

AFRL FIGHT'S ON!

THE AIR FORCE RESEARCH LABORATORY

VOLUME 34
SPRING 2019

COMBAT AIR FORCES MIGRATION TO PROFICIENCY-BASED TRAINING



Proficiency-based Training: The ability to quantify acceptable levels of performance, compare observed warfighter proficiency to that performance level and target areas requiring improvement.

—Combat Air Force LVC Vision, July 2014

Photo by Master Sgt Burt Traynor

Over the past several years, the Warfighter Readiness Research Division has partnered with Headquarters Air Combat Command, Flight Operations Division and the Test and Training Division to create a set of technologies that track specific subjective and objective mission-performance indicators; facilitate visualizing those indicators for after-action reviews and data warehousing; and quantify and monitor the quality and fidelity of training environments—both live and virtual. The Commander, Air Combat Command has identified the need to capture more specific performance and proficiency data as a means of improving and targeting training and readiness resources into the 2030 timeframe.

Based on this identified need, our first and foremost priority is combat employment in support of the joint mission. Adequate training enables our warfighters to meet combatant commanders' mission-proficiency expectations and helps ensure they are prepared for the challenges in their respective theaters of operations. Because our current training framework inherently contains some limitations, we have developed a multi-faceted rationale for modifying the training framework. This framework includes clarification of training needs and requirements, integration of relevant warfighting systems during training ("train as we fight") and ensures training remains as agile and adaptable as the future fight will require.

Central to the 2030 readiness target is moving from event-based to proficiency-based training. Developing and maintaining proficiencies will be the framework that defines individual competency and shapes readiness assessments and reporting, when aggregated at the unit level. Proficiency-based training will not replace the Ready Aircrew Program (RAP), but will be a hybrid of the two, such that identified proficiency deficiencies will influence subsequent RAP training events.

A shift to a proficiency-based system for readiness will enable assessment of performance (via objective and subjective measures) rather than counting the number of training events. The goal is to maximize the efficient use of resources to attain greater proficiency. Identified areas for improvement could be the target of a simulator scenario generated by a knowledge management system. The ability to assess proficiency could include a "common core" of required warfighter knowledge, skills and developmental experiences across missions or theaters to maximize warfighter readiness for the broadest possible set of contingencies.

Appropriate assessment metrics will be developed, validated, fielded and tracked to proactively refine proficiency levels and address emerging mission requirements. In addition, these metrics will optimize debriefing and enable tailorable reviews that target critical training aspects and real-time performance indicators for all participants.

In addition to appropriate metrics, we will develop a common performance assessment vernacular (based on Component-Major Command or Numbered Air Force performance expectations) for use among the various communities that observe and assess warfighter performance.

Identifying desirable current training practices that should continue and expand to all segments of the training audience will capitalize on efficiencies and enable a common training strategy. In addition, addressing modifications to the learning and training infrastructure can occur at the same time. Implementing modifications to the training framework, such as those detailed, will improve training readiness that is required to meet mission-proficiency expectations for our warfighters now and for the next decade. ☆

Dr. Winston Bennett, Readiness Product Line Lead

Dr. Leah Rowe, Branch Technical Advisor

Mr. Charles Colegrove, HQ ACC/A35

RED FLAG 19-1 DATA ARE ADVANCING PROFICIENCY-BASED TRAINING

The Warfighter Readiness Research Division supported RED FLAG 19-1, the largest high-intensity air-to-air combat exercise in the history of the Air Force. A record 39 units and 2,909 attendees along with the implementation of more complex multi-domain command and control scenarios than previous exercises provided ample opportunity for the Division to achieve its primary goal, which was to access live aircraft performance data and expedite Sharable LVC (Live-Virtual-Constructive) research objectives for proficiency-based training.

In 2018, the RED FLAG Commander requested the Division's guidance and support of the exercise in two areas: (a) exercise analytics to track participant readiness and effectiveness, and (b) define requirements for an enhanced multi-domain integrated debrief capability to increase learning and human performance at the exercise. To accomplish this, RED FLAG provided the adaptive LVC for the Enhanced Warfighter Readiness & Training Program full access to the exercise and its participants. RED FLAG also gave the program access to all associated training data necessary to build an infrastructure to support proficiency-based training.

The Division responded successfully to the Commander's request with three lines of effort.

1. Participant Analytics: The team stood up a data analytics cell, including 50 tablets and a secure standalone wireless network, which provided near real-time exercise analytics in a classified environment. This was the first time that RED FLAG has ever integrated modern wireless technology in their facility.

2. Space and Cyber Debrief Visualization: Under a Cooperative Research and Development Agreement with Cubic Corporation, the team delivered integrated multi-domain kinetic and non-kinetic effects in a unified debrief platform. Currently, no debrief technology has the ability to capture live space and cyber non-kinetic effects alongside traditional kinetic effects within a single program. Additionally, through analytical efforts, the team is quantifying the impact of the new debrief format to participant readiness.

3. Digital Mission Planning: The team shadowed a subset of mission planning activities at RED FLAG 19-1 with a prototype digital mission planning capability (Metis) that will serve as part of the technical foundation for digital-mission representations to improve debrief. The evaluation showed significant potential improvements to the current planning processes and timeline, and the data collected will shape future development direction. Support of the RED FLAG exercise provided the Division vital access to large volumes of quality data that will drastically reduce the time required to complete Shareable LVC objectives and bring the Air Force closer to a proficiency-based training model. The testing of these technologies at RED FLAG is accelerating maturation and future transition to the warfighter. ★

Crew chiefs assigned to the 4th Aircraft Maintenance Unit prepare to launch F-35A Lightning II fighter jets during RED FLAG 19-1 at Nellis Air Force Base's Nevada Test and Training Range. RED FLAG is a contested combat training exercise involving the United States Air Force and its allies.

Photo by Mr. Ronald Bradshaw

Dr. Leah Rowe, Branch Technical Advisor
Dr. Kevin Gluck, Core Research Area Lead
Capt Nicholas Attilio, C4ISR Team Lead
Mr. Joshua Ziegler, Computer Scientist
Mr. Brandon Nolan, Computer Scientist
Ms. Suzette Westhoff, Senior Technical Writer/Editor



711TH HPW/RHA

Hails

Dr. Jim Bliss
Mr. Kerry Campbell
Mr. Michael Colón
Mr. Ian Davis
Ms. Meghan Letizia
Maj Jason Lingle
Lt Tyler Lucas
Ms. Katherine Silas

Farewells

Ms. Misty Adams
Mr. Tony Bailey
Maj Kristi Buczek
Ms. Olivia Leung
Ms. Siera Martinez
Lt Col Eric Peschell
Mr. Mark Speed



Photo by Mr. Will Graver



Photo by 1982 Warfighter Readiness Research Division

CELEBRATING 50 YEARS OF COMMITMENT TO OUR WARFIGHTERS

Established as the Flying Training Division on 9 May 1969, the Warfighter Readiness Research Division has become recognized as a center of excellence in science and technology for education, training and readiness. Since its beginning at Williams Air Force Base, the Division has focused on creating and validating training research methods, models and innovative technologies that prepare warfighters for ever-changing missions.

As a driving force in Department of Defense pilot-training research, the Division's early work included curriculum design and engineering of technology that is central to today's modeling and simulation training.

DIVISION-LED PIONEERING WORK:

- Display and screen technology
- Motion cueing
- Simulator-flight ground models and mapping
- Helmet-mounted displays
- Run-time databases

Researchers and engineers explored how to network simulators to interoperate. These collaborative efforts culminated in Distributed Interactive Simulation as a protocol and later an IEEE (Institute of Electrical and Electronics Engineers) standard. The Division was also a key innovator in the definition and implementation of high-level architecture (HLA) as another distributed simulation standard. In fact, the Division's F-16 research testbed was among the first to be HLA accredited!

Throughout the years, Division personnel were actively involved in standards working groups in which their expertise and testbeds were leveraged to derisk standards in development.

The Division has also maintained an active presence in Joint and multinational collaborations for shared practices, common principles for learning and readiness assessment and NATO Standardization Agreement development. Division staff pioneered the Air Force's Distributed Mission Training concept as well as partnered with the Air Force Materiel Command Simulator System Program Office and then Colonel Ellen Pawlikowski and her team to field, evaluate and operationalize tactical training simulation. When Distributed Mission Training evolved into Distributed Mission Operations, the Division met the need to address additional integrated operations training with research studies, protocols, assessments and testbeds.

Today, the teams have research, engineering and transition work underway in and across a wide range of mission environments. A recent example of the Division's mission-relevant work was the Secure LVC [Live-Virtual-Constructive] Advanced Training Environment Advanced Technology Demonstration (SLATE ATD). This successful proof-of-concept prototype injected real-time virtual and constructive entities into live aircraft for advanced operational training—a game changer for future combat training!

As it has during the past fifty years, the Division will continue to collaborate with other technical divisions; Service laboratories; academia; and Joint, multinational, acquisition and industry partners to drive innovations in competency and proficiency-based learning and readiness science and technology. ★

Dr. Winston Bennett, Readiness Product Line Lead
Ms. Suzette Westhoff, Senior Technical Writer/Editor

DID YOU KNOW?

The Division had three personnel assigned to it initially
 The Mesa Research site officially closed on 15 September 2011
 The Division has had seventeen Division Chiefs

RECOGNITIONS

711TH HUMAN PERFORMANCE WING

RHA 1ST QUARTER WINNERS

Non-commissioned Officer:

SSgt Kacper Sovinski

Company Grade Officer:

Lt Alex Gaines

Field Grade Officer:

Maj Miguel Valle III

SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS (STEM) AWARDS

Outreach Champion Individual Award:

Lt Mitchell Lichtenwald

Outreach Champion Team Award:

GRILL® Team

Dr. Winston Bennett • Mr. Jonathan Diemunsch
Lt Mitchell Lichtenwald • Mr. Quintin Oliver

John L. McLucas Basic Research Award:

Dr. Glenn Gunzelmann

TRAINING SYSTEMS PRODUCT GROUP (TSPG) AWARDS

Excellence in Team Performance:

SLATE Team

Mr. John Noah • Maj Thomas Adams
Dr. Winston Bennett • Mr. Lance Call
Capt Michael Dooley • Dr. Donald Duckro
Dr. Ahmad Glover • Capt Darin Hoover
Mr. Michael Schwamm • Maj Miguel Valle III
Mr. John White

Excellence in Technical Achievement:

Lt Julian Barriga

Excellence in Leadership:

Ms. Stephanie Howard

Excellence in Program Support:

Mr. Garrett Goodin

DECORATIONS

Air Force Commendation Medal:

SSgt Kacper Sovinski

Air Force Achievement Medal:

SSgt Kacper Sovinski

SPECIAL AWARDS

Forty Under 40:

Dr. Leah Rowe

United States Patent:

Dr. Tiffany Jastrzembski • Dr. Kevin Gluck
Mr. Michael Krusmark • Mr. Stuart Rodgers

President's Volunteer Service Award:

Ms. Cayley Dymond

NEWS FLASH

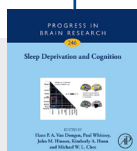


FORTY UNDER 40 AWARD RECIPIENT: DR. LEAH ROWE

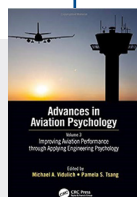
Dr. Leah Rowe was one of forty recipients, of nearly 250 people nominated, for the Forty Under 40 Award, which honors the region's brightest young leaders who have demonstrated business success during the past year. This prestigious recognition is a well-deserved testament to her work within the Warfighter Readiness Research Division, the Department of Defense and the local community.

PUBLISHED CONTENT

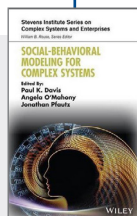
Book Chapters Written by Division Researchers



Gunzelmann, G., James, S., & Caldwell, J. L. (2019). Basic and applied science interactions in fatigue understanding and risk mitigation. In P. Whitney, J. Hinson, M. Chee, K. Honn, & H. P. A. Van Dongen (Eds.), *Progress in Brain Research, Vol. 246: Sleep Deprivation and Cognition* (pp.177–204). Academic Press.



Gluck, K. A., Jastrzembski, T., & Krusmark, K. (2019). Prospective comments on performance prediction for aviation psychology. In M. A. Vidulich & P. S. Tsang (Eds.), *Improving aviation performance through applying engineering psychology: Advances in aviation psychology, Volume 3* (pp. 79–98). Boca Raton, FL: CRC Press.



Saldahna, E., Blaha, L. M., Sathanur, A. V., Hodas, N., Volkova, S., & Greaves, M. (2019). Evaluation and validation approaches for simulation of social behavior: Challenges and opportunities. In P. K. Davis, A. O'Mahony, & J. Pfautz, *Social-Behavioral Modeling for Complex Systems* (pp. 495–520). Wiley.



DIVISION SUPPORT TO COMMANDER'S PROJECT TEAM RESULTS IN PATENT

In 2016, Division computer scientist Fred Webber served on the Commander's SUSTAIN (Singapore-United States Tactical All-Inclusive Navigation) project on behalf of the Air Force Research Laboratory. Webber and fellow team member, Eric Vinande (Sensors Directorate) developed a method of rapidly initializing a navigation system, such as a cell phone, from a more powerful "advantaged" platform. The method makes it possible to initialize navigation devices with a position solution in under half a second, which may otherwise not be possible due to a weak signal or practical due to a long signal-acquisition time.



Published quarterly since 2001, Fight's ON! continues to serve as the Division publication for our partners and features innovative science and technology that is accelerating and revolutionizing readiness.

Distribution Statement A / Approved for public release; distribution is unlimited.

Fight's ON! Point-of-Contact
Patricia D. Wood, 711 HPW/RHAO
patricia.wood.2@us.af.mil
937-938-4051

Cleared / Case # 88ABW-2019-3186

711/HPW RHA Branches:

- Cognitive Science, Models and Agents (RHAC)
- Operations Support (RHAO)
- Continuous Learning and Performance Assessment (RHAS)