National Aeronautics and Space Administration

TRACLabs' PRIDE software enables users to perform paperless procedures anywhere—even outer space.

Cloud Software Enables Collaborative, Real-Time Procedures for NASA and Others

Challenge

Eating, exercising, and sleeping are just a few everyday activities that astronauts are required to do in space. Though they may seem self-explanatory, each task needs to be performed by following distinct sets of steps—or procedures—in a zero-gravity environment. For example, an astronaut's daily schedule would likely include a designated time for exercise. The procedure for exercising while in space includes different workouts for maintaining healthy weight and instructions on how to use the equipment, including treadmills, bikes, and weight/resistance machines. In addition, different procedures are used to perform maintenance on the workout equipment to ensure that it is safe to use.

NASA uses procedures everywhere, especially in space, where thousands of procedures need to be carried out on the International Space Station (ISS) alone; these procedures govern everything from the most mundane to the most complicated tasks. Because thorough and clear procedures are key to minimizing errors and ensuring that operations are performed efficiently, NASA sought to develop an easy-to-use tool for carrying out procedures, especially those requiring the use of additional software to look up relevant information, such as equipment status, or issue commands to that equipment.

Solution

NASA awarded SBIR contracts to TRACLabs, Inc. starting in 2008 to develop their Procedure Integrated Development Environment (PRIDE) software. TRACLabs, headquartered in Webster, Texas, is a veteran of the NASA SBIR/STTR Program, with 57 SBIR and STTR awards as of September 2019.

Project

Procedure Integrated Development Environment (PRIDE) software

Mission Directorate

Human Exploration and Operations

Phase III Success

$3.3M for licensing the PRIDE software to a major oil field service company

Snapshot

TRACLabs' PRIDE software was the first collaborative and highly-customizable tool designed to allow astronauts to document and mark progress on procedures in real-time, display system data, and issue commands—all from a single application. The versatility of the software caught the eye of a major oil field service company, who bought licenses and support from TRACLabs for $3.3M

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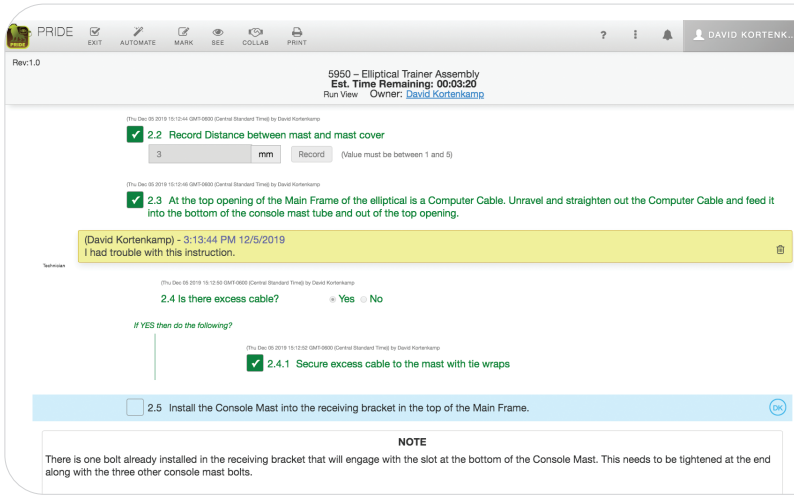
Among these awards, 14 have been granted to research and develop technology for procedures.

Designing effective procedures requires an understanding of just how important and intricate they are. Jeremy Frank, who is the Group Lead for the Intelligent Systems Division at NASA's Ames Research Center and has been involved with TRACLabs' work for at least 15 years, explains, "Procedures are used for just about everything. Some are long, some are not. Some have tools listed, some contain instructions to operate complex equipment, and the list goes on. These procedures are ubiquitous, complex, and diverse."

Prior to PRIDE, NASA's procedures were largely documented on paper, and crews were responsible for managing large volumes of their daily procedures. Eventually, "electronic" procedures were introduced, but they were little more than documents on a computer—they decreased the paper load, but did not eliminate the need to refer to other tools.

Unlike its predecessors, PRIDE is a software tool that allows users to document and mark progress on procedures in real-time, display system data such as temperatures, pressures, and system status, and issue commands—all from a single application. The web-based technology can be shared by multiple users at once and has a user-friendly drag-and-drop development environment.

TRACLabs' co-founder, co-owner, and CTO David Kortenkamp says PRIDE was among "some of the first cloud-based applications that have been used at NASA." As a cloud-based technology, users do not have to worry about version control and can check in on the status of procedures as others make updates. PRIDE has been demonstrated for use by flight controllers in the Mission Control Center, and is also in development for use on uncrewed missions, says Kortenkamp.



PRIDE software's user interface.

Business Impact

The versatility of PRIDE stems in part from the fact that it is not specific to particular procedures and can therefore be highly customized. "We don't have to be experts in their systems," says Kortenkamp. "It's kind of like giving someone Microsoft Word and they can use it however they want." The software has found traction outside of NASA as well; PRIDE was recognized by one of the world's largest oil field service companies, which led to a licensing and support deal for more than $3.3M. Now, Kortenkamp asserts that PRIDE is used by approximately 3,000 users that keep track of 7,000 procedures for oil drilling equipment and activities alone. As of September 2020, they now have over 2 million completed procedures.

To build on the success of PRIDE, TRACLabs is continuously developing new ways to improve procedure and process documentation for NASA. Beyond procedures, the company's experience with automation systems is contributing to other NASA initiatives under the SBIR/STTR program, such as robotics for the upcoming Moon mission and collaboration tools for use in space.

> "NASA SBIR has given us the opportunity to take an idea that we had and turn it into a full-fledged software system.
>
> – David Kortenkamp
> CTO of TRACLabs, Inc.