

DELIVERING CAPABILITIES

Ms. PAULA TRIMBLE
CHIEF, POLICY
DIRECTOR, SMALL BUSINESS PROGRAMS
SPACE DEVELOPMENT AGENCY

20 SEPTEMBER 2023

SEMPER CITIUS

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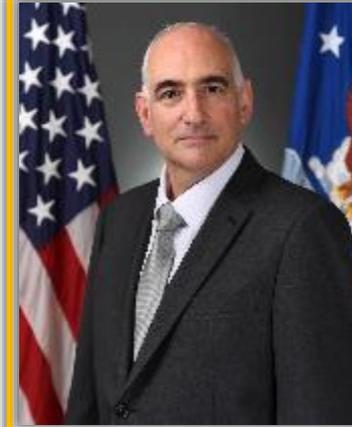


SDA IN THE DEPARTMENT OF THE AIR FORCE



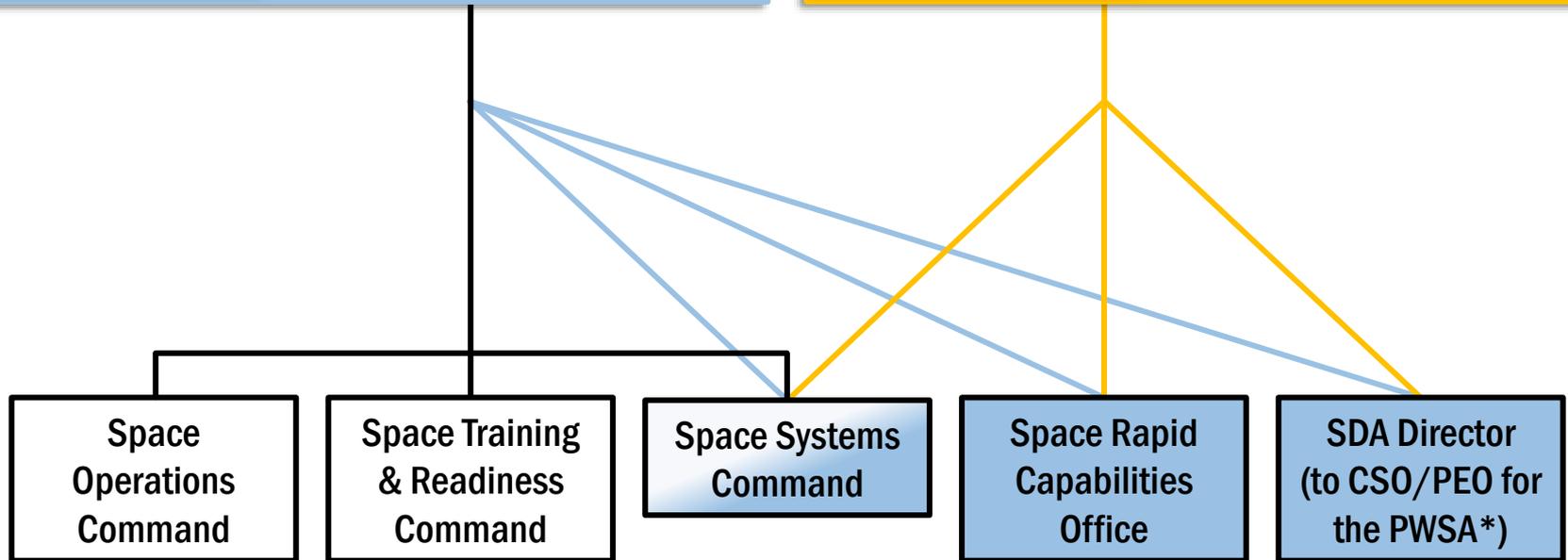
**GENERAL B.
CHANCE SALTZMAN**

Chief of Space Operations,
United States Space Force



FRANK CALVELLI

Assistant Secretary of the Air
Force for Space Acquisition and
Integration



* Proliferated Warfighter Space Architecture

WHO WE ARE

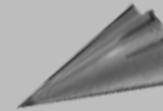
- Constructive Disruptors – always question status quo, change agent when necessary
- Space Development, Acquisition & Operations Professionals laser-focused on program execution and delivery
- Direct Reporting Unit in the USSF with mission, authorities, and autonomy to deliver warfighting capabilities to our joint forces on the ground

WHAT WE DO

Proliferated Warfighter Space Architecture (PWSA), a resilient, military sensing and data transport capability via proliferated space architecture



Beyond-Line-Of-Sight (BLOS) targeting for time-sensitive ground and maritime targets



Hypersonic and advanced missile threat warning and tracking

WHY WE DO IT

- Our customers asked for it.
Minimum Viable Capability (MVC) for each tranche endorsed by our Warfighter Council (WFC)
- The threat demands it.
National strategies call for action to deliver capabilities ahead of great power competition threats

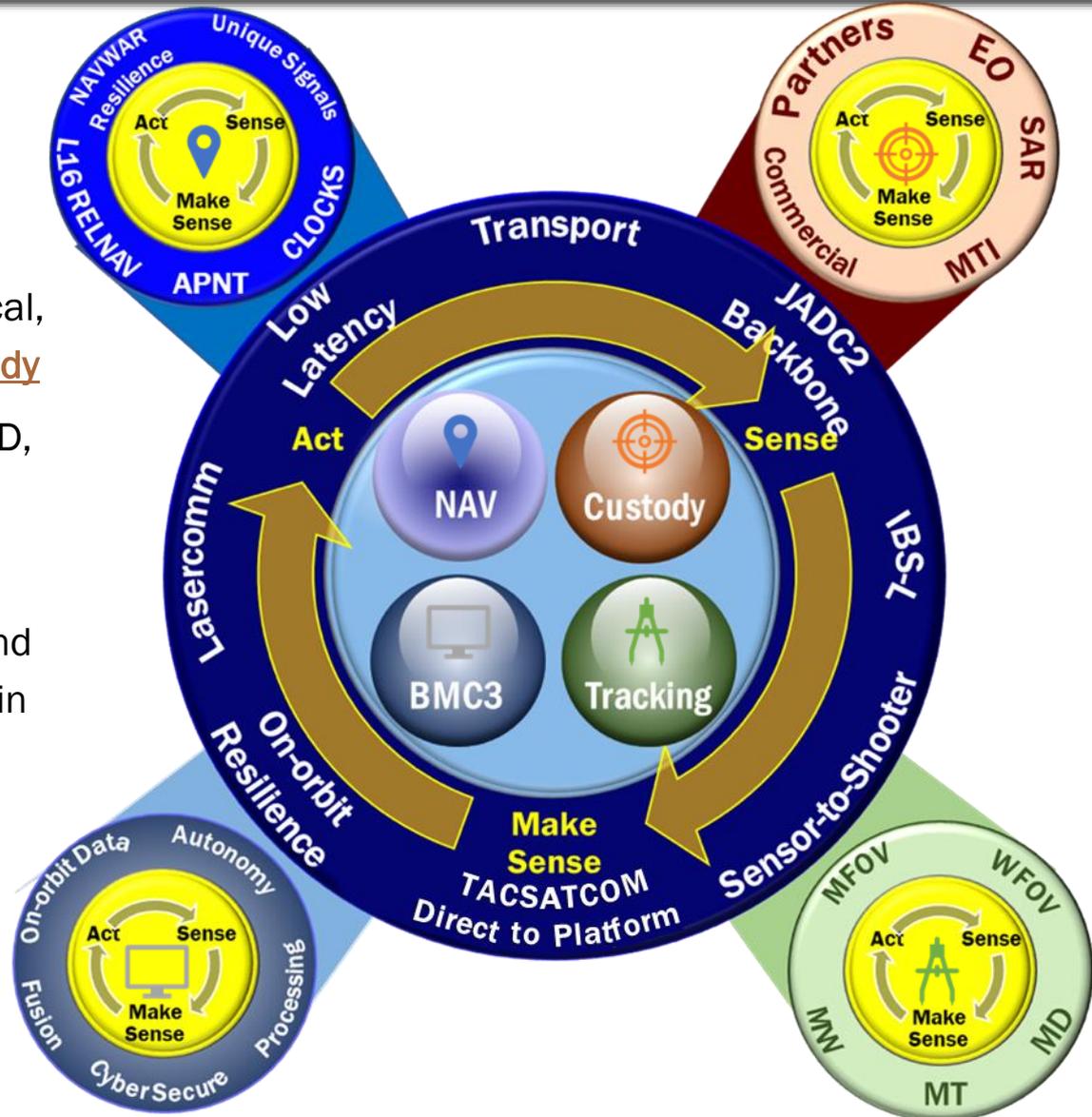
HOW WE DO IT

- Proliferation and Spiral Development
- Harness commercial space practices and technologies
- Trade performance \geq MVC, control costs to delivery on schedule
- Focus on execution, zero tolerance for distractions or unnecessary effort
- *“Semper Citius”*

THE PROLIFERATED WARFIGHTER SPACE ARCHITECTURE: A GLOBAL WEAPONS SYSTEM



- **Vision:** Space-based systems of systems providing surveillance and targeting as a service
- **Cornerstones**
 - Mission partner (National, tactical, commercial)-based target **Custody**
 - 24/7/365 **Tracking** (MW, MT, MD, fire control quality information)
 - On-orbit, cyber secure **BMC3**
 - Alternate Position, **Navigation** and Timing providing critical anchor in GPS-denied environments
- **Enabled** by a proliferated, resilient, low-latency, global, mesh **Transport** network
- **Advanced** by infusing ecosystem-wide **Emerging Capabilities**



TRANCHE DESCRIPTIONS



Tranche 0 (FY22) – *Warfighter immersion:* Demonstrates the feasibility of a proliferated architecture in cost, schedule, and scalability towards necessary performance for beyond line of sight targeting and advanced missile detection and tracking.

Tranche 1 (FY24) – *Initial warfighting capability:* Regional persistence for Link 16, advanced missile detection, and beyond line of sight targeting plus demonstration of UHF and S-band tactical satellite communications.

Tranche 2 (FY26) – *Full warfighting capability:* Global persistence for all in Tranche 1 plus demonstration of advanced tactical data link(s) and future proliferated missions.

Tranche 3 (FY28) – *Sustained capability:* Advanced improvements over Tranche 2 plus future warfighting applications. This includes better sensitivity for missile tracking, better targeting capabilities for BLOS, additional PNT capabilities, advances in lasercom, protected RF communications, and advancements in autonomous operations.

Tranche 4 (FY30) – *Autonomous operations:* continual advances across the architecture.

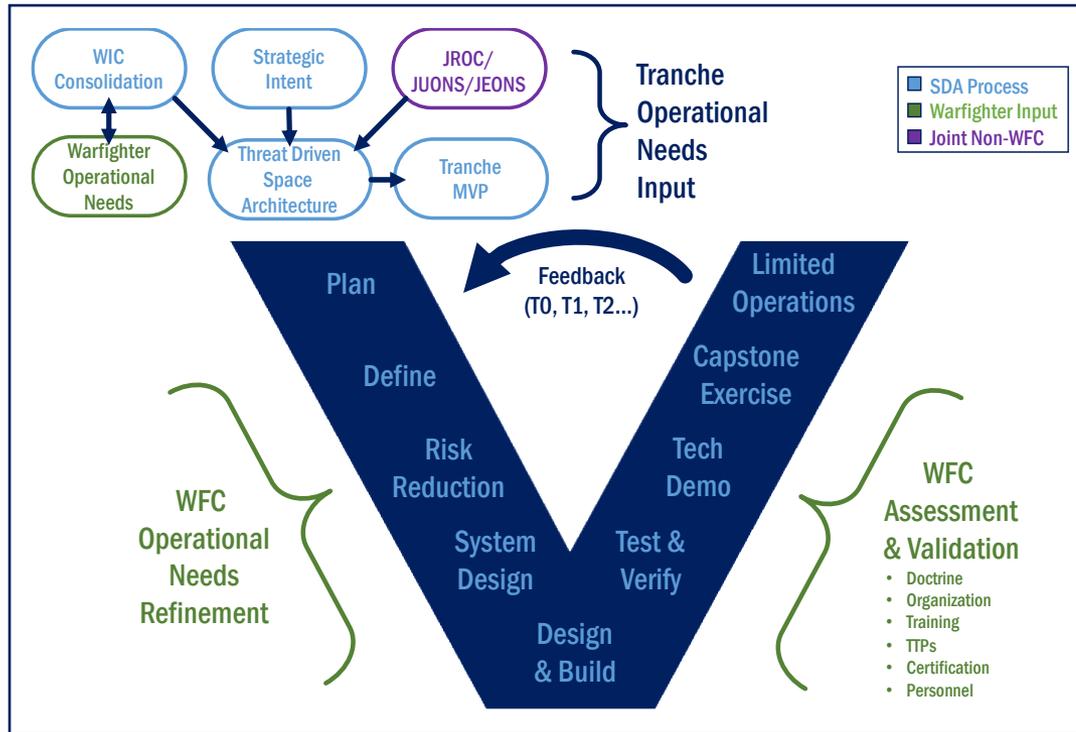
DRIVEN BY THE WARFIGHTER



Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WFC Working Group	WFC Working Group	Warfighter Council	WFC Working Group	Warfighter Council	WFC Working Group	WFC Working Group					

WORKING GROUPS (Monthly)

- Focus on SDA Tranches (MVP, Integrated Test Methodology)
- WFC Member organizations populate AO-level Groups

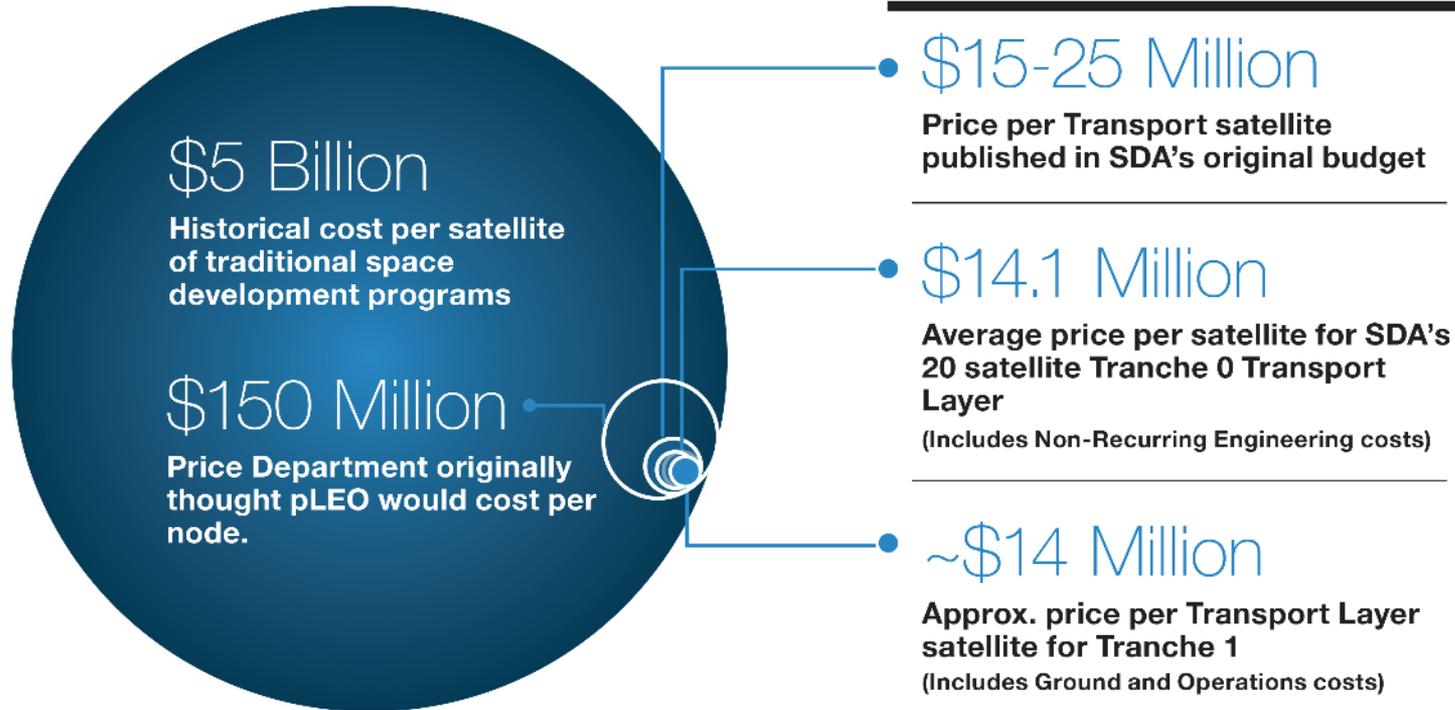


WARFIGHTER COUNCIL (Semi-Annual)

- Co-chaired by the VCSO and SDA Director
- Each member organization is represented at the SES or 1-star level



DELIVERING CAPABILITY AT AN AFFORDABLE COST



SDA IS ON PACE TO DELIVER INITIAL SPACE TRANSPORT CAPABILITIES ON THE AGENCY'S ORIGINALLY-ADVERTISED SCHEDULE AT A PRICE POINT ONCE DEEMED UNACHIEVABLE

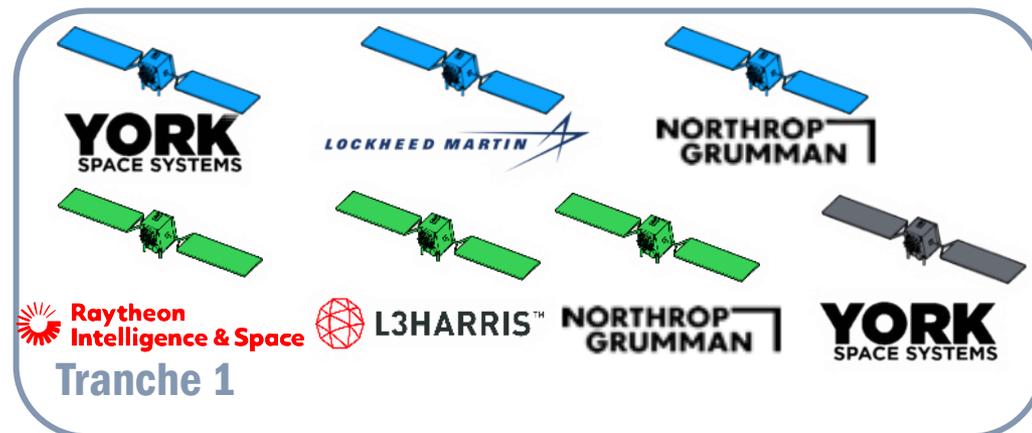
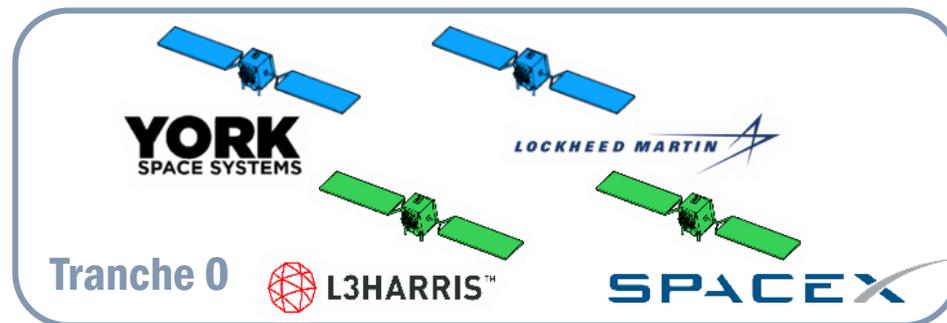
SPACE VEHICLES ACQUISITION APPROACH



Core Values

- 1 Hit Schedule, Minimize Schedule Risk
- 2 Control Costs
- 3 Trade Performance \geq MVP

- IMPLEMENTATION** ➤ Full & Open Competition
- ATTRIBUTES:** ➤ “Proliferation Readiness Levels”
- Multiple Vendors
 - Firm Fixed Price Contracting
 - Low Government Overhead



All SVs are on Firm Fixed Price contracts

- Requires contractors to team with non-traditional commercial vendors
- Meets requirements with a commoditized bus on the schedule that SDA needs, at a fixed price
- Allows the performer more control, leverages what they know

ACQUIRING CAPABILITIES AT SPEED



111 days on average from Solicitation to Contract Award

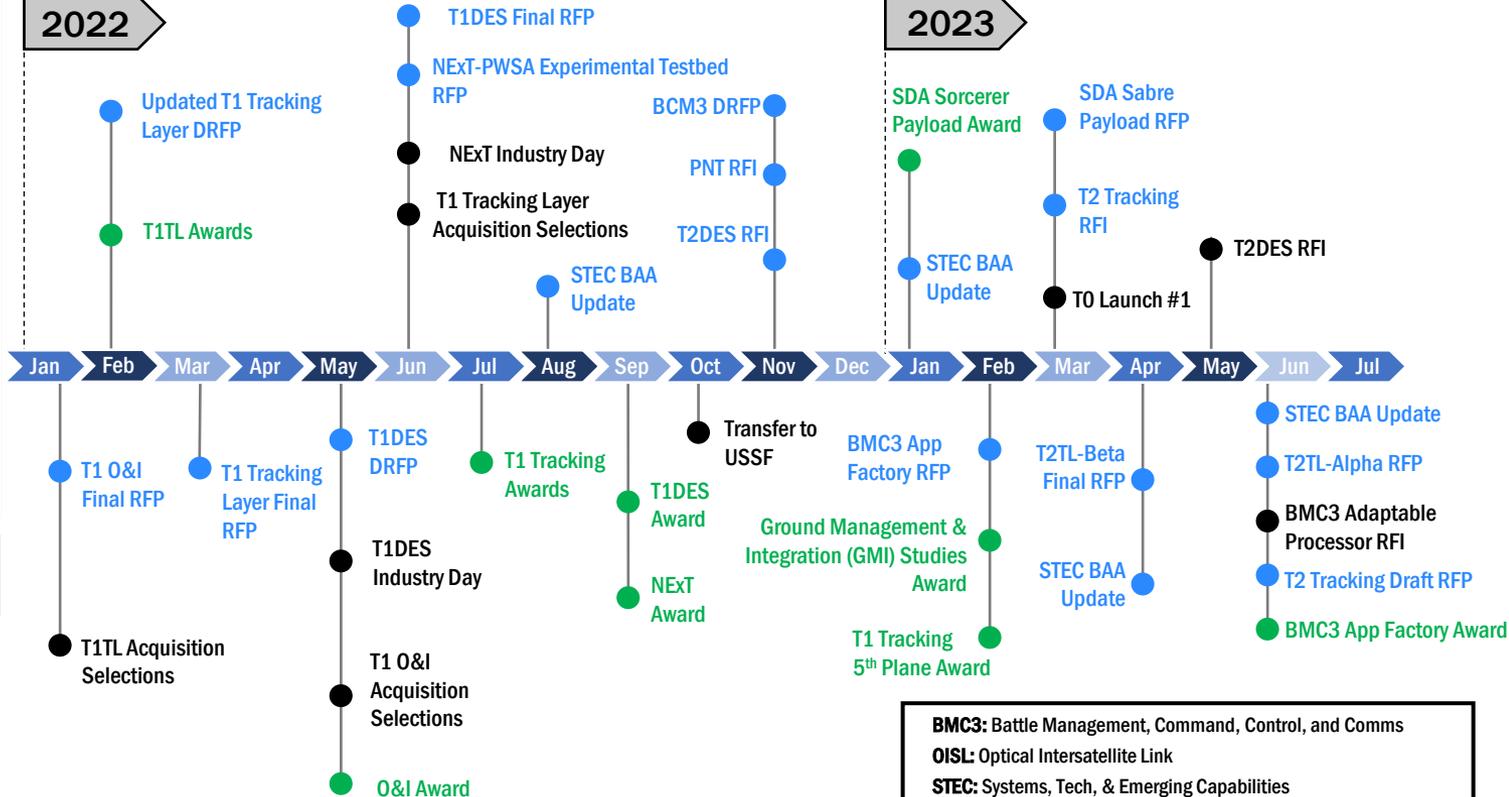
Solicitation
Contract Award
Other

FY 2020-2021

- 6** RFPs Published
- 15** Contract Awards
- 13** RFIs Released
 - Prototype Infrared Payload
 - Multi-Band OPIR Payload
 - OISL Demo
 - Deterrence Study (x2)
 - MSAP (x3)
 - SBIR Phase 2
 - Tranche 0
 - Transport (x2)
 - Tracking (x2)
 - Launch

- 18** OTA Signed
- 31** SBIR/STTR Signed

2022



BMC3: Battle Management, Command, Control, and Comms
OISL: Optical Intersatellite Link
STECA: Systems, Tech, & Emerging Capabilities

SDA IS ACCELERATING DEFENSE SPACE CAPABILITY DEVELOPMENT BY NAVIGATING ACQUISITION PROCESSES AT SPEED

PRIORITIES TO ENSURE SUCCESS



SDA is focused on delivering capabilities to the warfighter on schedule

Mechanisms

- Tranche 0 satellites on orbit in FY23
- Full funding for all tranches and layers of PWSA
- Use firm, fixed-price contracts, reduce NRE

Outcomes

- Warfighter Immersion
- Accelerate delivery of global tracking and targeting capability
- Satellites on orbit on schedule – ahead of threat
- Transport Layer is the proliferated low Earth orbit backbone for Joint-All Domain Command and Control

Mechanisms

- 2 GOCO Space Network Operations Centers
- Leverage commercial products and models (targeting as a service)
- Vendors deliver SV and associated ground systems
- Resilience enabled by sensor/payload diversity, proliferation

Outcomes

- Maximize efficiency, autonomy, and distribution of mission to deliver capabilities
- Interoperability before launch



SDA business model includes Space Operations

PWSA – Proliferated Warfighter Space Architecture
 NRE – Non-Recuring Engineering
 GOCO – Government-Owned, Contractor Operated
 SV – Space Vehicle



Ensure SDA’s acquisition authorities remain intact to maintain rapid delivery pace

Mechanisms

- HCA and delegable responsibilities of the Service Acquisition Executive and Senior Procurement Executive
- Warfighter Council to establish and validate capability for acquisitions
- Maximize use of MTA and OTA
- Maintain SES leadership
- Retain Program Elements and Budget separate from U.S. Space Force

Outcome

- Meet spiral development model timelines
- Model streamlined acquisition methods

Mechanisms

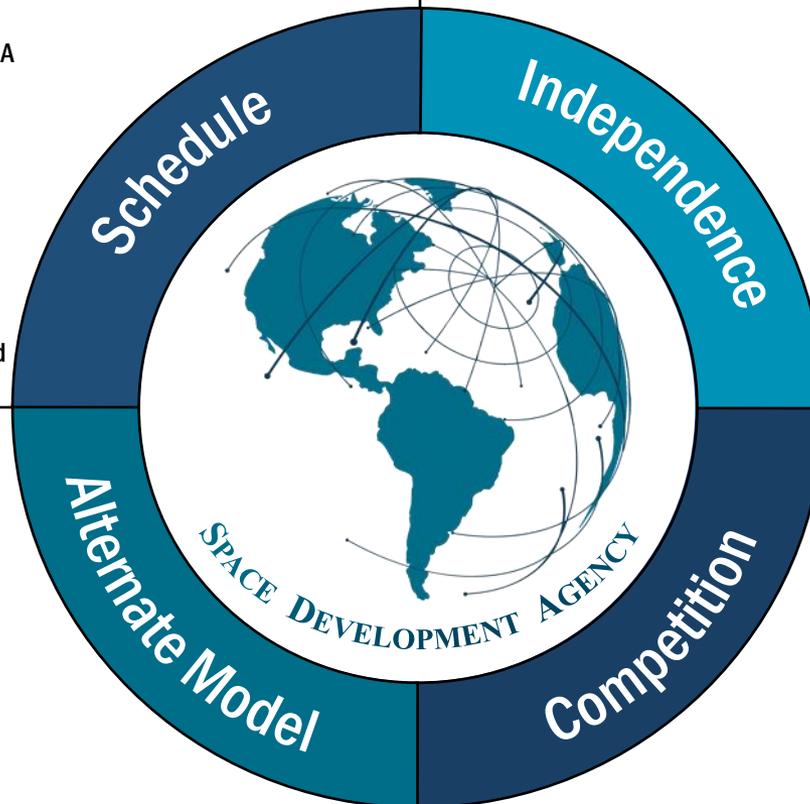
- Accountability through firm, fixed-price contracts
- Demand signal and delivery schedules prime supply chain to rapidly respond to SDA needs

Outcome

- Increased competition due to planned large satellite production quantities, full and open competitions for each tranche and layer, and multiple awards per tranche and layer



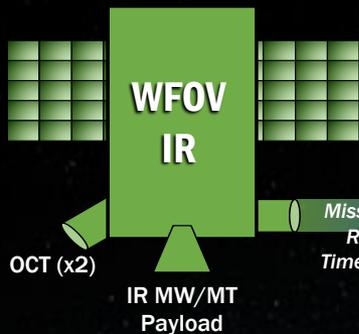
SDA continuous acquisition model promotes domestic supply chain security and growth



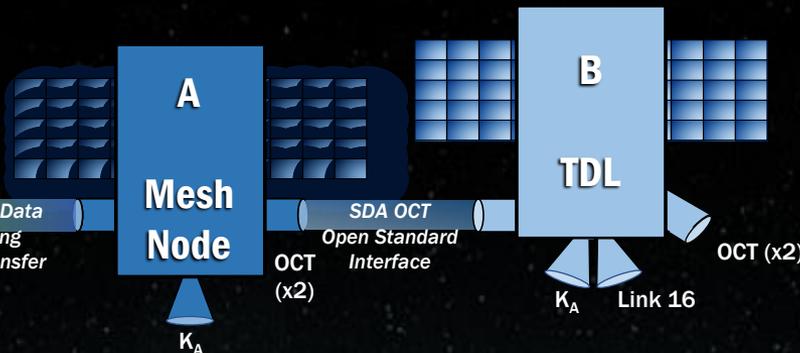
SDA TRANCHE 0 ARCHITECTURE OVERVIEW



TRACKING LAYER



TRANSPORT LAYER



- TRANCHE 0 CONSISTS OF
- 8 WFOV IR SVs
 - 13 GROUP A MESH NODE SVs
 - 7 GROUP B TDL SVs
- DISTRIBUTED IN 2 ORBITAL PLANES



- ✓ Launch 1: April 2023
- ✓ Launch 2: Summer 2023
- ☐ Launch 3: Fall 2023

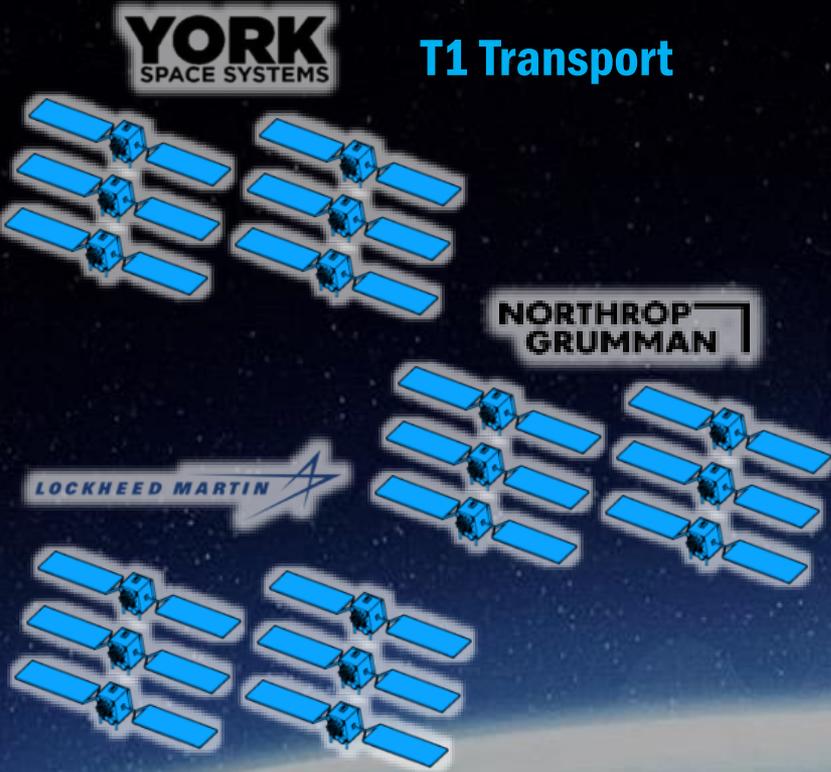


SLC-4 East
Vandenberg AFB, CA

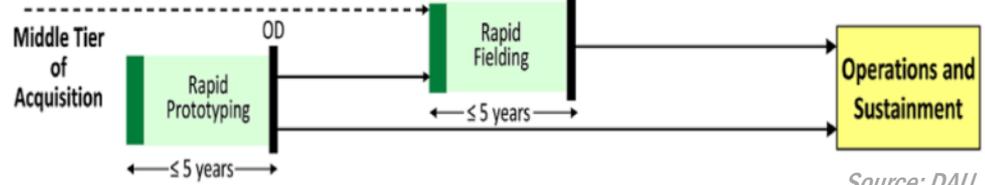
OCT: Optical Communication Terminal
IR: Infrared
TDL: Tactical Data Link
WFOV: Wide Field of View

CONTRACTING DIFFERENTLY – T1

T1 Transport



T1 SVs leveraged Other Transaction Authority based on agreements using Middle Tier Acquisition Pathway



T1 Tracking



T1DES



T1 Operations & Integration using Cost Plus Contract

Building the common ground architecture is complex

Complexity could exceed the original estimates

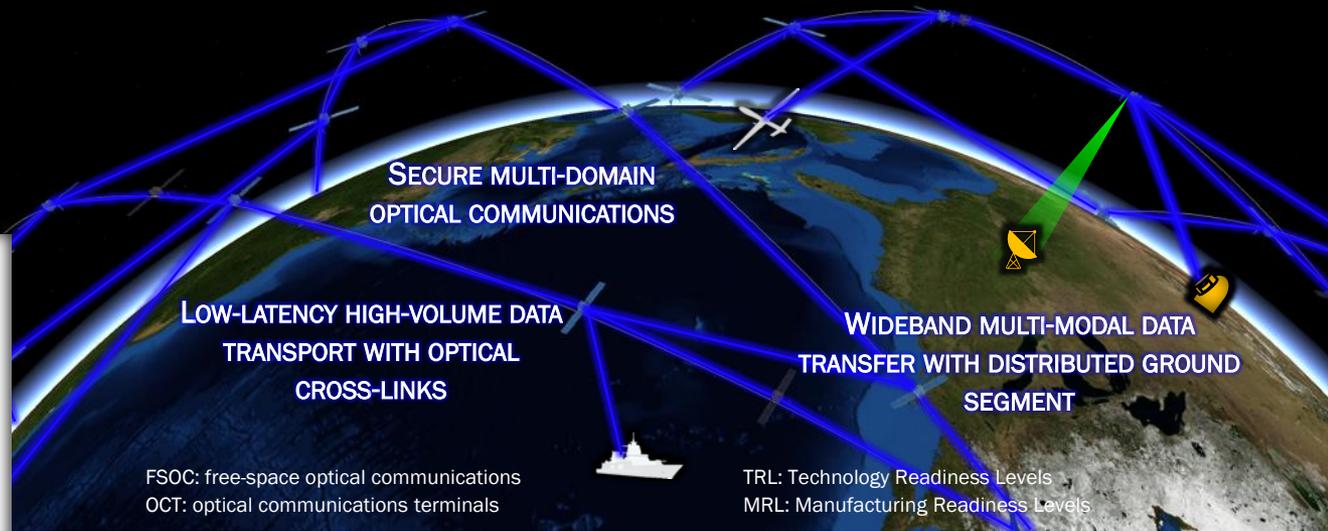
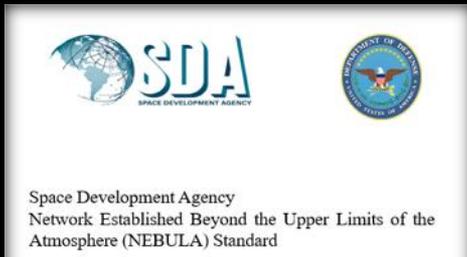
All the risk is not placed on the contractor



TRANCHE 1 STANDARDS

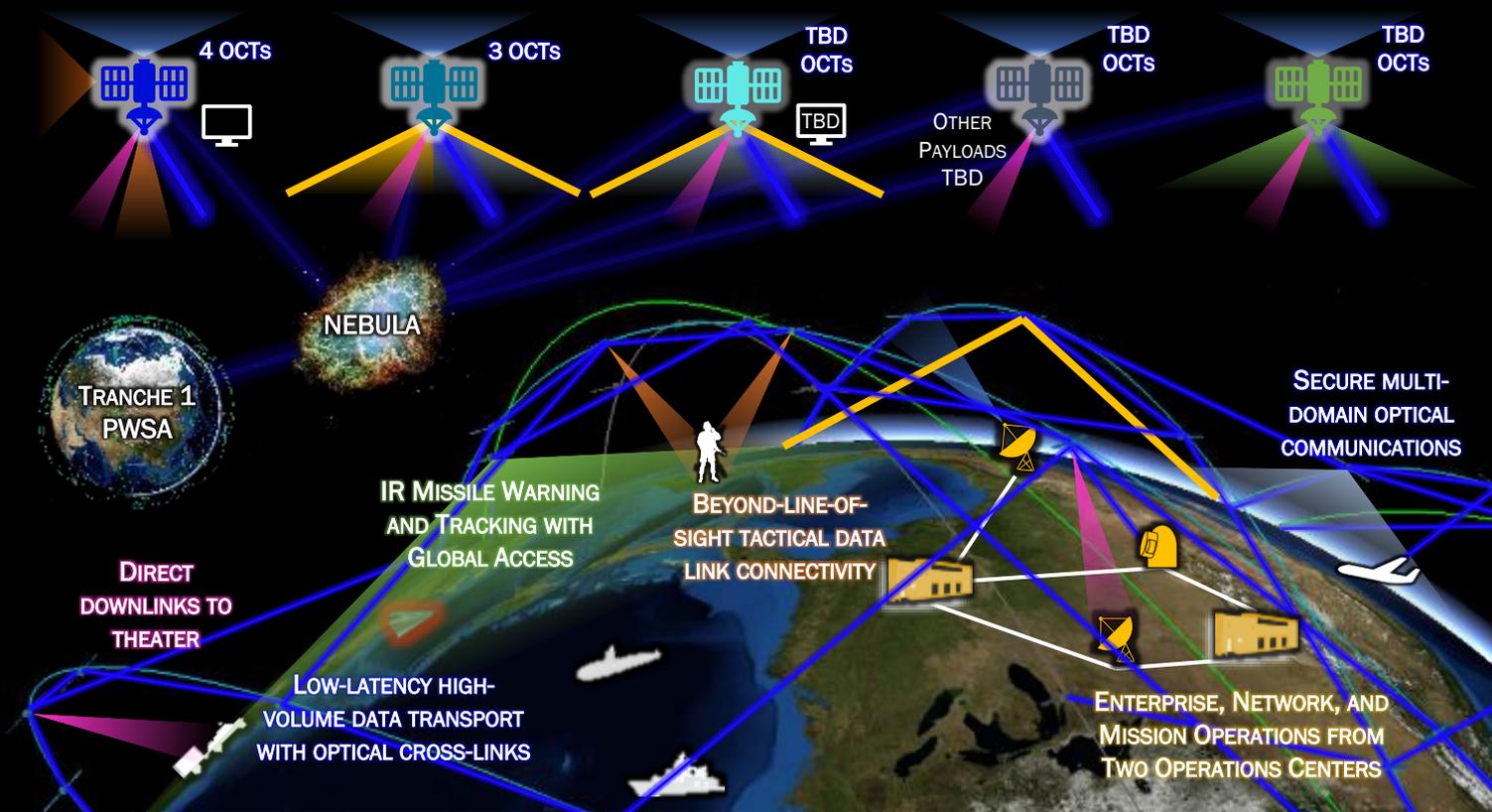
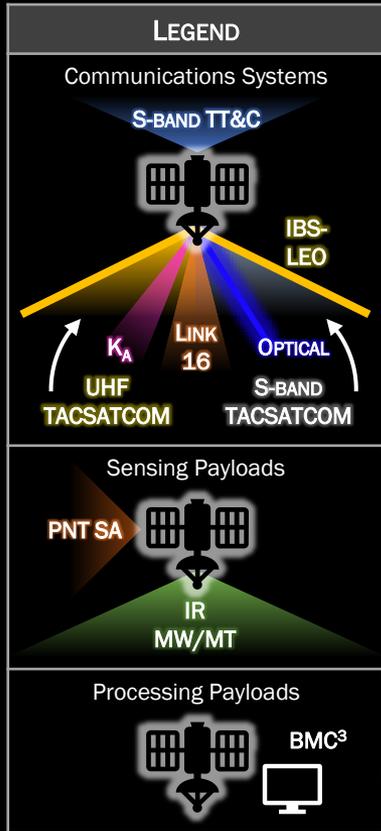


- **NEBULA Networking Standard**
 - T1TL SVs in conjunction with compatible terrestrial nodes form a mesh network
 - Each node must have compatible networking hardware, same network implementation as per SDA's T1 NEBULA Standard
 - Static routing policy through the Crawl stage of Nominal Operations, with a progression toward BMC³-enabled dynamic routing by the Run stage
- **OCT Standard**
 - Proliferation of FSOC is critical to the NDSA's secure, low-latency, high-volume data transport capabilities
 - Interoperability requires all OCTs have high TRL, high MRL, and comply with the SDA T1 OCT Standard
 - T1 OCT Standard balances performance against marketplace availability and technology maturity



TRANCHE 2 PWSA (2027)

T2TL-ALPHA	T2TL-BETA	T2TL-GAMMA	T2DES	T2 TRACKING
100 SVs / 10 PLANES	72 SVs / 6 PLANES	44 SVs / 4 PLANES	~20 SVs	54 SVs / 6 PLANES (TBR)
RESILIENT GLOBAL LINK-16	GLOBAL TACSATCOM GLOBAL LEGACY BROADCAST	ENHANCED TACSATCOM	CAPABILITY DEMONSTRATION	RESILIENT GLOBAL MW/MT PRELIMINARY FIRE CONTROL



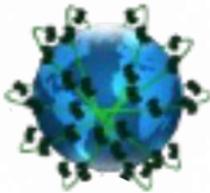
TRACKING LAYER EVOLUTION

SDA Tranche 1 (2025)

SDA Tranche 1 + SSC Epoch 1 (~2026)

SDA Tranche 2 + SSC Epoch 1 (~2027)

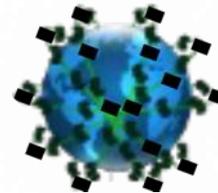
LEO



Initial global access capability

- **Polar coverage** for missile warning and tracking of HGVs and other advanced below-the-horizon threats
- **Near-global track custody** for radar cueing-quality data
- **35 SVs** in 5 planes

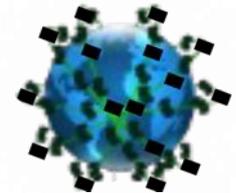
LEO + MEO



Initial global coverage capability

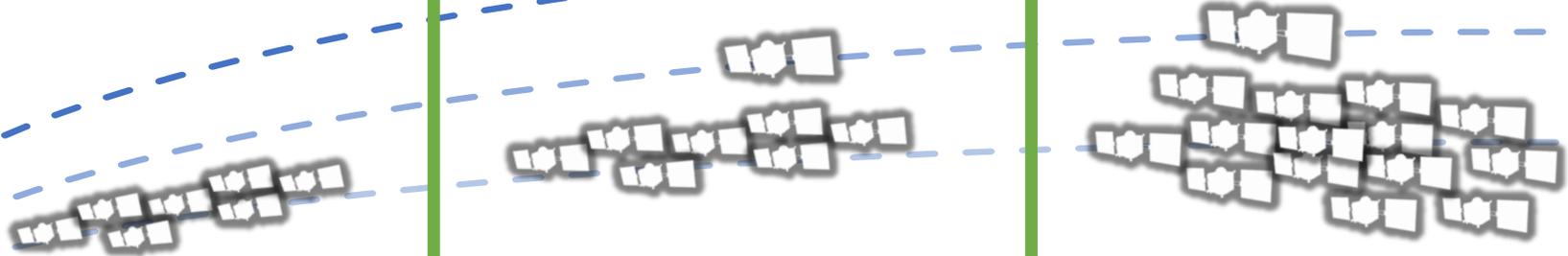
- **Addition of MEO** bolsters low-latitude coverage and track custody
- **Global track custody** for radar cueing and initial targeting-quality data
- **35 LEO SVs + MEO SVs** (2 planes)

pLEO + MEO



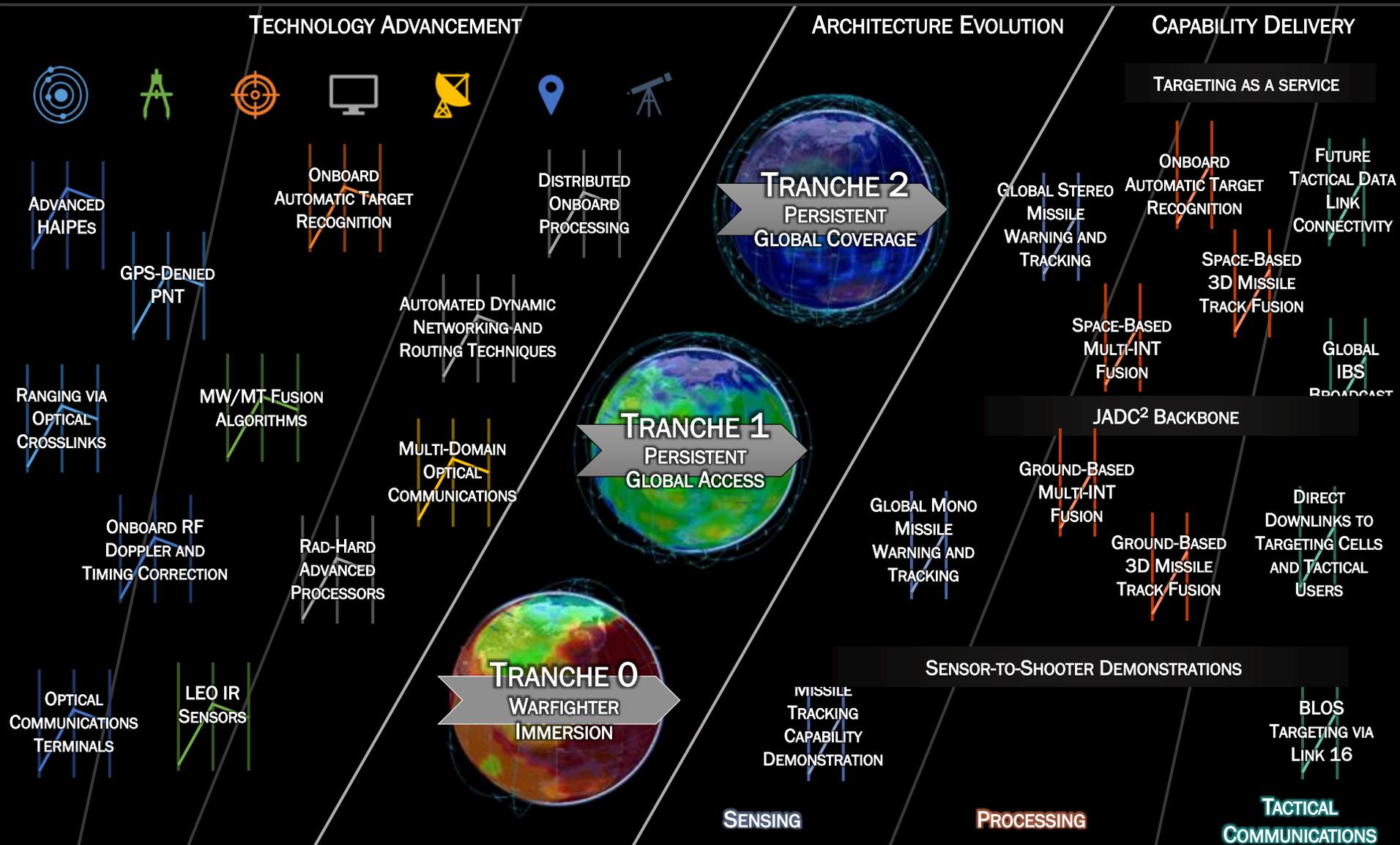
Robust global coverage capability

- **Global coverage** for advanced missile warning and tracking
- Near-global track custody for radar cueing and **stereo targeting-quality data**
- **~89 LEO SVs + MEO SVs**



T1 Tracking Layer is the first step toward an accelerated Global MW/MT Capability

MATURING TECHNOLOGY – ADVANCING CAPABILITY



FUTURE MW/MT/MD HYBRID ARCHITECTURE



Resilient Global MW/MT/MD 2030+ Notional Operational Concept Graphic (OV-1)

(Graphical depiction of architecture is intended for illustrative purposes; does not represent projected number of SVs)

Keys to Mission Success

- Reduce Latency
- Increase Cross-Agency C2
- Establish Standards & Interfaces



Real-Time Transfer Service

- MEO ops at TAP Lab, Boulder, CO
- LEO ops & transport layer at GFAFB/Redstone Arsenal
- C2BMC fire-control solution distributed
- RTS distributes tracks from MEO & LEO through terrestrial & space transport layer

“We are at a **critical juncture** for our defense space architecture, and there is a real **sense of urgency** to act.

THE NATION NEEDS TO **outpace its adversaries** and maintain the technological advantage it gets from space.

THE NATION NEEDS TO **integrate its space architecture** with other war fighting domains to give its warfighters a **strategic edge**.

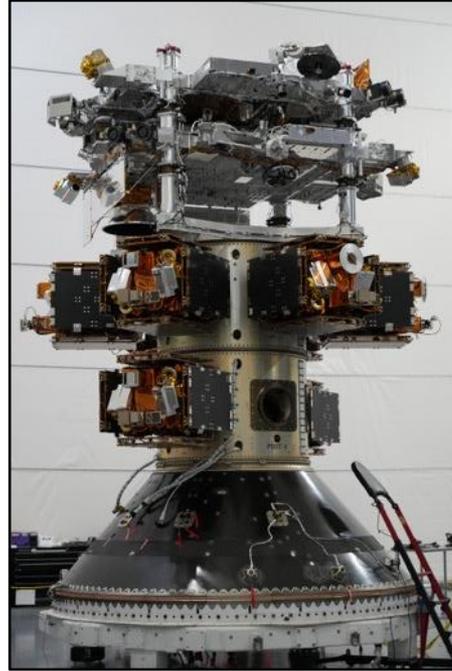
THE NATION NEEDS TO make its space architecture more resilient so that it can be counted on during times of crisis and conflict, and the nation needs to do this with **speed**.”

– Frank Calvelli, Assistant Secretary of the Air Force for Space Acquisition & Integration, before Senate Armed Services Committee, Feb, 2022

THE ROAD TO TRANCHE 0 LAUNCH 1



Tranche 0 Space Vehicles being prepared for delivery. (Image Credit: York Space Systems)



Integrated Space Vehicle stack
(Image credit: SDA)



SpaceX Falcon 9 at Vandenberg Space Force Base launch pad. (Image credit: SpaceX)

Satellite Specifics

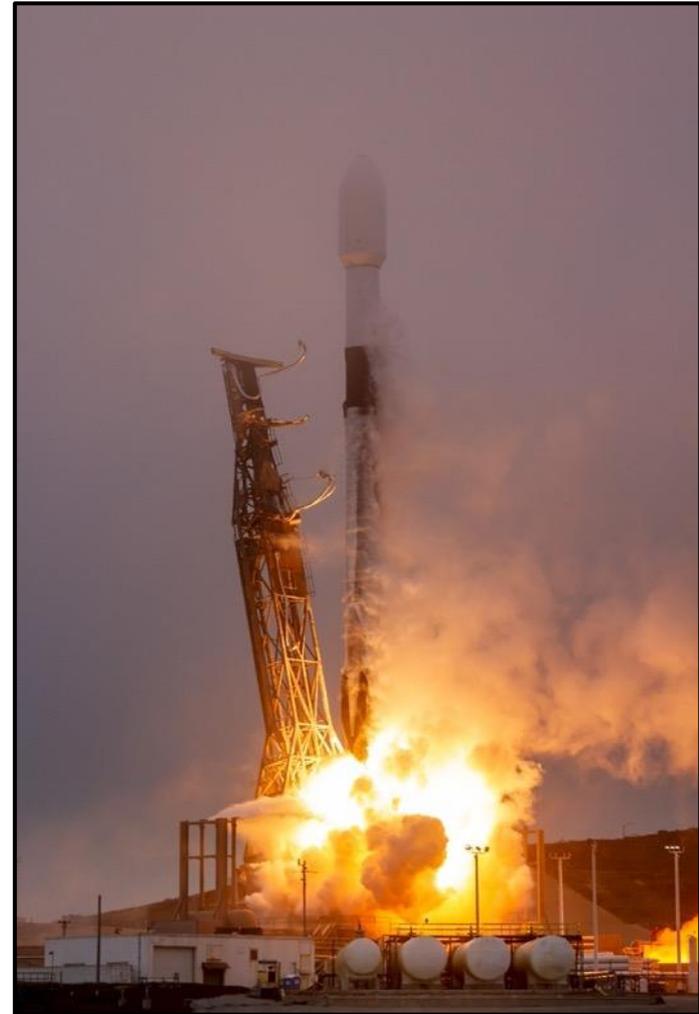
Launch Details

- Total of 10 Tranche 0 Satellite Vehicles to be launched
 - 8 Transport Vehicles (3SVBs, 5SVa); Developer: York Space Systems
 - 2 Tracking Vehicles; Developer: SpaceX
- Launched into a ~1000km deployment altitude at 80-82 degrees inclination

- Launch Vendor: SpaceX
- Launch Vehicle: Falcon-9R
- Location: Vandenberg Space Force Base, Calif.

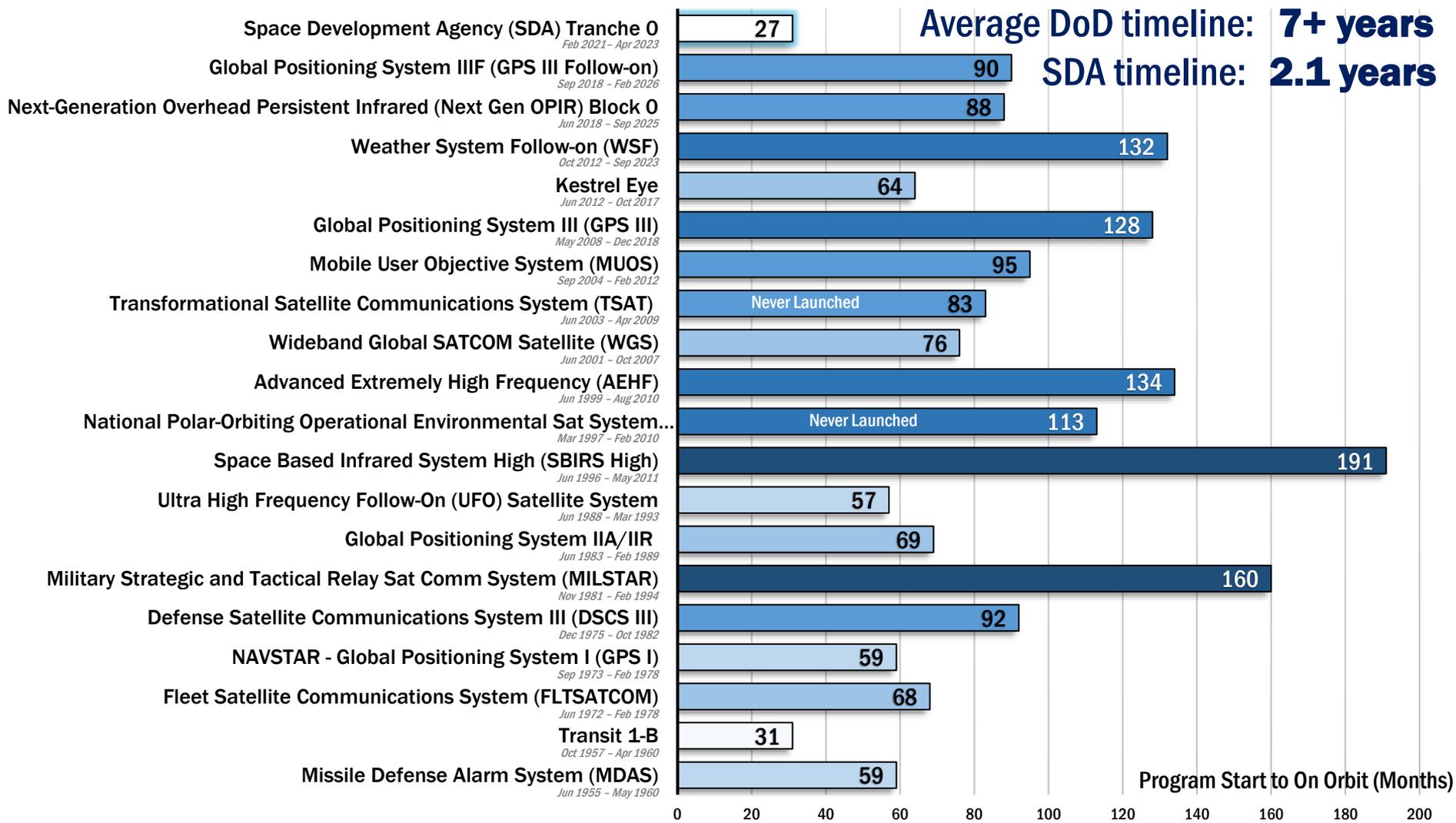
T0 LAUNCH 1 SUCCESS SUMMARY

- On April 2, 2023, SDA successfully delivered the first 10 satellites of Tranche 0 on orbit.
 - Approx 30 months from order to orbit for Transport satellites.
 - Even shorter timeline (approx. 27 months) for Tracking satellites.
 - for Tracking satellites)
- On September 2, 2023, SDA delivered 13 additional Tranche 0 satellites on orbit.
- Highlights SDA's collaborative and creative approach, working with various government and industry partners to move quickly.
- Demonstrates SDA can maintain schedule to deliver enhanced capabilities every two years.



Successful T0 Launch 1 April 2, around 7:29 am PT
(Image Credit: SpaceX)

SPACE DEVELOPMENT AGENCY'S DISRUPTIVE INNOVATION - PROLIFERATION



Breaking (Space) Barriers: SDA's disruptive approach leveraging proliferation of small satellites and spiral development on two-year cycles is unprecedented among military space programs

- SDA is a **constructive disruptor**, developing and fielding nontraditional pLEO space-based architecture
- SDA moves quickly to deliver new capabilities to the warfighter **every 2 years**
 - Leveraging OTAs for acquisitions
 - Firm-Fixed-Price contract awards
 - Important for industry to bid realistically and deliver to capability based on established schedule
- SDA has been successful at hitting milestones - **Schedule is the primary driver** for delivery in two-year “tranches”
 - FY21: Risk reduction demonstrations and flight experiments
 - FY23: First demonstration of capabilities to the warfighters (Tranche 0 Transport and Tracking on orbit)
 - FY25: First Tranche 1 Transport and Tracking warfighting capability
 - FY27: Global persistent capability
- SDA is **publishing standards** that are being adopted by industry
 - Industry driving toward interoperability, compatibility
- Delivery status
 - Tranche 0 SVs assembled and are being launched.
 - Tranche 1 on schedule
 - Tranche 2 Transport Solicitations released

SPEED – DELIVERY - AGILITY

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In Latin, it means “always faster.” SDA recognizes that good enough capabilities in the hands of the joint warfighter sooner may be better than delivering the perfect solution too late. Because of this, it means we as an agency accept a higher level of risk, employ novel business models, and move to develop and field capabilities more quickly than you might see in “traditional” government agencies. We believe this builds resiliency into our people and our product—the Proliferated Warfighter Space Architecture.

When we say “semper citius,” we mean that we are moving at or ahead of the speed of the threat because we know the joint warfighter is counting on us.

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