

## Case Study:

### Chilean Air Force modernizes Maintenance Training with VE Studio

How the Chilean Air Force Developed A Virtual Maintenance Training Solution for their Fleet of Bell 412 Helicopters



*Edith Montecinos, Development Engineer - VMT Team,  
Demonstrates The Bell 412 Classroom Trainer*

Maintenance training for the Chilean Air Force's fleet of Bell 412 helicopters previously involved a combination of classroom based training combined with hands on training using physical helicopter equipment.

As Chile's Air Force modernizes, this model has proven to be difficult to keep updated due to the high costs of the physical hardware and the inconveniences associated with the airframe being out of service during the training. In addition the incoming technicians are expecting more modern forms of digital education.

The Fuerza Aérea de Chile (FACH) División de Educación, is the Chilean Air Force organization responsible for developing training. In 2015, they were tasked by the Commandant of the Air Force Training Group to develop innovative ways to train aircraft technicians while reducing training costs.

After an extensive evaluation of various methodologies and commercial off the shelf technologies, FACH decided to create their own virtual maintenance training (VMT) solution with VE Studio from DiSTI as their development platform.

#### Challenge

- Reduce training costs with virtual technology
- Improve skills of maintenance technicians
- Implement virtual technology within 12 months
- Develop in-house using commercial technology

#### Solution

- VE Studio Virtual Training Development Platform
- VE Studio training and certification program
- DiSTI Professional Services

#### Impact

- Shortened project length from 18 months to 9
- Cut costs through less use of physical hardware
- Certified training development team for VE Studio
- Improve maintenance technician competency

*"We started the development of the project in June 2016 and delivered the first training class in February 2017. This is about 50% less time than we had originally planned for the project prior to evaluating using VE Studio."*

*The time savings are due to the automated procedures, existing templates, and the way all of the graphic objects and procedures are linked in the Fidelity Matrix."*

*- Cristian Román,  
FACH Technical Project Lead*



*Chilean Air Force Bell 412 Virtual Maintenance Trainer*

## Understanding The Need

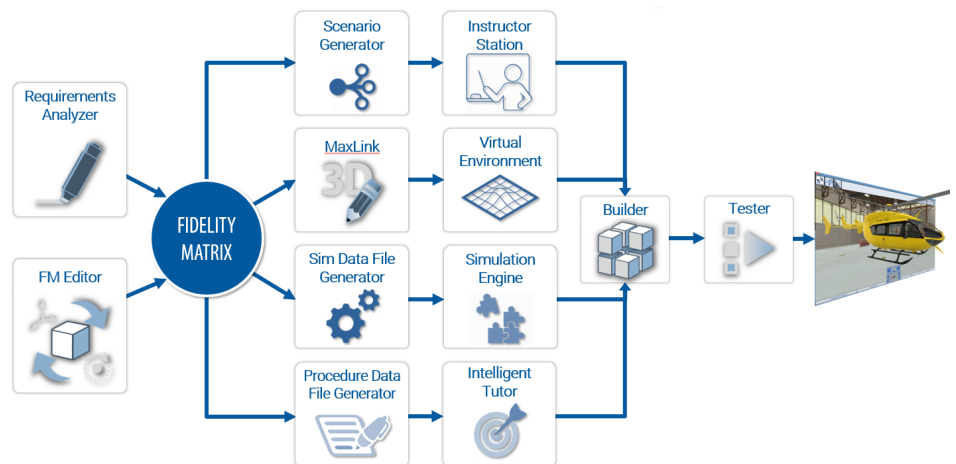
DiSTI's first objective was to understand FACH's goals and expectations and then propose a plan. For this project, FACH's key constraints were time, people, and budget. They needed to develop and field a virtual maintenance training system within 12 months while utilizing their existing training staff to both develop and maintain the VMT, all while adhering to their budget. The DiSTI team, along with their local partner, Altec, worked with FACH to develop a technology and implementation plan that met each of these requirements.

*"With VE Studio, we can use our existing staff to continue to develop the various training courses and do not have to worry about developing or maintaining the underlying technology platform."*

One of the biggest challenges to overcome was the lack of original equipment manufacturer (OEM) computer aided drawings (CAD) in order to develop the 3D virtual environment. The second challenge was to incorporate all of the complex maintenance procedures from the original maintenance manuals into the system. In order to meet the tight time constraints of the project, these two challenges needed to be addressed quickly and accurately.

## An Integrated Suite of Processes

VE Studio is a comprehensive 3D virtual training development platform that includes a comprehensive suite of tools to enable users to develop an end to end training solution. Designed to be a virtual training solution in a box', DiSTI has developed and patented a methodology<sup>[1]</sup> in which to import various types of graphical and procedural data into a relational database called the Fidelity Matrix. The Fidelity Matrix then forms the core database for the entire training solution.



By using the source data directly in the VMT creation process, a foundation of traceability and stability is created that resonates through the entire VMT, making late project changes easy to accommodate. Using the capabilities of VE Studio and the methodologies provided by DiSTI, companies can reduce their development time by at least 50% compared to manual hard coding development processes commonly used in virtual training system development.

The VE Studio Requirements Analyzer imports the massive amounts of procedural documentation into the database electronically, eliminating time consuming and sometimes error prone manual entry, while also establishing source to object relationships used throughout the other VE Studio applications.

VE Studio's Max Link relates models from 3dsMax with objects in the Fidelity Matrix database. FACH's 3dsMax models were developed using the latest in 3D photo scanning technology, so missing CAD data did not impact the project timeline. VE Studio also provides out of the box templates so any team can get quickly begin work on their project. The Fidelity Matrix Editor is the database front end that links objects and associated models, providing the relationships between the models and how they should act in the Virtual Environment. Using the relational model within the Fidelity Matrix makes system development efficient, since changes to objects only need to be made in one place, which is propagated throughout the system.

VE Builder for Unity builds the objects in the Virtual Environment, and serves to provide authors the ability to generate automatic on the fly builds during the development process. During the final production VE Builder works in tandem with VE Tester to automate a thorough regression testing process to verify the integrity of the Virtual Environment.

The culmination of the VE Studio workflow is the Training Assistant, which provides the end user's entry point to the Virtual Environment in the form of student and instructor stations, and the with lesson authoring capabilities.

VE Studio is a comprehensive "virtual training solution in a box" and a solution for projects where time and efficiency are critical to program success.

## VE Studio Certification

Given that FACH's requirement was for existing personnel to develop the VMT, DiSTI provided methodologies for using VE Studio. DiSTI provided training and certification to the FACH team via the VE Studio Certification program and supplemented the training with professional services to assist FACH with project planning, 3D modeling, and simulation development.

As a result of the project, FACH was certified to develop their own virtual training solutions for this project and for other aircraft projects, including ones for their Army and Navy colleagues with land and maritime applications.

## Refining and Improving for A Better Future

The initial VMT was developed for use in a traditional classroom model using large screen displays, however, one of the design requirements was to be able to incorporate future display device technologies. As part of the planned VMT expansion, capabilities were included to train outside of the classroom, including more immersive training using Virtual and Augmented Reality Technologies. VE Studio for Unity enables FACH to extend their virtual training solution to many different platforms, including tablets and AR/VR devices without having to redevelop their existing content.

For this project, FACH was able to create a training module in virtual reality in only 2 weeks.

## Evaluation of Benefits

One of the most prominent benefits of using a virtual maintenance training solution is seen in both the increased effectiveness of maintenance personnel and the reduced costs for training.

While measuring the cost benefits of virtual training is a fairly straight forward process, it is often more difficult to measure the learning improvements for virtual training provided through the VE Studio certification.

There is a growing body of evidence to support the proposition that virtual training is a much more effective way of training technicians.

Independent studies conducted by Stanford University and the Technical University of Denmark in 2014 show that incorporating virtual training into a traditional classroom environment increased learning improvement by 101%. [2]

Another study at Carnegie Mellon University revealed a decreased average of 35% in the time it takes for students to complete courses that incorporate virtual environments compared to the same courses taught using only physical training methods. [3]

One benefit area that is apparent but difficult to measure is the ability to deliver training at the "point of impact", or the ability to deliver training that is not only tailored to the specific task at hand, but also at the location where the procedure is to be performed. For example, a maintenance technician may be required to service a component on the aircraft, but it could have been months since his last training course.

By being able to access "refresher procedures" on a mobile device, the technician can familiarize himself quickly while at the designated location the procedure need to be executed. This particular benefit can be measured in the reduction of time it takes to do the procedure, the accuracy of the procedure performed, and the reduction in damaged parts.



*The FACH División de Educación receiving their VE Studio Certification*

## VE Studio versus Manual Development

While there are many ways to build a VMT system using various tools and manual coding processes, VE Studio was developed specifically as a means to reduce the time and cost of developing complex of VMTs.

The table reports a total cost of ownership (TCO) analysis on the reduction of costs acquired through using VE Studio in comparison to using manual processes, segmented by phase of project.

Typical Project Savings Using VE Studio	
Procedure Analysis	55%
VMT Modeling	61%
System Development	14%
System Testing	43%
Systems Engineering	58%
Overall Savings	50%

## Workforce Development for Virtual Reality and Augment Reality

Some of the biggest challenges facing organizations are not only how to attract and retain technical staff, but how to develop their technical capabilities in order to maintain a competitive edge. One of the goals of FACH was to use commercial technology that would enable them to develop skills and capabilities that could be leveraged in other areas to benefit both FACH and the Chilean Department of Defense through attracting new recruits into the virtual technology field.

Reports from industry analyst IDC shows that the global market for Virtual Reality and Augmented Reality technologies is worth \$18 Billion in 2018<sup>1</sup> and will continue to grow at a 98.8% annual rate through 2021 making it the fastest technology growth area. [4]

The final organizational benefit realized by using VE Studio was that small, focused organization could create their own content and intellectual property which can be productized to create new revenue streams or cost savings throughout other organizations.



General Gamboa Using HP Windows Mixed Reality Headset + Controllers

***"We have been very pleased with the results of this project for the Bell 412 and are looking to expand it to other aircraft in our fleet."***

***Our education team, DiSTI and their local business partner Altec have worked together as partners to make this project successful."***

*- José Aguirre Gamboa  
General de Brigada Aérea, Jefe de División de Educación*

For more information on The DiSTI Corporation and VE Studio contact us at [sales@disti.com](mailto:sales@disti.com)

### Sources

<sup>1</sup>Distributed collaborative environment definition system and method September, 2010

<sup>2</sup>Reimagining education and the effectiveness of Virtual Reality training, Education, April 11, 2016

<sup>3</sup>Robot Virtual Programming Games that work with NXT-G, LabView, and ROBOTC

<sup>4</sup>Worldwide Spending on Augmented and Virtual Reality Forecast to Reach \$17.8 Billion in 2018, According to IDC, 29 Nov 2017



11301 Corporate Boulevard, Suite 100 | Orlando, FL 32817 | Tel: 407.206.3390 | [www.DiSTI.com](http://www.DiSTI.com)