# Defense Advanced Research Projects Agency

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Deputy Director

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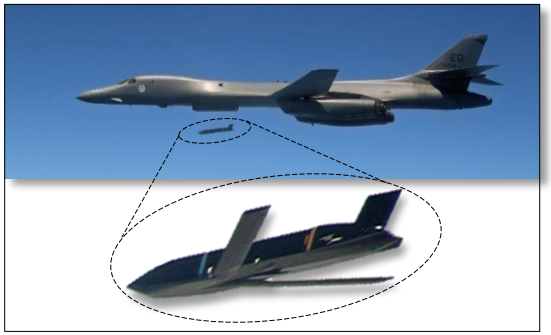
# Recent accomplishments

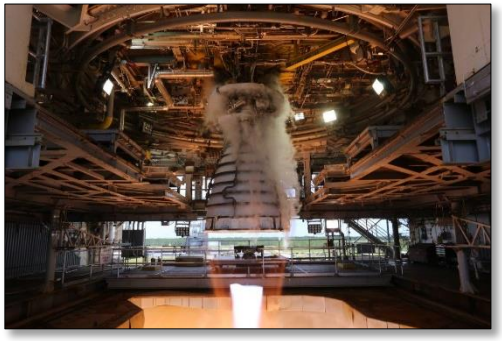


## Long Range Anti-Ship Missile (LRASM)

Met threshold requirements for Early Operational Capability on the B-1 bomber


## Electronics Resurgence Initiative (ERI)

Reinventing microelectronics by investing $1.5 billion toward partnerships between government, industry, and academia



## Experimental Space Plane (XSP)

Unprecedented 10 firings of the AR-22 rocket engine in 10 days for routine and affordable access to space


## AI Next Campaign

Announcement to invest more than $2 billion in next-generation AI and new capabilities for the DoD


## Hand Proprioception and Touch Interfaces (HAPTIX)

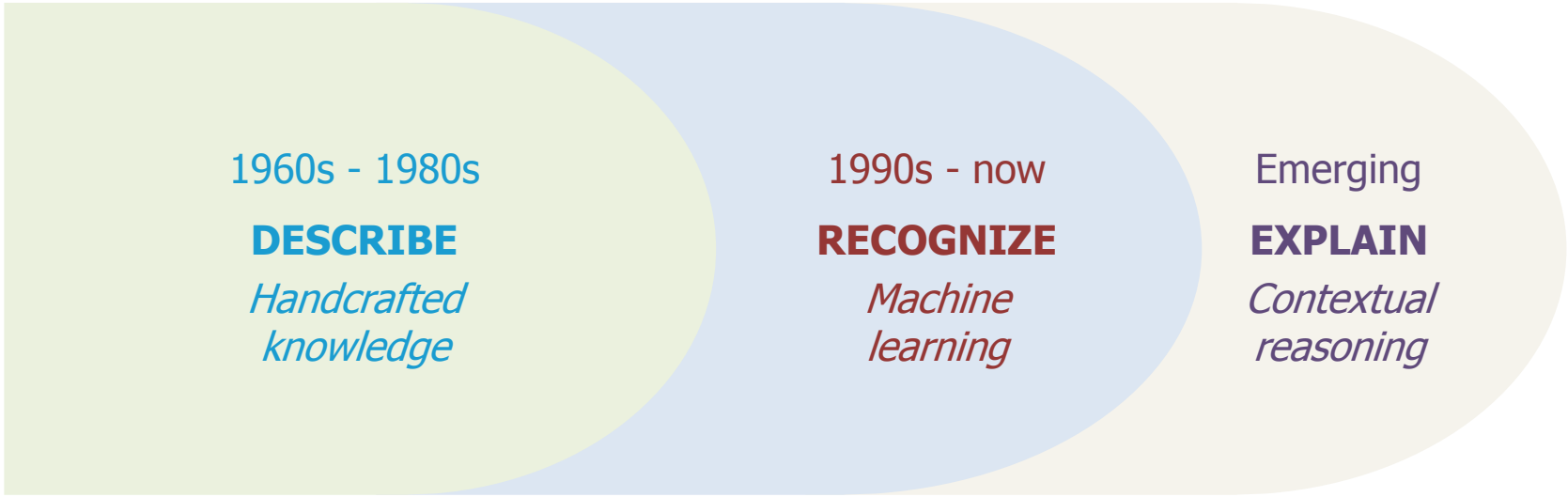
Sensory feedback and proprioception for prosthetics resulting in the ability to identify objects without looking

## Assault Breaker II

Partner with the Services to provide a warfighting construct capable of prevailing in highly contested environments

# DARPA Artificial Intelligence Strategy

# Three waves of artificial intelligence R&D



# A deep history of funding advances in AI

1960 1970 1980 1990 2000 2010 2020

1st wave

2nd wave

3rd wave

Handcrafted Knowledge

Machine Learning

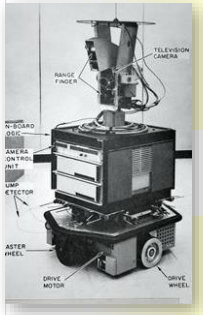
Project MAC

Perception & Robotics

Autonomous Land Vehicle

Grand Challenge Autonomous Car

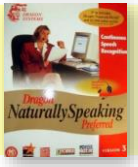
Problem Solving



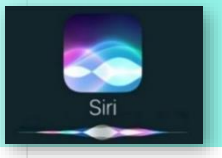
DART Logistics Planner

Formally Verified Flight Software

Natural Language Understanding




Speech Recognition



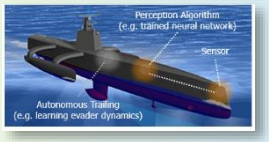
# AI investment strategy

Computers as Tools → Computers as Partners

Collaborative operations in denied areas

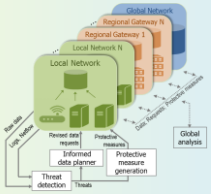
Adaptive autonomous ISR

Assured Autonomy




Assurance for machine learning-enabled systems

Cyber Security

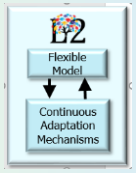


Cyber hunting at scale

AI Hardware

Neuro-morphic processor

Machine Learning




Biologically inspired lifelong learning machines

Explainable AI

*This is a Russian tank, it has a rounded front fender.*

## Common-sense reasoning

- Theory of other minds (motivations of actors)
- Causal reasoning from naïve qualitative physics
- Representation and use of world knowledge

## Theoretical foundations of machine learning

- Adversarial issues
- Performance and robustness characteristics
- Game theoretic aspects of autonomous systems

## Application of AI to complex DoD problems

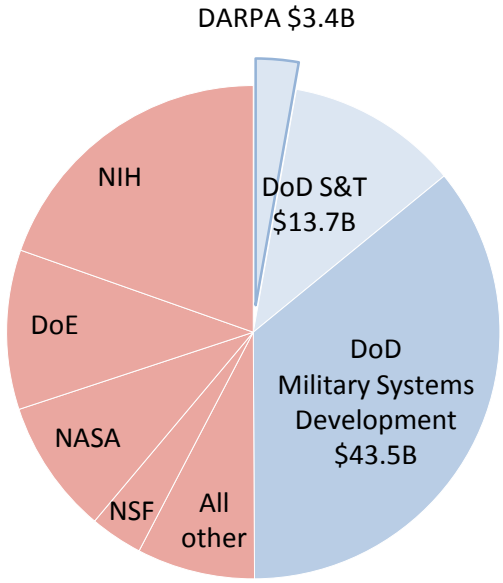
- Certification and accreditation of software
- Faster and more accurate security clearance
- Brain control of prosthetic limbs

# Future funding directions

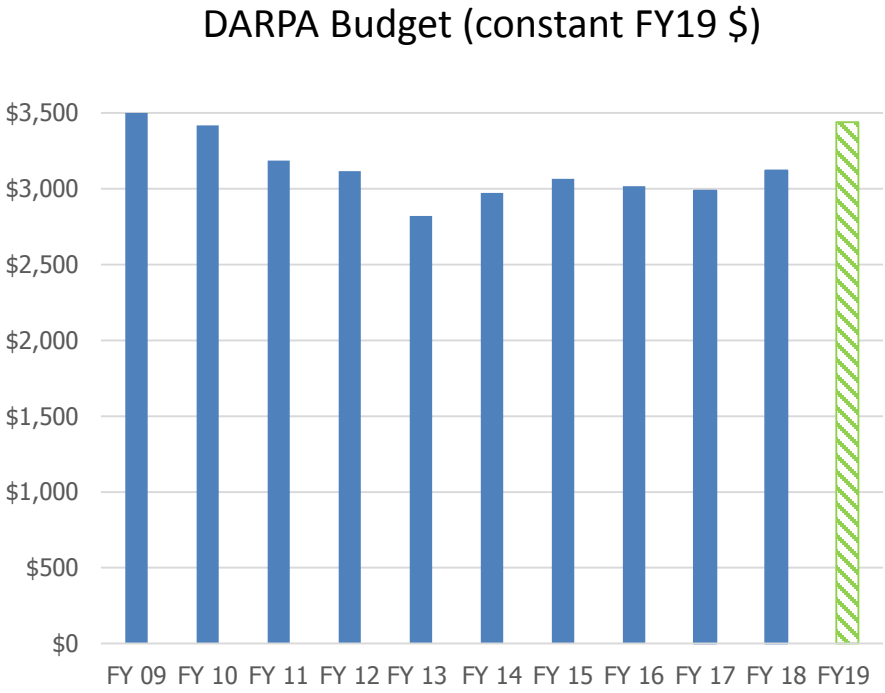
- Major programs
  - Multiple Broad Agency Announcements of new starts over the next 12 months
  - Advance the state of the art in: common sense reasoning, theoretical foundations, adversarial AI, reduction in data requirements for machine learning
- Funding pool for rapid execution of focused study efforts
  - Fund multiple, high-risk/high-payoff proof-of-concept study efforts
  - From proposal to award in less than three months
  - Quantify risks to accelerate new program starts
- Inspire research community to tackle challenging problems
  - Security clearance in a week
  - Software system accreditation in a day
  - Chip design 10x faster with fewer people
  - Spinal cord break bridging
- Focus on creating third wave advances in the state of the art
  - 2019 AI Colloquium to share knowledge and build research communities


www.darpa.mil

# DARPA Budget




**Federal R&D**
**FY 2019 President's Budget Request**
**$118B**




**92%** of funding to projects

**67%** to industry

**17%** to universities

**25%** of total DoD S&T funding