APRIL 3, 2025

USE CASES

DOD KILL CHAIN: F2T2EA - USE CASE SCENARIOS

Find

Objective: Detect potential targets of interest across wide-area surveillance.

- Personnel Involved:
    - **All-Source Intelligence Analysts** and **Geospatial Intelligence Analysts (GEOINT)** interpret SAR data for actionable insights.
    - **Collection Managers** and **Mission Managers** coordinate tasking of spacecraft sensors.
    - **Cybersecurity Engineers** and **Cyber Warfare Specialists** ensure secure communications and guard against spoofed data.
    - **Artificial Intelligence/Machine Learning Specialists** support AI-driven onboard identification.
    - **Watch Officers** and **Joint Staff J2** receive briefings and allocate response resources.
    - **Payload Operations Specialists** configure payloads for optimal imaging.
    - **Office of the Director of National Intelligence Liaisons** provide interagency coordination.
    - **Spacecraft** collects persistent intelligence, surveillance, and reconnaissance using Synthetic Aperture Radar (SAR) over designated AOIs using wide-area coverage modes.
    - **Ground Station Operator** receives collection tasking via Command and Control node; prioritized orbits/sensors for optimal collection based on mission urgency.

Fix

Objective: Precisely locate the target in time and space for further targeting actions.

- Personnel Involved:
    - **Attitude Determination and Control Engineers** ensure the satellite is correctly oriented for targeting.
    - **Data Dissemination Analysts** manage dissemination pipelines of location data.
    - Spacecraft: Shifts to narrow-beam, high-resolution collection or Multi-sensor fusion to verify target identity and coordinates.
    - **Ground Segment/Engineers** coordinates data correlation from multiple passes/sensors' manages latency to reduce delay in fix confirmation. handle low-latency comms and data relay.
    - **Satellite Operators** and **System Engineers** work in tandem to ensure sensor precision.
    - Military End User: Receives geolocation fix via tactical interface (exempli grata, ATAK); verifies fix through additional local ISR or HUMINT if available.

Track

Objective: Maintain custody of the target and predict its movements.

- Personnel Involved:
    - **Modeling and Simulation Engineers** develop target movement models.
    - **Flight Software Engineers** update onboard tracking algorithms.
    - **Network Engineers** optimize real-time data flow across systems.
    - **Reconnaissance Marines** and **Unmanned Aerial Systems Operators** may supplement data with on-the-ground movement patterns.
    - Spacecraft: Uses AI onboard to autonomously reacquire and track moving targets between orbits; may cue other assets.
    - **Ground Station Operators** monitor ongoing target track; coordinates updates to mission planners or C2 systems.
    - **Military End Users** view live or near-real-time target tracking overlay; integrates data with ground movements or troop positions for coordinated action.

Target

Objective: Develop a valid firing or strike solution.

- Personnel Involved:
    - **Imagery Scientists**, **SIGINT Analysts**, and **Targeting Officers** validate strike data.
    - **Combat Systems Officers** integrate this data into weapons platforms.
    - **Mission Assurance Analysts** evaluate risk factors before targeting.
    - **Program Managers/IPT Leads** coordinate joint target packages.
    - Spacecraft: Generates targeting-quality data (imagery, SIGINT, LIDAR); may support weaponeering through high-fidelity 3D mapping.
    - **Ground Station Operators** verify data integrity, timestamps, and classification level for use in targeting; pushes data to fire control systems.
    - **Military End Users** engage in joint targeting process (exempli grata, JTCB); confirms ROE compliance, collateral damage estimate, and mission authority.

Engage

Objective: Deliver kinetic or non-kinetic effects on the target.

- Personnel Involved:
    - **Radio Frequency and Communications Engineers** ensure real-time comms with strike assets.
    - **Joint Staff J6** manages operational command systems.
    - **Space Operations Officers** monitor mission timing and relay continuity.
    - **Cyber Warfare Specialists** support non-kinetic (cyber) engagements.
    - Spacecraft: May support comms relay, BDA (battle damage assessment) support, or counter-space warning; does not directly engage.
    - **Ground Station Operators** support ISR handoff to strike platforms; ensures uninterrupted data feeds during strike window.
    - **Military End Users** execute strike via direct fire, CAS, or long—range precision fires; uses satellite cueing to align effectors.

Assess

Objective: Evaluate effectiveness of engagement and inform follow-up actions.

- Personnel Involved:
    - **Thermal Engineers** analyze thermal imaging from post-strike passes.
    - **Imagery Scientists** and **All-Source Analysts** compare pre/post-strike imagery.
    - **Mission Schedulers** prepare follow-up tasks based on BDA needs.
    - **Under Secretary of Defense for Intelligence and Security** may direct assessment at policy level.
    - Spacecraft: Conducts immediate post-strike imaging or signal intercept to assess effect on target.
    - **Ground Station Operators** prioritize rapid downlink and processing of BDA assets; may cue re-tasking for additional passes.
    - **Military End Users** review BDA in near real-time, confirms mission success or need for re-engagement; updates C2 systems.

INTELLIGENCE CYCLE: TCPED - USE CASE SCENARIOS

Tasking

Objective: Assign collection requirements based on commander's intel priorities.

- Personnel Involved:
    - **Defense Space Policy Analysts** shape collection policy.
    - **Director, Defense Intelligence Agency** and **Deputy Assistant Secretary of Defense for Space and Intelligence** validate high-level priorities.
    - **United States Space Command Liaison Officers** deconflict space asset availability.
    - **Payload Engineers** and **Mission Systems Architects** configure collection methods.
    - **Spacecraft**: Accepts automated tasking via C4ISR (example grata, PED tasking from IC).
    - **Ground Station Operators** schedule spacecraft assets according to intel tasking orders; confirms asset availability and coverage feasibility.
    - **Military End Users** submit priority intelligence requirements (PIRs); requests mission-specific intel support.

Collection

Objective: Acquire raw data using technical or human means.

- Personnel Involved:
    - **Spacecraft**: Executes collection pass over AIO; may use onboard AI to prioritize spectral bands or event triggers.
    - **Ground Station Operators** manage downlink windows and data quality control; ensures multiple source integration if applicable.
    - System Administrators and Software Engineers support satellite control and data acquisition.
    - **Hardware Engineers** and **Mechanical/Structural Engineers** ensure payloads function correctly under dynamic conditions.
    - **Military End Users** may assist via ground sensors or additional local collection (example grata, drones, HUMINT teams) for fusion.

Processing

Objective: Convert raw data into usable information.

- Personnel Involved:
    - **Spacecraft**: may run edge-processing algorithms to triage or label raw data onboard before downlink.
    - **Ground Station Operators** use automated and human analysts to filter, decrypt, and categorize incoming data for exploitation.
    - **Data Scientists/Intelligence Systems Engineers** apply edge-processing and machine learning pipelines.
    - **Cybersecurity Engineers** manage encryption and security of data streams.
    - **Military End Users** may not directly process but receives categorized intel products for situational awareness.

Exploitation

Objective: Analyze data to derive actionable insights.

- Personnel Involved:
    - **Spacecraft** plays a limited role; may generate metadata or confidence scores via onboard analytics.
    - **Ground Station Operators** conduct full-spectrum exploitation (IMINT, SIGINT, MASINT); supports fusion center products.
    - **Intelligence Analysts**, **GEOINT Analysts**, and **SIGINT Analysts** review imagery and signals.
    - **Mission Systems Architects** fuse multiple intel domains for decision support.
    - **Military End Users** consume exploited intel in the form of reports, alerts, visual overlays; uses it to adjust tactics or reposition.

Dissemination

Objective: Deliver finished intelligence to decision-makers in time to act.

- Personnel Involved:
    - **Spacecraft**: Not applicable for dissemination, but may facilitate relay via comms satellite architecture.
    - **Ground Station Operator/Collection Managers** push final intel products to relevant units or command; ensures data matches classification protocols and urgency.
    - **Military End User:** Receives and integrates intel into mission planning; may provide feedback for intel refinement.
    - **Watch Officers** ensure timely notification to tactical operators.
    - **Joint Staff K2/J6**, **ODNI Liaisons**, and **Targeting Officers** coordinate dissemination across agencies.

APPENDIX A: PERSONNEL LIST

ID	Personnel	Category C: Contractor F: FFRDC I: Intelligence M: Military P: Pentagon S: SNOC	Role
1	All-Source Intelligence Analyst	I	Integrates data from multiple intelligence disciplines (exempli grata, GEOINT, SIGINT, HUMINT) to produce comprehensive reports that inform mission planning, threat assessments, and strategic decisions.
2	Anomaly Response Coordinator	S	Leads troubleshooting and recovery efforts in the event of system faults or satellite anomalies.
3	Artificial Intelligence/ Machine Learning Specialist	F	Apply machine learning to improve SAR data analysis, anomaly detection, predictive maintenance, and ISR exploitation pipelines.
4	Attitude Determination and Control/Guidance Navigation and Control Engineer	C	Designs algorithms for spacecraft orientation, maneuvering, and orbit control using star trackers, IMUs, et cetera.
5	Collection Manager	I	Coordinates intelligence collection priorities between space-based assets and field requirements, ensuring SNOC tasking aligns with military and national intelligence needs.
6	Combat Systems Officer	M	Manages weapons systems and tactical operations aboard aircraft or naval vessels.
7	Counterintelligence Analyst	I	Identifies and mitigates risks posed by adversaries targeting space infrastructure or intelligence operations, protecting both SNOC and military activities.
8	Cybersecurity Engineer	C,F	Implements system security controls, software hardening, anti-jamming, and NIST compliance.
9	Cyber Warfare Specialist	M	Defends against digital threats and executes offensive cyber operations.
10	Data Dissemination Analyst	S	Verifies the integrity of collected data and coordinates its secure distribution to end users across military, commercial, or research channels

11	Data Scientist/Intelligence Systems Engineer	I	Develops machine learning models and analytic tools to process satellite data at scale, improving speed and accuracy for intelligence exploitation.
12	Defense Space Policy Analyst	P	Support strategic planning and threat analysis involving adversary space capabilities, helping shape how SNOCs and intelligence agencies use space assets in contested environments.
13	Deputy Assistant Secretary of Defense for Space and Intelligence	P	Oversees policy, planning, and integration of space and Intelligence, Surveillance, Reconnaissance systems. Ensures alignment between satellite operations, warfighter needs, and intelligence collection strategies.
14	Director, Defense Intelligence Agency	P	Leads all-source intelligence efforts, provides strategic military intelligence to combatant commands and coordinates closely with satellite and SIGINT data exploitation.
15	Electrical and Avionics Engineer	C	Develops spacecraft electronics, power distribution, embedded processors, and internal data interfaces.
16	Flight Software Engineer	C	Develops and verifies spacecraft code for autonomy, command handling, and onboard processing.
17	Geospatial Intelligence Analyst (GEOINT)	I	Analyzes imagery and geospatial data from satellites (exempli grata, SAR, EO/IR) to produce maps, identify patterns, and support military operations, targeting, and battlefield awareness.
18	Ground Segment Engineer	S	Oversees ground station hardware, antennas, RF systems, and uplink/downlink processes.
19	Hardware Engineer	F	Support development and testing of spacecraft electronics, sensors, antennas, and payload systems.
20	Imagery Scientist	I	Works with raw satellite data to enhance image quality, extract technical features, and develop automated analysis tools for both defense and civilian applications.
21	Intelligence Analyst	M	Gathers and interprets data to support mission planning and threat assessment.
22	Joint Staff J2	P	Advises the Chairman of the Joint Chiefs on military intelligence matters, ensures synchronization between intelligence operations (including satellite tasking) and joint force requirements.

23	Joint Staff J6	P	Develops and oversees network and data-sharing architectures across the DoD, ensuring SNOC, ground stations, and field units remains connected and interoperable.
24	Mechanical/Structural Engineer	C	Builds physical structure of the spacecraft to withstand launch and space environment.
25	Mission Assurance Analyst/Risk Manager	F	Ensure technical quality, mission survivability, and end-to-end system performance.
26	Mission Manager	S	
27	Mission Scheduler	S	Schedules satellite tasking, data collection windows, and downlink sessions based on user requirements and orbital constraints.
28	Mission Systems Architect	C	Designs mission end-to-end concept (space-to-ground) and ensures system-of-systems alignment.
29	Modeling and Simulation Engineer	C, F	Uses digital twins and physics-based models to assess performance, behavior, and stress under mission scenarios.
30	Network Engineer	S	Maintains and optimizes the ground network infrastructure supporting satellite communication links and data flow.
31	Office of the Director of National Intelligence Liaison	P	Coordinate intelligence priorities, technical policies, and interagency support for satellite systems shared between the IC and DoD.
32	Payload Engineer	C	Designs and integrates mission payloads (exempli grata, Synthetic Aperture Radar), ensuring data quality and mission alignment.
33	Payload Operations Specialist	S	Manages the operation of the satellite's payload, such as SAR, EO/IR sensors, or communications equipment, ensuring optimal performance and data capture.
34	Program Manager/IPT Lead	C	Manages cost, schedule, risk, and customer coordination across engineering disciplines.
35	Radio Frequency and Communications Engineer	C	Designs telemetry, tracking, and command and mission data communication links to ground, handles encryption and frequency management.
36	Reconnaissance Marine	M	Specializes in collecting critical battlefield intelligence behind enemy lines.
37	Satellite Communications Technician	M	Maintains and operates satellite links for secure, long-range communication.

38	Satellite Operator	S	Monitors and controls satellite systems, including telemetry, tracking, and command functions to ensure health and performance.
39	Signals Intelligence Analyst (SIGINT)	I	Intercepts and deciphers electronics signals to track adversary communications, movements, and satellite activity, helping military and SNOC teams understand the electromagnetic environment.
40	Software Engineer/ Algorithm Developer	F	Design onboard and ground-based software for satellite control, data processing (exempli grata, SAR image formation), encryption, and fault management.
41	Space Operations Officer	M	Supports operations involving satellites, space surveillance, and orbital warfare.
42	System Administrator	S	Manages the IT systems, servers, and cybersecurity protocols within the operations center to ensure uptime and data protection.
43	System Engineer	C, F	Leads spacecraft architecture, requirements slowdown, and integration across subsystems.
44	Targeting Officer	M	Identifies, prioritizes, and validates targets for strike missions within the kill chain process.
45	Test and Integration Engineer	C	Manages assembly, system test thermal vacuum, vibration, EMI/EMC, and launch-readiness checks.
46	Thermal Engineer	C	Ensures all systems stay within operational temperature ranges via thermal modeling and heater integration.
47	Under Secretary of Defense for Intelligence and Security	P	Sets defense-wide priorities for Intelligence, Surveillance, and Reconnaissance programs, ensuring integration of space-based assets with intelligence and defense strategies.
48	Unmanned Aerial Systems Operator	M	Controls and monitors drones for surveillance or targeting missions.
49	United States Space Command Liaison Officers	P	Embedded within the Pentagon to represent operational space interests and coordinate with military users and SNOCs on satellite tasking, orbital conflict, and data distribution.
50	Watch Officer	I	Provides 24/7 situational awareness by monitoring global events, issuing alerts, and maintaining coordination between satellite operations and forward-deployed military units.

APPENDIX B: ACRONYMS

Abbreviation	Definition
ADCS	Attitude Determination and Control Subsystem
BDA	Battle Damage Assessment
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CSO	Combat Systems Officer
DASD-SI	Deputy Assistant Secretary of Defense for Space and Intelligence
DIA	Defense Intelligence Agency
DoD	Department of Defense
EMC	Electromagnetic Compatability
EMI	Electromagnetic Interference
EO/IR	Electro-Optical/Infra-Red
FFRDC	Federally Funded Research and Development Center
GEOINT	Geospatial Intelligence
GNC	Guidance, Navigation, and Control
HUMINT	Human Intelligence
IC	Intelligence Community
IPT	Integrated Project Team
ISR	Intelligence, Surveillance, and Reconnaissance
J2	
J6	
ODNI	Office of the Director of National Intelligence
RF	Radio Frequency
SAR	Synthetic Aperture Radar
SIGINT	Signals Intelligence

SNOC	Satellite Network Operations Center
SPACECOM LNOs	United States Space Command Liaison Officers
TT&C	Telemetry, Tracking, and Command Subsystem
TVAC	Thermal Vacuum Chamber
UAS	Unmanned Aerial Systems
USD(I&S)	Under Secretary of Defense for Intelligence and Security

APPENDIX C: GLOSSARY

Term	Definition
Actor	The user or external entity interacting with the system.
Assess	The process of evaluating the effects of an engagement by comparing predetermined assessment criteria against observed actions and outcomes, using ISR assets to collect post-engagement information and determine whether the desired effects and objectives were achieved.
Collection	
Engage	The process of confirming the target's hostile status and issuing the engagement order to the operator of the designated weapon system.
Expected Outcome	The results of the interaction.
Exploitation	
Dissemination	
Find	The process of detecting an emerging target and initiating its characterization, leading to its classification within one of the established dynamic targeting categories.
Fix	The process of positively identifying an emerging target and determining its precise location and associated data with sufficient accuracy to enable engagement.
Goal	The objective the user wants to achieve.
Processing	
Sequence of Actions	The steps the user takes to achieve the goal.
Target	The process of analyzing an identified, classified, located, and prioritized target to determine the desired effect and appropriate targeting solution, while obtaining the necessary authorization to engage.
Tasking	
Track	The process of maintaining continuous surveillance of a confirmed target and its location to ensure persistent custody and situational awareness.

APPENDIX D: SOURCES

ID	Citation
1	
2	“Targeting.” United States Air Force, www.doctrine.af.mil/Portals/61/documents/AFDP_3-60/3-60-AFDP-TARGETING.pdf. Accessed 5 Apr. 2025.
3	
4	