



Aerospace Viewer of NASA Project Staffing Data (aView)

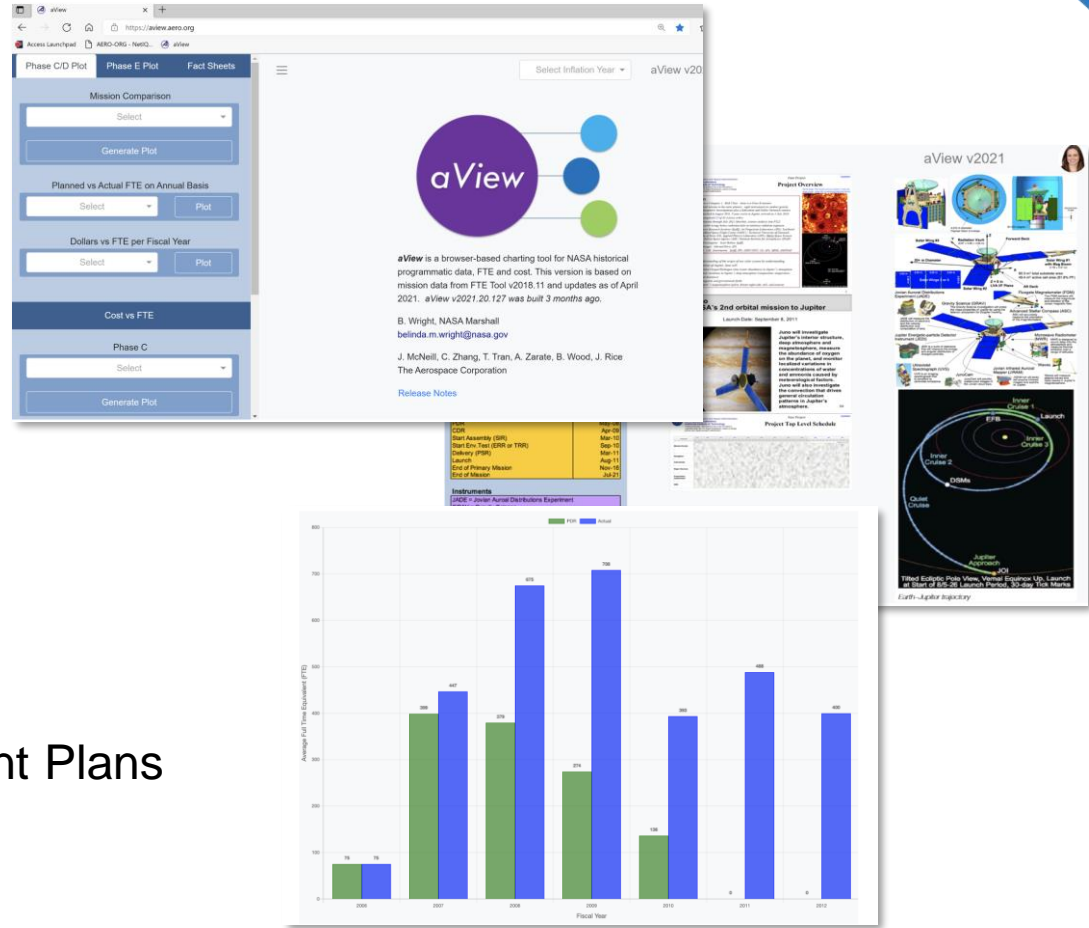
***A Practical Tool for Analyzing Staffing
Levels and Cost Across Missions***

***S. Lang, A. Zarate Garcia, J. McNeill,
J. A. Rice, T. Tran, C. J. Zhang
The Aerospace Corporation***

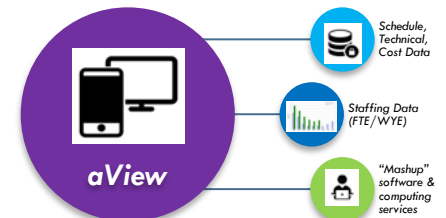
***2024 NASA Cost & Schedule Symposium
April 23-25, 2024***

Outline

- Introduction
 - Purpose
 - Timeline
 - Data Sources
- Its Utility and Capabilities
 - Why aView?
 - Plot Types
 - Capabilities
 - Mission Fact Sheets
- Architecture and Deployment Plans
- Summary



aView – the Aerospace Viewer of historical staffing profiles of NASA science missions



Introduction

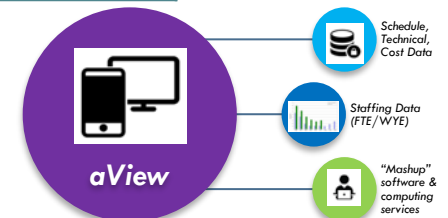
Purpose

- aView**, the Aerospace Viewer of archive of missions' staffing profiles, provides
- A curated, validated archive of FTE/WYE data for 30 science missions
 - Comparative analysis of mission programmatic data (FTE/WYE) from PDR through operations (Phases C, D, E)
 - Illustrations of how well projects keep to staffing plans at PDR and highlights excursions
 - Quick reference pages for missions' technical parameters and related information

Cassini	Dawn	Deep Impact	Dragonfly	Europa Clipper
Genesis	GRAIL	InSight	Juno	Kepler
LADEE	LCROSS	LRO	LUCY	MAVEN
MESSENGER	MER	MRO	MSL	Neo Surveyor
New Horizons	NuSTAR	OCO	OSIRIS-REx	Phoenix
Psyche	Spitzer	Stardust	STEREO	WISE

Mission List

***aView is underwritten by the NASA
Planetary Missions Program Office***



Introduction

Timeline

2009
thru
2018

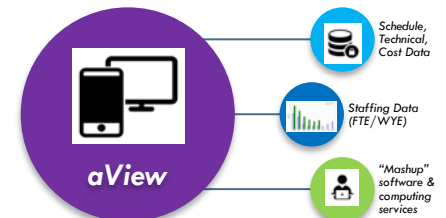
FTE Tool released with staffing data from thirteen missions

Built on MS Excel with embedded macros

Grew to contain historical staffing data for 24 science missions, mostly planetary

Various features added to aid cost analysts within the NASA PMPO

Presented at the NASA Cost and Schedule Symposium 2014



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Timeline

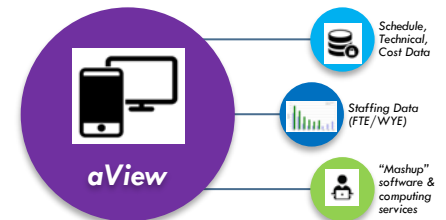


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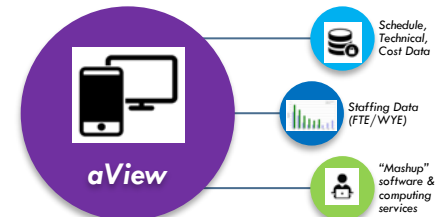
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Detailed reference information for each data point is recorded in the tool's DB



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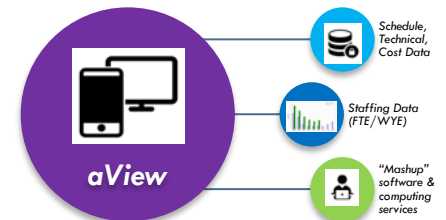
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Previous year's **aView 2021** made available via NASA ONCE's development server
Addition of LUCY and Psyche mission data



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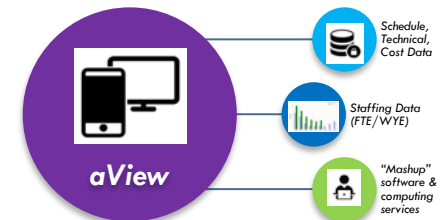
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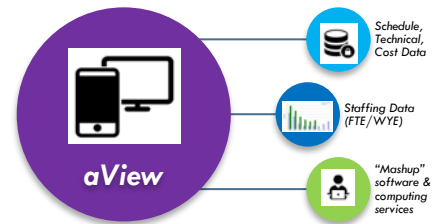
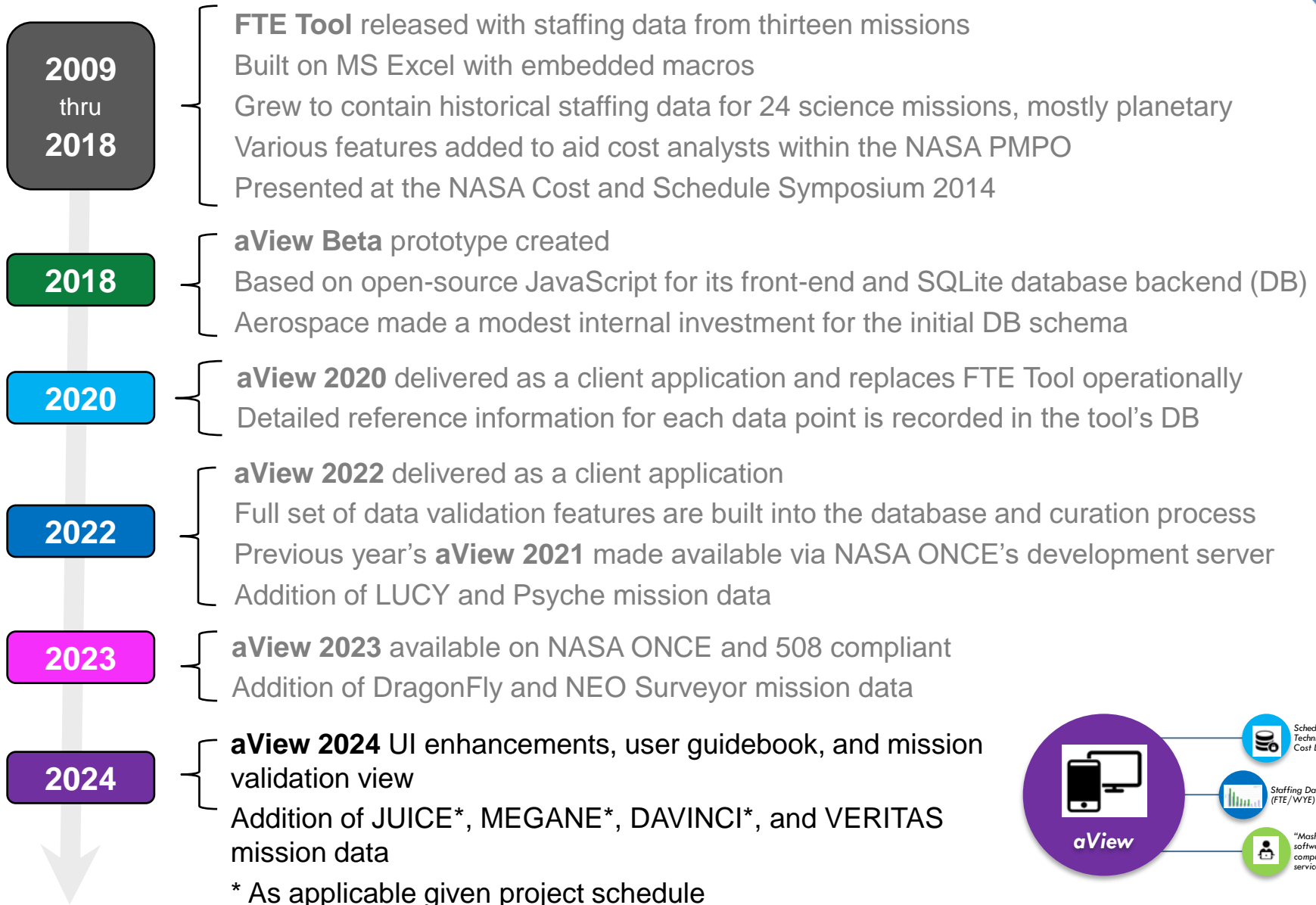
2023

aView 2023 available on NASA ONCE and 508 compliant
Addition of DragonFly and NEO Surveyor mission data



Introduction

Timeline





Introduction

Available on ONCE

The image displays two screenshots of the ONCE web application. The left screenshot shows the main interface with a sidebar menu. The right screenshot shows a detailed view of the aView tool, which is a browser-based charting tool for NASA historical data.

ONCE
ONE NASA COST ENGINEERING DATABASE

- ONCE
- Search
- User Reports
- User Charts
- Libraries
- Dashboards
- Family Box Plots
- CADRe Listing
- Human Data
- Model Portal
- File Zipper
- aView**
- Resources
- CADRe Inbox
- CADRe Status Screen
- My CADRes

aView v2023

Select Inflation Year

a browser-based charting tool for NASA historical data, FTE and cost. This version is based on mission data through August 2023. This version is built 6 months ago.

Zavodsky, NASA Marshall Space Flight Center
zavodsky@nasa.gov

J. McNeill, C. Zhang, T. Tran, A. Zarate, B. Wood, J. Rice
Space Corporation

Since deployment: 44 unique users and 74 tool instances

Introduction

Demonstration on ONCE



powerpoint screen recording - G x ONCE Main Menu x +

https://oncedata.hq.nasa.gov/frmMainSplit.aspx

Access Launchpad AERO-ORG - NetIQ... aView All Files | Powered... Roman Welcome - ICE Port... ot Directory and Reso... FranklinCovey Deployment Archit... SMD MPR - Home

ONCE

Message from OCFO SIB

base that provides controlled access and query of CADRe information is... mimics the CADRe templates - upload the documents and information...

ONCE Breaking News

12/5/2023
The FY23 NASA New Start Inflation Index for FY24 use has been posted to the Inflation Indices Library!

10/25/2023
The Libera CDR CADRe has been entered into ONCE!

10/23/2023
The GLIMR CDR CADRe has been entered into ONCE!

10/16/2023
The Mass Change SRR CADRe has been added to ONCE!

Recently Added Data

NoFunding.xlsx
Caruthers - SIR
NoFunding.xlsx
NoFunding/header.docx
COSI - PDR
NoFunding.xlsx

Who's Online?

Lang, Sarah
Terrill, Stefanie

Questions or Comments?

[Email Us](#)

Template Var.	Project	Acronym	Event	Status
5.0	Advanced Composition Explorer	ACE	LRD	Completed Post Launch
5.0	ACRIMSat	ACRIMSat	BOH	Completed Post Launch
	ACRIMSat	ACRIMSat	KDP-F	Completed
4.2	Aeronomy of Ice in the Mesosphere	ADH	SRR	Completed
4.2	Aeronomy of Ice in the Mesosphere	ADH	PDR	Completed
4.2	Aeronomy of Ice in the Mesosphere	ADH	CDR	Completed
4.2	Aeronomy of Ice in the Mesosphere	ADH	LRD	Completed
7.5	Apollo Command and Service Module	Apollo CSM	BOH	Completed
7.5	Apollo Lunar Module	Apollo LM	BOH	Completed
4.2	Aqua (PH-1)	Aqua	LRD	Completed
1.0	Aquarius	Aquarius	SRR	Completed
5.0	Aquarius	Aquarius	LRD	Completed
5	Aquarius	Aquarius	BOH	Completed
6.0	Aquila, Non-NASA	Aquila	LRD	Completed
4.2	Suzaku (ASTRO-E II)	ASTRO E II	LRD	Completed
4.2	ASTRO H	ASTRO-H	SRR	Completed
4.2	ASTRO H	ASTRO-H	PDR	Completed
4.2	ASTRO H	ASTRO-H	CDR	Completed
5.0	ASTRO H	ASTRO-H	PostSIR	Completed
4.2	Aura (Chem-1)	Aura	BOH	Completed

CADRes by Milestone

Click Event to Filter Grid

Office of the Chief Financial Officer

By clicking "OK" you agree:

- The use of data within the ONCE database is for the purpose of performing a contract with NASA.
- The misuse of data may constitute grounds for termination of access privileges, administrative action, and/or civil or criminal prosecution.
- To abide by proprietary software regulations and the Security of Information Technology Procedures and Guidelines (NPG 810.1).
- To acknowledge your individual responsibilities under applicable U.S. Export Control laws and regulations - including the obligation, under certain circumstances, to obtain an export license from the U.S. Government prior to the release of controlled technical data within the United States.
- To not share the software models and tools outside of the ONCE Model Portal or in violation of the posted guidelines or license restrictions.
- You are accessing a U.S. Government information system that may contain CUI.

ONCE Support email: hq-oncesupport@mail.nasa.gov

OK

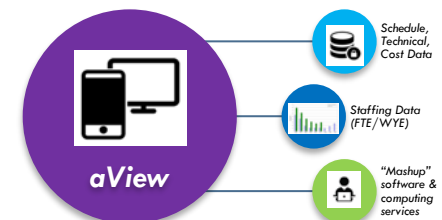
Work in Progress Pre-Launch



Introduction

Data Sources

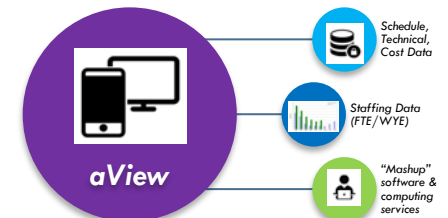
- **aView** is a repository of validated staffing and mission data
 - *Aerospace collects and validates the data in the aView DB*
 - *The sources of data and information for aView include:*
 - Formally approved reports at major mission milestones from the NASA Cost Analysis Data Requirement (CADRe)
 - Monthly Status Reports (MSRs)
 - Project and mission websites
 - Our customer at the NASA Planetary Missions Program Office



Outline

- Introduction
- **Its Utility and Capabilities**
 - *Why aView?*
 - *Plot Types*
 - *Capabilities*
 - *Mission Fact Sheets*
- Architecture and Deployment Plans
- Summary

aView – the Aerospace Viewer of historical staffing profiles of NASA science missions





Its Utility and Capabilities

Why aView?

The **aView** tool has a number of utilities that are not currently readily available through any other source. It allows the user to:

- *Visualize staffing profiles for Phases C, D and E (FTE and WYE) at the granularity of monthly data*
- *Display annual project cost data along side the annual staffing totals for Phases C, D and E*
- *Understand how the labor basis of estimate compares with past NASA science missions with similar characteristics*
- *Examine how well a project performs to its staffing plans from PDR through operations*
- *Reference technical and programmatic data of a mission, like spacecraft mass, mission schedule, launch vehicle, launch date, etc.*

Its Utility and Capabilities

Charting Capabilities and Fact Sheets

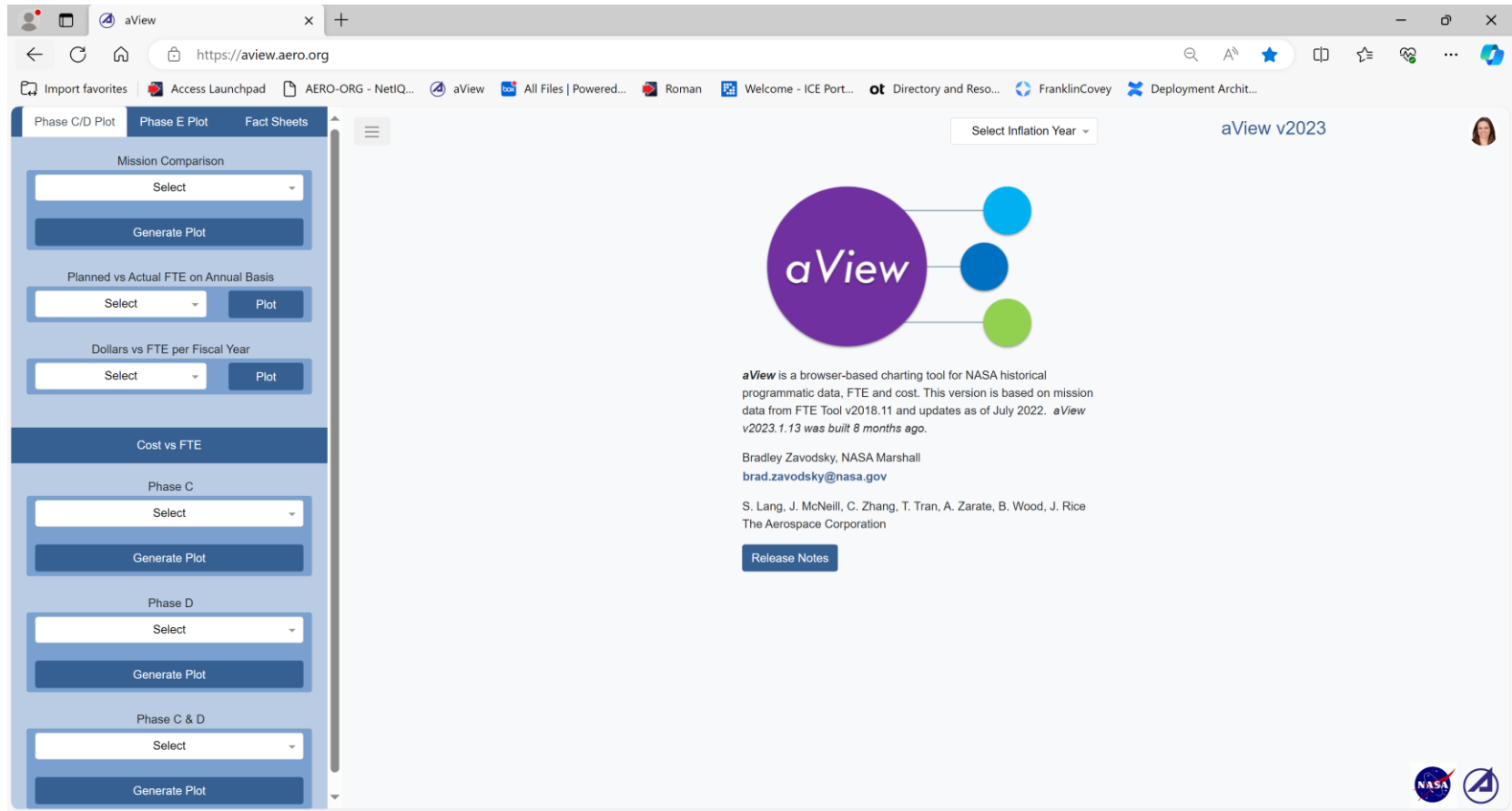


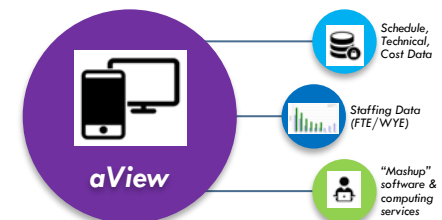
Figure A. "Front page" of aView via Google Chrome web browser



Its Utility and Capabilities

Chart Types

- A variety of chart types are available in aView and enable the user to examine programmatic data in different dimensions and ways. Currently, there are four chart types:
 - *FTE Comparison Plots for defined Periods*
 - *Planned and Actual FTE by Mission*
 - *Annual Cost and FTE by Mission*
 - *FTE vs. Cost*
- Each plot can be generated from mission data for Phases C and D or operations Phase E. The user can select the year for inflation to apply to the data



Its Utility and Capabilities

FTE/WYE Comparison Plot for Defined Periods

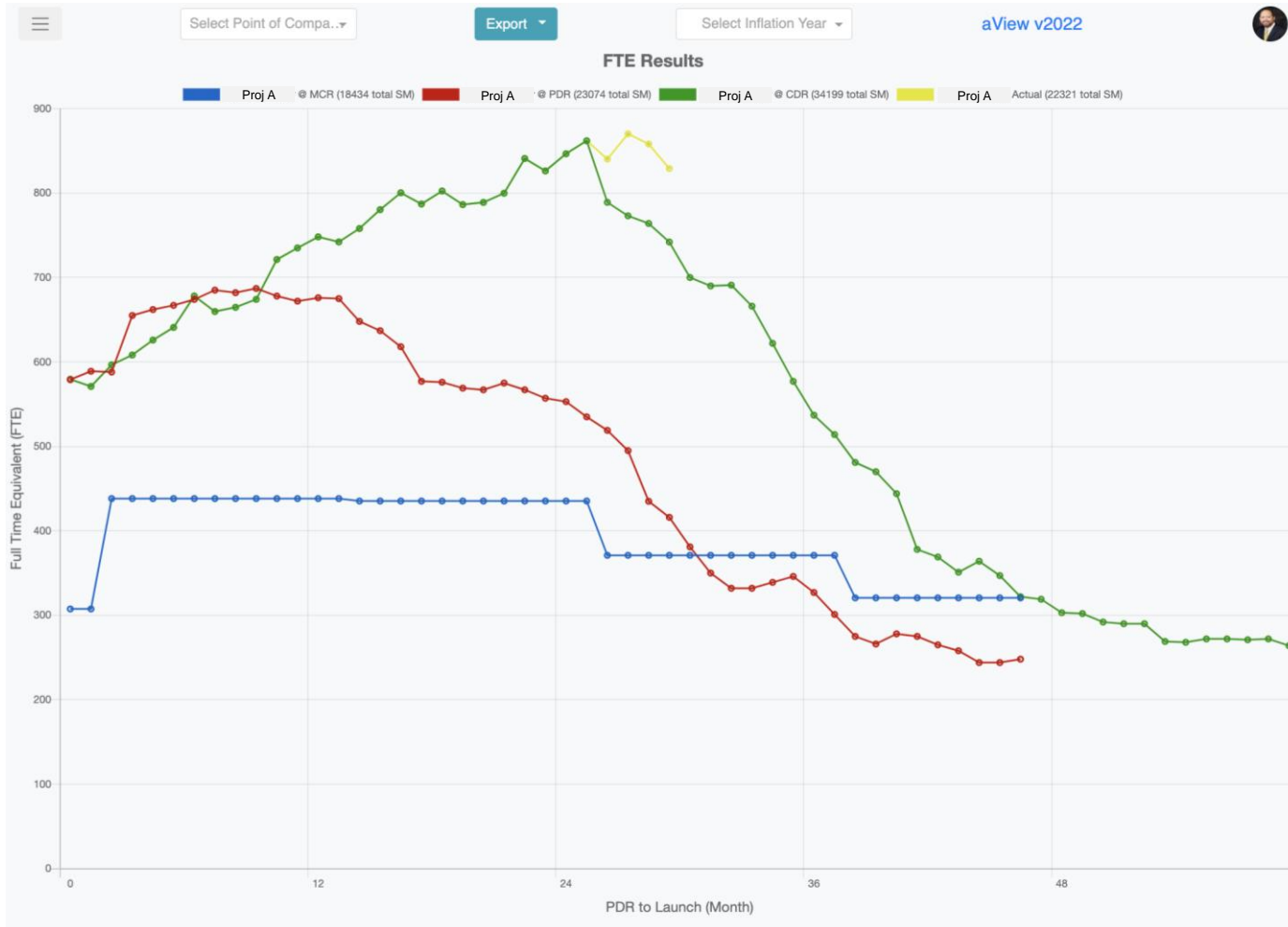


Figure B. Project A staffing actuals and plans crafted at MCR, PDR and CDR

Its Utility and Capabilities

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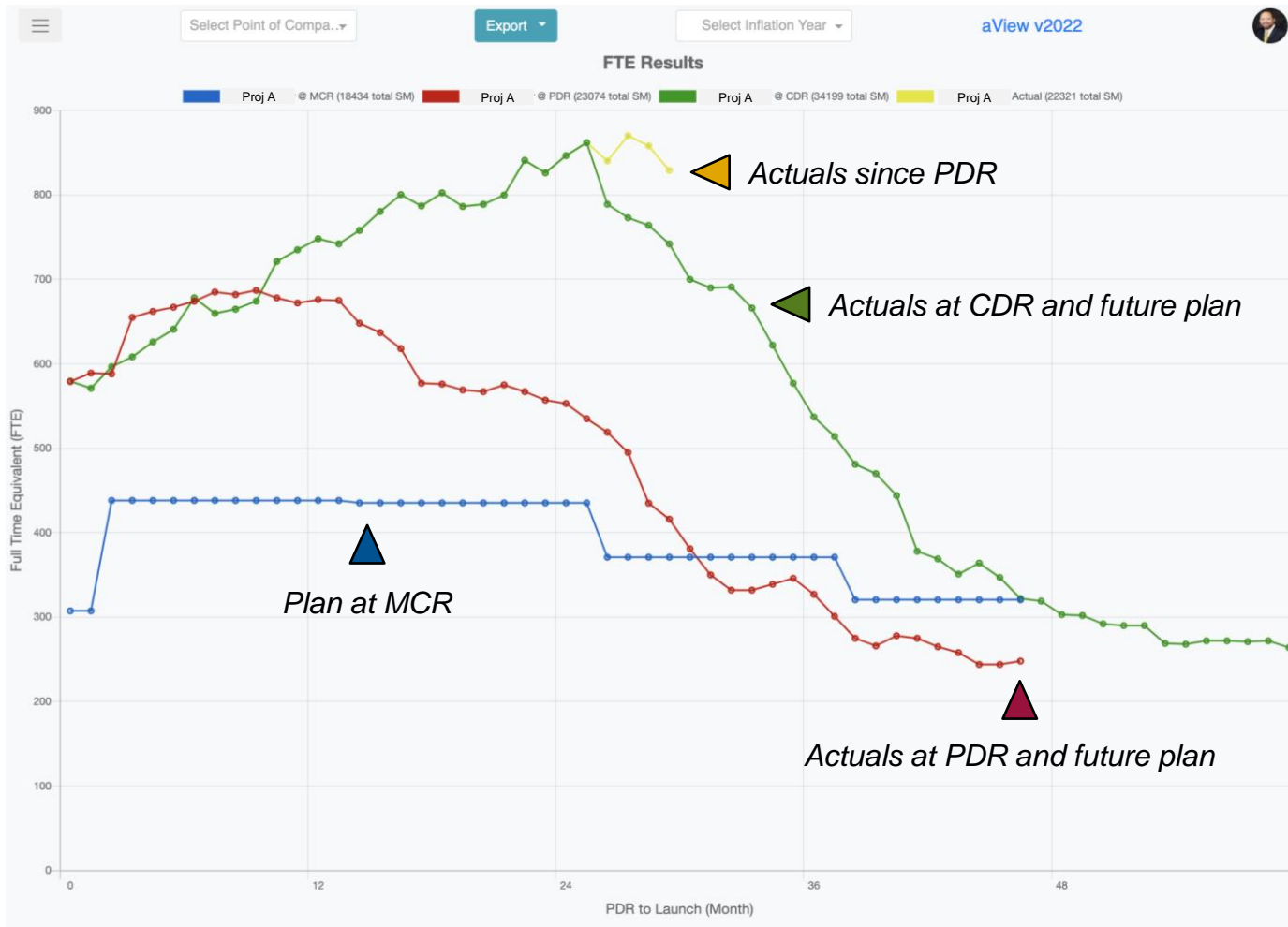


Figure B. Project A staffing actuals and plans crafted at MCR, PDR and CDR

Its Utility and Capabilities

FTE/WYE Comparison Plot across Projects

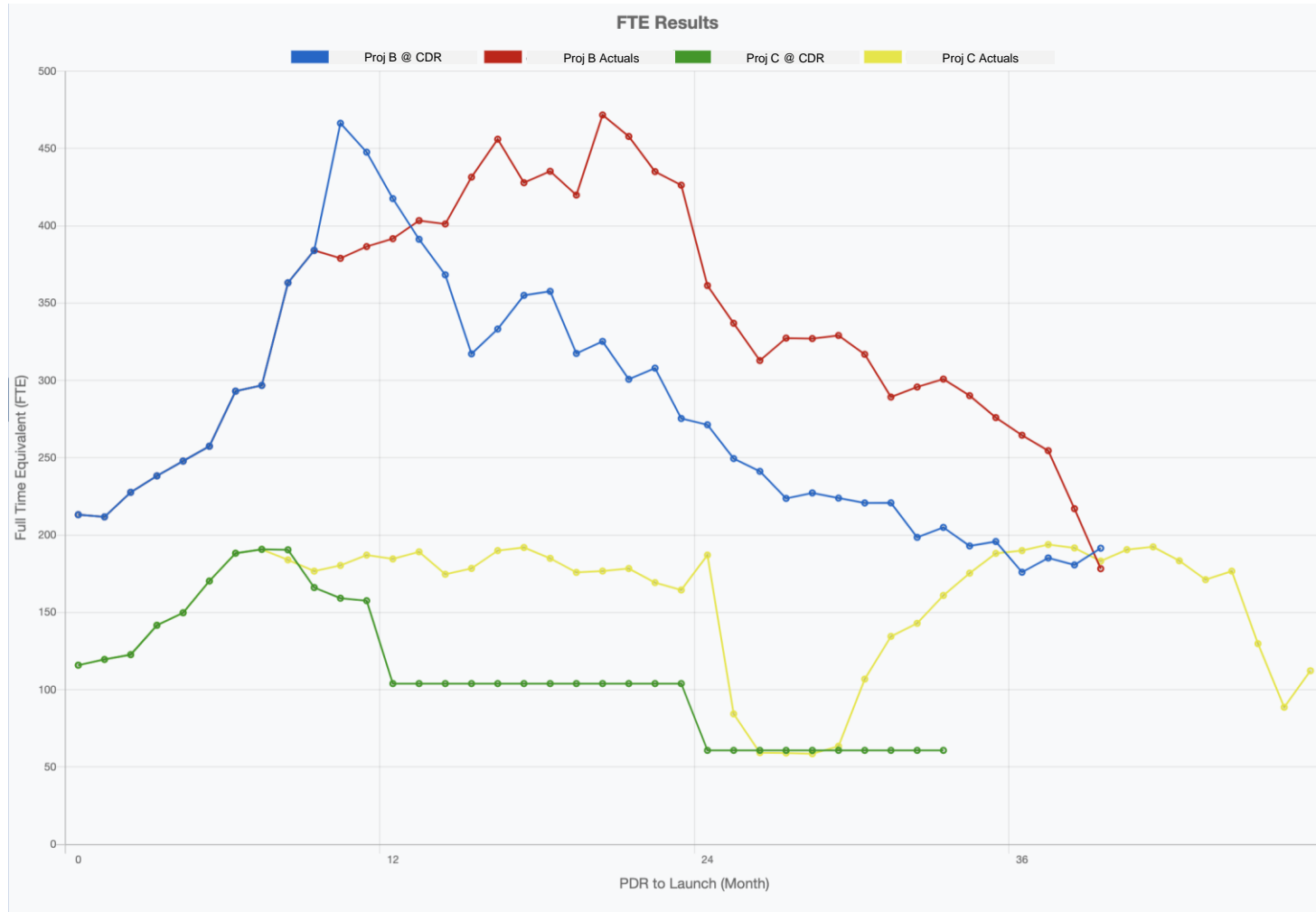


Figure C. Projects B and C staffing plans crafted at CDR and final actuals

Its Utility and Capabilities

FTE/WYE Comparison Plot across Projects

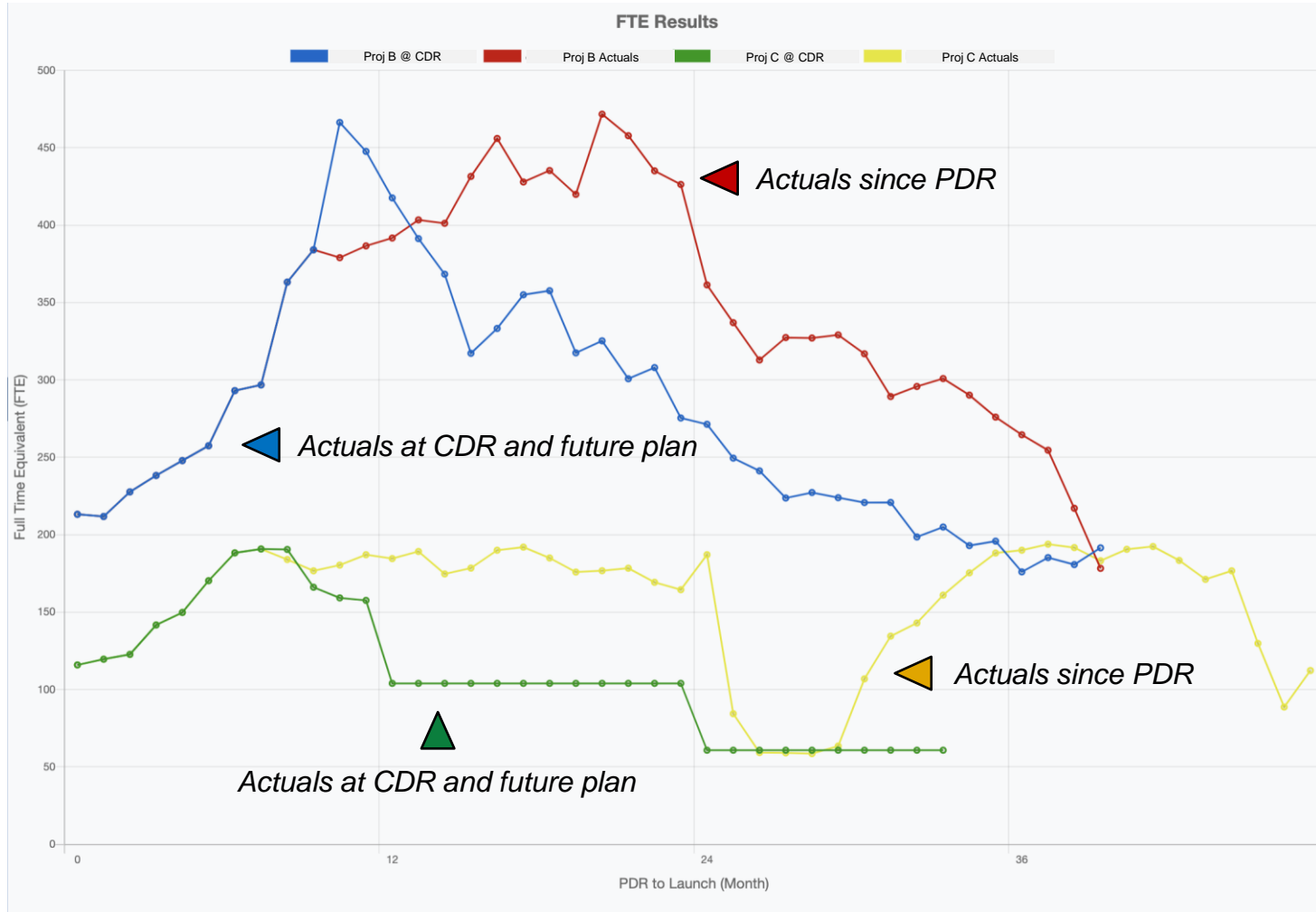


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Its Utility and Capabilities

Planned and Actual FTE/WYE by Project

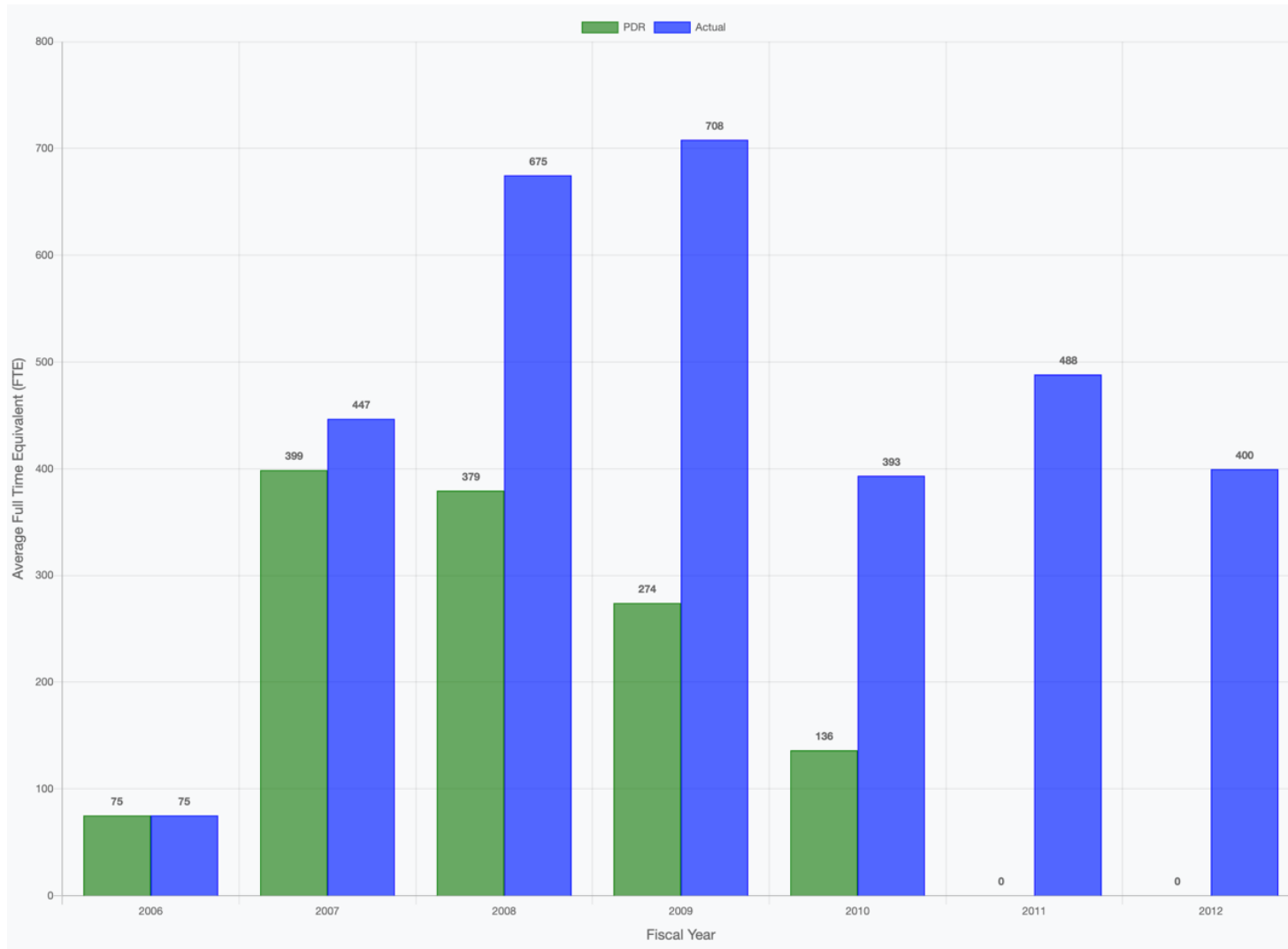


Figure D. Planned at PDR (green) and actuals (blue) at end of Phase D

Its Utility and Capabilities

Planned and Actual FTE/WYE by Project

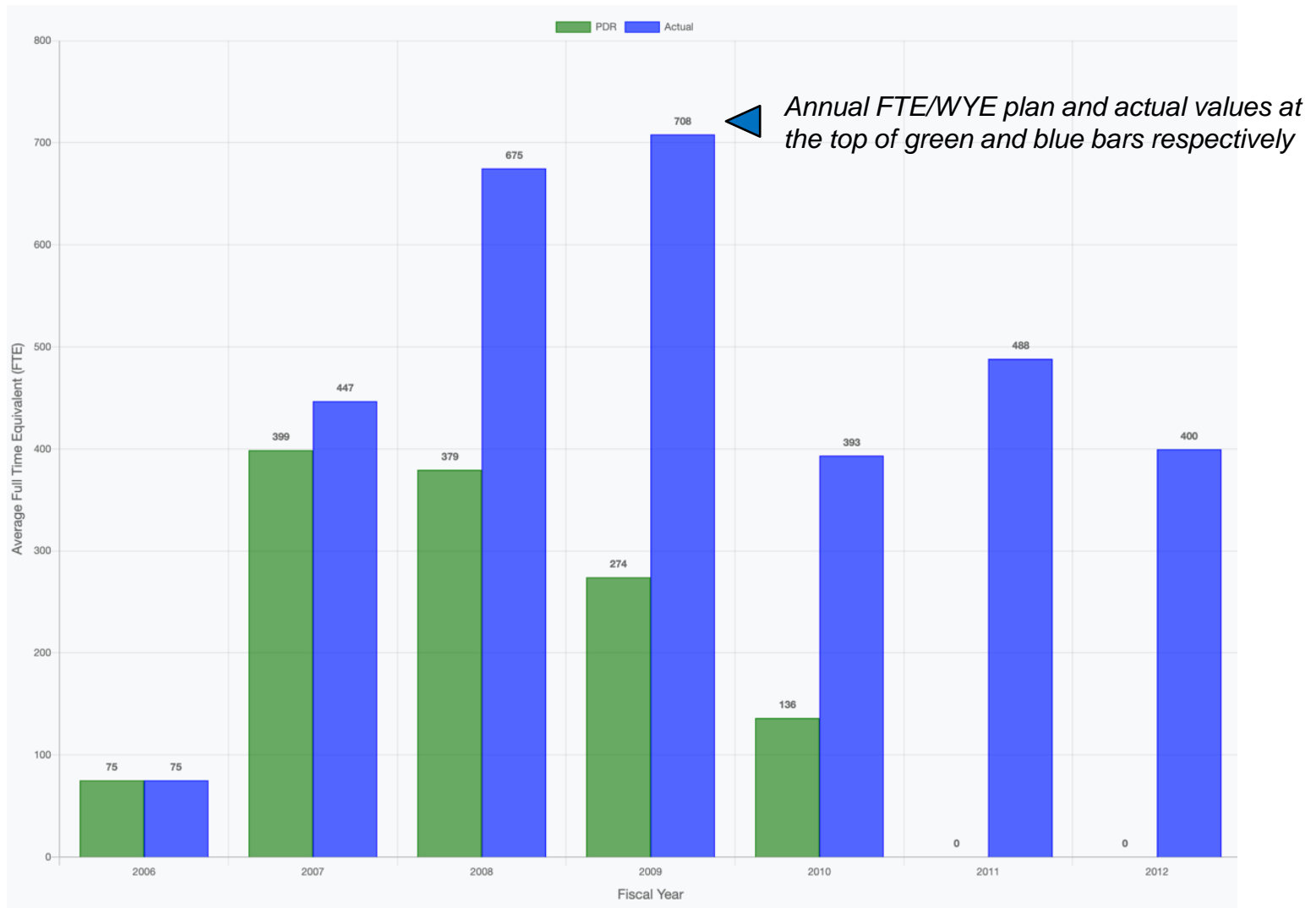


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Its Utility and Capabilities

Annual Cost and FTE/WYE by Project

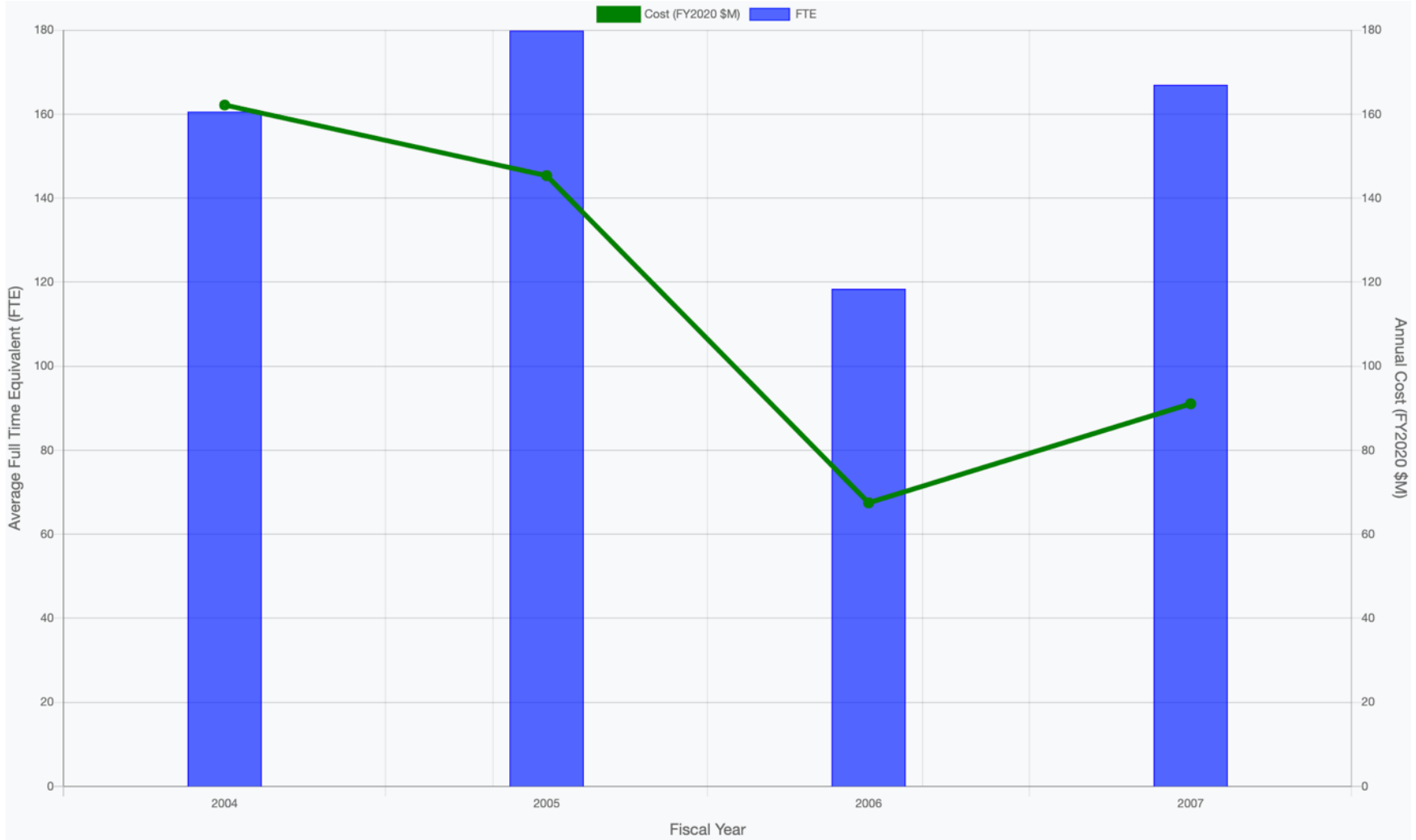


Figure E. Annual FTE/WYE and cost actuals by Fiscal Year

Its Utility and Capabilities

Cost vs. FTE

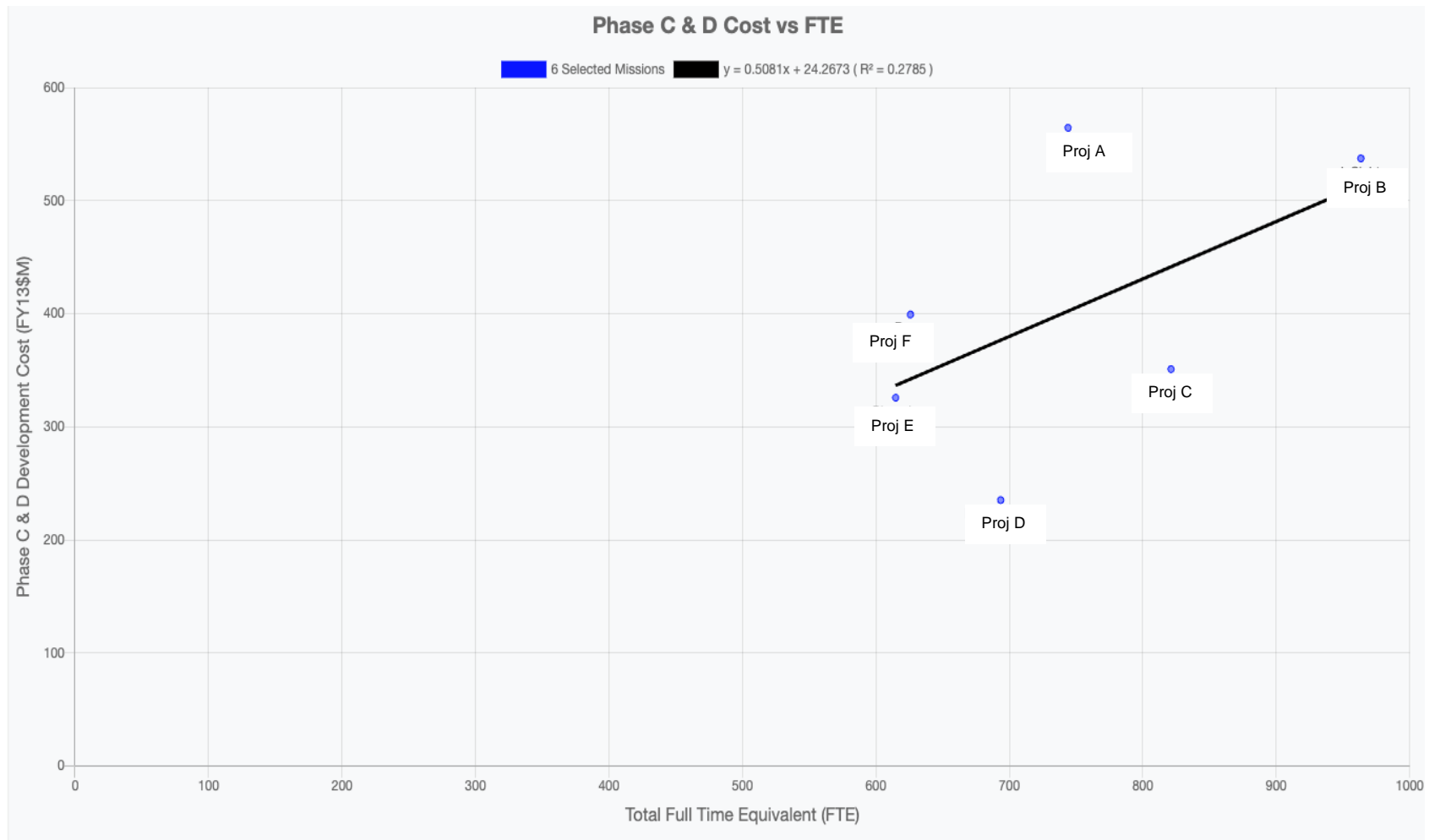


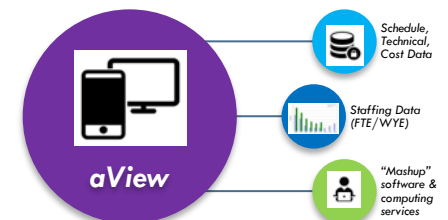
Figure F. Total Phases C & D Cost vs. FTE



Its Utility and Capabilities

Mission Fact Sheets

- Provide a capsule summary of the mission and project, providing some or all of these items
 - *Overview of the science objectives*
 - *Hosted payloads – instruments, sensors*
 - *Mission plan and characteristics*
 - *Project development milestone dates*
 - *Technical performance metrics*
 - *Basic concept-of-operation*
 - *Diagrams depicting the physical layout of components*
- NASA CADRe is the primary source for information given in these fact sheets
- As missions progress, fact sheets are updated with new, pertinent information



Its Utility and Capabilities

Mission Fact Sheets



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Phase C/D Plot Phase E Plot **Fact Sheets**

- Dawn
- Deep Impact
- Dragonfly**
- Europa Clipper
- Genesis
- GRAIL
- InSight
- Juno
- Kepler
- LADEE
- LRO
- Lucy
- MAVEN
- MER
- MESSENGER
- MRO
- MSL
- NEOSM
- New Horizon
- NuSTAR
- OCO
- OSIRIS-REx
- Phoenix
- Psyche
- Spitzer
- Stardust

Dragonfly

Technical Data

Program	New Frontiers
Lead Center	MSFC
Bus Manufacturer	APL
Mission Class	B
Launch Vehicle	Atlas-V521
Development Time (months)	
Design Life (months)	
Destination	
Max Distance from Sun (AU)	
Satellite Wet Mass (kg)	
Propellant Mass (kg)	
Satellite Dry Mass (kg)	
Spacecraft Bus Dry Mass (kg)	
Payload Mass (kg)	
Number of Instruments	
BOL Power (W)	
Solar Array Mounting Type	
Solar Array Area (m ²)	
Pointing Control (deg)	
Pointing Knowledge (deg)	
Stabilization Type	
Star Tracker?	
Mono or Biprop or Ion	Mono
Transmit Power (W)	
Downlink Datarate (kbps)	
Communications Band	X-Band

Schedule Data

ATP Start	Nov-17
SRR	Aug-20
PDR	Oct-22
CDR	Nov-23
Lander SIR	Jan-25
Lander PSR	Jan-26
Flight SIR	Jan-26
PSR	Dec-26
ORR	Feb-27
FRR	Apr-27
LRR	Jun-27
Titan Arrival	Nov-33
End of Primary Mission	Mar-37

Instruments

- DraMS mass spectrometer
- DraGNS gamma-ray and neutron spectrometer
- DraGMet geophysics and meteorology package
- DragonCam camera suite
- DRACO sampling system

Dragonfly Mission Concept Summary

• Dragonfly uses its rotorcraft mobility system to execute surface flights.

• Mission science is enabled by traversing to different sites of interest on Titan's surface, traveling from our initial landing site to Selk crater.

Preliminary Dragonfly Trajectory

- Launch: 04/05/2024, C3 = 19.2 km²/s²
- VGA: 04/15/2027, Alt = 9779 km
- EGA1: 05/27/2028, Alt = 1335 km
- EGA2: 09/05/2031, Alt = 1095 km
- Titan Arr.: 12/06/2034

Lander Diagram

Spacecraft = Cruise Stage + Entry Vehicle

Entry Vehicle = EDL Assembly + Lander

Rotorcraft Lander

EDL assembly includes aeroshell (heatshell and backshell), parachutes, ESI, and support equipment.

Lander in flight configuration, using mobility subsystem.

Lander in surface configuration, HGA deployed.

Figure G. Fact sheet for Dragonfly

Its Utility and Capabilities

Mission Fact Sheets – selective pop-up, zoom feature



← → ↻ 🏠 🔒 https://aview2022.ctl-services-a.aero.org 🔍 📄 ⭐ ⚙️ 🗄️ 👤

Phase C/D Plot Phase E Plot Fact Sheets

Dragonfly

Technical Data

Program
Lead Center
Bus Manufacturer
Mission Class
Launch Vehicle
Development
Design Life (m)
Destination
Max Distance
Satellite Wet Mass
Propellant Mass
Satellite Dry Mass
Spacecraft Bus
Payload Mass
Number of Instruments
BOL Power (W)
Solar Array Max
Solar Array Area
Pointing Control
Pointing Knowledge
Stabilization Type
Star Tracker?
Mono or Bipropellant
Transmit Power
Downlink Data Rate (kbps)
Communications Band

X-Band

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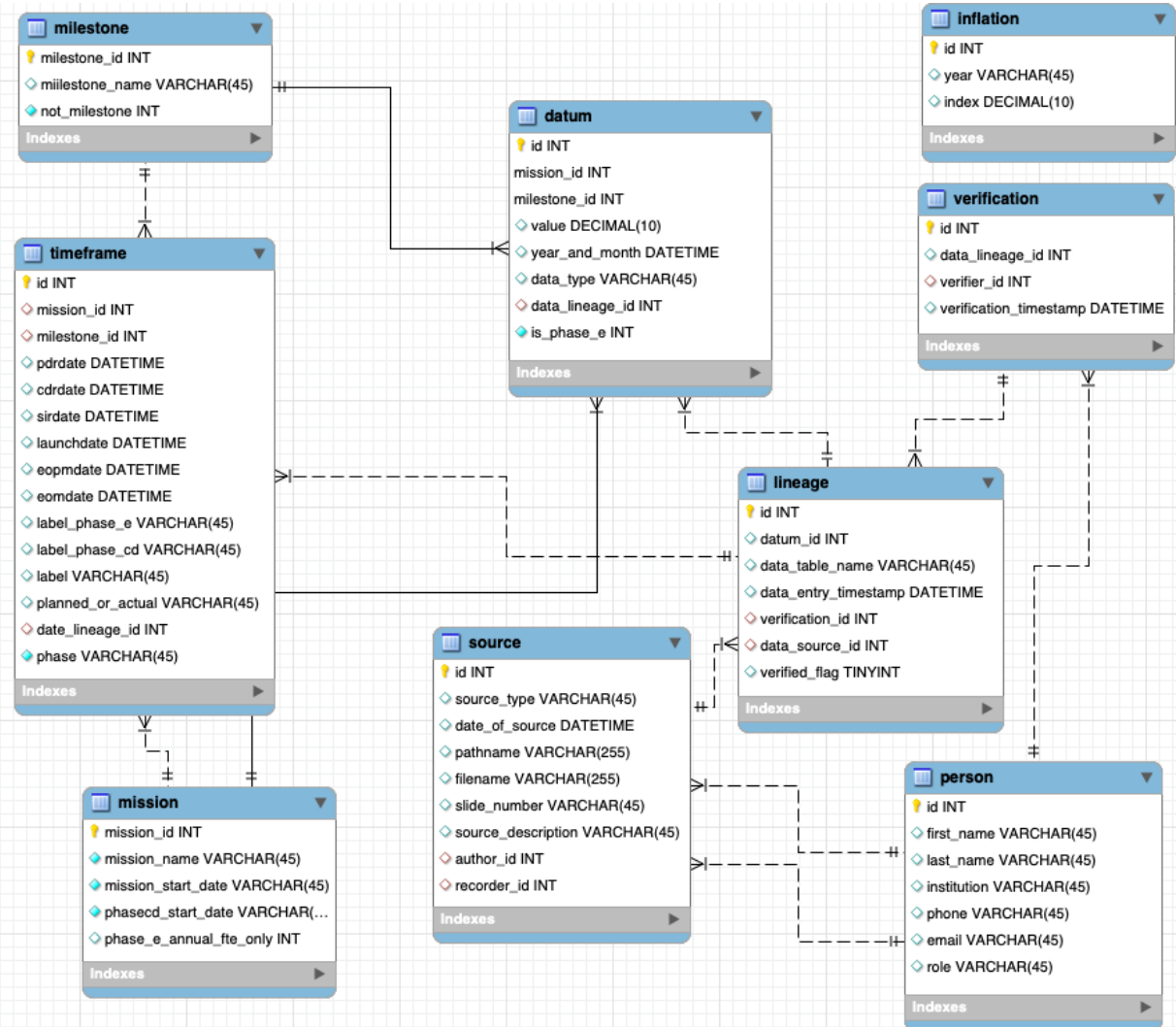
Lander in surface configuration, HGA deployed.

Log In

Figure H. Fact sheet Pop-up for Dragonfly

Tool Construction

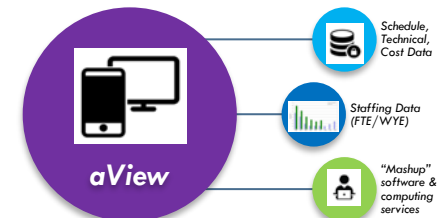
- aView uses open-source *chart.js*, a JavaScript tool suite on the frontend, and a SQLite database (DB) on the backend
 - *DB is designed to allow for complete traceability for every data point (datum) that is plotted*
 - *aView leverages aspects of Aerospace's infrastructure developed for detailed mission assurance of the nation's launch program for national space assets*



Summary

- aView developed to assist users in conducting comparative analysis
- Built on a detailed repository of mission programmatic data, it provides high-level views of the historical data for 30 NASA missions for development Phases C and D as well as the operations Phase E
- Given the wealth of mission and project information available in aView, both programmatic and technical, cost analysts can leverage the its capabilities to answer a variety of questions:
 - *Understand what development costs and staffing during Phases C and D for a proposed interplanetary mission based on similar historical missions*
 - *Understand how a proposed operations budget for Phase E compares to previous missions managed by the same Center*
 - *Understand how staffing levels track to development costs between PDR and ARR for a particular project*
- Aerospace seeks to broaden the aView DB to include more Earth Science, Astrophysics, and Heliophysics missions

**Welcome support from other customers
to expand the mission set**





Acknowledgments

- Customer
 - *Bradley Zavodsky, NASA Planetary Missions Program Office*
- Aerospace
 - *Sarah Lang, Lead*
 - *Justin McNeill, Advisor and Co-Lead*
 - *Tommy Tran, Software Development Lead*
 - *Alexander Zarate Garcia, Developer*
 - *C. Jason Zhang, Developer*
 - *J. Drew Rice, Curator*
- NASA OCFO & HQ IT
 - *James Johnson*
 - *Julie McAfee*
 - *Michael Blandford*
 - *Amanda Dawson*
 - *Ashley Mooney*

