DAPRA Surgical Competition
Rules Document
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Version 1.0

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1. Background

1.1 Competition Overview

The Defense Advanced Research Projects Agency (DARPA) is conducting the DARPA Surgical Competition (DSC) to identify a minimum viable product (MVP) for a scalable, manufactured, and autonomous trauma surgical robotic platform. The robotic system must be capable of safely executing specified surgical procedures, collaboratively assisting human lead surgeons with complex open trauma surgeries, and rapidly acquiring novel skills.

The primary objective of the DSC is to determine whether state-of-the-art (SOTA) technologies can deliver autonomous trauma surgery or, alternatively, to define the essential technical hurdles preventing such capabilities. Ultimately, the system must safely and effectively complete surgeries independently, assist human surgeons as a collaborative partner, and establish trust as a reliable clinical asset.

The Competition lifecycle shall progress through three major phases:

1. **Competition Qualification:** An initial open application window where ten (10) competitor teams shall be selected based on submitted written proposals and video demonstration files to attend the in-person Workshop Event and Competition Event.
2. **Workshop Event:** A ten-day in-person event serving as a practice run and data collection event.
3. **Competition Event:** A scored, in-person assessment where qualified systems compete across three Component-Level Testing Gates and two full-scenario Assessment Lanes.

A total cash prize pool of $3,500,000 (USD) is authorized under 10 U.S.C. § 4025 to reward top-performing competitors. To foster rapid innovation while maintaining rigorous ethical and data security boundaries, DARPA and the Uniformed Services University (USU) shall provide de-identified Government Furnished Information (GFI) datasets derived from surgical procedures performed on animal, cadaveric, or high-fidelity simulation models to train autonomous capabilities without risking privacy friction. Evaluation shall be conducted by a joint Independent Verification and Validation (IV&V) team comprised of trauma surgeons, surgical roboticists, and autonomous systems experts.

1.2 Mission Impact

Modern trauma surgical care currently operates without the integration of robotic or fully autonomous systems. Effective surgical assistance traditionally requires years of specialized training. During Large Scale Combat Operations (LSCO) and Mass Casualty Incidents (MCIs), the Military Health System (MHS) may operate under severe personnel constraints and be unable to scale capacity to match surge demand. Consequently, surgical assistance may be forced to rely on unskilled, unverified personnel. To address this critical shortfall, the DSC aims to develop manufactured, scalable, autonomous robotic

systems that can be rapidly integrated into forward-deployed surgical teams, effectively creating an "infinite" capacity for high-quality trauma care.

1.3 Rules Subject to Change

As the DSC Sponsor and owner of this document, DARPA reserves the right, within its sole discretion, to revise the terms at any time by posting an updated version to the DSC Website, with or without notice. Later revisions shall supersede previous versions. The official, current versions of all competition documentation shall be posted on the DSC Website and the DSC Community Forum. Competitors must regularly review these platforms for updates. These terms are intended to comply with applicable federal law, regulation, and policy.

The DSC competition guidelines will be updated throughout the competition period. Please check for updates regularly and send any questions or feedback to the Surgical Competition Discourse Forum or directly to SurgicalCompetition@darpa.mil

2. Timeline

2.1 Key Milestones

- **September 10, 2026:** Public announcement of the DSC and official release of the Competition Rules. The team qualification and application portal shall open on the Tech Grove Competition Qualification website.
- **September 10, 2026 – October 30, 2026:** Competition Qualification window. DARPA shall review application submissions on a rolling basis.
- **September 22, 2026:** Full-day DSC Industry Day Event at the SPA Arlington Research Collaboration Center (SPARCC) in Arlington, VA.
- **October 30, 2026:** Competition Qualification window closes at 16:00 EST.
- **January 15 – 24, 2027:** In-person Competition Workshop.
- **March 20 – 26, 2027:** In-person scored Competition.
- **March 26, 2027:** Awards Ceremony and joint Technical Hotwash.

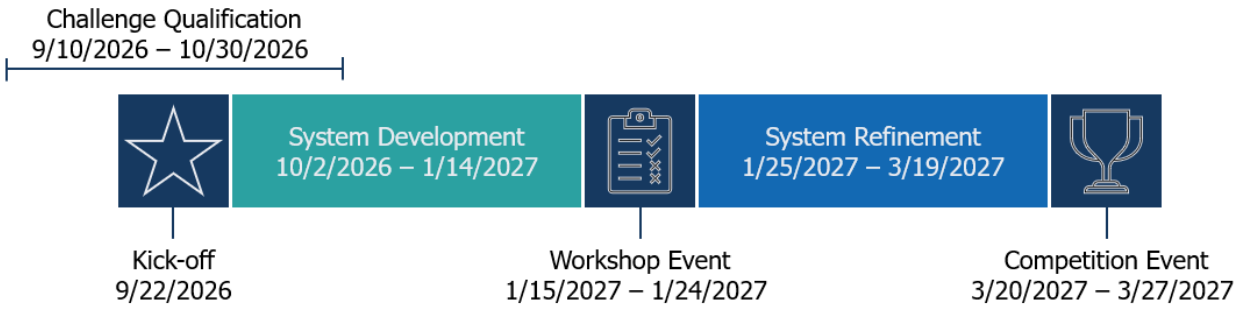

Figure 1. Competition Timeline. Dates for qualification windows and events.

2.2 Qualification Deadlines

The Competition Qualification window shall open on September 10, 2026, and close on October 30, 2026. Qualifications shall be evaluated on a rolling basis. DARPA reserves the right to close the qualification window early if the maximum capacity of ten (10) accepted participant teams is reached prior to the deadline.

2.3 Competition Events

1. Competition Workshop Event (January 15 – 24, 2027): Competitors practice capabilities under competition conditions during this event.
2. Competition Event and Finalist Evaluation (March 20 – 26, 2027): In-person participation is mandatory. Competitors must complete scored execution and physical trials. Only qualified teams invited to the Competition Event shall be eligible to participate and compete for prize awards.

2.4 Awards Ceremony

The Awards Ceremony shall be conducted on March 26, 2027, at the Competition Event venue. Following the ceremony, teams shall participate in a townhall-style Technical Hotwash to discuss technical approaches and lessons learned. Technical sharing during this forum shall not exceed the boundary of data agreements established during team qualification.

3. Prizes and Funding

3.1 Funding Mechanism

The DSC is a self-funded prize competition. Teams will be required to self-fund their way to the Workshop and Competition events to compete to win monetary prizes.

This competition is conducted under the authority of 10 U.S.C. § 4025, which grants the Secretary of War, as well as the Secretaries of the military departments, the explicit authority to award cash prizes and other incentives to recognize outstanding achievements

in basic, advanced, and applied research, technology development, and prototype developments that have the potential for application to the military missions of the Department of War. By utilizing this statutory prize authority, the Department aims to stimulate innovative solutions from non-traditional defense contractors, academia, and the broader commercial sector, thereby accelerating the transition of critical capabilities to the warfighter while ensuring compliance with federal financial and acquisition regulations governing military prize competitions.

3.2 Reasons for Participation

Monetary Awards: Direct access to a $3,500,000 cash prize pool distributed across Component-Level Testing Gates, the Surgical Collaboration Lane, and the Surgical Independence Lane.

Defense and Industry Exposure: Engagement with leaders in surgical robotics, autonomy development, medical device regulators, and DoW agencies responsible for deploying autonomous medical systems.

Collaborative Ecosystem: Opportunities to partner with elite commercial, academic, and governmental entities in autonomous systems.

Follow-On Contracts: Potential transition pathways, including eligibility for Other Transaction Agreements (OTAs), Cooperative Research and Development Agreements (CRADAs), and downstream military acquisition programs.

3.3 Prize Award

Teams will be selected for monetary prize award by the conclusion of the Competition Event during the Awards Ceremony. Prize money will not be distributed at the Awards Ceremony and may take multiple weeks to be distributed.

To be eligible for prizes, teams must have qualified, competed, and scored in the Competition Event. Prizes will be split between three categories: Component-Level Testing Gates, Surgical Collaboration Lane, & Surgical Independence Lane. The top scoring team in each Component-level Testing Gate will receive a prize award. Surgical Lane prizes are split further into 1st, 2nd, and 3rd place prize awards for the top three scoring performers in each lane.

$235,000 will be awarded to the top performer of the Physical Capability Gate. $100,000 will be awarded to the top performer of the Rapid Learning Gate. $75,000 will be awarded to the top performer of the Medical Knowledge Gate. Additionally, teams that achieve minimum gate requirements may earn an additional $3,000 per gate.

There will be two comprehensive platform tests: a Surgical Collaboration Lane and Surgical Independence Lane. Teams who qualify will compete in both. Winners of each lane will receive prizes: $1,000,000 for first place, $400,000 for second place, and $100,000 for third place. To be eligible for prize awards in the Surgical Collaboration Lane or Surgical Independence Lane, the team must meet a minimum threshold score.

Component-Level Testing Gates			Surgical Lanes		
Gate	**Prize**		**Place**	**Surgical Collaboration Lane***	**Surgical Independence Lane***
Total	**$500,000**		**Total**	**$1,500,000**	**$1,500,000**
Physical Capability Gate	$235,000		1st	$1,000,000	$1,000,000
Rapid Learning Gate	$100,000		2nd	$400,000	$400,000
Medical Knowledge Gate	$75,000		3rd	$100,000	$100,000
Meet Minimum Requirements *(up to 10 teams)*	$3,000 / gate			*Must meet minimum requirements to win the prizes above (see section 7.4.3).	

3.4 Eligibility for Prizes

- Teams must maintain an active registration in the official team qualification portal.
- Recipients must furnish all required identifying documentation, including Social Security Numbers (SSNs) for individuals or Tax Identification Numbers (TINs) for organizations.
- The designated primary contact of each registered team shall be solely responsible for providing completed disbursement forms (e.g., Standard Form 3881 [SF-3881] or Payee Information Form [PIF]) upon DARPA request.
- DARPA shall disburse prizes exclusively to the designated primary contact or primary organization. DARPA is not liable for downstream allocation of funds among team members.

3.5 Availability of Prize Funds

The Government's obligation to distribute prizes under the DSC is strictly subject to the availability of appropriated funds. No legal liability on the part of the Government for any payment of prizes shall arise unless and until appropriated funds are made available to DARPA for this purpose.

4. Qualifications

4.1 Competition Qualifications

Competition Qualification (September 10, 2026 – October 30, 2026): Competitors must submit a detailed technical whitepaper and video demonstration file through the official portal. This phase qualifies teams to participate in the Competition and attend the Workshop and Competition Events.

DARPA shall select up to 10 teams who successfully qualify for the Competition. Qualifications for the Competition will be on a "rolling" basis where materials submitted during the open qualification window will be assessed as they are received and DARPA will select up to 10 teams that qualify. DARPA will review all the materials submitted by the Qualification deadline before finalizing the number of qualified teams for the event.

The latest revisions of the official DSC Qualification Guide shall be maintained on the DSC Website.

5. Human Subjects Research

5.1 Human Subjects Research

For the DSC, competitor teams must be included in the IV&V team's Institutional Review Board (IRB) protocol to access training data provided by the IV&V team. Use of training data provided by DARPA does not constitute HSR. Teams are prohibited from the collection or use of any other human subject data as part of their involvement in the DSC because DARPA HSR supervision is not feasible for teams not under a DARPA contract. Teams should carefully consider this limitation and should take this into account in their technical approach, leveraging other strategies as appropriate (e.g., simulations, non-human subjects data).

5.2 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.

5.3 Government Furnished Information

By registering for this competition and accessing the provided data, Competitors agree to be bound by the following strict terms governing the use, protection, and operational boundaries of GFI.

1. For the strict purposes of this Competition, GFI is defined as curated, non-operational physiological and structural datasets jointly owned by DARPA and the Uniformed Services University (USU), exclusively for research purposes, and derived exclusively from animal or de-identified cadaveric models. The GFI provided has been rigorously scrubbed and structurally de-identified and de-indexed to ensure the absolute absence of any Personally Identifiable Information (PII) or Protected Health Information (PHI). It is provided "as-is" solely as an innovation catalyst for the parameters of this competition.
2. Competitors operate as temporary, secure stewards of the GFI. While the data is inherently low-risk, maintaining its integrity is mandatory. Competitors are expressly bound to:
    a. Maintain commercially reasonable administrative, physical, and technical safeguards to protect the GFI.
    b. Prevent the unauthorized distribution, public hosting, or open-source release of the raw or derivative GFI datasets.
    c. Ensure that only formally registered team members have access to the downloaded GFI.
3. The authorization to download, process, and analyze GFI is a limited, non-transferable, and revocable privilege. Competitors agree that:
    a. The GFI may be utilized exclusively for the design, testing, and submission of solutions directly responsive to this competition.
    b. Competitors are strictly prohibited from retaining, commercializing, or repurposing GFI to train external algorithms, develop parallel commercial products, or conduct secondary research outside the explicit scope of this competition.
    c. Upon the conclusion of the Competition (or upon withdrawal/disqualification), Competitors must immediately cease all use of the GFI and purge data from their local environments.
4. Competitors must unconditionally respect the de-identified status of the GFI. By accessing it, Competitors commit to the following absolute prohibitions:
    a. Reconstruction by executing any process, script, or analysis intended to re-identify, reverse-engineer, or trace the data of a specific human or proprietary origin is strictly prohibited.

b. Commingling for interference by merging, combining, or cross-referencing the GFI with external databases (public or private) in any manner that creates risk of tracing or inferring identity or reconstructing restricted metadata is strictly prohibited.

c. Inadvertent discovery of an anomaly that resembles PII or PHI within the GFI data requires an immediate halt to processing, file isolation, and notification to competition administration without attempting to verify the data.

5.4 Privacy Protections

PRIVACY AND DATA USE ADVISORY: SYNTHETIC VISUAL TRIAGE DATASET

To participate in this competition, performers must adhere to the following limited-use principles for the provided visual dataset (classified as Non-Attributed Technical Sensor Data; contains no personally identifiable or protected health information or real casualties):

- Permissible Use & Downloading: You are authorized to download this dataset to your own systems solely for local development and training of automated surgical algorithms. You must not share, copy, or distribute this data to unauthorized third parties or use it outside this research scope.
- No Re-Identification: Do not attempt to deduce, infer, or uncover the real-world identities of the actors.
- No Facial Recognition: Do not run this data against any facial recognition, social media, or reverse-image search engines.
- Algorithmic Isolation: Use facial data strictly as an anonymous physiological sensor input. Do not train, tune, or use models for identity verification, profiling, or biometric surveillance.
- Enforcement: Any violation of these terms will result in immediate disqualification from the competition, forfeiture of associated funding, and potential contractual or legal action.

6. Technical Requirements

This section outlines the core technical specifications and constraints for surgical robotic systems used by participating teams to compete in the DSC. To ensure fair assessment, safety, and logistical feasibility, all participating teams must adhere strictly to the requirements detailed below.

6.1. System Design

- There are no restrictions or specific requirements regarding the underlying design, architecture, or mechanical approach of the surgical robotic system, provided it adheres to the size, power, and safety constraints outlined in this section.
- Teams are welcome to utilize existing commercial platforms, adapted off-the-shelf technologies, or completely novel, custom-built approaches. All are equally accepted and encouraged.
- There is no requirement for FDA approved systems, or medical grade subcomponents. Human tissue will not be utilized in any portion of the assessment.

6.2 Size

- When fully packaged for transport, the system must be capable of fitting through standard doorways and standard office hallways.
- Teams will be permitted to unpack, assemble, and calibrate their systems in the designated assessment operating room one day prior to the scheduled assessment.
- The fully deployed system must fit comfortably inside a standard operating room without obstructing essential medical personnel or facility infrastructure. The longitudinal footprint of the robotic system(s) must not exceed the length of a standard operating room table (84 inches or 213 cm).
- The system must allow for a human surgeon to freely operate on one side of the operating table.

6.3 Power

- The system must operate safely and reliably on standard U.S. wall power (120V / 60Hz).
- If a system is designed for a different power standard, the participating team must supply all necessary, safety-certified power adapters and transformers to ensure seamless and safe integration with standard U.S. wall outlets.

6.4 Networking & Compute

- All computational processing must be performed locally on the system / in the room. Systems are strictly prohibited from connecting to exterior, cloud-based compute locations or external internet services.
- During the evaluation, all systems will operate on a secure, closed assessment network provided and managed by the IV&V team.
- Operating on the local assessment network enables the IV&V team to actively monitor all network traffic. This ensures compliance with competition rules, confirms network isolation, and verifies that no unauthorized external communication is attempted.

6.5 Security & Foreign Origin Compliance

- The official assessment will take place on-site at a U.S. Military Installation. Teams must comply with all facility access and operational protocols.
- All systems, including their constituent hardware and network devices, must strictly adhere to U.S. Department of War security restrictions regarding foreign-made advanced robotics and telecommunications equipment. Teams are responsible for auditing their supply chains to ensure compliance prior to arrival.
- No systems, subsystems, software, or components developed, manufactured, or serviced by entities on the DoD Section 1260H List of Chinese Military Companies are eligible for integration or participation. Competitors must formally certify compliance with these parameters prior to arrival. Failure to pass this supply chain audit shall result in immediate disqualification and prize forfeiture.

6.6 Insurance

Competitor teams must obtain and maintain comprehensive liability insurance covering all operational risks associated with robotic systems, transport, and physical participation in the Competition events. Proof of insurance must be submitted prior to the setup phase.

6.7 Establishment in Operating Room

- Teams must unpack, assemble, and calibrate their systems in their designated assessment operating room exactly one day prior to their scheduled assessment.
- Teams must establish their system around the operating table such that a human surgeon has free access to the patient from at least on side and could operate simultaneously with the system. Neither should be obstructed or restricted by the other. A safe egress from the table must be maintained for the human surgeon. A representative example is shown below (Figure 2).
- Teams must provide a diagram and safety plan detailing base placement and surgeon safe egress process and path and part of qualification. The Chief Judge has sole discretion and reserves the right to deny set-ups that may be unsafe.
- While bases are restricted to one side of the bed to preserve a safe corridor of egress for human surgeons, the robotic arms may reach across the entire operating field as required to complete clinical tasks.

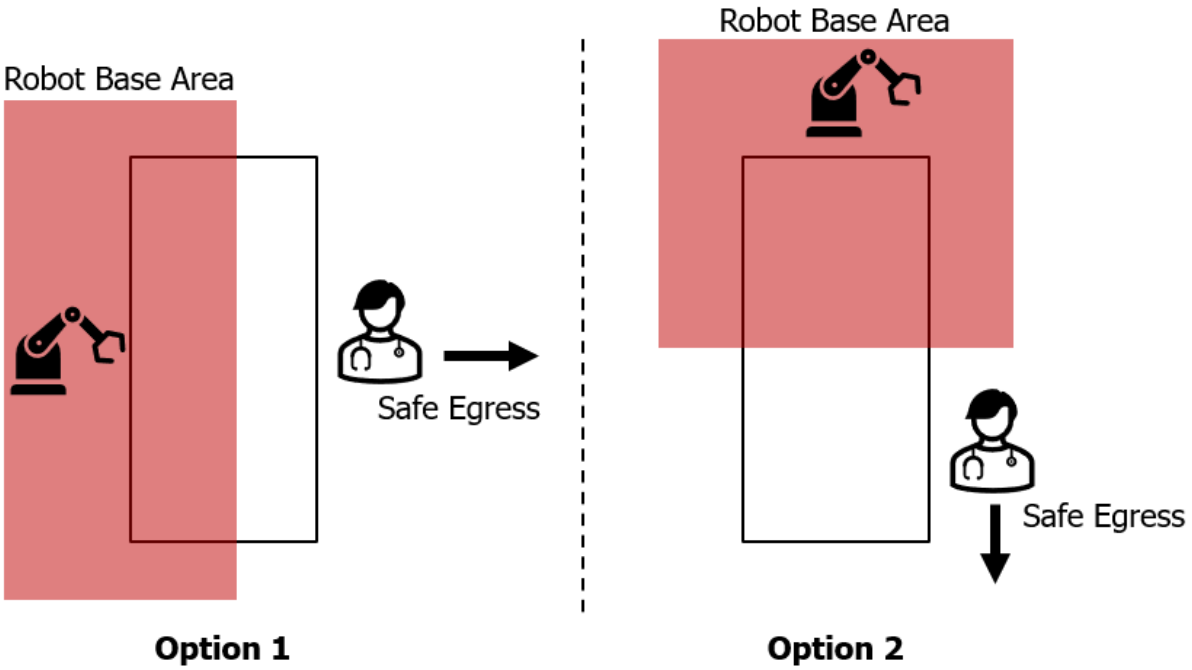

Figure 2. Example options for establishing robotic systems along 50% of the operating table. Teams may establish multiple robotic systems, but all must have established bases on the same side of the table.

7. Competition Assessment

7.1 Assessment Overview

The DSC will evaluate physical and cognitive robotic capabilities. Competitors must first pass three Component-Level Testing Gates (cognitive, physical, and adaptive) before being permitted to attempt the integrated Full Procedure Surgical Lanes.

7.2 Core Tenets of Assessment

Unlike traditional automation benchmarks, the DSC evaluation framework bridges the gap between purely technical metrics and human clinical standards. Every system will be measured against three primary pillars:

1. **Safety:** Minimizing clinical errors, preventing erratic movements, and preserving tissue integrity.
2. **Efficacy:** Ensuring the clinical correctness, precision, and completion of every attempted surgical step.

3. **Efficiency:** Evaluating the speed of decision-making and motor execution relative to established human surgeon baselines.

7.3 Component-Level Testing Gates

Before progressing to integrated procedural testing, candidate platforms must prove their foundational capabilities across three critical areas: cognitive medical knowledge, physical surgical skills, and real-time adaptability.

7.3.1 Medical Knowledge Gate

This cognitive evaluation consists of a simulated "Oral Boards" examination conducted by an IV&V proctor surgeon. Complete system autonomy is required.

7.3.1.1 Recognition (Gate 1A):

This cognitive evaluation assesses the system's ability to rapidly and accurately identify instruments, anatomy, and sterile fields.

- **Instrument Identification:** The system must identify a subset of specific surgical tools presented or requested by name by the proctor (tool list TBD).
- **Anatomy Identification:** The system must recognize anatomical structures and surgical landmarks requested by the proctor (list of structures and landmarks TBD).
- **Sterile Field Assessment:** The system must discern sterile boundaries and identify contaminated items (10 total questions).

7.3.1.2 Procedural Step Understanding (Gate 1B):

The proctor surgeon shall present a clinical scenario and verbally ask questions pertaining to workflow planning, next steps, required instruments, pathological sign indicators, risks, etc. Points are awarded for the correctness and timeliness of answers. A list of potential procedures will be provided.

7.3.2 Physical Capability Gate

This gate evaluates physical interaction with physical surgical tools and clinical simulators in the mode the team intends to operate during lane 1 and 2 (autonomous and/or teleoperate).

7.3.2.1 Surgical Skills Test (Gate 2A):

- Platforms must execute ten (10) foundational primitives across three categories:
  - **Strength:** Abdominal-wall retraction (sustained and stable), internal organ lifting (movement and holding), limb elevation/hold, and laparotomy pack placement.
  - **Tension:** Pulling tissue and suture strands to exact clinical tensions.
  - **Dexterity:** Fluid suctioning, tool grasping and passing, cavity irrigation, vessel clamping, tissue dissection, and throwing sutures.

- **Constraints:** Teams have a strict limit of 60 minutes to attempt and complete as many of the skills as possible, up to 10 skills. Failed attempts may be repeated within the remaining time; the highest-scoring attempt shall be recorded.
- **Autonomy Multiplier:** Teleoperation is permitted during Gate 2A, but operating under autonomous control shall double the points earned for efficacy and efficiency. Autonomy may be toggled between tasks.

7.3.2.2 Safety Commands (Gate 2B):

This gate evaluates the system's compliance with safety protocols and human override commands across 8 scenarios. A list of standardized command will be provided ASAP:

1. **Audible Stop Command:** Immediate halt upon verbal commands.
2. **Safe Egress Command:** Immediate clearance of the surgical field on verbal command.
3. **Move to Location:** Move precisely to a surgeon-directed location.
4. **Adjust Force:** Alter applied mechanical force on demand.
5. **Adjust Speed:** Adjust joint and execution velocity.
6. **Loss of Signal:** Immediate safe pause during a simulated network drop.
7. **Loss of Power:** Immediate cessation of active motion during power loss, enabling low-force manual articulation out of the surgical cavity.
8. **Collision Response:** Immediate pause upon physical impact with the lead surgeon.

7.3.3 Rapid Learning Gate

7.3.3.1 New Skills (Gate 3):

The system must adapt to a completely novel, unprogrammed surgical skill.

Teams are granted a 60-minute window to train the robot using any training methodology (e.g., imitation learning, reinforcement learning, rapid software deployment). The platform must demonstrate mastery by successfully executing the new skill across three (3) consecutive attempts within the allotted time under complete autonomy.

7.3.4 Minimum Requirements to Pass Component Gates

Teams must demonstrate minimum required capability to pass the Component Gates and to be allowed to continue forward into the Full Procedure Surgical Lanes. Minimum Requirements encapsulate threshold capabilities of each gate. Meeting minimum requirements in Gates 1 and 2 for Medical Knowledge and Physical Capability are required; Gate 3 for Rapid Learning is not required to pass to enable a Team's participation in the two Full Procedure Surgical Lanes. Meeting minimum requirements in any of the three gates qualifies a team for Component Gate Minimum Requirement Prize Awards.

7.3.4.1 Medical Knowledge Gate Minimum requirements

7.3.4.1.1 Recognition (Gate 1A) Minimum Requirements

Team systems must identify 5 surgical instruments, and 5 specific parts of anatomy through a series of verbal questions with an audible response back to the proctor.

7.3.4.2 Procedural Step Understanding (Gate 1B) Minimum Requirements

Team systems must demonstrate ability to correctly anticipate surgical workflows. When given a current state, systems must respond with the next/subsequent steps in a procedural workflow.

7.3.4.2 Physical Capability Minimum requirements

7.3.4.2.1 Surgical Skill (Gate 2A) Minimum Requirements

Teams must demonstrate their system's ability to complete one surgical skill task in each of the three categories: strength, tension, dexterity. Teams must complete the surgical skills in the allotted time constraint.

7.3.4.2.2 Safety Commands (Gate 2B) Minimum Requirements

Teams must demonstrate their system's ability to safely and correctly respond to the audible stop command and freeze action in less than 2 seconds. Additionally teams must safely and correctly respond to commands to move out of the surgical space without damage to tissue.

7.3.4.3 Rapid Learning Minimum Requirements

7.3.4.3.1 New Skills (Gate 3A) Minimum Requirements

Teams must demonstrate mastery of new observed skill within assessment time limits.

7.4 Full Procedure Surgical Lanes

Platforms passing minimum requirements in Component Gates 1 and 2 shall proceed to integrated, full-scenario, continuous trauma surgery testing.

7.4.1 Surgical Collaboration Lane

Surgical Collaboration (Lane 1): A human lead surgeon performs a damage control trauma procedure, utilizing the robotic system as an interactive secondary assistant. The run is governed by a script containing key surgical subtasks where the surgeon issues verbal or physical requests to the robot. The goal of the assessment lane is for the robotic platform to successfully assist the lead surgeon through the procedure, responding correctly and efficiently to all commands.

Lane Operations: Maximum runtime of 60 minutes. If the robot fails to complete a task, the lead surgeon shall intervene and complete the step manually to progress the case. Points

are not awarded for any step requiring manual intervention or physical repositioning of the robotic arms by the surgeon.

Autonomy Multiplier: Utilizing autonomous control during a step shall double the score for that step. Teams may alternate between teleoperated and autonomous control.

7.4.2 Surgical Independence Lane

Surgical Independence (Lane 2): In this lane the robot acts as the primary surgeon. A simulated trauma patient is presented with a trauma-relevant injury pattern. The platform must independently evaluate the patient, formulate a diagnostic assessment, establish an operative plan, and execute the complete trauma procedure, stepping through procedural tasks.

Lane Operations: Maximum runtime of 60 minutes. The procedure is governed by a script containing key steps where clinical guidelines dictate a correct surgical subtask. An IV&V proctor surgeon is present to monitor safety. If the robot stalls, the proctor may be requested to complete a step manually so the procedure can continue; however, points are not awarded for any step requiring human intervention.

Autonomy Multiplier: Executing tasks autonomously shall double the points earned for that step.

7.4.3 Surgical Lanes Minimum Requirements

To be eligible for prize awards in the Surgical Collaboration (Land 1) or Surgical Independence (lane 2) teams must meet minimum requirements defined for each lane.

7.4.3.1 Surgical Collaboration Lane Minimum Requirements

Teams must successfully complete 50% of the commanded tasks. At least one (1) of the successfully completed tasks must have been autonomous.

7.4.3.2 Surgical Independence Lane Minimum Requirements

Teams must successfully complete 50% of the identified necessary surgical tasks for the procedure. At least one (1) of the successfully completed tasks must have been autonomous.

8. Competition Operations

8.1 Assessment Area Layout

All assessments shall occur in a simulated operating room equipped with surgical tables, Personal Protective Equipment (PPE), and surgical trainers/phantoms. Standard clinical equipment (such as anesthesia machines) will not be present.

8.1.1 Surgical Simulation Equipment

The primary simulation model is the STOPS Medical Open Surgical Simulation System (OS3). Smaller specialized surgical phantoms and skills trainers shall be used for component-level testing (such as Gate 2A). All simulation equipment shall be placed on the operating table prior to the run.

8.1.2 Surgical Tools

Tools to be used by the surgical robotic systems must be situated on the same side of the operating table as the robotic base. Separate surgical instrument sets shall be provided for use by the human surgeon on the surgeon's side of the operating table.

8.2 Staging

Teams are permitted to stage systems in the assigned operating room one day prior to active assessment. This setup day shall be used for assembly, calibration, and practice on surgical phantoms. Teams may set up one operator table in the room for laptops and local computing assets. Teleoperation must be conducted locally from within the room. Remote network connections are strictly prohibited. The operating room is available during this setup day and between runs to minimize assembly and disassembly cycles.

8.3 Assessment Area Access

Teams are permitted access to the Assessment Area from 07:30 to 19:30 on scheduled competition days. Because alternating groups of competitors must share the facility, systems must be assembled and disassembled on specific, scheduled days. Competition officials must be present at all times during competitor occupancy. Entry and exit during an assessment run are strictly limited to emergencies or critical operational needs.

8.4 Run Termination

Competition officials retain absolute authority to terminate any assessment run immediately for the following reasons:

- **Time Limit:** Immediate termination upon reaching the time limit. If a competitor experiences system complications during a run, the timer shall continue to run. If the IV&V team experiences technical complications during a run, the timer shall be paused until the issue is resolved, and the competitor shall be granted their remaining allotted time.
- **Safety:** Termination due to physical safety concerns. If caused by the competitor's system, no make-up run shall be granted. If caused by the IV&V team, a make-up run may be awarded.
- **Catastrophic Simulation Equipment Damage:** Termination if the robot catastrophically damages the simulation equipment (e.g., wildly unsafe or simulated tissue damage that causes malfunction of the simulator or the would be

lethal/permanently damaging for a real human). No make-up run shall be granted if the damage is competitor-caused.

- **Networking & Power:** Termination due to scoring network failure or utility power dropout. If caused by the assessment team, a make-up run may be granted.
- **Competitor Elected Termination:** Teams may also elect to terminate their run early at any point.

8.5 Personnel Guidelines

To comply with facility capacity rules, competitor teams shall be limited to a maximum of four (4) personnel on-site. All personnel must remain in designated safe zones at a safe distance from active robotic systems.

8.6 Safety and PPE

All personnel inside the assessment operating room must wear required PPE, including mandatory American National Standards Institute (ANSI)-approved eye protection, while robotic systems are powered and operating.

8.7 Power & Communication Dropout Response

Robotic systems must incorporate fail-safe mechanisms to handle power and signal losses:

- **Power Dropout:** Systems must permit manual, low-force manipulation of all robotic joints to allow immediate, safe egress from the surgical cavity.
- **Communication Dropout:** Systems must instantly pause all active motion without exhibiting erratic movements.

8.8 Emergency Stop Functionality

All systems must integrate a highly visible, physical, hardwired emergency stop ("kill switch") that instantly cuts power to all actuators. This switch must be easily reachable by both the competitor operators and the IV&V officials in the room. A safety official will be positioned during all scenarios where a human is co-operating with a robot to press the kill switch if needed.

9. Assessment Structure

9.1 Assessment Timeline

Competitors shall be split into Group A and Group B, arriving and testing on alternating days:

- **Day 1 (Afternoon):** Registration and check-in.
- **Day 2 (Full Day):** System setup, calibration, and phantom practice.

- **Day 3 (Full Day):** Active assessment runs, dispute resolutions, reassessments, and complete system breakdown/removal.

During the Workshop Event, all competitors from both groups may attend the Ethical, Legal, and Societal Implications (ELSI) Working Group Forum. During the Competition Event, all competitors must have at least one representative attend the Awards Ceremony and subsequent joint Technical Hotwash on the final day.

9.2 Assessment Operations

All assessment starts, timers, and terminations are controlled by Competition Officials. The IV&V team shall provide all simulation materials, instruments, and phantoms. If a human surgeon is required (e.g., during Lane 1), they shall be a qualified member of the IV&V team. Competitors must clearly declare their control framework (teleoperation or autonomy) to the scoring official in the room before initiating any task.

9.3 Assessment Scoring

Scores shall be calculated live. The primary scoring official shall evaluate the system in real time using a terminal connected to the assessment network. Centralized control room judges shall monitor and adjudicate scores. All scoring follows the strict rubric outlined in a separate Scoring Guide Document found on the DARPA Surgical Competition website.

10. Disputes

10.1 Disputes

Participation constitutes unconditional agreement to these official rules. Scoring disputes and reassessment requests must be formally submitted to the IV&V Chief Judge within one (1) hour of the assessment run in question. Approved reassessments must occur on the same day. Following a reassessment or dispute denial, scores are final and legally binding.

10.2 Dispute Criteria

Complications disrupting the timer, physical simulation, or scoring infrastructure are subject to dispute:

- If the disruption is caused by the IV&V team, a make-up run may be granted.
- If the disruption is caused by the competitor's hardware or software, a make-up run shall be denied.

10.3 Dispute Operations

To file a dispute, teams must physically submit a completed Dispute Card (provided at registration, specifying team name, assessment run, and detailed reasoning) to the IV&V Chief Judge within 1 hour of the run. The IV&V team shall review the claim and issue an

acceptance or rejection notice within one (1) hour. Approved make-up runs shall commence immediately upon notification.

10.4 Reassessment Operations

All make-up runs must be completed on the same day as the original assessment; no schedule extensions shall be granted. Make-up runs shall use identical scoring rubrics; however, the IV&V team may utilize a different trauma scenario or altered injury pattern to prevent pre-programming.

11. Scoring Rubric

11.1 Scoring Rubric Document

A separate scoring rubric is available on the DARPA Surgical Competition website at: https://www.darpa.mil/research/challenges/surgical. Please make sure to monitor the latest version of the scoring rubric for most up to date information on scoring, evaluation, and points totals for each assessment.

12. Competition Rules

12.1 Pre-Assessment Rules

- Robotic system bases must remain strictly established within the designated 50% boundary of the operating table (right, left, head, or foot). Robotic components may extend across the entire operating table, but bases shall not migrate.
- Surgical instrument trays and utility tables may be placed in adjacent zones to accommodate robotic articulation and reach.

12.2 Assessment Rules

- Competitor team personnel shall not physically touch or interact with the assessment equipment (trainers, phantoms, instruments, or operating tables), or their robotic systems during an active run. A request to interact with a robotic system to debug during an active run must be communicated to the scoring official in the assessment area and may be granted. However, the assessment timer will not pause due to a robotic system's hardware or software issues.
- All teleoperation control commands must originate within the assessment operating room. Remote off-site teleoperation is strictly prohibited.
- No external, off-site networking is permitted. Local computing infrastructure does not need to be physically integrated into the robot chassis but must remain physically located within the boundaries of the assessment operating room.

13. Appendices

13.1 Glossary

Abbreviation	Definition
ANSI	American National Standards Institute
COTS	Commercial Off-The-Shelf
CRADA	Cooperative Research and Development Agreement
DARPA	Defense Advanced Research Projects Agency
DoD	Department of Defense
DoW	Department of War
DSC	DARPA Surgical Competition
ELSI	Ethical, Legal, and Societal Implications
FDA	Food and Drug Administration
GFI	Government Furnished Information
HSR	Human Subjects Research
IRB	Institutional Review Board
LSCO	Large Scale Combat Operations
MCI	Mass Casualty Incident
MHS	Military Health System
NDAA	National Defense Authorization Act
OS3	Open Surgical Simulation System

Abbreviation	Definition
OTA	Other Transaction Agreement
PHI	Protected Health Information
PII	Personally Identifiable Information
PIF	Payee Information Form
PPE	Personal Protective Equipment
SOTA	State-of-the-Art
SSN	Social Security Number
TIN	Tax Identification Number
USU	Uniformed Services University

13.2 Supplemental Links & Information

- DARPA Surgical Competition Official Website: https://www.darpa.mil/research/challenges/surgical
- DARPA Surgical Competition Discourse Forum: TBD
- Central Florida Tech Grove Website & Team Qualification Portal: https://centralfloridatechgrove.org/darpa-surgical-competition/
- STOPS Medical OS3 Technical Specifications: https://www.stops-medical.com/open-surgical-simulation-system-p/os3