

Integrated Visual Augmentation System (IVAS)

Executive Summary

- On September 25, 2018, the Army Acquisition Executive approved the Integrated Visual Augmentation System (IVAS) to proceed as a middle tier of acquisition rapid prototyping effort. The Army intends to deliver 2,550 IVAS prototype systems using an iterative approach of four capability sets.
- In March 2019, the Army executed Soldier Touch Point (STP) 1 to assess Capability Set 1 prototype capabilities in an operational environment.
 - Soldiers and marines equipped with IVAS Capability Set 1 navigated and maneuvered with the Heads-Up Display (HUD) and observed targets in low-light conditions. Warfighters trained in the Synthetic Training Environment, entering and clearing six rooms in a real-world building against virtual targets.
 - Overall, warfighters responded favorably to surveys on the usability and perceived usefulness of IVAS.
- DOT&E observed STP 1 and submitted an evaluation to Congress as requested by the Chairman, Senate Armed Services Committee.

System

- The IVAS is a HUD, body-worn computer, and networked radio.
- The Army intends IVAS to use a variety of imaging sensors, artificial intelligence, and machine learning to provide a fully integrated day/night combat capability at the forward edge of the battlefield.
- The Army has structured IVAS as a middle tier of acquisition, 2-year prototyping period with four capability sets with software sprints and hardware builds. The Army and Microsoft will define each capability set in a design review based on the results from the previous capability set and overarching program goals.
 - The IVAS Capability Set 1 is Microsoft’s commercial HoloLens 2 with an integrated commercial, thermal sensor, and Tactical Assault Kit software and maps. These prototypes operate on an internal battery and require a Wi-Fi network. The Army received delivery of 50 systems in March 2019.
 - The IVAS Capability Set 2 will be a modified commercial prototype with integrated tactical radios and GPS capability. The Army expects to receive delivery of 300 systems in October 2019.
 - The IVAS Capability Sets 3 will be the ruggedized military form factor with integrated low light and thermal sensors. The Army expects to receive delivery of 600 systems in June 2020.
 - The IVAS Capability Set 4 will be the production-ready end-user device to provide enhanced squad lethality.



Soldier wearing the IVAS heads-up display (HUD).

The Army expects to receive delivery of 1,600 systems in September 2020.

Mission

- Commanders of Army and Marine Corps close combat formations and Special Operations Forces units will employ IVAS to achieve overmatch against near-peer threats identified in the National Defense Strategy. The Army intends to evolve the concept of operations in coordination with the joint force through experimentation as the system capabilities mature.
- Squads will train with IVAS in the Synthetic Training Environment in a high fidelity, live and mixed reality, immersive environment enabling rapid conduct and repetition of training scenarios.

Major Contractor

Microsoft – software developed in Redmond, Washington, and hardware developed in Mountain View, California

FY19 ARMY PROGRAMS

Activity

- On September 25, 2018, the Army Acquisition Executive approved IVAS to proceed as a middle tier of acquisition rapid prototyping effort. In November 2018, the Army awarded an Other Transaction Agreement to Microsoft to develop IVAS.
 - In March 2019, the Army executed STP 1 at Fort Pickett, Virginia, to assess Capability Set 1 prototype capabilities to determine if the HoloLens commercial technology could be adapted for military combat and training use.
 - DOT&E observed STP 1 and submitted an evaluation to Congress as requested by the Chairman, Senate Armed Services Committee in July 2019. Since STP 1 was an experiment, the Army did not develop an operational test plan for DOT&E approval.
 - The test design include both demonstration activities (performed once) and investigation activities (repeated with increasing complexity over time). STP 1 data collection consisted of recording whether warfighters successfully completed specified tasks, focus groups, and surveys aimed at gaining increased understanding of user acceptance.
 - Soldiers and marines, organized into fire team units, conducted land navigation, trained in the Synthetic Training Environment, fired virtual M4 airsoft rifles with rapid target acquisition technology, and observed targets under low light conditions. IVAS operated on a Microsoft-provided network.
 - The Army intends to execute STP 2 to assess Capability Set 2 in October and November 2019 at Fort Pickett, Virginia. Building on information learned from STP 1, the Army will conduct STP 2 with squad and platoon-sized units. DOT&E will observe STP 2.
 - Observation of hidden and moving human targets during low-light conditions indoors, in a darkened room, and outdoors at day and night with an integrated thermal sensor.
 - Live-fire shooting while wearing IVAS hardware.
- The goal of STP 1 was to measure user acceptance and military feasibility of IVAS. Overall, warfighters responded favorably to surveys on the usability, perceived usefulness, and acceptability of IVAS.
- The Army has not developed an experimentation and evaluation strategy, to include cybersecurity testing and integration in the tactical network, to guide the rapid prototyping efforts. An experimentation and evaluation strategy will help define scope and resources required for subsequent STPs.
- A comparative evaluation between Army and marine platoons equipped with IVAS and a baseline platoon against a robust opposing force would allow the Army to measure the stated program goal of increased lethality.
 - The Army will need instrumentation for IVAS for future STPs and operational tests. The Army could find efficiencies by leveraging the embedded tools developed by Microsoft.
- The Program Office and Soldier Lethality Cross-Functional Team have maintained an environment of inclusiveness with DOT&E. DOT&E will remain engaged and report on subsequent Capability Sets and STPs.

Assessment

- During STP 1, warfighters equipped with IVAS Capability Set 1 demonstrated the following:
 - Navigation and maneuver indoors and outdoors using Tactical Assault Kit software and maps integrated into the HUD
 - Enter and clear six rooms as a team in a real-world building with virtual Synthetic Training Environment targets and content using synthetic M4 airsoft rifles and trackers. Following each experiment run through, warfighters received feedback about their performance including shots taken, kills, and shots received. Warfighters could replay their actions as avatars in a virtual after-action review.
 - Shooting with rapid target acquisition-like technology against virtual targets. Upon completion, the HUD provided the shooter's score.
- ## Recommendations
- The Army should:
1. Develop an experimentation and evaluation strategy to guide rapid prototyping efforts.
 2. Conduct a comparative evaluation between Army and Marine platoons equipped with IVAS and a baseline platoon against a robust opposing force.
 3. Conduct STP 3 or 4 in conjunction with the Integrated Tactical Network to prove the brigade network is capable of supporting the increased bandwidth requirements and to gain understanding on limitations. IVAS should be assessed in each expected mode of operation (fight, rehearse, and train) and the corresponding communications conditions (jammed, contested, and permissive).
 4. Work with Microsoft to determine how embedded IVAS instrumentation can be used to support both test and evaluation and training after action reviews.
 5. Conduct a cyber-tabletop exercise.