

Engaging with DARPA

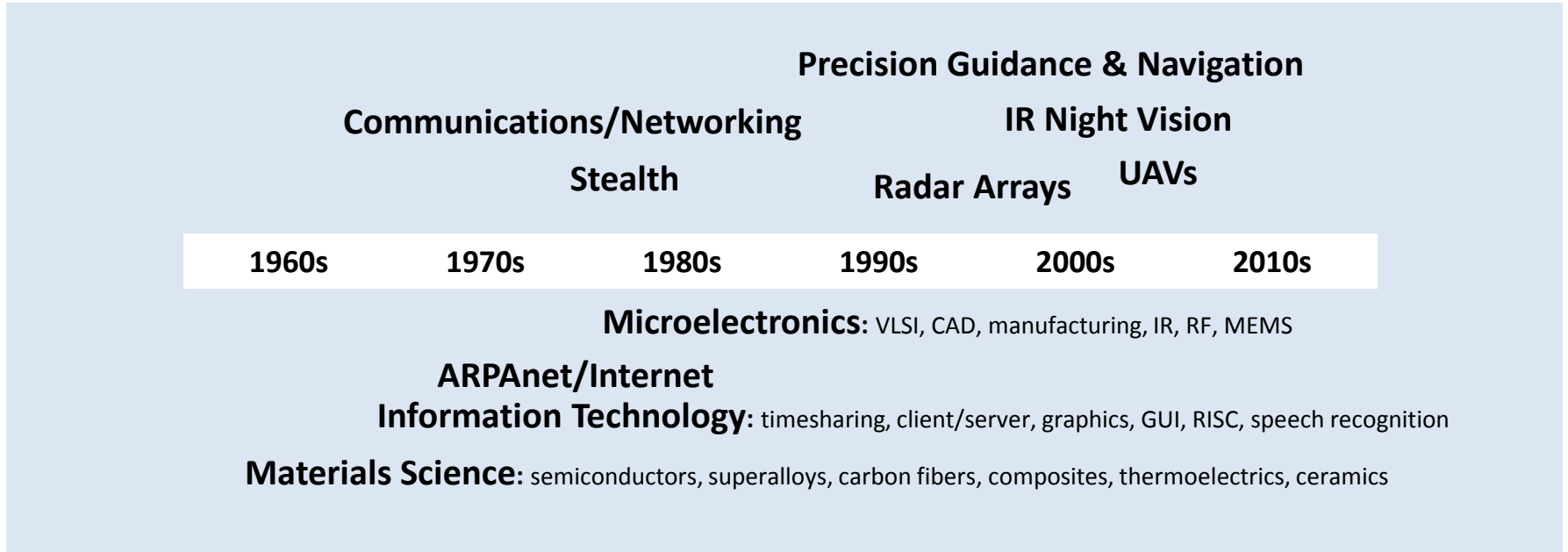
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Breakthrough Technologies for National Security



New capabilities require a healthy ecosystem across Service S&T, universities, and industry

DARPA's role: pivotal early investments that change what's possible



Stellar program managers

Technology leadership

Adventurous spirit

Conviction and drive to
change the world

Active engagement with technology community

Universities

Labs

Companies small and large

Military services and
agencies

DARPA Culture

Off-scale impact

Risk taking

Honor in public service



DARPA Technical Offices





Embrace Risk

2004



0 out of 15 completed the course

2005



5 out of 23 completed the course

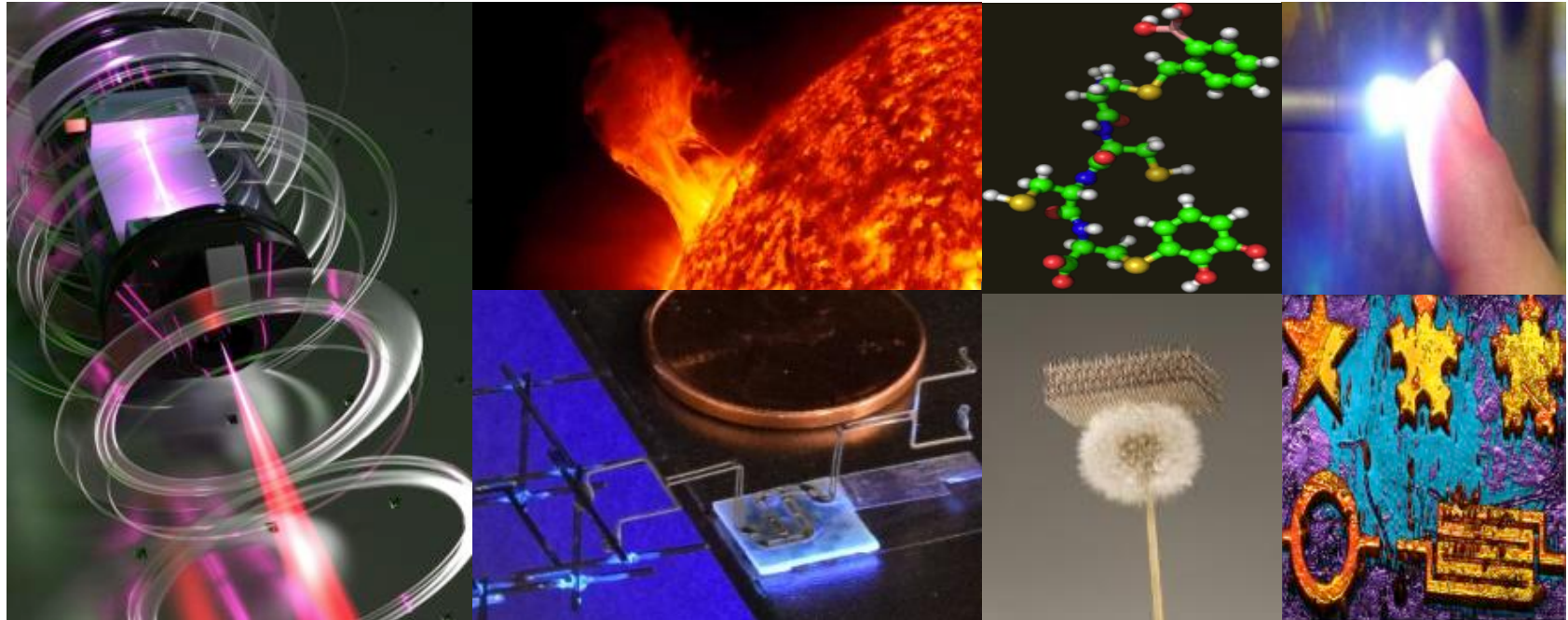
2007



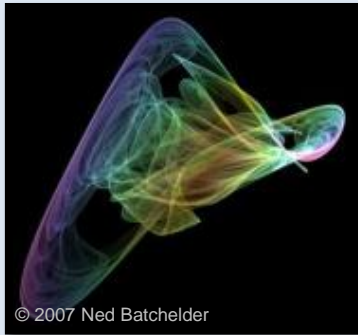
6 out of 11 finalists completed the course

Desert terrain

Suburban terrain

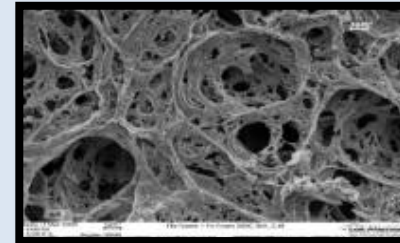


Accelerating breakthrough discoveries to create new enabling technologies for national security



Math, Modeling & Design

Physical Systems



Human-Machine Systems



Social Systems





Wide range of national security challenges: evolving nation states, shifting networks

Powerful, globally available technologies set a fast pace

Military systems' cost, pace, and inflexibility limit our operational capabilities



DSO New Programs



Enabling Quantification of Understanding in Physical Systems (EQUIPS)	Foundational mathematics to enable quantification of uncertainty in physical systems	BAA release: 12/18/2014
Fast Lightweight Autonomy (FLA)	Minimalistic algorithms for high-speed autonomous navigation in cluttered, unfamiliar environments	BAA release: 12/22/2014
Materials for Transduction (MATRIX)	Integrate transduction modeling, design and validation into unified R&D approach with applications focus	BAA release: 1/23/2015
Revolutionary Enhancement of Visibility by Exploiting Active Light-fields (REVEAL)	Comprehensive theoretical framework to enable maximum information extraction from complex scenes by using all photon pathways and leveraging light's multiple degrees of freedom	BAA release: 5/22/2015
Make-It	Automated chemical synthesizer that can produce, purify, characterize and scale a wide range of small molecules	BAA release: 6/9/2015
Tailorable Feedstock and Forming (TFF)	Rapid manufacturing of small aerospace composite parts at costs competitive with metal	BAA release: 9/11/2015
Complex Adaptive System Composition And Design Environment (CASCADE)	Design system of systems architectures for resilient response to unexpected situations	BAA release: 11/23/2015
Fundamental Limits of Detection (Detect)	Establish the first-principles limits of photon detection by developing new models, and by testing those models in proof-of-concept experiments	BAA release: 1/21/2016
Improv	Scope emerging threats to military personnel, technology, and operations posed by commercially available technology and products	BAA release: 3/11/2016
Next Generation Social Science (NGS2)	New experimental methods, models, and practices for conducting research into complex social systems	BAA release: 3/18/2016
Transformative Design (TRADES)	Develop/exploit new mathematics to incorporate advanced materials and manufacturing techniques into the design of solid parts and structures	BAA release: 5/11/2016



DSO Recent RFIs



Design of Dynamically Composed System of Systems (RFI)	Analysis and design frameworks for dynamically composed networked system of systems (SoS) architectures	Released 5/26/2015
Extreme Challenges in Optics and Imaging (RFI)	Extreme challenges encompass systems, components, devices, processing schemes, or design/optimization tools that drastically outperform the current state of the art, and expand the limits of what is typically deemed possible using conventional design methodologies	Released 8/24/2015
New Capabilities for Experimental Falsifiability in Social, Behavior, and Economic (SBE) Sciences (RFI)	Develop novel methods, including new tools, platforms, techniques, and/or approaches, that could contribute to the development of unprecedented capabilities for testing the experimental falsifiability of (i.e., disconfirming) models, theories, and hypotheses in SBE sciences	Released 9/1/2015
Design for Advance Materials and Manufacturing (RFI)	Revolutionize design of complex engineered objects, from multifunctional components to entire products (e.g., air, space, marine and transport vehicles)	Released 10/8/2015
Fabrication Technologies for Scalable Production of Extended Solids (RFI)	Scalable techniques for the synthesis of extended solid materials characterized by extensive covalent bond networks	Released 11/16/2015
Open Manufacturing Transition Study (RFI)	Qualification for Additively Manufactured Aircraft Components	Released 3/23/2016
Theoretical Foundations for the Design of Collective Human-Machine Systems (RFI)	Foundational, quantitative theories for the analysis and design of human-machine systems	Released 4/15/2016
Nanoweaving (RFI)	Assessing the state of the art in nanoweaving and nanobraiding	Released 5/11/2016
Fundamental Limits of Learning (RFI)	What are the fundamental limitations inherent in machine learning systems?	Released 5/12/2016



Some Recent Seedlings



Understanding Dynamical Systems in High-Dimensional Parameter Spaces

Extended Transport of Long Wavelength Radiation in Air Waveguides

Data-driven Inverse Design Paradigm for Part Qualification in Additive Manufacturing

High-Speed Plasma Science to Enable Advanced Radiation Devices

Engineering Self-Organizing Systems

Investigating Novel Geometric Representations for Computational Fabrication

Maximizing Direct Electrical Power Generation from Ionizing Radiation

New Strategies for Prediction and Data Assimilation for Turbulent Dynamical Systems

Mitigating the Curse of Dimensionality Using Sparse Grids

Ultrasonic Fourier Computing for Ultrafast Solver for the Vlasov Equation

Biologically Inspired Automata



We look forward to your ideas



www.darpa.mil



- E-mail questions about the BAA to DARPA-BAA-16-46@darpa.mil
- FAQs posted under the BAA at <http://www.darpa.mil/work-with-us/opportunities> (filter by "DSO")
- Find PM bios and program information at <https://www.darpa.mil/about-us/offices/dso>