



Facility Management using the NASA-wide Institutional Geographic Information System

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- What is the NASA-wide Institutional GIS
- Classification of Buildings based on Real Property Fields
- Migration to the ArcGIS API for JavaScript
- Query Information Across NASA
- Search Data tied to Floor plans
- Add Map Services from Local Sources
- Support for Mobile Devices
- Plans



- **What is the NASA-wide Institutional GIS**

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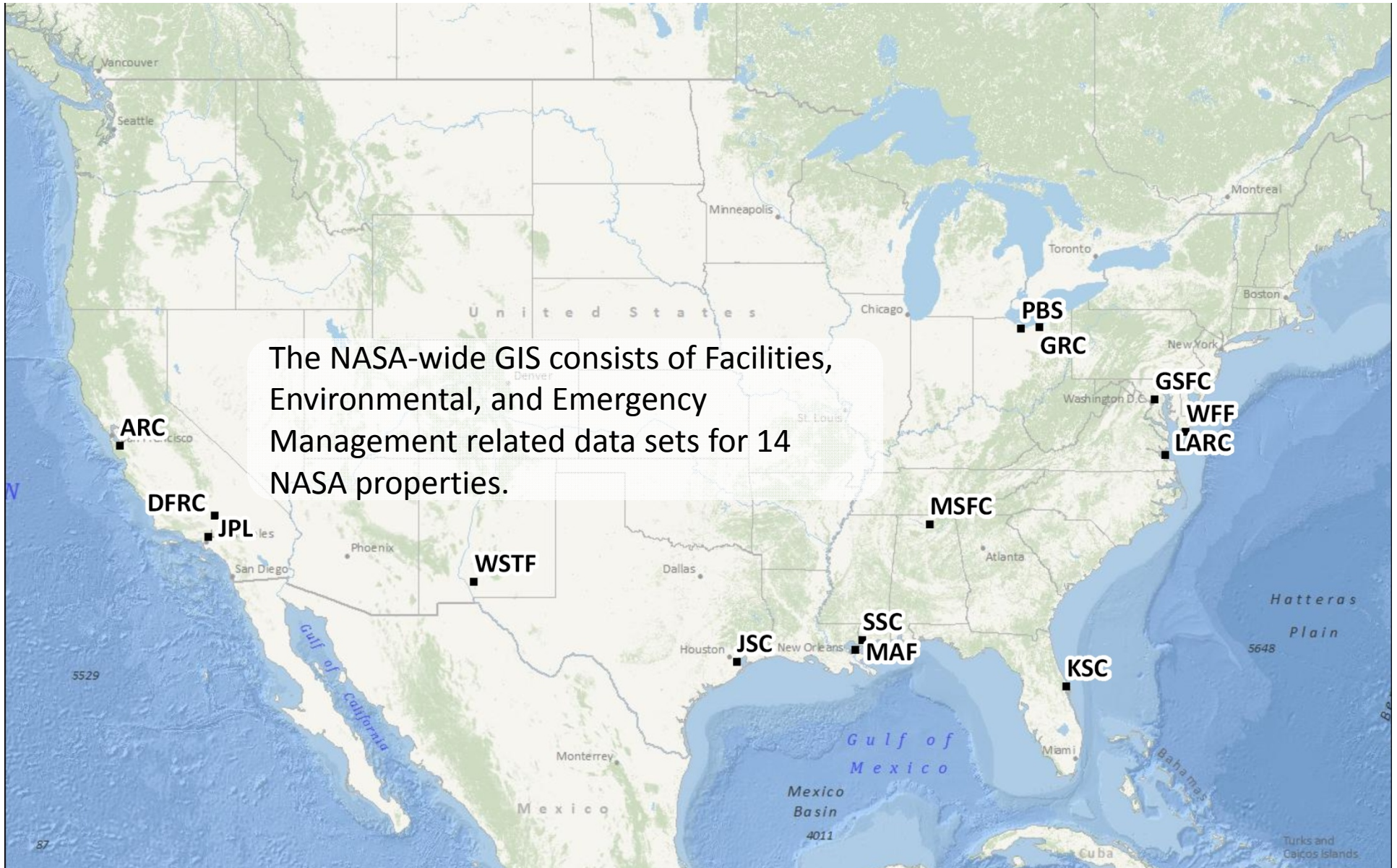
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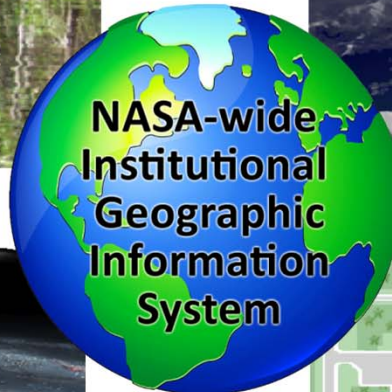
- Add Map Services from Local Sources

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NASA-wide Institutional GIS



NASA-wide Institutional GIS Supports Multiple Functions



Data Sets Collected from Centers

- Cultural Resources
- NASA Real Property
- Center Infrastructure
 - Buildings
 - Parking
 - Roads
 - Boundaries
- Land Use
- Utilities
- Emergency Response
 - Tanks
- Natural Resources
- CERCLA/RCRA

Data Sets Collected from Public Sources

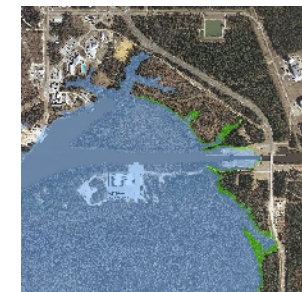
- Water Bodies
- Flood Zones
- Storm Surge Data
- USGS Topographic Maps
- Elevation Contours
- NWI Wetlands
- Soil Types
- Aerial Photography



Common Data Themes included in NASA-Wide GIS



- Find out information about a facility (i.e. square footage, mission dependency, year built)
- Locate a facility and determine what features/entities surround it
- Take approximate measurements (area and distance)
- View elevations, flood zone status, tank locations, etc.



Common Portal Use Examples



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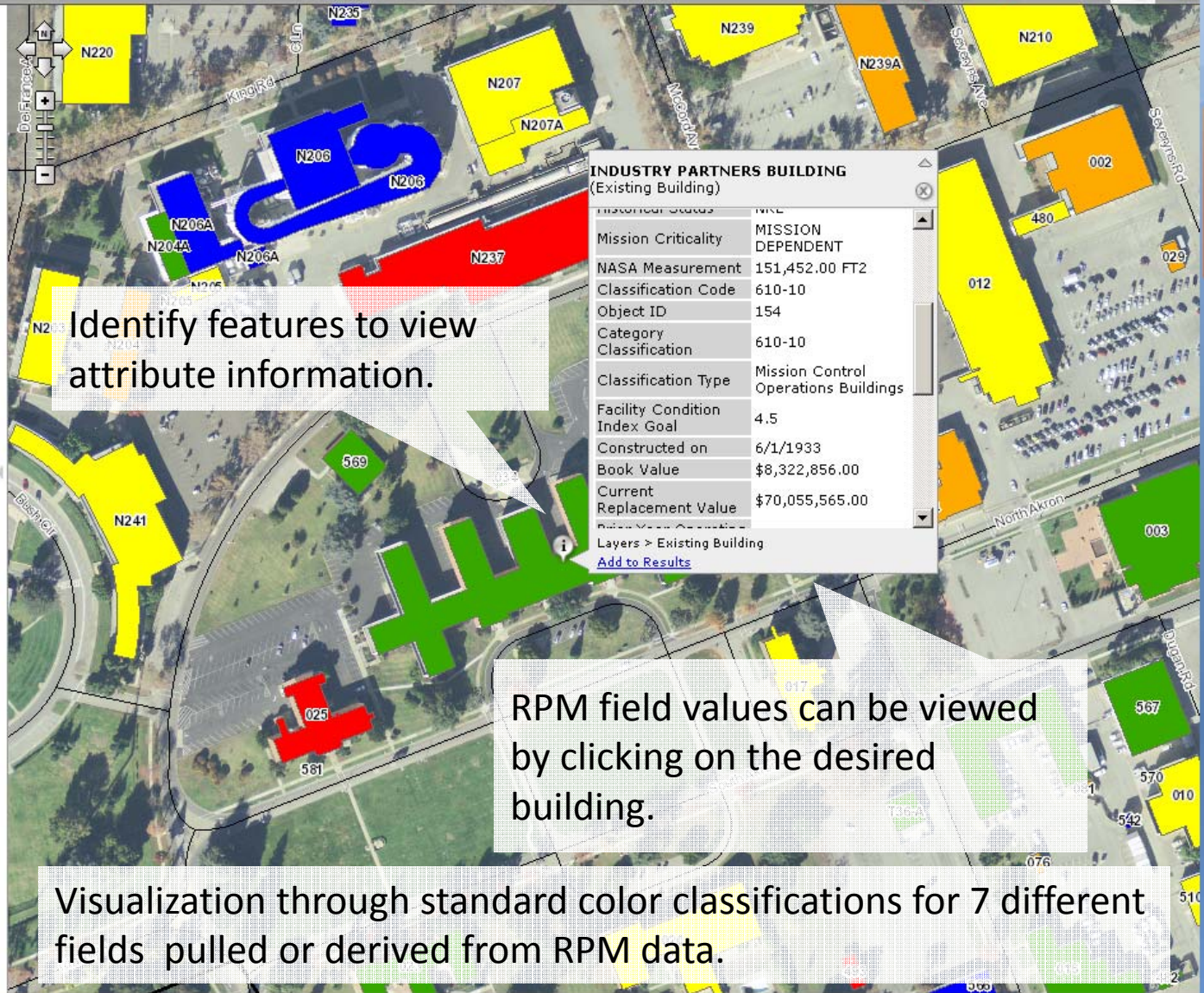


Search Buildings | Print Map | Query CRV | Query Mission Dependency | Query Year Built

Results

Map Contents

- Layers
 - Cultural Resources
 - Real Property Management
 - Current Status
 - Abandoned
 - Mothballed
 - Standby
 - Active
 - Historic Status
 - National Historic Landmark
 - National Register Listed
 - National Register Eligible
 - Not Evaluated
 - Evaluated, Not Historic
 - Non-contributing Element
 - Facility Condition Index (FCI)
 - < 2.9
 - 3.0 to 3.4
 - 3.5 to 3.8
 - 3.9 to 4.2
 - > 4.3
 - FCI Delta
 - < -0.90
 - 0.90 to -0.60
 - 0.60 to -0.31
 - 0.30 to 0
 - > 0
 - Mission Dependency Index
 - 0 - 9, Low
 - 10 - 54, Moderate
 - 55 - 70, Relevant
 - 71 - 85, Significant
 - 86 - 100, Critical
 - Age of Building
 - < 20
 - 21 - 40
 - 41 - 60
 - 61 - 80
 - > 81
 - Current Replacement Value
 - < \$ 10,000
 - \$ 10,000 - \$ 100,000
 - \$ 100,000 - \$ 1,000,000



Current Support for RPM Data



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NASA National Aeronautics and Space Administration

+ Visit NASA
+ Visit Destination Earth

NASA-WIDE INSTITUTIONAL GIS

Facility Engineering & Real Property | Environmental Management Division

NASA Headquarters
Ames Research Center
Dryden Flight Research Center
Glenn Research Center
Glenn Research Center Plum Brook Station
Goddard Space Flight Center
Jet Propulsion Laboratory
Johnson Space Center
Kennedy Space Center
Langley Research Center
Marshall Space Flight Center
Michoud Assembly Facility
Stennis Space Center
Wallops Flight Facility
White Sands Test Facility

GEOGRAPHIC INFORMATION SYSTEM

FIRSTGOV Year First Click to the U.S. Government

- + Freedom of Information Act
- + Budgets, Strategic Plans and Accountability Reports
- + The President's Management Agenda
- + NASA Privacy Statement, Disclaimer, and Accessibility Certification
- + Inspector General Hotline
- + Equal Employment Opportunity Data Posted Pursuant to the No Fear Act
- + Information-Dissemination Priorities and Inventories

NASA IASIA Officials:
Ron Magee
Hugh Carr

Last Updated: January 22, 2010
+ Contact NASA

NASA National Aeronautics and Space Administration

Ames Research Center
Geographic Information System

Select NASA Center
NASA-Wide Institutional GIS

Search Buildings | Print Map | Query CRV | Query Mission Dependency | Query Year Built

Results

Map Contents

- Layers
 - Cultural Resources
 - Real Property Management
 - General Information
 - Infrastructure
 - Natural Resources
 - Solid and Hazardous Waste
 - Physiography
 - Rasters
- Imagery
 - 2009 RGB 1 Foot

NASA National Aeronautics and Space Administration

Johnson Space Center
Geographic Information System

Select NASA Center
NASA-Wide Institutional GIS

Search Buildings | Print Map | Query CRV | Query Mission Dependency | Query Year Built

Results

Map Contents

- Layers
 - Cultural Resources
 - Real Property Management
 - General Information
 - Infrastructure
 - Land Use
 - Emergency Response
 - Natural Resources
 - Physiography
 - Rasters
- Imagery
 - 2007 3 Inch Ortho

- Current NASA-wide GIS is based on the .NET Framework
- Separate Application for each Center, Agency-wide Queries not supported

Current NASA-wide Institutional GIS



- Lighter Client
- Client connects to data sources.
 - User can connect to data sources not accessible to the host server.
- No plugins required.
 - NASA users sometimes use older browsers.
 - Most users do not have the Administrative privileges necessary to perform the install
- Migrating will allow the agency to leverage and integrate new tools and templates as they are developed. Samples are simple to implement and extend

Why Migrate to ArcGIS API for JavaScript?



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Query Building | Base Map | Add Map Service | Bookmarks

Build Query:

Select Center
All

Select Field
CurrentStatus

Select Operator
=

Select/Enter Value
STANDBY

ACTIVE

ABANDONED

MOTHBALLLED

EXCESS

Users can construct custom queries against Real Property data for one center, multiple centers or the whole agency

Operators include =, >, <, and <>

Available values change based on the selected field.

Legend | Layers

Layers

Center

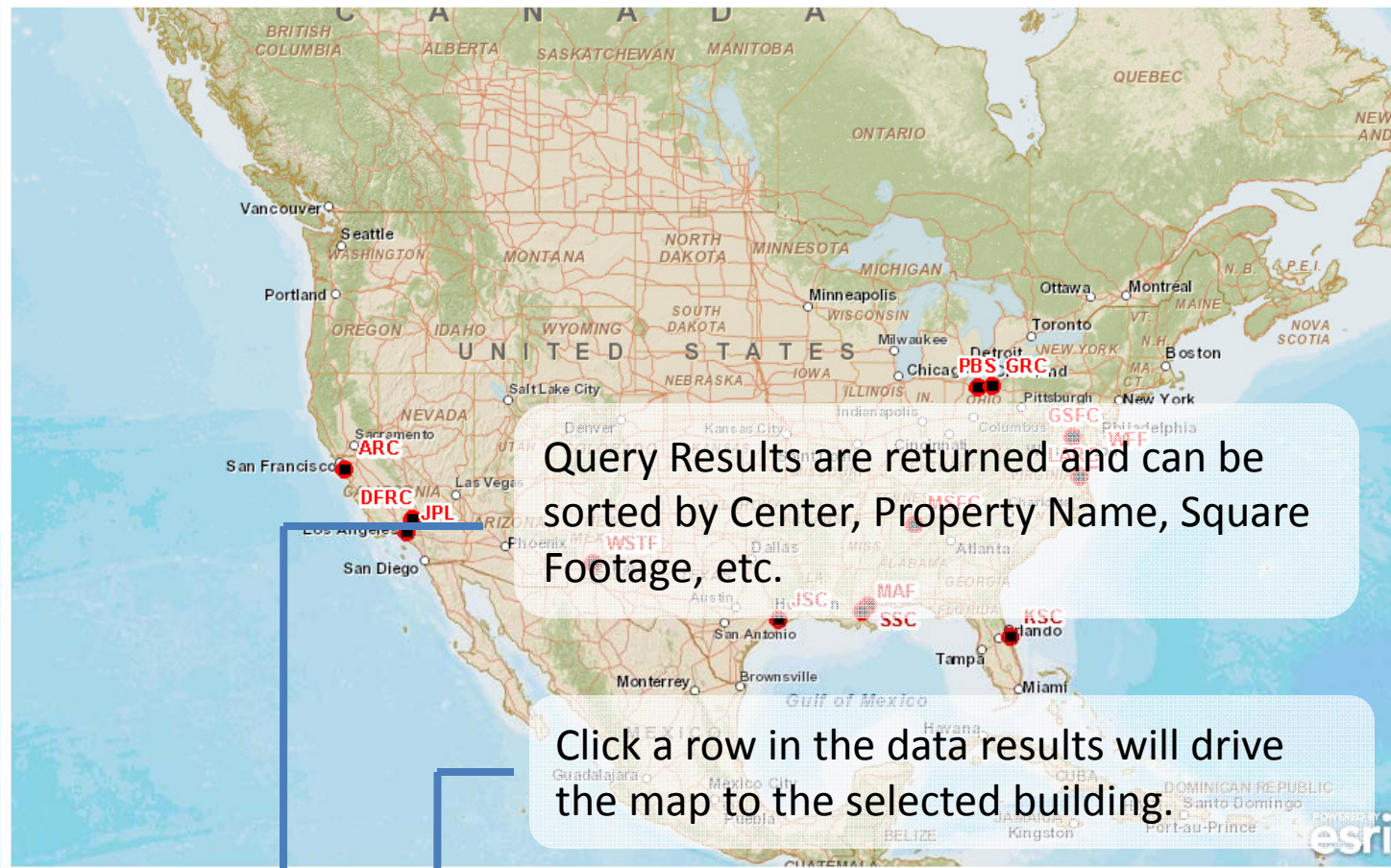
Building

ID	Center	Prop No	Prop Name	Current Status	Constructed On	Historic Status	MDI Score	Mission Criticality	Book Value	CRV	NASA Measurement	GSA Measurement	Total Gross (SF)

Query Information Across NASA – Build Query Tool



Query Building ▾ Base Map ▾ Add Map Service ▾ Bookmarks ▾



Legend Layers

Center

Building

ID	Center	Prop No	Prop Name	Current Status	Constructed On	Historic Status	MDI Score	Mission Criticality	Book Value	CRV	NASA Measurement	GSA Measurement	Total Gross (SF)
1	ARC	001	HANGAR ONE	STANDBY	06/01/1933	NRL	60	MISSION DEPENDENT	5533595	185281106	385,290.00 FT2	385,290.00 FT2	385290
23	ARC	025	ADMINISTRATION AND AUDITORIUM	STANDBY	06/01/1933	NRL	8	NOT MISSION DEPENDENT	103986	3593840	24,855.00 FT2	24,855.00 FT2	24855
76	ARC	153	ADMINISTRATION BUILDING	STANDBY	07/01/1953	ENH	10	MISSION DEPENDENT	1886902	4880910	15,785.00 FT2	15,785.00 FT2	15785

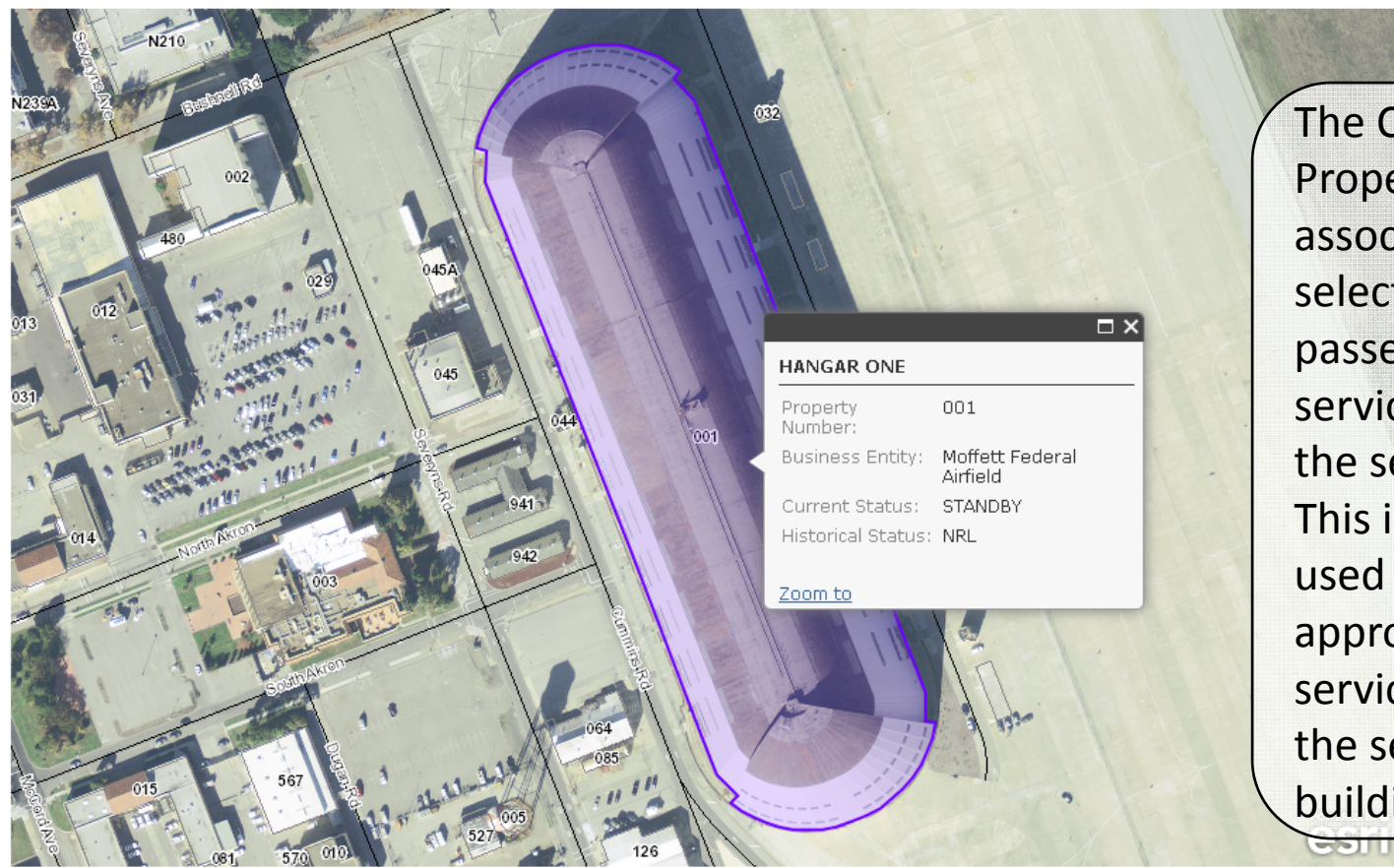
Query Information Across NASA – Query Results



- **Problem:** The NASA-wide GIS Portal has been separated into different applications because NASA's data are represented in 14 different coordinate systems. Merging data from different parts of the country into a Geographic Coordinate System may compromise the integrity/accuracy of the data.
- **Solution:** In the new application, the center data are still published as separate map services. An enterprise map service containing data for the entire agency is used to perform queries then load the appropriate map service



Query Building | Base Map | Add Map Service | Bookmarks



HANGAR ONE

Property Number: 001

Business Entity: Moffett Federal Airfield

Current Status: STANDBY

Historical Status: NRL

[Zoom to](#)

The Center and Property Number associated with the selected row are passed to the map service specific to the selected center. This information is used to load the appropriate map service and zoom to the selected building

ID	Center	Prop No	Prop Name	Current Status	Constructed On	Historic Status	MDI Score	Mission Criticality	Book Value	CRV	NASA Measurement	GSA Measurement	Total Gross (SF)
1	ARC	001	HANGAR ONE	STANDBY	06/01/1933	NRL	60	MISSION DEPENDENT	5533595	185281106	385,290.00 FT2	385,290.00 FT2	385290
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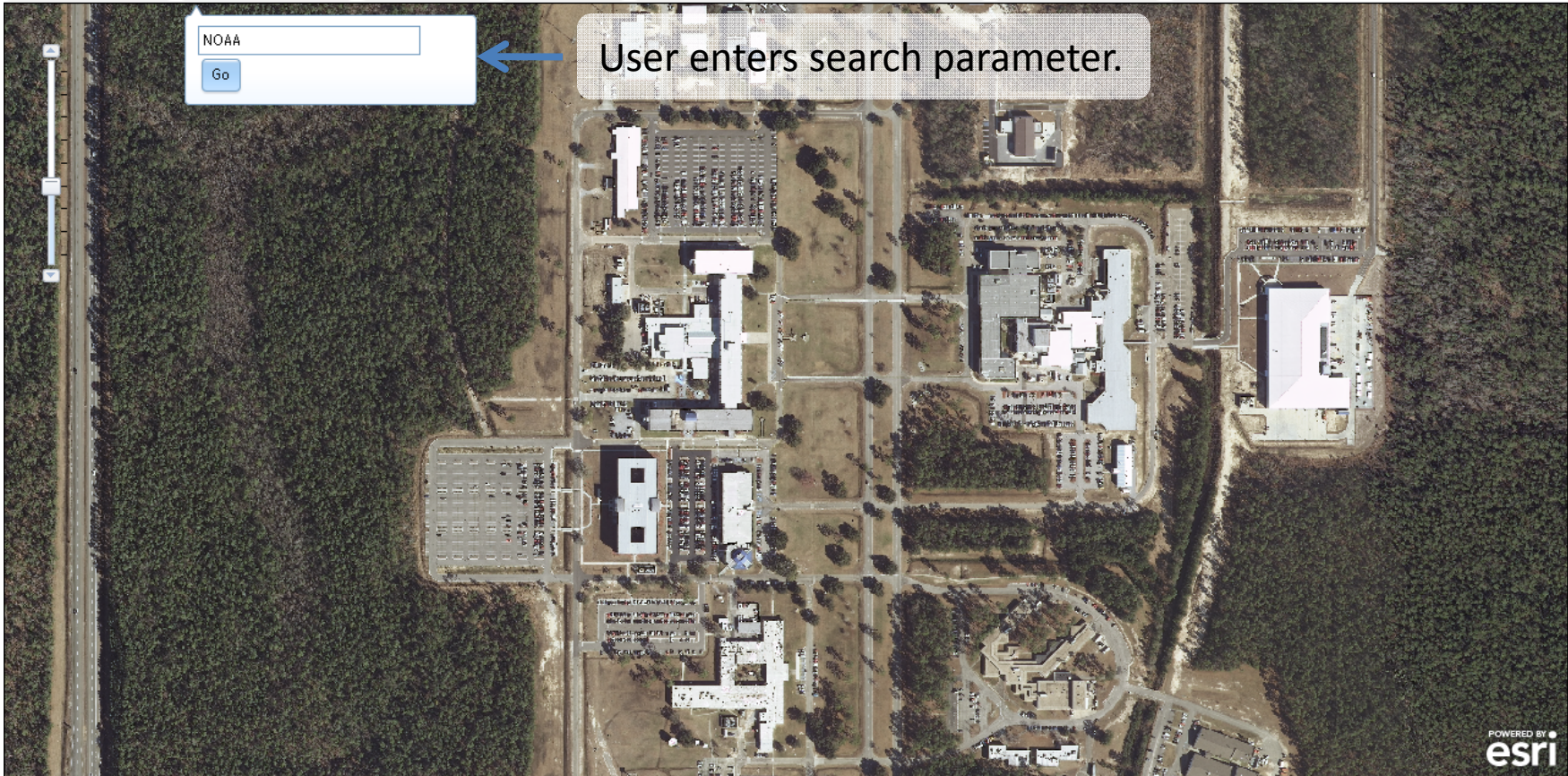
Query Information Across NASA – Go to Building



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- **Search Data tied to Floor plans**
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- Plans



- Search by Building
- Search By Emp/Org
- View Reports
- Filter Rooms
- Draw Tools
- Base Map
- Map Layers
- Export map to PDF
- Switch Floor



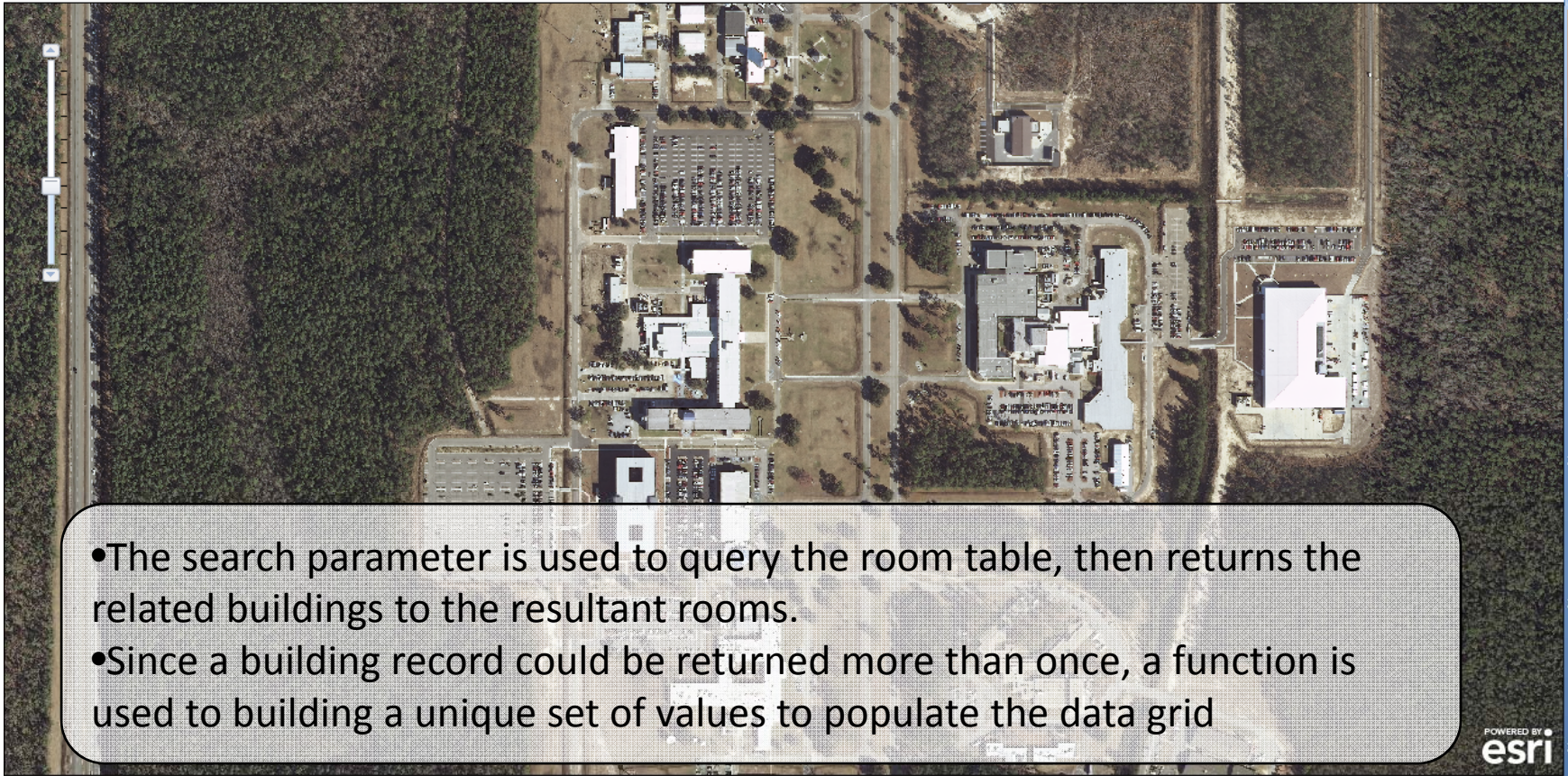
Building Results | Room Results

ID	Building Number	Name	Square Footage	Year Built	Book Value	CRV	DM
----	-----------------	------	----------------	------------	------------	-----	----

Search Data – Drill Down to Room Level



Search by Building Search By Emp/Org View Reports Filter Rooms Draw Tools Base Map Map Layers Export map to PDF Switch Floor



- The search parameter is used to query the room table, then returns the related buildings to the resultant rooms.
- Since a building record could be returned more than once, a function is used to building a unique set of values to populate the data grid

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Building Results Room Results

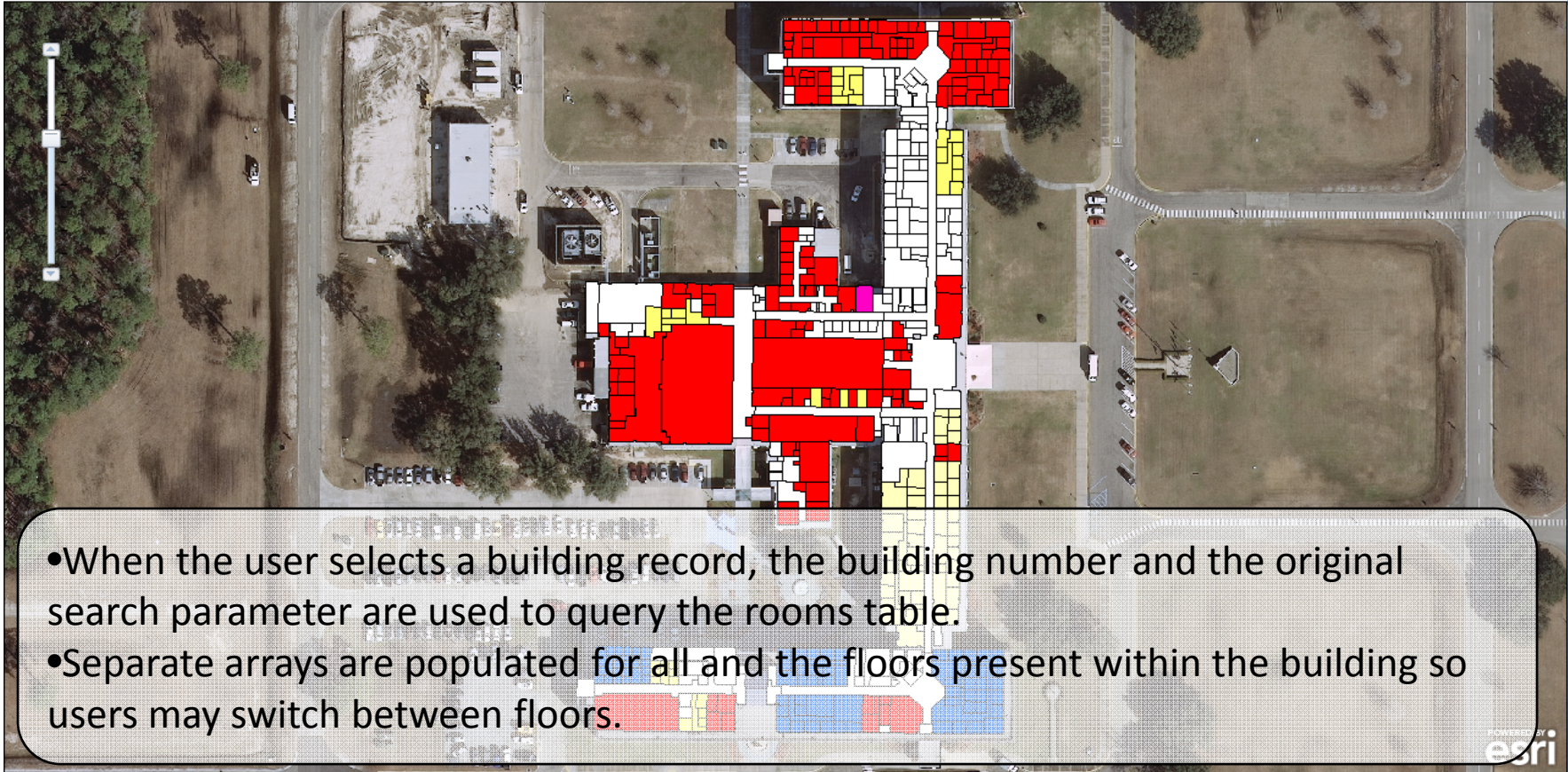
ID	Building Number	Name	Square Footage	Year Built	Book Value	CRV	DM
317	3203	Oceanographic/Vertical	70846	1966	6565474	0	0
319	3205	Sys Test & Development	13435	1984	468712	0	0
103	3206	NDBC Metal Office Building	0	1988	90817	0	0
320	3208	NDBC Storage Facility	2899	1986	80783	0	0
318	3209	Sandblast & Paint Facility	1551	1988	73626	0	0

Clicking a building result allows the user to view inside the building.

Search Data – Drill Down to Room Level



Search by Building Search By Emp/Org View Reports Filter Rooms Draw Tools Base Map Map Layers Export map to PDF Switch Floor



- When the user selects a building record, the building number and the original search parameter are used to query the rooms table.
- Separate arrays are populated for all and the floors present within the building so users may switch between floors.

Building Results Room Results

ID	Building ID	Room #	Last Name	First Name	Floor	Organization	Program	Room Use	Class Code	Class
3333	1100	108B	MESICK	SHARON	1	DOC/NOAA/NCDC	PBXX	NCDC	OF	
3334	1100	108C	LAVOIE	DAWN	1	DOC/NOAA/NCDC	PBXX	NCDC	OF	
3335	1100	108D	SCHENCK-GARDNER	ELIZABETH	1	DOC/NOAA/NCDC	PBXX	NCDC	OF	
3336	1100	110B	BOSCH	JULIE	1	DOC/NOAA/NCDC	PBXX	NCDC	OF	
3337	1100	110C	LARTIGUE	JULIEN	1	DOC/NOAA/NCDC	PBXX	NCDC	OF	

Room results are returned for the lowest floor of the selected building.

Search Data – Drill Down to Room Level



Search by Building Search By Emp/Org View Reports Filter Rooms Draw Tools Base Map Map Layers Export map to PDF Switch Floor



- The Switch Floor combo box will be populated only with floors that satisfy the original query.
- When the user changes floors, the floor plan geometry and query results associated with that floor are shown.

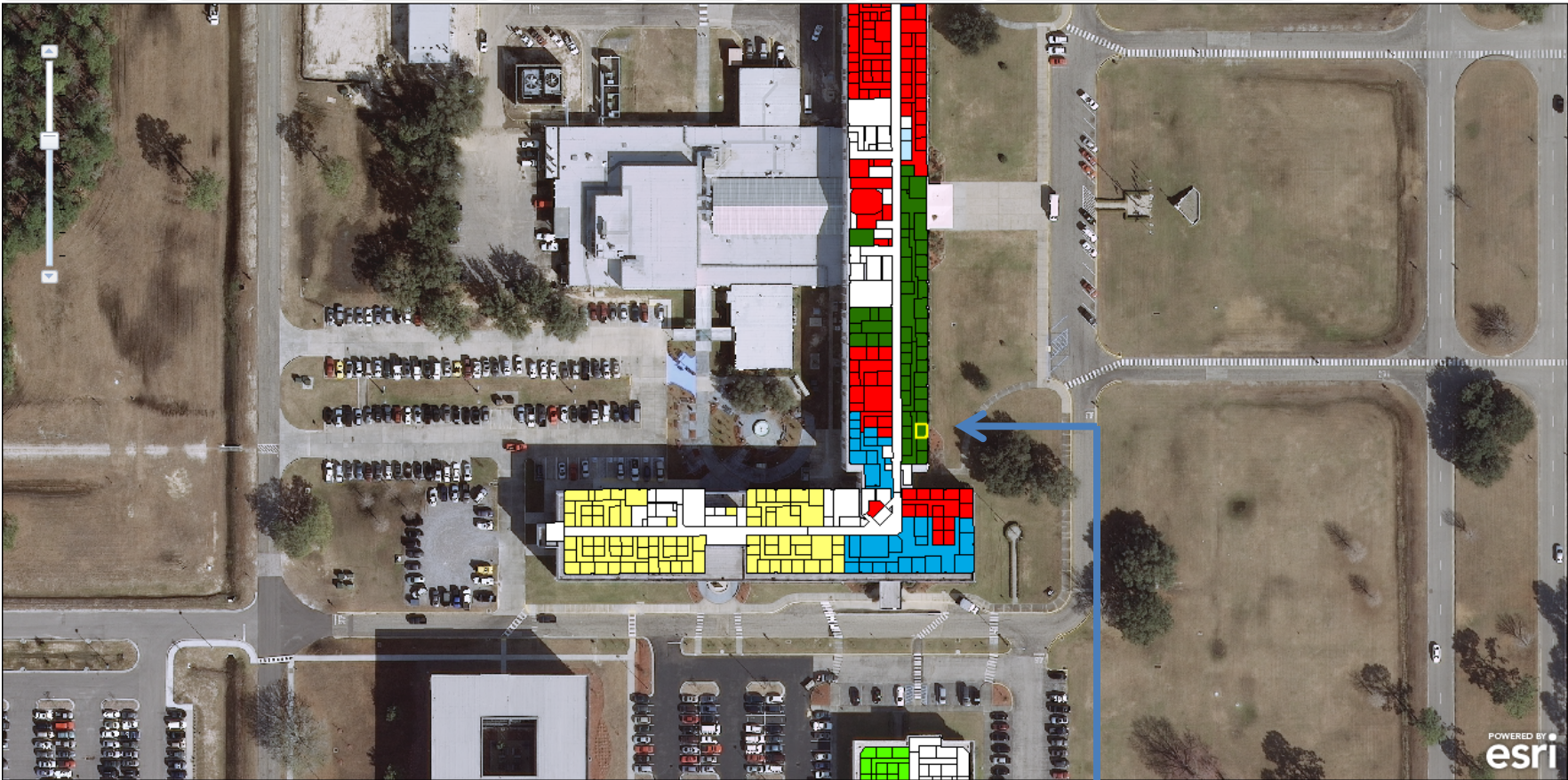
Building Results Room Results

ID	Building ID	Room #	Last Name	First Name	Floor	Organization	Program	Room Use	Class Code	Class Type
3771	1100	202D	CLARK	AMY	2	EPA/GMPO	PXXX	GMPO	OF	1
3772	1100	202F	WEAVER	ANN	2	EPA/GMPO	PXXX	GMPO	OF	1
3821	1100	202C	BURNS	ROBIN	2	EPA/GMPO	PXXX	GMPO	MS	1
3822	1100	202E	HANISKO	MARIAN	2	EPA/GMPO	PXXX	GMPO	OF	1

Search Data – Drill Down to Room Level



Search by Building Search By Emp/Org View Reports Filter Rooms Draw Tools Base Map Map Layers Export map to PDF Switch Floor



Building Results Room Results

ID	Building ID	Room #	Last Name	First Name	Floor	Organization	Program	Room Use	Class Code	Class Type
3771	1100	202D	CLARK	AMY	2	EPA/GMPO	PXXX	GMPO	OF	
3772	1100	202F	WEAVER	ANN	2	EPA/GMPO	PXXX	GMPO	OF	
3821	1100	202C	BURNS	ROBIN	2	EPA/GMPO	PXXX	GMPO	MS	
3822	1100	202E	HANISKO	MARIAN	2	EPA/GMPO	PXXX	GMPO	OF	

The selected row displays on the map.

Search Data – Drill Down to Room Level



- This Data Search Example showed tenant/building occupancy information but it can also be used to show:
 - Chemical Inventory
 - Personal Property
 - IT/Jack Information
 - Assets/Equipment

Search Data – Drill Down to Room Level - Example



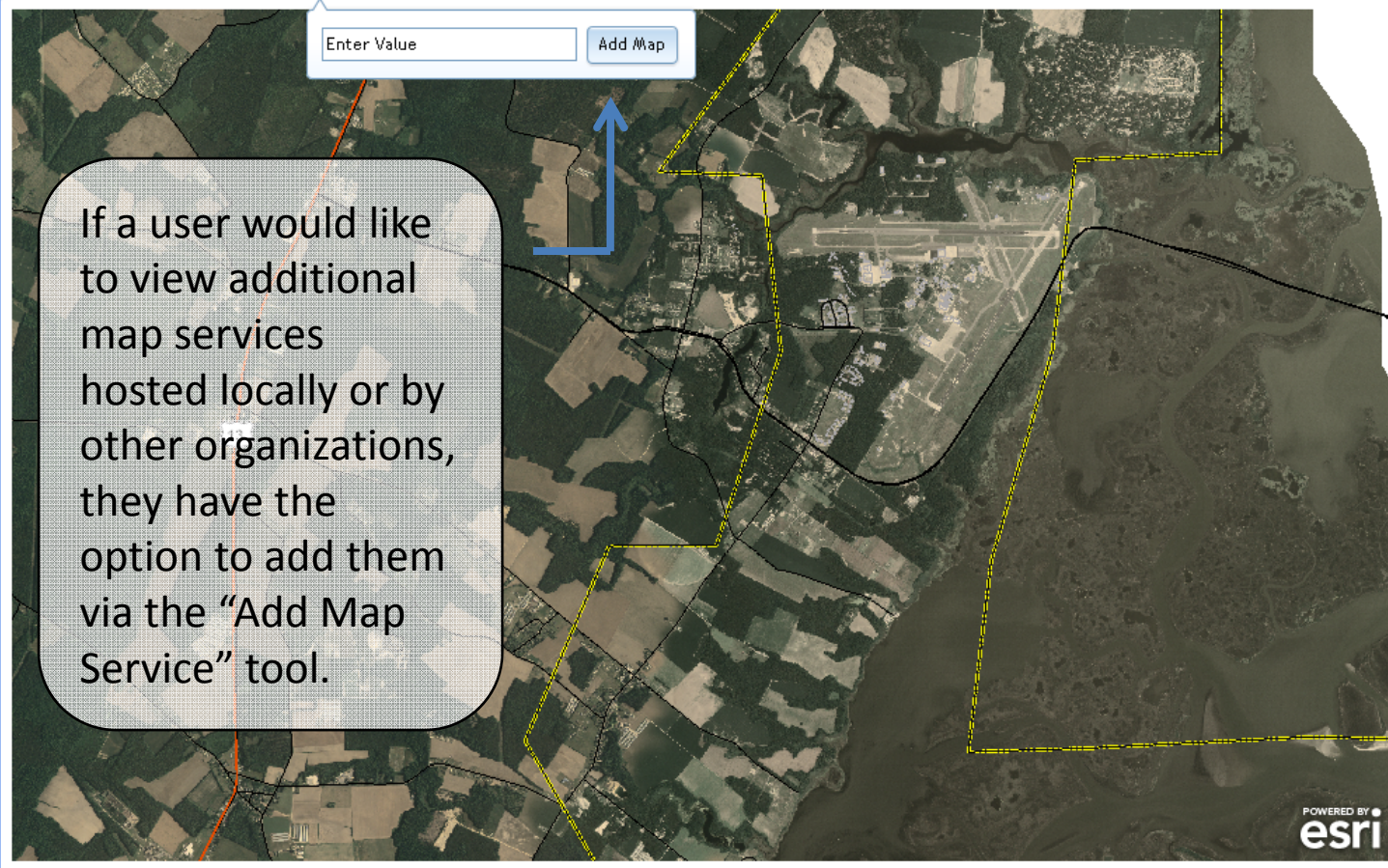
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Query Building ▾ Base Map ▾ Add Map Service ▾ Bookmarks ▾

Enter Value Add Map

If a user would like to view additional map services hosted locally or by other organizations, they have the option to add them via the "Add Map Service" tool.



Legend Layers

Layers

Center

Building

ID	Center	Prop No	Prop Name	Current Status	Constructed On	Historic Status	MDI Score	Mission Criticality	Book Value	CRV	NASA Measurement	GSA Measurement	Total Gross (SF)
413	WFF	V-042	READY SERVICE MAGAZINE	STANDBY	12/31/1956	ENH	23	MISSION DEPENDENT	1000	9538	63.00 FT2	1.00 EA	63
413	WFF	V-050A	UTIL CANOPY DYN BAL FAC	STANDBY	12/31/1963	ENH	91	MISSION CRITICAL	35716	360739	6,816.00 FT2	6,816.00 FT2	6816
413	WFF	V-052	READY SVC CHML STOR MAG	STANDBY	12/31/1956	ENH	85	MISSION CRITICAL	1000	9538	63.00 FT2	1.00 EA	63

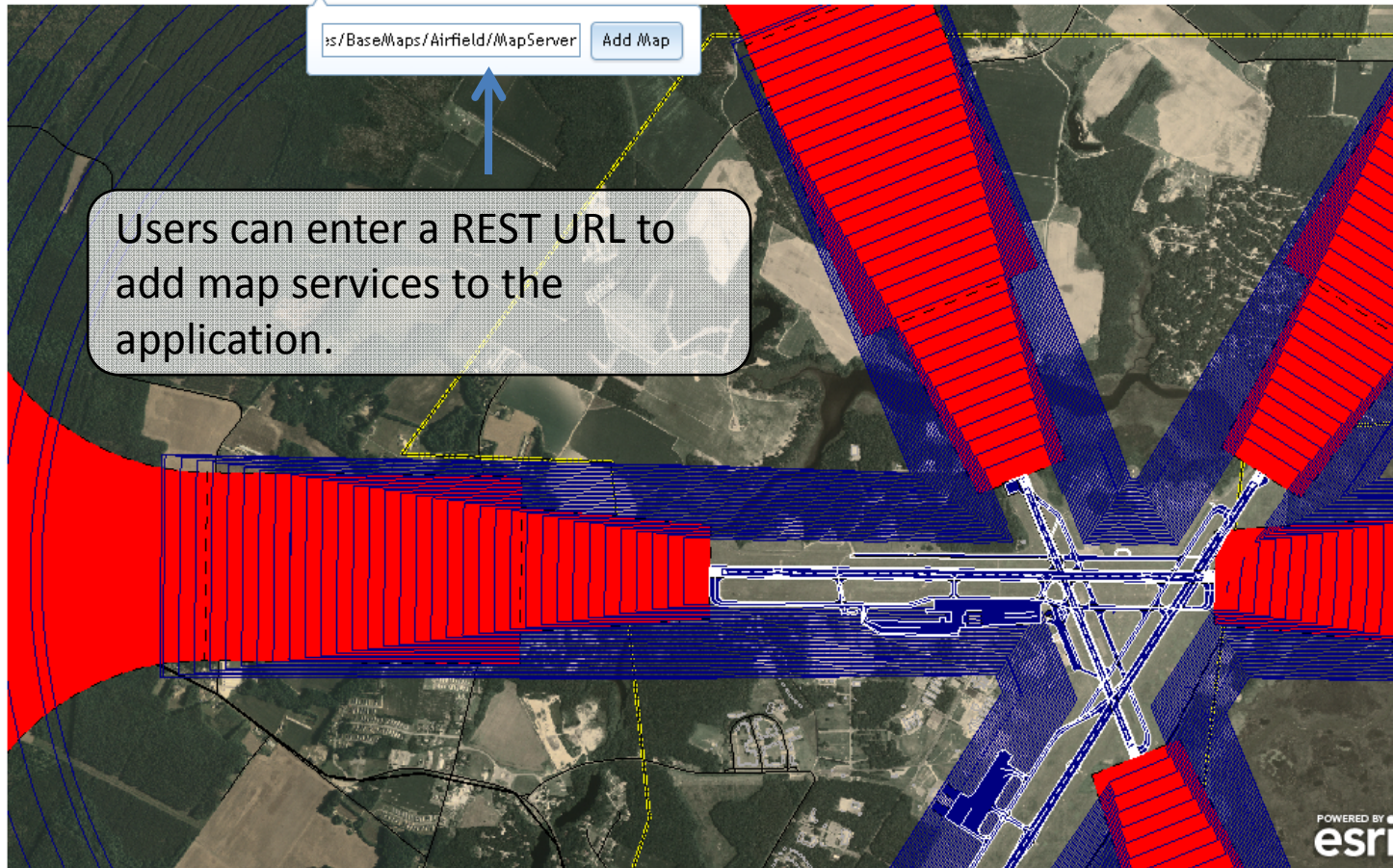
Add Map Services from Local or Other Sources



Query Building ▾ Base Map ▾ Add Map Service ▾ Bookmarks ▾

es/BaseMaps/Airfield/MapServer Add Map

Users can enter a REST URL to add map services to the application.



Legend Layers

ID	Center	Prop No	Prop Name	Current Status	Constructed On	Historic Status	MDI Score	Mission Criticality	Book Value	CRV	NASA Measurement	GSA Measurement	Total Gross (SF)
413	WFF	V-050A	UTIL CANOPY DYN BAL FAC	STANDBY	12/31/1963	ENH	91	MISSION CRITICAL	35716	360739	6,816.00 FT2	6,816.00 FT2	6816
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414	WFF	V-080	ROCKET MOTOR READY STOR	STANDBY	12/31/1963	ENH	35	MISSION DEPENDENT	110809	798604	5,920.00 FT2	1.00 EA	5920

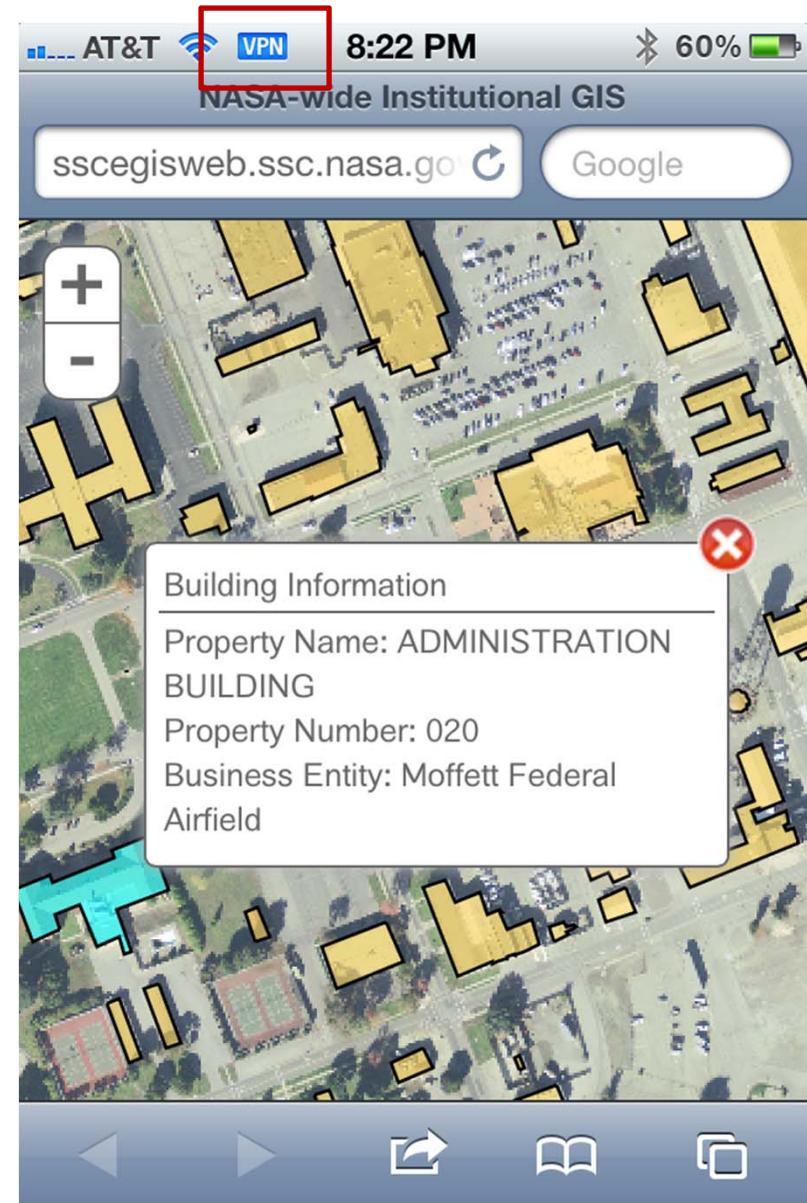
Add Map Services from Local or Other Sources



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- Building identify capability on iPhone and iPad using a Mobile Sample provided as part of the ArcGIS API for JavaScript
- Agency Network can be accessed by establishing a VPN connection via the device





National Aeronautics
and Space Administration

NASA-Wide Institutional
Geographic Information System



Demonstration



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- **Plans**



- **Broader Support for Complex Queries**
 - Search capabilities for data from previous fiscal years
 - Compound Queries
 - View results as report
- Explore the use of FRPP Data model and web templates to show metrics within the portal.
- Wider use of floor plan data to provide spatial context to databases.
- Increased functionality on mobile devices, more device support.



Questions?

Contact Information

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