Occupancy Sensor Camera Activation: The occupancy sensor did not reliably activate the Type 1 prototype during set up on the morning of the OFA. The occupancy sensor scenario was moved to the afternoon to allow Hitron time to troubleshoot. Hitron was unable to resolve occupancy sensor activation issues with the Type 1 prototype; therefore, the evaluators performed the scenario tasks with only the Type 2 prototype.

Holster Sensor Camera Activation: The holster sensor scenario was moved to the morning session instead of the afternoon as scheduled, while Hitron attempted to troubleshoot the technical difficulties encountered during set up of the occupancy sensor scenario. One evaluator opted not to perform this scenario as the tasks performed went beyond his organizational role.

Hemodynamic Sensor Camera Activation: Due to time constraints, two of the four evaluators did not perform this scenario with the Type 2 prototype.

Remote Activation: A cellular network link between the Type 2 prototype and the Hitron computer running the remote activation software could not be established; therefore, the remote camera activation scenario was not performed. Evaluator feedback was limited to the underlying concept of remote activation of body-worn cameras.

3.0 RESULTS

OFA results are reported in the following three sections. Section 3.1 summarizes NUSTL data collector observations on the technological performance of the Type 1 and Type 2 prototypes and four critical event sensors during the assessment scenarios. Evaluator feedback provided in the form of survey responses is presented in Section 3.2. Evaluator feedback in the form of comments provided at various stages of the OFA is presented in Section 3.3.

Figure 2-1 Holster Sensor Scenario

3.1 Scenario Performance Outcomes

NUSTL data collectors tracked how frequently the critical event sensor succeeded in activating the Type 1 and Type 2 prototypes, assessed whether the prototypes activated quickly enough to fully capture each scenario's events, and captured other relevant information about the performance of the prototypes and critical event sensors. Their observations are summarized below.

Holster Sensor Camera Activation: The holster sensor activated the Type 1 and Type 2 prototypes in 100 percent of the trials performed. Evaluators repeated a verbal command to mark the release of the weapon retainer strap on the holster; the camera recordings did not always begin soon enough to capture these verbal commands.

Occupancy Sensor Camera Activation: During the set-up of this scenario, the Type 1 prototype did not respond to trigger signals produced by the occupancy sensor. Hitron was unable to troubleshoot this problem; therefore, the scenario was only performed with the Type 2 prototype.

Figure 3-2 Occupancy Sensor Scenario

The Type 2 prototype did not consistently perform as intended when used in this scenario. Two evaluators performed four trials, each with one successful activation. Two other evaluators performed one trial after the occupancy sensor was moved from the driver's door to the steering wheel. In both trials, the Type 2 prototype successfully activated; however, in all successful trials, camera activation was not immediate as intended. The cameras began recording during the victim (actor) interview rather than upon exiting the vehicle.

Audio Sensor Camera Activation: During the audio sensor scenario, activation success varied greatly between the Type 1 and Type 2 prototypes. The audio sensor was recalibrated by the first evaluator after his first two unsuccessful trials with the Type 2 prototype. In all following trials, the Type 2 prototype was successfully activated by each evaluator. Ten trials were performed with the Type 1 prototype and only one was successful.

- As the evaluators completed the survey on the prototypes and critical event sensors, the data collectors encouraged them to provide comments elaborating on their responses.
- The debrief session included an open-ended discussion led by the OFA test director eliciting feedback from the evaluators on the operational suitability of the Type 1 and Type 2 prototypes and the four critical event sensors for use by law enforcement organizations. The evaluators were encouraged to offer suggestions on possible improvements to the prototypes and critical event sensors, and to provide feedback on any point that had been missed by the surveys and in the discussion up to that point. Data collectors took notes on evaluator comments made during this discussion.

3.3.1 Type 1 Prototype

The evaluators appreciated the underlying concept of the Type 1 prototype, i.e., that law enforcement organizations would be able to field body-worn cameras with automatic activation capability through a simple retrofit of their existing equipment rather than by purchasing entirely new equipment; however, there was a general consensus that the overall design of the Type 1 prototype was somewhat cumbersome and needed to be streamlined in the final product design. The Type 1 prototype requires users to wear the Axon Flex manual control unit and mechanical actuator on their belts, connected by cable to a power supply carried in a pants pocket. Evaluators noted that their belts were already crowded with equipment, and expressed a preference for eliminating potentially entangling cables wherever possible. They recommended that in a final product design, the manual actuator and power supply be integrated into a single, compact component directly attached to the Axon Flex manual control unit.

3.3.2 Type 2 Prototype

One evaluator commented that he preferred the all-in-one design of the Type 2 prototype to the multicomponent design of the Type 1 prototype. Evaluators suggested that a final version of the Type 2 prototype should have recording indicators that are clearly noticeable to the wearer; the only way to determine if the prototype is recording in its current design is to view the display screen on the back of its housing. One evaluator suggested that the array of manual control buttons on the Type 2 prototype's body was too complicated and should be simplified in a final product design. Several evaluators recommended that a final version of the Type 2 prototype should be smaller and lighter than the current prototype. Evaluators noted that the lags in camera activation during the assessment scenarios were more problematic for the Type 2 prototype than for the Type 1 prototype because the Type 2 prototype lacked the Type 1 prototype's 30-second video buffer.

3.3.3 Holster Sensor

The holster sensor received the most positive feedback of the four critical event sensors. The evaluators all agreed that any event in which a weapon is drawn should be recorded.

Comments and suggestions regarding the holster sensor centered on three points:

Sensor attachment: Evaluators expressed concerns that the hook and loop fastener used to secure the sensor to the holster could be detached from the holster by a car seat or seatbelt. In a related remark, one evaluator stated that the sensor was too large and, for this reason, might be susceptible to detaching.

Variety of holsters in use: Evaluators noted that holsters in use by law enforcement officers vary considerably in design based on weapon type and holster preference. Holster sensors compatible with the wide variety of holsters in use across the country would therefore be desirable. One evaluator noted his department did not use a holster with a retention strap and therefore this sensor as implemented could not work for them as it is sensing the proximity of the retention strap to the sensor.

Integration with other equipment: One evaluator suggested that the holster sensor be capable of triggering both a body-worn camera and a radio alert message to the wearer's command unit.

3.3.4 Occupancy Sensor

Due to technical problems with the Type 1 prototype, the occupancy sensor scenario was only performed with the Type 2 prototype. The Type 2 prototype did not consistently activate when the evaluators exited the vehicle. When camera recordings were initiated, evaluators considered the time lapse between vehicle exit and camera activation to be too long.

Additional comments, summarized below, focused on the general concept of use of the occupancy sensor rather than its performance.

Unnecessary activations: The occupancy sensor is currently designed to initiate camera recordings whenever officers leave their vehicle. The evaluators stated that this would result in the camera recording numerous vehicle exit events unrelated to law enforcement response and therefore not worth recording. Some evaluators believed that in a typical shift, the number of recordings of such events would exceed the number of recordings of events that needed to be recorded, significantly increasing the amount of video data needing to be archived. It was suggested that camera activation should be based on trigger signals emitted by the occupancy sensor in conjunction with a second critical event, such as the activation of the patrol vehicle's emergency lights.

Sensor calibration: Several evaluators considered the current calibration process for this sensor to be impractical for field use. They indicated that the calibration process took too long, and that officers would not want to go through the process of calibrating the sensor at the start of each shift, or might forget to do so. Evaluators suggested that the occupancy sensor should be designed so that it only needed to be calibrated once to function properly.

Interference: One evaluator stated that his organization's vehicles had an inward-facing infrared illuminator that was used in conjunction with an in-vehicle camera used to record transported arrestees; the evaluator's concern was that this infrared illuminator might interfere with proper function of the occupancy sensor.

3.3.7 Remote Activation

The Type 2 prototype remote activation feature did not function on the day of the OFA because a communication link between the Type 2 prototype and the software could not be established. As such, evaluator comments focused on the underlying concept of remote activation, which was to enable a command unit to activate an officer's body-worn camera when there is concern that the officer is in distress. One evaluator stated that many law enforcement officers would not like the remote activation feature, pointing to the fact that police radios can be programmed to allow remote listening, but no agencies he knew of use this feature due to privacy concerns. Evaluators indicated that it would be important for officers to know that their cameras had been remotely activated (i.e., there needed to be clearly audible and visible recording indicators). One evaluator suggested the addition of an acknowledgement feature allowing the officer to indicate to his command unit that camera activation was unnecessary.

3.3.8 Keying Sensors to Cameras

The Type 1 and Type 2 prototypes are currently designed to be activated by any critical event sensor within a range of approximately 10 meters. Evaluators had mixed opinions about this. On the positive side, the activation of multiple cameras would provide several perspectives of the recorded event, which might better document what had occurred. On the other hand, it might inappropriately capture sensitive conversations unrelated to a critical event. Another possible problem noted by the evaluators is that cameras might be inadvertently activated by a non-critical event (e.g., responders exiting a nearby vehicle in a police station parking lot). This issue was raised during the debrief session and Hitron stated that it could addressed by providing law enforcement organizations with the option to key their body-worn cameras to a specific set of sensors.