

AIRSPACE TECHNOLOGY

DEMONSTRATIONS

TECHNICAL INTERCHANGE MEETING

Traffic Aware Strategic Aircrew Requests

Moderated by: David Wing

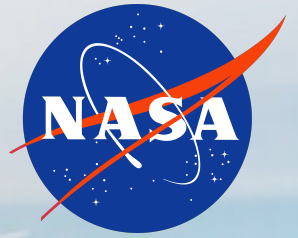
TASAR Principal Investigator

September 22, 2021



Traffic Aware Strategic Aircrew Requests

NASA Flight Deck Application for En Route Flight Optimization



Guest Speakers

Capt. Jared Woodward

EFB Program Manager and Technical Pilot, Alaska Airlines

TJ Horsager

VP of Sales and Business Development, APiJET

F.O. Jason O'Brian

TASAR Program Manager and Technical Pilot, Delta Airlines

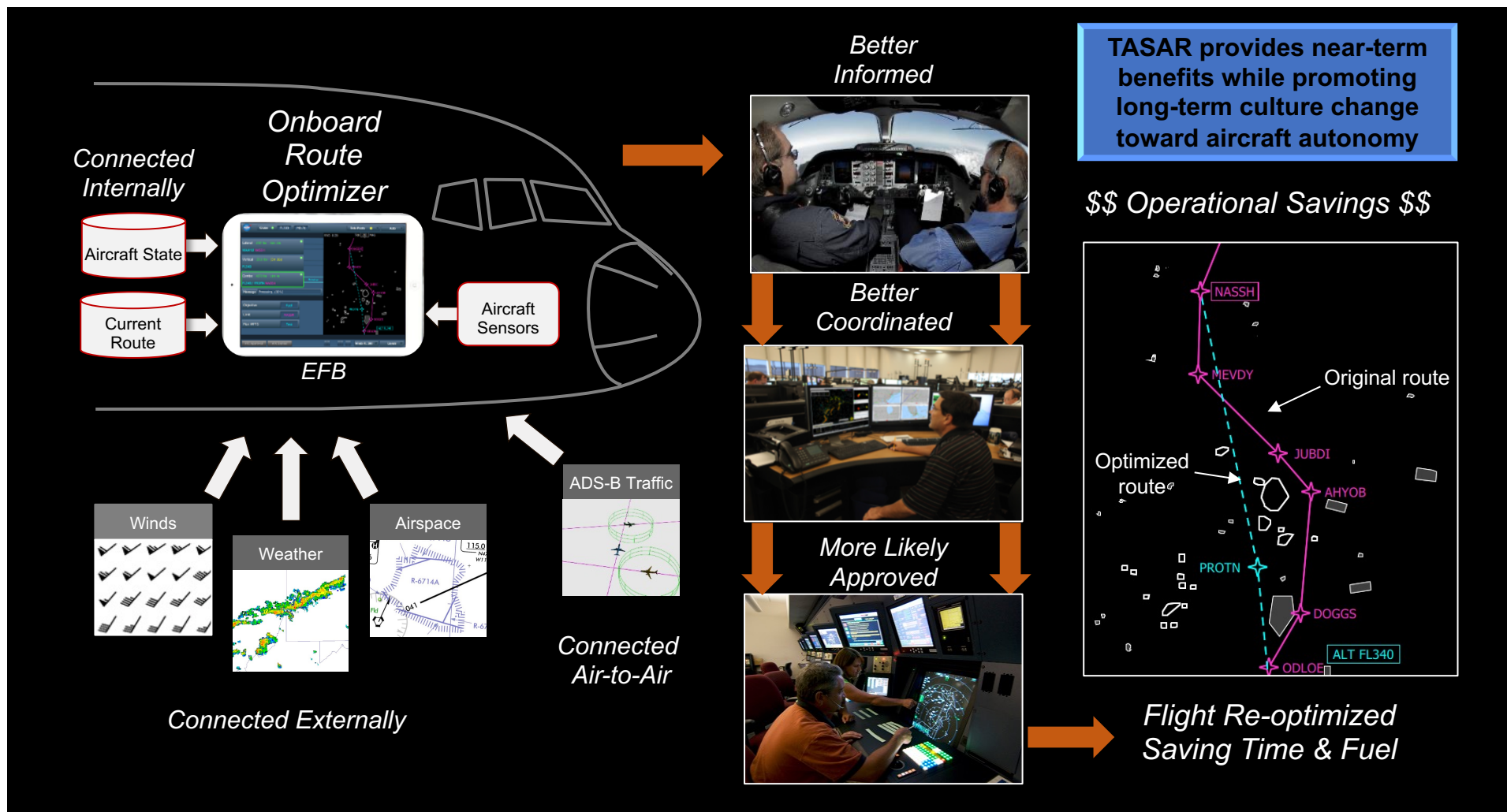
Dr. Joachim Hochwarth

PI for Communication & Connected Technologies, GE Aviation

Matthew Underwood

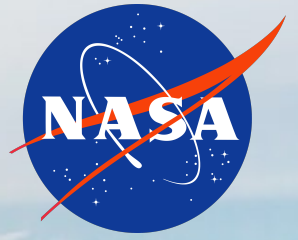
TASAR Lead Test Engineer, NASA

Enabling Strategic and Informed Route Optimization: Turning Data into Dollars





NASA TASAR Project Accomplishments

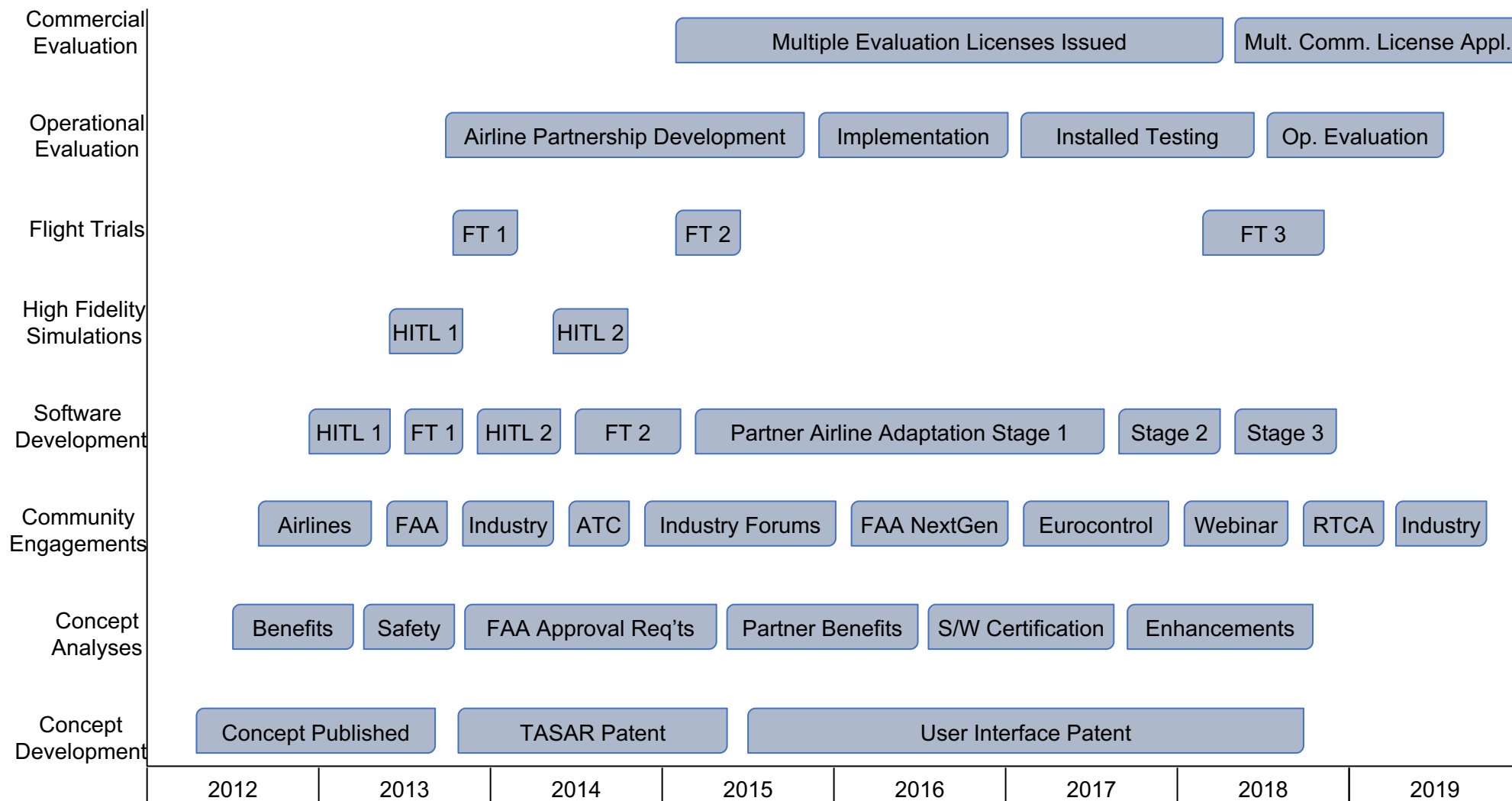
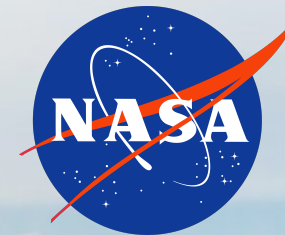


- ✓ Developed route-optimization application for the Connected EFB
- ✓ Estimated DOC savings (time, fuel) via modeling
- ✓ Analyzed safety, human factors, FAA authorization, and market
- ✓ Developed software prototype
- ✓ Conducted simulations and flight trials
- ✓ Conducted airline operational evaluation
- ✓ Validated DOC savings and operational utility
- ✓ Transferred technology to industry via commercial licenses
- ✓ Concluded project at TRL 7



Rapid Pace of Accomplishment

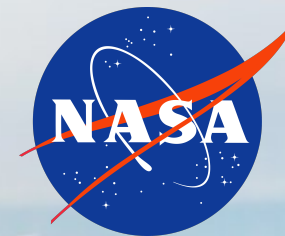
Timeline of Technology Maturity





TASAR Technology: Traffic Aware Planner (TAP)

Interactive Route Optimization App for Pilots



Leverages connectivity for operational savings

Applies multiple degrees of freedom

Pilot-adjustable optimization objective

Powerful search algorithm finds non-obvious reroutes

Incorporates complex dynamic constraints

Adaptable to different aircraft and hardware architectures



Unique capabilities, near-term benefits, and long-term revolutionary impact led to two significant awards of recognition:

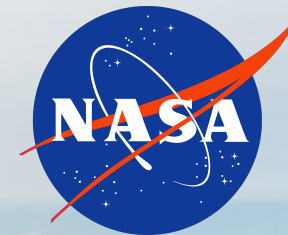
2016 NASA Software of the Year

2019 R&D 100 Award Winner*

* Internationally selected as one the 100 most technologically significant new products of the year



Operational Evaluation of TASAR Conducted with Alaska Airlines



- ✓ Partnered from 2015-2019
- ✓ Collaborated with industry leaders
- ✓ Equipped three aircraft for TASAR
- ✓ Approved for revenue service operations
- ✓ Conducted 90 valid flights for analysis
- ✓ Validated cost savings and operational utility

Industry Collaborators

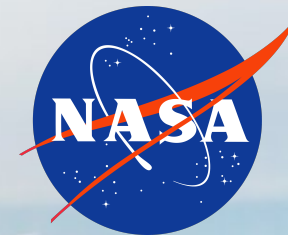


Collins Aerospace

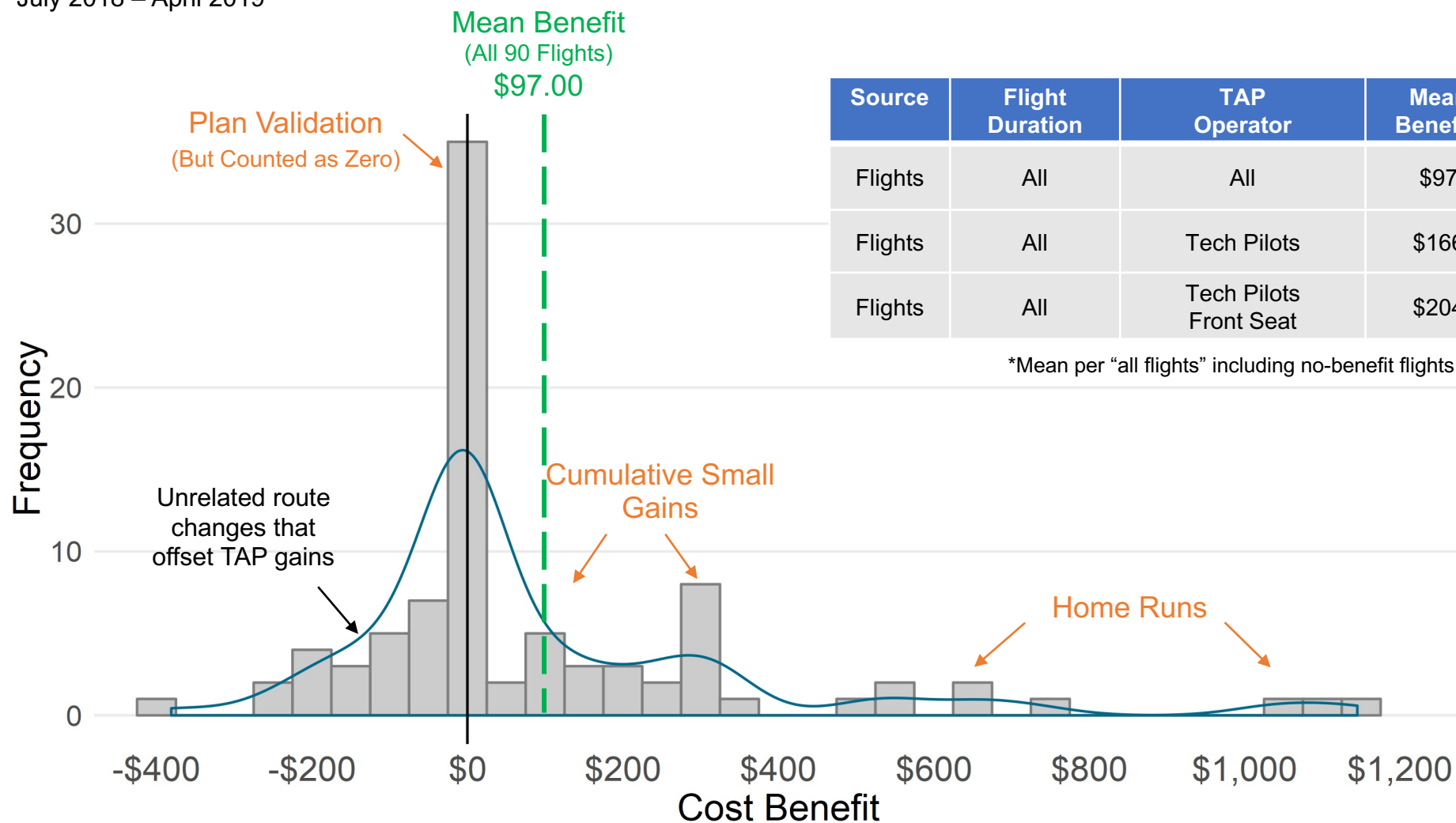




Achieved Benefits Driven by Method of Use and Types of Opportunities

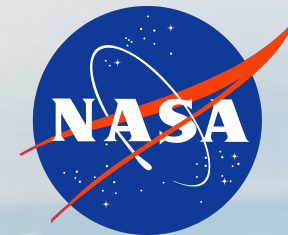


90 Evaluation Flights
July 2018 – April 2019





Estimated Annual Benefits for 10 U.S. Airlines



Substantial savings are anticipated for U.S. airlines

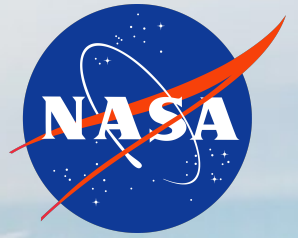
Airline	Estimated Aircraft that are Candidates to be Equipped with TASAR	Estimated Annual Cost Savings due to TASAR	Estimated Annual Emission Reductions due to TASAR
Alaska	180	\$14.97M/year	101.6 million lb CO ₂ e
Allegiant Air	37	\$1.41M/year	10.51 million lb CO ₂ e
American	831	\$52.29M/year	348.29 million lb CO ₂ e
Delta	466	\$23.61M/year	166.11 million lb CO ₂ e
Frontier	62	\$4.38M/year	31.94 million lb CO ₂ e
JetBlue	63	\$6.69M/year	50.43 million lb CO ₂ e
Southwest	754	\$36.47M/year	280.04 million lb CO ₂ e
Spirit	61	\$4.86M/year	37.87 million lb CO ₂ e
Sun Country	30	\$1.41M/year	9.83 million lb CO ₂ e
United	562	\$23.26M/year	164.33 million lb CO ₂ e
Total	3,000+	~\$170M/year	1200.41 million lb CO₂e

- Pre-COVID-19 estimate
- Applies Alaska's achieved benefits (time and fuel savings by flight length)
- Applies conservative benefits estimate (\$97/flight)
- Adjusts for fleet size, flight lengths, and direct operating costs (all public data)
- Includes modern mainline jets; excludes regional and older jets
- Includes domestic origin & destination only



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