



NOAA

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NSOSA Implementation: Developing Our Next-Gen Earth Observation Architecture

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From NSOSA to Now, and What Comes Next: Examining Capabilities in LEO, GEO-XO



2018:

NSOSA Analysis
Completed, Reference
Architecture Identified



2019-2020:

Broad Agency
Announcements,
Industry Concept Study
Cycles for GEO-XO and
LEO Capabilities,
Missions & Instruments



2020's:

Ongoing Industry Concept
Study Cycles, Ongoing
Joint Ventures, NGES
Underway, Demonstration
Flights Begin



2026-2029:

Next-Gen Ground
Architecture
Identified,
SounderSat1 & 2
Launches*



~2030:

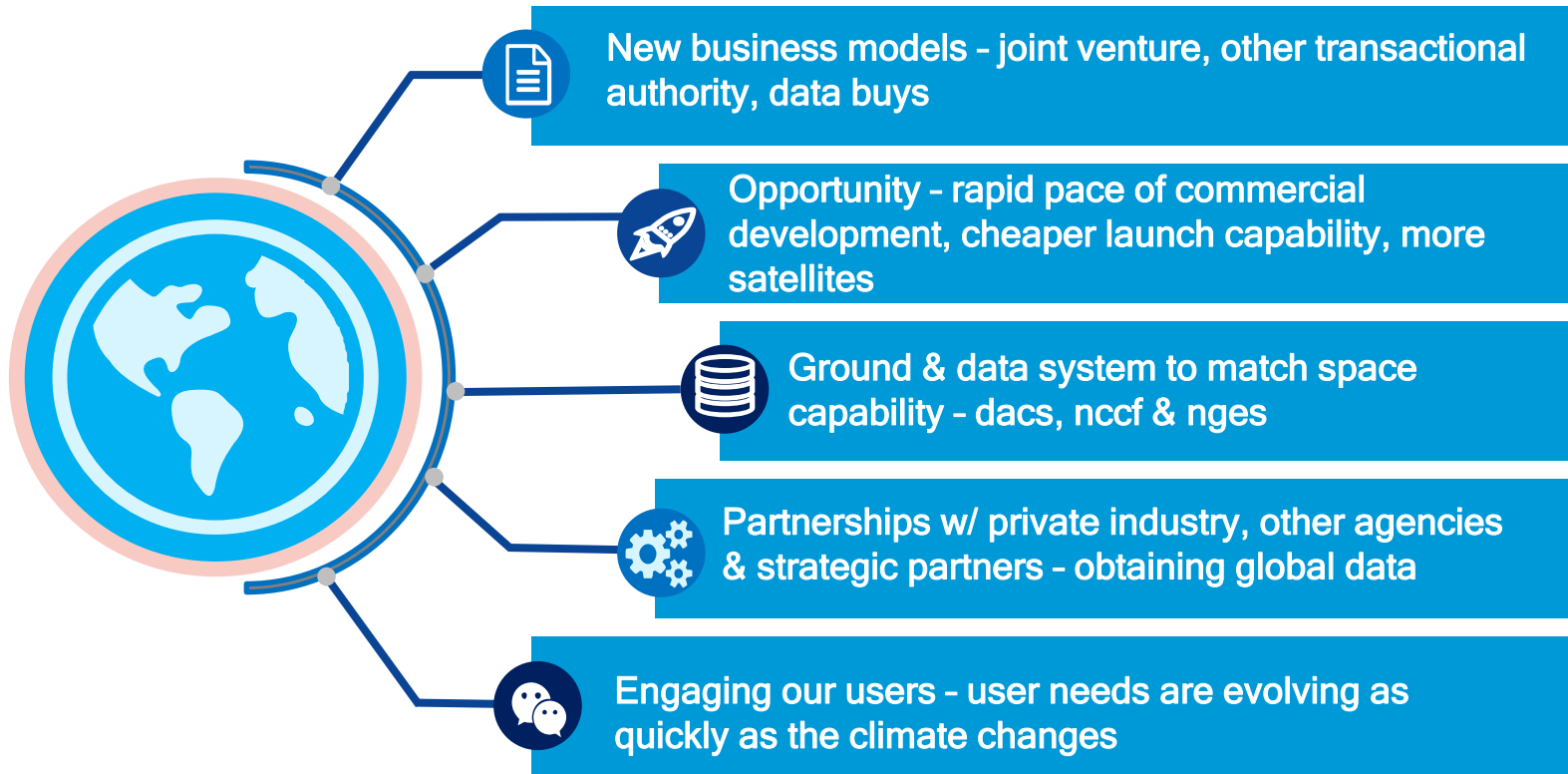
Transition Underway
to Next-Gen Ground,
GEO-XO1 Launch*



**Notional launch dates, dependent on out-year funding*

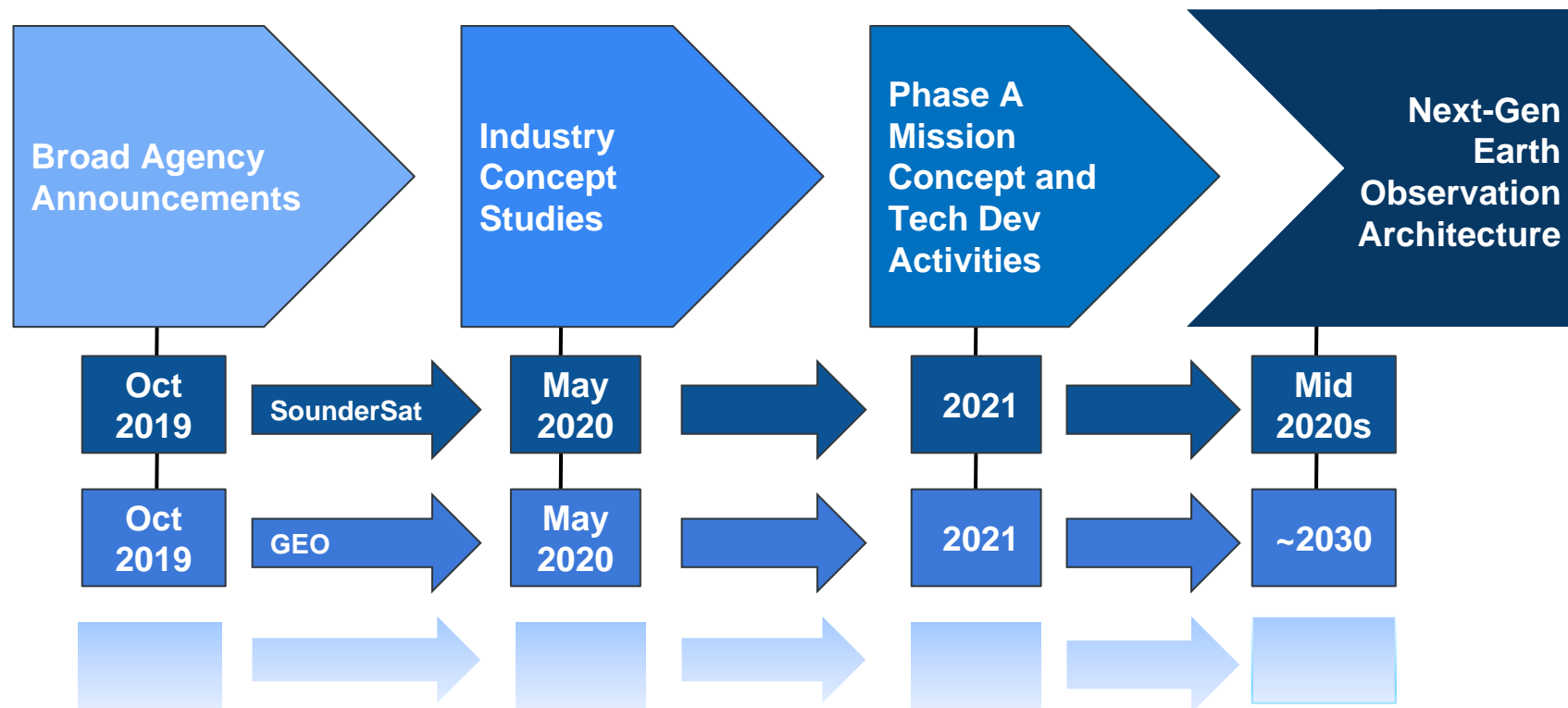


NOAA'S Next-Gen Observation & Data Information Systems: How We Get There





Partnering with Industry: Ongoing Cycles to Leverage Industry Concepts, Ideas & Innovation





GEO-XO Industry Concept Analyses

FY20 funds being used to partner with industry for options to **replenish GOES-R Series data by 2030:**

Instruments

- Regional, real-time weather imagery
- Space weather data
- High latitude observations – highly elliptical orbits (Tundra) for Arctic observations
- Hyperspectral sounding

Implementation solutions

- Standard satellite bus
- Small satellites for space weather instruments
- Hosting services
- Commercial data



2020: Complete pre-Phase A studies
2021: Phase A start



SounderSat Industry Concept Analyses

Priorities in LEO:

- SounderSats providing critical sounding data
- Small to medium instruments observing 3D winds, ocean surface vector winds, precipitation data, and low light imagery.

Industry awards to explore design and capability options:

- Sounding instruments (microwave, infrared, radio occultation)
- New acquisition and observing system concepts:
 - Commercial services
 - Multi-orbit coverage
 - Common satellite bus for flexibility in instruments flown
 - Rapid launch cadence
 - Demonstration missions
 - Risk tolerance and observing system risk management



2020: Initial pre-Phase A studies

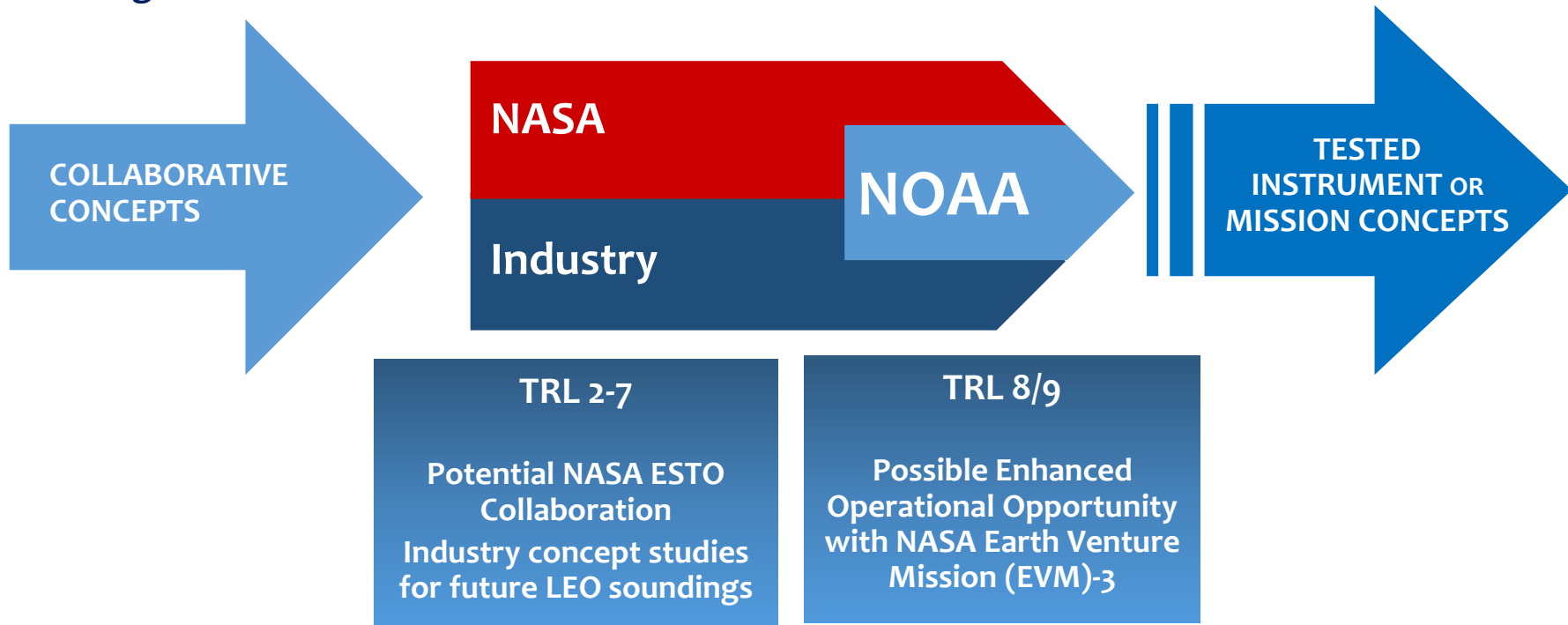
2021: Complete pre-Phase A and begin focused industry designs and collaborations

Mid-2020s: Demonstration Flights



Developing Capabilities Through Joint Venture

NOAA develops new technology and capabilities with NASA and industry through Joint Venture.





Commercial Weather Data Pilot & Purchase



Radio Occultation Data to Date:

- **Commercial Weather Data Pilot Round 2 Completed Spring 2020:** Demonstrated readiness of commercial sector to provide RO data operationally
- **Commercial Weather Data Purchase:** RFP released in August for purchase of commercially-provided RO data for operational use



Upcoming work:

- **Continuing Commercial Weather Data Pilots:** FY21 budget request includes funds to investigate additional commercial capabilities beyond RO
- **Planning RFI in near future to inform upcoming Pilots**





Matching Tomorrow's Enterprise Ground Services to our Next Gen Flight Systems



Strategic Architecture Analysis to Shape NOAA's Common Ground for 2030+

**Satellite
Operations**

Space-Ground Communications
Mission Operations

**Science
Operations**

Algorithm Operations
Environmental Information
Operations

**Data
Operations**

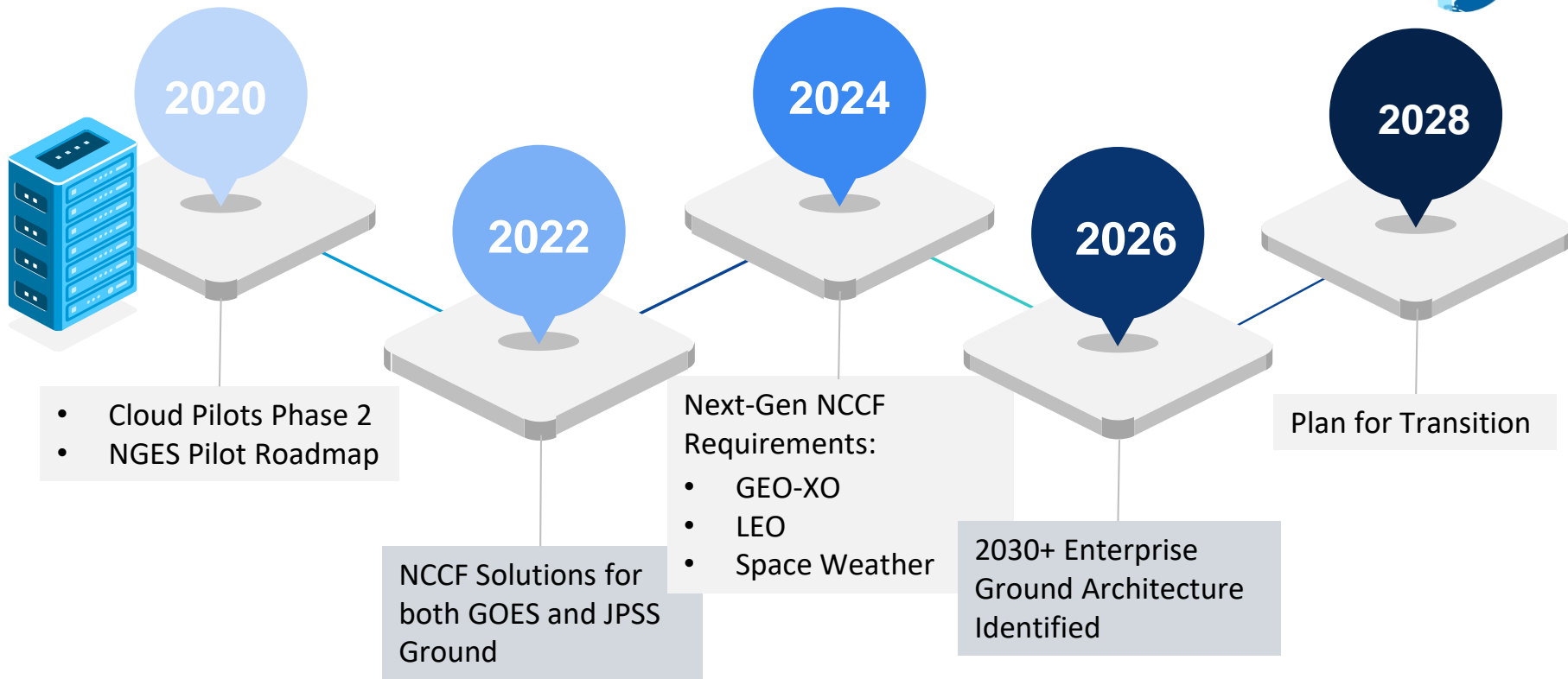
Production Operations
Data Delivery

Study to be Completed by Summer 2021





How We Get There: Next-Gen Data & Information Systems



Backup





Matching Tomorrow's Common Ground Services to our Next Gen Flight Systems



NOAA SmallSats



Commercial Data



Other USGS Data



New Data Types

Int'l Partner Data

Command / Control /
Communication

Secure Data Ingest

Data Processing

Product Development

Transitioning to the cloud

Considering commercial capabilities

Employing an enterprise approach





BAA Concept Studies awarded to date: GEO-XO

Instruments

- **Raytheon:** Real Time Imager (RTI)
- **Lockheed Martin:** Flexible Hosted Imager (FHI)
- **L3Harris:** Advancing Today's ABI Foundation into the Next-Gen GEO Imaging Solution
- **L3Harris:** Hyperspectral GEO Sounder Study
- **Leidos:** GEO Earth Multispectral Mapper (GEMM) for Terrestrial Weather Imaging
- **JPL:** GEO IR Sounder
- **JPL:** GeoSTAR: A Geostationary Microwave Sounder for NOAA
- **Ball Aerospace:** Ball Operational Weather Instrument Evolution - (BOWIE) Geostationary IR Sounder Study for Compact Hyperspectral IR Observations (CHIRO)
- **Northrup Grumman:** Photonic Imaging Spectrometer Instrument Concept Exploration
- **Northrup Grumman:** Geostationary Microwave Sounding Unit (GEMSU)
- **Ball Aerospace:** Dedicated Auroral Imager for a Tundra Satellite

LEO constellations/Commercial data and services

- **BAE Systems:** Infrared Sounding Instrument Constellation Study
- **ASTRA:** GEO Utilization of Common LEO Architecture for Weather (G-CLAW)
- **GeoMetWatch:** Global HyperSpectral Atmospheric Sounding Capability: Commercial Fee-for-Service Option
- **Maxar SSL:** Commercial Hosting Service for Sustained GEO Weather Missions
- **Xplore:** PANORAMA - Commercial Earth-Sun L1, L4, L5 Missions





BAA Concept Studies awarded to date: LEO Soundings

Instruments

- **L3Harris:** Infrared LEO Sounder Instrument Study
- **Northrup Grumman:** Alternative Leo Small Microwave Sounder (ASMiS)
- **Ball Aerospace:** Ball Operational Weather Instrument Evolution -Microwave (BOWIE-M) Sounder Study
- **Ball Aerospace:** Ball Operational Weather Instrument Evolution (BOWIE) IR Sounder Study
- **Raytheon:** LEO Sounding Satellite (SounderSat) Concept Exploration (HIRIS)
- **Colorado State University:** TEMPEST-based CubeSat Microwave Sounder for Temperature and Moisture Profiling
- **JPL:** Developing Microwave Sounders for NOAA Users in 2030

Missions

- **York Space Systems:** Gaea – LEO SounderSat Mission Concept Study
- **Brandywine Photonics:** MetNet Small Weather Satellite Network Mission Concept
- **L3Harris:** Joint LEO Sounding Mission Study
- **Northrup Grumman:** Next-Gen MW/IR/RO Sounder Sat Evaluation
- **GeoOptics:** CICERO-X: An Alternative Mission Concept For Global Atmospheric Sounding
- **Northrup Grumman:** Microwave Reference Radiometer (MIRER) Constellation Architecture

Constellations

- **Northrup Grumman:** Small Satellite Constellation
- **MAXAR SSL:** Common Bus for Sustained Hosting of LEO Weather Missions

