Systems Competition Rules

Event 3 Version 3b

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1 Contents

2 Introduction

This document describes the Systems Competition Rules of the DARPA Triage Challenge (DTC). This document supersedes previous versions of the DARPA Triage Challenge Rules. Significant revisions from past versions of this document for the same phase are indicated by blue text. Teams are encouraged to closely review the entire document. The intent of this document is to provide participants guidance on competition design and scoring objectives to inform their development efforts in preparation for the first competition event. This document is subject to change and may be superseded by later versions. The latest official versions of all documents are posted on the DARPA Triage Challenge Website (triagechallenge.darpa.mil) and the DARPA Triage Challenge Community Forum.

DARPA intends to release a draft of the Competition Rules no later than nine months before each Challenge Event. The final version of the Competition Rules will be released no later than three months prior to each respective event. The DARPA Triage Challenge Chief Judge has the final authority to make any decisions related to the rules or scoring. All decisions made by the Chief Judge are final.

The main goal of the DARPA Triage Challenge is to inspire development of scalable, timely, and accurate capture of novel injury signatures to enhance triage decision-making in austere, complex, and mass-casualty settings. The challenge elements and the competition structure itself are intended to address the additional goal of increasing the diversity, versatility, cost-effectiveness, and robustness of relevant technologies and systems capable of addressing the myriad needs of a wide range of mass casualty incidents (MCIs) rather than single-purpose or specifically tailored solutions. The third goal of the DARPA Triage Challenge is to establish a collaborative community by bringing together multi- disciplinary teams and cross-cutting approaches across disparate fields to address the autonomy, perception, and diagnostic needs of the medical triage community.

3 Overview

Under the authority of 10 U.S.C. §4025 to stimulate innovations using prize competition, the DARPA Triage Challenge will use a series of competition events to drive breakthrough innovations in the identification of physiological features (“signatures”) of injury. These new signatures will help medical responders perform scalable, timely, and accurate triage. Of particular interest are MCIs, in both civilian and military settings, when medical resources are limited relative to the need.

The DARPA Triage Challenge’s long-term vision is 1) an initial, or primary stage of MCI triage supported by sensors on stand-off platforms, such as uncrewed aircraft systems (UASs) or uncrewed ground systems (UGSs), and algorithms that analyze sensor data in real-time to identify casualties for urgent hands-on evaluation by medical personnel; followed by 2) a secondary stage, after the most urgent casualties have been treated, supported by non-invasive sensors placed on casualties and algorithms that analyze sensor data in real-time to predict the need for life-saving interventions (LSIs) by medical personnel. Injury information provided by these sensors in primary and secondary triage could be integrated with other information about the scene to accumulate evidence about the injury mechanism and characteristics in order to enhance overall situational awareness, and to focus further physiological interventions.

To advance progress towards this vision, the DARPA Triage Challenge aims to bring together multi-disciplinary teams and industries that will identify physiological signatures and develop sensor and algorithm strategies for complex MCI settings. Teams participating in the DARPA Triage Challenge will be tasked with developing and demonstrating strategies for capturing high-value signatures for either primary or secondary triage, or for both. While aspects of the DARPA Triage Challenge involve sensors and sensor-delivery platforms, the priority is the development of signatures and models to detect them, not the development of new sensor or platform technology.

4 DARPA Triage Challenge Schedule Overview

The DARPA Triage Challenge is a 3-year effort with 3 sequential 12-month phases for Primary Triage (Systems and Virtual Competitions) and Secondary Triage (Data Competition) in parallel, each culminating in a challenge event (Figure 1; see the DTC website for competition details). In each phase, competitors will develop signatures and detection and analysis strategies for Primary and/or Secondary Triage. DARPA will host two competition events in each phase; a workshop and a challenge event.
Competition events will become progressively more difficult and realistic from Phase 1 to Phase 3.

Figure 1: Timeline

The workshops will provide an opportunity for practice runs for all tracks and an opportunity for Systems competition teams to collect data from physical simulations of scenarios similar to the end-of-phase challenge event.

Table 1 provides additional information on schedule and format of Competition events and workshops.

Systems Competition			
Event	**Format**	**Est. Duration**	**Date**
Year 1			
Challenge Kick-off	In person	2 days	Nov 6-7, 2023
Workshop - Month 8 *Evaluations / runs*	In person	6 days	6/3/2024 - 6/8/2024
Workshop - Month 8 *Lessons-learned session*	Virtual	1 day	6/17/2024
Challenge 1 - Month 12 *Evaluations / runs*	In person	7 days	9/28/2024 - 10/5/2024
Challenge 1 - Month 12 *Awards /lessons-learned session*	Hybrid	1 day	10/5/2024
Year 2			
Workshop - Month 4	In person	6 days	3/9/2025 - 3/15/2025
Workshop Month 4 ***Lessons learned session***	Virtual	1 day	4/2/2025
Challenge 2 - Month 12 *Evaluations / runs*	In person	7 days	9/27/2025 – 10/4/2025
Challenge 2 - Month 12 *Awards /lessons-learned session*	Hybrid	1 day	10/4/2025
Year 3			
Workshop - Month 4	In person	5 days	Window between: 3/9/26 and 3/19/26
Workshop - Month 4 *Lessons-learned session*	Virtual	1 day	~4/24/2026
Final Challenge - Month 11 *Preliminary Rounds*	In person	7 days	Window between: 11/4/26 and 11/15/26
Final Challenge - Month 11 *Finalists only - Runs and Awards*	In person	1 day	Window between: 11/4/26 and 11/15/26

*Table 1: Schedule of DARPA-organized Challenge events and workshops. *Note: DARPA-funded teams must attend all workshops in person. It is highly recommended that self-funded Systems teams also attend the workshops in person. For the Challenge events all Systems teams must attend in person.*

5 Prizes and Funding

Teams are encouraged to pursue high-risk, high-reward approaches to meet and exceed the objectives of the Challenge Events. Monetary prizes will be awarded the Competitions at each of the Challenge Events (Table 2).

Challenge I Fall 2024

Prizes	Systems [self-funded]	Data [self-funded]	Virtual [self-funded]
Ist	$120,000	$120,000	$60,000
2nd	$60,000	$60,000	$30,000
3rd	$20,000	$20,000	$10,000

Challenge II Fall 2025

Prizes	Systems [self-funded]	Data [self-funded]
Ist	$300,000	$300,000
2nd	$150,000	2nd $150,000
3rd	$50,000	3rd $50,000

Challenge III Fall 2026

Prizes	Systems	Data
Grand	$1,500,000†	$1,000,000†
1st	$300,000*	
2nd	$150,000*	
1st Each Gate	$12,500†	

† All teams
*Self-funded teams only

Table 2: Prize structure for the three Challenge Events

DARPA-Funded Teams
DARPA-funded teams (Systems and Data Competitions) are eligible for the Grand and Gate prizes in the Final Event (selection for DARPA-funded team has closed).

Self-Funded Teams
Self-funded teams in Systems are eligible for all Challenge Event prizes.

Systems Competition Prizes and Funding:

The Phase 3 prizes are divided into three groups. The Grand Prize goes to the team with best combined score between all courses (weighting TBD). 1st and 2nd prize go to the top two self-funded teams in Gates 1-4. The 4 remaining prizes go to the top competitor in each individual Gate. All prizes will have a minimum benchmark for winning, see section 9.8.49.8.4.

The Government's obligation for prizes under DARPA Triage Challenge is subject to the availability of appropriated funds from which payment for prize purposes can be made. No legal liability on the part of the Government for any payment of prizes may arise unless appropriated funds are available to DARPA for such purposes.

To be eligible for prizes, teams must first be registered in the team qualification portal. The award process requires recipients to furnish information that may trace or identify recipients either individually or as an organization (e.g., Social Security Number or Tax Identification Number). The primary contact of each registered team is responsible for providing the award information necessary for prize disbursement. DARPA will reach out by email to the primary contact of each registered team to either confirm their vendor status or request the required forms (e.g., SF-3881 or PIF). DARPA is not responsible for disbursement of prizes to any team members other than the primary contact/organization.

At the end of each competition event, teams will be invited to discuss their technical approaches and lessons learned in a townhall-style hotwash. The extent of technical details shared does not need to exceed

data agreements established upon qualification.

6 Qualifications

Prospective DTC competitors must demonstrate competition appropriate performance capabilities to be eligible to participate in DARPA Triage Challenge. All teams in all competitions (Primary Triage Systems tracks and Secondary Triage Data tracks; see the DTC website for track details) must complete two types of qualification: a Team Qualification at the beginning of each phase, and a later event-specific Event Qualifications for each Workshop and Challenge Event. Successful Team Qualification is a prerequisite to Event Qualifications in the same phase.

The *DTC Event Qualification Guide* will continue to be updated for each event. The latest revision will be posted on the DTC Website and DTC Community Forum.

6.1 Team Qualification

Teams must qualify for DARPA Triage Challenge competition events during the designated qualification window by completing the *Team Qualification* form on the DTC Team Portal. Team Qualification submissions will be accepted on a rolling basis but must be submitted by the deadline (see Table 3). Team qualification is required to receive access to datasets and prior to event-specific enrollment.

Team Qualification Windows by Phase	
Phase 1	9/1/2023 - 11/13/2023
Phase 2	9/1/2024 - 12/2/2024
Phase 3	11/1/2025 - 2/1/2026

Table 3: Team qualification schedule.

6.2 Event Qualification

Prospective teams are required to demonstrate baseline performance and utility capabilities (e.g., safety measures for the Systems Competition and algorithm capability for the Data Competition), to be eligible to participate in events. **All** teams (DARPA-funded and self-funded) in all competitions (Systems, and Data) must qualify for each event including the DTC workshops, Preliminary Events (i.e. Phase 1 and Phase 2 Challenge Events), and Final Event.

The latest revision of the *DTC Event Qualification Guide* will be posted on the DARPA Triage Challenge Website and DTC Discourse Community Forum. Event Qualification submissions will be accepted on a rolling basis but must be submitted by the deadline to be eligible to participate in the event (Table 4). The specific qualification deadlines for each event are provided in the *DTC Event Qualification Guide.*

Failing a previous qualification attempt does not preclude a team from resubmitting a revised qualification submission within the qualification deadlines for any given event. DARPA may adjust the qualification rules for each event and may choose to award qualification waivers for teams that have successfully participated in a prior Workshop or Challenge Event.

DARPA reserves the right to disqualify any team that is found to violate either the rules or applicable laws and regulations.

Event	Event Qualification	Event Date

Workshop 1	3/5/2024 - 4/5/2024	6/3/2024 - 6/8/2024
Challenge 1	6/28/2024 – 7/30/2024	9/28/2024 - 10/5/2024
Workshop 2	12/5/2024 -1/5/2025	3/9/2025-3/15/2025
Challenge 2	6/28/2025 – 7/30/2025	9/27/2025 – 10/4/2025
Workshop 3	12/5/2025 – 2/5/2026	Window between: 3/9/26 and 3/19/26
Challenge 3	**Systems** 7/28/2026 – 8/30/2026 **Data** 6/28/2026 – 7/30/2026	**Systems** Window between: 11/1/26 and 1/15/26 **Data** 9/30/26 - Submission November 2026 - Awards

Table 4: Event qualification schedule.

7 DARPA Triage Challenge Technical Workshops

DARPA encourages vibrant information exchange and collaborative interactions among all DARPA Triage Challenge participants, to include DARPA technical staff, independent verification and validation (IV&V) teams, representatives from competitor teams, infrastructure developers, and other government partners. To that end, DARPA will host a workshop in each phase which will offer a forum for community building and cross-pollination of technical ideas and approaches as well as an opportunity for testing in the Systems Competition.

In each phase (8 months into Phase 1, 4 months into Phases 2 and 3) DARPA will host a multi-day hybrid workshop. This will include live practice sessions for Systems Competition competitors to test their systems on simulated casualty scenes similar to the next challenge event. The practice sessions will be followed by a 'lessons learned' discussion for all competitions and an opportunity to discuss real-world needs with Government partners.

At the workshops, teams will have opportunities to rehearse their runs, confirm integration with the DARPA instrumentation and scoring systems, and inform their development efforts. Runs at the workshops do not count towards the prizes, but teams are encouraged to operate according to the Competition Rules to prepare for the Challenge events. In Phase 3 in-person attendance at workshop events is required for all DARPA-funded teams. Self-funded teams may choose to or not to attend in person, although Self- funded teams on the Systems track are **strongly** encouraged to attend in person.

We will hold a virtual lessons learned meeting shortly after each workshop for teams to discuss experience gained regarding technical aspects of their systems at the workshop tests.

8 Human Subjects Research (HSR)

For the Primary Triage Competition ("Systems Competition"), teams must be included in the IV&V Team's Institutional Review Board (IRB) protocol through a DoD Institutional Agreement for Institutional Review Board Review (IAIR) to access training data collected by the IV&V team and to collect data at DTC workshops and challenge events. For the Data Competition, use of training data

provided by DARPA does not constitute HSR, and competitors do not need to obtain IRB approval to use these data. For both Primary and Secondary Triage Competitions, DARPA-funded competitors require DARPA approval for the collection or use of any other human subject data. **Self-funded teams are prohibited from the collection or use of any other human subject data as part of their involvement in the DARPA Triage Challenge, beyond data and data-collection opportunities provided by DARPA, because DARPA HSR supervision is not feasible for teams not under DARPA contract.** Self-funded teams should carefully consider this limitation and should take this into account in their technical approach, leveraging other strategies as appropriate (*e.g.*, simulations).

DoD Definition of Human Subjects Research (HSR)
The term "human subject" can be applied to research efforts that meet EITHER of the following criteria: A living individual about whom an investigator (whether professional or student) conducting research:

- Obtains information or biospecimens through intervention or interaction with the individual, and uses, studies, or analyzes the information or biospecimens; or
- Obtains, uses, studies, analyzes, or generates identifiable private information, personally identifiable information, or identifiable biospecimens.

Human Subjects Research involves:

- Activities that include both a systematic investigation designed to develop or contribute to generalizable knowledge and involve a living individual about whom an investigator conducting research obtains information or biospecimens through intervention or interaction with the individual, or identifiable private information, or biospecimens.

8.1 Handling of DARPA-provided data

Primary triage datasets are jointly owned by DARPA and the Army and developed by the Army's Institute of Surgical Research (ISR) exclusively for research purposes (including DTC). The ISR datasets have been intentionally de-identified to ensure—to the greatest extent practicable—that there is no reasonable basis to believe that the data could be used to trace a specific identity or present a risk of harm to any individual. However, ISR datasets may incidentally or unintentionally contain sensitive information and images (including facial imagery). Therefore, as previously acknowledged in the DTC Qualification process, competitors agree they will *not* attempt to re-identify, share, or re-use Army/ISR data as provided by DARPA.

9 Systems Competition Rules

9.1 Systems - Illustrative Scenario

The notional DARPA Triage Challenge primary triage setting is the first few minutes of an MCI where the number of casualties and/or the environment likely would preclude a timely initial assessment of each casualty by first responders.

The objective of the primary triage competitions is to detect and identify signatures of injury derived from data captured by stand-off sensors to enable early prioritization of casualties, allowing medical care professionals to quickly focus on the most urgent casualties. Competitors will develop algorithms that detect those signatures in real-time from stand-off sensors on robotic mobility platforms (e.g., UASs, UGSs) to provide decision support appropriate for austere and complex pre- hospital settings. Of particular interest are signatures of acutely life-threatening conditions that medics are trained and equipped to treat

during primary triage, such as hemorrhage and airway injuries.

Challenge events for System competitors will be physical simulations of casualty scenarios which may include medics. Although the setting and complexity of challenge events will vary over the course of DTC, the following features are expected to be maintained across events. Each competitor will have access to the same scenario, and no two teams will operate on the same location simultaneously. Competitors will have only general information on the setting beforehand—for example, that it is a battlefield scenario, or a collapsed building following an earthquake. There will be actors and manikins exhibiting simulated injuries of varied type and severity (subject to the limitations of what can be simulated).

Competitor systems with stand-off sensors, robotic mobility platforms, and algorithms will need to *autonomously process sensor data and provide real-time casualty identification and injury assessment* (see Section 9.4.3for more information on autonomy requirements). No part of a competitor's system may touch a casualty or manipulate the scene (e.g., clear rubble). Each scenario will have a time limit, with no scenario expected to have a duration greater than 30 minutes.

9.2 Systems - Technical Challenge Elements

The Challenge competition courses will be designed to assess performance across various challenge elements, including Degraded Sensing, Obscuring Obstacles, Terrain Obstacles, Dynamic Obstacles, and Dynamic Casualties. The challenge elements are expected to become progressively more difficult from Phase 1 to Phase 3.

1. *Degraded Sensing*: The courses are expected to include elements that range from constrained passages to large open fields, lighted areas to complete darkness, and dusty to wet conditions. Sensors will need to have the dynamic range to reliably operate in these environments. Dust, fog, mist, contained fire, smoke, talking, flashing light, heat spots, simulated explosions and loud background audio effects are within scope of this challenge element. Extreme temperatures, uncontrolled fire, and hazardous materials are not expected to be within scope.

2. *Obscuring Obstacles:* Casualties may be fully visible to partially obscured to completely obscured, such as buried under a shallow layer of rubble. Sensor modalities capable of penetrating rubble will have an advantage in such situations. Stand-off sensor access to skin may be possible but cannot be assumed. Casualties may also be grouped with limbs overlapping or may be interacting with live responders.

3. *Terrain Obstacles*: Systems will be required to demonstrate robustness in navigating a range of terrain features and obstacles. Terrain elements and obstacles may include constrained passages, large drops/climbs, inclines, stairs, rubble and multi-story structures. The environments may include natural or human-made materials; structured or unstructured clutter; and intact or collapsed structures and debris.

4. *Dynamic Obstacles*: Live responders, "walking wounded", or other physical changes to the environment will test the agility of systems to identify and assess casualties in an evolving scene.

5. *Dynamic Casualties*: Some treatable injuries may rapidly be fatal, so taking too long to find and assess casualties may result in the window for effective LSI being missed.Casualties who are not evaluated within an appropriate timescale may have a change in status (for example, progression of untreated hemorrhage or airway injury, or similarly, stabilization after casualties receive

treatment). Likewise, casualties that have been assessed/treated may be moved to casualty collection points. Registering and managing registered casualty lists supports medical response to a MASCAL.

6. *Endurance Limits:* It is expected that individual scenarios will run between 5-45 minutes. Teams will be permitted to replace batteries during their run, but teams should consider the implications of returning to the original launch location and redeploying their systems.

9.3 Systems - Competition Courses

Challenge Event 3 will feature a component-testing approach, divided into component testing gates and Human-Machine Teaming (HMT) Lanes with setups designed to individually test key elements of competitors' systems. Each course will have a different scoring structure. All courses are expected to be mainly outdoors and may include any of the technical challenge elements outlined in Section 9.2. Runs may be delayed in the event of high wind or significant rain. See Table 5 for summary of objective and challenges in each course. Course duration will range widely from 5 – 30 minutes.

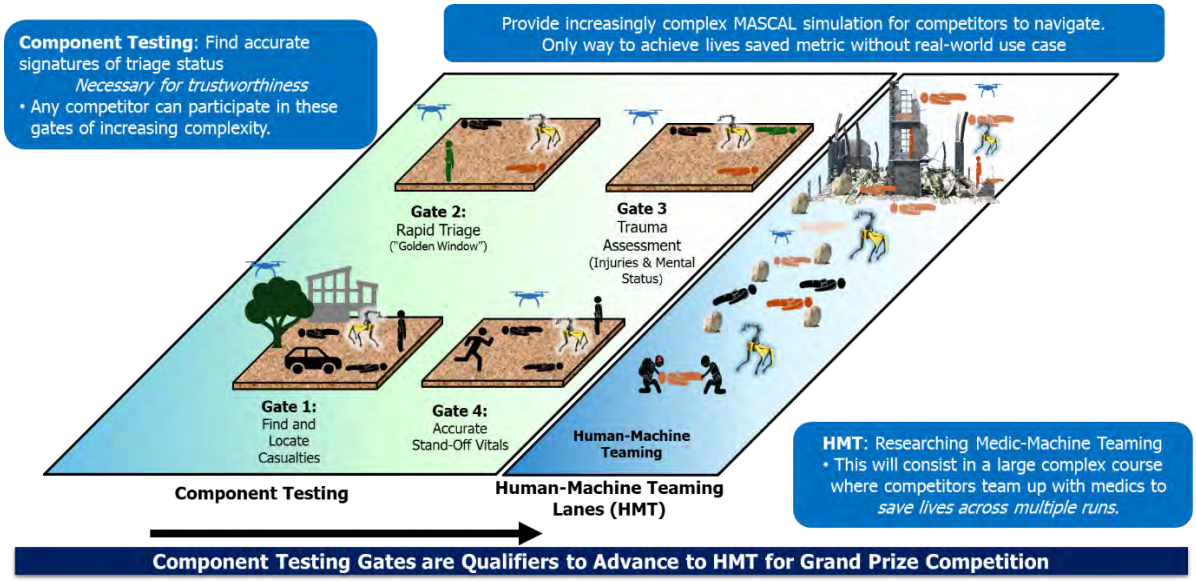
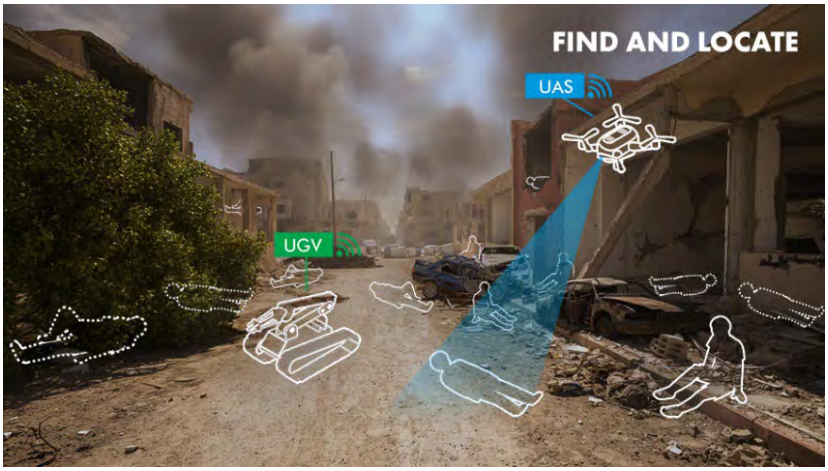


Figure 2: Structure of challenge event courses

- **Component Testing Gates: Accurate Triage Assessment:** These gates test identification of accurate signatures of triage status
    - **Description:** Gates focuses on component testing of team's ability to find and accurately assess casualty status. Each key component is tested on a separate gate through a course of varying difficulty and length. Table 5 shows a preliminary description of each gate. A detailed description of each gate is forthcoming.
    - Gate 1 – Find and Locate

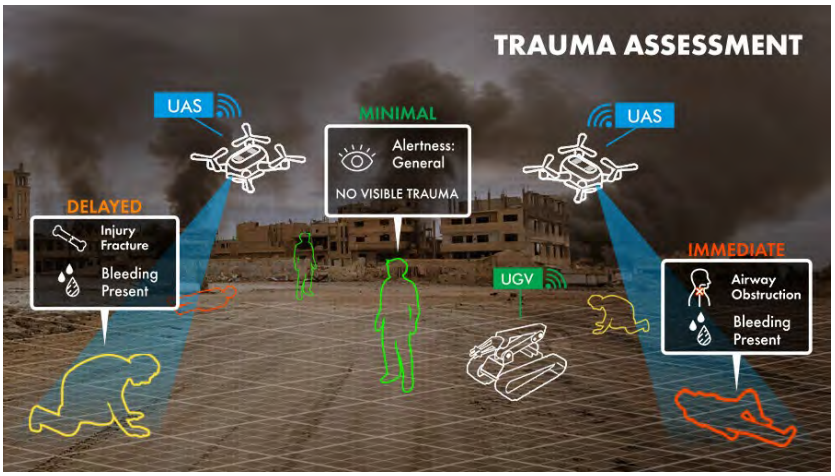


- Platforms must autonomously locate as many casualties as possible, as quickly as they can.

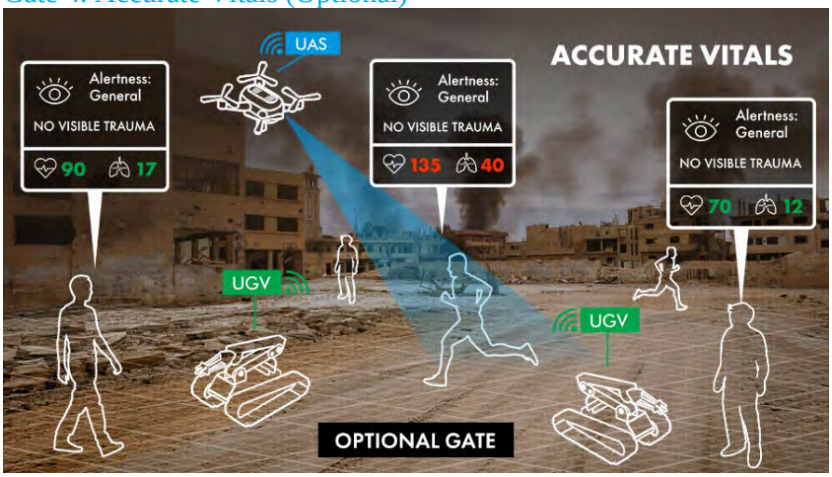
- Gate 2. Rapid Triage

- When time is of the essence, teams must identify severely injured casualties within minutes.

- Gate 3. Trauma Assessment



- Using sophisticated onboard sensors, teams will report on injury types and casualty locations.

- Gate 4. Accurate Vitals (Optional)
  - 

    - Teams will accurately report on vital signs such as heart and respiration rates. Scores from this optional gate will add to the aggregate score for teams choosing to participate.

- **Human-Machine Teaming Lane:** This lane focuses on researching Human-Machine Teaming, exploring the ability of teams to increase the number of lives saved by medics.
  - 

Description: *This lane teams competitors with medical responders on a complex course. Medics will work with* ***autonomous*** *systems and use the team-provided user interface to find and treat casualties across several runs. HMT Lane will consist of multiple courses with a mix of both day and night runs. Runs will begin with early deployment of the team's UAS, followed by the arrival of medics and UGVs on the scene. It is expected that teams with systems that can most rapidly locate and provide triage categories and/or prioritized casualty management sequences will do better.*

Type	Gate	Gate Name	Objective	Technical Challenges
Component Testing	**Gate 1**	Rapid Casualty Detection & Location	Quickly and accurately locate casualties.	• Degraded Sensing • Obscuring Obstacles • Terrain Obstacles • Dynamic Obstacles • Endurance Limits

Type	Gate	Gate Name	Objective	Technical Challenges
	Gate 2	Rapid Triage (Golden Window)	Rapidly triage casualties into the correct category in a short time.	
	Gate 3	Trauma Assessment	Correctly assess mental status, injury location/type, and identify non-casualties.	• Dynamic Obstacles • Endurance Limits
(Optional, points added to final score)	**Gate 4**	Accurate Vitals	Accurately measure the respiratory rate and heart rate of "casualties."	
HMT Lane *(Qualification Required)**	**N/A**	Human-Machine Teaming	Evaluate the system's ability to assist medics and increase the number of lives saved.	• Terrain Obstacles (multi-story buildings, rubble, woods) • Degraded Sensing • Obscuring Obstacles • Dynamic Obstacles • Dynamic Casualties • Endurance Limits

Table 5: Description of courses and features

* **HMT Lane Qualification Requirements:**

- Must demonstrate working user interface.
- Must be one of the **top 4 teams** see section 9.8.3 for final ranking in Lane 1.
- Must achieve a **minimum score of 60** in each of the three required gates.
- Must demonstrate **full autonomy for a minimum of 80%** of each run through Gates 1-3.

Type	Gate	Max # Active Systems	Max # personnel	Minimum Hardware / Autonomy Required	Minimum benchmark for Prizes
Component Testing	**Gate 1**	5	5	Autonomous System	Score of 60, achieved with autonomous navigation 80% of the time
	Gate 2	2	5	Sensor Pack*	Score 60
	Gate 3	3	5	Sensor Pack*	Score 60

(Optional)	**Gate 4**	2	5	Sensor Pack*	TBD
HMT Lane *(Qualification Required)*	**N/A**	10	5	Autonomous System	Score 60

*Table 6: Summary of Lane Requirements * Teams may carry a sensor pack, teleoperate or be autonomous . Teams attempting to qualify for lane 2 must be autonomous.*

9.4 Systems - Event Operations

9.4.1 Competition Format

Prospective teams are required to demonstrate baseline performance and utility of capabilities during event qualification, as described in Section 6.2, to qualify for Challenge Event 3. It is anticipated that up to 16 teams may successfully qualify for the event. The event is expected to include 9 competition days. Qualified teams will be eligible to participate in the event, which will consist of multiple courses with multiple runs on each course. Each course will have its own scoring rubric.

Figure 2 shows a notional workflow and communications plan for the competition events. The competing team will set up and begin their run in the designated Staging Area. At the beginning of a run, teams will deploy their systems onto the course where they will explore, locate, and triage casualties for no longer than the time limit set for the scenario. Observation data will be transmitted to the team's Base Station which will, in turn, provide triage reports to the DARPA Command Post (CP) where the reports will be automatically evaluated and scored. The DARPA Command Post will provide submission status back to the team's Base Station.

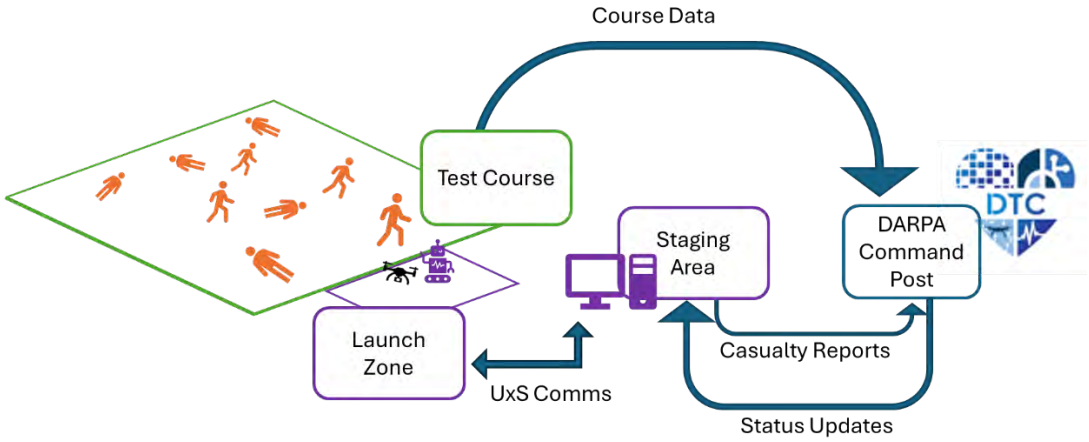


Figure 3: Course workflow and data transmission

An Interface Control Document (ICD) and reference implementation will detail the mechanism for providing triage reports to DARPA. The latest revision of the DTC ICD will always be posted on the DTC Website and DTC Community Forum.

9.4.2 Staging Area

The Staging Area will include at a minimum a 10’x10’ tented and netted space for the team operators (C2 Tent) and a 30’x30’ space for launching platforms (Launch Zone). All systems will be required to start in the Launch Zone behind the Starting Gate at the course entrance. No systems will be permitted to operate outside of the competition course boundaries except within the Staging Area. In the C2 Tent, teams will be provided at a minimum two and half (2.5) banquet tables, six (6) chairs, and one (1) 120V, single-phase, 20A circuit with NEMA 5-20R T-slot receptacles. Teams are permitted a limited number of personnel in the Staging Area; these personnel are designated as the Pit Crew. See section 9.5 for Pit Crew details.

9.4.2.1 Gates

For the gates, the staging area will be split. The C2 tent will be disjointed from the course and launch zone. Direct communication between the gate area and C2 crews will be limited. All communication will be mediated through a DARPA-provided communications system (radios). This communication will be permitted for discussing system needs (e.g., battery changes) *and* troubleshooting issues requiring collaborative problem-solving.

9.4.2.2 HMT Lanes

In HMT lanes, the staging area will not be split. However, the launch zone is remote from the course entrance. Teams will be able to launch all of their systems from the staging area and all systems will need to return to the launch zone for any repairs. Systems that are unable to return to the launch zone must remain in place until the end of the run.

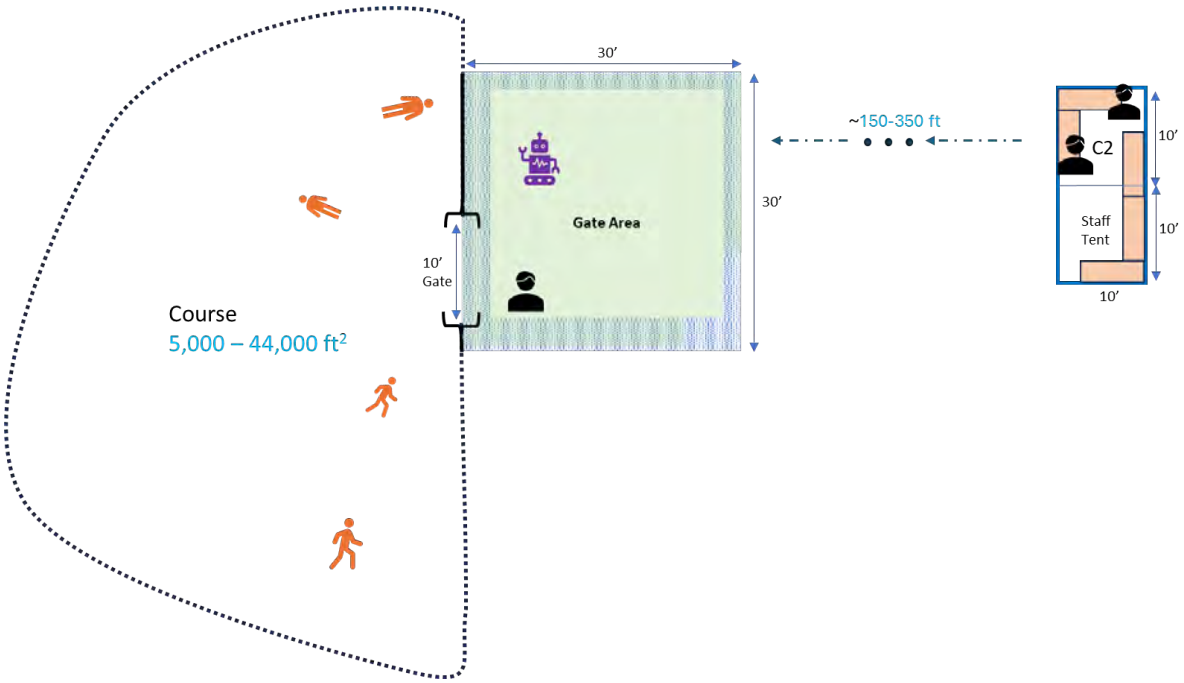


Figure 4a: Team Staging Area for Gates. The launch zone will be separated from the course by a wall with a 10’ wide gate in the wall. The location of the launch zone will be separated from the C2 tent.

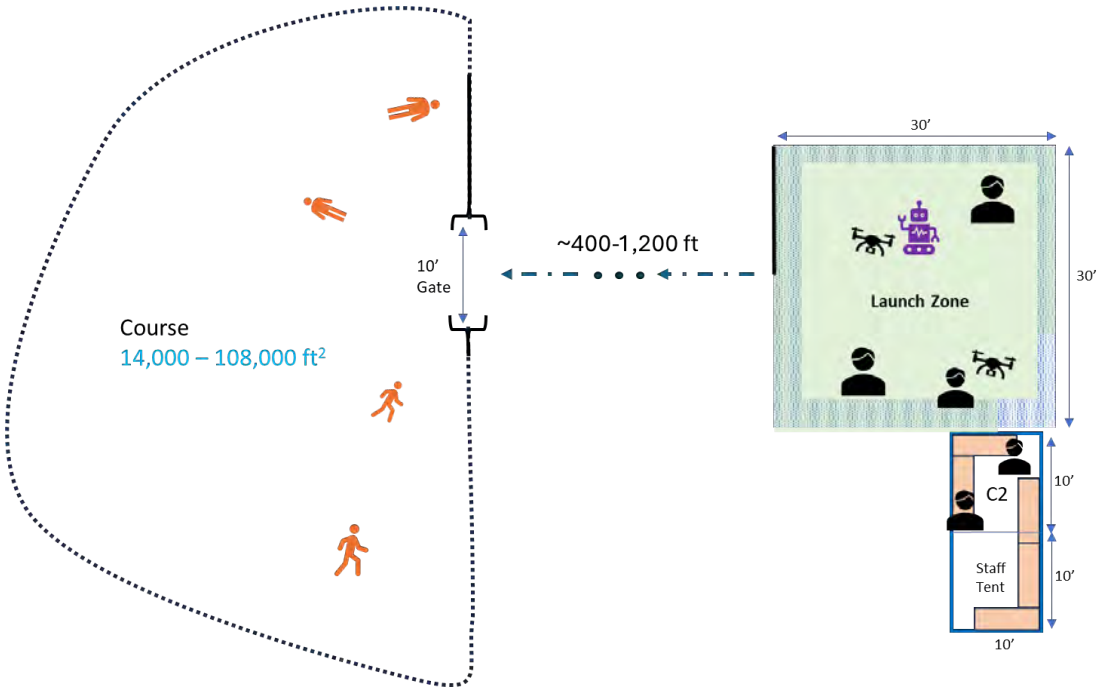


Figure 4b: Team Staging Area for HMT Lanes will be disjointed from the course.

9.4.3 System Autonomy

Autonomy in the triage challenge can be broken up into triage algorithms and navigation:

- Triage algorithms include person location, casualty identification, health assessment and triage categorization. All components of the triage algorithms must be fully autonomous, without any human intervention on all courses.
- Navigation includes platform flight planning and sensor pose positioning. The level of autonomous navigation required to participate in the challenge depends on the specific lane / gate (see Section 9.3).

9.4.3.1 Autonomous Navigation

Prior to the start of a run, teams **must notify DARPA** of whether they intend to Teleoperate their systems or use autonomous navigation. In either case, teams must follow all applicable §107 regulations for UASs. DARPA has obtained a §107.35 waiver for participating teams to autonomously operate multiple UAS platforms (10) per pilot. Teams piloting autonomously will need to rely on DARPA spotters as they are unlikely to see the entire course from the staging tent.

9.4.3.2 Teleoperation

Teleoperation is defined as any human intervention with the controllers, keyboards, mouse, etc. *All teams must have the capability to take control and teleoperate their systems in case of emergency*. Teams will be expected to correct their systems to maintain safe operations (out of bounds, erratic movement). If the course official determines the team is unable to continue to safely operate their system, they will be required to stop that system for the remainder of the run.

Teleoperation time will be calculated as any time a control stick is picked up or an operator steps within the no-go zone around the base station. A minimum of 15 seconds will added to teleoperation time with each instance.

Due to the complexity of the courses, tethers for power, communications, or physical retrieval are not permitted. With the exception of teams carrying a sensor pack-only system on gates 2, 3 and 4, no manual physical intervention or entry by any (human) team members onto the course is permitted. Only authorized DARPA personnel are permitted to enter the course preceding and during the run.

9.4.4 Course Access

Systems are allowed to enter, exit, or reenter the competition course at any time within the duration of the run. All human operators and personnel must stay within the Staging Area. No manual physical intervention or entry by any (human) team member on the course will be permitted, except for a team approved to carry their sensor pack through the course while escorted. A system may only be handled or retrieved if it has crossed back into the Staging Area past the front face of the Starting Gate. Once a system has partially or completely crossed into the Staging Area, team personnel are permitted to handle the systems as long as the personnel stay within the Staging Area and do not pass the front face of the Starting Gate. Only authorized DARPA personnel are allowed to enter the course preceding or during a run. Once a run has finished and the course is clear, up to two (2) team members will be permitted by the Course Official to retrieve any UxSs that remain on the course.

9.4.5 Run Termination

A scored run terminates upon any of the following conditions:

- Run Completion: The deployed systems successfully report on all casualties and exit the course.
- Run Cancellation: Competition Staff cancels the run due to an external factor such as weather, including lightning, rain, snow, wind, or actor health.
- Emergency Stop: Competition Staff initiates an emergency stop because of an unsafe condition.
    - Unsafe conditions include, but are not limited to:
        - Casualty Collision: *This results in immediate run termination.*
        - Breach of standoff distance: *Upon any breach of this rule the initial action is an emergency stop. If the breach is safely correctable during the same run, the run may be continued. However, it is up to the Course Official's discretion to determine whether it is safe for the systems to restart and the run to continue.*
        - Breach Geofence: *This results in immediate run termination of that platform.*
- By request: The Team Lead requests an end to the run.
- Time Expiration: The scored run time expires before another termination criterion is met.

9.4.6 Terminated Runs

A team may be eligible for an additional attempt if a run is canceled or stopped due to an emergency or external factor outside of the team's control. The Chief Judge will review eligible cases and determine the course of action. The Chief Judge has the final authority to make any scoring-related decisions.

9.4.7 Disputes

Dispute Cards are intended to provide teams a mechanism to submit a formal dispute or request for review by the Chief Judge. The Dispute Card must be completed and delivered by the Team Lead to the relevant Course Official, Team Garage Coordinator, or Chief Judge. All submissions will be reviewed by the Chief Judge in a timely manner. All decisions made by the Chief Judge are final. Disputes can be separated into run related disputes and score related disputes.

For score related disputes, the Dispute Card must be submitted within 8 hours following receiving the score of the run in question. For the final day of runs, the deadline to submit a dispute will be shortened to within 1 hour of the completion of the run in question.

For non-score related disputes, the Dispute Card must be submitted within 60 min from end of the run.

9.5 Systems - Personnel Guidelines

The number of competitor personnel (Pit Crew) permitted in the Staging Area is dependent on whether a team is teleoperating and the number of systems they are operating. All teams are permitted 5 pit crew. This includes one Human Supervisor, one UxV Operator, one Safety Officer and two general Pit Crew. Teams with both UAS and UGV systems who choose to have 2 base stations may swap a general Pit Crew for a second Human Supervisor. Teams who are teleoperating more than 2 systems are permitted to swap general Pit Crew for UxV Operators such that the total number of Operators (including the Human Supervisor/s) equals the number of systems. Figure 4 provides a detailed workflow for how data may be shared between the systems, team Base Station, team personnel, and DARPA Command Post

Pit Crew personnel are permitted to assist with operations tasks such as physically deploying the systems, performing repairs, modifying software or firmware, and changing batteries. General Pit Crew personnel are only permitted to access limited Status Data. They are not permitted to wirelessly communicate with the deployed systems and are not permitted to access Derived Data or Casualty Reports. Pit Crew may take on one of three additional specialized roles:

- **Safety Officers / spotters** are responsible for maintaining the safety of personnel and property and are permitted to communicate with the deployed systems solely for safety purposes.
- **UxV Operator / Pilots** are permitted to communicate with deployed UxV platforms, teleoperate deployed UxV platforms, activate safety emergency stops, and access Status Data.
- **Human Supervisors** are permitted to communicate with deployed systems, teleoperate deployed platforms, activate safety emergency stops, and access Status Data.

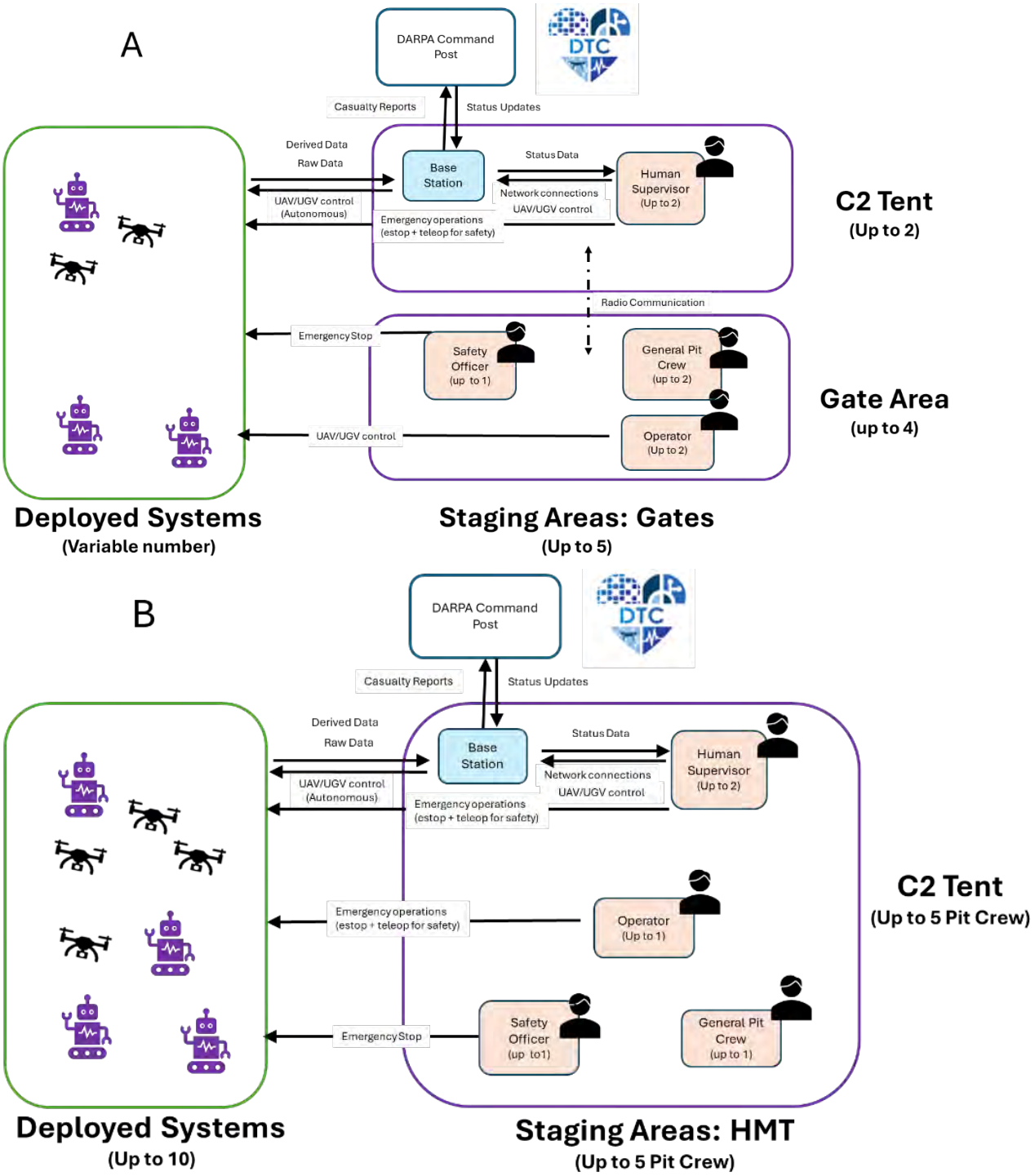


Figure 5: Data workflow for various team configurations in the Systems Competition. Team that are teleoperating (A) have unlimited communication between all members (A). Teams autonomously operating (B) may be separated into different tents with the C2 remote from the course.

9.5.1 Pit Crew Personnel

The role of the Pit Crew is to assist with operations tasks such as physically deploying the systems, performing repairs, modifying software or firmware, and changing batteries. Once a team's set up for their run has begun, the Pit Crew personnel may not be substituted with other personnel. While pit crew personnel cannot be substituted after setup begins, role designations among existing pit crew members may be reassigned up until the run begins. Once the run has officially started, both personnel and their designated roles are locked and cannot be changed. When entering the staging area from the team garage, only the designated Pit Crew is permitted to arrive for setup. Other members must remain in the team garage area.

In lane 1, the Pit Crew personnel, including Operators, Safety Officers and Human Supervisors, are permitted to verbally communicate without restrictions. In lane 2, the two crews will have limited ability to communicate between the C2 tent and the launch zone instead relying on communication through a DARPA assigned representative. The base station can provide limited status data to the Pit Crew via a wired display to support operations tasks such as calibration and completing startup checklists. The Pit Crew is not permitted to directly interface with the base station in any way (e.g., toggling between windows via peripherals). The Pit Crew is only permitted to view limited system status data such as battery health, network status, and real-time telemetry.

Pit Crew personnel are permitted to view and access Status Data but are not permitted to view or access Derived Data. Pit Crew personnel are specifically prohibited from viewing or accessing Casualty Reports.

When a staging tent is disjointed from the launch zone, Operators and human supervisors must remain in the staging tent and may not assist with robot setup.

9.5.2 Safety Officers

The role of the Safety Officer is to preserve the safety of personnel and property. Safety Officers are permitted to activate Tier 1 wireless emergency stop transmitters and/or operate remote controls for safety purposes only. Safety Officers may only use wireless communications for emergency stop transmitters and limited system initialization (e.g., arming, initial takeoff).

The team is permitted to have up to one Safety Officers. For aerial systems, the Safety Officer may aid in initial takeoff and hover as long as the system is within the Staging Area and does not intrude into the competition course. However, any further maneuvering of the aerial system must be initiated or controlled by a Human Supervisor or Air Vehicle Operator. If the safety of personnel is at risk, the Safety Officer is permitted to take control of the aerial system for the sole purpose of safely landing the platform. Safety Officers may only take control of systems in the competition course to: (1) trigger a Tier 1 emergency stop, or (2) safely land an aerial platform if personnel safety is at immediate risk. In case (2), the system must immediately exit the course and cannot re-enter during that run.

The Safety Officer's primary role is to preserve the safety of personnel in the Staging Area rather than preserving the safety of the system or the completion of the run. If a Safety Officer triggers a Tier 1 emergency stop, the Human Supervisor must authorize and execute any reset of that emergency stop.

Safety Officers are also permitted to perform all the roles of the Pit Crew personnel.

9.5.1 Operators

The Operator is responsible for managing one UxS during the team's run which includes take-off, landing, safety procedures, and full movement throughout the course. When operating under manual control, each

UxS shall have a dedicated operator utilizing a hand controller. For autonomous operation, refer to section 9.5.6. Any individual acting as a UAS Operator must hold a valid Part 107 license.

9.5.2 Human Supervisor

As the operational scenario suggests, DARPA is interested in approaches that are mostly autonomous without the need for substantive human interventions, and capable of remotely locating and providing assessments of causalities. The team is permitted to have one Human Supervisor. Human Supervisors are required to have valid part 107 license if they are responsible for aerial vehicles.

The Human Supervisors are permitted to monitor and manage the communications with their deployed systems. The Human Supervisors are permitted to view, access, and/or analyze all data types. While systems controlled by the Base Station are in the course Human Supervisors may only: (1) teleoperate the system, (2) communicate for safety purposes, and (3) activate emergency stops. All other interactions are prohibited. Once a team's run has begun, the Human Supervisors may not be substituted with other personnel.

Human Supervisors are also permitted to perform all the roles of the Safety Officers, and Pit Crew personnel. Only the Human Supervisor may interact with the Base Station.

9.5.3 Status and Derived Data

Two categories of data produced by the systems are delineated: Status Data and Derived Data. Status Data includes real-time sensor streams from the deployed systems for the purposes of calibration, system status monitoring, teleoperation, and safety monitoring. Derived Data includes data that has been processed or fused to create derived information from the raw sensor streams. Derived Data specifically includes any casualty reports. System locations on the map would be considered status data, while casualty location or status would be considered derived data. Additionally, teams navigating in Lane 2 may view derived data on a user interface. Teams in lane 1 may not view any derived data other than casualty location.

Role	Responsibilities and Access					
	View Status Data (one system)	View Status Data (all systems)	View Derived Data	Trigger Tier 1 E-stop	Service UxS	Teleoperation Of UxS
General Pit Crew (Up to 5)					✓	
Pit Crew: Specialized Roles (each general pit crew teammate permitted up to one specialized role)						
Human Supervisor (Up to 2, one per system type)	✓	✓	Lane 2 only	✓	✓	✓
Operator (Up to 2)	✓		Lane 2 only	✓	✓	✓
Safety Officer (up to 1)				✓	✓	

Table 7: Roles and Responsibilities of Pit Crew.-

9.6 Systems - Preliminary Event Course

9.6.1 Course Layout

The exact course layout will not be known to competitors in advance, and DARPA intends to alter the competition courses to randomize casualty types. Each of the courses will contain a different scenario. Geofence coordinates of the courses will be provided to teams prior to their run. Team systems must remain inside the geofence. The geofence, Launch Zone and gate coordinates will be provided, course coordinates will not be provided.

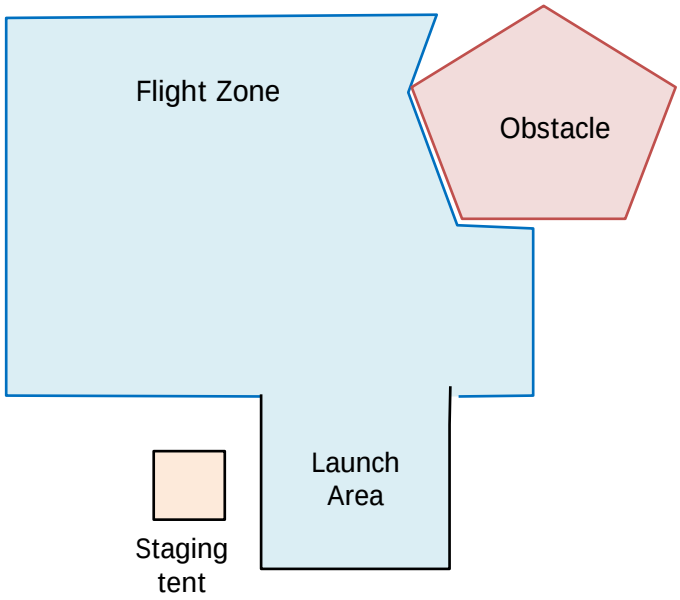


Figure 5: Flight zone around the course will be clearly marked, with GPS coordinates provided.

9.7 Systems - Guidelines

9.7.1 Prohibition on deployment of humans or animals

Teams may choose to deploy a wide variety of systems to complete the course objectives including but not limited to robotic platforms, sensors, and communication components. Except in the case of an operator hand-carrying a sensor packet, no humans or animals will be permitted as any part of the deployed systems that enter the competition course.

9.7.2 NDAA Compliance

9.7.2.1 UAS

UASs must be National Defense Authorization Act (NDAA) 2024 “American Security Drone Act of 2023,” and NDAA 2023 Section 817(a) Compliant. All teams will need to submit documentation on the NDAA compliance of all UASs. see section 10.2 for the definition of prohibited UASs reproduced with permission from https://www.diu.mil/blue-uas-policy.

The definition of a UAS includes all systems that communicate with the UAV.

9.7.2.2 UGV

In anticipation of implementation of additional language from the 2025 NDAA, the following requirements apply to UGVs.

- UGVs cannot be manufactured in a covered foreign country
- Any UGVs not manufactured in the USA will need to go through an NDAA review for covered components.
- Lidar cannot be manufactured in a covered foreign country or by an entity domiciled in a covered foreign country;
- All systems must have NDAA compliant data communication hardware.
- All covered hardware added to the UGVs must be NDAA compliant.

Please see the appendix for a list of covered components

9.7.3 System Constraints

- UGS maximum weight = 200kg
- UAS/UGS maximum diameter = 1.5m
- UAS maximum weight = 9kg
- DARPA is interested in portable systems. Therefore, all system elements must pack down to be carried by two vehicles (car, sports utility vehicle or pickup truck),
- Platforms must not produce any visible illumination other than what is legally required for UAS flight. See section 9.7.8
- While on course UGV platforms will have a maximum speed of 5m/s.
- While on course UAV platforms will have a maximum speed of 15m/s.
- Teams with multiple identical systems will need to mark the systems so they are identifiable from a distance during the day and at night. For example, using tape and lights of different colors for system A and system B.

9.7.4 Stand-off Distances

- UGSs minimum stand-off distance = 2 meter
- UASs will have variable minimum stand-off distances based on size
    - Less than 175g = 1 m
    - Between 175g and 300 g = 2 m
    - Between 300 g and 5 kg = 6 m
    - Greater than 5 kg = 10 m
- When a UAS is within 6m of a structure, it may descend below the minimum height in order to approach / enter windows and doorways. However, the minimum stand-off distance for casualties remains the same.
- UAS maximum altitude = 50 m

- Teams will adequately deconflict altitude when flying multiple UAS

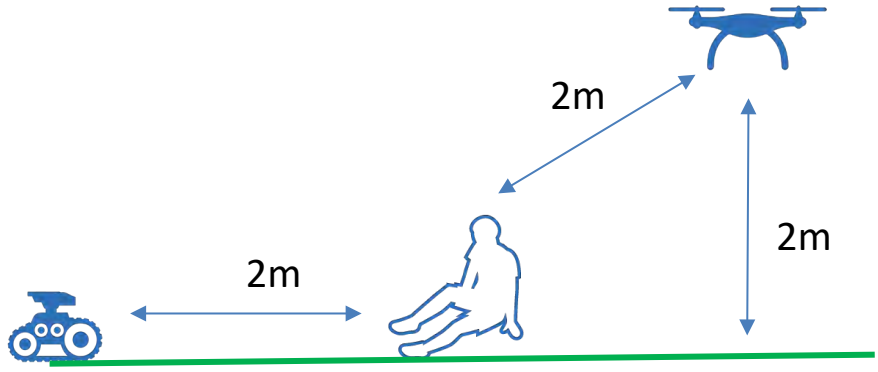


Figure 7a: Standoff Distance. The standoff distance is measured from UxS to ground or nearest body part to nearest UxS part.

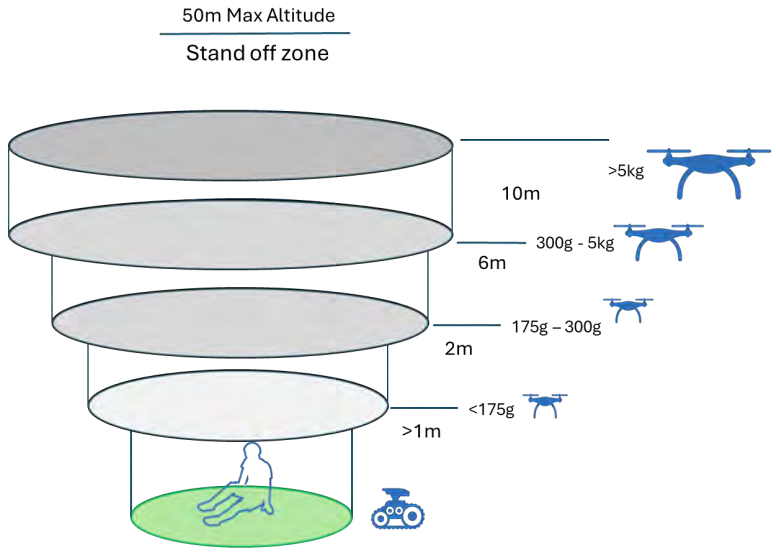


Figure 7b: Size-based standoff distances: Standoff distance is a hemisphere with a minimum height from the ground based on UAS size. The UAS may not hover in a 1m cone directly over the casualty.

9.7.5 Sensor Constraints

DARPA expects that multi-modal approaches will be required to improve signature identification and address multiple challenge elements that could degrade the usefulness of any one sensor (e.g., environmental conditions, casualty pose, casualty location). Various sensor modalities and combinations will be allowed, including but not limited to LIDAR, acoustic, visual, RF, IR, UV, radar, gravity, compass/magnetic, GPS, and chemical.

- Sensors must be capable of detecting the desired signatures from the relevant stand-off distances (Figure 8).
- All sensor elements must be skin- and eye-safe.

- Sensors may not physically interact with casualties.
- All audio communication with casualties must be autonomous: no human communication is permitted between teams and casualties.

9.7.6 Sensor Packs

Teams who are only interested in demonstrating their algorithms and are not interesting in participating on all gates may choose to use sensor packs instead. Sensor packs may only be used on gates 2, 3, or 4. Sensor packs must be hand carried and all casualty identification / evaluation / triage must still be autonomous. A team using a sensor pack will be escorted on the course by DARPA personnel and must still maintain the 2m minimum standoff distance of a UGV. A team may not use sensor packs on some gates and systems on other gates. A team may not mix UxS and sensor packs on the same course. This option is intended for self-funded teams who do not have a UGV/UAS solution.

9.7.7 System Quantity Constraints

The number of systems a team can deploy depends on the specific Lane and Gate see section 9.3. Teams are permitted to bring backup, functional systems to the staging area. The total number of systems (including both the primary/active systems and any backups) cannot exceed twice the maximum number of systems allowed per team on the course. Teams are not allowed to activate or utilize these backup systems while their primary systems are active or on the course.

Definition of Active Systems: For the purpose of this rule, a system is considered *active* under *either* of the following conditions:

1. Physical Presence: The system is physically present on the course. A system is considered active from the moment it enters course until leaves the course. *This includes systems that are functional, malfunctioning, disabled, or otherwise non-operational.*

2. Powered On: The system is powered on, regardless of its location (on the course or in the staging area).

Teams are not allowed to activate or utilize the backup systems while their primary systems are active or on the course. The number of active systems on the course will be included when determining if the team is allowed to switch over to a spare system.

DARPA is interested in solutions that are cost-effective and attrition-tolerant. Due to the complexity of the environments, teams should expect and plan for some level of failures and/or attrition. While there are currently no limits on the aggregate cost of deployed systems, DARPA may introduce additional constraints as the competition progresses to appropriately incentivize such solutions.

9.7.8 System lighting

Teams may not use visible lighting for the purpose of illuminating the course. On night courses teams are required to have lighting on all systems sufficient for spotters to uniquely identify separate systems. The lighting on UAS must comply with FAA requirements.

It is highly recommended that teams use colors to differentiate the L and R sides of each platform, as well as differentiate between active platforms.

9.7.9 Base Station Constraints

The base station, aka ground control station (GCS) is the heart of the standoff system, integrating uplink and downlink commands from up to 10 UxS and autonomously submitting reports to the DARPA command post. Teams must mirror their main base station display to the DARPA command post. Teams with both UAVs and UGVs may opt to have separate Base Stations for a total of 2 base stations. If teams have two Base Stations, they must mirror both displays.

9.7.9.1 User Interface

Teams may be implementing up to two types of user interfaces; one designed for crew control of the systems (base station interface) and one geared towards medics (medic interface). Neither interface is required to compete on Lane 1. The medic interface is required for teams to qualify to compete on Lane 2. Teams should expect to mirror this display to CP along with their base station display/s.

The medic interface should run in ATAK or similar software and be deployable on both phones and tablets At a minimum, the interface must provide casualty location and the following categories:

- Primary Assessments
  - Urgent
  - Non-urgent
- Secondary Assessments
  - Urgent
  - Priority
  - Routine

Teams will have at least an hour to meet with the medics ahead of Lane 2 runs to demonstrate use of the medic user interface.

9.7.9.2 Interfacing with the Base Station

Only the human supervisor may work with a base station. The human supervisor may not manually submit reports using the base station. Once a run has begun, the human supervisor may only interact with the base station to teleoperate a system, monitor systems and correct comms issues with the systems or the scoring computer.

Once a system has entered the course during a run, the human supervisor may only interact with the base station to teleoperate a system. When all systems are in the launch zone, the human supervisor may interact with the base station to correct comms issues or other issues interfering with the operation of systems.

9.7.10 System Retrieval

All systems must begin the run in the Staging Area. It is encouraged but not required for the deployed systems to return to the Staging Area by the end of the run. Any systems that have not autonomously exited the course at the termination of a run will be retrieved by up to two (2) team members with guidance from the Course Official.

9.7.11 Course Safety

9.7.11.1 Team Safety (PPE)

DARPA will provide a safety brief at the Team Orientation, all team members physically on site will be required to view the team orientation.

DARPA will provide reflective safety vests, hard hats, and protective eyewear that will be required to be worn in the Course Staging Areas, Launch Areas, and Practice Areas at all times. Team members are also required to provide and wear their own long pants and closed-toed shoes in these areas.

9.7.11.2 Casualty Safety

Team must ensure that their systems maintain safe standoff distances from the casualties. Teams unable to demonstrate this capability will not be permitted to participate in competition runs. During a run, teams will be told to e-stop their systems if they appear out of control or approach too close to a casualty. Systems that are not safely stopped by the team will be stopped using tier 2 e-stop. If tier 2 e-stop is used, all UGVs will come to a stop. If the unsafe condition can be ameliorated, non-affected UGVs can be restarted. However, an emergency stop resulting from collision with a casualty will result in run termination. Due to the more confined conditions within buildings only UAS ≤ 300g or UGSs may enter buildings.

9.7.11.3 Loss of Comms

Operating Unmanned Aircraft Systems (UAS) indoors creates a higher probability of communication loss. The standard "Return to Launch" (RTL) response is hazardous in this environment and significantly increases the likelihood of a crash. Teams who plan to allow their small UAS (≤ 300g) to enter buildings should adjust the response to comm loss for these UAS to land in place. A system that has landed on the course may not be relaunched during that run.

9.7.11.4 Emergency Stop

The emergency stop (E-Stop) requirements are designed to ensure the safety of personnel, equipment, and the competition course environment. All systems participating in the Systems Competition will utilize a complementary three-tiered emergency stop system.

Tier 1: Team Wireless E-Stop

Teams are required to implement a wireless emergency stop capability as a component of their system's communication architecture. The emergency stop must be able to be triggered from the team's base station and/or portable wireless transmitter. The Tier 1 E-stop transmitter must instruct mobile platforms within effective communication range to initiate safe behaviors. Safety protocols dictate unique responses for Unmanned Ground Vehicles (UGSs) and Unmanned Aerial Vehicles (UASs) upon activation of the E-stop signal. UGSs are mandated to immediately cease all movement and maintain a stationary position until manual control is resumed by the operator. The platform must achieve this safe state within 30 seconds. Conversely, UASs are instructed to either execute a return-to-launch (RTL) procedure or sustain a hovering state until manual intervention from the safety operator is initiated. UASs larger than 300g are restricted from landing in their current location unless specifically directed by the operator.

The emergency stop must include clear visual feedback of the mobile platform's safe, halted state (e.g., red LED). The emergency stop capability may be targeted to a specific platform but should also provide the functionality to rapidly render all platforms safe. A team must be able to render all platforms within communication range completely motionless within 60 seconds.

Tier 2: Recovery Wireless E-Stop

The tier 2 E-Stop will be optional for UASs but required for UGSs. The module specifications and configuration guidelines for the Tier 2 E-Stop are detailed in the *Transponder and Emergency Stop Integration Guide*. The tier 2 E-Stop is operated by DARPA.

Tier 3: On-Platform E-Stop

Teams must integrate at least one emergency stop button on each platform that weighs more than 10 kg. The button must be a red mushroom-capped button at least 25 mm in diameter, with clear markings indicating that it is an emergency stop button. The buttons must latch when triggered and must require a twisting motion to release the latch. The buttons must be completely unobstructed and must be easily accessible by recovery personnel. The emergency stop procedures implemented on the mobile platforms must, upon receiving a Tier 3 E-Stop trigger, render all platforms completely motionless within 5 seconds.

E-Stop Qualification:

In accordance with the DTC Event Qualification Guide document, all teams are required to demonstrate emergency stop compliance to be eligible for participation in the Competition Events. Year 2 Workshop qualification requires teams to demonstrate fully functional emergency stopping in compliance with Tier 1, Tier 2 and Tier 3 outlined in this document. Demonstration requirements are outlined in the "Emergency Stop" section of the *DTC Event Qualification Guide*.

Emergency stop functionality and compliance will be verified by DARPA at each official DTC Challenge event. DARPA reserves the right to deny a team's participation in one or more runs if any of their mobile platforms are non-compliant with the emergency stop rule.

9.7.12 Dropped Components

Teams are permitted to use dropped components and leave-behind peripherals. Components may only be dropped from UGVs, not UAS. Components must comply with the same minimum 2m standoff distance as UGVs. Components will count towards total system limit.

9.7.13 Course Alteration

The course may not be willfully altered by any of the deployed systems, including but not limited to digging, burrowing, or intentional degradation or destruction of the environment's walls, floors, ceiling, immobile barriers or obstacles, or other course infrastructure or instrument.

9.7.14 Power Sources

All fuel and power sources will need to be approved by DARPA for use in the competition. Teams may be required to submit safety protocols and DARPA may require additional site-specific approvals which could require significant lead time. Most electric battery sources are expected to be approved. Combustible fuels are not permitted for DTC events. Teams are encouraged to address any potential concerns early.

9.7.15 Competition Networking

Casualty reports will be submitted from the base station over a DARPA-managed wired network. A wireless team's network will be available for teleoperation and encrypted data transmission between platforms and the base station. Further details may be found in the Operations Guide.

9.7.16 Internet and Cloud Resources

DARPA does not plan to provide or allow the use of internet (www) or cloud connectivity during the runs

in the Systems Competition. Access to such resources is often limited in the field and in real-world scenarios following natural disasters. Team personnel in the Staging Area are not permitted to access the internet, communicate with team garage or make calls on any devices (e.g., cell phone, tablet, radio) during the competition run.

9.7.17 Data Protection

Teams are required to use encryption for data transmission between their base station and their UxSs. Data transfer from the base station computers to a computer approved for processing, analysis and/or data storage will be performed using approved transfer methods such as writeable CDs, DVDs, or memory cards, after being scanned for malware. At the end of an event, teams will remove and clear any removable memory in the UxS. Teams must review and sign the Data Management agreement provided as part of the IAIR.

UAS Data encryption should meet Advanced Encryption Standard (**AES)-128** or equivalent standard as established by the U.S. National Institute of Standards and Technology. It is the responsibility of the competitor to ensure all UAS data, signals that are collected, transmitted, or received by the UAS are sufficiently protected from compromise.

9.7.18 Geofencing

Teams will be required to implement a geofence around the courses based on GPS coordinates and ceiling that will be provided by DARPA for each course and practice area before teams are permitted to fly on course. For teams, using other methods of Geofencing, the DARPA team will work with them to determine a viable solution.

To ensure that teams are maintaining appropriate standoff distances and remaining in their geofence, teams will be required to submit regular geocoordinate updates on their systems. The frequency of these reports is TBD.

9.7.19 Location Status

Teams will be required to have all active UxS report current GPS coordinates at a 1-4 Hz frequency. For further details see the ICD.

9.8 Scoring Criteria

Teams are evaluated based on accuracy and/or speed in assessing casualty condition using one or more autonomous platforms and stand-off sensors. Casualties are distributed throughout the competition course in a manner which rewards teams that are able to rapidly find and assess casualties. The nature of the casualties is not known prior to a run by competitors and may vary between courses. To measure system performance on different components of autonomous triage and medic-machine teaming, scoring will differ between each course. All scores are integer values between 0 and 100.

9.8.1 Casualty Report

The Casualty Report captures clinical information about health condition relevant for triage decision making including vital signs, triage categorization indicating urgent need for care, injury and alertness assessments, and an image. Upon locating and assessing a casualty, teams will submit casualty information to be compared against concurrent ground truth for scoring. The scored casualty information will differ between Gates and for HMT as described in Section 9.8.2 below.

Casualty Reports will be submitted to the DARPA Command Post via the team's base station over an Ethernet link. Upon submitting a Casualty Report, teams will receive an automated system response including confirmation of report receipt and run status information.

For detailed report format, protocol, and example implementation, please see the Interface Control Document (ICD).

9.8.1.1 Reported Casualty Location

Casualty location will be reported as latitude, longitude, and level. Level is used to indicate the floor of casualties located in the interior of a building, where Level 1 indicates the ground floor. Exterior locations should be indicated with Level 1.

9.8.1.2 Casualty Identity and Ground Truth Association

Each reported casualty is identified by a unique casualty ID, provided within the Casualty Report. The casualty ID serves as a linking variable between separate submissions of information about the same casualty, as applicable. A new reported casualty ID within the same run is interpreted as a newly detected casualty.

A reported casualty must be associated with a ground truth casualty in order to be scored and receive points for correct assessment. For Gate 1 and HMT courses, association with a casualty is based on the proximity of the reported location and the ground truth casualty location. Level will be included in proximity, where reports may only associate with casualties on the same level within a building. For Gates 2, 3, and 4 where accuracy of casualty assessment is the focus instead of location, a list of casualty locations and casualty IDs will be provided prior to the run. Teams are expected to provide the casualty ID at the location provided, and association of reports in these gates will be based on the casualty ID alone.

Both casualty ID and location are required fields in all Casualty Reports. A reported casualty ID can only be associated with a single ground truth casualty for scoring, and vice versa.

9.8.1.3 Casualty Image

Teams are required to include an image with each Casualty Report. The provided image should serve as evidence of the information contained in the report. See the ICD for details on format.

9.8.1.4 Report Limits

To discourage guessing and preserve system bandwidth, the DARPA Command Post will limit the total number of casualties that can be submitted during a run. Any report submitted with a unique casualty ID will count toward the report limit. Any further reports beyond this limit are rejected and will not impact the score. Reports on casualties located outside of the course boundaries will not be scored or counted towards the report limit. Report limits will not be provided ahead of runs.

9.8.1.5 Report Time

Scoring will be based off the time a report is received by the DARPA Command Post. The health assessment will be scored using the relative timestamp for each field provided in the Casualty Report

("time ago") applied to the report receipt time. In response to each successfully submitted report, teams receive run status with both the clock time and the elapsed time into a run. Details regarding report format and responses are provided in the ICD.

9.8.2 Report Scoring

Each Gate and Lane course is designed to evaluate team systems on a component capability or set of capabilities needed for rapid, autonomous, stand-off triage assessment. Scoring differs across each course, both in the information in the Casualty Report that is scored and in how points are awarded. The following subsections describe the scoring approach within each course.

9.8.2.1 Gate 1: Location

In this course, teams will be evaluated on how well they can detect and localize casualties in a complex scene. Required Casualty Report fields in Gate 1 include casualty ID and location. Only one report per reported Casualty ID is accepted. The score reflects both the number of casualties found and how early they were found within the run. In order for a ground truth casualty to be considered found before time *t*, the ground truth casualty must have an associated Casualty Report received before time *t*. Only reports that associate with a ground truth casualty will contribute to the score. Reports may not be retracted or revised once submitted.

The score for this course is the area-under-the-curve of number of casualties found over time as a percentage of maximum possible score for the run, penalized by false positive reports:

$$S_1 = round\left(100 * max\left(0, \frac{\sum_{i=1}^{T} L_i - \omega K_i}{C\ T}\right)\right), \qquad T = \frac{R}{\Delta t}$$

where:

- S_1 is the score for Gate 1
- C is the total number of casualties
- R is the run duration
- Δt is the time interval used for scoring
- T is the total number of time intervals in the run
- L_i is the number of casualties found before run time $t = i * \Delta t$
- K_i is the number of false positive casualties reported before run time $t = i * \Delta t$
- ω is the penalty weight for false positive casualty reports

For Workshop 3, $\Delta t = 5$ seconds and $\omega = 1$.

9.8.2.2 Gate 2: Rapid Triage ("First-Pass Assessment")

In this course, teams will be evaluated on how well they can rapidly assess triage classification of found casualties. Required Casualty Report fields in Gate 2 include casualty ID, location, and first-pass triage classification. Only one report per reported Casualty ID is accepted. The score reflects the number of casualties found and correctly assessed, and how early casualties were correctly assessed. For this course, a casualty is considered correctly assessed before time *t* if the reported triage classification matches the casualty ground truth and was received before time *t*. Casualties that are incorrectly assessed do not contribute to the score. Only reports that associate with a ground truth casualty will contribute to the score. Reports may not be retracted or revised once submitted.

For each casualty, ground truth triage classification does not change for the entire duration of the run within Gate 2. Triage classification indicates signs of life, severity of injury, and urgency of need for care:

- **Urgent / Hemorrhage**: Casualty with suspected life-threatening bleeding needing intervention in the next 5 minutes.
- **Urgent / Airway:** Casualty with suspected life-threatening injury impacting airway or breathing needing intervention in the next 5 minutes
- **Non-Urgent / Ambulatory:** Living casualties without apparent life-threatening injury that are able to walk.
- **Non-Urgent / Stationary:** Living casualties without apparent life-threatening injury that are not able to walk.
- **Deceased**: Casualty with no signs of life

See Tables 8 and 9 in the Appendix for full triage classification definitions.

The score for this course is the area-under-the-curve of number of casualties correctly assessed over time as a percentage of maximum possible score for the run, penalized by false positive reports:

$$S_2 = round\left(100 * max\left(0, \frac{\sum_{i=1}^{T} Y_i - \omega Z_i}{C\ T}\right)\right), \qquad T = \frac{R}{\Delta t}$$

where:

- S_2 is the score for Gate 2
- C is the total number of casualties
- R is the run duration
- Δt is the time interval used for scoring
- T is the total number of time intervals in the run
- Y_i is the number of casualties found and correctly assessed before run time $t = i * \Delta t$
- Z_i is the number of false positive reported casualties with incorrect location or incorrect triage assessment before run time $t = i * \Delta t$
- ω is the penalty weight for false positive casualty reports

For Workshop 3, $\Delta t = 5$ seconds and $\omega = 1$.

9.8.2.3 Gate 3: Detailed Assessment

In this course, teams will be evaluated on how well they can detect injuries, assess alertness, and provide second-pass triage classification for found casualties. Required Casualty Report fields in Gate 3 include casualty ID and location with optional fields for detected injuries, alertness assessment, and second-pass triage classification, where fields may be reported separately or together across multiple reports for the same casualty. Second-pass triage assessment will be included in Workshop 3, after which DARPA will assess whether to include the scoring for Challenge Event 3.

Injuries are reported by type and location and may only be reported once for a given type and location per casualty ID. Each alertness field (Ocular, Verbal, Motor) may only be reported once per casualty ID. Similarly, second-pass triage classification may only be reported once per casualty ID. Reports may not be retracted or revised once submitted. The score reflects accuracy of injury detection, alertness classification, and second-pass triage classification, as well as number of casualties correctly assessed. Unlike in Gates 1 and 2, there is no score incentive for early reporting on this course, although teams are encouraged to submit

Casualty Reports as soon as each casualty is assessed.

For each casualty, ground truth injuries, alertness, and second-pass triage classification do not change for the entire duration of the run within Gate 3. See Tables 10, 11, and 12 in the Appendix for definitions of injury types, body regions, and alertness assessments, respectively. See Table 8 in the Appendix for definitions of second-pass triage classifications.

The score for this course is a weighted sum of injury detection performance, alertness classification, and second-pass triage classification performance:

Injury detection performance is the ratio of correct reported injuries (by location and type) to the sum of detected injuries (correct and incorrect) and missed injuries:

$$D = \frac{T}{T + F + M}$$

where:

- D is injury detection performance for Gate 3
- T is the number of correct injury detections, with correct type and body region
- F is the number of false injury detections, with incorrect type or incorrect body region
- M is the number of missed injured body regions across all casualties that were not reported as injured with any injury type

Injury types and body regions are more granular this year, see Table 10 and 11 respectively for definitions. While reported body regions include laterality (left/right, front/back), confusions between sides for a single-sided injury will still be counted as correct detections (for example, a left arm amputation that was reported as a right arm amputation). However, confusions between single- and both-sided injury will be counted as one correct and one false-positive detection (for example, a left arm amputation that was reported as double-arm amputation). Injuries on the same casualty with the same type in the same body region are treated as a single injury for scoring (for example, multiple burns on the left leg are counted as a single injury). For any injury, verbal confirmation by the casualty constitutes a detectable injury.

Alertness classification performance is calculated as the ratio of correctly reported alertness (motor, verbal, or ocular) to the sum of correct, incorrect, and missed alertness classifications:

$$A = \frac{T}{T + F + M}$$

where:

- A is alertness detection performance for Gate 3
- T is the number of correct reported alertness classifications
- F is the number of incorrect reported alertness classifications
- M is the number of missed alertness classifications that were not reported

Each alertness assessment (motor, verbal, or ocular) per casualty contributes equally to the terms T, F, M above.

Second-pass triage classification performance is calculated as the ratio of correctly reported triage category to the sum of correct, incorrect, and missed triage classifications:

$$C = \frac{T}{T + F + M}$$

where:

- C is second-pass triage classification performance for Gate 3
- T is the number of correct reported second-pass triage category
- F is the number of incorrect reported second-pass triage category
- M is the number of missed second-pass triage categories that were not reported

The composite score S_3 for Gate 3 is a weighted sum of injury detection performance, alertness classification and triage categorization performance:

$$S_3 = round\big(100 * (\lambda_D\, D + \lambda_A\, A + \lambda_C\, C)\big)$$

For Workshop 3, the weights will be $\lambda_D = \lambda_A = \lambda_C = 1/3$.

9.8.2.4 Gate 4: Vitals

In this course, teams will be evaluated on how well they can estimate vital signs from stand-off sensing. Required Casualty Report fields in Gate 4 include casualty ID, location, and vitals assessment for Heart Rate and/or Respiratory Rate with relative timestamp. Vital sign types are Heart Rate (HR) and Respiratory Rate (RR); they can be reported separately, however only one report per vital sign type per reported casualty ID will be accepted. Relative timestamp (a.k.a., "time ago") indicates the time in the past to compare estimated vitals against ground truth, relative to the report receipt time. The score reflects the performance of vitals estimation.

Vitals performance is the ratio of correctly reported vitals (both HR and RR) to the sum of correct, incorrect, and unreported vitals:

$$S_4 = round\left(100 * \frac{T}{T + F + M}\right)$$

where:

- S_4 is vitals performance for Gate 3
- T is the number of correct reported vitals estimates
- F is the number of incorrect reported vitals estimates
- M is the number of missed vitals estimates that were not reported

Both HR and RR contribute equally to the terms T, F, M above. Vitals must be within a predetermined range of the ground truth value to be counted as correct. For Heart Rate, the reported estimate must be within +/- 5 BPM (beats per minute) of ground truth measured over the preceding 10 seconds. For Respiratory Rate, the reported estimate must be within +/- 3 BrPM (breaths per minute) of ground truth measured over the preceding 60 seconds. See Table 11 in the Appendix for correctness criteria for vital signs.

9.8.2.5 HMT: Medic-Machine Teaming

In this course, teams will be evaluated on how well their systems improve outcomes by assisting one or more human medics responding to the simulated scenario as if it was a real-world mass casualty event. Simulated casualties will degrade or improve depending on whether they have life-threatening injuries or receive stabilizing treatment, respectively.

Casualties will have either life-threatening or non-life-threatening injuries. Each casualty with life-threatening injuries will have a pre-determined time at which they degrade beyond recovery. If at least one of the human medics arrives at the casualty with sufficient time to treat their injuries, that casualty will be considered as treated by the medic and count towards "lives saved". Medic locations relative to casualty locations will be tracked throughout the run. The number of "lives saved" is then the number of casualties treated by a medic before succumbing to their injuries. Casualties without life-saving injuries may be treated, but they do not count towards "lives saved".

For HMT runs, there will be dynamic casualties. To indicate casualties who have degraded and expired during a run, systems will be able to request the locations of deceased casualties. This list includes casualties who have expired since the beginning of the run, but it does not include casualties who were deceased at the beginning of the run. See the ICD for more information. Once a dynamic casualty has expired, it will no longer be worth points as those casualty locations will have been provided to teams during the run.

The score for HMT combines percentage of lives saved with incentive for rapid location and rapid first-pass triage classification, along with accurate injury, alertness, and second-pass triage classification:

$$S_T = round\left(100 * \left(\theta_L \frac{L}{N} + \theta_1 S_1 + \theta_2 S_2 + \theta_3 S_3\right)\right)$$

where:

- S_T is the HMT score for medic-machine teaming runs.
- L is the number of lives saved
- N is the number of casualties expected to expire before the end of the run (i.e., "lives who could be saved")
- S_1 is the rapid location scoring equation from Gate 1, excluding casualties who have expired during the run
- S_2 is the rapid triage classification scoring equation from Gate 2, which will only contribute to the score for reports received within the first 5 minutes of the run and excluding casualties who have expired during the run
- S_3 is the injury, alertness, and second-pass triage assessment scoring equation from Gate 3, excluding casualties who have expired during the run
- $\theta_L, \theta_1, \theta_2, \theta_3$ are weights for lives saved, rapid location, rapid triage classification, and secondary triage respectively

For Workshop 3, the following weights will be used: $\theta_L = 0.5$, $\theta_1 = 0.2$, $\theta_2 = 0.2$, $and\ \theta_3 = 0.1$.

9.8.2.5.1 Autonomy Bonus – HMT Lane

For every minute in autonomy a bonus of TBD points will be added to the score. Total time in autonomy will count as total run time minus time in teleoperation, see section 9.4.3.2.

9.8.3 Final Ranking

The Gate Score for Gates 1–4 will be a weighted sum of scores for each gate using the formula:

$$\text{Gate Score} = round(\alpha_1 S_1 + \alpha_2 S_2 + \alpha_3 S_3 + \alpha_4 S_4)$$

For Workshop 3, the weights will be uniform: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0.25$. For courses with multiple runs, the average of the top two runs will be used for scoring. The Gate Score will be used to determine 1st and 2nd

prize winners. In the event of a tie, the team with the best score in Gate 1 will be ranked higher.

The Event Score is determined by performance on HMT and Gates 1–4:

$$\text{Event Score} = round(\beta_T S_T + \beta_1 S_1 + \beta_2 S_2 + \beta_3 S_3 + \beta_4 S_4)$$

For Workshop 3, the weights will be: $\beta_T = 0.4$ and $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0.15$. For courses with multiple runs, the average of the top two runs will be used for scoring. Final ranking for the Grand Prize will be based on the Event Score. In the event of a tie, the team with the highest HMT score (S_T) will be ranked higher.

9.8.4 Minimum Benchmarks to Win Prizes

There is a minimum benchmark for winning prizes Below are the specific benchmarks for each prize:

- Gate Score: 60
  - Gate 1: $S_1 = 60$ with autonomous navigation 80% of the time
  - Gate 2: $S_2 = 60$
  - Gate 3: $S_3 = 60$
  - Gate 4: TBD
- Event Score: 60

10 Appendix

10.1 Casualty Report Definitions

Triage Classification	Definition
	FIRST PASS (Rapid) Triage
Urgent / Hemorrhage	Casualty with suspected life-threatening bleeding needing intervention in the next 5 minutes: Signs of Severe Hemorrhage
Urgent / Airway	Casualty with suspected life-threatening airway complications needing intervention in the next 5 minutes: Signs of Respiratory Distress
Non-Urgent / Ambulatory	Casualty expected to survive at least 5 minutes without intervention: **NOT** Urgent **AND NOT** Deceased **AND** Ambulatory*
Non-Urgent / Stationary	Casualty expected to survive at least 5 minutes without intervention: **NOT** Urgent **AND NOT** Deceased **AND NOT** Ambulatory*
Deceased	Casualty with no signs of life: No detectable vitals **AND** Unconscious*
	SECOND PASS (Deliberate) Triage
Urgent	Casualty with suspected life-threatening injury needing intervention in the next 5 minutes: Signs of Severe Hemorrhage or Signs of Respiratory Distress
Priority	Medium priority casualty with serious injury or illness who will require surgery or advanced medical treatment at a delayed time (may include limb- and eyesight-threatening injuries).
Routine	Low priority casualty with minimal injury or illness who will require additional medical treatment, or expectant casualty for whom life-saving interventions will be minimized.

Table 8: Definitions for triage classification. Asterisk (*) indicates additional term defined in Table 7 below, caret (^) indicates injury term defined in Table 8 below. For more information see Remley, Michael A., et al. "Triage in Action: A Principles-Based Approach to Mass Casualty Management in Tactical Combat Casualty Care." Journal of special operations medicine: a peer reviewed journal for SOF medical professionals 25.3 (2025): 127-131.

Term	Definition
Severe Hemorrhage	Active bleeding external to the body with oozing, squirting, or pooling blood **OR** At least 4 body regions with blood present on clothes or exposed skin
Respiratory Distress	Tripod position and open mouth with intermittent gasping sounds **OR** Abnormal head/neck position and open mouth with gasping sounds **OR** Rapid shallow breathing, snoring, gasping, wheezing, agitation
Ambulatory	Standing or walking **OR** Able to stand or walk given verbal command
Unresponsive	Absent Motor alertness **AND** Absent Verbal alertness

Table 9: Additional definitions for triage classification.

Injury Type	Definition
Amputation	Traumatic removal of body part with visible blood at or /around wound site **OR** Verbal confirmation of injury.
Open	Body region with break in the skin that is visibly open to the environment: Discontinuous skin surface (gap, laceration) **OR** Blood, moist tissue surfaces, or exposed underlying structures **OR** Penetrating wound
Closed	Body region showing evidence of blunt or indirect injury but no visible opening in the skin: Bruising, swelling, or discoloration of skin **OR** Deformity or fracture of limb or region without open break
Burn	Body region showing signs of thermal or chemical injury: Reddened, whitened, or darkened skin discoloration **AND** Shiny, dry, cracked, blistered, or charred skin texture

Table 10: Definitions for injury types.

Body Region	Definition
Head	Upper part of the human body, including neck
Torso–Back	Posterior side of trunk of the human body, including abdomen, hips, and shoulders, excluding neck
Torso–Front	Anterior side of trunk of the human body, including abdomen, hips, and shoulders, excluding neck
Arm–Right	Right side arm and hand, excluding shoulder
Arm–Left	Left side arm and hand, excluding shoulder
Leg–Right	Right side leg and foot, excluding hip
Leg–Left	Left side leg and foot, excluding hip

Table 11: Definitions for injury regions.

Field	Definition
Alertness: Ocular	**OPEN if:** One or both eyelids open and blinking spontaneously **OR** One or both eyelids open without movement **OR** Responsive to prompts to open and uncover eyes. **CLOSED if:** Both eyelids closed **AND** Does not respond after 2 speech prompts to open and uncover eyes. **NOT TESTABLE if:** Cannot assess due to both eyelids being injured or occluded.
Alertness: Verbal	**NORMAL if:** Responsive to prompts after at most 2 attempts with coherent and relevant speech. Oriented to time, person, and place. **ABNORMAL if:** Responsive to prompts after at most 2 attempts with confused or irrelevant speech **OR** Does not respond after 2 speech prompts with pain- or distress-related speech or non-speech vocalization. **ABSENT if:** No vocalization after 2 speech prompts **NOT TESTABLE if:** Cannot assess due to injured mouth, jaw, or throat.
Alertness: Motor	**NORMAL if:** Walking, standing, or sitting unsupported with coordinated movement of limbs **OR** Responsive to prompts to move, within limits of sustained injury. **ABNORMAL if:** Lying or sitting supported with minimal movement or twitching **AND** Does not respond after 2 speech prompts to move body. **ABSENT if:** Lying or sitting supported with no limb movement. **NOT TESTABLE if:** Cannot assess due to external immobilization of limbs or total occlusion of limbs.

Table 12: Definitions for Alertness.

Vital sign	Correctness criteria
Heart Rate	Response within ±5 BPM from GT, as calculated from preceding 10 second window
Respiratory Rate	Response within ±3 BrPM from GT, as calculated from preceding 60 second window

Table 13: Correctness criteria for vitals assessment

10.2 NDAA Compliance Definitions

The National Defense Authorization Act (NDAA) for Fiscal Year 2023 was passed on 23 December, 2022 and Section 817 remains in effect. Section 817 modified portions of FY23 NDAA Sec 848. The bill can be found in its entirety at Congress.gov.

These definitions are extracted with permission from the Procedures for the Operation or Procurement of Unmanned Aircraft Systems to Implement Section 848 of the NDAA for Fiscal Year 2020, published 2 September, 2021. Terms that were modified by FY23 NDAA Sec 817 have been updated.

Covered UAS: Any UAS and any related equipment that:

1. Are manufactured in a covered foreign country or by an entity domiciled in a covered foreign country;
2. Contain critical components, as defined in this document, manufactured in a covered foreign country or by an entity domiciled in a covered foreign country;
3. Use a ground control system or operating software developed in a covered foreign country or by an entity domiciled in a covered foreign country; or
4. Use network connectivity or data storage located in or administered by an entity domiciled in a covered foreign country

Covered UAS Company: Any of the following:

1. Da-Jiang Innovations (or any subsidiary or affiliate of Da-Jiang Innovations)
2. Any entity that produces or provides unmanned aircraft systems and is included on Consolidated Screening List maintained by the International Trade Administration of the Department of Commerce
3. Any entity that produces or provides unmanned aircraft systems and—
    1. is domiciled in a covered foreign country; or
    2. is subject to unmitigated foreign ownership, control or influence by a covered foreign country, as determined by the Secretary of Defense unmitigated foreign ownership, control or influence in accordance with the National Industrial Security Program (or any successor to such program).

The term "covered foreign country" means the People's Republic of China, the Russian Federation, the Islamic Republic of Iran and the Democratic People's Republic of Korea. The term "place of manufacture" has the definition provided in FAR 52.225-18, as the "place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government." If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

The following are included in the definition of "critical components":

1. Flight controller: The combination of embedded software on computing hardware, that issues commands to actuators based on the difference between the desired and actual position of a UAS.
2. Radio: A device that enables communication by packaging, transmitting, and/or receiving modulated signals into or from electromagnetic waves in the radio frequency (RF) spectrum.
3. Data transmission device: Electronic hardware that actively transfers electronic information from one digital system to another. This includes Bluetooth and Wi-Fi and all other data transmission links.
4. Camera: A device that converts focused light onto a photosensitive sensor for the purpose of recording or transmitting visual images in the form of photographs, film, or video signals.
5. Gimbal: A mechanism, typically consisting of electromechanical actuators and a mechanical frame, which rotates about one or more axes to stabilize and properly orient cameras or other sensors.
6. Ground control system: An electronic mechanism that enables a human operator to transmit data in order to influence the actions of an aerial vehicle remotely.
7. Operating software: A program that directs a computer's basic functions, such as scheduling tasks, executing applications, and controlling peripherals.
8. Network connectivity: The hardware and software required for communication between computers over the internet or other distributed and separately administered systems, for example, through the use of routers, switches, and gateways.
9. Data storage: The collective methods and technologies that capture and retain digital information on electromagnetic, optical, or silicon-based storage media.

10.3 DTC Glossary

Chief Official – Program manager or higher DARPA authority for the DARPA Triage Challenge.

Systems Competition –Primary Triage Competition run with actors on a real course (Track A, B).

Virtual Competition – Primary Triage Competition run on a virtual platform (Track C).

Data Competition – Secondary Triage Competition (Track D, E).

Base Station – One or more computers or controllers that serve as the interface between the systems, the DARPA Command Post, and the Human Supervisor.

Chief Judge – DARPA-designated individual with the sole and final authority to make any decisions related to the rules or scoring.

Competition Course – Physical or virtual environment in which deployed systems are expected to explore, and search for casualties.

Course Official – DARPA-designated individual that is based in each Staging Area to apply and enforce the rules and make safety-related decisions, with decision-making authority only superseded by the Judge and Chief Judge.

DARPA Command Post – Computer interface which receives casualty reports and map updates from teams and returns run status. Also refers to the main headquarters where the DARPA staff execute the Challenge.

Gate – Single course in lane 1 focused on testing of a single component of the triage algorithm

Human Supervisor – Team-designated individual permitted to interface with the Base Station, provide high-level interactions with the deployed systems, use wireless communications, and access both course data and status data.

Human-Machine Teaming (HMT) - in DTC this entails a run in which human medics work with autonomous systems to rapidly triage and treat casualties

Lane – Division of course types in CE3 between component testing (lane 1) and HMT (lane 2). Each lane contains multiple courses

Judge – DARPA-designated individual with authority to make decisions related to rules, scoring, and safety, with decision-making authority only superseded by the Chief Judge.

Pit Crew – Team personnel permitted in the Staging Area to assist with operations tasks such as physically deploying the systems, performing repairs, modifying software or firmware, and changing batteries.

Safety Officer – Team-designated members of the Pit Crew responsible for preserving the safety of personnel and property, activating emergency stop transmitters, and/or operate remote controls for safety purposes.

Staging Area – Specified area immediately outside of the Competition Course entrance from which teams deploy their system.

Starting Gate – Installed structure or existing entrance which serves as the threshold between the Staging Area and the Competition Course.

Starting Gate Fiducial – An easily identifiable object attached to or near the Starting Gate to assist teams to align with the official coordinate frame in which casualties are reported. These may include 2D barcodes, reflective targets, or survey prisms.

Team Garage Coordinator- DARPA-designated individual supporting team prep.

Team Lead – Team-designated individual responsible for making official team decisions (e.g., termination of a run) and communicating with the DARPA Competition Staff.