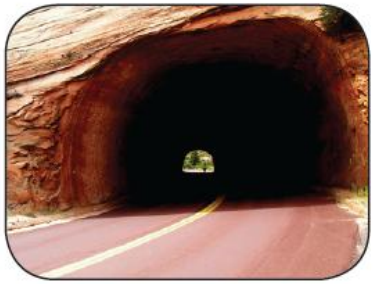
National PNT Architecture

National Space-Based PNT Advisory Board

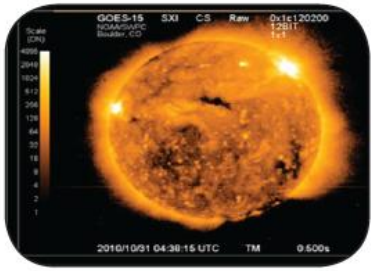
June 9, 2011

Karen Van Dyke

PNT Challenges and Capability Gaps



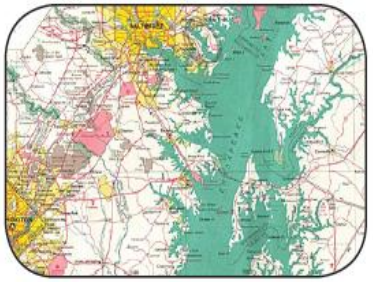
1. Physically Impeded Environments



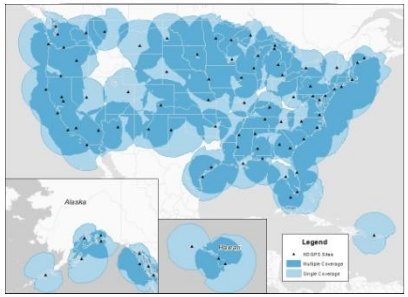
2. Electromagnetically Impeded Environments

3. High Accuracy with Integrity

4. Timely Notification of Misleading Information



5. Accurate Geospatial Information



6. PNT Modeling and Simulation Capabilities

PNT GAP: OPERATIONS IN PHYSICALLY IMPEDED ENVIRONMENTS



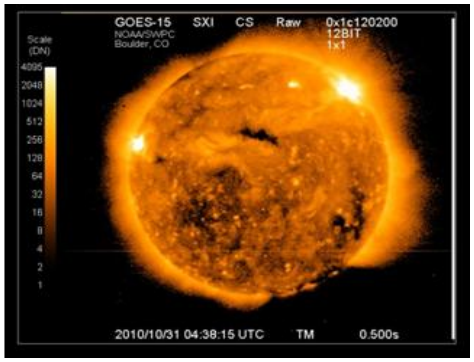
Description: Physically impeded environments reduce users ability to obtain accurate and reliable GPS service

Importance: PNT use is increasing in ever-growing urban areas with many more indoor applications. GPS frequency radio signal is sometimes unavailable in these environments.

Problem Areas: Indoors, underground, underwater, areas under dense foliage as well as urban canyons

Affected Applications: Cell Phones, PDAs, personal navigation, and surface transportation applications

PNT GAP: ELECTROMAGNETICALLY IMPEDED ENVIRONMENTS



Description: Electromagnetically impeded environments reduce users ability to obtain accurate and reliable PNT service

Importance: Radionavigation signals, such as GPS, can be intentionally and unintentionally interfered with, resulting in a loss of PNT service.

Problem Areas: Could occur anywhere, although urban areas present a particular challenge for interference

Affected Applications: Any device or application that receives updates through GPS radio signals

PNT GAP: HIGH ACCURACY WITH INTEGRITY


Description: High accuracy with integrity is needed by many applications in order to function safely and properly

Importance: Improving the accuracy of current PNT technology will allow for higher rail and road capacity, increased efficiency, and improved safety.

Problem Areas: Advanced driver assistance systems (road departure and lane change collision avoidance) which need 10cm accuracy; railroads which need 1 m accuracy; safety of life drive integrity requirements

Affected Applications: Roads/Rails traveling at surface speeds, urban canyons, tunnels, valleys, and under canopies

PNT GAP: TIMELY NOTIFICATION of Degraded or Misleading Information


Description: Safety-of-life applications require timely notification (some as short as 1 sec) when PNT information is degraded or misleading

Importance: Degraded or misleading PNT information that is not detected in time could possibly lead to adverse situations.

Problem Areas: Transportation including road and harbor navigation, as well as aviation approach and landing

Affected Applications: All safety-of-life applications, especially, air, surface, and maritime transportation

PNT GAP: GEOSPATIAL INFORMATION

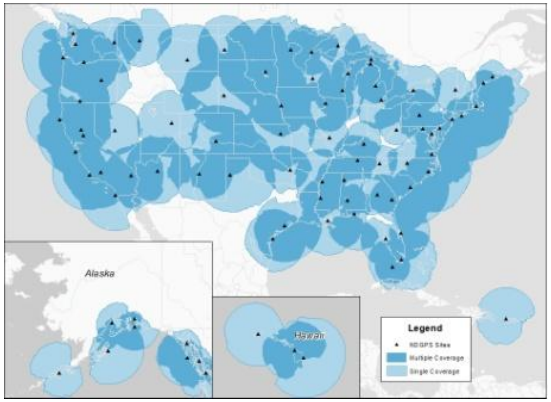
Description: Users require access to accurate geospatial(map) information for successful navigation

Importance: Geospatial (map) information is needed, in addition to GPS signals, to provide accurate navigation information to all PNT users. More reliable and accurate geospatial information will result in users having greater knowledge about their intended path of travel.

Problem Areas: Changing conditions due to road construction or areas that are not well mapped

Affected Applications: Air, surface, and subsurface navigation users, personal navigation devices

PNT GAP: MODELING CAPABILITIES



Description: Modeling capabilities and simulations of integrated PNT technologies are needed to determine the accuracy, availability, and reliability of PNT services in impeded conditions

Importance: The ability to better model and simulate integrated PNT capabilities will lead to the ability to develop those capabilities to close the PNT capability gaps.

Problem Areas: Modeling the use of integrated PNT

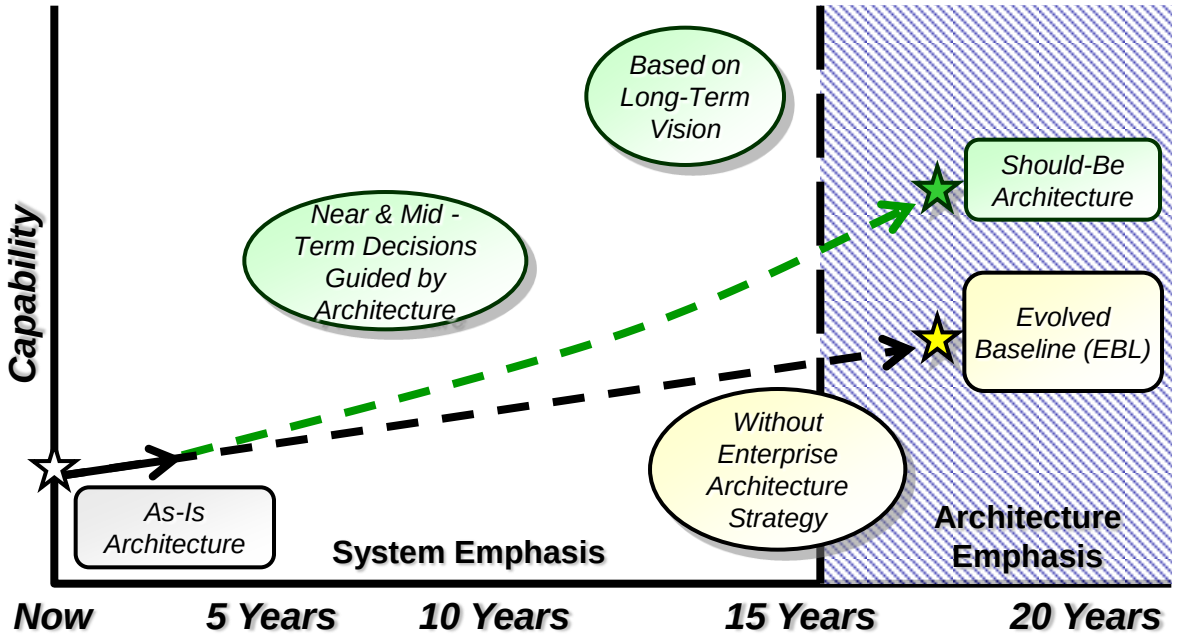
Affected Technologies: Integrated PNT technologies (GPS, INS, foreign GNSS, chip-scale atomic clocks, etc.)

National PNT Architecture

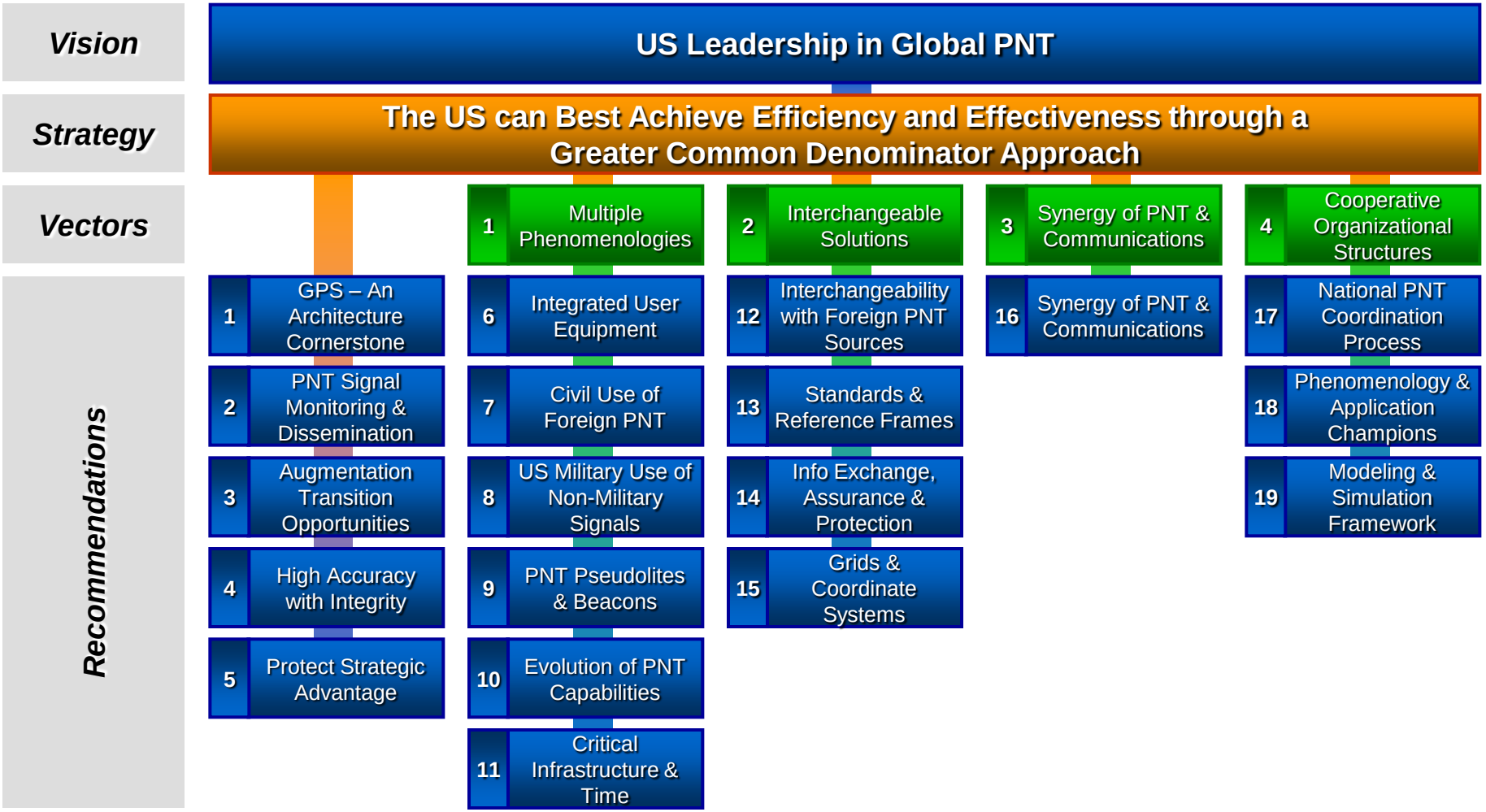
- Eighteen month effort:
  - 31 civil and military Federal agencies
  - 200+ people
- Provide more effective and efficient PNT capabilities to USG
- Vision, Strategy, Vectors and Recommendations approved June 2008

RITA
FAA
FHWA
FRA
DOC
NIST
DHS
USCG
DOI
DOS
NASA
JPDO
NCO

NII
AT&L/S&T
PBFA
JS
USA
USN
USMC
USAF
SAF/USA
NGA
NSA
STRAT
SMDC
AFSPC
USNO
NRL
SMC
NSSO



National PNT Architecture Recommendation Tree



National PNT Architecture Implementation Plan

- National Architecture Implementation Memorandum
  - Signed by Assistant Secretary of Defense for NII and Undersecretary of Transportation
    - Released July 28, 2010
  - Approves the Implementation Plan
  - Close the National PNT Architecture Terms of Reference

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

APR 9 2010

OFFICE OF THE UNDER SECRETARY

MEMORANDUM FOR ACTING ASSISTANT SECRETARY OF DEFENSE FOR NETWORKS AND INFORMATION INTEGRATION
UNDER SECRETARY OF TRANSPORTATION FOR POLICY

FROM: National Security Space Office
1670 Air Force Pentagon
Washington DC 20330-1670

SUBJECT: National Positioning, Navigation and Timing Architecture Implementation Memorandum

Request your signature on the attached National Positioning, Navigation and Timing (PNT) Architecture Implementation Memorandum (AIM). It is provided in accordance with the July 2006 PNT Architecture Terms of Reference (TOR) and associated June 2008 Architecture Guidance Memorandum.

Attached to the AIM is the National PNT Architecture Implementation Plan approved by the PNT Architecture Decision Coordination Group on 19 Mar 10. In line with the original TOR objectives, the Plan will serve to guide future PNT planning, programming, budgeting, and execution activities.

The signed AIM will promulgate the Architecture Implementation Plan and tangibly demonstrate the U.S. Government's commitment to effectively and efficiently meeting the Nation's future PNT needs.

JOSEPH D. ROUGE, SES, DAF
Director

Attachment:
Proposed Architecture Implementation Memorandum w/Atch

UNCLASSIFIED//FOR OFFICIAL USE ONLY

Positioning, Navigation, and Timing Architecture

Implementation Plan

April 2010

UNCLASSIFIED//FOR OFFICIAL USE ONLY

National PNT Architecture – Next Steps

- Identify and take credit for work across the interagency that supports the National PNT Architecture Implementation Plan
  - Examine areas that are being worked by industry and universities
- Map future planned activities against PNT Architecture Implementation Plan
- Perform assessment of how well we are moving toward "Should Be" Architecture
- Perform gap analysis of tasks not being implemented
- Refine and update architecture based on data and analysis

National Space-Based PNT Advisory Board Task

Perform an independent assessment of the way ahead for the National PNT Architecture Implementation Plan.

- What can the Departments and Agencies do to ensure the successful implementation of the Plan?
- What sort of organizational, functional, or technical issues does the Board believe may impede successful implementation of the Plan?
- How can the Departments and Agencies reduce the likelihood that these impediments occur?
- How can the Departments and Agencies reduce the effect these impediments may have?