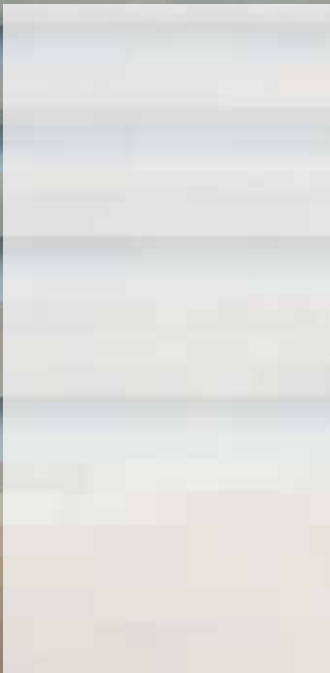


UNMANNED SYSTEMS

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Meet Avenger



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Defense Secretary Robert Gates prepares to testify before Congress on the FY 2010 defense budget, p 31. DoD photo.

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On the cover: General Atomics Aeronautical Systems' jet-powered Predator C, or Avenger. Photo courtesy GA-ASI.

The Role of SMALL BUSINESS in UNMANNED SYSTEMS DEVELOPMENT

By Fred Patterson

Getting funding for developing technology is tough, always has been and always will be. Unmanned systems technology is no exception, but it has an advantage: there is great interest in having machines do work in hazardous situations where human safety is at risk.

This provides impetus and immediate justification for the value proposition: What's the problem? What's the solution? What's the resulting benefit? The more compelling the value proposition the more likely that money and effort will be applied to it.

The U.S. Department of Defense (DOD) recently updated its Unmanned Systems Integrated Roadmap for the period 2009-2034. The DOD's vision calls for "capitalizing on unmanned systems technologies so that the warfighter can conduct missions more effectively with less risk."

The new roadmap says that over the next five years (FY 2009-2013), the DOD will spend just over \$8 billion on research, development, test and evaluation for unmanned systems technology, and that doesn't include procurement or operations and maintenance of the systems it deploys—nearly \$11 billion additional is forecast for that.

Who gets the contracts for developing these new technologies that the DOD says it wants? Federal investment in research and development has always focused on big business and top-tier prime contractors.

But what about small technology businesses? Can they compete with the primes for these R&D contracts? Not directly, at least not very effectively in head-to-head competition. That's where the Small Business Innovation Research (SBIR) Program enters the picture. Created in 1982, it requires large federal agencies—those that spend more than \$100 Million per year on R&D—to set aside a percentage (currently 2.5%) of their R&D budget for SBIR projects. In 2008, this represented more than \$1 billion of DOD's R&D budget. These projects are reserved for domestic, for-profit small businesses that are independently owned and operated by individuals (not large entities).

The DOD components (currently 12 of them participate) pose problems, usually tough ones that they need solved to help fulfill their missions. The small businesses are invited to submit proposals for solving them, describing how they're going to do the work and spend the money. Contracts average \$850,000 in two phases, feasibility and prototype development.

The proposals are evaluated and the best ones are funded, based solely on the merits of the planned project, the qualifications of the team and the potential for turning the technology developed into a business with potential customers being from both the government and the private sector.

It's very competitive—only about 10-15 percent of the submitted applications get funded. The awards are essentially grants, although the DOD styles them as contracts. There's no debt to repay and no equity to give up, and there are special rules whereby the small business gets to keep exclusive rights to intellectual property (called SBIR Data Rights) protected long enough for patents to be filed. In fact, it's the intellectual property aspects of SBIR that make it uniquely attractive for inventors and entrepreneurs seeking to fund their de-

velopment without losing control of their inventions.

Small businesses have made good use of the SBIR program, (and STTR, its sister program that involves university partnering for developing unmanned systems.) A quick, and incomplete, search of the DOD SBIR/STTR awards database identified more than 6,000 projects related to unmanned systems technologies.

Keyword: SBIR/STTR Projects

Unmanned	1,384
Robot/Robotic	2,031
UGV/RPV	1,461
UAV/Drone	1,330
Total	6,206

There are always new projects involving unmanned system technologies in the DOD SBIR solicitations. The new one (DOD 2009.2) will be closing just about the time this issue reaches you. A search using the same keywords identified 34 topics that would be of direct interest to AUVSI members.

The DOD isn't the only agency interested in unmanned system technology—a search of the SBIR topic archives using the same keywords revealed opportunities from the DOE, National Institute of Standards and Technology, National Oceanic and Atmospheric Administration, NASA, National Science Foundation and even the National Institutes of Health.

Case Studies

Many small businesses have based their funding strategy for technology development on SBIR. Some have done an exceptionally good job of using SBIR as a launch pad for company evolution. I had occasion to be in Huntsville, Ala., recently and had discussions with two companies who are heavily involved in developing technologies for use in unmanned systems.

CFD Research Corp., Alabama's leading SBIR award winner, has pioneered the development and use of multi-physics, multi-disciplinary simulations since 1987.

"The SBIR program has been of pivotal value in CFDRC's growth and success," says Ashok Singhal, president of the company, which

has built a Missile Defense Agency-funded system for computing the trajectory of a guided missile nose cone with and without an active-fin control autopilot.

This type of simulation enables designers and analysts to test control modules and maneuvering capability in real-life type situations where aerodynamics, flight dynamics and controls are fully coupled, an essential element in design of advanced unmanned flight systems.

Advanced Optical Systems of Huntsville has won more than \$10 million of SBIR awards over the past several years, and subsequently leveraged that into more than \$15 million of follow-on funding with five different DOD components and NASA. AOS has evolved to where more than 80 percent of its revenues are from non-SBIR sources. One product is the AOS ULTOR fully automated space vehicle docking system, developed through a combination of DARPA and NASA funding.

Tennessee's most successful SBIR awardee, Accurate Automation Corporation (AAC) of Chattanooga, is also an unmanned system technology company. It has recently developed an Automatic Launch and Recovery System (ALaRS) that operates unmanned aerial vehicles from aboard the Sentinel (NEO) Unmanned Surface Vessel (USV). Funded initially via a Navy SBIR, the approach allows hands-free manipulation of each UAV. No human intervention is required at any stage of the process.

AAC based the ALaRS system design upon existing boats and existing UAVs. The control system is so generic that virtually any boat can be equipped with it and it can be outfitted for a wide range of UAV sizes.

AAC has won more than 70 Phase I SBIRs and nearly 50 Phase IIs, totaling \$43 million. The company has leveraged those into another \$40 million in Phase III contracts. And, like AOS, it has evolved to where more than 80 percent of revenue is from non-SBIR sources.

These three companies are indicative of the benefits that SBIR has brought to small business, but it's possible that the program could end. Like all federal funding programs, SBIR must be reauthorized periodically. This has happened three times in the past (in 1986, 1992 and 2000) and the program is up again this year. Congress has begun the debate but federal spending isn't a sure bet, and without reauthorization the program will expire on July 31, 2009.

Some of the issues involved are contentious, involving special interests. Here's what's on the table:

- Eligibility (who may compete for awards)
- Agency Allocation Base (percentage of R&D set-aside)
- Award Caps for Phase I and II
- Phase I bypassing—should it be permitted?
- Multiple Phase II awards
- Phase III funding and required support

For More Information:

www.jointrobotics.com/documents/library/UMS%20Integrated%20Roadmap%202009.pdf

www.SBIRgateway.com

www.SBIRcoach.blogspot.com



AAC's Automatic Launch and Recovery System.

- State (FAST) and Rural Outreach support
- Funding for SBIR/STTR administration costs
- Streamlining the process of review and award
- Special technology priority mandates
- How long until the next reauthorization?

If you're interested in any of these issues, go to www.SBIRreauthorization.com to find out what the alternatives are and what the various interests have done and are doing to reshape, and hopefully improve, the SBIR program. Then get involved by contacting your legislative representatives in the House and the Senate and make your opinion known.

The value proposition for SBIR is clear: Small business needs a level playing field to fairly compete for a share of federal R&D expenditures. SBIR has provided that level playing field for more than 25 years, has resulted in the formation of thousands of small businesses, the creation of tens of thousands of jobs and the development of countless numbers of innovative solutions to tough technology problems. Reauthorization would allow SBIR to continue, hopefully with an increased level of participation and expanded support for transitioning developed technologies to end use.

Fred Patterson, "the SBIR coach," is the cofounder of two of Texas' most successful SBIR award-winning companies and has worked with the SBIR program virtually since its inception.

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