



# ***Flying Prototypes and Prototyping Ground Systems***

***Garick Lue-Chung (Aerospace)  
Alex Garcia (RDSMO)***

***March 1, 2023***

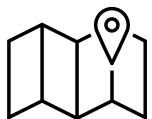
Approved for public release. OTR 2023-00385.



# What is a RDSMO?

- RDT&E Space and Missile Operations (RDSMO) Program Element
  - 10+ simultaneous missions supported
- **Mission:** Innovate, Prototype, Sustain and Evaluate USSF ground systems to support RSC missions as well as speed transition of war winning capabilities
- **Vision:** Develop the most advanced ops center and ground station in USSF – delivering rock-solid command and control and data distribution for experiments and prototypes

- Priorities
  - *Customer Focus: Ground system integration, development and testing within cost, schedule and performance expectations to meet on-orbit experiment/prototype needs*
  - *Cloud Now: Design, build and test a cloud-based operations center in 2 years – IOC: FY24*
  - *Transform MRF: Increase MRF role as future testbed for ground antenna/scheduling/networking prototypes worldwide*



## **Kirtland Air Force Base**

Rendezvous and Proximity Operations Floor (REPR)  
RDTE Support Complex (RSC)  
Multi Mission Space Operations Center (MMSOC)  
Mobile Range Flight (MRF)



## **Schriever Space Force Base**

Delta 9, 1 SOPS Satellite Operations

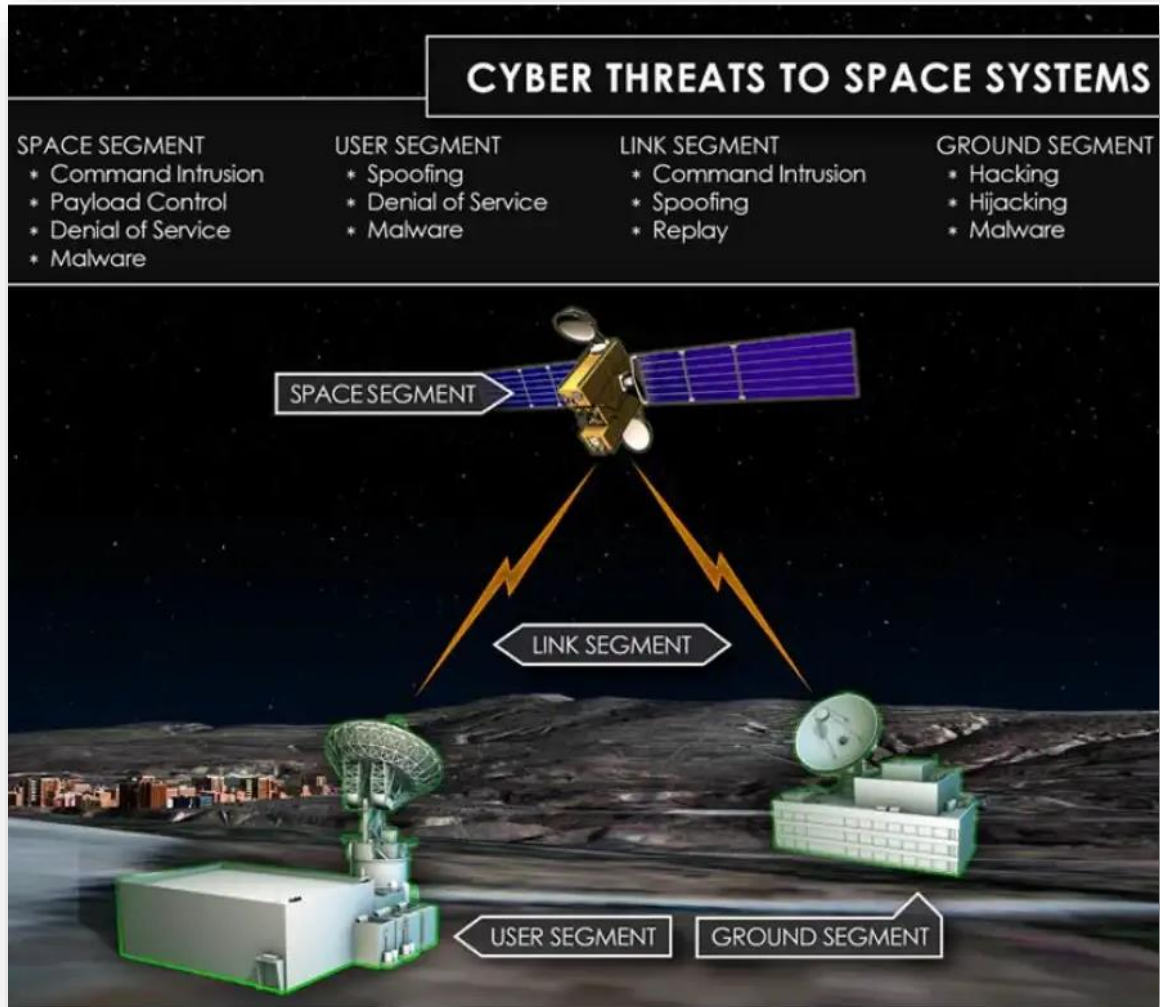
# RDSMO and LDPEs



- Long Duration Propulsive ESPA (LDPE)
  - *RDSMO operates multiple LDPEs with varying payloads (six available ports)*
    - “[LDPEs are] an affordable path to space for both hosted and separable payloads,” Space Force’s Space Systems Command
  - *LDPE-3a launched in January 2023*



- RDSMO Ground Segment
  - *LDPE manifest decisions impact ground segment*
    - Highest payload classification drives the system (space and ground segment) classification
  - *RDSMO created a new ground system to satisfy LDPE-3A data distribution requirements*



Credit: Aerospace Corporation

## • LDPE-3A

- *Multiple users with different classifications needs*
  - Space Systems Command (2 payloads)
    - *Aerospace Catcher – space domain awareness*
    - *Sandia WASSAT – prototype wide-area sensor with multiple cameras*
  - Space Rapid Capabilities Office (3 payloads)
    - *2 x situational awareness*
    - *Prototype crypto/interface encryption payload*
- *All commands are sent from the RDSMO Rendezvous & Proximity Operations (REPR) Operations Floor*

***Highest payload data classification drive the ground system classification and data delivery***



# Stronger Together

- The RDSMO Program RSC is infamous for just-in-time, minimum viable ground systems to meet minimum satellite safety operations criteria
  - *LDPE-3A data distribution requirements necessitated a new, just-in-time ground system*
- RDSMO Mission: **Innovate, Prototype**, Sustain and Evaluate USSF ground systems
  - *Innovating and prototyping USSF ground systems were missing from previous just-in-time ground systems*
- RDSMO team identified an opportunity to partner with Enterprise Ground Services (EGS) to conduct LDPE-3A operations while fulfilling its mission to the enterprise



**AEROSPACE**


**SAIC**

**MITRE**




# Developing the Relationship through Prototyping

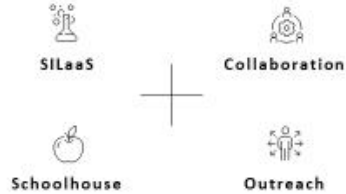
- RDSMO and EGS collaborated on an unclassified ground system demo to replicate the planned LDPE-3A classified system
- Proved EGS Canopy Software Integration Lab (SIL) would satisfy the RDSMO requirements while advancing the enterprise
  - *RDSMO and EGS developed a plan to replicate the EGS Canopy SIL at Kirtland AFB*




## Canopy Software Integration Lab: Enabling the Ground Enterprise



Canopy, a new SSC/ECXG collaboration center, exists to transform satellite operations by providing an innovation ecosystem to assess and transition technology to operational utility for the space enterprise through four focus areas...

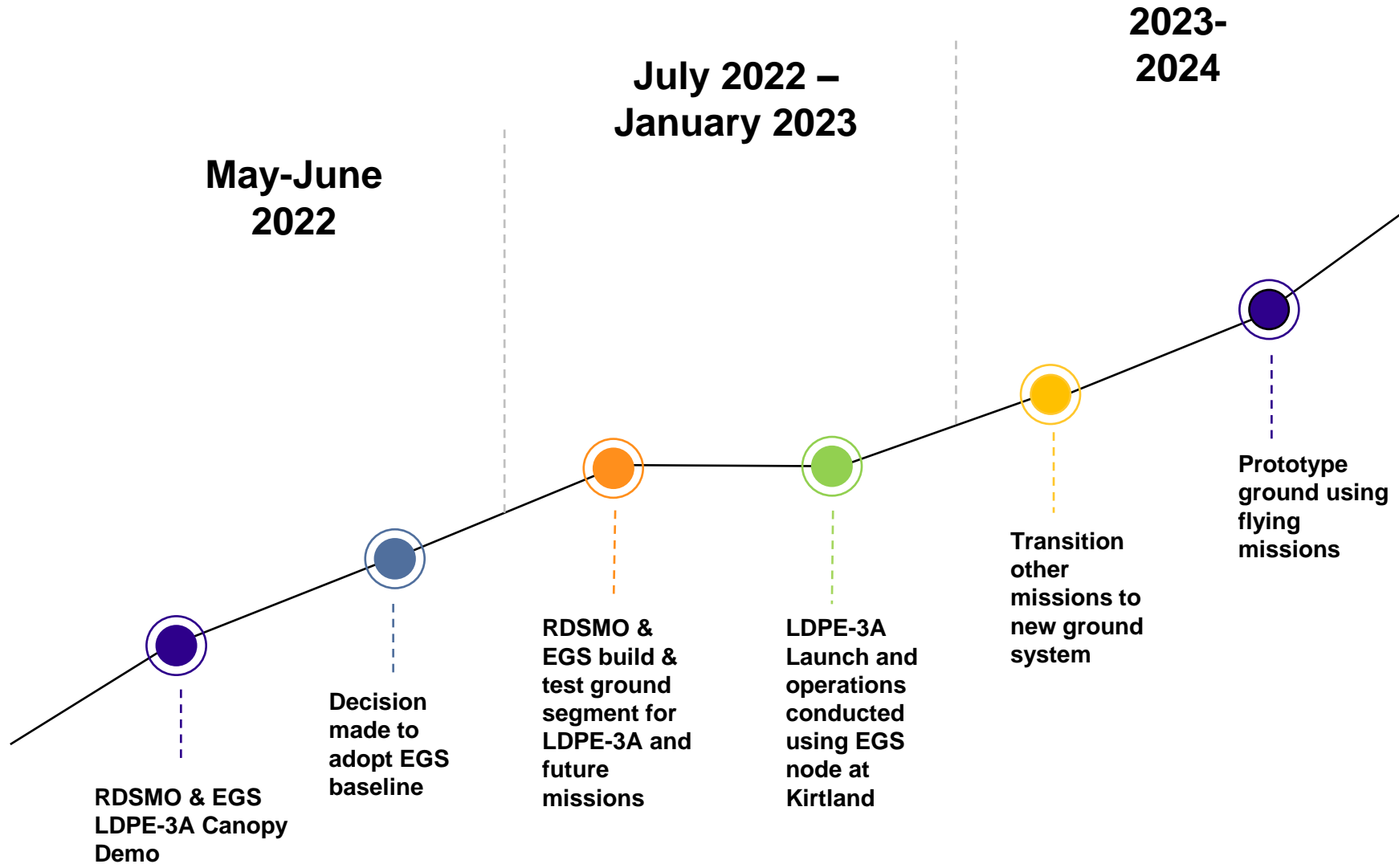


The synergy created by these interactions will allow direct feedback from our most important customers, our warfighters... **together we will inform smarter, better, technology development.** We are making this investment because we recognize the importance of our partners, and we are dedicated to their success because we understand it is also our own.



Permission granted from SSC EGS Program Office.  
Picture is from the EGS Enterprise Cloud Strategy GSAW 2022 presentation

# Moving Fast

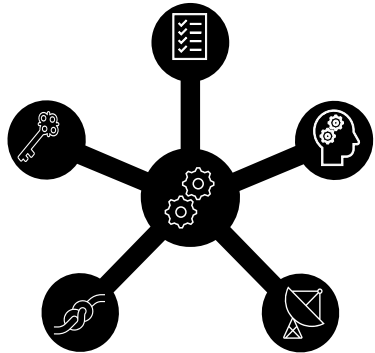


# Nebula Project



Nebula is a giant **cloud** of dust and gas in space

– *Definition from NASA*



RDSMO is designing, building, and testing an off-premise, commercial cloud-based operations center for its missions

– *Not just a cloud SIL*

– *Military relevant*

- Operators, Cyber, Crypto, Interfaces, ground station, contracting, ...



# *Opportunity to Prototype*



## **Aerospace RDSMO Support**

Garick Lue-Chung  
garick.a.lue-chung@aero.org

## **Nebula Project**

Alex Garcia, NH-03  
Alejandro.garcia.25@us.af.mil

## **SSC Front Door**

<https://www.ssc.spaceforce.mil/Connect-With-Us/Space-Systems-Command-Front-Door>