JTEG Technology Forum: Technology Enhanced Workforce Development

Technology Enhanced Workforce Development

Military maintainers are constantly faced with the challenge of learning how to maintain new or different equipment, while also continuing to perform their daily support missions. Conventional methods such as training courses and on-the-job training help build proficiency, but more efficient and modern training tools are also needed. Numerous new technologies exist today that can create more realistic, more expedient, and more efficient training for the military maintainer. Examples include on-line libraries of maintenance training videos. Point of View (POV) cameras such as GoPros can be used to record training events, upload the information to a secure cloud platform, and then shared across the DoD maintenance enterprise, providing our maintainers quality first-person training when and where they need it. Another technology on the market is augmented or mixed reality technologies available in head mountable hands-free devices or in tablets. These devices display digital data such as technical manuals and checklists, but also display videos and can be used to access the Internet. These devices could be used to identify parts or even communicate with a subject matter expert for assistance. This technology is currently being explored by manufacturers and developers. This forum includes presentations on several of these technologies and their potential application in the workforce development of DoD maintainers. Additionally, the forum will include a presentation which discusses the comparison of virtual reality technologies and some key considerations in using these technologies for workforce training and development. Please join us and participate in the exchange of information and ideas.

AGENDA:

1300-1309: Welcome and Overview – Greg Kilchenstein (OSD)

1309-1310: Administrative Notes – Debbie Lilu (NCMS)

1310-1330: Multipurpose Reconfigurable Training System – 3D Presentation – David Williams (NAWC Training Systems Division)

1330-1350: Enhancing maintenance with Augmented and Mixed Reality Technologies – Michael Robinson & Patrick Violante (NCWC Philadelphia)

1350-1410: Virtual Reality for Distributed Workforce Settings – Dr. Alexander Klippel (PSU)

1410-1430: INTERACT Multi-Modal Interface to Improve Immersive Training – Jonathan Brown (AnthroTronix, Inc.)

1430-1450: Augmented Reality Paint Simulator – Ken Fahrney (LEAD)

1450-1500: Wrap-up and JTEG Principals Comments
Connect

MINUTES:

Event: On 22 November, 2016, the Joint Technology Exchange Group (JTEG), in coordination with the National Center for Manufacturing Sciences (NCMS), hosted a virtual forum on “Technology Enhanced Workforce Development”.

Purpose: The purpose of the forum was to present new technologies and their potential application in the workforce development of DoD maintainers. Additionally, the forum included a presentation which discusses the comparison of virtual reality technologies and some key considerations in using these technologies for workforce training and development.

Welcome: Greg Kilchenstein (JTEG Co-Chair), welcomed everyone to the forum, thanked the presenters and all the listeners for their attendance, briefly described the purpose of the JTEG technology forums, and highlighted the point that the DoD workforce is getting younger and the training needs to be developed differently, i.e. video games, virtual training etc.

Administrative: This was an open forum. The presentations, along with questions and answers, were conducted through Adobe Connect. A separate audio line was used. Approximately 50 participants from across DoD and industry joined in the forum.

Multipurpose Reconfigurable Training System – 3D (MRTS-3D) Presentation – David Williams (NAWC Training Systems Division) described the concept and evolution of MRTS-3D which provides a 3D simulation of tactical equipment using COTS computers and large, multi-touch, flat-panel displays. He described the Mobile Electric Power Plant (MEPP), MRTS 3D® software and device hardware, and both present and future applications.

Enhancing maintenance with Augmented and Mixed Reality Technologies – Patrick Violante and James Case (NSWC Philadelphia) described the use of hands-free augmented reality (AR) technology to enhance maintenance activities. Benefits include the display of all types of digital

data, including technical manuals, procedures, checklists, and videos and access to the internet, hands free access, use as a guiding instructor, the identification of missing parts, record pictures or video, and allow annotations for distance support.

Virtual Reality for Distributed Workforce Settings – Dr. Alexander Klippel (PSU) spoke about immersion and presence and the study framework. The findings include: Higher visual immersion improves presence; presence + attention relate to satisfaction; actual task locations with better presence improve satisfaction; remote collaborator experiences improve when using more immersive devices that display actual collaboration task locations.

Interactive Next-Generation Testbed Environment for Retention and Assessment of Computer-Based Training (INTERACT) – Jonathan Brown (AnthroTronix, Inc.) described the INTERACT background, need, SBIR phase I outcome and prototypes, and phase II training software platform selection. He also discussed the Interact gloves and scent collar development and their future integration plans.

Augmented Reality Paint Simulator – Ken Fahrney (LEAD) briefly described the virtual reality paint simulator used at Letterkenny Army Depot. LEAD did not design the simulator, but utilized it to train workers and set up a satellite site with the University of Northern Iowa.

Closing Comments: Greg Kilchenstein thanked the presenters for their contributions and the audience for their participation. He commented on the quality of the presentations and the great variety of capabilities discussed by the presenters.

Action Items:

1) Obtain “public release” versions of the presentations and post to the JTEG website. These meeting minutes, the Q&A, and those briefing slides approved for public release, will be posted on the JTEG website at http://jteg.ncms.org/ . (All presenters, LMI, NCMS)

Next JTEG Meeting: The next JTEG virtual forum is 5 December, 10:00 – 12:00 pm EST. The topic is “Additive Manufacturing Town Hall” and will consist of a panel of AM subject matter experts at the DoD Maintenance Symposium discussing AM in maintenance operations. This forum will have a live feed, but will use a NEW URL:

https://ncms.adobeconnect.com/mxsymposium/

NOTE: This is NOT the usual URL for the monthly JTEG forums. Also, we will NOT be using a separate phone line, so audio will be through your PC. Ensure that your speakers and microphone are turned on and properly configured to listen to the session.

POC this action is Ray Langlais, rlanglais@lmi.org , (571) 633-8019

Forum Q&A

Multipurpose Reconfigurable Training System – 3D Presentation – David Williams (NAWC Training Systems Division)

Q1. Do you have customers from other services that leverage MRTS 3D?

A1. Only Navy now. We are looking at an inquiry from Army with funding for FY18. The number of Navy customers interested are growing daily.

Q2. Where do the requirements and resources come from needed to develop and roll out training packages?

A2. The program has only been around about 5 years. We started in-house. This year we have done $20M of MRTS 3D business. The equipment sponsor provides the requirements. Coding is outsourced.

Q3. This looks like a very powerful training tool. What reference material is used to generate the 3D models of the consoles? Are you using laser scanning equipment to capture control rooms?

A3. We have not laser scanned yet. With regard to reference material, for the Navy VA class diesel generator the Navy bought the 3D CAD files. Our 3D models reduce the time in half.

Q4. Which IT network is this running on? NGEN, RDT&E, other?

A4. They are all stand-alone networks. We haven't had a need yet. Connectivity is easy, the hard part is cybersecurity.

Q5. Have you developed any training simulations for maintenance managers or for CPI/LEAN training?

A5. VA Diesel had some money left over. We have performed some maintenance tasks. Future work includes O-level maintenance tasks also.

Q6. Is S-1000D standard required for MRTS? (S1000D = International standard for tech manuals, xml-based. Used for IETMs.)

A6. Yes, looking out, IETM type products – government logic trees

Enhancing Maintenance with Augmented and Mixed Reality Technologies Michael Robinson & Patrick Violante (NSWC Philadelphia)

Q1. Is this capability in use in any of the shipyards? What is the tech transition plan?

A1. It is not. Talking to Norfolk as part of our innovation venture and working on the next step.

Q2. What is the tether like from the HoloLens? Does it go to the tablet or a computer? Is there a power supply or battery?

A2. Everything is built-in. There is no hard wire. Everything is through Blue-tooth. The user can share their display. The battery lasts approximately 4 hours.

Q3. Is there a plan to connect NAVSEA's ETWD system with these AR tools?

A3. We haven't started down that path yet. We are ready and working on another tablet-based system.

Virtual Reality for Distributed Workforce Settings – Dr. Alexander Klippel (PSU)

Q1. Are you looking into improvements in recollecting of knowledge/data through usage of the virtual environments (Edgar Dale)?

A1. We have a number of different outcome scenarios. Yes, the outcomes will be used for improvements.

Q2. How do you measure effectiveness differences between real and virtual immersive training?

A2. Good question. Most immersive experiences that we use are supplemented by real world experiences. For example, we visit an active volcano as one experience. However, we have not set up an experiment to measure the difference.

Q3. Have you piloted this virtual full immersion capability with any DoD partners?

A3. No

INTERACT Multi-Modal Interface to Improve Immersive Training – Jonathan Brown (AnthroTronix, Inc.)

Q1. Have you measured the improvement in knowledge retention and time to train using multi-modal full immersion virtual training versus traditional classroom training?

A1. Not yet, but it is part of our goal.

Augmented Reality Paint Simulator – Ken Fahrney (LEAD)

Q1. What was your purchase cost for the system?

A1. We did not design, but utilize the virtual reality simulator. We set up a satellite site for the University of Northern Iowa. We pay a fee for the service and training.

Q2. Is the simulator required to certify your painters?

A2. Yes, it is. We actually use it score the person on transfer efficiency.

Q3. Have you measured your before and after waste reduction? Time to paint?

A3. Time to paint – No – it varies with the painter. We have seen some decrease in waste.

Q4. How many man-hours for the basic/starter qualification?

A4. Initially a 3 day class. The refresher class is 1 day.

Q5. Is there a presentation available for this system that can be sent out with some POC information?

A5. University of Northern Iowa has the user guide for VirtualPaint online.

Q6. Does it include sanding and other elements, or just paint?

A6. We are going to include sand blasting in the future and also looking at a blueprint reading class.

Comment. I believe Norfolk Naval Shipyard is also using a virtual reality paint simulator that records over-spray, drips, coverages, thickness and scores based coverages and deficiencies