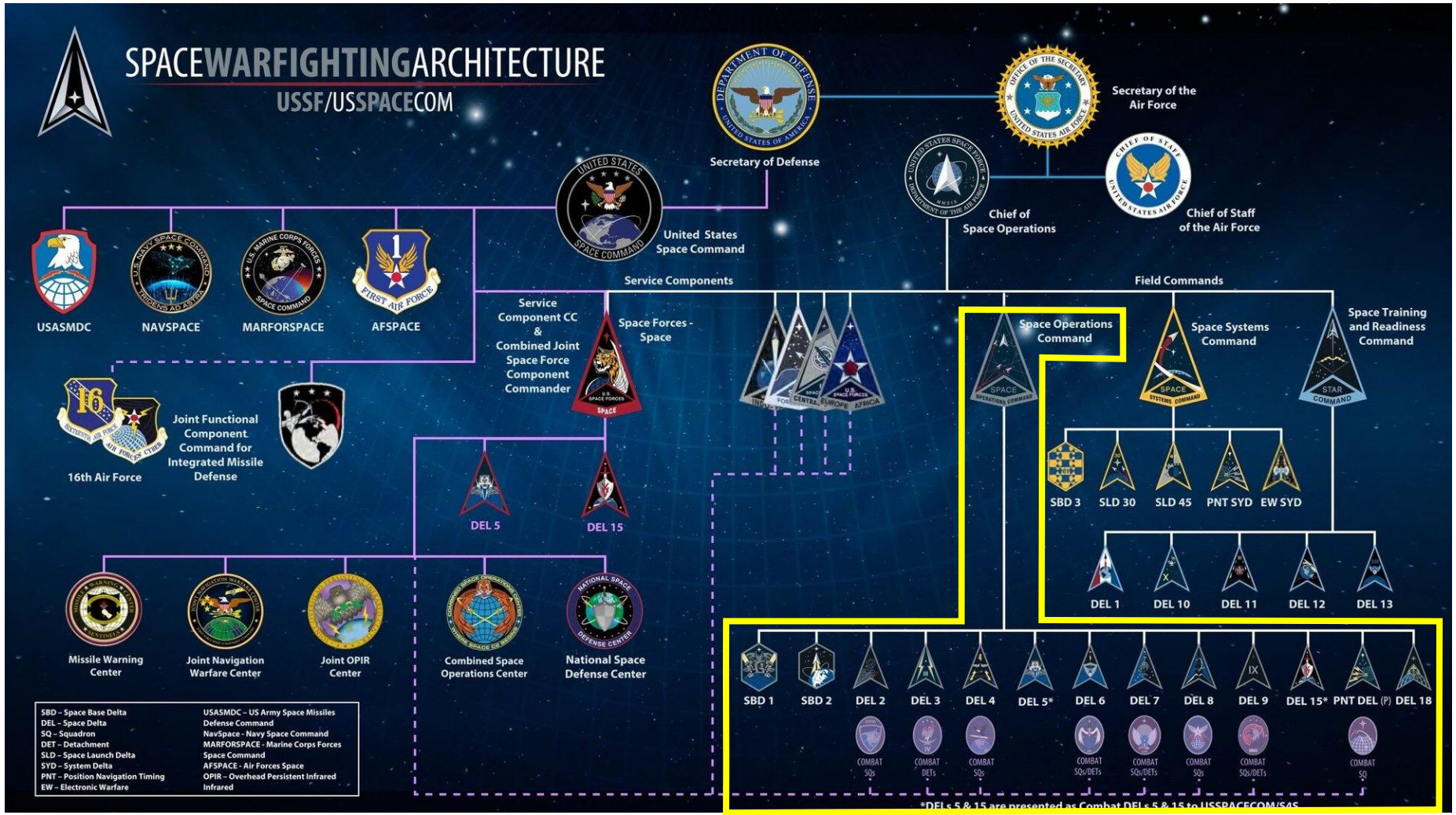
AI and Space Operations

Michael Ficken
Space Operations Command
Chief Data and Artificial Intelligence Officer

SpOC's Role in the USSF



SpOC Deltas

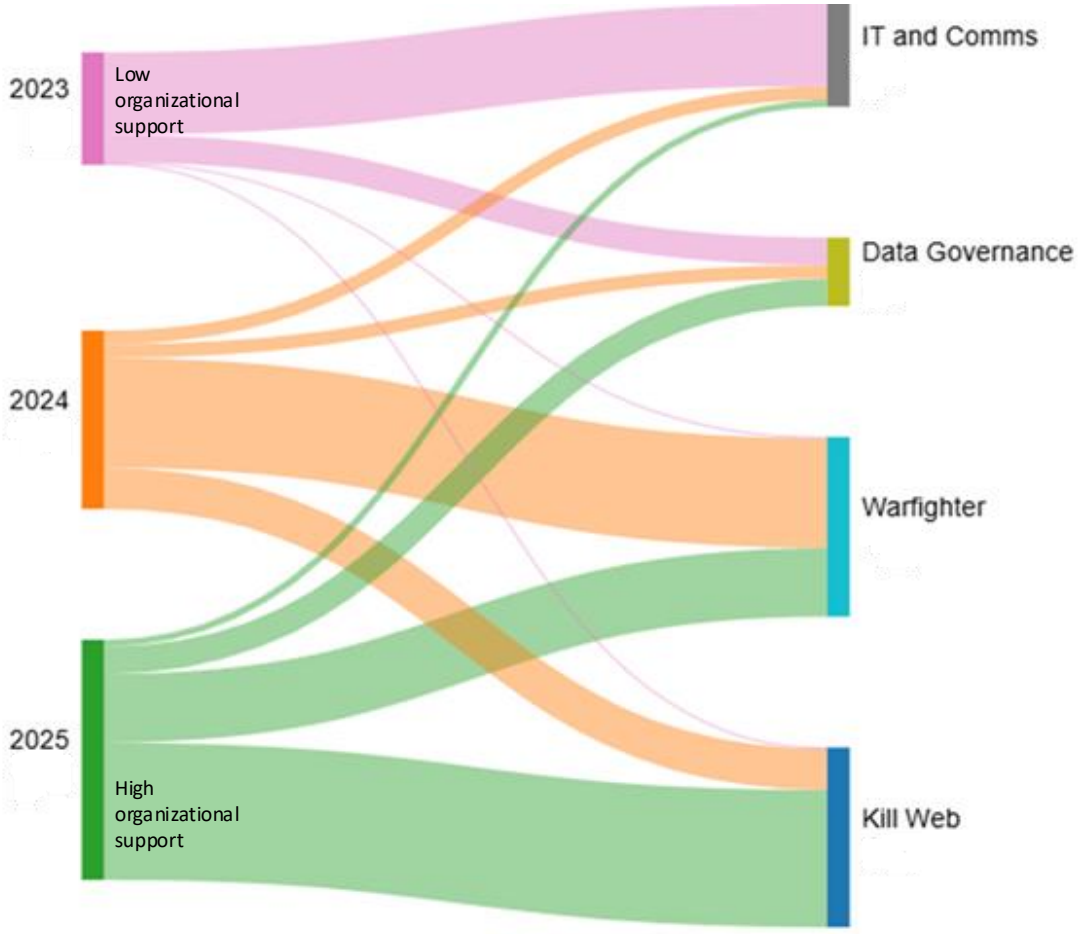
SBD 1: Peterson SFB
SBD 2: Buckley SFB
SBD 41: Schriever SFB
MD 2: Space Domain Awareness
MD 3: Space Electromagnetic Warfare
MD 4: Missile Warning
Del 6: Cyberspace Warfare
Del 7: ISR and Targeting
Del 8: Satellite Communications
Del 9: Orbital Warfare
MD 31: PNT & SCN IMD

Del: Delta
IMD: Integrated Mission Delta
ISR: Intelligence Surveillance and Reconnaissance
MD: Mission Delta
PNT: Positioning, Navigation, and Timing
SCN: Satellite Control Network
SFB: Space Force Base
SpOC: Space Operations Command

Data and AI Within SpOC

	Title	Org	Responsibilities	Focus
2023	Chief Data Officer (CDO)	DCG-T*	IT, Comms, Data	IT, Comms, Data
2024	Chief Data and AI Officer - CDAO	COS	AI, Data	Warfighters
2025	Chief Data and AI Officer - CDAO	S3/5/7	AI, Data	Kill Web

*DCG-T: Deputy Commanding General for Transformation



SpOC S35A Projects

Accelerating Warfighters through Human-Machine Teaming

Threat-Informed Dynamic Space Maneuver

Automatic Target Recognition

Problem: Force-presented SpOC units lack ability to **automatically exploit imagery, identify targets, and report findings** at operationally relevant speeds.

- **CDAO Solution (Ongoing):**
  - SpOC Units ***automatically exploit imagery*** to rapidly ***identify targets***, gain deeper understanding of adversaries, and drive ***improved Joint Operations***
  - Closely ***partner with NGA*** to rapidly train and ***improve AI models*** with imagery and technical subject matter expertise
- **Value:**
  - ***70% less man-hours*** *in manual review time*
  - ***Event-driven review*** cycle replaces inefficient ***queue-based review*** process
  - AI-generated COAs drive ***dynamic space operations*** by ***integrating ATR*** into intelligence and operational workflows
  - ***ATR data fusion*** with other data provides multi-INT insights that ***forecast adversary maneuvers*** and provide ***decision advantage***

Maneuver Prediction

Problem: SpOC's killwebs underutilize available data leading to less valuable **satellite maneuver predictions.**

- **CDAO Solution (Ongoing):**
  - Integrate ***commercial data*** sources to ***reduce*** Guardian ***uncertainty*** and ***risk***
  - Review and vet commercial data and deploy an ***insight pipeline*** that delivers ***maneuver predictions*** directly to Guardians
  - ***Eliminate barriers*** for improved ***software delivery*** on ***operational networks***
- **Value**
  - ***Reveal*** previously hidden ***adversary TTPs*** by analyzing multiple ***diverse data streams***
  - ***Improve operator training*** by incorporating realistic adversary ***maneuver indicators***
  - ***Provide tactical decision advantages*** to Guardian Warfighters via ***operationally relevant and timely notifications***

Force Generation & Proponency

Enhanced Mission Planning

Problem: SpOC Deltas need integrated and common mechanisms to improve mission planning and uniform ways to gain insights from **historic mission data**.

- **CDAO Solution (Upcoming):**
  - Deliver a scalable, centralized mission ***insights tool*** that informs ***tactical maneuver planning***
  - Rapidly ***adapt mission planning*** to dynamic ***adversary TTPs*** and scenarios
  - Guardians ***recursively learn*** from and ***develop tactics*** and maneuvers
- **Value**
  - ***Enhanced training for operators*** driven by historic ***mission data*** and ***realistic scenarios***
  - ***Uncovered insights*** revealed by state-of-the-world AI techniques to ***improve mission planning***
  - ***Upgraded mission planning*** process through ***Guardian interaction*** with historic mission data
  - Continued understanding ***beyond unit turnover***

*SpOC CDAO projects reduce kill web timelines across **4 Squadrons, 6 Deltas,** and **4 Combatant Commands,** tracing to **37 PIRs** and **25 METs***

VIA VINCIMUS

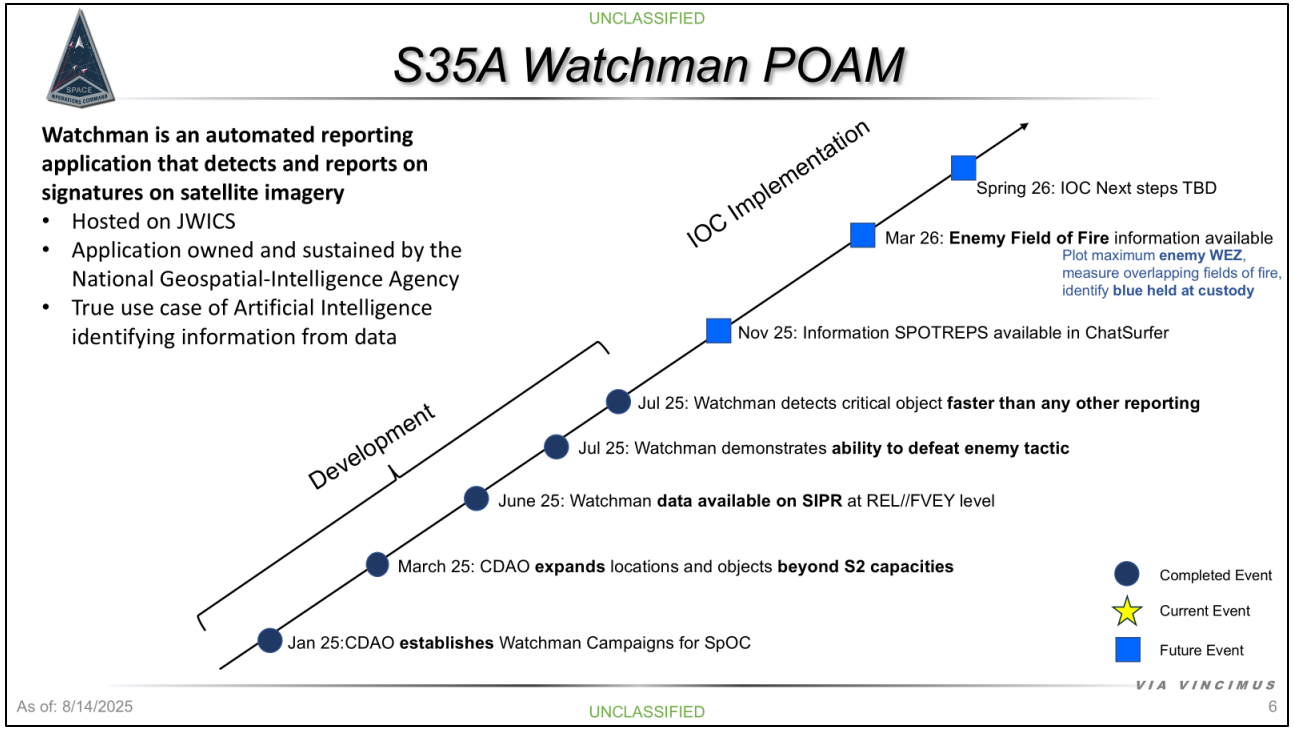
Automated Target Recognition

Problem:
Force-presented SpOC units lack ability to automatically exploit imagery, identify targets, and report findings at operationally relevant speeds.

Solution:
Leverage state of the world technologies to detect, identify, and classify signatures of interest, then report the findings on operationally relevant timelines.

Successes:

- The application exceeds human capacity. Both in volume of locations, and volume of equipment.
- Improved reporting mechanisms. Notifications are on SIPR and going to FVEY. Scaling to auto report in Chatsurfer.
- Algorithm is improving and changing. Demonstrable improvement through supervised learning.
- Additional mechanisms available if necessary.



Improving Maneuver Prediction and Mission Planning

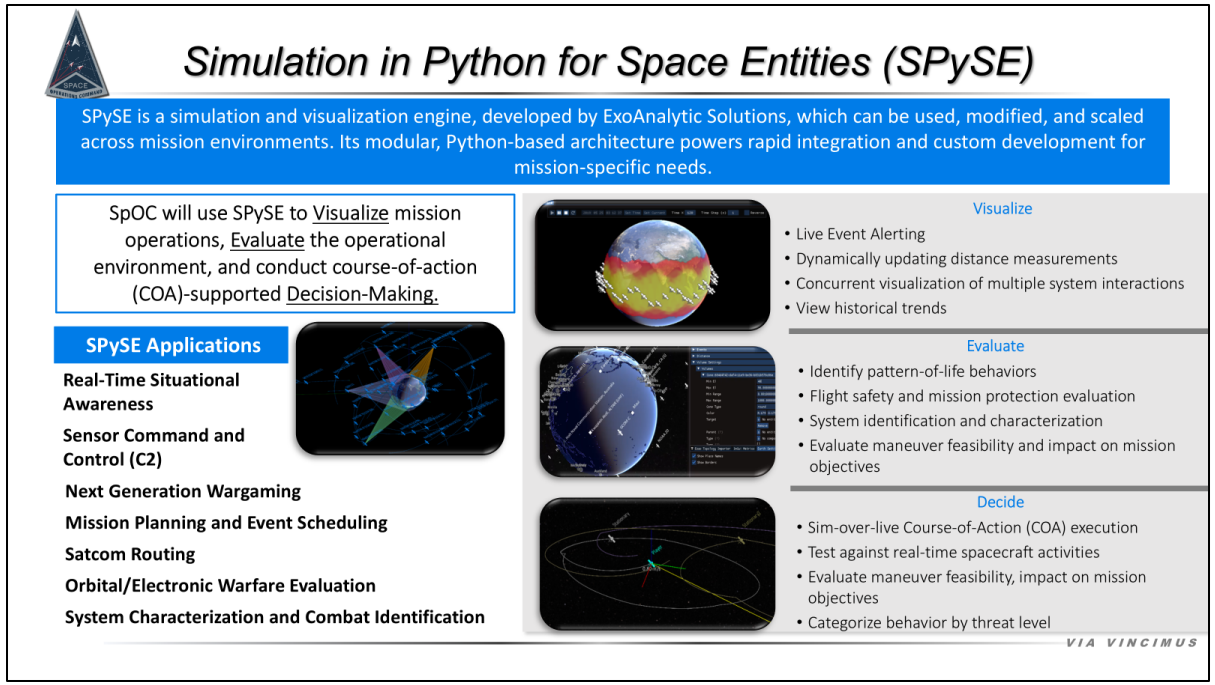
Problem: SpOC's killwebs underutilize available data leading to less valuable satellite maneuver predictions.

Solution:

Deliver a tool that reduces time to insights by integrating data, presenting it in useful ways, and meeting operational timelines

Way ahead:

- Solution identified that meets warfighter requirements
- Start on NIPR and move to JWICS
- Integrate multiple data types and sources



Closing Gaps Without the Basics

Requirements


United States Space Force
Capability Needs Statement
For the
USSF Data Integration Layer
Sponsoring Organization: HQ USSF

USSF

Point of Contact:

UNCLASSIFIED

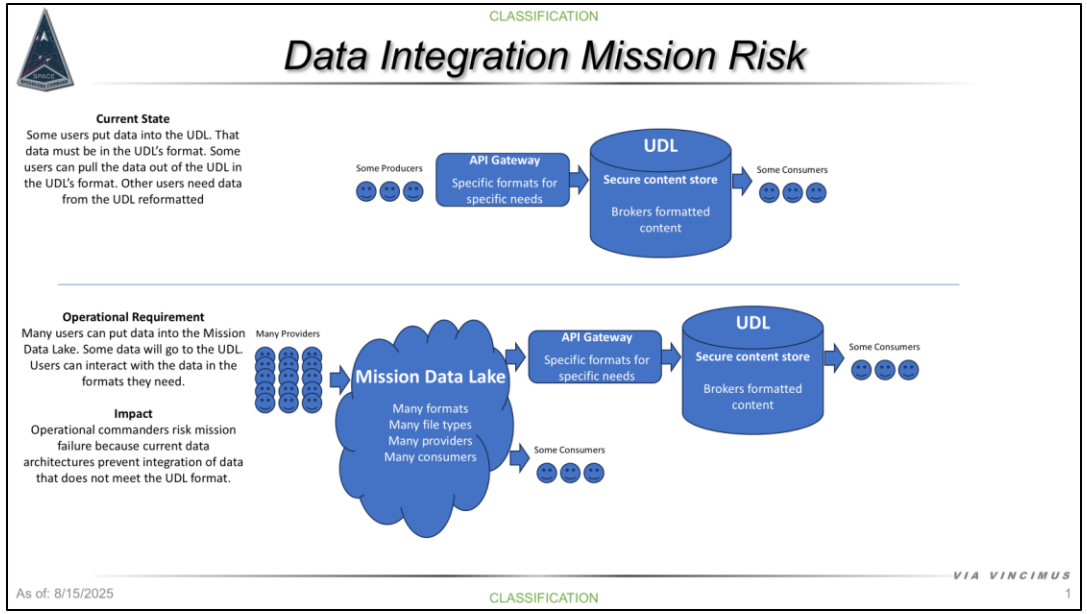
Capability Needs Statement for the USSF Data Integration Layer Signed December 2024

TBD: Capability Needs Statement for the USSF Data (Transformation) Layer

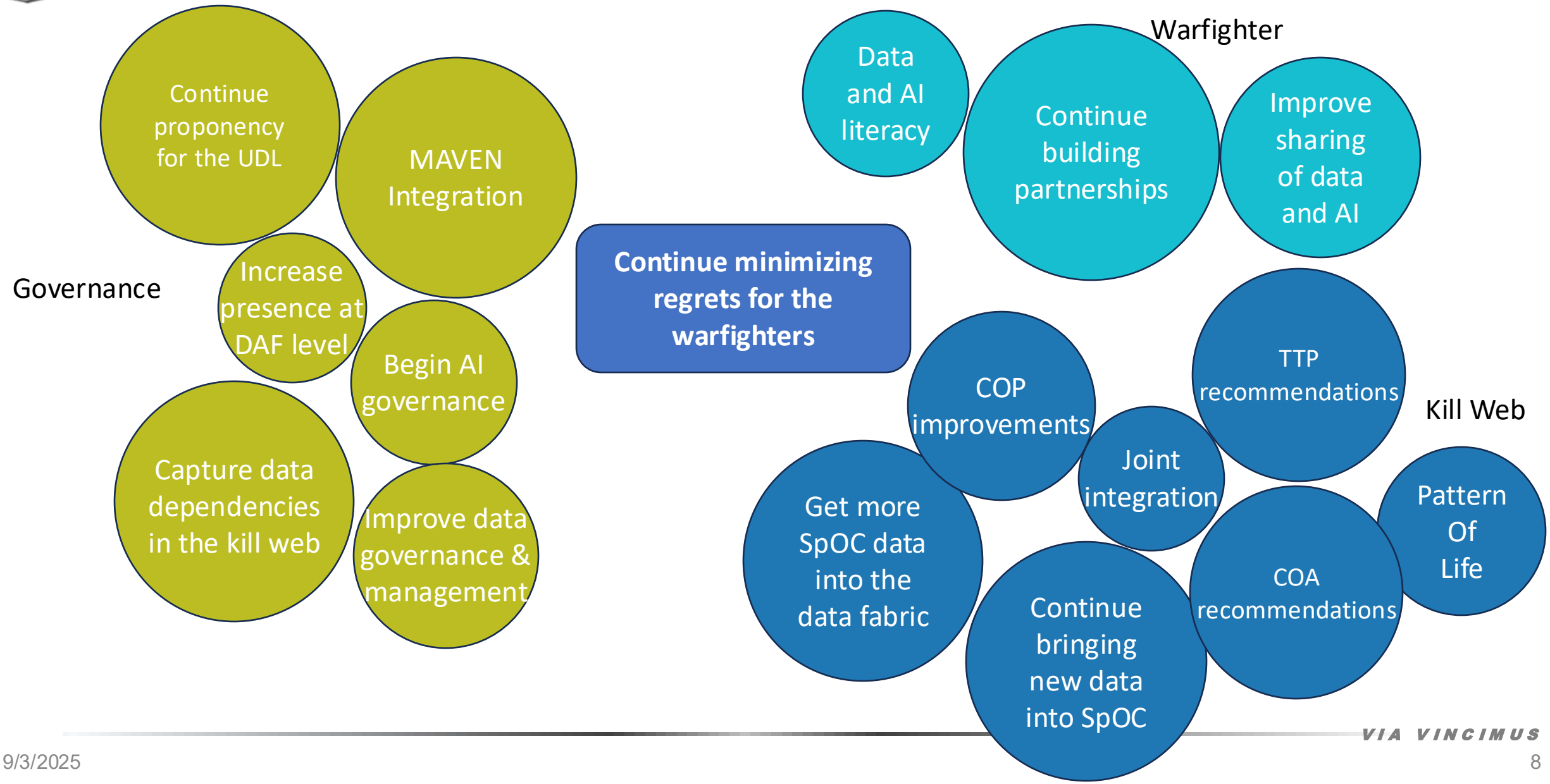
TBD: Capability Needs Statement for the USSF Data (Interaction) Layer

Basic IT

Lacking a DEVSECOPS environment



Way Ahead


Continue proponency for the UDL
MAVEN Integration
Governance
Increase presence at DAF level
Begin AI governance
Capture data dependencies in the kill web
Improve data governance & management
Continue minimizing regrets for the warfighters
Warfighter
Data and AI literacy
Continue building partnerships
Improve sharing of data and AI
Kill Web
COP improvements
TTP recommendations
Joint integration
Pattern Of Life
Get more SpOC data into the data fabric
COA recommendations
Continue bringing new data into SpOC

Questions

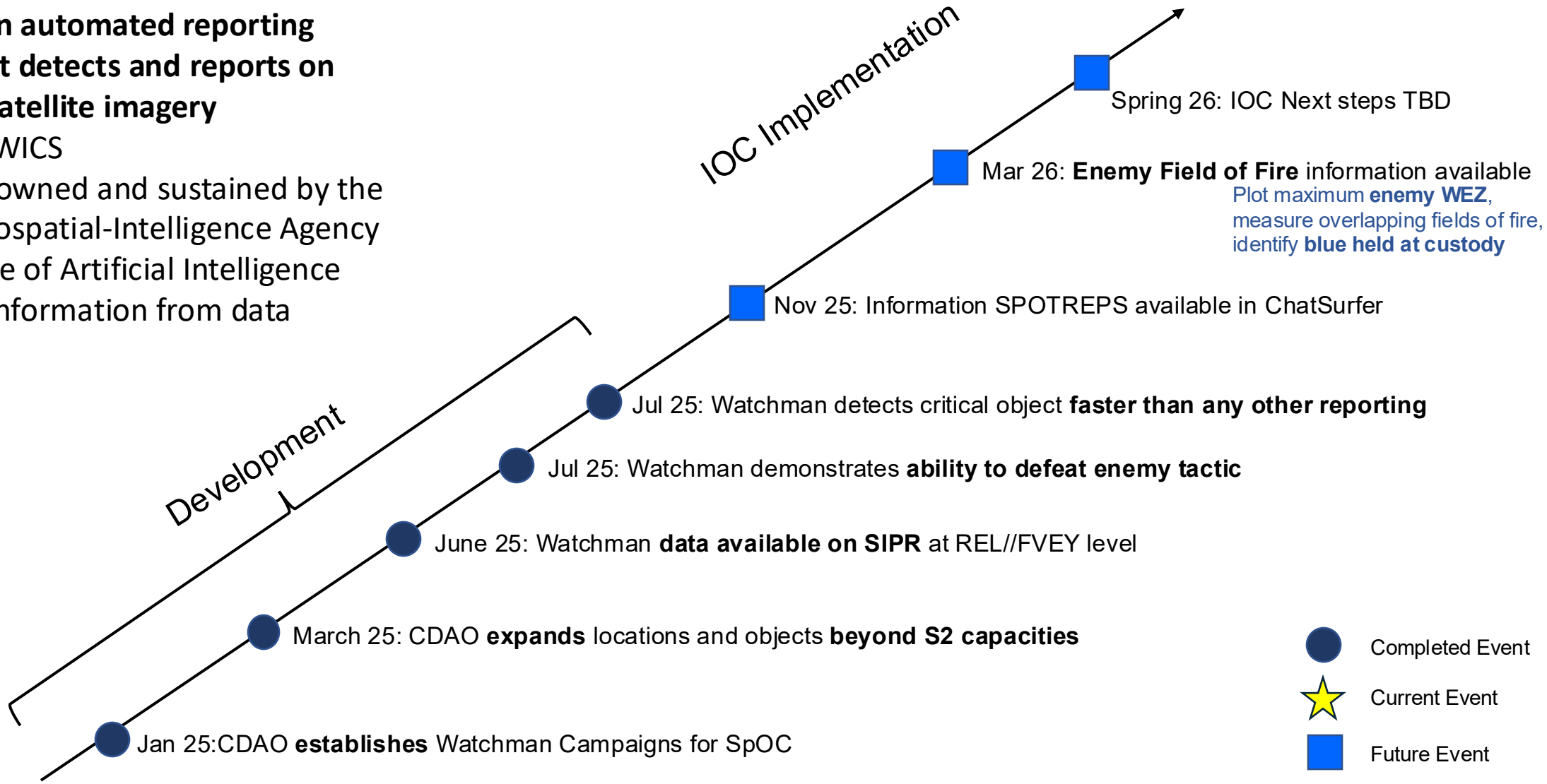
Contact Information

Michael Ficken
Chief, Command Data and AI Division
Chief Data and Artificial Intelligence Officer
HQ SpOC/ S3/5/7 /S35/S35A
719-554-4382
Michael.ficken.2@spaceforce.mil

S35A Watchman POAM

Watchman is an automated reporting application that detects and reports on signatures on satellite imagery

- Hosted on JWICS
- Application owned and sustained by the National Geospatial-Intelligence Agency
- True use case of Artificial Intelligence identifying information from data



VIA VINCIMUS

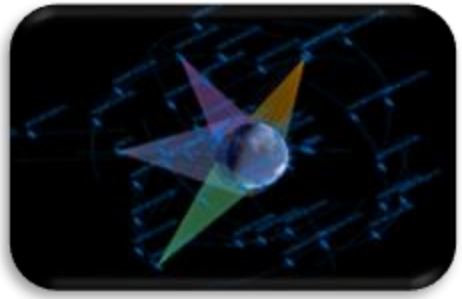
As of: 9/3/2025

Simulation in Python for Space Entities (SPySE)

SPySE is a simulation and visualization engine, developed by ExoAnalytic Solutions, which can be used, modified, and scaled across mission environments. Its modular, Python-based architecture powers rapid integration and custom development for mission-specific needs.

SpOC will use SPySE to Visualize mission operations, Evaluate the operational environment, and conduct course-of-action (COA)-supported Decision-Making.

SPySE Applications



Real-Time Situational Awareness

Sensor Command and Control (C2)

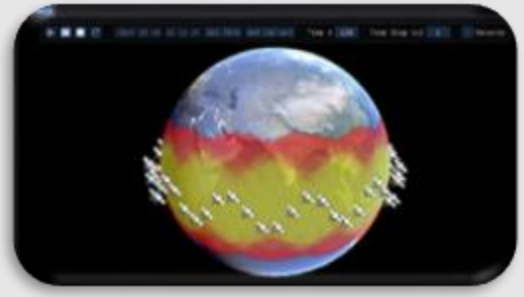
Next Generation Wargaming

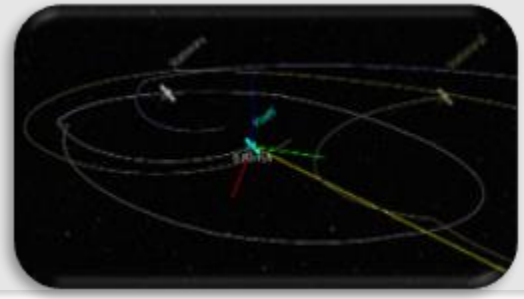
Mission Planning and Event Scheduling

Satcom Routing

Orbital/Electronic Warfare Evaluation

System Characterization and Combat Identification





Visualize

- Live Event Alerting
- Dynamically updating distance measurements
- Concurrent visualization of multiple system interactions
- View historical trends

Evaluate

- Identify pattern-of-life behaviors
- Flight safety and mission protection evaluation
- System identification and characterization
- Evaluate maneuver feasibility and impact on mission objectives

Decide

- Sim-over-live Course-of-Action (COA) execution
- Test against real-time spacecraft activities
- Evaluate maneuver feasibility, impact on mission objectives
- Categorize behavior by threat level