Beyond DAML

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- **The DARPA Seedling process (Greaves)**
  - Get new technology ideas
  - Expose the program creation process
  - Show / critique some ideas on SEE
- **The Semantic Enabling and Exploitation (SEE) Seedling Project (Kettler)**
- **Thoughts on new technologies (Sycara)**
- **Discussion**

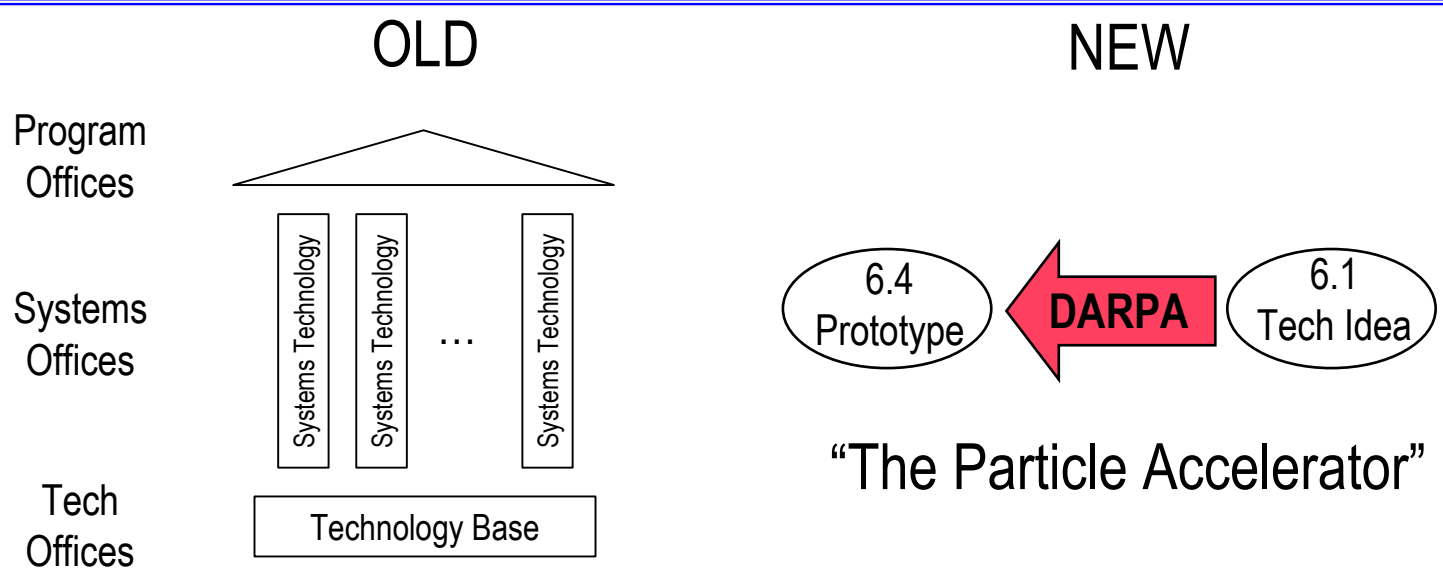
A Little DARPA History

- Established 1958 as the first U.S. response to the Soviet launching of Sputnik
- Long Range R&D Organization of the U.S. Department of Defense
  - Maintain U.S. Military Technology Superiority
  - Prevent technological surprise from her adversaries
  - Operating in coordination with, but completely independent of, the military research and development (R&D) establishment (ARL, AFRL, ONR)
- Pursue Imaginative & Innovative R&D Projects
  - Lightweight staffing model and no dedicated facilities beyond simple office space
  - Personnel rotation policy embedded in the culture
- Cause Fundamental Change in Technology, Industrial Capability & Military Capability
  - Designed to be a deliberate counterpoint to traditional thinking and approaches
  - Successes include VELA HOTEL, M-16, HAVE BLUE (F-116), TACIT BLUE (B-2), Sea Shadow, GPS, ARPANET, TEAL RAIN (Global Hawk), AMBER (Predator), AI, Silicon compilers, MEMS, Strategic Computing Initiative,…
- Always looking for
  - New technology ideas that will result in revolutionary new military capabilities
  - New PMs

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**

IXO Program Context



- New Programs
  - Must result in or point to a new *military* capability
  - Must be about removing a *technological* barrier, not a policy barrier
    - Problem must be "DARPA-hard"; typically 10x improvement
    - Barrier to capability must be primarily technical, not policy
  - Must start from a *specific new* immature technology idea or ideas
    - Specific = must be identified at the program approval phase
    - New = typically based on work that is < 5 yrs old

The Heilmeyer Catechism

- **What are you trying to do? Articulate your objectives using absolutely no jargon**
  - Example: “take anthrax off the table as a threat to our forces”
  - What is the new military capability that Semantic Web Services could provide?
- **How is it done today, and what are the limits of current practice?**
  - Why is this specifically a technology problem?
- **What's new in your approach and why do you think it will be successful?**
  - All software is Turing-equivalent, so software methodology is usually not relevant
  - What is your argument/analysis that a 10x difference in a technology will result in a new capability?
- **Who cares? If you are successful, what difference will it make?**
  - Who is the customer for the new idea, and what evidence do you have that any transition will be successful?
- **What are the risks and the payoffs?**
- **How much will it cost? How long will it take?**
- **What are the midterm and final exams to check for success?**
  - Metrics and experimentation plans defined up front

Other Questions

- What is DARPA's Transition Strategy?
  - How does new capability transfer to a Service or Agency?
    - Gold: DARPA work leads to a direct acquisition
    - Silver: DARPA work leads to a direct maturation effort by a PEO
    - Bronze: DARPA work leads to a new capability that a contractor will try to sell back to DoD
    - Tin: DARPA work leads to a better state of the world
  - Is there an MOU / MOA and funding in the POM?
- Why is this different from other DARPA and DoD programs?
- What are our metrics for measuring our progress?
  - Always difficult for software; exceptionally difficult for architectures
- What are the phases of the Program?
  - Phase I is typically 18 months
  - Phase II funding is contingent on meeting specific agreed-upon phase I milestones

Seedlings: SEE and NCL

- **New Program Definition Effort – SEE**
  - The Semantic Web is too important for DARPA to declare victory with DAML
  - United States investment in fundamental semantic web technologies must continue
  - I am actively working to define a new program
    - SEE effort
    - NCL and AC2 are tangentially related
  - Goal: a newstart brief to the DARPA Director in January, with a possible solicitation by late summer 2004

- **SEE Problems**
  - No good transition target with acquisition authority
  - What exactly is the new military capability, since we already integrate systems – why isn't this a policy problem?
  - How do we measure the impact
    - Where is the factor of 10 improvement that is directly attributable to service composition?

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