



SPACE-BASED POSITIONING  
NAVIGATION & TIMING  
NATIONAL ADVISORY BOARD

# PTA Subcommittee Update

**PTA Subcommittee**  
**6 December 2023**



# PTA Subcommittee Members and Charter

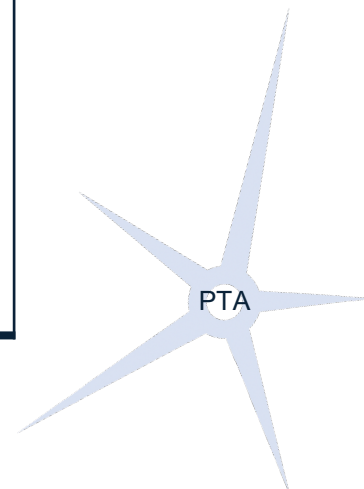
**Objective: Robust and competent sources of PNT, especially in critical infrastructure**

## **Members:**

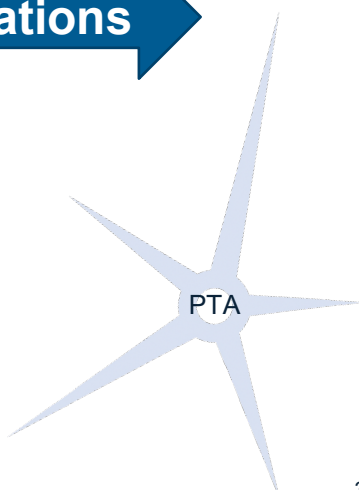
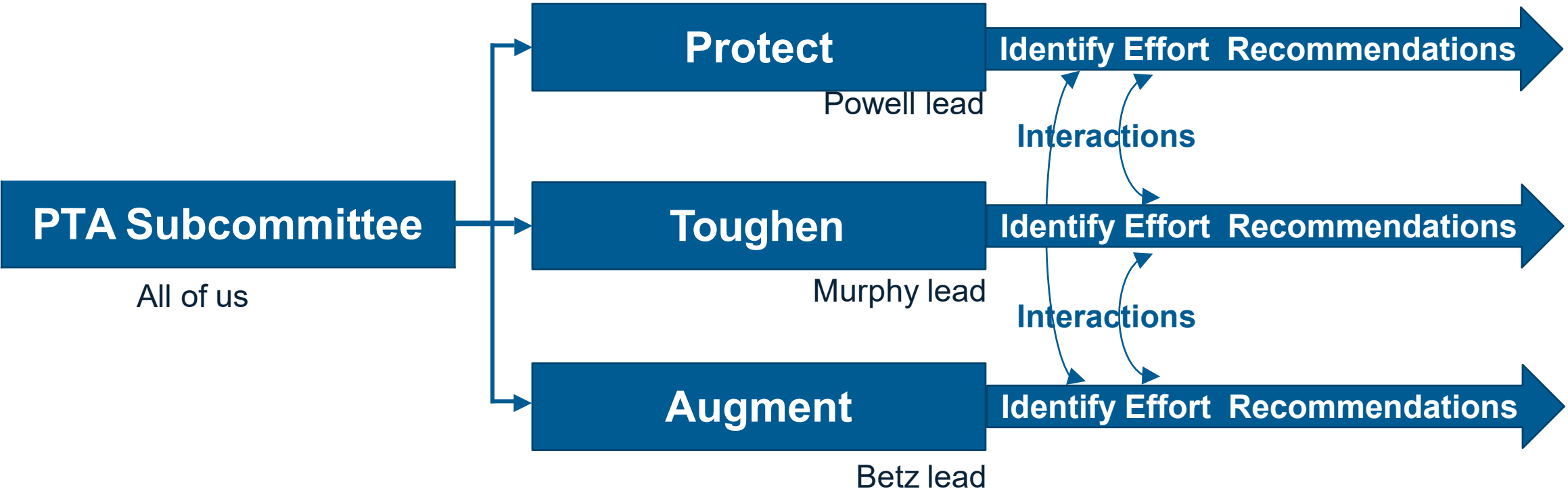
- **John Betz, Chair**
- **Tim Murphy, 1st Vice-Chair**
- **Tom Powell, 2nd Vice-Chair**
- **Scott Burgett**
- **Pat Diamond**
- **Renato Filjar**
- **Michael Hamel**
- **Larry James**
- **Vahid Madani**
- **Logan Scott**
- **Willie Shelton**
- **Todd Walter**

## **Role/ Study Areas:**

- **Protect: Transparent & balanced spectrum management, preventing or removing harmful interference sources**
- **Toughen: Ensure government restrictions do not unduly constrain civil & commercial interests, other steps that help receivers resist attacks and anomalies**
- **Augment: GDGPS, Complementary PNT, GNSS Signal Monitoring**



# PTA Subcommittee Parallel Focus



# PTA Framework

		Challenges and Threats			
		Space Weather	Interference	Physical Attack	...
Defenses and Mitigation	Protect				
	Toughen				
	Augment				

- Consider whether Protect, Toughen, or Augment is needed against different challenges or threats
- Users have finite resources—risk management is needed
- Need to assess toughness of augmentations against common and unique challenges and threats



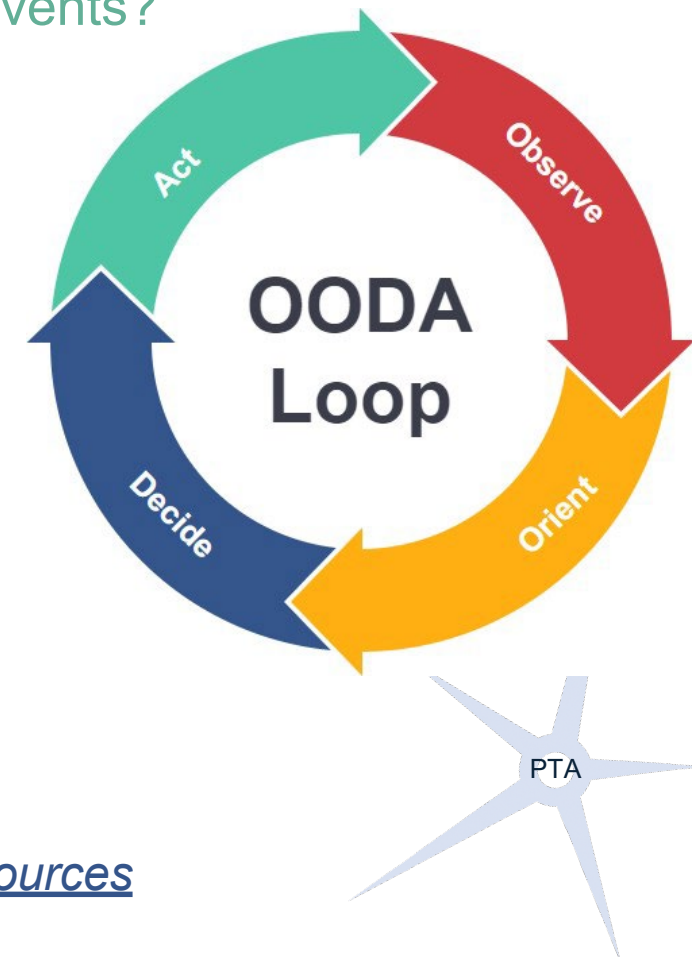
# Obstacles to Protecting, Toughening, and Augmenting Critical Infrastructure

- Protecting remains a challenge
  - Still potential for strong adjacent band interference to GNSS receivers
  - Some progress toward a nationwide capability for interference monitoring and removal, but a long way to go
- Export controls hinder the most capable GNSS receiver toughening—adaptive antijam antenna systems
  - 2023 white paper and recommendation targeting that obstacle
- Proliferation of timing technologies—how should owner/operators choose?
- Lacking needed information concerning Toughening and Augmenting
  - Investment in Toughening vs. Augmenting depends on likelihood that GPS provides useful signals—2022 recommendation that USG provide that info
  - Need to assess how augmentations meet needs of critical infrastructure
  - No independent evaluation of product toughness and competence
  - Difficult to discern critical infrastructure progress in Toughening and Augmenting
    - “You can't improve what you don't measure.” *Attributed to Peter Drucker*



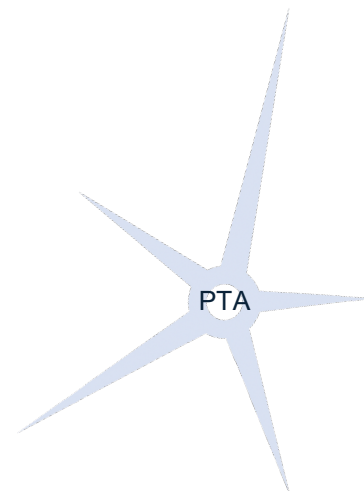
# Protect Working Group Update

- “OODA Loop” for GNSS Spectrum Protection (start with “A”)
  - **Act**
    - What mitigation steps have been applied to GNSS interference events?
      - Presentation(s) to PNTAB
  - **Observe**
    - Recent GNSS interference events (last 6 months?)
    - Review GNSS spectrum SA capabilities
      - Presentation(s) to PNTAB
  - **Orient**
    - Are events becoming more frequent, severe?
    - Are mitigations working?
      - PNTAB/PTA SC discussion
  - **Decide**
    - What can PNTAB do?
      - Specific PNT EXCOM Recommendations on policy, technology, resources



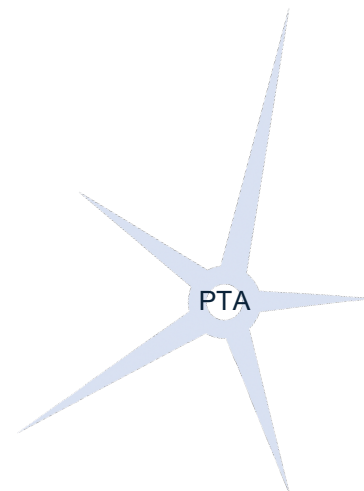
# Toughen Working Group Update

- Activity
  - Most recent activity was completion of the Whitepaper calling for relaxation of ITAR controls on CRPAs
- Outcomes
  - White paper reportedly circulated widely inside the USG supporting internal discussions
  - No public announcement yet regarding what changes may be coming.
- Way Ahead
  - Toughen group will shift to focus on proposals for resilience through augmentation (e.g. HARS)
  - Collaborate with the Augmentation subgroup



# Augment Working Group Update

- Draft white paper describing alternative timing technologies
- Framework for assessing suitability of GPS augmentations for critical infrastructure applications





# Proposal for Spring 2024 Meeting: Protecting, Toughening, and Augmenting PNT for Critical Infrastructure

- PTA SC would take responsibility for entire open meeting on Wednesday
- Mix of speakers from PNTAB and external
- Focus on integrated near term pragmatic improvements (“raise the bar”)
  - Current problems and their causes—why is more PTA urgently needed?
  - Protecting: Towards operational interference sensing
    - Space-based and terrestrial crowd-sourced
    - Data interpretation
    - Interference removal
  - Toughening: Improving resistance to jamming and spoofing
    - Antijam antennas: export control considerations
    - Evaluating product toughness
  - Augment
    - Matching technologies to needs
    - Near-term approaches to augmenting and backing up GPS
- Final Product: Recommended roadmap for near term PTA improvements

