

# Purpose of US PNTAB:

*Assuring PNT for all-*  
and

*Exploiting GNSS for Future Applications*

*FACA Representing 100s of millions of diverse users  
and many scores of applications*

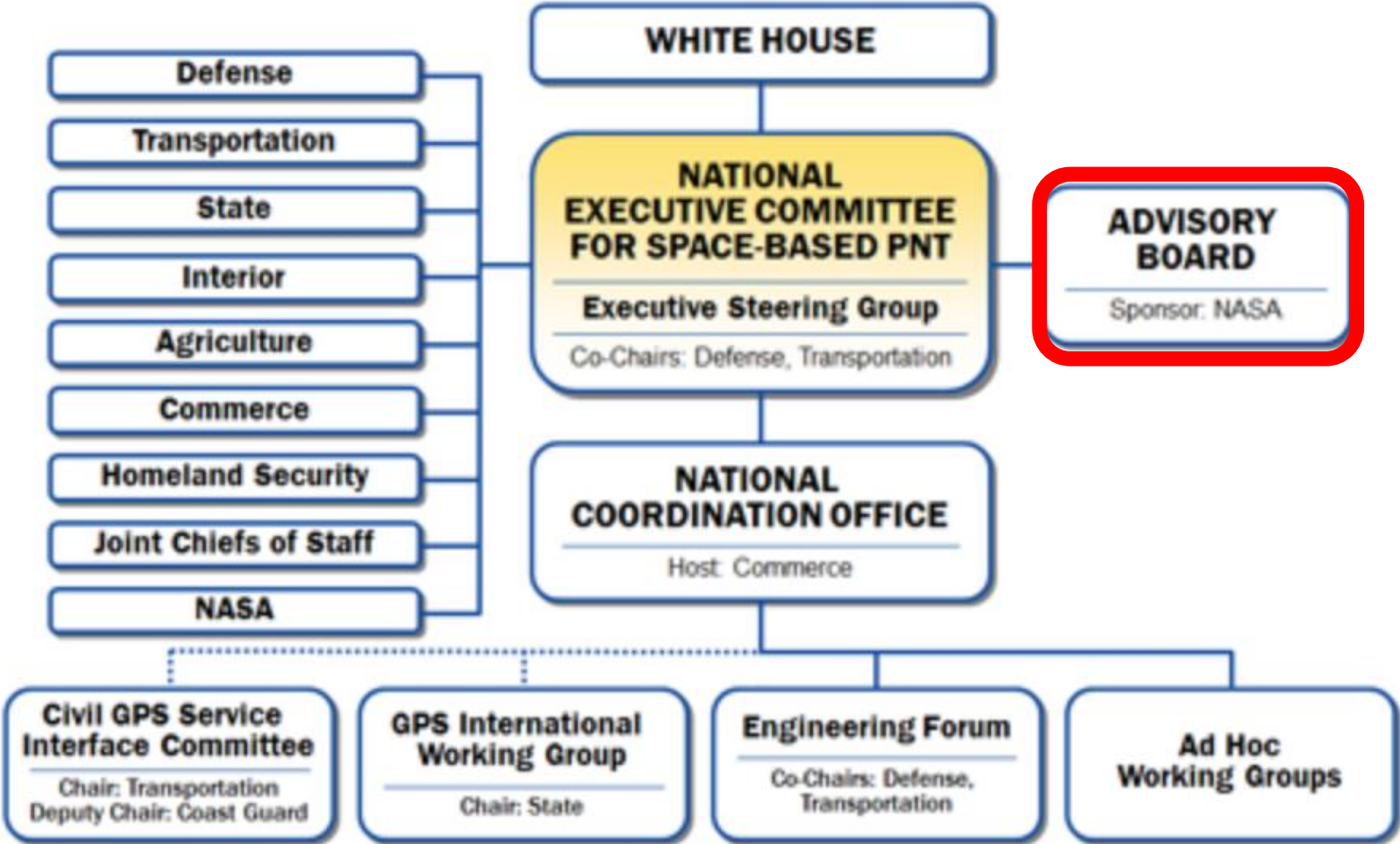
Adm. Thad Allen (Chairman), Booz Allen Hamilton

Hon. John Stenbit (Deputy Chairman), former Assistant Secretary of  
Defense

Dr. Bradford Parkinson (1st Vice Chair), Stanford University

Governor James E. Geringer (2nd Vice Chair), Environmental Systems  
Research Institute (ESRI)

# Organizational Structure



# To Assure Availability of PNT - "PTA"

Take specific steps to:

- Protect Clear and Truthful Reception
- Toughen System and User's Receivers
- Augment or substitute PNT sources

What is important for  
PNT users now?



Feedstock for the Current and Future  
PNT Advisory Board Meetings

# What are possible criteria for “Important” - an approximate guide to spur thinking?

## Should Preserve/Enhance current and/or future PNT and Applications

- Robustness (Including PTA plus FAA definitions of Availability, Accuracy, and Integrity)
- Safety
- Productivity
- Convenience

## Decision Makers should have potential leverage

- Remove Barriers
- Create Enablers
- or Both

# An Initial List of Important Things??

A summary list to stimulate thought and conversation - possibly leading to recommendations

It is recognized there is overlap and some areas are not phrased as questions, but rather placeholders...

## "Protect"

- P1. Protecting spectrum - both current threats and recurrence of 2001 Wide-band problem
- P2. Need for a National System to monitor, locate and shutdown jammers and spoofers? Existing Purposeful Interference Response Team in US.

## "Toughen"

- T1. Gather, collate, and disseminate a comprehensive threat model & techniques/counters to GNSS Spoofing/Jamming
- T2. Vulnerabilities and solutions for PNT cybersecurity- nonmilitary (Ties into T1)

## An Initial List of Important Things 2

### "Augment"

**A1. What additional augmentation to GPS are being or should be pursued, including future capabilities?**

- Includes both public (government) and private/commercial augmentations
- What is certification Process

**A2. What are FAA plans to include Galileo and others in WAAS monitoring system?**

**A3. Incorporate Global Differential GPS in monitoring capability and provide connectivity to individual users**

## An Initial List of Important Things 3

### "Future Applications and Capabilities"

- F2 Progress and prospects of Intelligent Transportation Program  
(includes positive Train Control)
- F3 Progress on fielding Autonomous Vehicles - especially large interstate trucks and consumer vehicles on expressways)
- F4. How can GNSS help in integrating UAS and Urban Air Mobility (UAM) into the airspace system?
- F5. Insuring protection for Powergrid Timing
- F6. Ensuring Timing for the Financial community
- F7. Ensuring scientific capabilities are preserved and enhanced, such as water vapor measurements and weather predictions

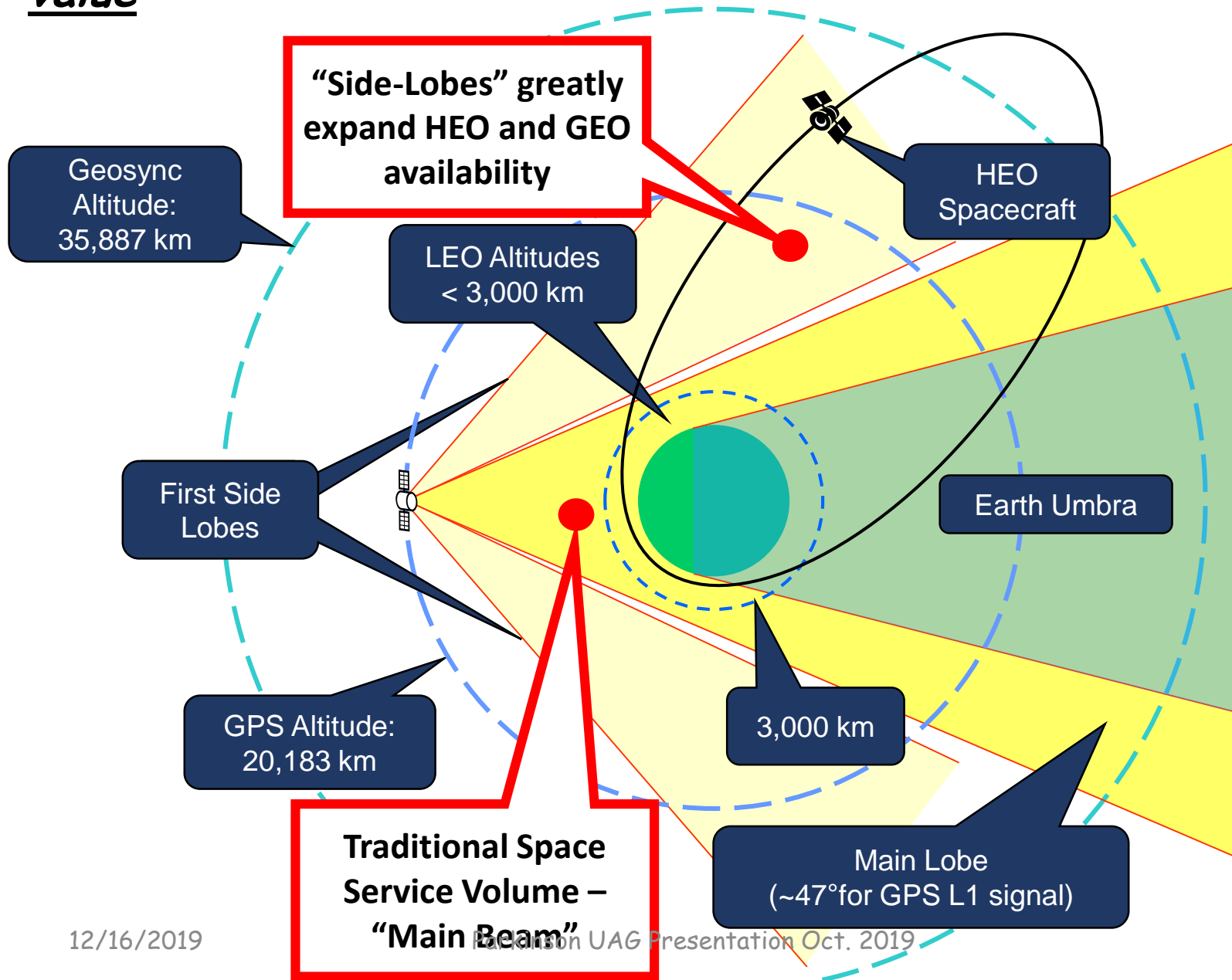


## An Initial List of Important Things 3

### "Future Applications and Capabilities"

- F1. Defining and publicizing power of 2nd (and 3rd) GNSS satellite signal lobes for SSV**
- F2 Progress and prospects of Intelligent Transportation Program (includes positive Train Control)
- F3 Progress on fielding Autonomous Vehicles - especially large interstate trucks and consumer vehicles on expressways)
- F4. How can GNSS help in integrating UAS and Urban Air Mobility (UAM) into the airspace system?
- F5. Insuring protection for Powergrid Timing
- F6. Ensuring Timing for the Financial community
- F7. Ensuring scientific capabilities are preserved and enhanced, such as water vapor measurements and weather predictions

# Space Service Volume: New techniques have greatly increased value



# Conclusion - A possible goal

(my personal version)

- Request that all GNSS providers *update their antenna patterns* by adding the typical second and third (at least) sidelobe patterns for each current generation of satellites
- Also that they agree to continue to update these data *as new generations are launched*
- These second and third lobe patterns would not be guaranteed but would be available to allow space mission designers to exploit all GNSS for space positioning applications.

**Ad Luna !**

# Backups

# Overarching Important Issue

- Providing the Best PNT Service
  - Availability, Accuracy Integrity
  - Orbit predictability - retroreflectors, CG stability
  - Openness
    - During Failures and Anomalies
    - About Satellite Design Parameters - Antenna Patterns
    - Defining System Performance Specification
  - # of Frequencies and Signals (L1/L2/L5 - L1C, L2C, L5 etc)
- Where does each provider stack up?
- Where is the world expected to be in 5/10/15 years on current trajectory?

**Should we modify our PROGRAMMATIC trajectories?**

# Conclusions for what is important: Actionable Recommendations for US EXCOM AND SIMILAR GROUPS IN PROVIDER COUNTRIES

- Removing Barriers
- Creating Enablers

# Four Areas of Possible PNTAB Recommendations

- Re consider measures of GNSS excellence
- Removing threats and creating opportunities for UASs.
- Countering the Threat of Spectrum repurposing and/or Ultra Wide Band
- Consider barriers and enablers for high Productivity PNT enablers such as long haul trucking and other autonomous vehicles