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# **Development of a training tool for enhancing operator sustained attention in the Testbed for Integrated Ground Control Station (GCS) Evaluation and Rehearsal (TIGER)**

## **Progress Report**

*June 2016 to December 2017*

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## **Abstract**

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This reference document describes work to develop a training tool for payload operators of Unmanned Aircraft Systems (UASs) in support of the Royal Canadian Air Force (RCAF) Joint Unmanned Aerial Vehicle Surveillance Target Acquisition System (JUSTAS) project for the period June 2016 to December 2017. The tool is to enhance sustained operator attention when monitoring UAS sensor displays for prolonged periods of time. Topics covered are a brief introduction to sustained attention, the study methodology, and the present state of the study.

## Résumé

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Le présent document de référence décrit les travaux effectués en vue d'élaborer un outil de formation pour les opérateurs de charge utile des systèmes d'aéronef sans pilote (UAS) à l'appui du projet du Système interarmées de surveillance et d'acquisition d'objectifs au moyen de véhicules aériens sans pilote de l'Aviation royale canadienne, pour la période de juin 2016 à décembre 2017. L'outil vise à accroître l'attention soutenue des opérateurs lorsqu'ils surveillent les affichages de capteur des UAS pendant de longues périodes. Dans le présent document, on donne une brève explication du concept de l'attention soutenue et on présente la méthodologie et l'état actuel de l'étude.

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# **1 Introduction**

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## **1.1 Background**

An Unmanned Aircraft System (UAS) includes the Unmanned Aircraft Vehicle (UAV), the Ground Control Station (GCS), and the human crews. UAS are a low-risk force multiplier for military operations, allowing militaries to perform a variety of missions that include Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) without putting a pilot's life at risk (Cook, 2007). The Joint Unmanned Aerial Vehicle Surveillance Target Acquisition System (JUSTAS) project will procure and field a mature Medium-Altitude, Long-Endurance (MALE) UAS to provide reconnaissance, surveillance, target acquisition, and precision strike capabilities to the Canadian Armed Forces (CAF). The MALE UAS will complement existing capabilities and increase maritime and arctic domain awareness. The Testbed for Integrated Ground Control Station (GCS) Evaluation and Rehearsal (TIGER) is the simulation GCS being used to assess operator training needs, crew configuration, and human system integration technologies in order to make recommendations to the JUSTAS project for GCS design and training (Covas-Smith, Grant, Hou, Joralmon, & Banbury, 2015; Hou, 2015). The outcome of research on critical GCS human-machine interface information requirements, identified with TIGER, will provide inputs to the Statement of Requirements being produced by the JUSTAS Project Management Office (PMO; Hou, 2015). The effectiveness of advanced interface technologies in the GCS will be optimized by identifying problems with prolonged operator monitoring in UAS operations and by proposing strategies to enhance operator performance.

## **1.2 Purpose**

The purpose of this reference document is to describe work on the development of a training tool on sustained attention in support of the Royal Canadian Air Force (RCAF) JUSTAS project for the period June 2016 to December 2017. The tool aims to enhance sustained operator attention when monitoring UAS sensor displays for prolonged periods of time. The initial stages of work performed on the development of a training tool on sustained attention is reported elsewhere (Arrabito, Grant, Jarmasz, & Hou, 2016).

## **1.3 Scope**

The study of sustained attention is part of the Air Reach Human Cognition project whose objective is to conduct research on design concepts, training approaches, and best practices in Human-Technology Effectiveness (HTE) to support the development and evaluation of future autonomous systems within the CAF.

## **1.4 Outline**

Section 2 provides a brief introduction to sustained attention. The goal of the study is provided in Section 3. Sections 4 and 5 describe the stimuli and experiments, respectively. We discuss the present state of the study in Section 6. The conclusions are presented in Section 7.

## 2 A Brief Introduction to Sustained Attention

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The study of sustained attention or vigilance investigates the ability of human observers to maintain attention and remain alert for the detection of critical signals (e.g., enemy targets and system malfunctions) that occur infrequently and at irregular intervals over a prolonged period of time (Davies & Parasuraman, 1982; Warm, 1984). Work environments that require sustained attention include detecting targets in military surveillance devices, screening x-rayed carry-on luggage, conducting industrial products control, inspecting anesthesia gauges during surgery, and monitoring automated systems (Warm, Parasuraman, & Matthews, 2008). The failure of operators to sustain attention in these settings could increase the probability that critical signals will not be detected or increase the time taken to respond to critical signals, which could have severe consequences.

The ability of human observers to detect critical signals in monitoring tasks is remarkably fragile. The fragile nature of observer performance is reflected in the decrement function, a decline over time in the frequency of the detection of critical signals and/or a slower response time to critical signals that are correctly detected. This decline is often complete within the first 30 minutes of the watch (Davies & Parasuraman, 1982; Warm, 1984), but it can appear within the first 5 minutes of the watch when the task is highly demanding (Helton et al., 2007; Jerison, 1963; Nuechterlein, Parasuraman, & Jiang, 1983; Rose, Murphy, Byard, & Nikzad, 2002; Temple et al., 2000).

The decline in observer performance is attributed to the high mental workload for processing of information in a vigilance task, and the decrement reflects the depletion of information-processing resources over time (Helton et al., 2005; Johnson & Proctor, 2004; Warm & Dember, 1998; Warm, Dember, & Hancock, 1996; Warm et al., 2008). Additional support that the vigilance decrement reflects the temporal depletion of information-processing resources is provided by a decline in cerebral blood flow velocity as measured by transcranial Doppler sonography, a psychophysiological index of information processing resource utilization during sustained attention (Matthews et al., 2010; Shaw et al., 2009; Warm & Parasuraman, 2007). Operators also find vigilance tasks highly stressful (Szalma et al., 2004; Warm, Parasuraman, & Matthews, 2008; Warm, Finomore, Vidulich, & Funke, 2015).

Given the ubiquitous role of vigilance in work environments, techniques to attenuate the vigilance decrement and to reduce the mental workload and psychological stress in vigilance tasks are required to minimize its negative impact on worker health and productivity (Nickerson, 1992). The results of sustained attention research have practical implications for the RCAF JUSTAS project. A missed detection of a critical signal in a UAS monitoring task like those examined with TIGER, for example, could lead to mission failure, costly repairs, or loss of a UAS. The failure to detect enemy threats has motivated researchers to investigate various techniques to improve sustained attention for UAS operators. For example, two different visual display formats (sensory display and cognitive display) were examined in aiding UAS operators to detect enemy threats (Gunn, Warm, Nelson, Bolia, Schumsky, & Corcoran, 2005). As training interventions have been shown to mitigate the vigilance decrement in laboratory-based sustained attention tasks (e.g., Davies & Parasuraman, 1982), it is also important to investigate whether training can improve sustained attention for UAS operators.

A necessary step in investigating how to improve sustained attention in applied tasks such as UAS operations is to develop more operationally-relevant stimuli sets. Stimuli used in traditional sustained attention studies consisted of both simple and artificial elements (e.g., detecting different line lengths,

relative lightness of pairs of circles, symbols of aircraft flying in circular patterns, and air traffic control displays, which show flight paths represented as lines) that purport to represent important aspects of detection and discrimination tasks in operational settings (Szalma et al., 2014). In almost all of these sustained attention studies, the stimuli to be inspected were presented in a series of individual discrete trials. Although such configurations can be representative of some actual real-world tasks, they bear only a limited resemblance to the relevant features of many real-world detection requirements (Donald, 2008). Most operational settings are dynamic, i.e., the flow of information is continuous rather than discrete. Real-world environments surrounding any pre-specified or spontaneous target comprise a multitude of irrelevant objects and/or people rather than a uniform or uncluttered background. One such environment is the detection of armed militants carrying out insurgency activities. The detection of armed militants is often difficult because they are disguised and integrated with local inhabitants, making it difficult to discriminate friend from foe. Preliminary work on sustained attention in dynamic environments has been conducted (e.g., Szalma et al., 2014) but this study was not representative of the demands required of operators in the GCS. TIGER, however, provides the capability to study the simulation of Payload Operators (POs) monitoring a video sensor feed over extended periods for the presence of armed militants that is representative of a real-world task carried out by a UAS used by the RCAF. This, in turn, will allow us to investigate the effectiveness of training interventions for sustained attention that are of relevance to the RCAF.

### 3 Study Goal

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The present study will simulate a condition whereby an operator must monitor a visual display for the appearance of a predetermined target. Participants will not know when the target will appear. All the signals that are not targets will be presented more frequently than the targets in order to simulate a real-world monitoring condition. The baseline evaluation of operator sustained attention will comprise a structured, simulation-based study. Participants, acting as a UAS PO, will complete a series of critical tasks within a simulated mission representative of future RCAF UAS missions and operational environments. The participants' performance in a series of simulated UAS missions will be measured using objective and subjective approaches and analyzed to describe UAS operator performance, mental workload, stress, and confidence in monitoring performance.

Future studies will measure the improvement in operator sustained attention by employing countermeasures evaluated in laboratory settings that include the provision of rest breaks (Arrabito et al., 2015; Colquhoun, 1959; Pigeau, Angus, O'Neill, & Mack, 1995; Szalma et al., 2004), direct supervision (Bergum & Lehr, 1963; Fraser, 1953), and knowledge of results in the form of performance feedback (McCormack, 1959). Finally, the series of studies will obtain feedback on the GCS concept implemented in TIGER to propose novel countermeasures for the development of a training tool that can be evaluated to sustain operator performance in real-world scenarios for the RCAF.

## 4 Stimuli Development

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This section describes the stimuli used in the study of sustained attention for the JUSTAS project in support of the RCAF.

### 4.1 Mission Scenario Development Environment

Following the selection of the operational requirements of interest, a mission scenario was developed that is representative of a real-world task carried out by a UAS used by the RCAF. The mission scenarios are developed using Virtual Battlespace 2 (VBS2) v1.6 from Bohemia Interactive Simulations (Orlando, FL). VBS2 is a flexible simulation training solution for multiplayer scenario training, and mission rehearsal. VBS2 has been used by military organizations and industry for a broad range of training tasks. VBS2 enables trainers and users to conduct virtual exercises for land, air, maritime, and shoreline operations in highly immersive environments.

The VBS virtual environment offers realistic physics, comes with an extensive content library for creating models and populating scenarios, and has the capability for expanding existing terrains and developing geospecific terrains. VBS2 provides limited Artificial Intelligence (AI) for controlling virtual actors (often termed “AI units”). Behaviours are largely limited to path finding or the triggering of simple scripts in response to events. VBS2 is equipped with a robust Developer Suite including tools for creating buildings, creating terrains from satellite imagery and other data sources, and converting models designed in other environments to work with VBS2. Researchers have used VBS2 to investigate operator sustained attention (e.g., Szalma et al., 2014).

### 4.2 Target

The target in the mission scenario is a male wearing a light blue long tunic and matching pants, a dark cap, and a grey “suicide vest,” that is, a vest packed with explosives. The explosives are on the front of the vest. The shoulder straps on the vest cross over in the back to form an X-shaped pattern, visible from a rear view of the target. VBS2 provides a choice of six colours of the clothing for the target: white, pink, green, blue, brown, and black. As the suicide vest was available only in grey, an important consideration for choosing the colour of the target’s clothing was the colour contrast between the target clothing and the suicide vest. A high contrast would make the target stand out in the scene, while low contrast would make it too difficult to detect the target. Therefore, the white and pink coloured clothing were excluded for having too great a contrast, and the green, brown, and black coloured clothing were excluded for having too little contrast. We ultimately chose the blue coloured clothing for the target (see Figure 1). Pilot testing has yet to validate this choice.



*Figure 1: Front view of target.*

### 4.3 Mission Scenario

The mission scenario simulates the condition of the PO monitoring the sensor feed of the UAS for insurgency. It was developed in consultation with JUSTAS Subject Matter Experts (SMEs) so as to capture representative aspects of video feeds POs could expect to encounter during surveillance taskings on counter-insurgency-type operations. In this mission scenario, the UAS maintains a counter-clockwise orbit with fixed altitude and speed. Its visual sensor is locked to a location on the ground, maintaining fixed zoom, and unoccluded line of sight on the location. An environment resembling village marketplaces often encountered by CAF troops on previous peace support operations was created using VBS2 content meant to simulate environments found in Afghanistan. The central area of the marketplace is rectangular, formed by two long rows consisting of small buildings and two shorter sides (see Figure 2). Many of the buildings have front awnings. The left side of Figure 2 is composed of buildings and the right side of Figure 2 has an archway for incoming and outgoing pedestrian and vehicle movement. In addition to this archway, at the midpoint of the bottom rows of buildings, there is a long tented structure open at both ends that also allows for movement in and out of the central space.

The activity of the marketplace consists of people (men/women/boys/soldiers), animals (e.g., dogs and donkeys), and vehicles (e.g., cars, tanks, and bikes). The area is also populated with objects that one might find in a marketplace (e.g., tables, barrels, plants, cardboard, and pallets of various wares). Some people are dressed in typical Afghan clothing such as long tunics, matching pants, hats/caps for men and burqas for women, while other men are wearing Western style clothing (e.g., buttoned shirts, pants or jeans). People's movements were designed to mimic naturalistic behaviour such as walking across the length of the marketplace, walking from building to building, or standing still in pairs or groups. In the

periphery of the marketplace, marked by the area behind the buildings (see Figure 2), there are boys playing together in addition to adults and animals walking around.

Efforts are underway to develop several mission scenarios that are variations of the scene described in Figure 2. Each mission scenario is five minutes in duration. The UAS takes one minute to make one complete revolution of the scene. All mission scenarios share the same layout (Figure 2); what differs is how each mission scenario is configured in terms of people's movements and locations over the course of time. This is done to simulate a real-world marketplace since the activity varies from day to day. For example, in one mission scenario a car arrives, people enter it and then drive off. In a different mission scenario, this event may occur again, but it will be at a different time and/or location in the marketplace. Another example may be the arrival of a military vehicle (e.g., tank or jeep) with U.S. soldiers. In one mission scenario, the soldiers may arrive at the beginning to patrol the main area of the marketplace whereas in another mission scenario, the soldiers may arrive at a later time and patrol the periphery of the marketplace. All the developed mission scenarios will be concatenated to form a video that will be presented to the participant. The order of concatenation will be randomly determined for each participant.

The target appears at random intervals for a brief duration in each mission scenario. Specifically, targets appear at a rate of 1–2 per minute with at least 30 seconds between targets. This target rate is similar to that used in traditional sustained attention research (Becker, Warm, & Dember, 1994; Szalma et al., 2004; Szalma, Warm, Dember, & Parsons, 2006; Szalma, 2011). Figure 3 presents an example of the target in the mission scenario. In accordance with Szalma et al. (2014), targets emerge from occluded positions to better control the ease of detection and to limit the duration of target exposure to a few seconds.



**Figure 2:** Image of a fictitious Afghanistan marketplace used in mission scenario.



***Figure 3: Example of target appearance in mission scenario.***

## 5 Experiments

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To date three DRDC Human Research Ethics Committee (HREC) protocols for the sustained attention study have been prepared and approved (Arrabito & Grant, 2016a, 2016b; Arrabito & Jarmasz, 2017). These DRDC HREC protocols are inter-dependent and must be run in the following order: 1. stimuli selection, DRDC HREC protocol # 2017-029 (Arrabito & Jarmasz, 2017), 2. stimuli validation, DRDC HREC protocol # 2016-033 (Arrabito & Grant, 2016b), and 3. baseline evaluation study on sustained attention, DRDC HREC protocol # 2016-004 (Arrabito & Grant, 2016a). Each HREC protocol requires that mission scenarios be developed. As all the mission scenarios have not yet been developed, none of the DRDC HREC protocols have been executed. Each DRDC HREC protocol is briefly summarized below.

### 5.1 Stimuli Selection for Baseline Evaluations of Sustained Operator Attention in Unmanned Aircraft System (UAS) Operations

As described in DRDC HREC protocol # 2017-029 (Arrabito & Jarmasz, 2017), the first step in the development of a sustained attention task is to determine the characteristics of the stimulus (Szalma et al., 2004, Szalma et al., 2014). Specifically, researchers typically utilize SMEs to select stimuli from a repository of exemplars developed for the targeted simulated environment. Hence, the goal of the experiment is to carry out an initial step in our task development. SMEs will view the stimuli set and rate the stimuli on various attributes that have the potential to affect: 1. target detection, and 2. the relevance of the scenario to typical UAS operator surveillance tasks carried out by the RCAF. These stimuli will then be validated using DRDC HREC Protocol 2016-033 (Arrabito & Grant, 2016b).

The procedure for this experiment involves a maximum of twenty CAF participants. The participants will examine the stimuli developed within a simulated mission representative of future RCAF UAS missions and operational environments, and then rate the stimuli. The participants' performance will be measured using subjective ratings collected from CAF SMEs. The time involvement for each participant will be two consecutive hours. The benefits of the study include the selection of stimuli that will be used in future DRDC – Toronto Research Centre studies investigating sustained attention for operators of a UAS in support of the RCAF. This is a minimal risk study. Participants may experience normal levels of eye strain and muscular discomfort from sitting for a prolonged period gazing at the computer monitor.

### 5.2 Stimuli Validation for Baseline Evaluations of Sustained Operator Attention in Unmanned Aircraft System (UAS) Operations

Following stimuli selection (Arrabito & Jarmasz, 2017), the next step is to validate the stimuli. As described in DRDC HREC protocol # 2016-033 (Arrabito & Grant, 2016b), the development of a sustained attention task requires researchers to determine the properties of stimuli to be defined as targets and how these characteristics differ from all the signals that are not targets (Szalma et al., 2004, Szalma et al., 2014). Researchers typically select stimuli that can be detected under alerted conditions on most trials (e.g., 85–90% of trials) using a two-alternative forced choice procedure (2AFC; e.g., Szalma et al., 2004; Szalma et al., 2014). In a 2AFC procedure, each trial contains two stimulus events in which one

event is the target. There is no uncertainty regarding whether the target is present during a trial. The observer must decide which of the two stimulus events includes the target. The 2AFC procedure is referred to as an “alerted condition” because on each trial the participant knows apriori that one of the two stimulus presentations will include the target. Hence, the goal of the experiment is to carry out an initial step in our task development to determine whether the stimuli to be discriminated in the monitoring task described in Section 4.2 (Figure 1) could be detected under alerted conditions.

The procedure for this experiment involves a maximum of thirty novice participants to validate stimuli developed within a simulated mission representative of future RCAF UAS missions and operational environments. The participants’ performance will be measured using objective approaches and analyzed to describe UAS operator performance. If the stimuli are not validated according to the above predetermined criterion then new stimuli will need to be developed, selected, and validated. The time involvement for each participant will be two consecutive hours. The main benefit of the proposed study includes the validation of stimuli that will be used in future studies investigating operator sustained attention for operators of Unmanned Aircraft Systems in support of the RCAF. This is a minimal risk study. Participants may experience normal levels of eye strain and muscular discomfort from sitting for a prolonged period gazing at the computer monitor.

### **5.3 Baseline Evaluations of Sustained Operator Attention in Unmanned Aircraft System (UAS) Operations**

Following stimuli selection (Arrabito & Jarmasz, 2017) and stimuli validation (Arrabito & Grant, 2016b), the next step is to run the baseline study on sustained attention (Arrabito & Grant, 2016a). As described in DRDC HREC protocol # 2016-004 (Arrabito & Grant, 2016a), the goal of the proposed study is to obtain baseline UAS sustained attention data for comparison against future experimental trials using TIGER.

The procedure for this experiment involves a maximum of sixty CAF participants, acting as a UAS PO, who will complete a series of critical tasks within a simulated mission representative of future RCAF UAS missions and operational environments. The participants’ performance in a series of simulated UAS missions will be measured using objective and subjective approaches and analyzed to describe UAS operator performance, mental workload, stress, and confidence in monitoring performance. The time involvement for each participant will be two consecutive hours.

The main benefit of the study is the scientific basis which provides for the UAS Concepts of Operations, training systems, and requirements being created by DRDC in support of the RCAF. This is a minimal risk study. Participants may experience normal levels of eye strain and muscular discomfort from sitting for a prolonged period gazing at the computer monitor.

## 6 Discussion

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The main focus of the project at this stage is to advance and complete the development of mission scenarios. Presently mission scenarios representative of the scene depicted in Figure 2 are being developed. Several challenges have been encountered in the development of mission scenarios that are described in Annex A. To date, one mission scenario has been developed. The baseline study on sustained attention (Arrabito & Grant, 2016a) requires at least eight mission scenarios to yield eight 5-minute periods of watch in order to allow sufficient time to observe the expected vigilance decrement (Davies & Parasuraman, 1982; Warm, 1984).

In addition to developing mission scenarios, the program to run the baseline study on sustained attention was developed in the summer of 2016. This program requires modifications to run the baseline study. The programs to run the stimuli selection and stimuli validation have yet to be developed.

## **7 Conclusion**

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This reference document describes work to develop a training tool for POs of UAS in support of the RCAF JUSTAS project for the period June 2016 to December 2017. Work is advancing despite the challenges encountered in developing mission scenarios (Annex A). Efforts are underway to prepare for the next phase that involves running the stimuli selection study (Arrabito & Jarmasz, 2017).

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## **Annex A    Challenge in Stimuli Development**

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We encountered numerous challenges during the process of developing mission scenarios using VBS2. Like other simulation environments, VBS2 has Non-Playable Characters (NPCs) whose actions are controlled by AI built into VBS2 and are not normally controllable by the player. In VBS2, these characters, called “units,” move according to waypoints. A series of waypoints can be set by the user to create routes. In order for units to follow waypoints, some AI functionalities in VBS2 need to be disabled in order to exert direct control over the units. Not disabling the AI can result in the units failing to follow waypoint commands. Disabling AI, however, also disables Collision Path Planning that can cause units to collide with one another. Furthermore, even with AI disabled, units do not always behave as directed since the program is non-deterministic due to a randomization feature built into VBS2 that causes unit behaviour to be inconsistent over multiple iterations. This randomization was originally introduced by request of early users of VBS2 in other militaries. For example, the movement of units in a mission scenario at a particular time and location may follow predetermined waypoints, but in a subsequent iteration of the same mission scenario may result in these same units colliding into one other. Moreover, units will sometimes bypass one or more intermediate waypoints and head straight for the next waypoint in the route sequence. There are also collisions between units and vehicles. Sometimes units will walk into vehicles and carry the vehicle with them as they continue on their route set by waypoints. This unpredictability slows down the mission scenario development process greatly because there is no control over the randomization feature in VBS2.

There is no systematic method to address these issues inherent to VBS2. In some cases, waypoints need to be moved slightly by the user or deleted and then reinserted again. Repositioning units does not guarantee that units will follow a waypoint route. These same strategies are also applied to resolving collisions; however resolving one collision in one mission scenario iteration may inadvertently cause another collision that did not previously exist. It should also be emphasized that since there are many units moving at different times within a mission scenario that problems of following waypoints and collisions can pile up. Given that the nature of these VBS2 anomalies require a trial-and-error strategy in order for them to be resolved, this vastly increases the time involved in developing a single mission scenario with an acceptable level of unit movement with as few collisions as possible. As a result, the overall strategy for generating scenarios has had to be altered so as to rely less on continuing to generate new material in VBS2, and more on reusing and altering existing materials. It is expected that this approach will mitigate the delays created by the issues in VBS2.

## List of Symbols/Abbreviations/Acronyms/Initialisms

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2AFC Procedure	2-Alternative Forced Choice Procedure
AI	Artificial Intelligence
CAF	Canadian Armed Forces
DND	Department of National Defence
DRDC	Defence Research and Development Canada
GCS	Ground Control Station
HREC	Human Research Ethics Committee
HTE	Human-Technology Effectiveness
ISTAR	Intelligence, Surveillance, Target Acquisition, and Reconnaissance
JUSTAS	Joint Unmanned Aerial Vehicle Surveillance Target Acquisition System
MALE	Medium-Altitude, Long Endurance
NPC	Non-Playable Character
PMO	Project Management Office
PO	Payload Operator
RCAF	Royal Canadian Air Force
SME	Subject Matter Expert
TIGER	Testbed for Integrated Ground Control Station Evaluation and Rehearsal
UAS	Unmanned Aircraft System
UAV	Unmanned Aircraft Vehicle
VBS2	Virtual Battlespace 2

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This reference document describes work to develop a training tool for payload operators of Unmanned Aircraft Systems (UASs) in support of the Royal Canadian Air Force (RCAF) Joint Unmanned Aerial Vehicle Surveillance Target Acquisition System (JUSTAS) project for the period June 2016 to December 2017. The tool is to enhance sustained operator attention when monitoring UAS sensor displays for prolonged periods of time. Topics covered are a brief introduction to sustained attention, the study methodology, and the present state of the study.

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Le présent document de référence décrit les travaux effectués en vue d'élaborer un outil de formation pour les opérateurs de charge utile des systèmes d'aéronef sans pilote (UAS) à l'appui du projet du Système interarmées de surveillance et d'acquisition d'objectifs au moyen de véhicules aériens sans pilote de l'Aviation royale canadienne, pour la période de juin 2016 à décembre 2017. L'outil vise à accroître l'attention soutenue des opérateurs lorsqu'ils surveillent les affichages de capteur des UAS pendant de longues périodes. Dans le présent document, on donne une brève explication du concept de l'attention soutenue et on présente la méthodologie et l'état actuel de l'étude.

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TIGER; Uninhabited Air Vehicle; Sustained Attention; Trainer