



NOAA Unmanned Aircraft Systems (UAS) Program

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Outline



- Program Charter
- Requirements Driven
- Reality
- Tools
- Program Management
- Systems Engineering
- Platforms & Sensors
- Missions & Mission Analysis



Program Charter

Driving Requirements and Mission



- “The NGSP specifically recognizes UAS and related sensor technologies as emerging capabilities which can strengthen observation of hard-to-reach regions such as the Arctic and remote ocean areas”
- 8 related legislative drivers, 5 related policy drivers

Mission

To develop, optimize, and transition UAS and related sensor capabilities to routine operations, thus advancing NOAA’s goals through strengthened understanding of oceanic and atmospheric changes, hurricanes, wildfires, marine ecosystems, polar regions, hazards, and other environmental and ecological processes; ultimately leading to improved climate and weather predictions, and management of marine resources.



Reality of Unmanned Aircraft Systems

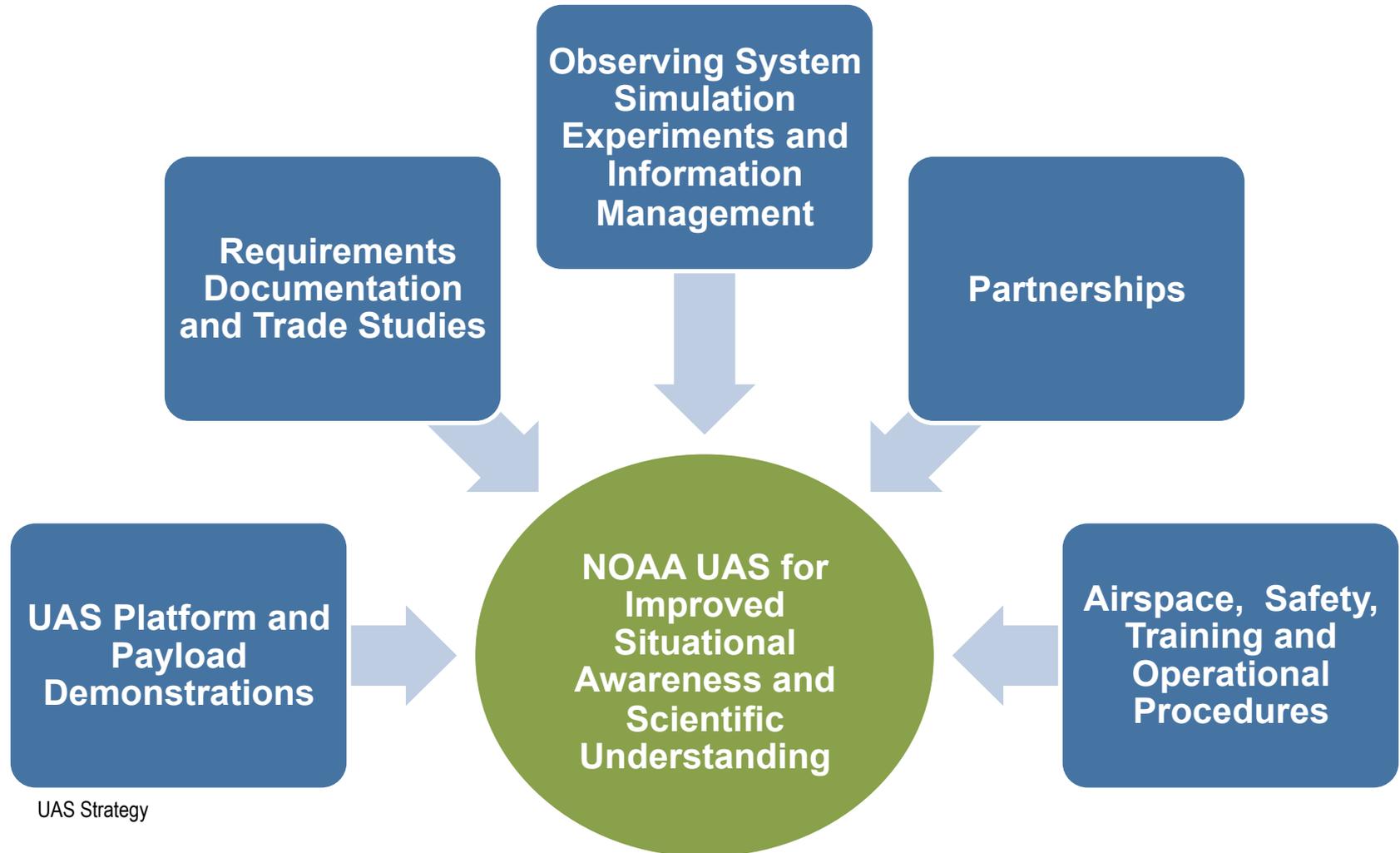


- **Proven platforms and payloads**
 - Many classified at Technology Readiness Level – 9
 - Air Force and Navy Global Hawk - 20,000 flight hours over 10 years
 - Air Force and CBP Predator – 1M flight hours over 15 years
 - Army PM UAS – 1 M flight hours among 5 operational UAS models
- **Airspace Access improving**
 - FAA Certificate of Authorization (COA) to flight - Approved for NASA and NOAA science missions
 - FAA flight rules for small low altitude UAS – Expected by 2013
 - Advancing DOD sense and avoid technologies – Army/FAA pilot study underway for 2010 - 2015
- **New capabilities on the horizon**
 - High altitude Zephyr - flown for 2 weeks
 - DARPA technology investments – flight times of months to years
 - UAS - launched from balloons or other aircraft



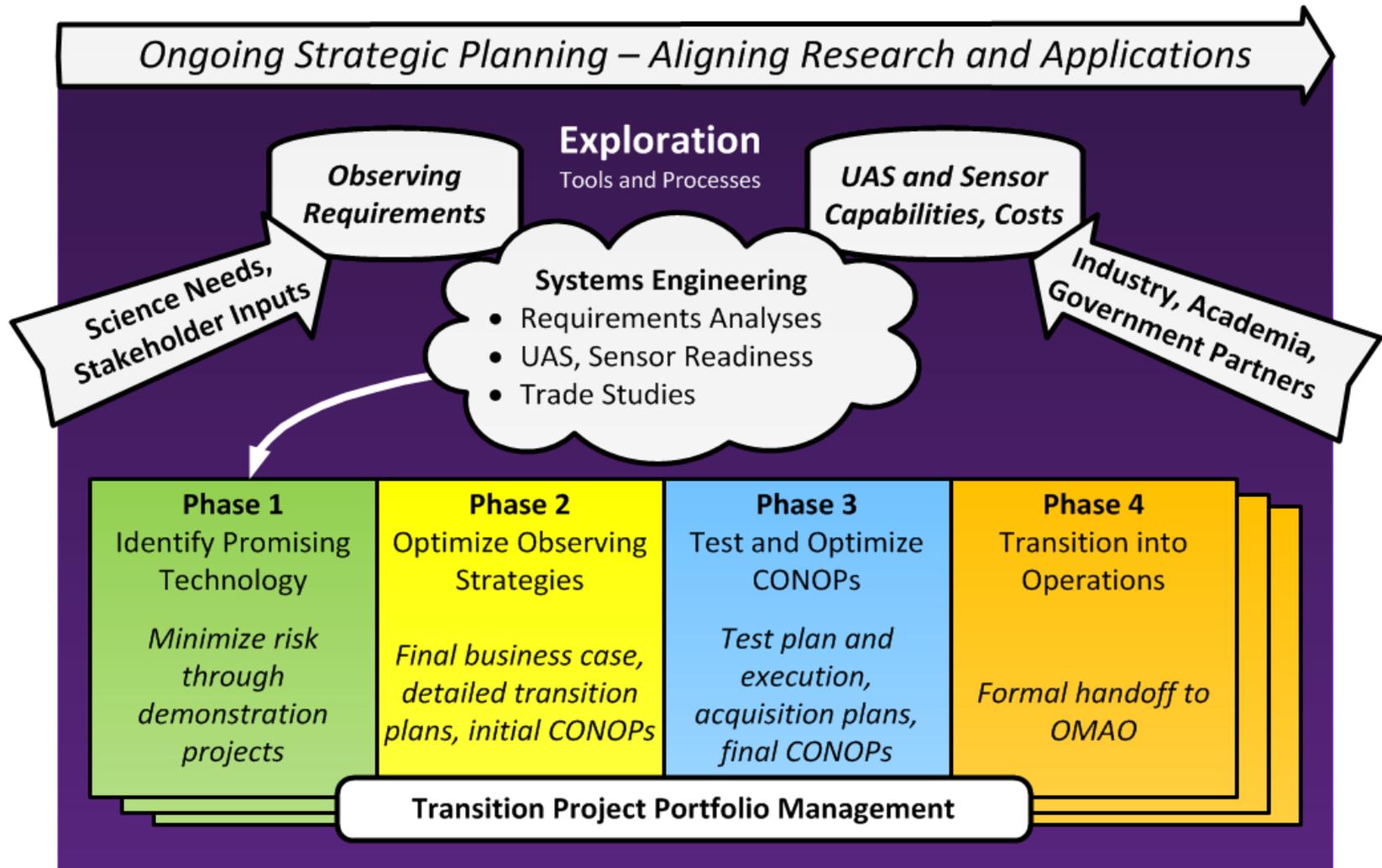


Tools for Building UAS Capacity



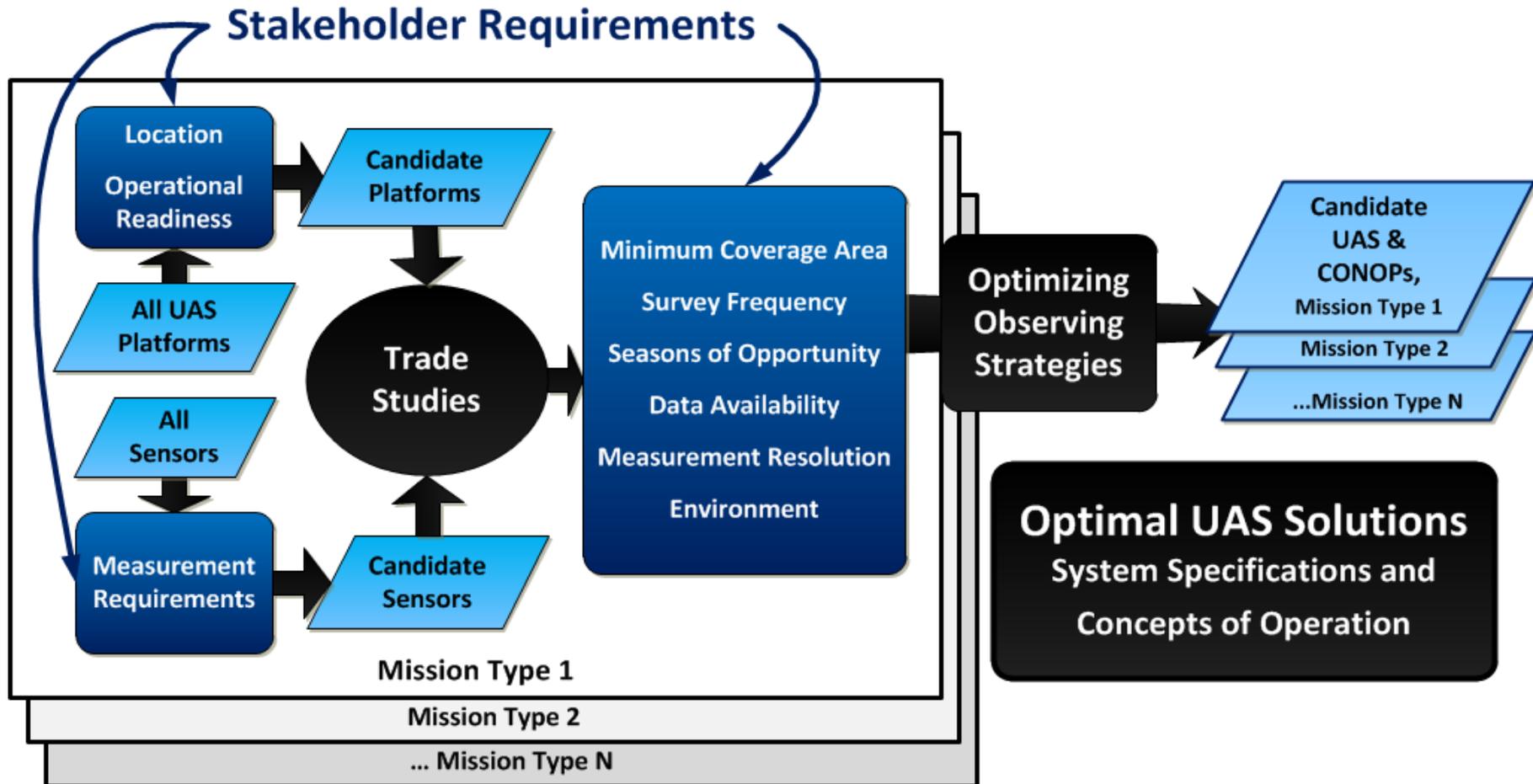


Program Management Plan Program Processes





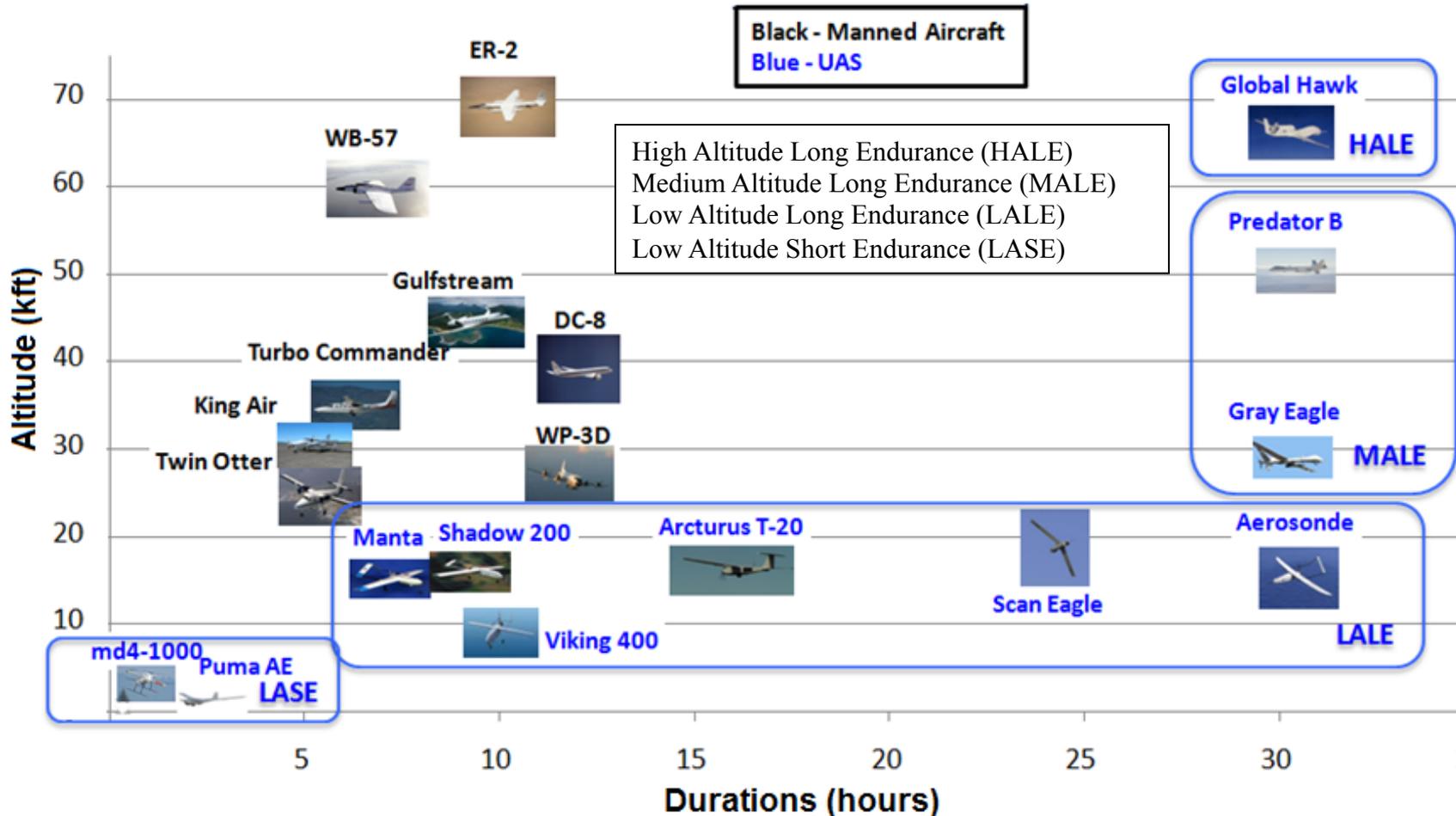
Program Management Plan Systems Engineering Process





Platforms

Manned and Unmanned Performance Capabilities





Platform and Sensor Information



Sensor: PIKA II
Manufacturer: RESONON



Design Specifications

Type: Hyperspectral
Spectral Range: 400 - 900 nm **Smile:** 1.5 microns
Spectral Resolution: 2.1 nm **Keystone:** 6 microns
Spectral Channels: 120 **F/#:** F/3
Size: 4 (L) 6.6 (W) 2.75(H) Inches
Weight (lb): 2.3
Mass (kg): 1.04
Power (W):
Output:
TRL: [?]
Other Equipment Required: Data Acquisition System, Interfaces with PI Athena INS

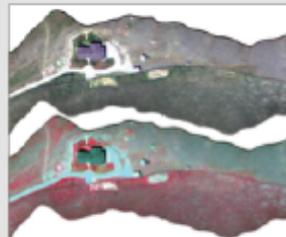
Experience

<u>UAS Platform</u>	<u>Manufacturer</u>	<u>Classification</u>
Manta Block B4	BAE Systems	LALE
Silver Fox	BAE Systems	LALE
T-16	Arcturus	LALE

Manned Aircraft
 Cessna
 Bell 212 Helicopter

Additional History:

Sample Image



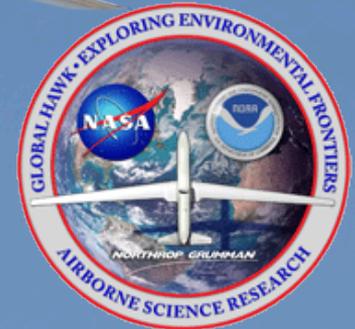
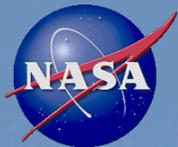
Notes: 102mm X 165 mm X 70 mm



Vehicle: Aerosonde
Manufacturer: AAI
Launch: Catapult
Recovery: Belly/Capture
Speed (knots): 65
Range (nm): 2000
Payload (lb): 11.7
Endurance (hr): 30
Ceiling (ft): 10000

2010-2011 Global Hawk Missions

NASA, Northrop Grumman and NOAA partnership



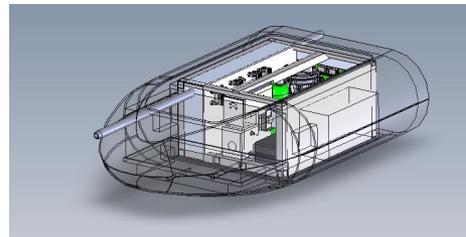


Polar Monitoring – Wildlife and Black Carbon



Antarctic Mission from Russian Ship

Arctic Black Carbon Mission in Partnership with Norwegian and Russian Scientists



Temperature, Relative humidity
Ozone and Aerosol Sampler Payload

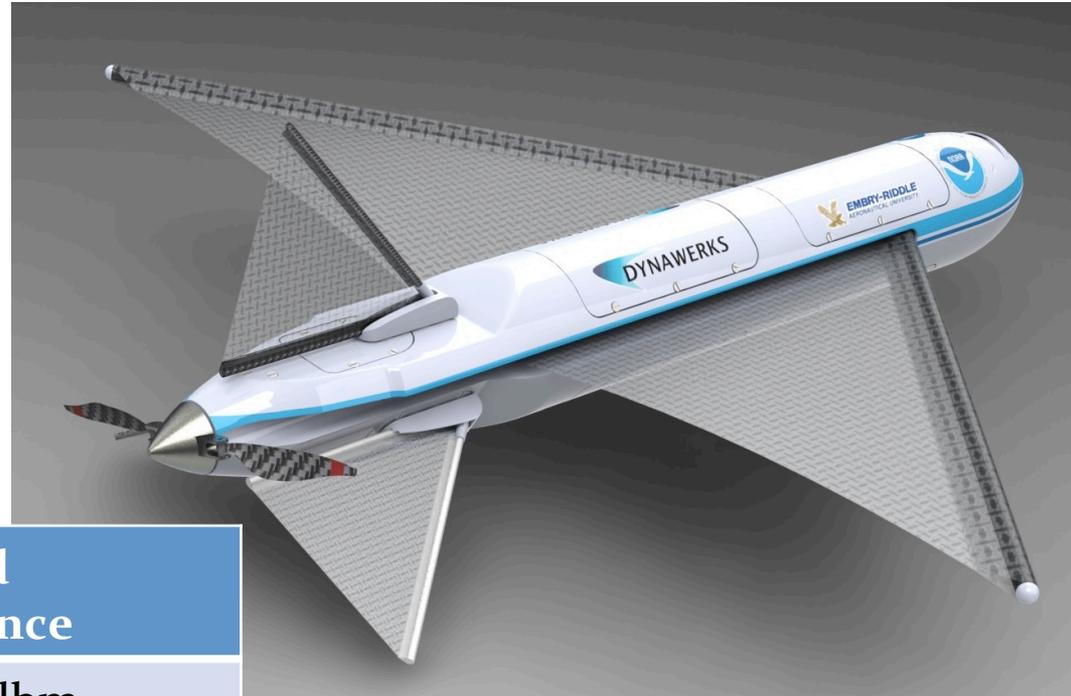


Soot Transport, Absorption and Deposition Study (STADS) in Norway





Gale UAS



Performance Attribute	Estimated Performance
Mission Weight	8.0 lbm
Cruise Speed	42 kts
Dash Speed	110 kts
Stall Speed	22 kts
Mission Endurance	60 minutes



Marine & Grav-D Monitoring



Vehicle: Puma AE

Manufacturer: AeroVironment

Launch: Hand Launch

Recovery: Belly

Cruise Speed (knots): 20-45

Range (nm): 56

Payload (lb): ~2

Endurance (hr): 2

Ceiling (ft): 500

BLOS C2 Capable: No

LOS C2 Range (nm): 8.1

Data Sources:

Manufacturer's Online Specification
accessed 08/30/10. Range Calculated.

2011 Partnership with Army UAS Program

Potential 2012 Missions

- **Marine Debris**
- **National Marine
Sanctuary Surveys**
- **Fisheries Law
Enforcement**
- **Wildlife Assessments**
- **Beach and Shoreline
Patrols**



Contact



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Backup Slides

DOD UAS Classifications



UAS Category	Max Gross Takeoff Weight (lb)	Normal Operating Altitude (ft)	Speed (kts)	Representative UAS
Group 1	0 - 20	<1,200 AGL	<100	Raven, Puma-AE
Group 2	21 - 55	<3,500 AGL	<250	ScanEagle, Silver Fox, Aerosonde
Group 3	<1320	<18,000 MSL		Shadow, Integrator, Viking
Group 4	>1320		>18,000 MSL	Any Airspeed
Group 5		>18,000 MSL	Predator B, Global Hawk, BAMS	
AGL = Above Ground Level		MSL = Mean Sea Level		