and DTRA have no citizenship or residency requirement

Services/DTRA - received Ph.D. or equivalent degrees within the last five years
DARPA – tenure track assistant/associate professors within 5 years of appointment

Topics must conform with agency interests

How Much:

Army - not to exceed $60K/yr for three years
Air Force - $120K/yr for three years
Naval - up to $170K/yr for three years, possibility of additional support for capital equipment or collaborative research with a Navy laboratory
DTRA - $100K/yr for two years
DARPA - $150K/yr for up to two years

When: Anytime for Army

July 28, 2010 for the Air Force FY11 competition	(AFOSR BAA 2010-3)
Dec 22, 2010 for Naval FY11 competition	(ONR BAA 2010-025)
39 June 2010 for the DTRA period 5 competition	(HDTRA1-08-10-BRCWMD-BAA)
Feb 5, 2010 for the DARPA FY10 competition	(DARPA RA 10-23)

Where: See BAAs on websites

See also www.spo.berkeley.edu/Fund/newfaculty.html and
viterbi.usc.edu/research/info/funding-opportunities-for-new-and-junior-faculty.htm

Listing of prior AF, Navy, DARPA awardees available from DC Office

Army Young Investigator Award

BROAD AGENCY ANNOUNCEMENT FOR BASIC AND APPLIED SCIENTIFIC RESEARCH FY07 – FY11
W911NF-07-R-0001-05 (FY2007-2011), YIP information on page 114

Who. This program is open to resident aliens and U.S. citizens holding tenure track positions at U.S. universities and colleges who have held their graduate degrees (Ph.D. or equivalent) for fewer than five years at the time of application.

What: Attract to Army research outstanding young university faculty members, to support their research, and to encourage their teaching and research careers.

Strongly encourage informal discussions with the cognizant Army Research Office (ARO) technical program manager before submission of a formal proposal.

A supporting letter from the applicant's Department Chairperson, Dean, or other official who speaks for the university regarding support for and commitment to the applicant. Strong university support for the applicant is essential. This support can include the applicant's 9-month academic salary, release time from administrative responsibilities, the purchase of equipment, support for the applicant's graduate students, waiver of indirect costs, departmental cost sharing, start-up funding, and so on.

How Much: YIP awards not to exceed $50,000 per year for three years

When: Proposals may be submitted at any time.

AF Young Investigator Award (YIP)

Air Force Fiscal Year 2011 Young Investigator Research Program AFOSR-BAA-2010-3

Who: The individual award will be made to a U.S. institution of higher education, industrial laboratory, or non-profit research organization where the principal investigator is employed on a full-time basis and holds a regular position.

The principal investigator must be a U.S. citizen, national, or permanent resident who has received a Ph.D. or equivalent degrees in the last five years (on or after 1 May 2005 for the FY11 competition)

What: foster creative basic research in science and engineering, enhance early career development of outstanding young investigators, and increase opportunities for the young investigators to recognize Air Force mission and the related challenges in science and engineering.

Proposals addressing the research areas of interest for the Air Force Research Laboratory will be considered. The basic research areas of current interest are available on-line at the AFOSR web site: http://www.wpafb.af.mil/AFRL/afosr/

How Much: The estimated value of each award is approximately $120K per year for three years. Exceptional proposals will be considered individually for higher funding level and/or longer duration (up to five years upon a successful review during the third year).

When: 28 July 2010 for FY11 competition

FY 2009 competition had 39 awards out of 210 proposals
FY 2010 competition had 38 awards out of 202 proposals
FY 2011 approximately 30 awards anticipated

Naval Young Investigator Program

Fiscal Year 2011 ONR Young Investigator Program ONR BAA 10-025

Who: Principal Investigator of a proposal must be a U.S. citizen, national, or permanent resident (on the date proposals are due), holding a tenure-track or permanent faculty position at that university, who received her/his graduate degree (Ph.D. or equivalent) within the last five years (on or after 01 November 2005 for this FY09 competition).

What: The objectives of this program are to attract outstanding faculty members of Institutions of Higher Education to the Department of the Navy's research program, to support their research, and to encourage their teaching and research careers.

Applications may (should) contact a Program Officer who is the point-of-contact for a specific technical area, to discuss their research ideas. Brief informal pre-proposals may be submitted to facilitate these discussions. Such discussions can clarify the content and breadth of the priority research areas and enhance the match between a subsequent proposal and Department of the Navy research needs.

How Much: Proposals may request up to $170,000 per year for three (3) years. These funds may be budgeted against any reasonable costs related to the conduct of the proposed research, for example, salary for the Young Investigator, graduate student support, supplies, and operating expenses. Additional funds (beyond the basic $170,000 yearly amount) for capital equipment which enhances the Young Investigator's proposed research may be requested for the first budget period, based on the needs of the research. The basic $170,000 per year award can be supplemented through a "matching funds" enhancement available only to those receiving an ONR Young Investigator award.

When: 22 December 2010 for the FY11 competition

FY09 competition had 15 awards out of 193 proposals
FY10 competition had 17 awards out of 217 proposals

DEFENSE THREAT REDUCTION AGENCY (DTRA)

Research and Development Enterprise

Basic and Applied Sciences Directorate

Basic Research for Combating Weapons of Mass Destruction (C-WMD)
HDTRA1-08-10-BRCWMD-BAA Amendment 7 (May 2010)

Who: Non-tenured faculty who received a Ph.D. or equivalent degree on or after 15 May 2005 (for the CY10 submission). No requirement for US citizenship or permanent residency

What: Y Topics: Proposals that focus on exploratory aspects of a unique problem, a high risk approach, or innovative research in subjects with potential for high impact to C-WMD science (page 56 of BAA)

- Per5-Y-1: Basic Research for 3He Alternatives
- Per5-Y-2: Basic Research on Prompt Diagnostic Signatures of Nuclear Detonations
- Per5-Y-3: Theory-based Approaches for Complex Probabilistic Software
- Per5-Y-4: Basic Science for Nuclear Test Verification and Monitoring

How Much: DTRA anticipates that Young Investigator Awards will be $100,000 per year for two years.

When: 30 June 2010 Phase I White Paper Submission Deadline

In 2009 competition ~15 awards

Defense Advanced Projects Agency (DARPA) Young Faculty Award

Research Announcement Young Faulty Award, DSO/MTO/I2O
DARPA-RA-11-02 (FY12 release expected in Nov 2010).

Who: Participation is limited to untenured Assistant or Associate Professors within 5 years of appointment to a tenure-track position at a U.S. institution of higher learning. DARPA is particularly interested in identifying outstanding researchers who have previously *not been performers on DARPA programs, but the program is open to all qualified applicants with innovative research ideas.*

There is no prohibition against a non-U.S. citizen/a Permanent Resident/here on a Green Card/etc., from submitting a proposal for consideration; nor is it a requirement of the RA that the submitter be eligible to obtain a U.S. security clearance.

What: The YFA program will provide high-impact funding to these faculty early in their careers in order to develop their research ideas in the context of Defense needs. DARPA's long-term goal for this program is to develop the next generation of academic scientists, engineers, and mathematicians in key disciplines who will focus a significant portion of their career on Department of Defense and National Security issues.

Single investigator proposals for research and development in the areas of the Physical Sciences, Engineering, and Mathematics of interest to DARPA's Defense Sciences Office (DSO) and Microsystems Technology Office (MTO), and Social Sciences of interest to DARPA's Transformational Convergence Technology Office (TCTO). Proposed research should focus on innovations that will enable revolutionary advances; high-risk/high-payoff ideas are strongly encouraged. The announcement contains detailed descriptions of the Offices' interest areas.

Topic POCs are unable to accommodate any meetings/calls; you may send questions to DARPA-RA-11-02@darpa.mil.

It is a requirement that an Executive Summary Slide is completed.

How much: Awards will fund two years of research for a single investigator and will be less than $300,000.

When: Proposals were due December 10, 2010 for the FY11 competition

In FY10 competition 31 awards
In FY09 competition 33 awards from ~300 proposals

Anecdotes on Competing for DOD YIP Funding

Thursday, April 29, 2010 Web posting

NSF funding isn't enough to maintain a group. While some focus on NIH, in my field, going to DoD (army, navy, air force) is the way. All three branches of DoD have young investigator programs (YIPs). To be eligible, you have to be a U.S. citizen, and you must be no more than 5 years out from your PhD. These requirements whittle down the playing field, so your chances of being funded - if you're eligible - are seemingly high. (Although the last ONR YIP funding rate was < 10%, sigh).

The problem is with getting your foot in the door. For NSF, you can submit an idea - your idea with whatever application you like. But for DoD, you need to bounce ideas off of the program manager to find what fits into their program. If you've got a great idea but it doesn't fit in with the goals of DoD, then it won't get funded. So in other words, communicating with a program director prior to submission is critical.

Now for the YIP. I am exceedingly frustrated with the way program managers in DoD uniformly ignore young investigators - even those inquiring about YIP. You can call, email, send in unsolicited white papers, and there is a brick wall of silence. It's not just me. Mr. JP has the brick wall. Colleagues get the brick wall. So then, I ask, who is getting these YIPs? I talked with one colleague who is a star, and he gets the brick wall from other military branches. With this particular YIP that he got, someone actually wrote back. Other advice is to arrange appointments with the PMs when you are in DC. That's a great idea, and I would love for that to happen. But my emails and calls saying, "Hey, I'm in your neck of the woods, let's talk," get ignored.

Comments contributed to the posting:

1. I got the ARO young investigator. Like you, most of the people I called or emailed ignored me. I repeatedly called or emailed until I got one or two on the phone, but they were not terribly interested. Eventually, I found a program manager who I had met before at a conference. When I called him, he remembered seeing my talk, was very friendly, and was interested in my applying for the YIP. Don't worry, keep persisting. Use any connection you can find -- ask your postdoc advisor and grad school advisor who they are funded by and if they can send an email introducing you. For DARPA, I believe it is less dependent on the program manager as all applications are handled by one person, rather than different applications going to the PM closest to that field. PS: DARPA PM's are not supposed to talk to you about the YIP in particular. I got a very cold brush-off when I tried it. This is different from the usual modus operandi for seed grants and other DARPA funding. ONR, ARO and AFOSR PM's will in principle talk to you if you can get a hold of them.

2. To get any of the DOD young investigator awards, you must make a connection with the PM. They have to *want* to fund you as part of their program, as these awards are usually partly YIP funds partly PM's program's funds. You ought to go to Washington and talk to the PM in person, email white papers, etc., and cultivate a relationship, otherwise it's a no go. A good way is to be introduced to a PM by a senior well funded colleague. Then you start emailing the PM and try to deepen the relationship. It takes time but is worth it. I don't think any of them are particularly easy to get a hold of, though, so don't take it personally if the don't answer email or voicemail.

Presidential Early Career Award Science and Engineering (PECASE)

What: White House award to recognize some of the finest scientists and engineers who, while early in their research careers, show exceptional potential for leadership at the frontiers of scientific knowledge during the twenty-first century.

Candidates must hold tenure-track positions at U.S. Univ. or College

Have received their Ph.D. degree within the preceding 5 years

Typically 2 nominees per Service

How Much: ~$200K/yr for five years (cost borne by DOD through the URI line)

When: Submitted to White House in October

Where: OXRs submit nominees from their grantees – typically YIPs

Suggestions on working with DOD Basic Research

Program Officer – Program Officer – Program Officer

- DOD Program officers have considerable latitude at project level
- Typical “subprogram” budget ~ $1-2 M
- Their reputation/professional advancement tied to your “success / failure”

Make contact with Program Officer before submitting a white paper or proposal

- Significantly improves chance of tailoring ideas
- First read the descriptive paragraph on the website – call informed
- Plumb his/her current interest – website paragraphs are likely dated
- Also ask after availability of funds – resources may be fully committed

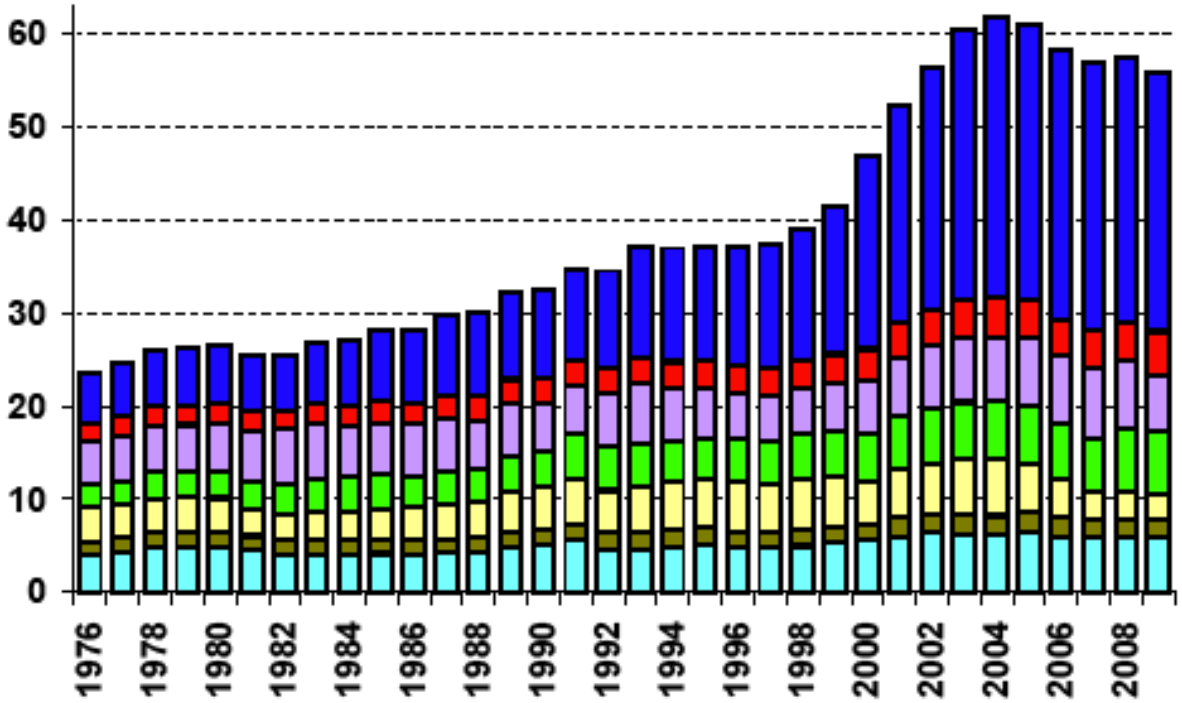
Begin Supplemental Charts

DOE as part of Federal "Basic and Applied Research" Funding

Trends in Research by Agency, FY 1976-2009 *

in billions of constant FY 2008 dollars

The American Competitiveness Initiative to grow NSF, DOE, NIST



2009 DOD does not show adds Congress will insert in the appropriations bill

Source: AAAS analyses of R&D in annual AAAS R&D reports.
* FY 2009 figures are latest AAAS estimates of FY 2009 request. Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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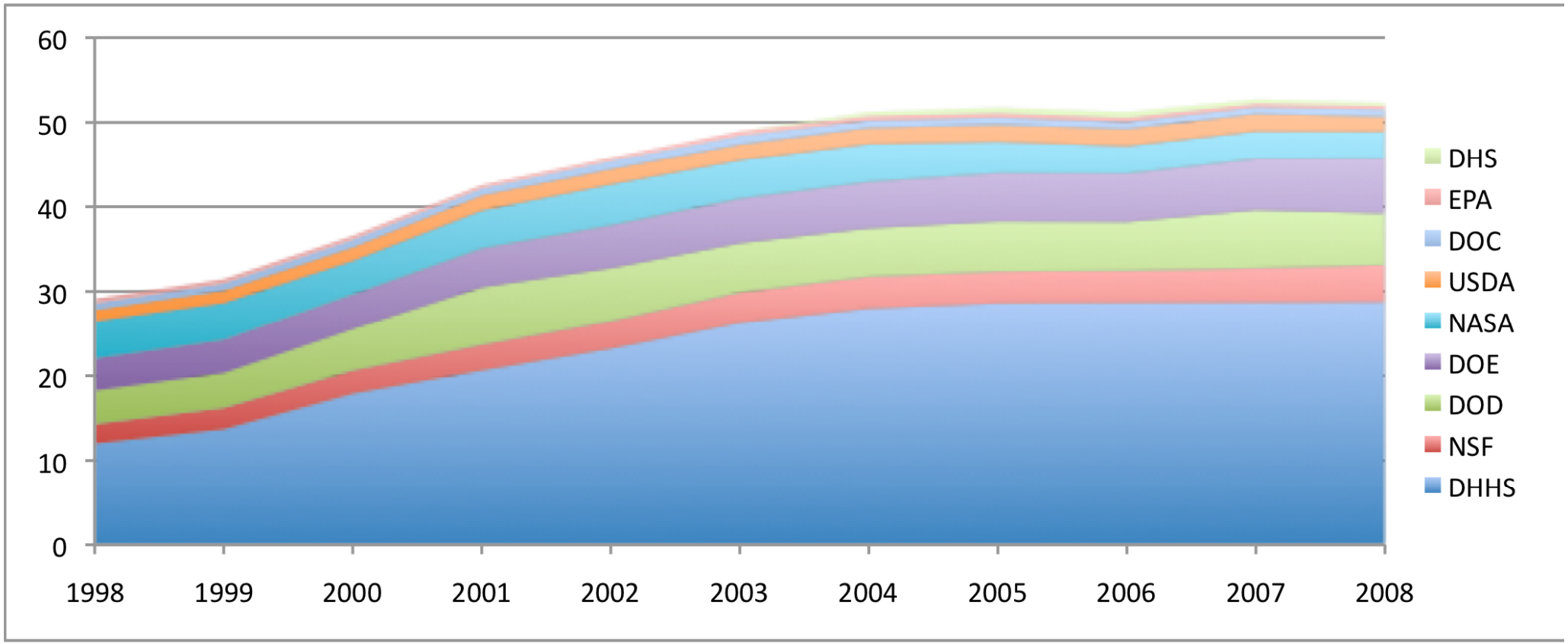
AAAS

Federal Obligations ($B) for Research by Agency (NSF 10-303)



DOD FY11 Basic Research Open to University PIs, By Discipline
(Murday Best Estimate)

Discipline / Agency	Army	AF	Navy	DARPA	DTRA	CBDP	OSD	CDMRP
Biology / Life Sciences	6	xx		54				
Human Systems			17					
Biology / Medical			19					
Chemistry	8	42	xx	xx				
Propulsion		34						
Physics	12	50	xx	xx				
Electronics/Photonics	14	45	54	70				
Materials	13	32	64	78				
Mechanics	xx		xx					
Mechanics Structural		21						
Mechanics Fluid		27						
Environment								
Ocean			82					
Atmosphere and Space		xx	30					
Environmental Science	2							
Computer, Information Sciences, Mathematics			35	73				
Mathematics and Computing Sciences	11	38						
Information Sciences		53						
Networks	4							
Air/Ground/Sea Vehicles			57					
Counter IED Devices			23					
Science Education Career and Outreach	xx	10	29					
Transformative				53				
Weapons			21					
Chemical/Biological Warfare Defense				xx		50		
Weapons of Mass Destruction Defeat					47			
High Energy Laser Multidisciplinary Research Initiative		13						
Multidisciplinary University Research Initiativs (MURI)	58	76	86					
Defense University Instrumentation Program (DURIP)	13	15	17					
National Defense Science & Engineering Program		45						
National Defense Education Program (NDEP) - STEM							64	
Social / Cultural / Human - MINERVA, HSCB	15	xx	xx				0	
National Security Science & Engineeering Faculty Fellow							46	
Medical								~700
Total	156	501	534	328	47	50	110	

xx Could not be ascertained – incorporated in the other lines

Computer, **Mathematics**, and Information Sciences

Mathematics - ARO

Cooperative Systems	David Arney	919.549.4254	david.arney1@us.army.mil
Computational Mathematics	Janet Spoonamore	919.549.4284	janet.spoonamore@us.army.mil
Discrete Math & Comp Sci	Janet Spoonamore	919.549.4284	janet.spoonamore@us.army.mil
Modeling of Complex Systems	John Lavery	919 549 4253	john.lavery2@us.army.mil
Stochastic Analysis & Statistics	Mou-Hsiung Chang	919 549 4229	mouhsiung.chang@us.army.mil

Math and Information Sciences **- AFOSR**

Computational Mathematics	Fariba Fahroo	703 696 8429	fariba.fahroo@afosr.af.mil
Optimization and Discrete Math	Donald Hearn	703 696 1142	donald.hearn@afosr.af.mil

Mathematics, Computers and Information Research - **ONR**

Computational Analysis	Reza Malek-Madani	703 696 4314	reza.malekmadani@navy.mil
Mathematical Optimization	Don Wagner	703 696 4313	don.wagner@navy.mil

Mathematics – DARPA DSO

Fundamental Mathematics	Ben Mann	571 218 4246	benjamin.mann@darpa.mil
Probability, Statistics, Decision	Nozer Singpurwalla	571 218 4568	nozer.singpurwalla@darpa.mil