MAGPIE Capability Summary

Virtual Environment

- Provides interactive 3D models and simulation
- Uses industry standard Unity game engine

Intelligent Tutoring System (ITS)

- Tracks student performance in real time
- Provides continuous status and error feedback
- Adapts instructor view to highlight top-priority student needs

Classroom Management Tool

- Supports 20 simultaneous students
- Provides After Action Report analytics on student performance and errors
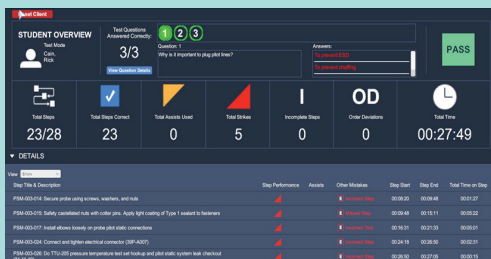
Authoring Tools

- Enable procedure and skill model extensions to create new training content
- Provide tools to add new graphical components and simulations with VEStudio®

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MAGPIE is a flexible framework for constructing intelligent virtual training systems *for any training domain*, including aircraft maintenance, satellite communications system troubleshooting, and heavy equipment operation. MAGPIE dynamically delivers instruction that is responsive to individual learning needs and instructor guidance by combining:

- Efficient content authoring tools
- Dynamic performance assessment models
- An adaptive training engine

MAGPIE is in active use by the 365th Training Squadron at Sheppard Air Force Base for F-15E avionics maintenance training, where it has delivered an initial estimated 50% instruction efficiency improvement for Safe For Maintenance training sessions.

MAGPIE's Intelligent Tutoring System (ITS) tailors training to individual student needs, which improves knowledge and skill retention and results in increased efficiency during hands-on instruction on the physical aircraft.

UH-72 Helicopter Maintenance Training

Western Army National Guard Aviation Training Site

The UH-72 Trainer in active use at Western Army National Guard Aviation Training Site (WAATS) in Marana, Arizona, where it is used to train 100 students per year.

The UH-72 Trainer is based on the DiSTI VE Studio® Virtual Enviroment and the MAGPIE engine that uses skill tree models to drive adaptive training and performance tracking. MAGPIE offers advanced error tracking that dynamically classifies trainee mistakes while rating their performance, providing individualized guidance for improvement.

For the UH-72 Trainer, Charles River Analytics modeled 66 essential UH-72 maintenance tasks, capturing both the individual steps that must be performed and meta-information on how to dismantle, repair, and reconstruct the equipment. MAGPIE's robust error tracking framework analyzes user performance, determines when errors occurred, and reclassifies the errors based on the actions of the trainee to provide an automated understanding of their specific mistakes.

WAATS has been successfully running the Light Helicopter Repairer Course with the UH-72 Trainer since June 2016. Students and instructors lauded the system as more resilient and effective than previous training systems.

www.cra.com/work/case-studies/vmt

EAGLE Satellite Groundstation Troubleshooting

338th Training Squadron Keesler Air Force Base
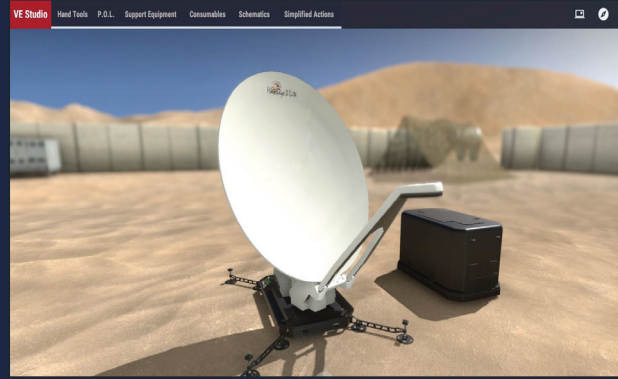
Troubleshooting the Hawkeye III Lite in EAGLE's immersive virtual environment is especially valuable because students do not have access to the Hawkeye equipment during training.

EAGLE helps US Air Force satellite communications technicians learn and remember complex procedures on the Hawkeye III Lite. The 338th Training Squadron (TRS) must produce technicians who are well-prepared to deploy Hawkeye equipment in multiple mission spaces and conditions, and EAGLE provides just-in-time training for troubleshooting configuration problems in the field when experts or instructors aren't available.

EAGLE is built on the MAGPIE intelligent virtual training framework and uses the MAGPIE engine to track technician performance and provide adaptive guidance in real time. Under EAGLE, we are adding basic troubleshooting into MAGPIE procedures so technicians can explore and address multiple fault conditions. EAGLE is being developed as an AFWERX innovation effort with the 338th TRS.

EAGLE gives training command a global reach with instruction that can adapt to individual training needs.

www.cra.com/company/news/just-time-training-eaglebr-charles-river-analytics-and-disti-develop-intelligent

Weaver High-Risk Career Field Training

364th Training Squadron Sheppard Air Force Base

Weaver is an AFWERX innovation effort with the 364th TRS Cable & Antenna Systems Initial Skills Course. The 364th esimates Weaver will double or triple hands-on practice time.

Weaver is an Intelligent Virtual Trainer for the Low Profile Altec DM47 Derrick Digger. Weaver provides adaptive, hands-on training for high-risk procedures that cannot safely be performed in the current training environment.

Weaver uses the MAGPIE virtual environment to provide risk-free, hands-on practice of dangerous, low-profile truck procedures. Under Weaver, we are adapting the MAGPIE baseline to a tablet form factor, so students can practice in their off-time and while they wait to use live equipment. We are also extending MAGPIE to add environmental stressors that emulate the complex and high-risk challenges of outdoor elements on vehicle operation and antenna/electrical maintenance. This extended, adaptive trainer revises difficulty levels to ensure lessons are both challenging and achievable.

Weaver is expected to provide ~1,000 supplemental hours of collective practice per year for the same instructor course load, yielding Airmen with improved skills who are better prepared for the threats and challenging environments they face in global deployments.