Society for Keeping Everybody East of the Mississippi (SKEEM)

A Sense of Place

The Power of a Picture

SCPNT Gov Geringer
GPS/GNSS: From the Farm to the Front Office
GPS Enabled Precision Ag

Sprayer nozzles shut-off when not above crop section.

From the Farm...
Precision Enabled Decision Making

Record and Adjust While Operating

Actionable Information for Analysis and Decision Making.
Picture 18 shows a trench which was excavated by the traditional way.

Picture 21 shows a trench excavated with the new way.
Wall-Ye V.I.N. robot uses GPS to help wine growers

The Wall-Ye V.I.N. robot works in a vineyard near Chalon-sur-Saone, France, on...
World’s smallest camera and GPS system. Automatically snaps two pictures every minute.

http://memoto.com/
To the Front Office –
Policy and Security: Challenges and Issues

- Border and Port Security
- Economic and Financial Pressures
- Catastrophic Disasters
- Cyber Security
- Health Pandemics
- Energy and Environmental Changes
- Terrorist Activities and Threats
- Technological Hazards and Weapons of Mass Destruction
What is the big idea?

What are GNSS services about?

• It is about the global distribution of common positioning & timing information to meet user needs in all environments

• The general use of this information is to
  - Provide common global situation awareness
  - Enable precision operations

GPS proponents spend most of the time discussing “the how” of the information provided rather than what changes in the future might mean to the user of these services
In which of these systems do you place your trust?

Ideal interoperability allows navigation with one signal each from four or more systems with no additional receiver cost or complexity.

Interoperable = Better Together than Separate
U.S. National Space Policy

*Space-Based PNT Guideline: Maintain leadership in the service, provision, and use of GNSS*

- Provide civil GPS services, free of direct user charges
  - Available on a continuous, worldwide basis
  - Maintain constellation consistent with published performance standards and interface specifications
  - Foreign PNT services may be used to complement services from GPS
- Encourage global *compatibility* and *interoperability* with GPS
- Promote transparency in civil service provision
- Enable market access by industry
- Support international activities to detect and mitigate harmful interference
GPS Policy Challenges

• Sustainability
  - Protecting the L-band spectrum environment and space service spectrum in general
  - Protecting wide-bandwidth for high precision metric tracking regardless of RNSS signal source

• Affordability
  - Constraining cost growth while delivering already committed capabilities
  - Equipment is developed on the anticipation of signal availability

• Retaining U.S. Strategic Advantage
  - Multiple GNSS systems represent both opportunity and threat
  - There are no non-space alternatives to replace GPS
  - Civil, military, scientific, and commercial interests cannot be separated but must be managed as a whole
June 28, 2010 – Presidential Memorandum: 
*Unleashing the Wireless Broadband Revolution*

- Directs the Executive Branch to work with FCC towards making 500 MHz available for wireless broadband.
Frequency Universe

GPS IS HERE

AND HERE
March 2010 - U.S. Federal Communication Commission’s National Broadband Plan

In 2009, the Federal Communications Commission (FCC) proposed a National Broadband Plan to ensure every American has “access to broadband capability.”

Recommendation 5.8: The FCC should make 500 MHz newly available for broadband use within the next 10 years, of which 300 MHz between 225 MHz and 3.7 GHz should be made newly available for mobile use within five years.

Recommendation 5.8.4: The FCC should accelerate terrestrial deployment in 90 megahertz of Mobile Satellite Spectrum (MSS).
GPS at this time is not prepared to handle a strong signal in an adjacent or overlapping frequency band

TASKING to PNT Advisory Board: Propose a study structure to determine the economic benefit and value of GPS services in the U.S. and worldwide

NTIA Tasking: Adjacent Band Study (NTIA vs. DoT/FAA/other Federal agencies)
Economic Benefits

Source: U.S. Department of State

• GPS provides an estimated $67.6 billion in direct economic benefits in U.S. due to annual productivity increases and cost savings (2011)
• More than 3.3 million jobs in U.S. rely on GPS technology (2011)
• U.S. agriculture benefits from total savings and yield improvement of over $14 billion annually by using GPS technology (2012)
• GPS saves lives in aviation and provides more than $200 million per year in cost savings through more direct routes and greater runway efficiencies (2012)
GIS: Geographic Information System

Latitude 35° 45' 20"
Longitude -121° 28' 52"

... GIS: Geographic Information System
PNT Is Fundamental to Improving Our World

Understanding and Decisions

Knowledge

Information

Data

GPS

Mapping

Integration, Analysis and Modeling

Sharing and Collaboration

... GPS Enables Better Decisions
There’s Data, and then, There’s Data

Just ask APPLE

The Brooklyn Bridge on the Manhattan side. (Business Insider)
Gasoline at a Furniture Store?
Burger King??

I-93 in Boston
Apple

Google Android

http://www.businessinsider.com/ios-6-maps-apocalypse-2012-9?op=1
How to Fix Map Errors on Navigation Devices

Do GPS devices show your house or business in the wrong place? Don't blame the GPS satellites... contact the map makers! We'll tell you how.

LEARN MORE…

Solar Storm Leaves GPS Service Intact

The solar activity in early March did not significantly degrade reception of the GPS signals. It also had no impact on the 31 operational GPS satellites in space. LEARN MORE…

New Additions to GPS.gov

- Sep 19: CGSIC Nashville presentations
- Sep 11: Civil GPS Service Interface Committee (CGSIC) section, including charter, meetings, U.S. States & Local Government Subcommittee, International Information Subcommittee, Timing Subcommittee, Surveying, Mapping, and Geo-Sciences Subcommittee, and open issues
- Aug 22: External links
- Aug 21: Advisory Board membership, tasks, recommendations, and updated overview
- Aug 19: ICGWG meeting materials

GPS User Support

What is GPS?
DATA: Authoritative and Reliable

- **Completeness** – Features are absent and some features that are included seem to have erroneous attributes and relationships.
- **Logical Consistency** – the degree of adherence to logical rules of data structure, attribution and relationships.
- **Positional Accuracy** – is considered the closeness of a coordinate value to values accepted as being true.
- **Temporal Accuracy** – particularly in respect to temporal validity – are the features that they map still in existence today?
- **Thematic Accuracy** – particularly in respect to non-quantitative attribute correctness and classification correctness.

“The committee found that fundamental improvements are needed in existing observation and information systems because they only loosely connect three key elements:

- the **raw observations** that produce information;
- the analyses, forecasts, and models that provide timely and coherent **syntheses** of otherwise disparate information; and
- the **decision processes** that use those analyses and forecasts to produce actions with direct societal benefits.”
GIS: A Platform To Synthesize Data and Understand The Economic Value of PNT/GPS

Everything You Do Is Somewhere…and affects something else

Integrating Geography into Everything We Do . . .

. . . Building Communities That Work With and Across Disciplines, Geographies and Organizations
Position and Timing: The Essential Inputs

Helping Organizations, Missions, and Projects

- Natural Resource Management
- Local Government
- Emergency Management and Security
- Environment and Human Health
- Housing and Social Issues
- Business Management
- Utilities & Asset Management
- Transportation

Your Work Provides The Evidence
GPS is a Critical Component of the Global Information Infrastructure

- Satellite Operations
- Power Grids
- Aviation
- Communications
- Personal Navigation
- Fishing & Boating
- Oil Exploration
- Surveying & Mapping
- Disease Control
- Trucking & Shipping
- Precision Agriculture
- SCPNT  Gov Geringer

Gov Geringer
Planning for and Responding to Disasters

- Fire Response
  - South Australia
- Fire Simulation
  - California
- Situational Awareness
- Tornado Damage Assessment
  - Alabama
- Tsunami Forecast, Earthquake Damage Assessment
  - Tohoku, Japan
- Flooding
  - Brisbane, Australia
- Emergency Response Zones
  - Czech Republic
- Quake Tracking
  - Tohoku, Japan
Hurricane Sandy: The AfterMap
Drag the red line to explore storm damage through before and after imagery.

Pre-Hurricane Sandy Imagery

NOAA Imagery for Sandy

MAP LEGEND ▼
Hurricane Sandy and Vulnerable Populations

Ocean County, NJ

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Total Population</td>
<td>578,728</td>
</tr>
<tr>
<td>2010 Population 65+ Years Old</td>
<td>133,819</td>
</tr>
<tr>
<td>2010 % Population 65+ Years Old</td>
<td>23.10</td>
</tr>
</tbody>
</table>

Population Older than Age 64

Hover cursor over or tap column for details.
Planning For and Managing Emergencies

- Populations Affected
- Fire Planning and Response
- Situational Awareness
- Hurricanes
- Evacuation Management
- Earthquake Planning
- Flooding
- Search and Rescue
- Tornado Damage
- US Department of State
- National Park Service
- USFS
- SimSuite USACOE
- Kentucky, FEMA
- Alabama
- US Coast Guard
- National Guard
Gulf Oil Spill-GPS and GIS Supported All Aspects
Supporting Law Enforcement

Incidence Density
National Police Brazil

Crime Forecasting
Arizona

Analysis of Violence
Russia

Crime and Policing
London

Crime Hotspots
Oakland, CA

Crime Hotspots
Las Vegas, NV

Kingslake Fire Fatalities
Victoria, Australia

Weapon Recovery
Las Vegas, NV

Crime Analysis & Reporting
Broward County Sheriff's, Florida
Engaging Citizens and Crowdsourcing

Transparency

Citizen Science

Twitter Earthquake Commentary

Sharing Earthquake Video

Ushahidi Flood Reporting

311 Reporting Services

City of Los Angeles

Cornell

Spain

Japan Earthquake

311 Reporting Services

City of Los Angeles

Citizen Science

USA

Storm Reporting

Storm Damage

Japan Earthquake

Streetlight Outage Reporting

Denmark

USA

Tennessee

311 Reporting Services

City of Los Angeles

Citizen Science

USA

Tennessee

311 Reporting Services

City of Los Angeles

Citizen Science

USA

Tennessee
Homeland Security and Defense

National Security System
- Esri NEA
  Bahrain

Battle Geometry
- US Army
  JTCOIC

Safe Passage and Docking
- Critigen
  Florida

Situational Awareness
- Bradshaw Consulting
  Charlotte

US Army Range Mapper
- GISi
  Germany
Providing Defense and Security

Unexploded Ordnance

IED Analysis

National Security

Operation Centers

Department of Homeland Security

Afghanistan

Bahrain

Santiago, Chile

Blue Force Tracking

Threat Assessment

Maritime Security

Situation Awareness

San Diego

Hawaii

3D Viewshed
Threat Assessment - Intelligence
Protecting Critical Infrastructure
Rapid Growth in Mobile GIS
More Devices, More Capabilities … And Many More Users

Supporting Mobile Workers and Citizen Engagement . . .
. . . Providing Real-Time Situational Awareness

- SMARTPHONES
- iOS
- Windows
- Android
Organizations Are Rapidly Adopting This Platform
Organizing and Sharing Their Information – BIG DATA IS COMING

Cloud GIS

US Government
Indonesia SDI
The World Bank
NGOs – Data Basin
Eye on Earth Network

Abu Dhabi
UNEPLive
ArcGIS Online

. . . Building Shared Infrastructure
Providing Timing for Business, Financial, Networking and Defense Applications
Education

Student Population Forecasting

School Assignment

Learning Disparities

Campus Facility Management

Milwaukee

Davis Demographics & Planning
  California

Blue Raster
  United States

Bergmann Associates
  Rochester
Human Health

Shellfish Contamination
US Food and Drug Administration

Tracking Imports

HIV Infected Population
USAID/ICF Macro/Blue Raster, LLC

Spread of HIV–DRC
US Department of State

Influenza

Cancer
National Cancer Institute

Physician Visits

Healthcare Safety
US Veterans Administration

US Veterans Administration
Health Information in Context

**Compare Web Maps**

**Air Pollution**

This map shows the number of Particulate Matter Days recorded in 2010 in the contiguous U.S., by state and county. A Particulate Matter Day is defined as a day that air quality is above the National Ambient Air Quality Standard for the particulate matter (PM2.5, less than 2.5μm in diameter).

For a complete list of indicators, please visit [Health Indicator Warehouse](https://www.healthindicators.gov/). Note that many of the indicators on the Healthy Living list are not broken out below the national level.

**Primary Care Providers**

This map shows the number of Primary Care Providers available per 100,000 people in the U.S., by state and county. The map switches from state to county data as the map zooms in.

A person’s ability to access health services has a profound effect on every aspect of his or her health: yet, at the start of the decade, almost 1 in 4 Americans do not have a primary care provider (PCP) or health maintenance organization (HMO). Many of these people experience health disparities in access to care, increasing their risk for negative health outcomes. When they do access health services, they are often burdened with high medical bills and out-of-pocket expenses. Increasing access to health routine medical care and medical insurance are vital steps in improving the health of all Americans.

For a complete list of indicators, please visit [Health Indicator Warehouse](https://www.healthindicators.gov/). Note that many of the indicators on the Healthy Living list are not broken out below the national level.

**Population with Health Insurance**

This map shows the percentage of adults, non-institutionalized, age 18-64 years of age who report having health insurance, based on 2010 data, in the U.S., by state and county. The map switches from state to county data as the map zooms in.

A person’s ability to access health services has a profound effect on every aspect of his or her health; yet, in the early 21st century, about 30% of Americans do not have a primary care provider (PCP) or health maintenance organization (HMO). Many of these people experience health disparities in access to care, increasing their risk for negative health outcomes. When they do access health services, they are often burdened with high medical bills and out-of-pocket expenses. Increasing access to health routine medical care and medical insurance are vital steps in improving the health of all Americans.

People without medical insurance are more likely to lack a usual source of medical care, such as a PCP, and are more likely to skip routine medical care due to costs, increasing their risk for serious and disabling health conditions, when they do access health services. They are often burdened with high medical bills and out-of-pocket expenses. Increasing access to health routine medical care and medical insurance are vital steps in improving the health of all Americans.
Environmental Assessment & Conservation

- Wetlands: L-3 STRATIS, Alaska
- Vegetation: MDA Information Systems, New Jersey
- Noise Assessment: alta4, Stuttgart
- Invasive Species: SEH, Wisconsin
- Species Endangerment: Blue Raster, Africa
- Solar Potential: CyberCity 3D, California
Relative Sea-Level Changes on U.S. Coastlines, 1958 to 2008
Visualizing and Managing Buildings In Context of Place

- **Public 3D Viewer**: China
- **Cityscape**: Corpus Christi, Texas
- **Campus Design**: University of Rochester, New York
- **Urban Modeling**: City of Paris, France
- **Apartment Complex**: Indiana
- **Virtual City**: Dubrovnik, Croatia
Transportation and Logistics

Sidewalk Management
- JMT Delaware

Rideshare
- RideAmigos Los Angeles

Bike Routing
- alta4 Germany

Dynamic Routing
- ESC Engineering Oman

Port Management
- Critigen US

Flight Trajectory
- CGX AERO Norway
Transportation Management

Airport Management

Aeronautical Charting Services

Tracking Trains

Geospatial Content Management

Transportation Fact Reporting

USDOT/FAA

USDOT/FAA

USDOT

USDOT/RITA
Energy and Natural Resources

- Reservoir Analysis: Schlumberger, Gulf of Mexico
- Wind Farm: LandWorks, Pennsylvania
- Flood Analysis: AECOM, Pottawatomie
- Logging: Blue Raster, Congo
- Forestry: ISM International, British Columbia
- Natural Gas: ESC Engineering, Wyoming
- Pipeline: APOS, Texas
Assessing Renewable Energy

Energy Investments

Alternative Fuel Resources

Hydropower

Hydrology and Biofuels

Community Energy Analysis

Conservation International

USDA
Business and Location Analysis

Newspapers

Sales Management

Insurance

Sales Demographics

Bank Locations

Market Penetration

Components

ComponentOne

Los Angeles

RPM Consulting

Los Angeles

Azavea

Los Angeles

alta4

Germany

CloudTrigger

Oceanside

APOS

Riverside
Economic Benefit and PNT....

Understanding and Decisions

Knowledge

Information

Data

GPS

GPS Enables Better Decisions
Added Value Goes Beyond Economic Value
GPS Has Changed Our World...

How We Collaborate . . .

How We Organize & Reason . . .

Spatially Integrated Thinking

Shared Geographic Knowledge

How We Make the Economy and our Society Work . . .
Thanks!