

Congressional Testimony 12 July 2012  
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1. How did your company partner with NASA and what technologies resulted from that partnership?  
How have you leveraged those technologies into commercial products?

Response:

Our relationship with NASA has not been the traditional spin off, it has been more of a spin in. Impact Instrumentation, Inc. has developed and manufactured life support equipment that is used by the Department of Defense (DoD), other governments and civilian care providers for the last 35 years. While I was a member of the Wyle Laboratories Advanced Projects Group at NASA our group modified the Impact ventilator that the military was using to treat and transport critically injured warfighters from the battlefield, through in-theater care and back home to the United States. The testing and certification that the device needed to meet military specification is very similar to the requirements NASA has for equipment used in space. While the modified ventilator was never used in space, its development helped identify a method whereby NASA and industry could work cooperatively to leverage commercial technology for space.

I joined Impact and we began a series of projects to develop new technology for the military that expanded the level of care for ill or injured patients while at the same time reducing the mass, volume and power of these devices. We received funding from the Defense Advanced Research Projects Agency (DARPA), US Army Medical Material Development Agency (USAMMDA) and the Office of Naval Research (ONR). Recognizing that these solutions would be useful for both military and space applications, we developed a series of noncompensated Space Act Agreements that enabled Impact to share technology that we were developing with NASA. This allowed NASA engineers access to the technology early enough in its development so that they could identify space-specific issues that may require change to the device or its implementation in order to meet operation and safety issues unique to the NASA mission. It also allows NASA to be part of the device's required Food and Drug Administration (FDA) and ISO testing and use these tests as a method to demonstrate the safety and efficacy of the space device.

Working together we have developed a number of prototypes of an advance life support device that replaces a suite of therapeutic and monitoring equipment. In addition, Impact has completed development of a new ventilator that is deployed with our forces and has also been tested by NASA with the anticipation that it would replace existing equipment on the space station when it is retired.

That said, the biggest leverage has been the cultivation of a new generation of young engineers that are working at NASA, at Impact or who have left the projects to start their own businesses. The Space Act Agreement (SAA) created a government, industry and academic partnership that allowed our group to work on a series of medical challenges, sharing in the institutional knowledge and

experience of the organization while developing solutions that benefit the warfighter, astronauts and civilians.

2. What has been the direct economic benefit of this investment? What are the other benefits to society in general that can be derived from these products?

Response:

We have benefited by the addition of NASA and NASA-contracted engineers that have been part of the different programs under the SAA. Their labor has contributed to the development and testing of equipment we have developed for the DoD and civilian use. In addition, as a small business, we have benefited from the association with NASA. Though we have never marketed our products with any association with NASA it is known in the military that we work with NASA and that has positively affected the standing our company, products and development efforts.

Societal benefits are difficult to determine but as a group we have authored a number of peer-reviewed papers on telemedicine, care of critically ill or injured patients in remote environments and closed-loop control of mechanical ventilation and other therapeutic modalities whereby the devices will be able to manage themselves in the absence of a skilled care provider. Devices that have been commercialized are smaller, lighter and more capable than commercial devices that, 15 years ago, weighed ten times more than the equipment our military is now using. These breakthroughs are benefiting our military and will benefit NASA as the next generation of space missions get underway. Civilians around the world have benefited as technology that we've shared with NASA has been used to treat earthquake victims in Haiti and is stockpiled for use by a number of nations around the world as part of their disaster preparedness programs.

3. How might future partnerships with NASA enable continued technology developments?

Response:

Just as NASA is partnering with commercial aerospace companies to develop its next generation space vehicles, it should also partner with other industries to develop capabilities that are needed in for both space and terrestrial applications. Doing this:

1. Leverages the resources of both organizations. NASA benefits through direct access to emerging technology while the company benefits through access to a talented population of engineers and researchers as well as use of the finest collection of test and evaluation laboratories in in the world.
2. Timelines at NASA are improved based on the drive that companies have to commercialize technology.
3. Companies benefit from the health and safety culture that is inherent in sending people into space and returning them safely.

While there certainly can be culture clashes between the NASA and a commercial organization, a program that promotes collaboration and partnership leverages the best of both, spurs development and deployment of technology, promotes domestic job growth and incubates a new group of American engineers and researchers.

4. What were the greatest challenges working with NASA and what improvement, if any, do you recommend that would enhance NASA's ability to more quickly transition their ideas into new products?

Response:

Our greatest challenge was overcoming the questions as to why would we want to have a noncompensated space act agreement. Fortunately, there were people in the Advance Projects Group and managers in the NASA Space Medicine Branch office that recognized that working together would benefit both groups. NASA would benefit by recognizing that much of the technology that's needed for its next missions is available commercially and that by working with industry costs can be reduced and timelines accelerated. The benefits to industry, whether uncompensated or compensated can be significant as our government support development, testing and multiuse deployment of new technology.