

## Counterterrorism Technology: Picking winners and Losers

Thank you, Mr. Chairman and members of this distinguished subcommittee, for the honor to testify on my company's experience with, and opinions of, the Technical Support Working Group (TSWG) process of identifying and promoting promising new technologies. iRobot Corporation is a young entrepreneurial company in Burlington Ma. While we are a small business, we are the largest supplier of mobile robots and recognized as the technological leader in our field. My name is Lee Sword and I am a program manager in the Military Systems division of iRobot. I lead the five TSWG-funded projects that are investigating technologies for the next generation of Explosive Ordnance Disposal (EOD) tools. Four of the projects are past the midpoint of two year contracts to develop proof of concept prototypes. The fifth project is a Phase 2 contract that will advance the state of maturity of an intelligent tether management system to a level that facilitates small quantity manufacturing. My remarks today, will include iRobot's experiences with the TSWG process of identifying and promoting promising new technologies, a brief capitalistic view of my projects target market, and I will conclude with my opinions related to potential improvements in the process.

iRobot is in business to bring robotic technology into the mainstream through defense and commercial channels. We have participated in more than 27 research and development robotics programs for the defense industry, (contracts totaling over \$60 million). Hundreds of Thousands of our Roomba robotic vacuums and hundreds of research and military mobile robotic systems have been delivered throughout the world. Our program sponsors include: the Army, Marines, Special Operations, DARPA, and Office of Naval Research.

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Our engineers come to us from institutions such as, MIT, CMU, Draper Labs, Honeywell, Disney's Imagineering Labs and NASA. Our team worked on robotic systems that ventured miles into the earth, journeyed to other planets, revealed insights into civilizations that no longer exist, and improved the situational awareness of our troops in combat situations. iRobot is one of the largest robotics companies in the world with a team of 76 dedicated engineers.

iRobot Corporation has submitted a total of 34 responses to four different Broad Agency Announcements (BAAs) from TSWG. Initially, each solicitation was brought to our attention through a press release from the Department of Defense. Solicitations to which we responded, span the spectrum from the narrow focus of requesting a next generation of Explosive Ordnance Disposal (EOD) robotics tools (02-Q-4653) to the more general request for technology to combat terrorism (02-Q-4655). In each case, we believe that the solicitations were posted with appropriate technical detail, clear instructions with regard to how to properly respond, and provided reasonable time frames for the responses to be generated.

Noteworthy, is the fact that none of the solicitations initially requested "full" proposals, but instead asked for either "white papers" when the expected number of responses was relatively small, or "quad charts" when the number was expected to be high. This approach not only allows companies to find out if there is an interest in their proposed ideas without huge expenditures of internal Bid & Proposal money, but also greatly reduces the burden on the reviewers. Once an idea was identified as relevant and plausible, TSWG

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would request that a full proposal be submitted for further review. Five of iRobot's 34 responses to TSWG resulted in requests for full proposals, and all five have resulted in contracts to develop proof of concept prototypes.

In mid-2001, iRobot was selected by the UK Ministry of Defense (MOD) as prime contractor for the design and development of a Man-portable Remote Control Vehicle with its associated Portable Command and Control System. The system, called ICECAP, is based on iRobot's man-portable PackBot platform and will be used on both Improvised Explosive Device Defeat (IEDD) and conventional munitions disposal (CMD) tasks. Utilizing the PackBot's modular chassis with payload ports, the ICECAP system adds a fiber optic tether system and an 8-degree of freedom manipulator. Extensive field trials have been performed on these robots demonstrating them to be highly rugged and capable EOD systems. Working closely with the UK EOD operators, iRobot received valuable feedback leading to design changes and enhancements.

iRobot believes our involvement with the ICECAP program funded by the UK Ministry of Defense influenced the selection process in two very significant ways. First, we acquired an awareness of strengths and weaknesses of existing EOD equipment, or perhaps more important what the users liked and disliked. Second, the MOD's belief (backed by development funding) in our technical approach added credibility to our proposals for a next generation of EOD robotics tools for the US Government. The leading edge technologies developed with ICECAP funding (adapted for the US and marketed as PackBot EOD), have influenced in a very positive way the contracts currently underway with TSWG. This serves as a very good

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example of how TSWG's international connections positively influence the path of technology development here in the US.

Working through the solicitation process, contract negotiations, and subsequent execution of the development contracts, it has become clear that TSWG and iRobot share some common visions for the future of robotics. We share the opinion that in order to be useful, advanced technologies must be developed with the end-user's needs in mind. Without clear objectives and measurable success criteria, engineers will tend to create really cool but useless technology. The benefit of modular designs is another shared vision that has already served our company well. The robot presented at this hearing was configured as an Explosive Ordnance Disposal robot, yet shares the same base chassis as those currently in use by our forces in Afghanistan and Iraq. The robots deployed overseas have a scout payload installed where the EOD arm on this robot is currently mounted, and do not have the fiber optic spooler. The need for interoperability is a third area of shared vision for the future of robotics. TSWG is defining a common architecture that includes the physical, electrical, and logical layers for robots, payloads, and control units that will allow compliant equipment from multiple vendors to seamlessly integrate into useful systems. We at iRobot endorse this approach, and are working with TSWG to refine and mature the concept so true "plug-and-play" capability can be delivered to the end user.

The end-users for the next generation tools being developed in all five of the TSWG funded iRobot projects are: local, state, and federally supported "bomb squads." The technicians and support personnel within these organizations form a small and tight community. Within this small

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community, information disseminates quickly (technological success or failure), past performance and reputation of vendors is extremely important, and results in a situation where brand loyalty creates a tough market for new players. Hand-in-hand with the fact that EOD is a small community is the fact that it is a small market. Given the total number of active bomb squads in existence, there is very little financial incentive for private industry to invest large sums of money in “breakthrough” technologies. The past two decades have seen only evolutionary changes to existing equipment. The infusion of money from TSWG is causing revolutionary changes in the capability and utility of EOD equipment that otherwise may have taken many years to occur on its own.<sup>1</sup>

iRobot’s experience with the TSWG process was, and continues to be a positive one. The entire process from release of the Broad Agency Announcement, to issuance of development contracts is handled in a professional manner, by experienced individuals that obviously have a good grasp of the end-user’s needs with an understanding of the limitations of the available equipment. My recommendation for improvements in the TSWG process would involve implementing a mechanism for quickly increasing staffing levels to address unanticipated workload. I am specifically addressing the overload experienced following the release of the homeland defense Broad Agency Announcement, where a total of 12,500 responses were received.

Thank you Mr. Chairman, this concludes my statement.

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