

Developments at DARPA

Peter Lee

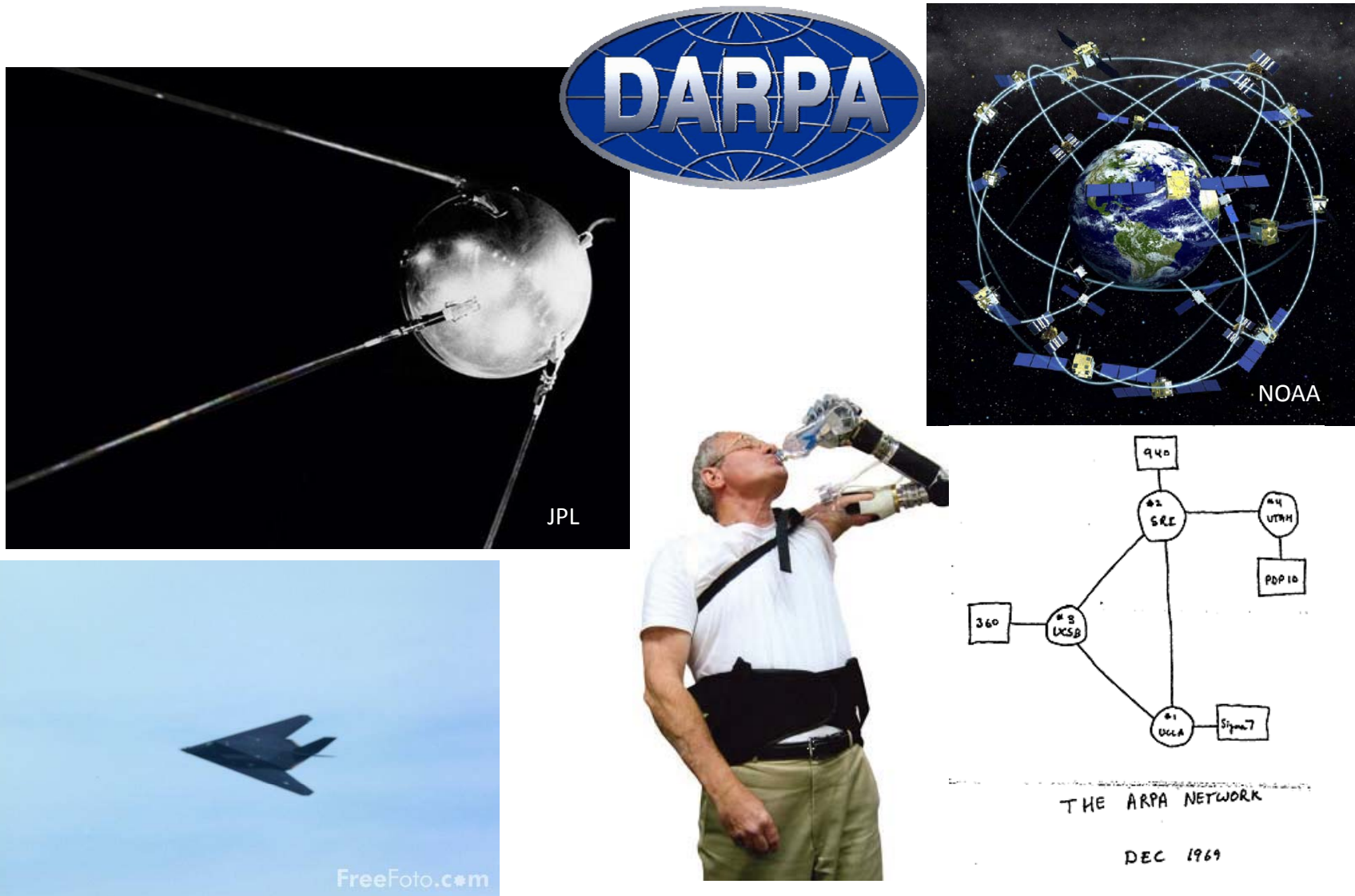
February 2010

CRA Leadership Summit

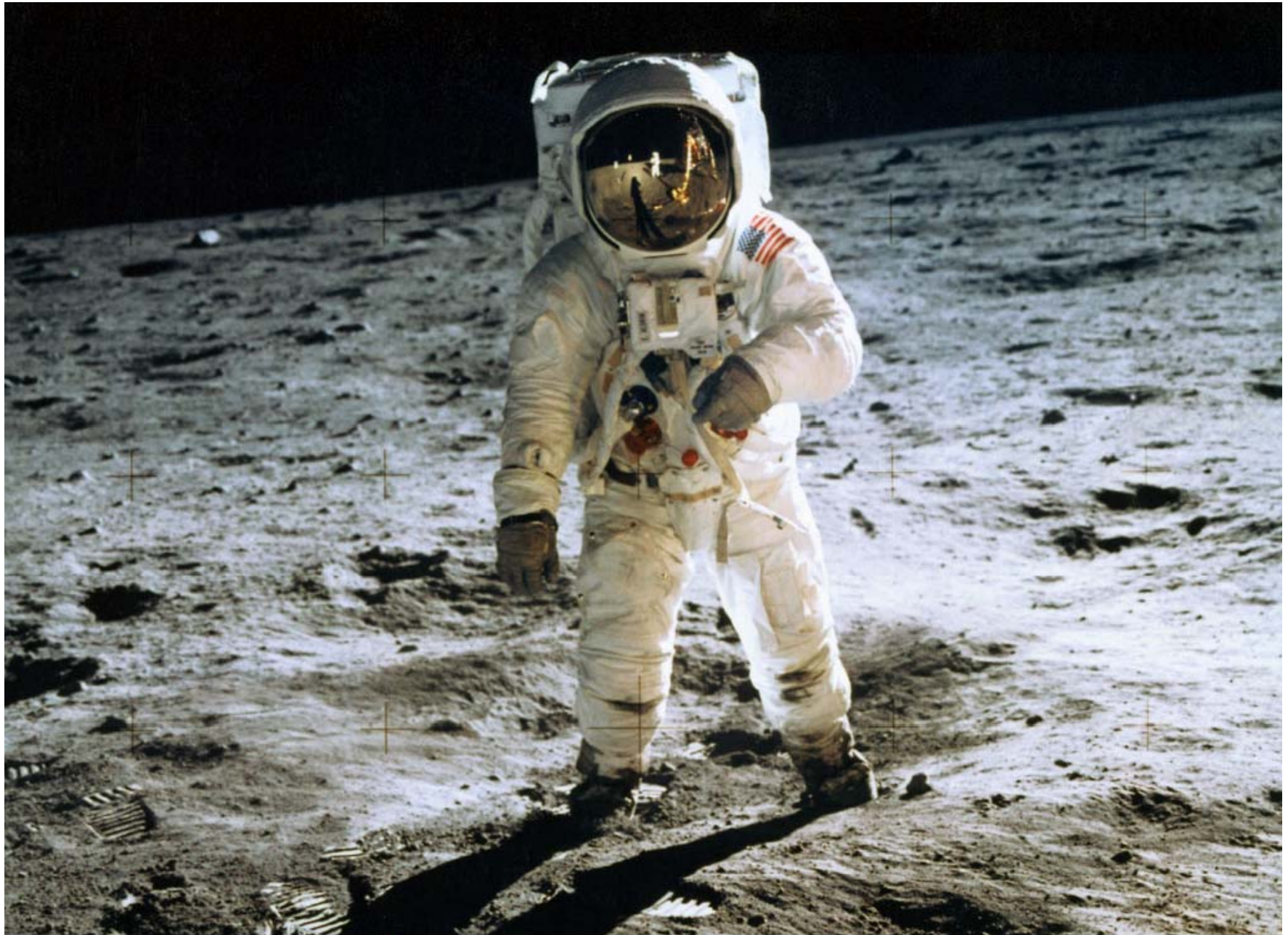


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Formed in 1958 to **PREVENT** and **CREATE** strategic surprise



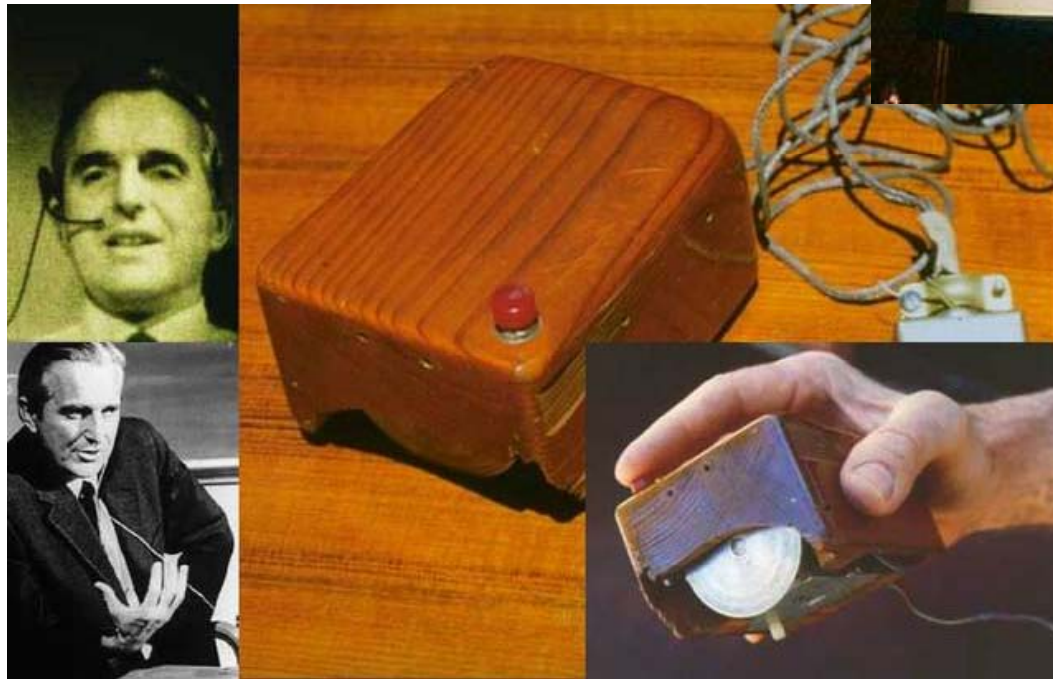
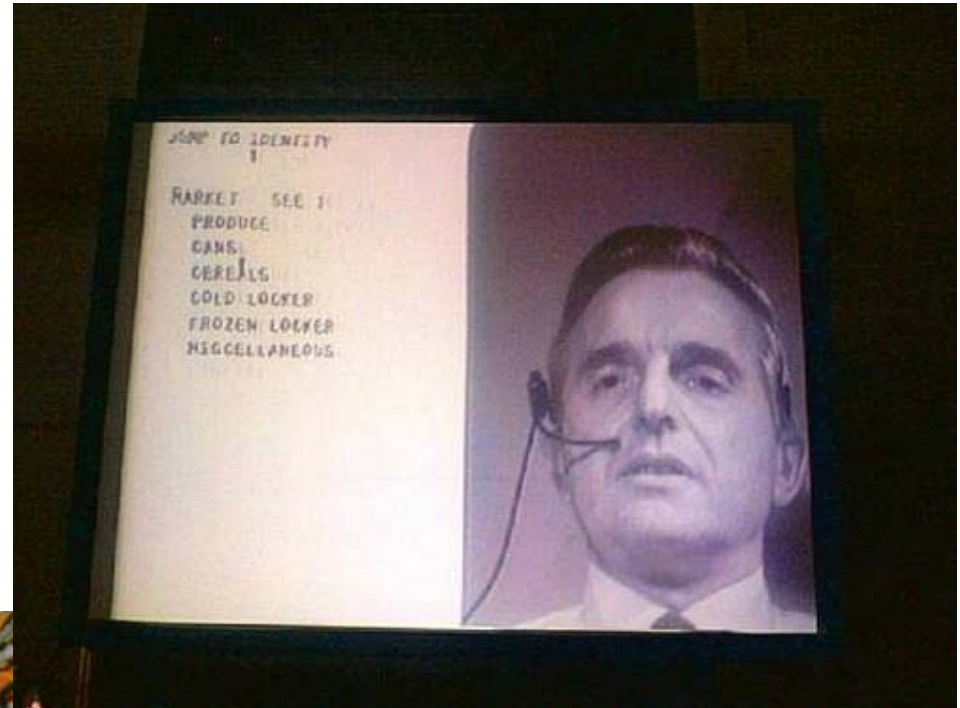
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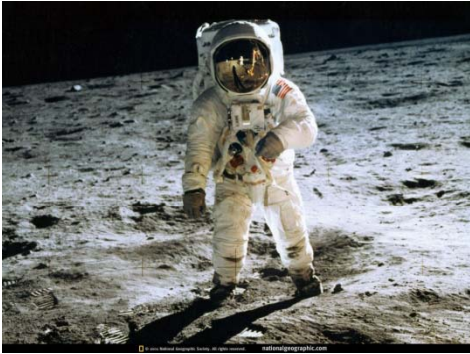
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“By ‘augmenting human intellect’ we mean increasing the capability of a man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to derive solutions to problems. We do not speak of isolated clever tricks that help in particular situations...”

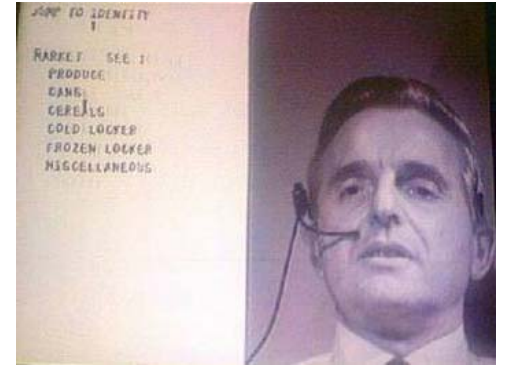


...We refer to a way of life in an integrated domain where hunches, cut-and-try, intangibles, and the human ‘feel for a situation’ usefully coexist with powerful concepts... and high-powered electronic aids.”

— Doug Engelbart, 1962



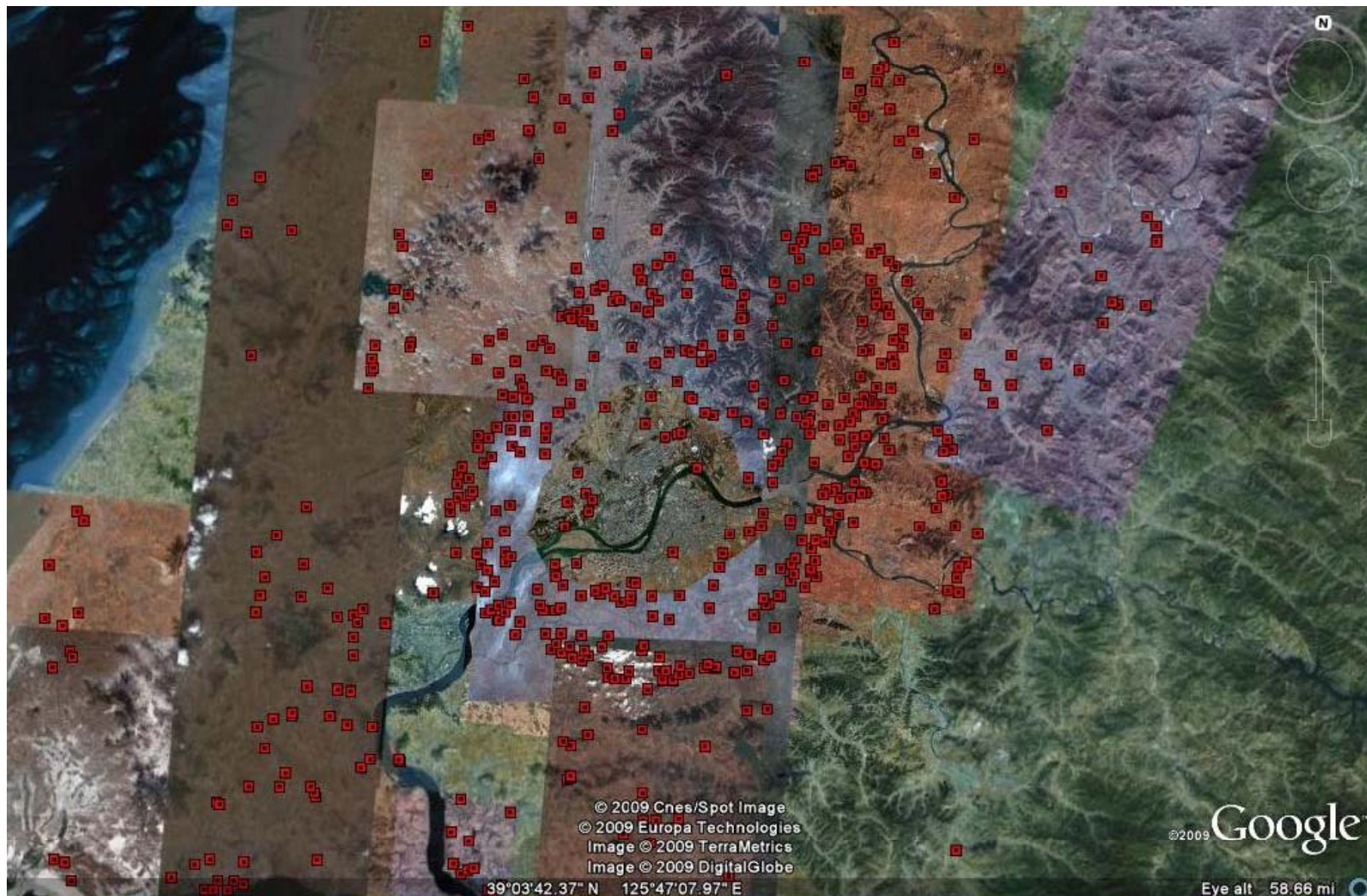
Which had more impact?



Source: Pat Lincoln, SRI

Has your child been to the moon?

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The disruptive effects of

- technology democratization and
- going beyond the DoD world view.



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*Focus on strategic surprise;
Pursue diverse approaches to innovation;
Challenge the DoD world view.*

Transformational
Convergence
Technology
Office

Defense
Sciences Office

Information
Processing
Techniques
Office

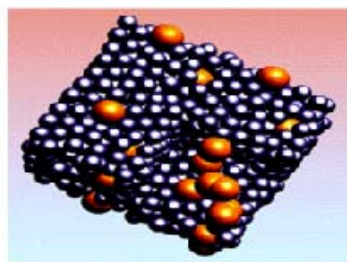
Microsystems
Technology
Office

Strategic
Technologies
Office

Tactical
Technologies
Office

Adaptive
Execution
Office

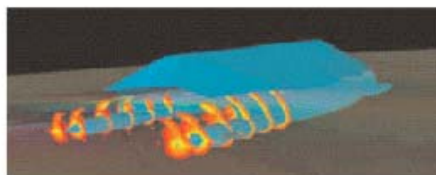
*Improve quality of tech transition;
Encourage better partnerships;
Create “skunkworks” environment.*



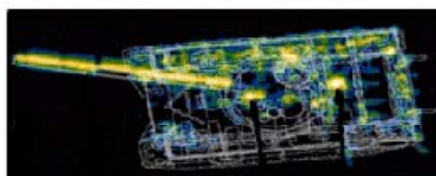
**Simulating High-Energy
Density Rocket Fuels**



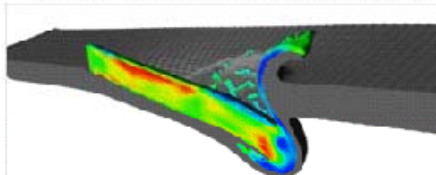
Aircraft-Weapons Integration



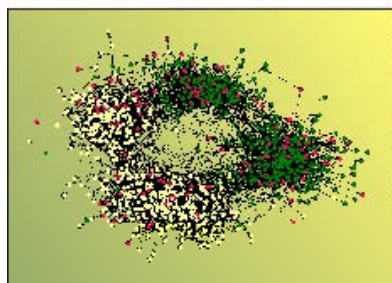
Ship Design



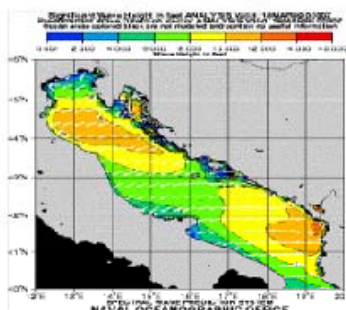
Radar Cross-Section Prediction



Armor and Projectile Design



Graph Analytics



Ocean Forecasting

High-Productivity Computing Systems

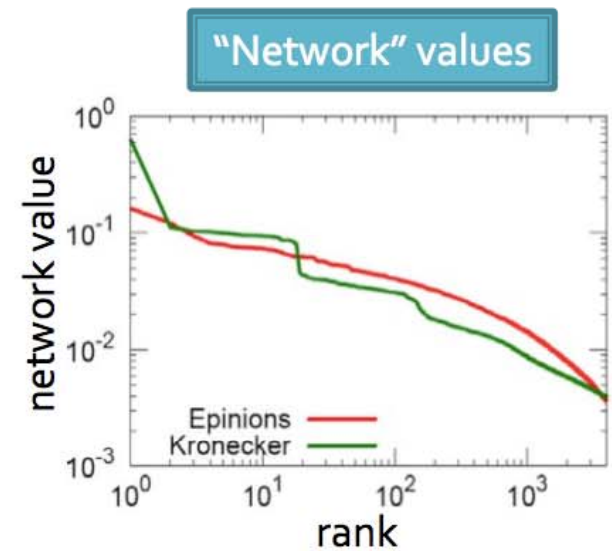
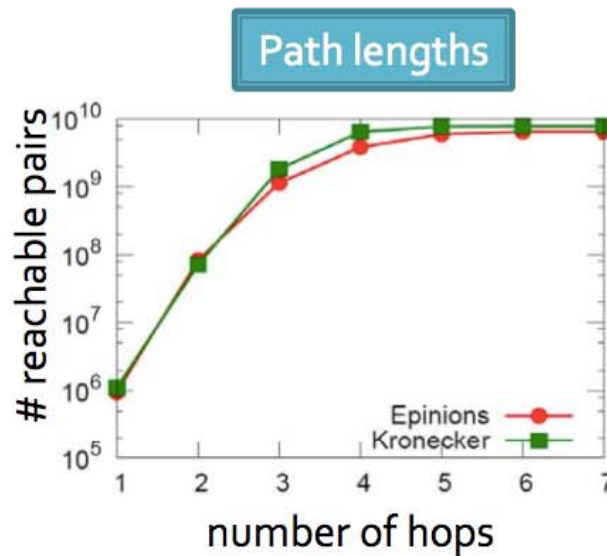
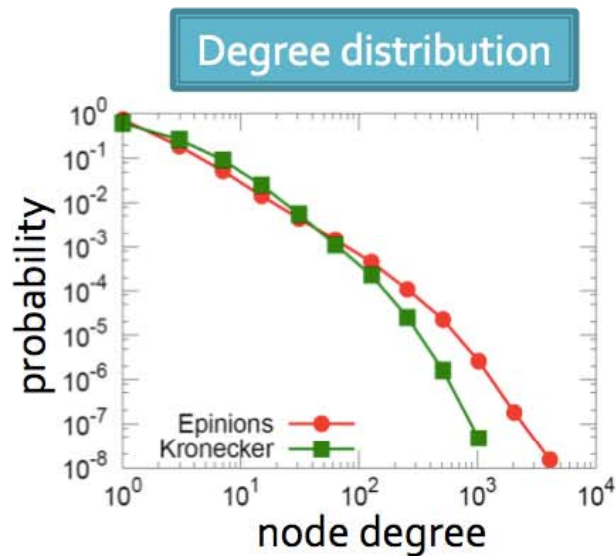
NCSA Blue Waters
(in construction)



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Networked Systems science

New computer science models and fast analysis algorithms shed light on the structure and evolution of real-world human-machine networks



[Leskovec & Faloutsos '07]

Core computing research areas of interest:

- computer systems and architectures
- networked systems science
- cybersecurity
- software systems (systems and languages)
- AI (including robotics and vision)

DARPA NETWORK CHALLENGE



40th Anniversary of the Internet

*29 Oct – Announced
5 Dec – Balloons Up*

\$40k Prize



4367 registrants
194 countries

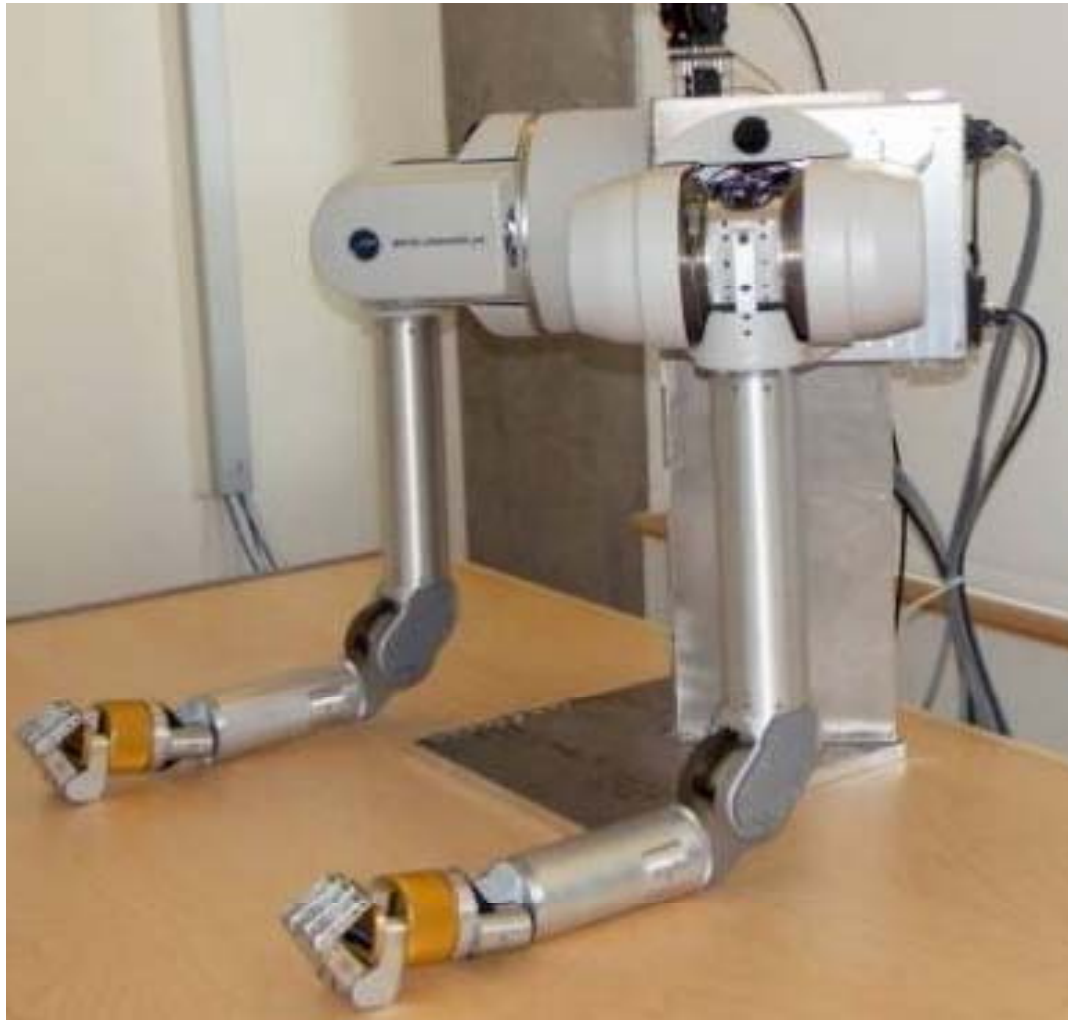


Acquisition that is fully IT-enabled, social media-enabled, and warfighter-empowered?

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“Autonomous Robotic Manipulation”

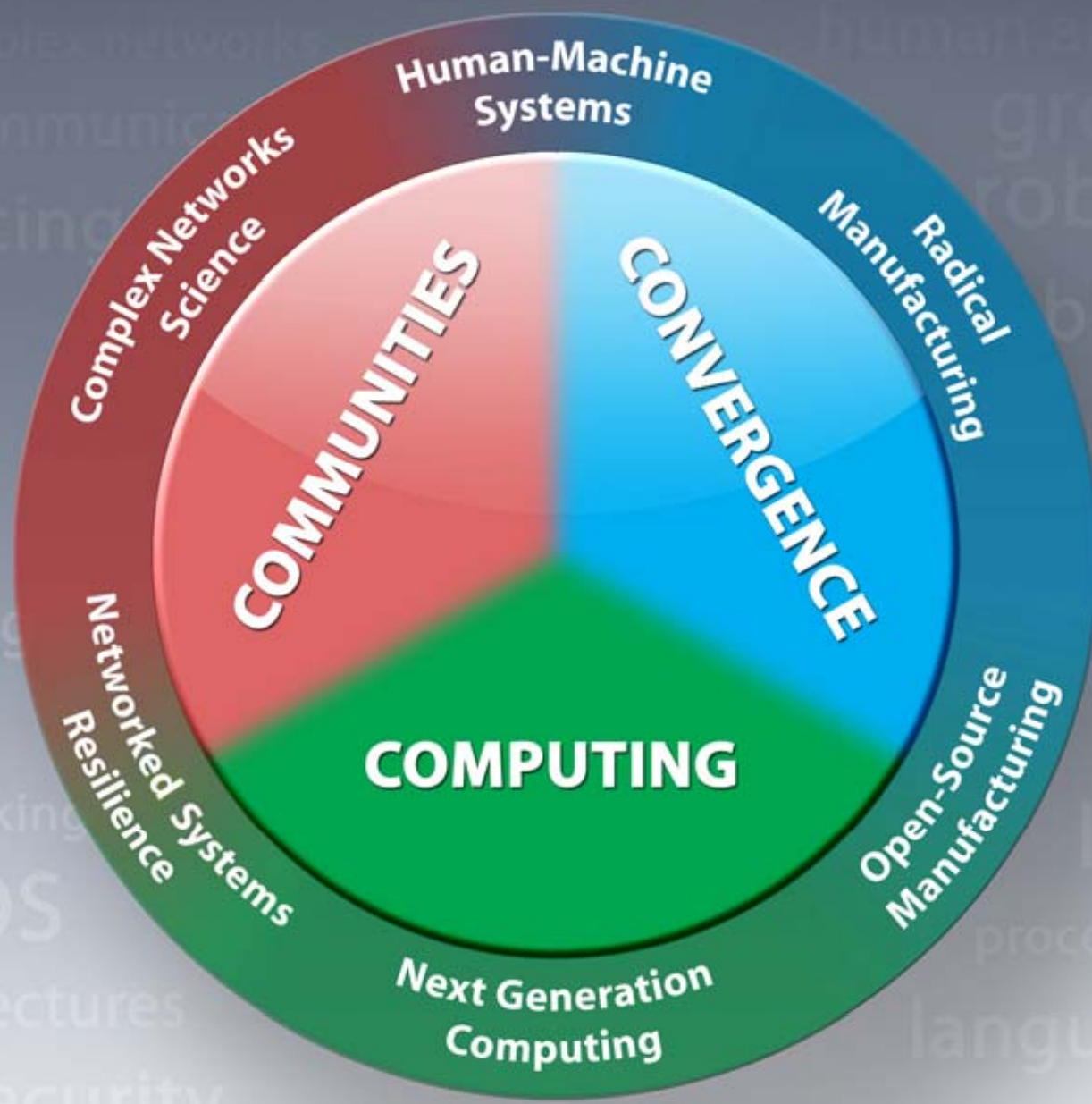
http://www.darpa.mil/IPTO/solicit/baa/BAA-10-28_ARM-S.pdf

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“Crowd-sourcing algorithms for Spacecraft Cluster Control”
<http://www.darpa.mil/tto/programs/inspire>

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Current status

- 6 program managers
 - Initial plan for 8 this year (up to 10)
 - Highly selective recruiting process
- Three new solicitations in pre-release process
 - Plus a new CSSG class and computing-oriented YFA
- Funding is just beginning to flow
- Several new programs in development


Pentagon Research Director Visits Universities in Bid to Re-energize Partnerships

By JOHN MARKOFF

Published: October 6, 2009


The new director of the Pentagon's research arm has started visiting university campuses around the country in an effort to rebuild bridges that were severed under the Bush administration.


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The director, Regina E. Dugan, who was appointed in July to lead the [Defense Advanced Research Projects Agency](#), or Darpa, made visits last week to the [University of California, Berkeley](#); [Stanford University](#); the [University of California, Los Angeles](#); and the [California Institute of Technology](#). She had previously visited Virginia Tech and Texas A&M.

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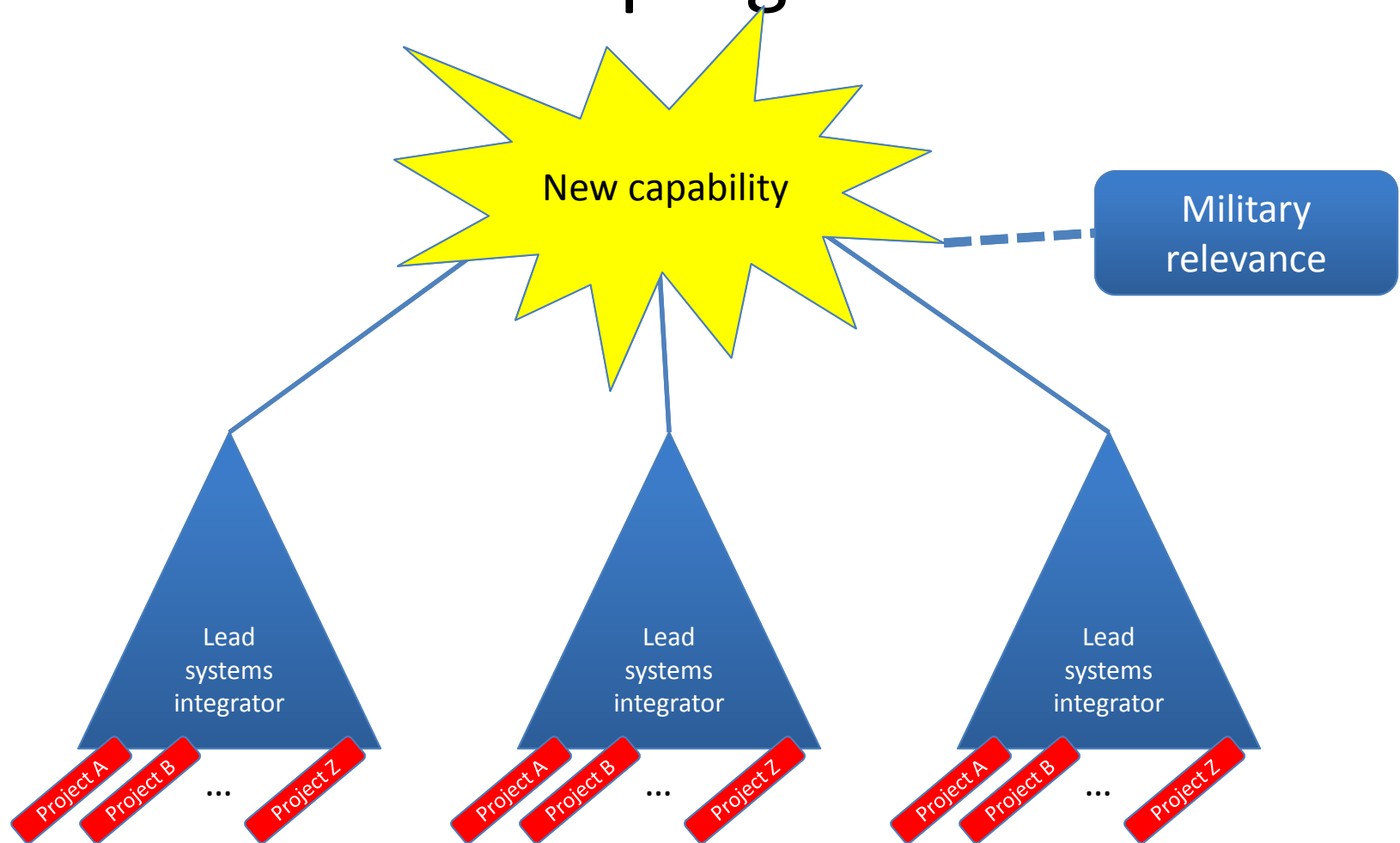
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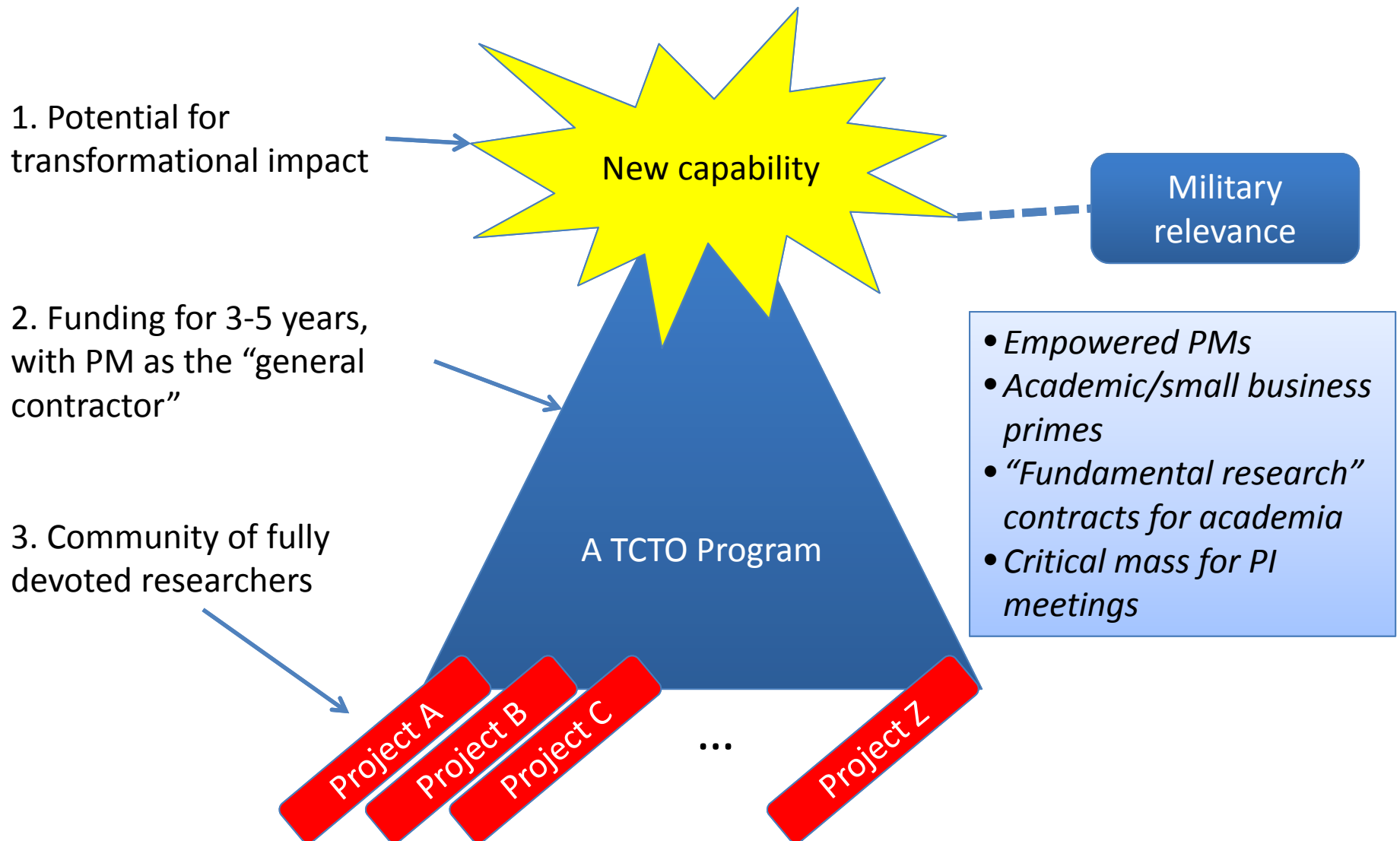
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Typical previous-style DARPA program



Back to the future



“ ‘I work for the Transformational
Convergence Department.’
Gee, what if that was your job! ”

— *NPR's John Hockenberry*