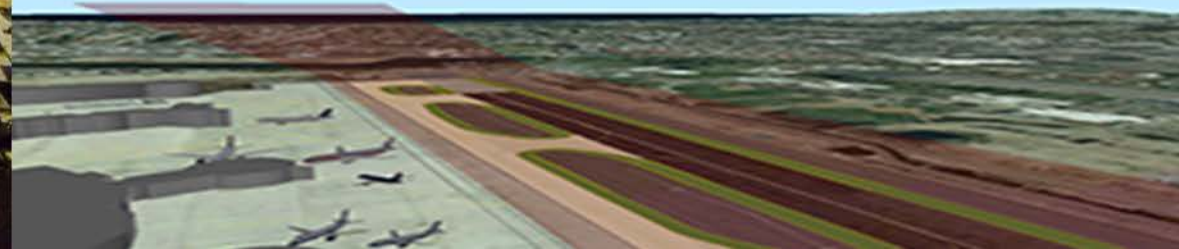


# GIS IN AIRPORTS SOLUTIONS & APPLICATIONS

DECEMBER 2017





# Agenda

- About Esri Northeast Africa
- What is GIS ?
- GIS In Egyptian Aviation Sector
- GIS For Airport Solutions & Applications
- Atlanta Airport Case
- Live Demo
- Discussion



An aerial photograph showing the Great Pyramids of Giza in the background, a dense urban area in the middle ground, and a green field in the foreground. The image is split diagonally: the left side shows the original photograph, and the right side is a green-tinted version of the same scene. The text 'About Esri Northeast Africa' is overlaid on the green-tinted right side.

# About Esri Northeast Africa



**20****Years****Geospatial Solutions & Services  
Provider****5****Countries****Egypt (as QSIT)  
Libya, Sudan, South Sudan and  
Chad (as Esri NeA)****10****Industries****In different sectors****1<sup>ST</sup>****Branded****GIS Company compliant with CMMI****100****Footprints****Professional Services****150****Technical****Team members**



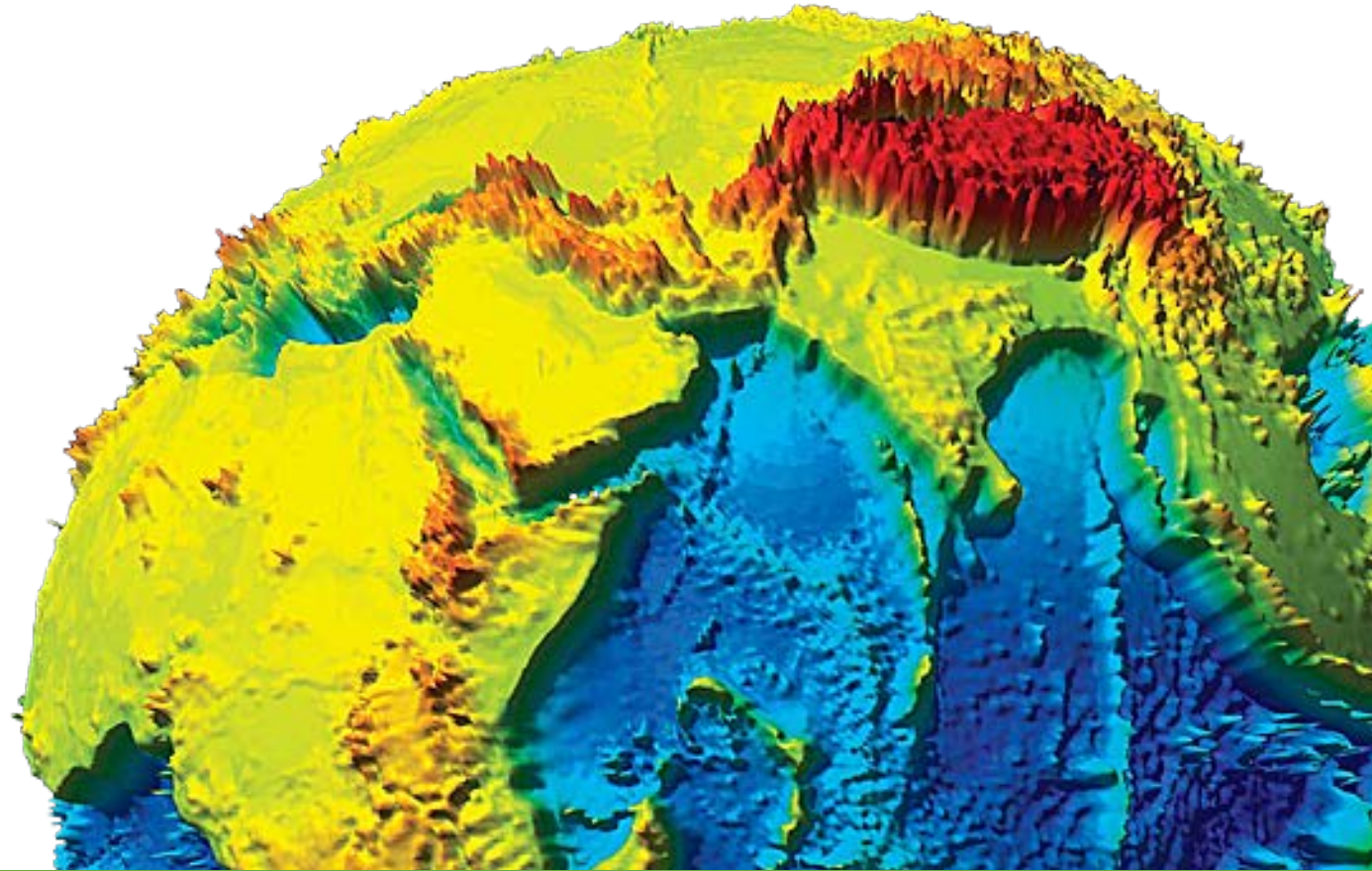
An aerial photograph showing the Great Pyramids of Giza in the background, a dense modern city in the middle ground, and a green field in the foreground. The image is split diagonally: the left side shows the original photograph, and the right side is a semi-transparent green overlay with a faint city grid pattern.

# What Is GIS ?



# GIS Is Based On Geography – The Science of Our World

- Understanding
  - Patterns
  - Relationships
  - Processes
- Conceptualizing
- Modeling
- Visualizing

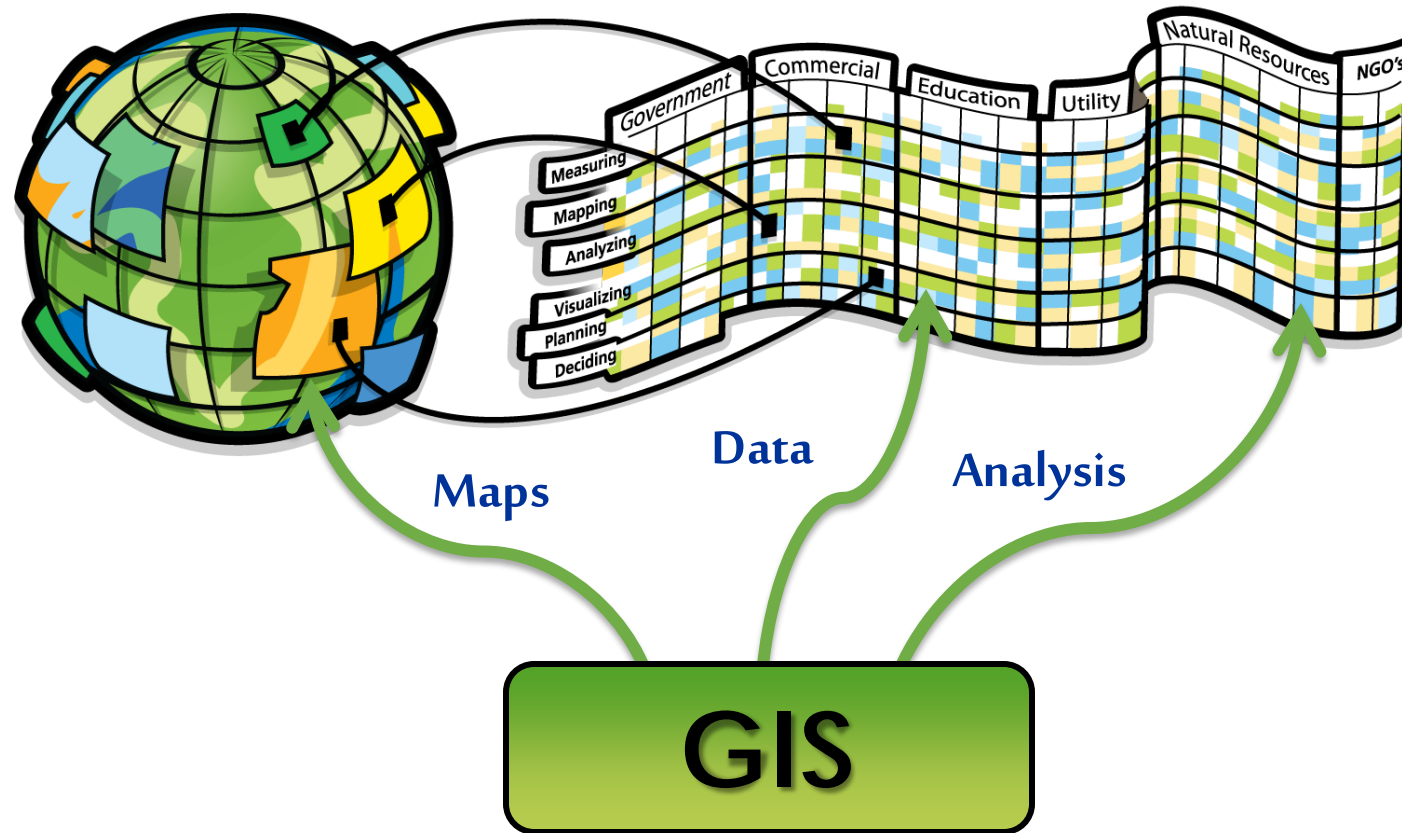


... By understanding geography and people's relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.



# GIS Technology

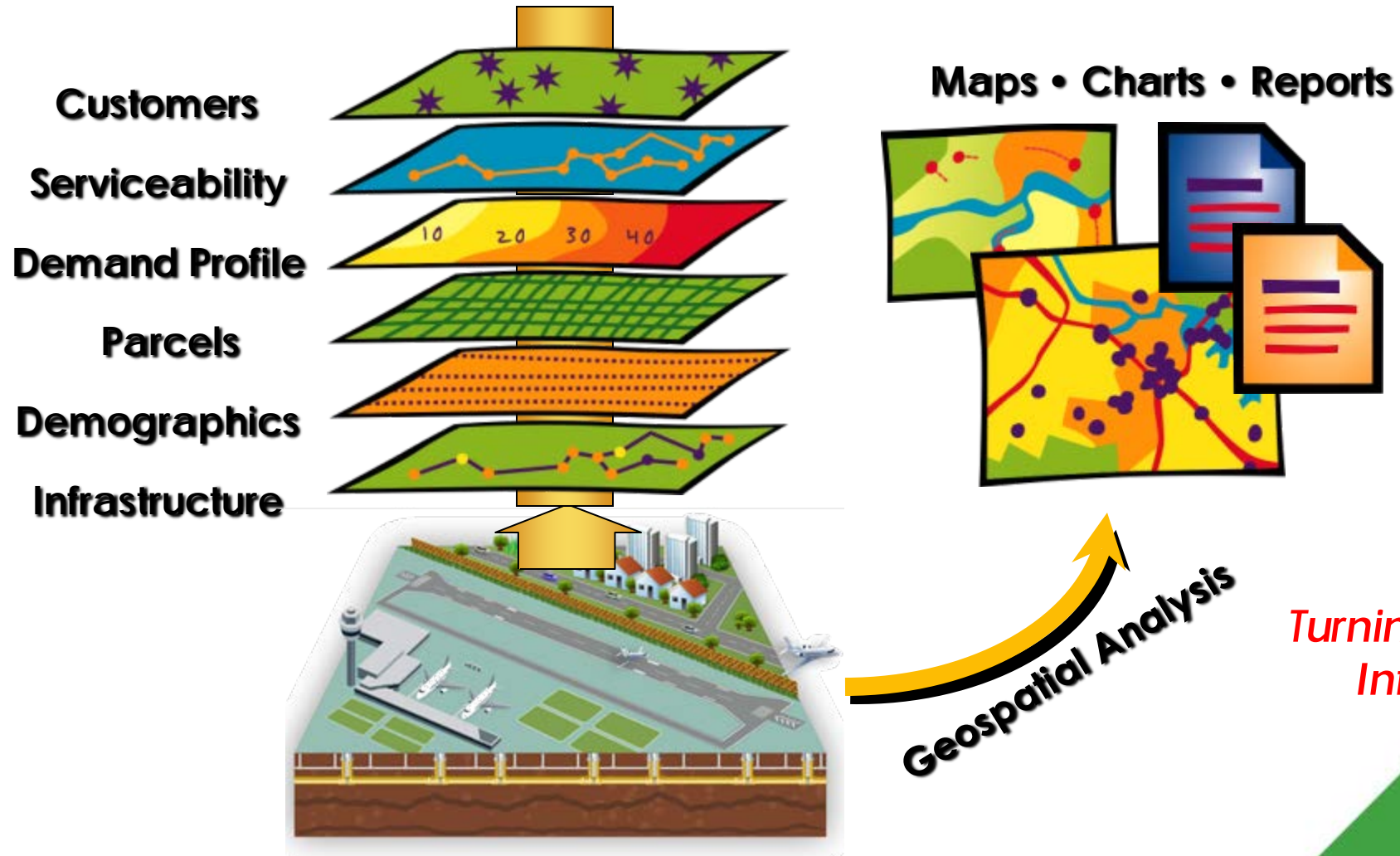
Linking tabular data with its real location



GIS provides several different map layers where each layer holds data about a particular kind of features related to spatial phenomena.



# Abstracting Real World Objects into Layers





# GIS and CAD

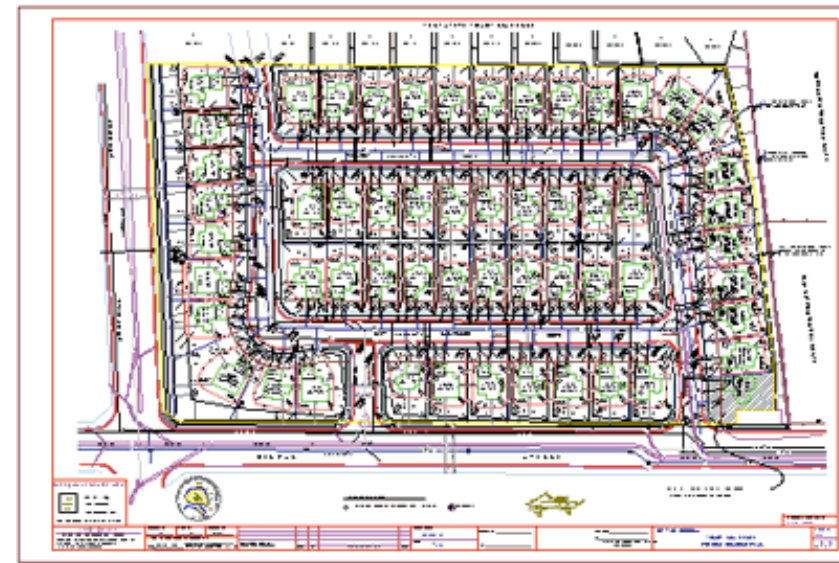
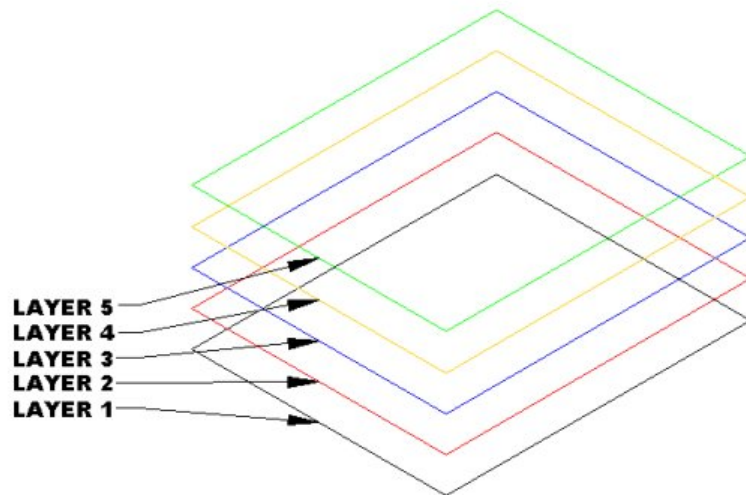
What is the difference between  
Geographic Information Systems (GIS)  
and Computer Aided Drafting (CAD)?



# CAD Program

## CAD is a graphics program

- Graphic elements are described by a mathematical equation or a set of parameters
- Designed to enable and enhance drafting using the computer
- With CAD, it's the lines that are important, i.e. the drawing is the information

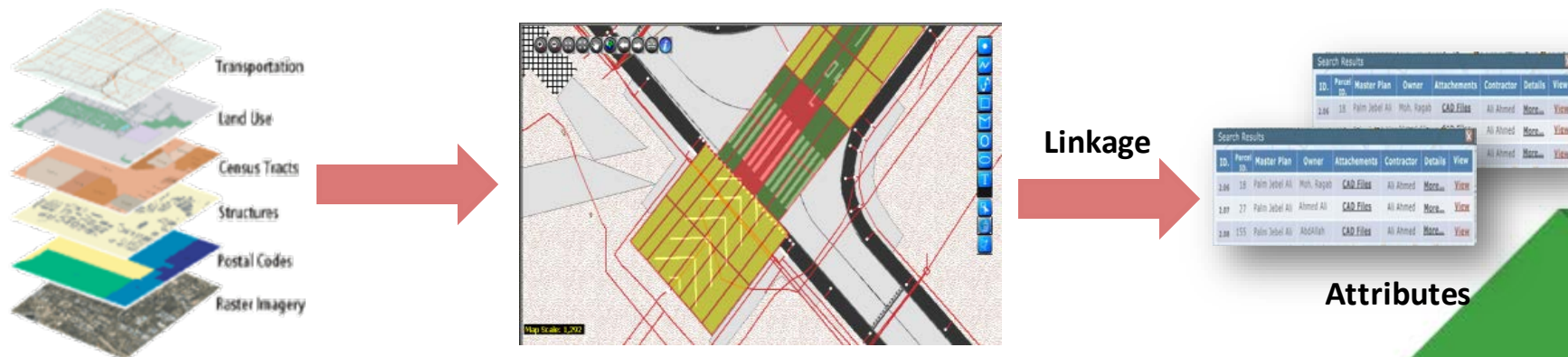




# GIS Technology

## GIS is a Technology Filling the Gap Left by CAD

- Links Between Geometry & Attributes
- Built on relationships:  
Features / Features & Features / Tabular
- Enables:  
Network-Analysis, Spatial Analysis & what-if scenarios required for tasks



# Benefits of implementing GIS



Representing stored tabular data (attributes) with simple cartographic features (points, lines, and polygons)



Understanding networks, enclosed areas...etc



Giving users the flexibility to choose the symbology of the cartographic objects based on attributes in the database



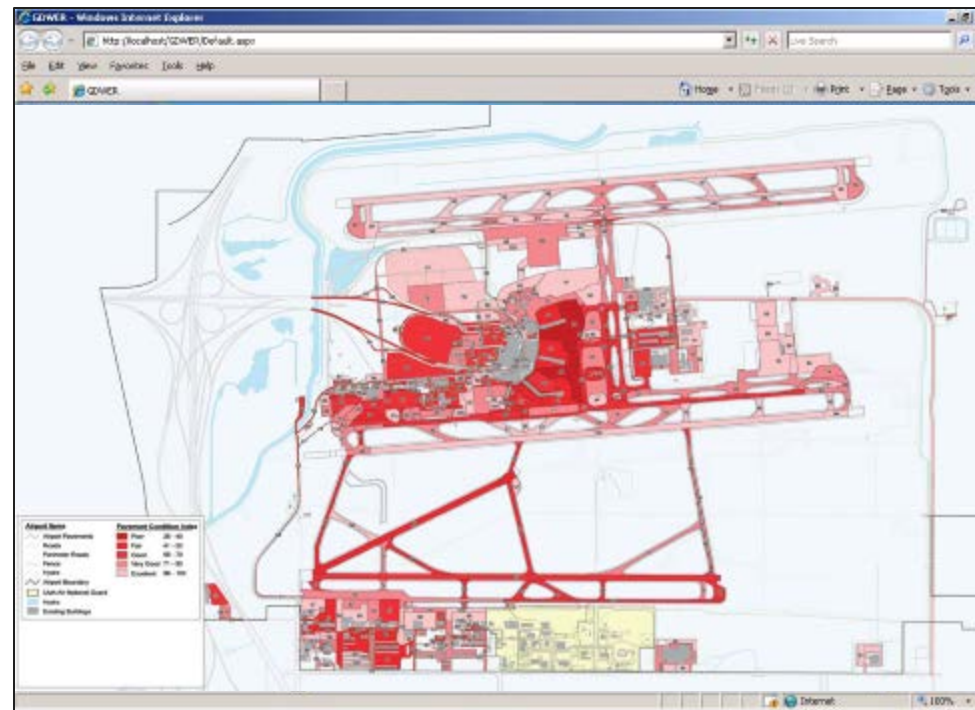
# GIS Layers



**I SEE MEANS I UNDERSTAND**

**GIS: A Tool to provide the Visual Details  
*NOT* Seen with  
Tabular Data**

Research



Take  
Decision

Make Action

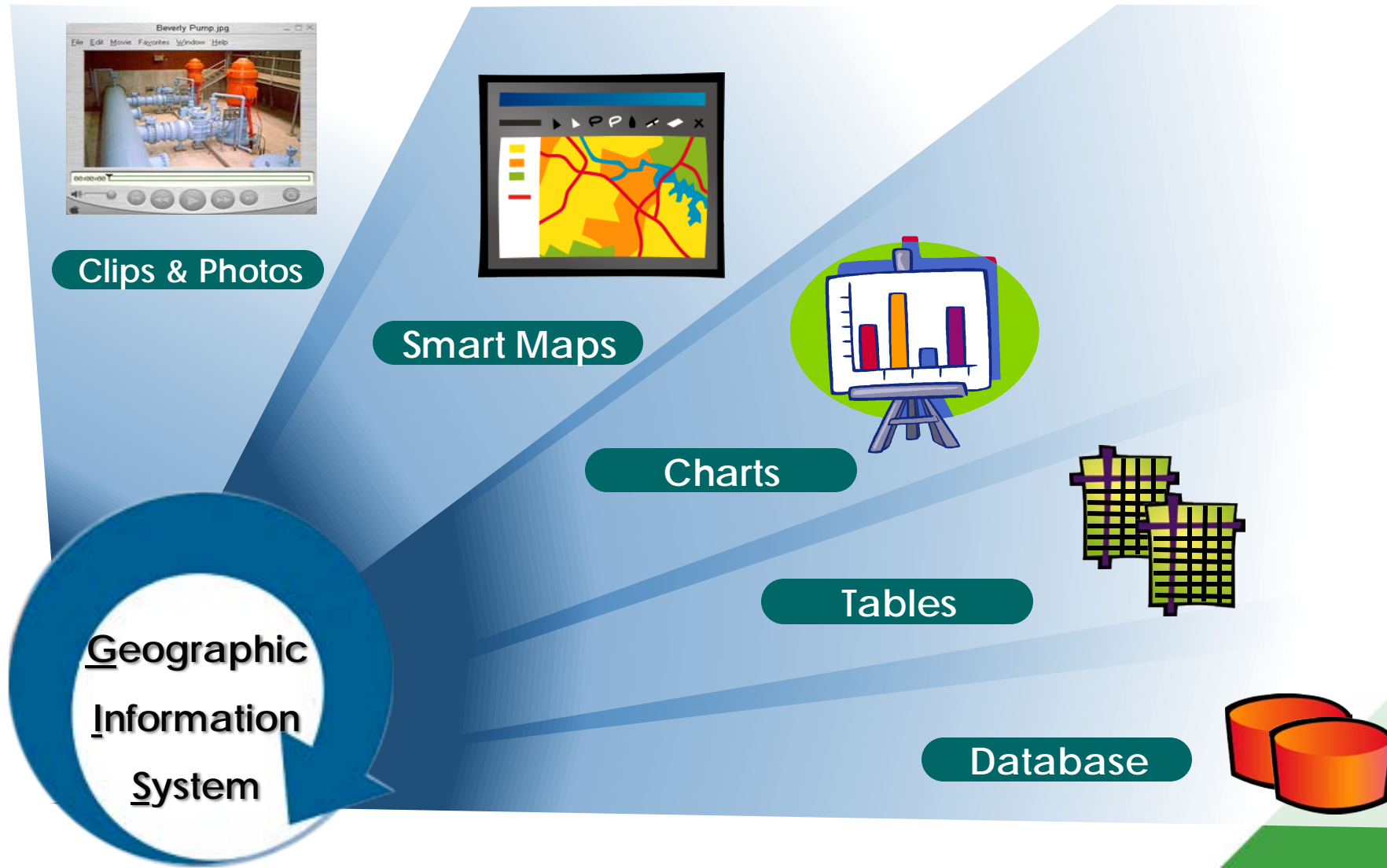
# GIS Components

- People
- Applications
- Data
- Hardware
- Software





# Outputs from GIS

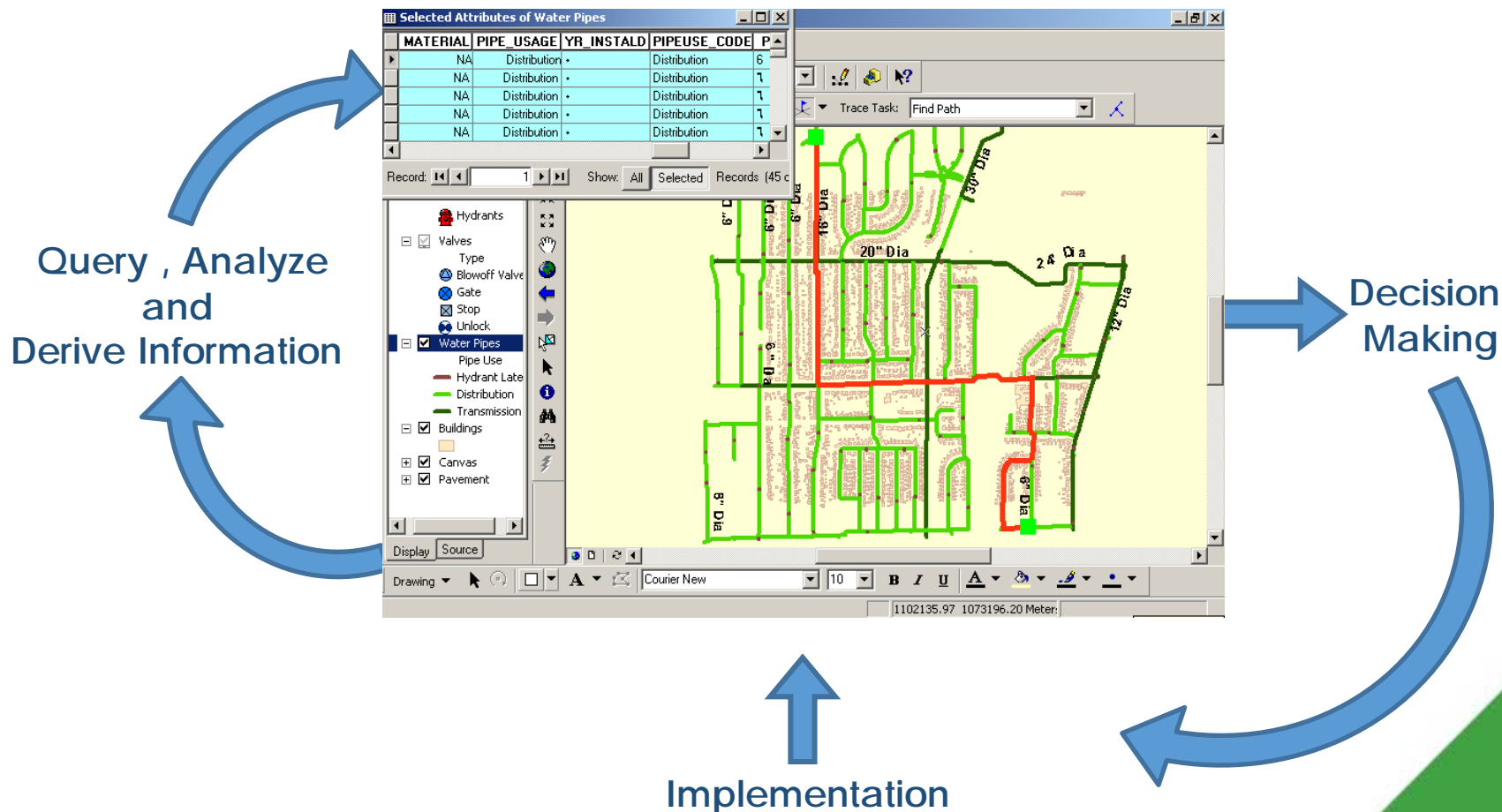




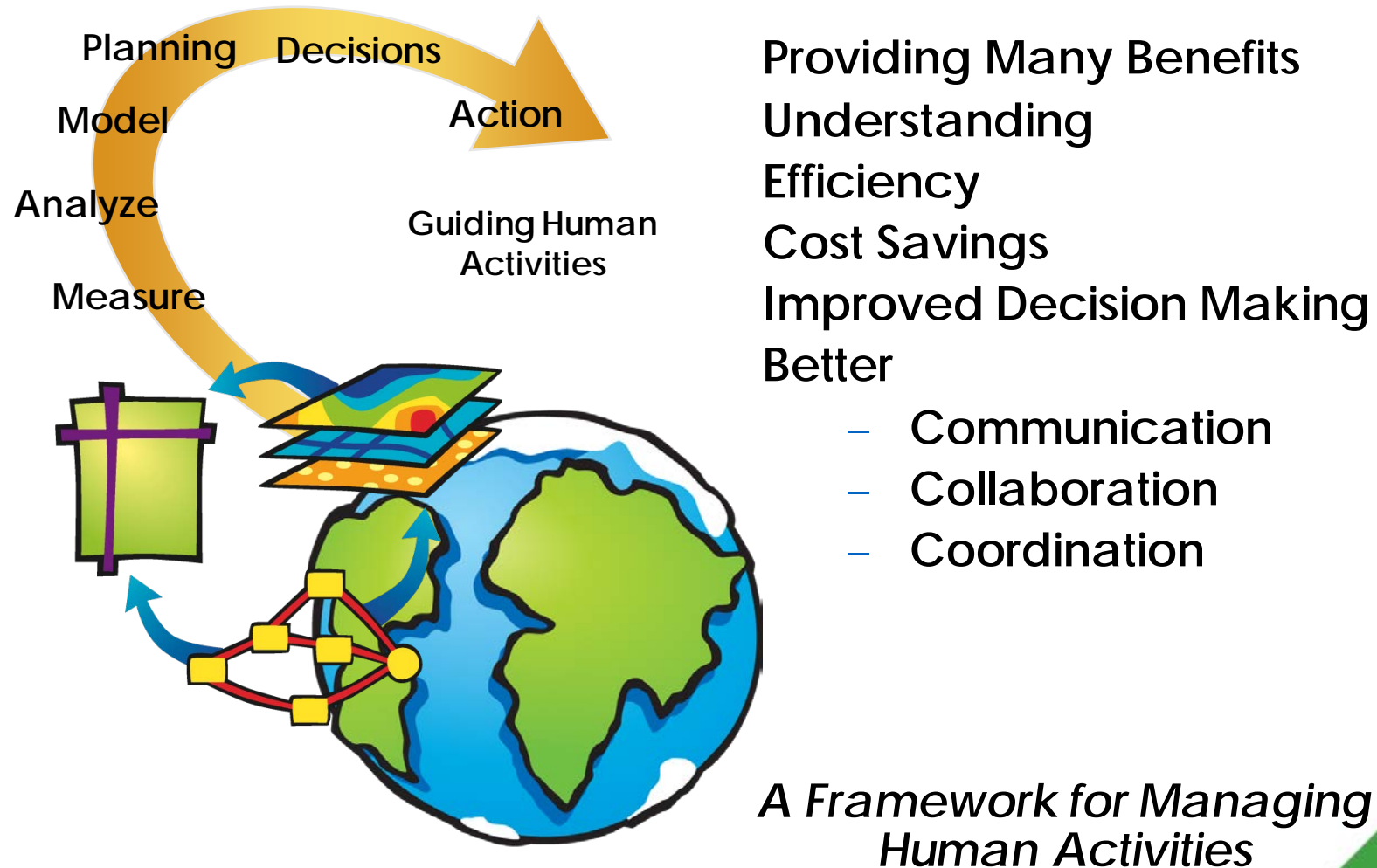
# A picture is worth a 1000 words

## Smart Maps as a tool for Decision Making

A tool to get not evident information through tabular data

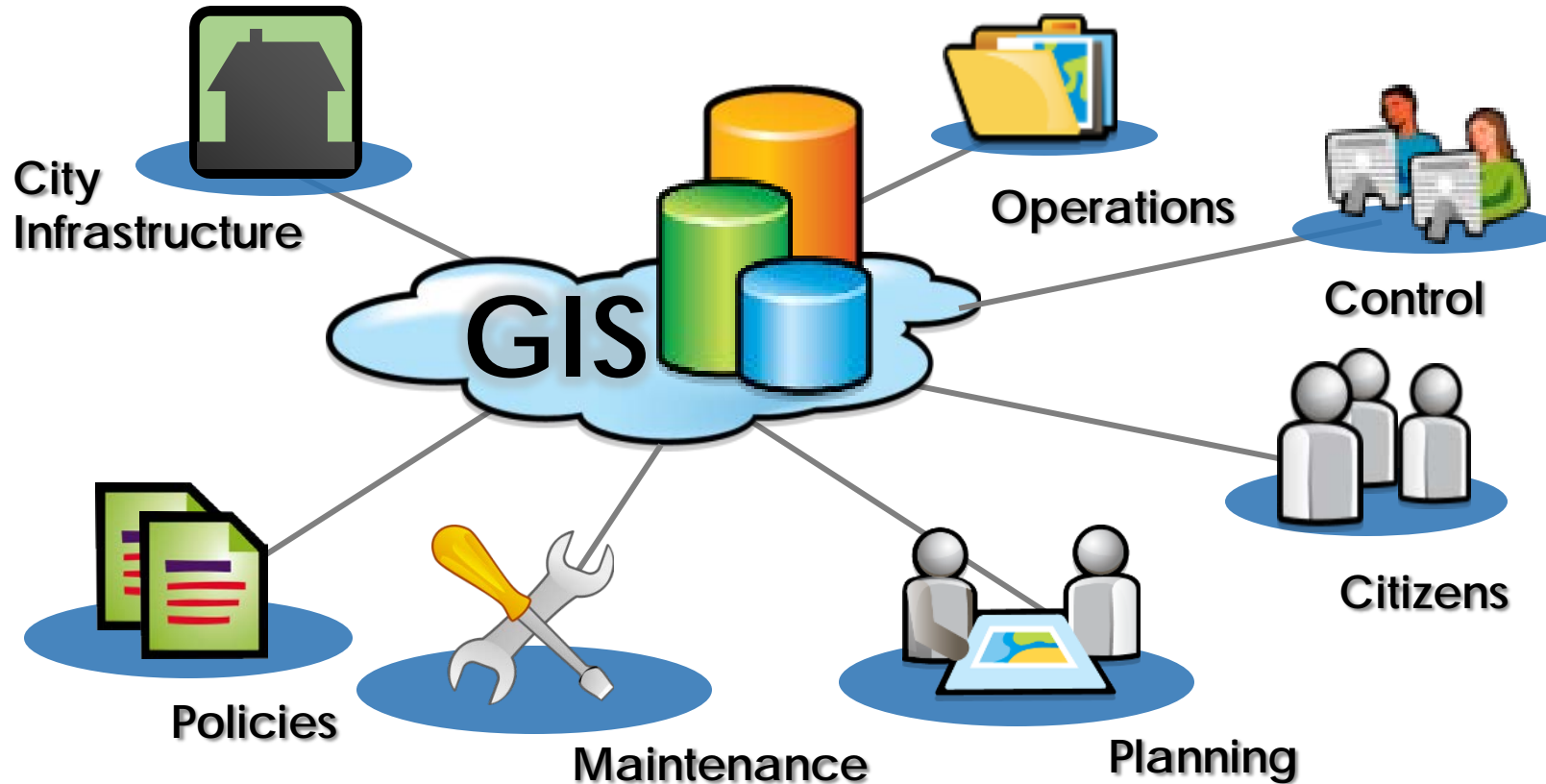


# GIS is particularly valuable.....





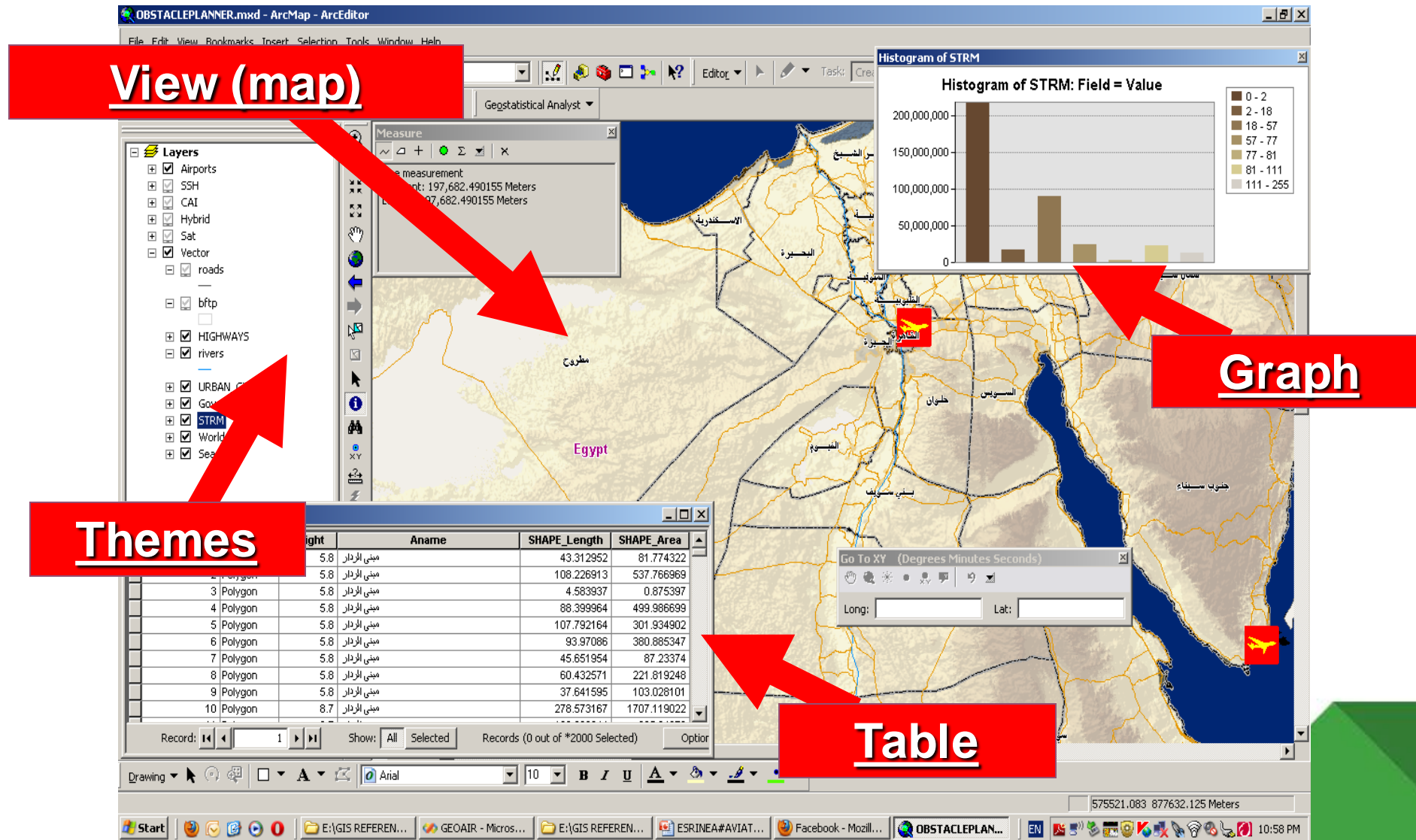
# GIS Creates Intelligent Communities



## More

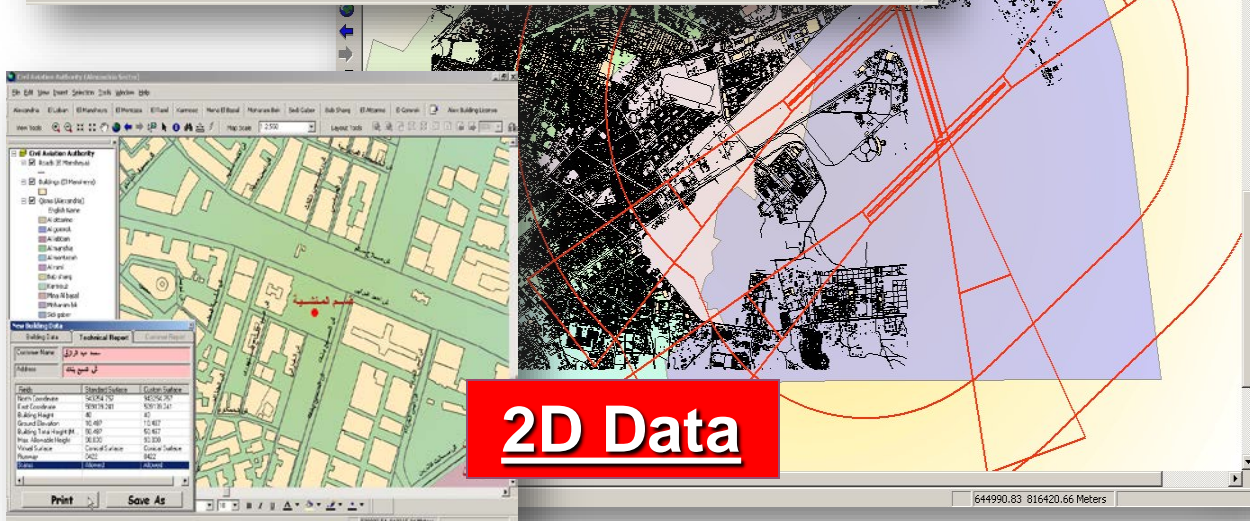
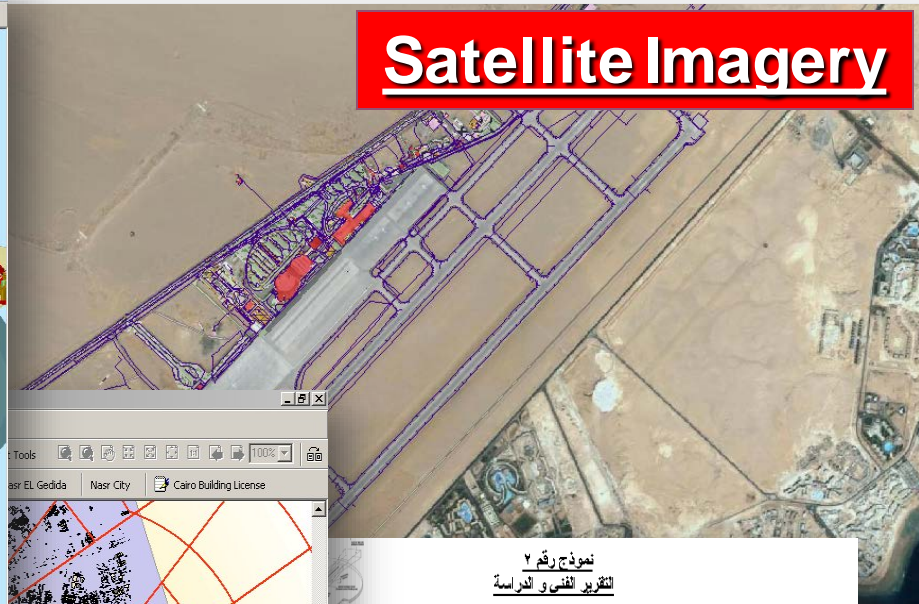
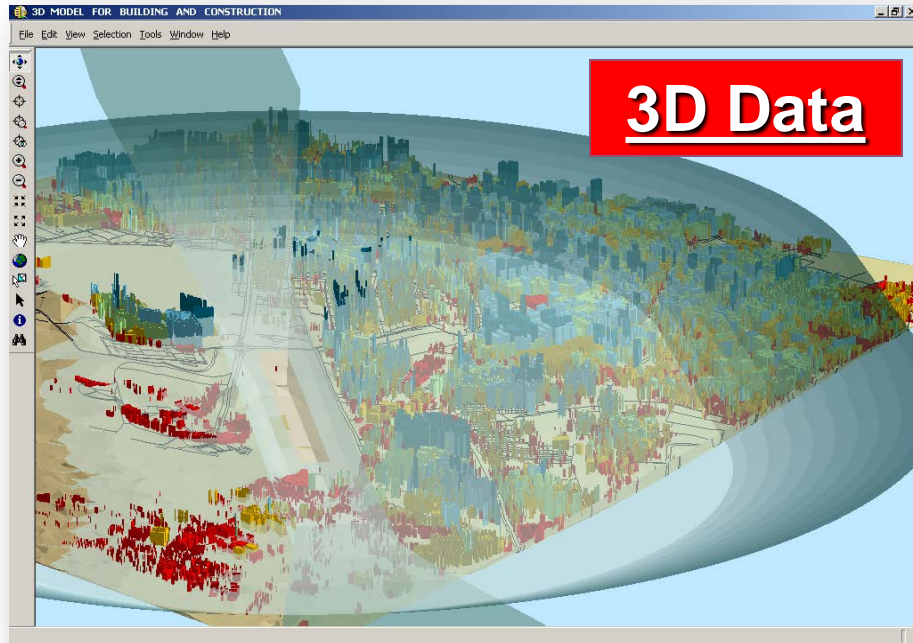
- Efficient
- Effective
- Responsive
- Integrated
- Sustainable
- Participatory

# Example GIS Display





# Example GIS Display



## Satellite Imagery

### نموذج رقم ٧ التقرير الفني والدراسة

اسم هيئة الرقابة  
اسم صاحب التصريح  
عنوان المنشأ

Ahmed Reyad Hassan  
9 Abdel Mohsen Soliman , EL Dokki

Standard	0422	المطابق الواقع في دائرته المنشأ
944027.018		الاحداثيات الشمالية للمنشأ ETM
511311.669		الاحداثيات الشرقية للمنشأ ETM
13.901		منسوب ارض المنشأ فوق سطح البحر
20		الارتفاع المطلوب من سطح الأرض
33.901		منسوب اعلى نقطة في المنشأ من سطح البحر
Inner Surface (0422,42.124)	Inner Surface (1836	الارتفاع المسموح له من سطح البحر
	43.285)	

المنسوب المطلوب  
المنسوب المسموح به من سطح البحر

Inner Surface  
42.124

## Reports

الارتفاع المسموح  
اسم القائم بالدراسة  
اسم مدير الرقابة





# GIS In Egyptian Aviation Sector



# Challenges Facing Airports

- **New & Evolving Airport Regulations**
  - Compliance Management
- **New Generation of Digital Information**
  - Analog to Digital Data Transition
  - Data Management is critical
  - Data Consistency/Integrity is paramount
- **Improved business efficiencies required**



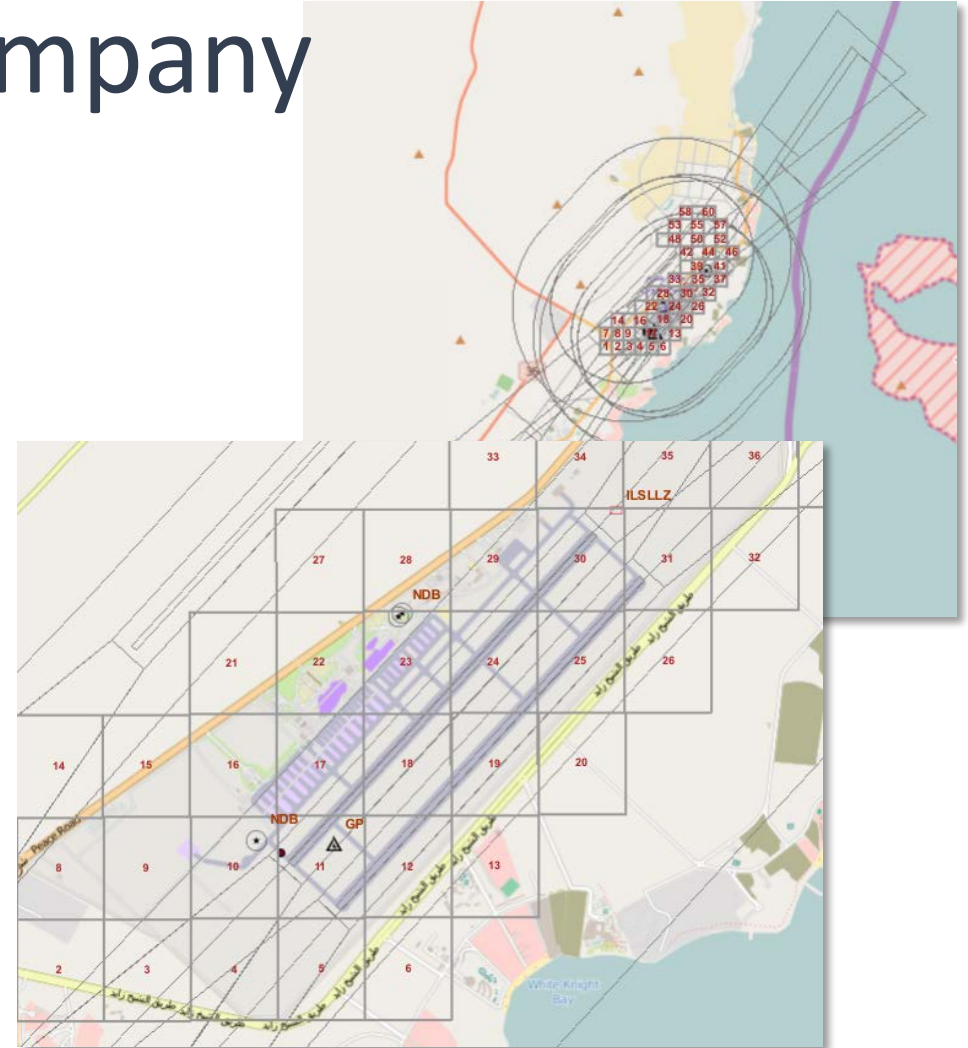
# GIS at Egyptian Airports Company

- **Data Management**

- Standardized/Extensible Data Model
- Data Exchange
- Data Validation

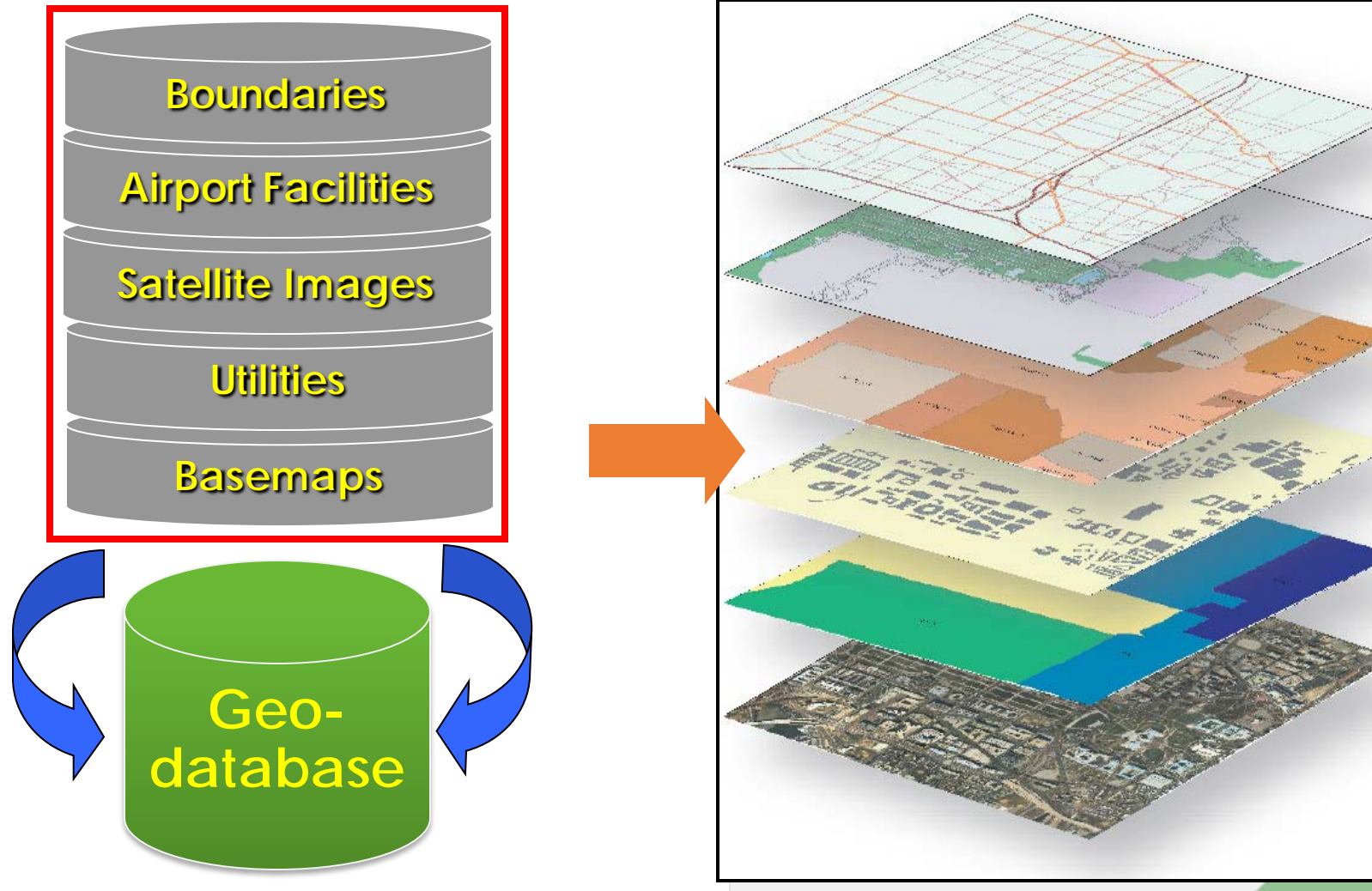
- **Obstruction Management**

- Surface Creation/Modification
- Obstruction Analysis/Evaluation
- Visualization

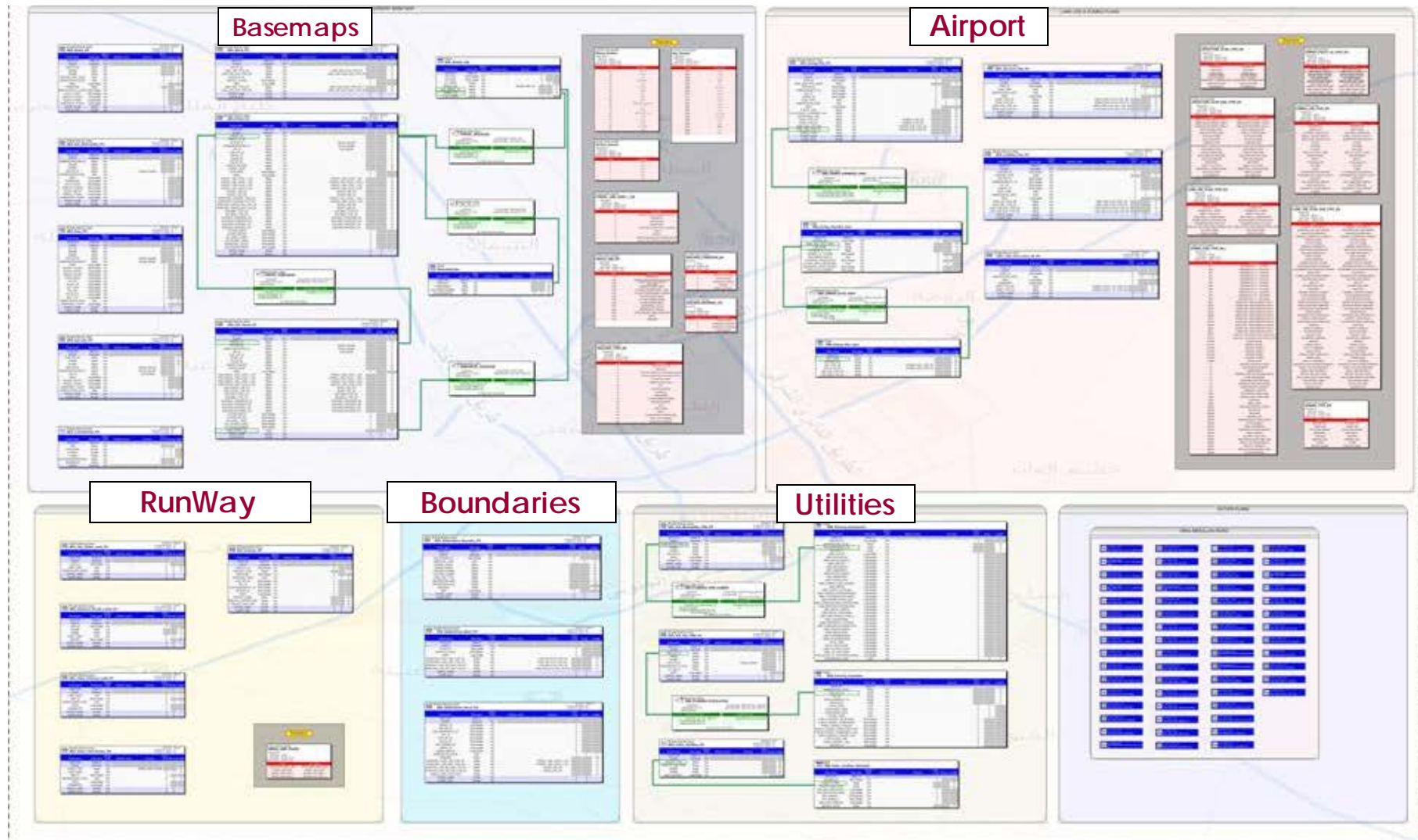




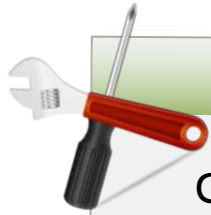
# Airport Geodatabase



# Airport Geodatabase

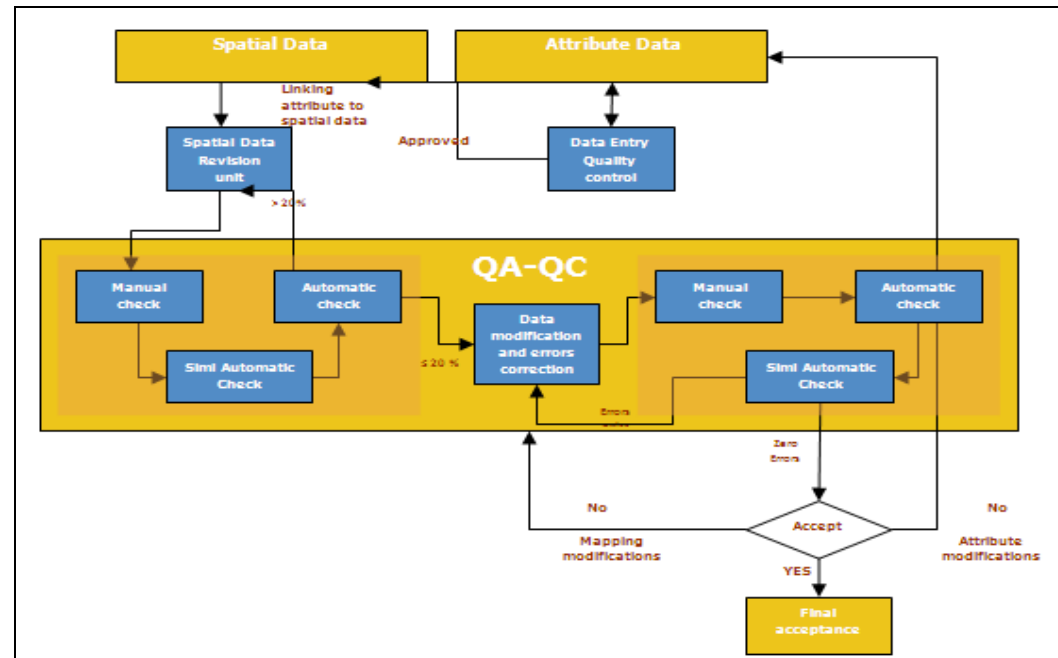


# QA/QC



## Quality Assurance/Quality Control

QA\QC operations on the data in order to reach the maximum consistency and meet the international data standards.

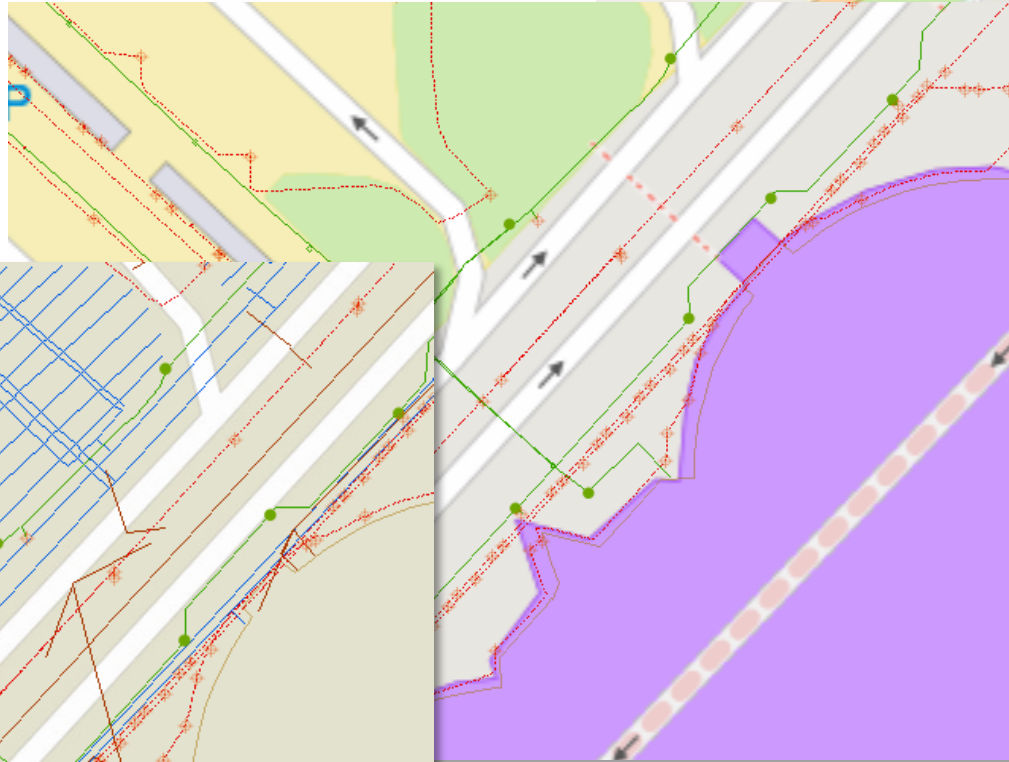




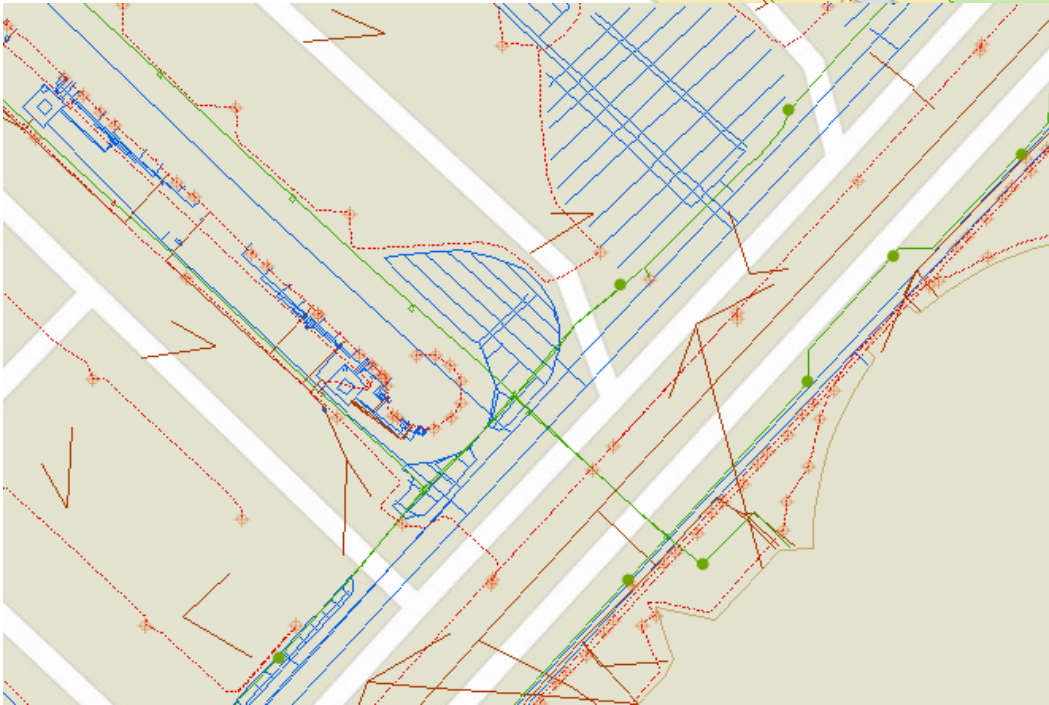
# Sharm El Sheikh Airport



Basemap & Runways



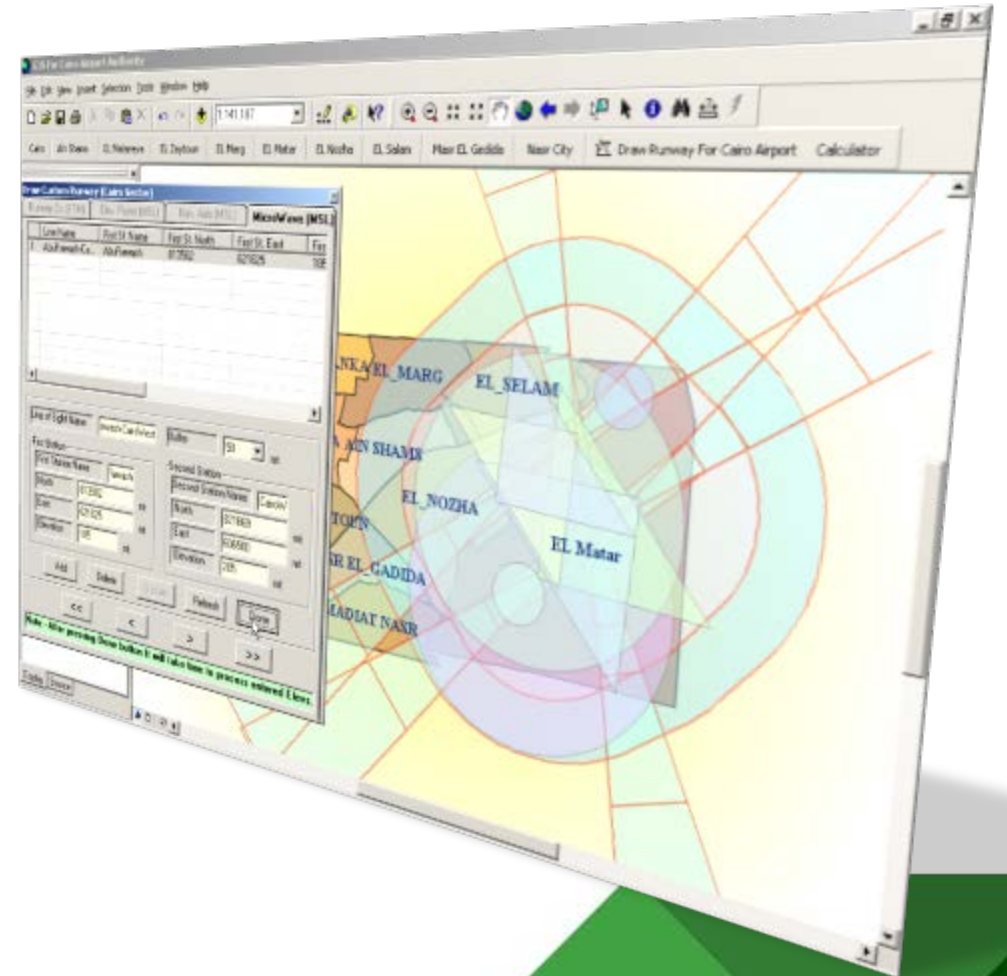
Airport Facilities



Airport Utilities

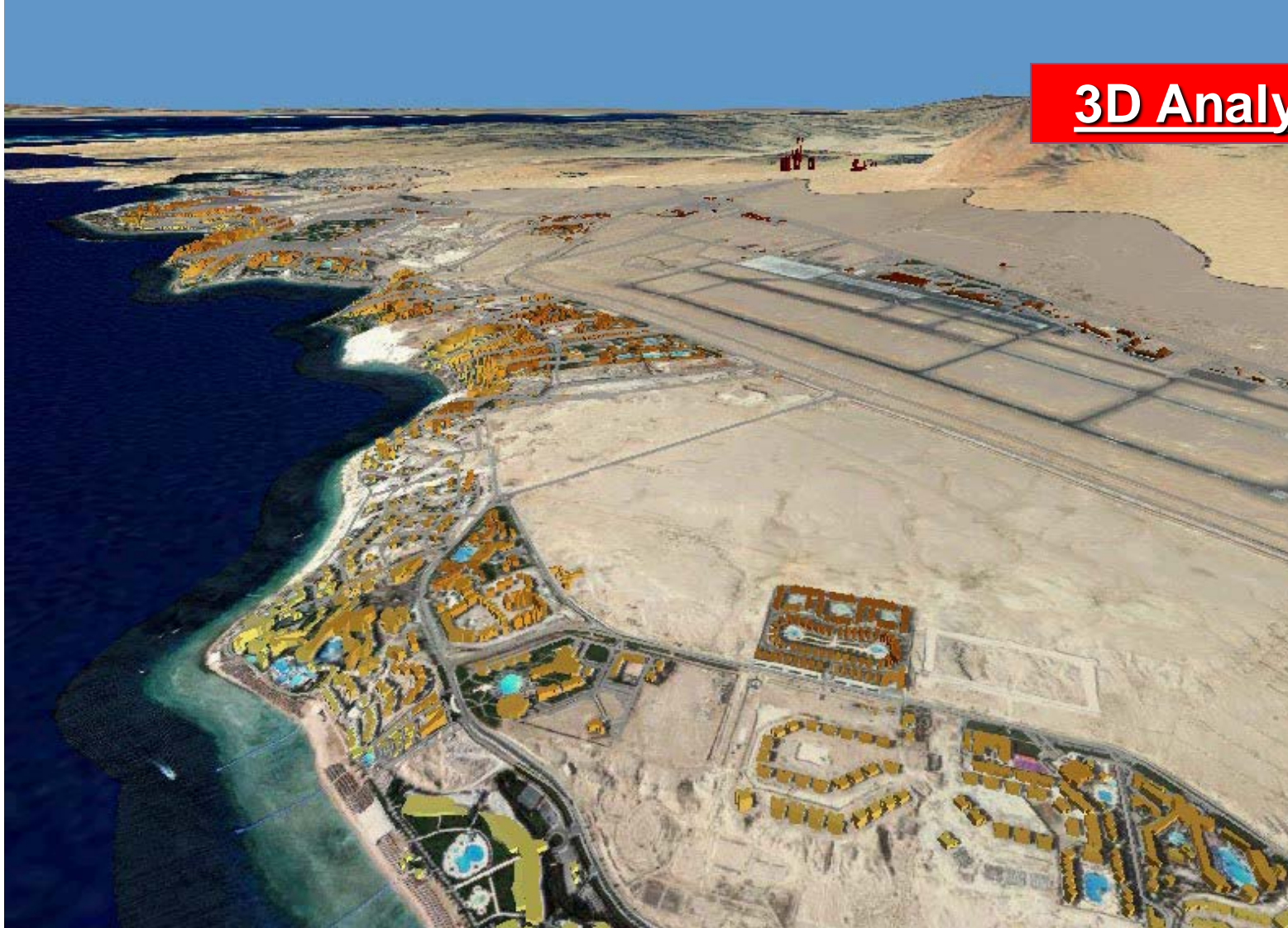
# Obstacles Permitting for Egyptian Civil Aviation Authority

- Egypt's Civil aviation Authority turned to GIS to support automating permits issuing for obstacles around the Airport areas, Generating both technical and customer reports.





# Sharm El Sheikh Airport



3D Analyst



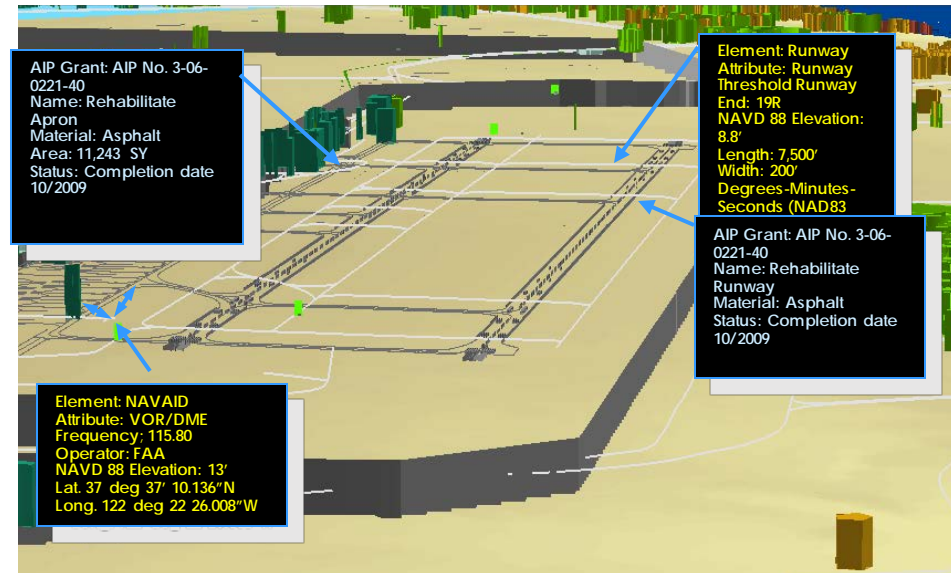
An aerial photograph showing the Great Pyramids of Giza in the background, a dense urban area in the middle ground, and a green field in the foreground. A large green diagonal overlay covers the right side of the image, containing the title text.

# GIS For Airport Solutions & Applications

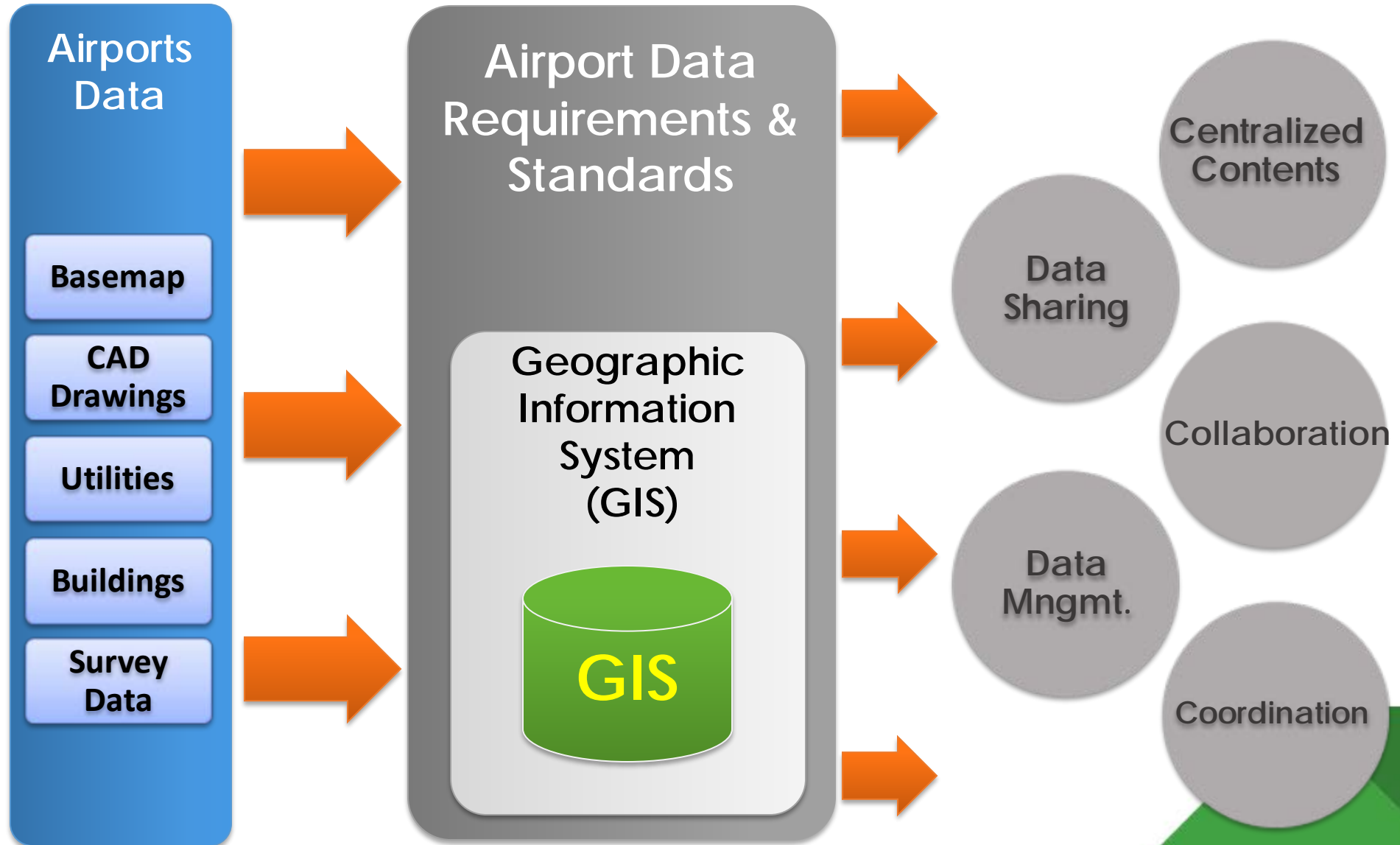


# Vision

What if... We could capture and validate Airport data against a defined standard, export it, and make it available electronically for whoever needs it?



# Vision

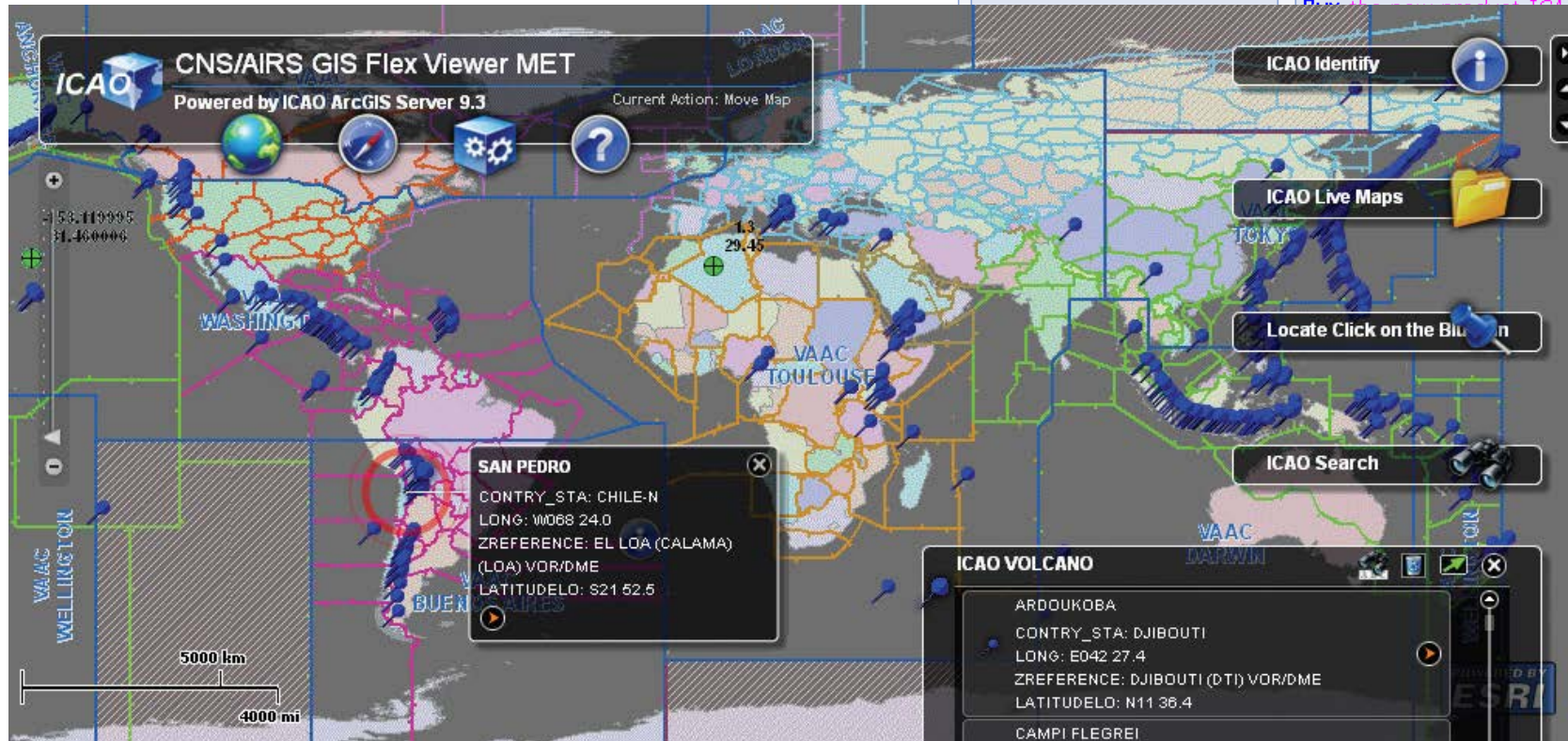




# Vision

The global aeronautical community can access ICAO GIS information via the Internet using ArcGIS.

The screenshot shows the ICAO GIS Portal website. The header features the ICAO logo and the text "ICAO GIS Portal" and "Global Air Navigation Plan". Below the header is a navigation bar with links: Home, eDoc, eShop, eService, Support, and About. A search bar is located on the right. The main content area displays a date "Monday, April 11, 2011" and a "Home" link. There are several content boxes: "New ICAO GIS server" with links to "New ICAO ArcGIS server 9.3", "New SLNC ArcGIS Flex PROTO", and "New SLNC ArcGIS.net PROTO"; "Try the new ICAO GIS Services" with links to "ICAO new GIS Services" and "ICAO FIR Web GIS Services (Subscription)"; "GIS Data" with links to "AOP Data Maintenance proto", "ICARD SLNC Data Maintenance", and "MET Data Maintenance New"; and "Old GIS Tutorial" with links to "ArcIMS GIS Quick help - Eng.", "ArcIMS GIS Quick Help - Fr.", "Google Earth - Eng.", and "Google Earth - Fr.". A small map of Africa is visible in the bottom right corner of the main content area.



# Vision



Federal Aviation  
Administration

## Airports GIS

- [Login](#)
- [Newsletters](#)
- [AGIS Online Help](#)
- [AGIS Issues/Questions](#)
  - [Issue Tracking Form](#)
  - [FAA Response to Received Forms](#)
- [FAQ's](#)
- [Airports](#)
  - [Steps to Follow](#)
  - [Airport Regions](#)
  - [AIP](#)
  - [AC 150/5300](#)
  - [Contractor Security](#)
  - [Airport Sponsor Benefits](#)
  - [Planning Considerations](#)
- [Surveyors](#)
  - [Survey Intro](#)
  - [Airport Familiarization](#)
  - [Aviation Glossary](#)
  - [AIM](#)
  - [Airport Visual Aids](#)
  - [Airport markings/Signs](#)
  - [Phonetic Alphabet](#)

## FAA Airport Surveying - GIS Program

[Login to Airports GIS web application.](#)

### FAA Airport Surveying - Integration

The Federal Aviation Administration (FAA) is actively working to streamline the multiple existing survey applications into a single integrated system for the delivery of airport and aeronautical survey data to the FAA. While in development, this page serves as a gateway to the existing web applications: Airport GIS and the Third Party Survey System (TPSS). This integration is scheduled for completion in 2008 with the introduction of a single internet portal for the submission of airport and related aeronautical data. This integration is designed to meet the data requirements of an evolving national airspace system while planning to support the Next Generation national airspace system.

The integration is planned for implementation in three phases. The first phase includes integrating all survey submissions into a single application; support for open data standards; enhanced workflow and tracking capabilities; automatic validation on all submitted data; and a GIS viewer for the airport data. The second phase includes support for and production of electronic Airport Obstruction Charts and electronic Airport Layout Plans. The final phase of integration is planned to support multiple versions of the airport (preliminary, current, planned, and temporary) data and the ability to share data with other FAA systems such as iOEAAA and eNASR. Please stay tuned for more information regarding these future phases.

There is a tremendous amount of work ahead for the program but in the end it will be worth it. Please continue visiting our site to see our progress, which we will update in the News section.

### Why Integrate?

Each survey system has similar capabilities, though each approaches these similarities in a different manner and uses different processes and rules, the same overall conceptual workflow is used in each system. This provides a basic foundation for the development of an integrated survey system. Streamlining these similar survey sites into a single system is beneficial and provides better service to our customers (internal and external). TPSS was developed as a solution to address a specific need and the successful functionality it contains will be included in the integrated system. This integrated system will go beyond management and survey validation provided by the TPSS.

- Accepting fully electronically generated survey data:

### Latest News Letter

Volume 2, Issue 1 includes the following:

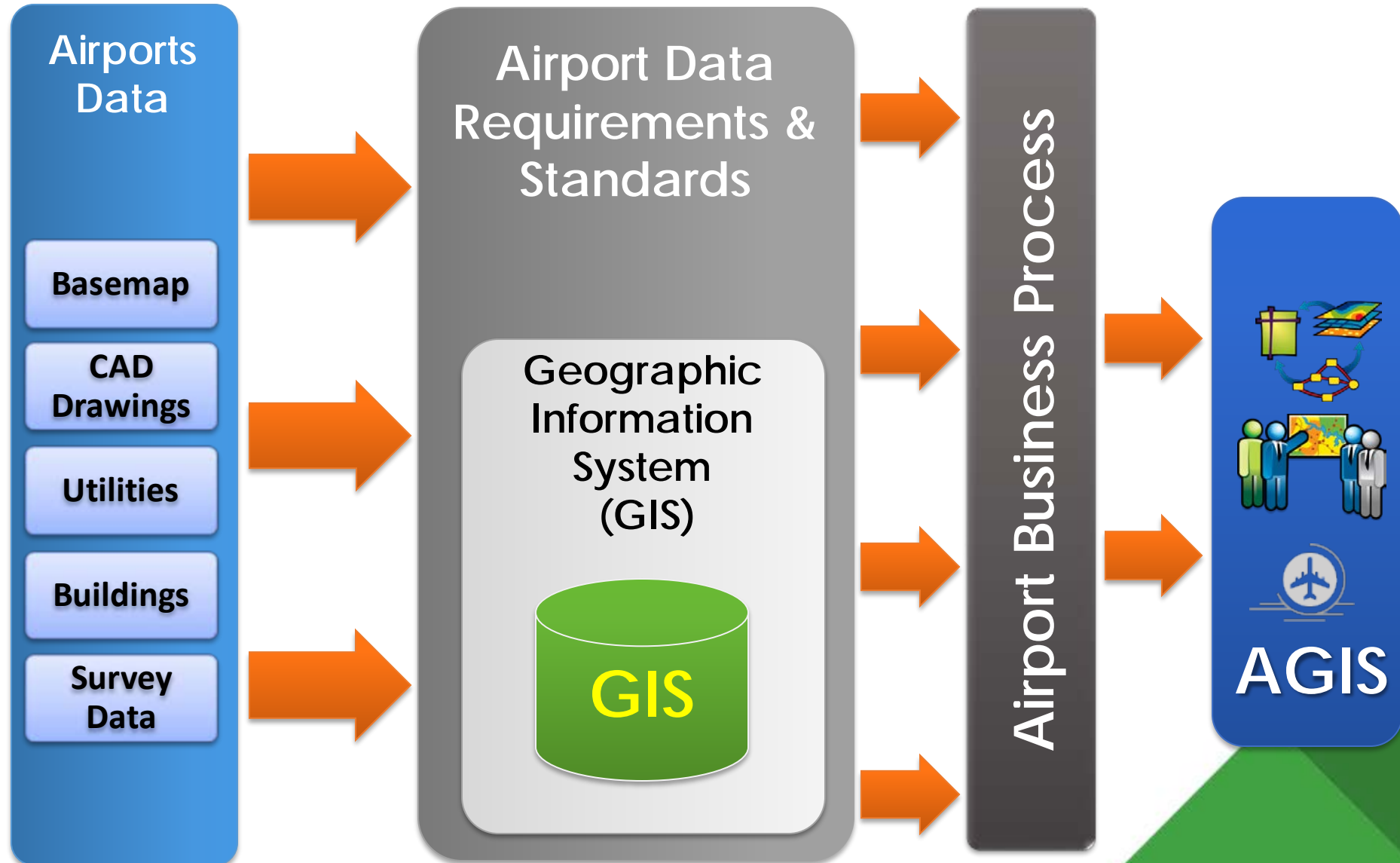
- Airports Geographic Information System (AGIS)
- A Guide to Airport Surveys
- Airport Policy Guidance
- AC Integrated Distance Learning Environment (IDLE)
- 5010 Program Into AGIS
- AGIS Issue Tracking Form
- Electronic Airport Layout Plan (eALP)
- Tech Tips
- Airport Conferences

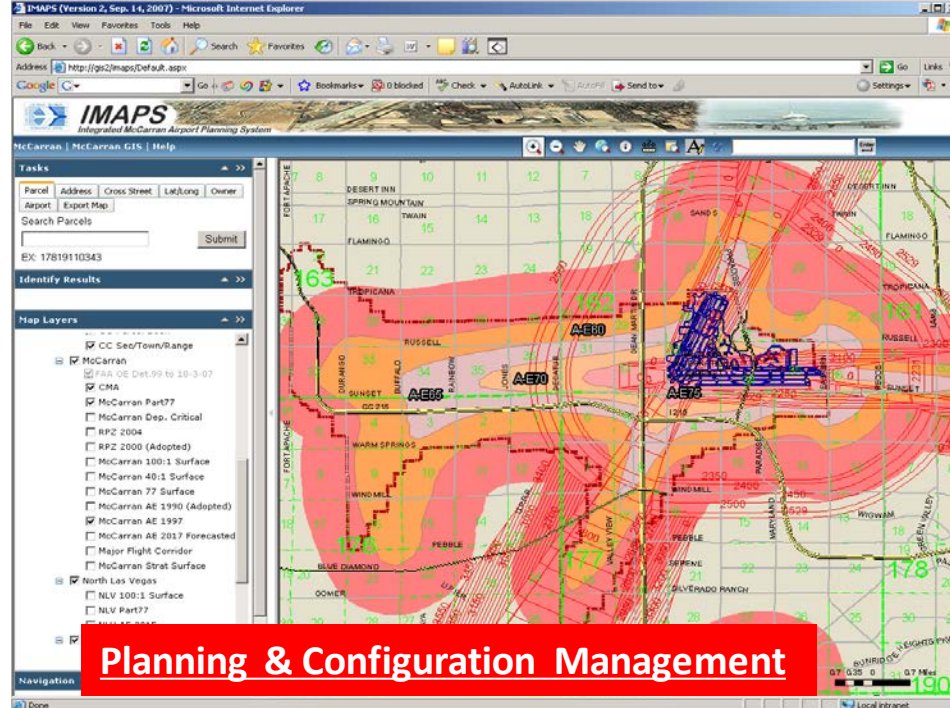
 [Open as PDF](#)

<https://airports-gis.faa.gov/>

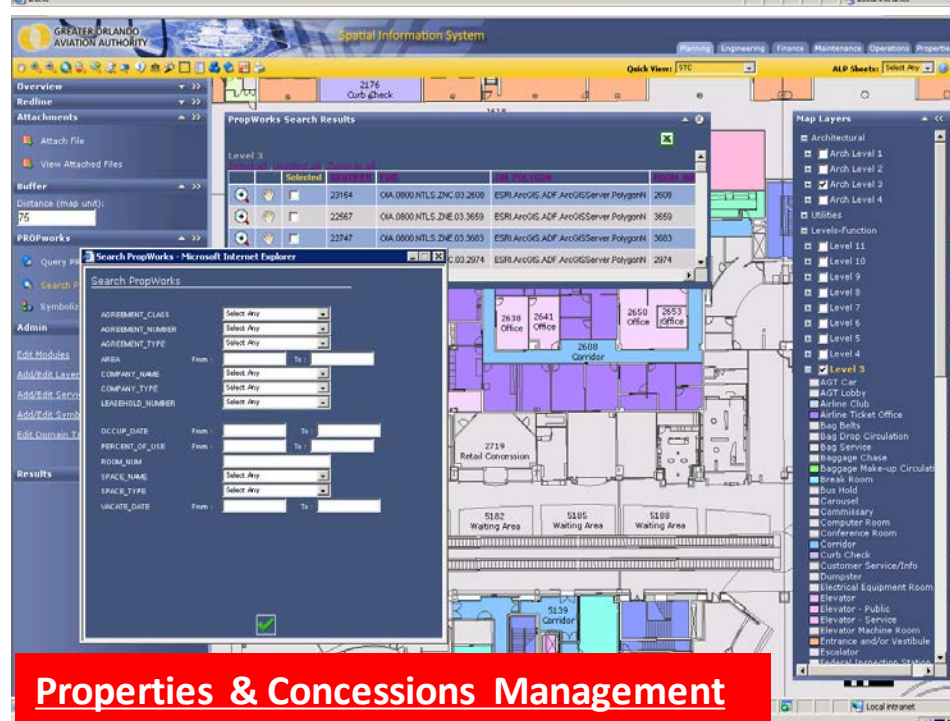


# Vision - **AGIS**

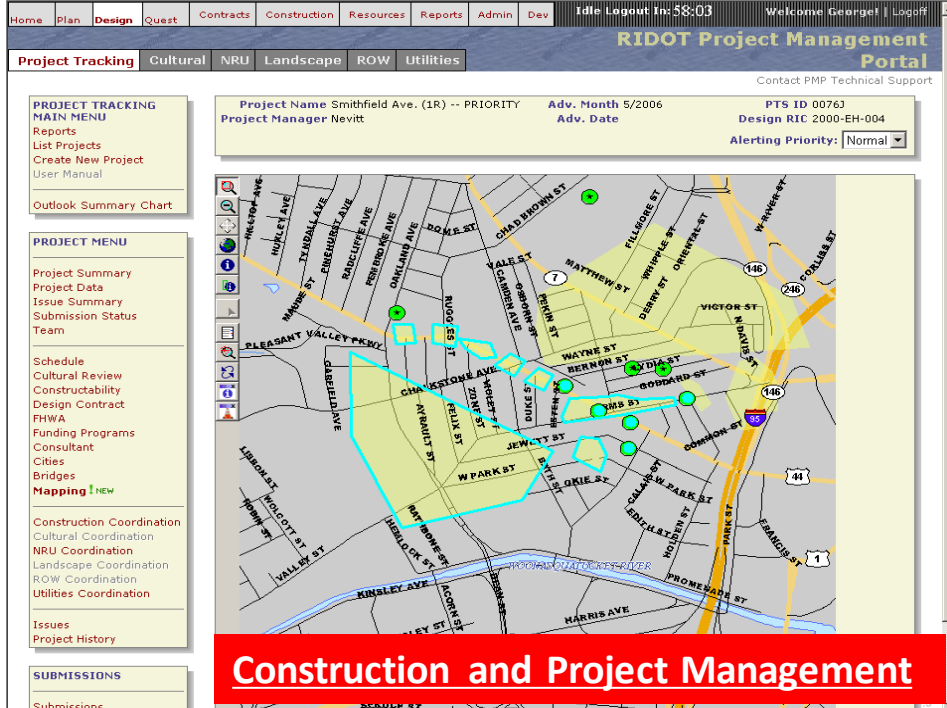




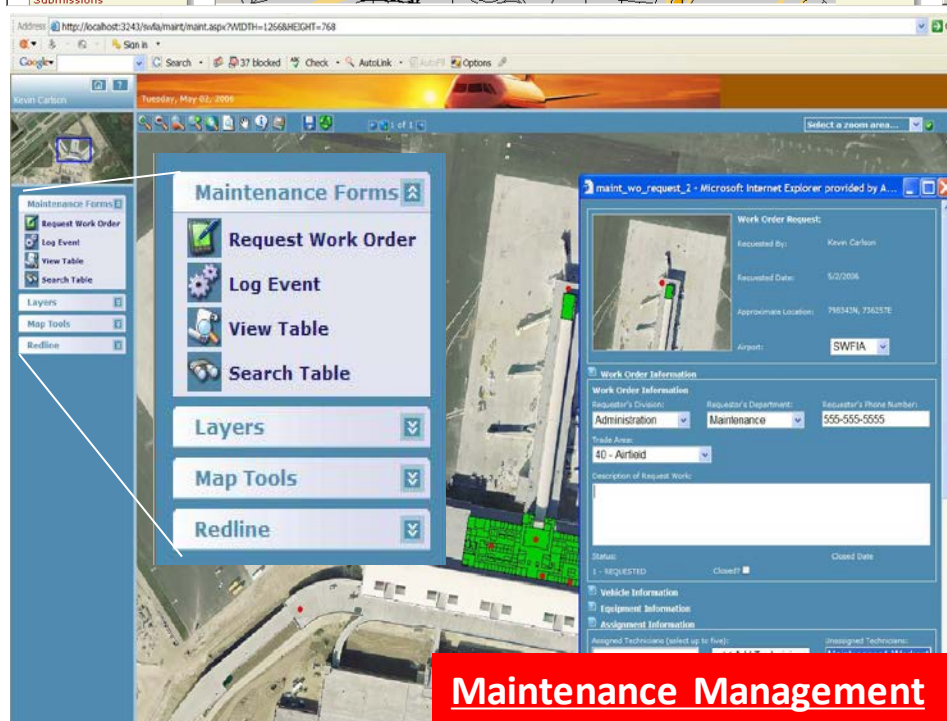
## Planning & Configuration Management



## Properties & Concessions Management

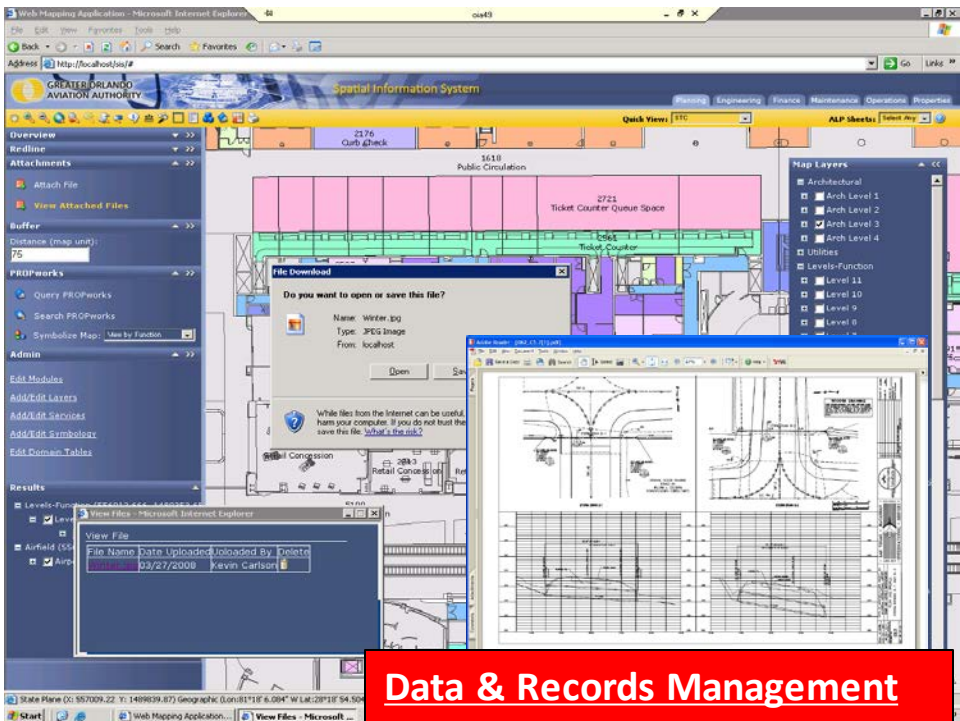
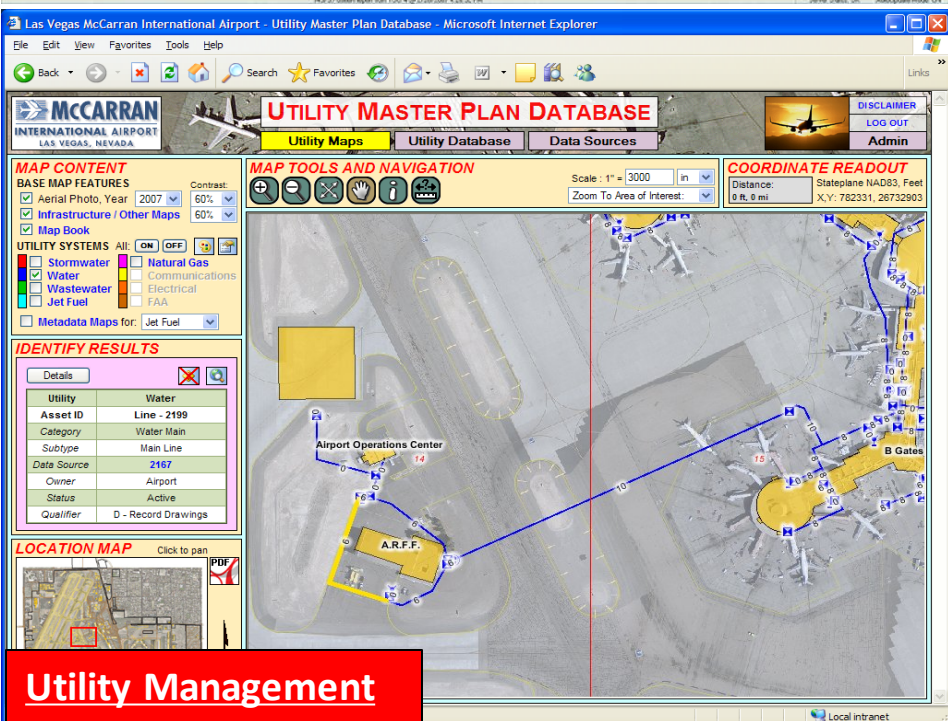
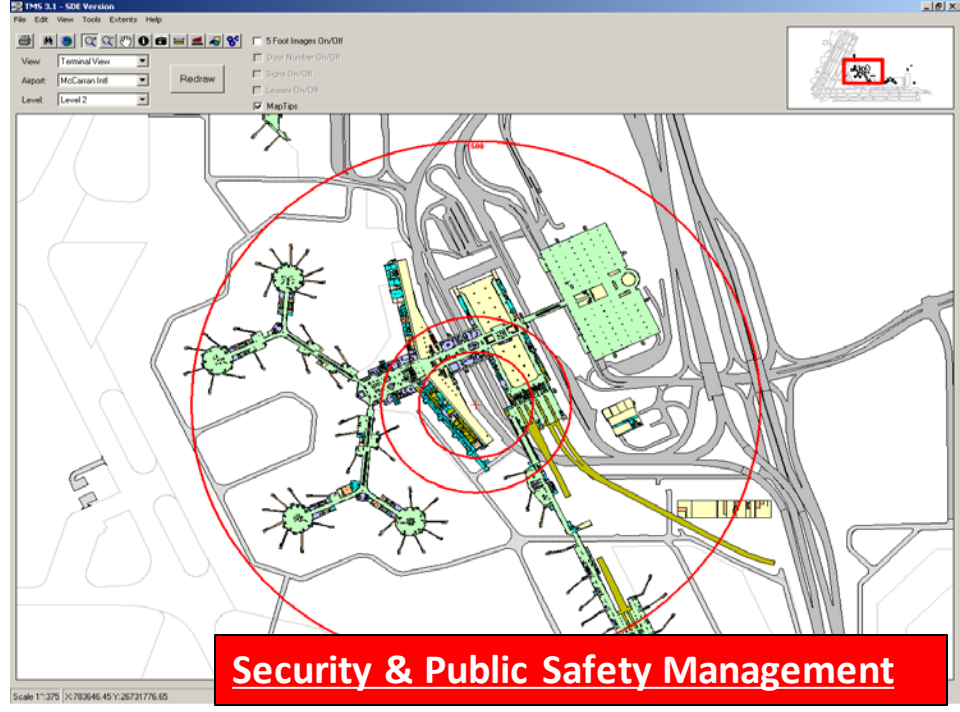
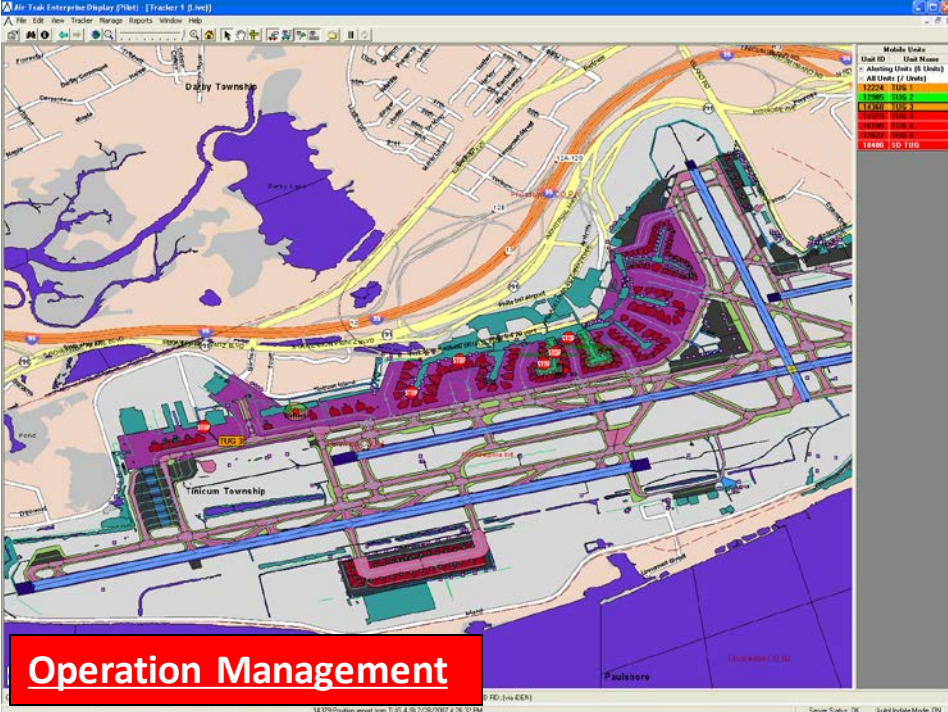


## Construction and Project Management



## Maintenance Management





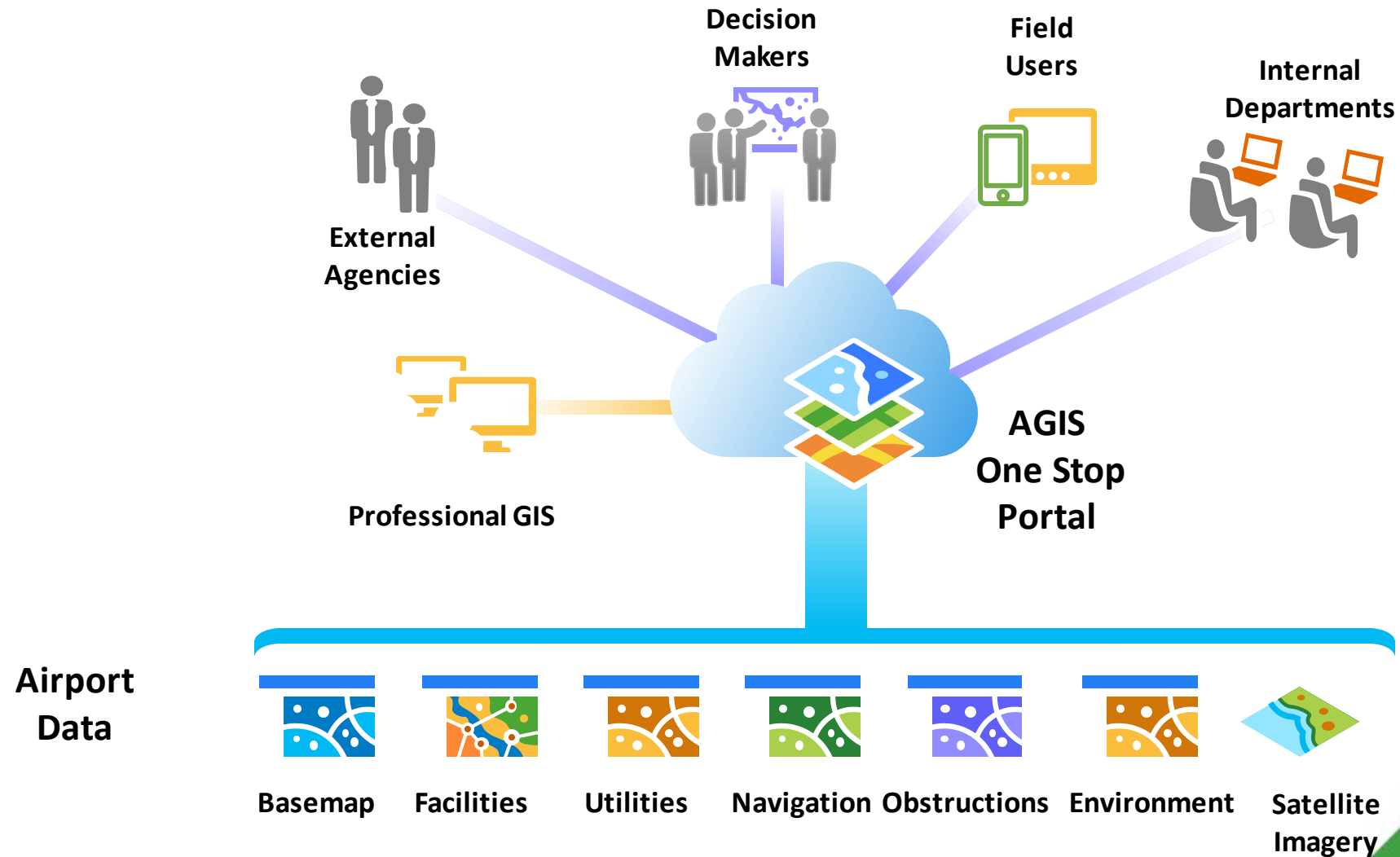


# Vision - NextGen





# AGIS Solution Approach

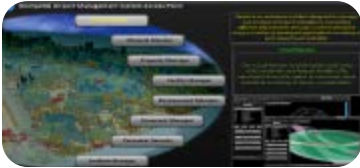


# AGIS Applications

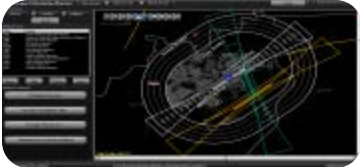




# AGIS Applications



- **Access Point**; *AGIS system access points.*



- **V.Surf Planner**; *builds vsurf using ICAO standards and Federal Aviation (FA) standards having the option to customize these standards according to design consideration.*



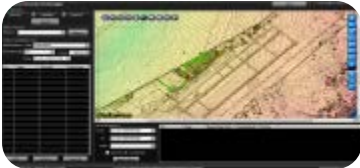
- **Obstacle Monitor**; *monitors obstacles/constructions around or inside the airport according to the permitted heights retrieved from the runways virtual surfaces with the ability to issue building permits.*



- **Property Manager**; *allows airport authorities to efficiently geographically manage the properties from both lands and buildings owned by airport.*



- **Facility Manager**; *allows airport authorities to efficiently manage the airport facilities from buildings, utilities network in addition to as-built drawings, and route maps to quickly locate and repair utilities.*



- **Environment Manager**; *allows airport authorities to view and analyze noise and pollution data generated by aircraft and infrastructure operations.*

# AGIS Applications



- **Pavement Manager**; *allows airport authorities to view and analyze pavement survey conditions activities from assessment of the surface, resurfacing schedules, and other related activities.*



- **Perimeter Security**; *allows airport authorities to view and secure airport premises by providing integrations capabilities with sensors and CCTV.*



- **Incident Manager**; *allows airport authorities to log and analyze incidents that takes place in airport premises.*



- **AGIS Admin**; *manage logging, to maintain tables & lookups, to configure dispatch policies, and to manage system users.*



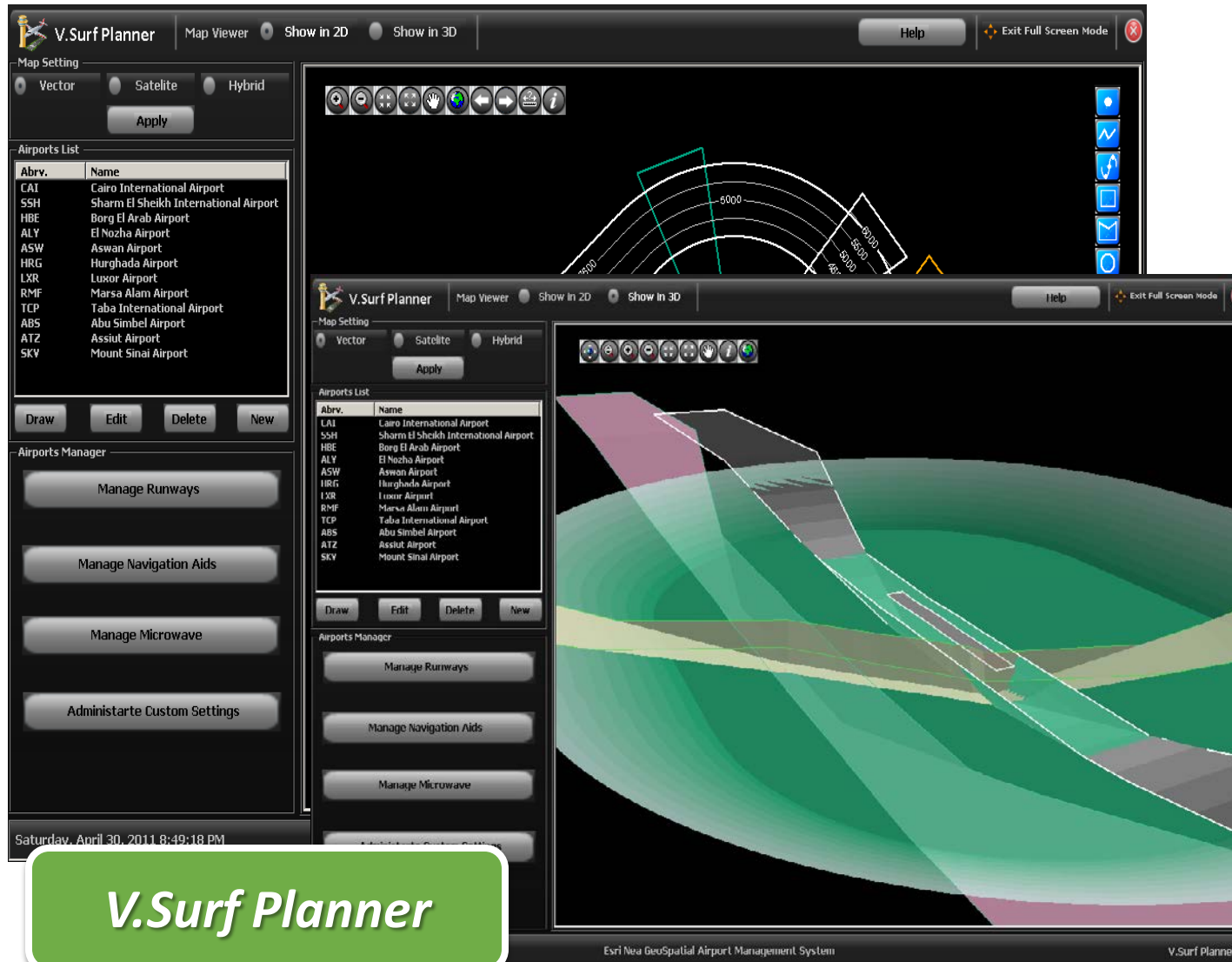
# AGIS Applications



- V.Surf Planner
- Obstacle Monitor
- Property Manager
- Facility Manager
- Environment Manager
- Pavement Manager
- Perimeter Security
- Incident Manager

*Access Point*

# AGIS Applications



- Build airport virtual surface (Standard / Custom)
- Manage Runways
- Manage Navigation Aids
- Manage Microwave
- Administrate Custom Setting
- 2D/3D views



# AGIS Applications

The screenshot displays the V.Surf Planner software interface, which is part of the Esri Neo GeoSpatial Airport Management System. The central map view shows a topographic map with contour lines and a runway layout. A green banner with the text "V.Surf Planner" is overlaid on the map.

Surrounding the central map are several toolbars and panels:

- Runway Editor:** Contains fields for Runway name, Start threshold, End threshold, Start X Coordinate, Start Y Coordinate, End X Coordinate, End Y Coordinate, Elevation, and Runway width. It also includes a "Done" button.
- Navigation Aids Editor:** Contains fields for Navaid Name, Navaid Type, Xcoord, Ycoord, and Elev. It also includes a "Runway Buffer" field and a "Vertical Slope" field.
- Microwave Editor:** Contains a table for Microwave data with columns for LOS Name, 1st Name, Xcoord, and Ycoord. It also includes fields for Line of sight name, First station name, North, East, and Elevation.
- Airports List:** A table listing various airports with columns for Abbr. and Name. The list includes: CAI (Cairo International Airport), SSH (Sharm El Sheikh International Airport), HBE (Borg El Arab Airport), ALY (El Nozha Airport), ASW (Aswan Airport), HRG (Hurghada Airport), LXR (Luxor Airport), RMF (Marsa Alam Airport), TCB (Taba International Airport), ABS (Abu Simbel Airport), ATZ (Assiut Airport), and SKV (Mount Sinai Airport).
- Airports Manager:** A panel with buttons for "Manage Runways", "Manage Navigation Aids", "Manage Microwave", and "Administrate Custom Settings".

The bottom status bar shows the date and time: "Saturday, April 30, 2011 8:49:18 PM". The bottom right corner displays the text "Esri Neo GeoSpatial Airport Management System" and "V.Surf Planner".

# AGIS Applications



- Monitor Obstacles
- Violated Buildings Report
- Issue Buildings Permits reports
- Manage issued Permits reports
- Permits Search
- Integrates with:
  - DMS
- 2D/3D views



# AGIS Applications

The screenshot displays the Esri Nea GeoSpatial Airport Management System (AGIS) interface, which is used for managing airport infrastructure and safety. The interface is divided into several main sections:

- Building Permit Report:** This section on the left contains a form for reporting building permits. It includes fields for the building type, coordinates, and a map viewer. The map viewer shows a 3D view of the airport terrain with various buildings and runways. A green box labeled "Obstacle Monitor" is overlaid on the map.
- Violated Buildings:** This section on the right displays a table of buildings that have violated airport safety regulations. The table includes columns for the building address, the runway it penetrated, and the height of the violation.
- Search Permits Archive:** This section at the bottom right allows users to search for specific permits. It includes fields for the request ID, request owner, request location, date from, and date to. A "Search Archive" button is provided to execute the search.

The central map viewer shows a 3D view of the airport terrain with various buildings and runways. A green box labeled "Obstacle Monitor" is overlaid on the map, indicating areas where buildings or other structures may pose a safety hazard to aircraft operations.

**Violated Buildings Table:**

Bld Address	Penetrated Runway	Hieght
Sheraton, Bld 234, Ahmed Fareed	23L05R	4.5
Nozha, Bld 456, Mohamed Hussien	23L05R	3.0
	1643	2.5

**Search Permits Archive Table:**

Request ID	Issue Date	Request Owner	Location	Notes
1256/60/2011	1/12/2011	Reyad Moahmed Aly	Nasr City	New Building
1256/60/2010	20/10/2010	Reyad Mohammed	Nozha	Extension
1256/60/2009	24/6/2009	Reyad Mohamed Seif	Sheraton	Garage

The interface also includes a status bar at the bottom showing the date (Tuesday, March 29, 2011), the system name (Esri Nea GeoSpatial Airport Management System), and the current page number (Building Permit).

# AGIS Applications



**Property Manager**

- Manage airport properties
- Link properties to:
  - Deeds
  - Layouts
  - Images
- Properties Search
- Integrates with:
  - DMS
  - CAD
- 2D/3D views



# AGIS Applications

The screenshot displays the 'Facility Management' application interface. The top navigation bar includes 'Req. Assign', 'Dashboard', 'Help', and 'Full Screen Mode'. The left sidebar contains a 'Map Setting' section with 'Vector', 'Satellite', and 'Hybrid' options, and a 'Select Airport' dropdown set to 'Sharm El Sheikh Internati'. Below this are tabs for 'New Request' and 'Search Request'. The 'New Request' form includes fields for 'Request ID' (243), 'Requester Info' (Caller Name: Mohamed Reda, Dept., Phone No. 3666), 'Request Details' (Request Location: Radar Building, Request Type: Installation, Request Priority: Medium, Request Category: Electricity), and a 'Request Summary' section with the text 'Electricity cables installation'. A 'Create' button is at the bottom of the form. The main map area shows a satellite view with red lines indicating a route. A smaller window titled 'Facility Management' is overlaid on the map, showing an 'Open Orders List' table with columns 'ID', 'Type', 'Reporting Date', and 'Status'. Below the table are 'Order Details' and 'Search Options' sections. The 'Search Options' section includes date and time filters, a 'Type' dropdown, and checkboxes for 'include finished requests' and 'include finished requests'. A legend at the bottom indicates 'Running' (yellow), 'Delayed' (red), and 'Closed' (green). The status bar at the bottom shows the date 'Friday, April 01, 2011 11:29:16 PM', the system name 'Esri Nea GeoSpatial Airport Management System', and the application name 'Facility Management'.

**Facility Manager**

- Create work-order requests
- Search work-orders requests
- Assign work orders
- Track requests
- Red lining
- Route to order
- Integrates with:
  - *Asset Mngmt*

# AGIS Applications

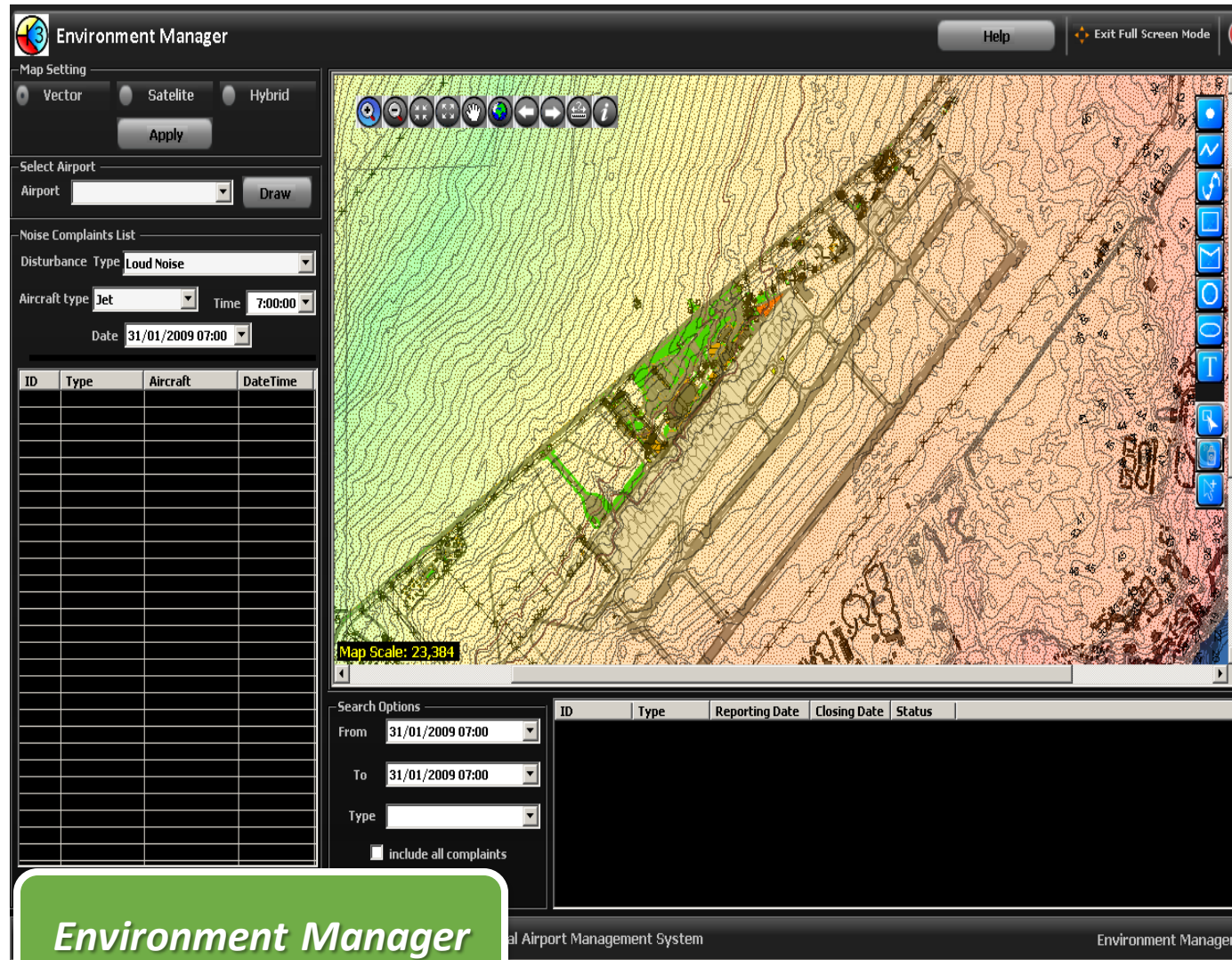


- Alerts
- Key Performance Indicators
- Real Time Statistical Viewer

**Facility Manager**



# AGIS Applications



## ■ Noise Complaints:

- Add
- Edit
- Delete

## ■ Red lining

# AGIS Applications

**Pavement Manager**

Map Setting: Vector, Satellite, Hybrid (Apply)

Select Airport: Airport: Cairo International Airport (Draw)

Pavement Condition Survey List

ID	Distress Type	Severity	Quantity

Edit Delete Search

Map Scale: 1,292

Search Options

From: 31/01/2009 07:00 To: 31/01/2009 07:00 Type: include finished maintenance Apply Filter

ID	Section	Maintenance Date	Inspection Date	Status

al Airport Management System Pavement Manager

*Pavement Manager*

## ■ Pavement Survey Condition:

- Add
- Edit
- Delete

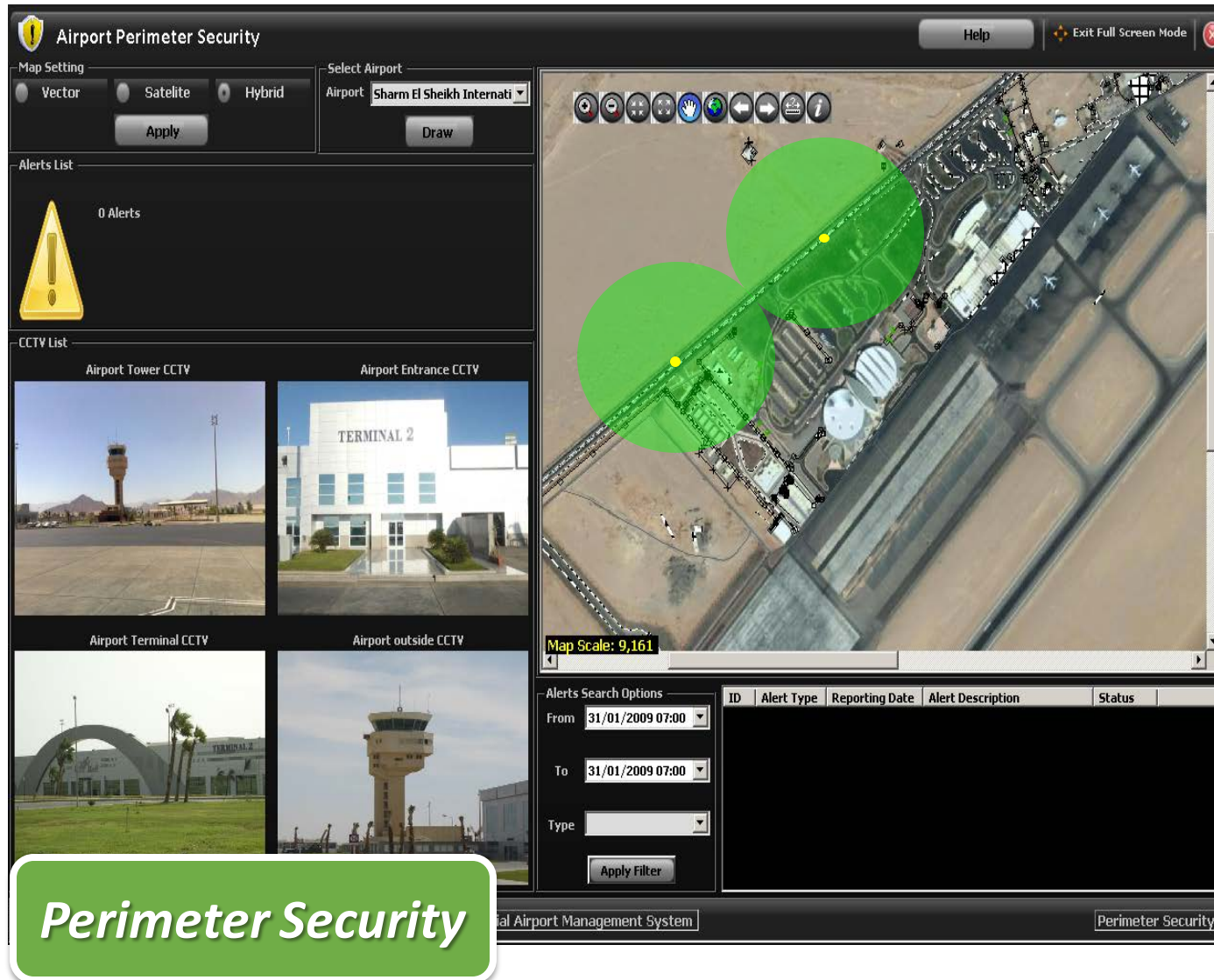
## ■ Red lining

## ■ Integrates with:

- DMS



# AGIS Applications



- Secure Airport Perimeter
- Shows CCTV locations/coverage
- Display CCTV live stream
- View/Search Alerts
- Integrates with:
  - CCTV
  - Motion Detectors



- Incident Mgmt.***

# AGIS Applications

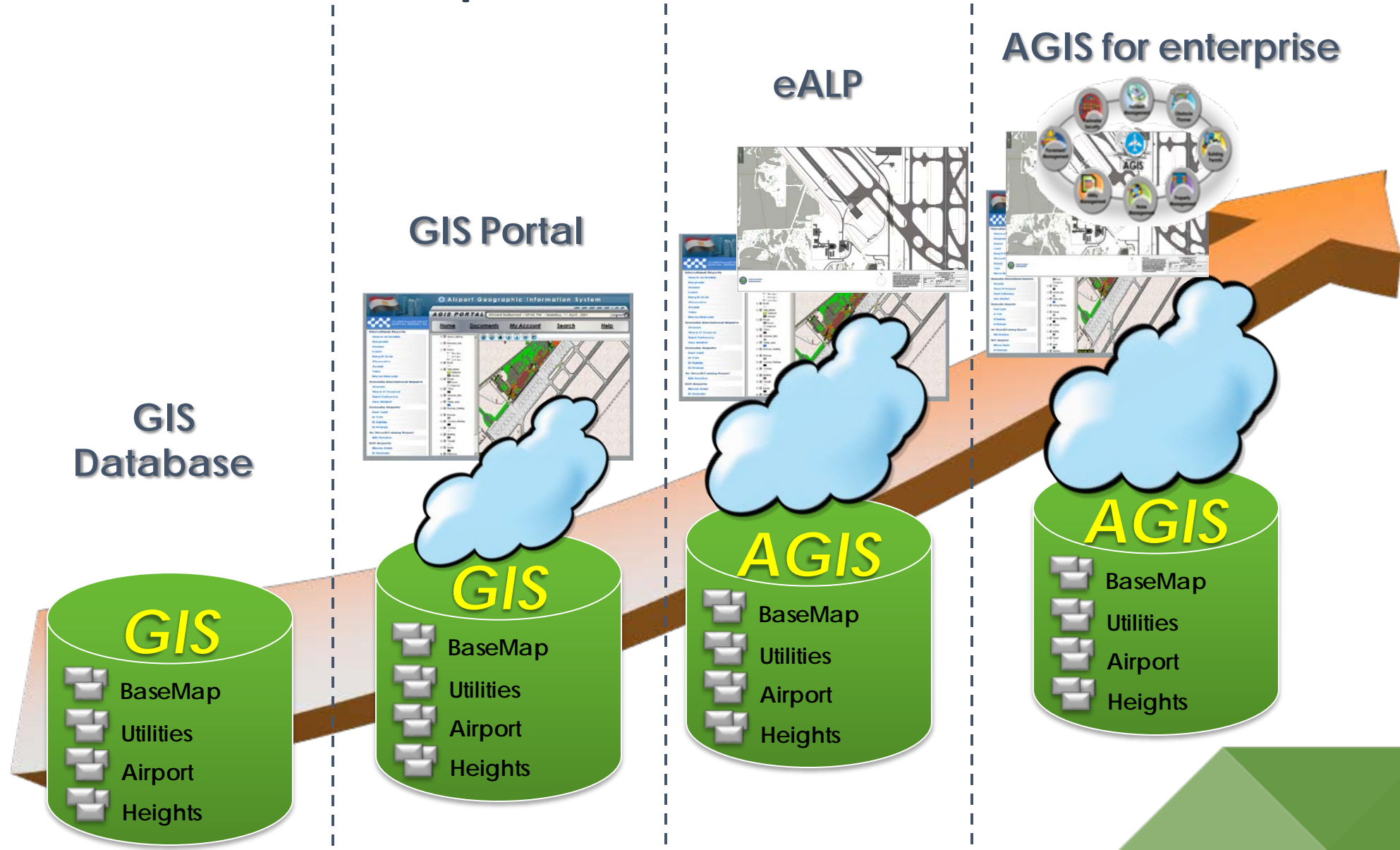
The screenshot displays the AGIS Admin web application interface. At the top, the header includes the logo of the Egyptian Airports Co. (الشركة المصرية للمطارات) and the user information: Ahmed Mohamed Ahmed, logged in on 04/05/2009 at 14:30:23. A news ticker is visible below the header. The left sidebar shows a navigation menu with categories like NEM Enterprise Manager, Tables & Lookups Maintenance, Organizational Structure Configurations, Directories, GIS-related Configurations, Status Configurations, CFS Configurations, and Security Configurations. The 'Alerts' option under Security Configurations is selected. The main content area is titled 'Upon CFS is Routed' and 'Upon Data Change'. It features a list of alerts (Alert 01, Alert 02, Alert ..n) on the left and a detailed configuration form on the right. The form includes fields for ID, Name, and A. Name, a Rule section with Classification 1, 2, 3, and Priority dropdowns, a Receivers section with Groups (N. Group 01, 02, 03) and Humans (Human 01, 02, 03) checkboxes, and a General Settings section with Content (CFS Date/Time, CFS Class/Alias, No. of Injuries, CFS Location, CFS Priority, No. of Mortalities) and Options (Allow override Notification Groups/Humans) checkboxes. There are also time pickers for 'Ignore Sending Alerts From' and 'To'. A 'Show Retired' checkbox is at the bottom left, and a 'Save' button is at the bottom right.

**AGIS Admin.**

- Manage system users
- Administrate application privileges & security policies
- Maintain System tables & lookups
- Administrate system GIS Data



# AGIS Road Map

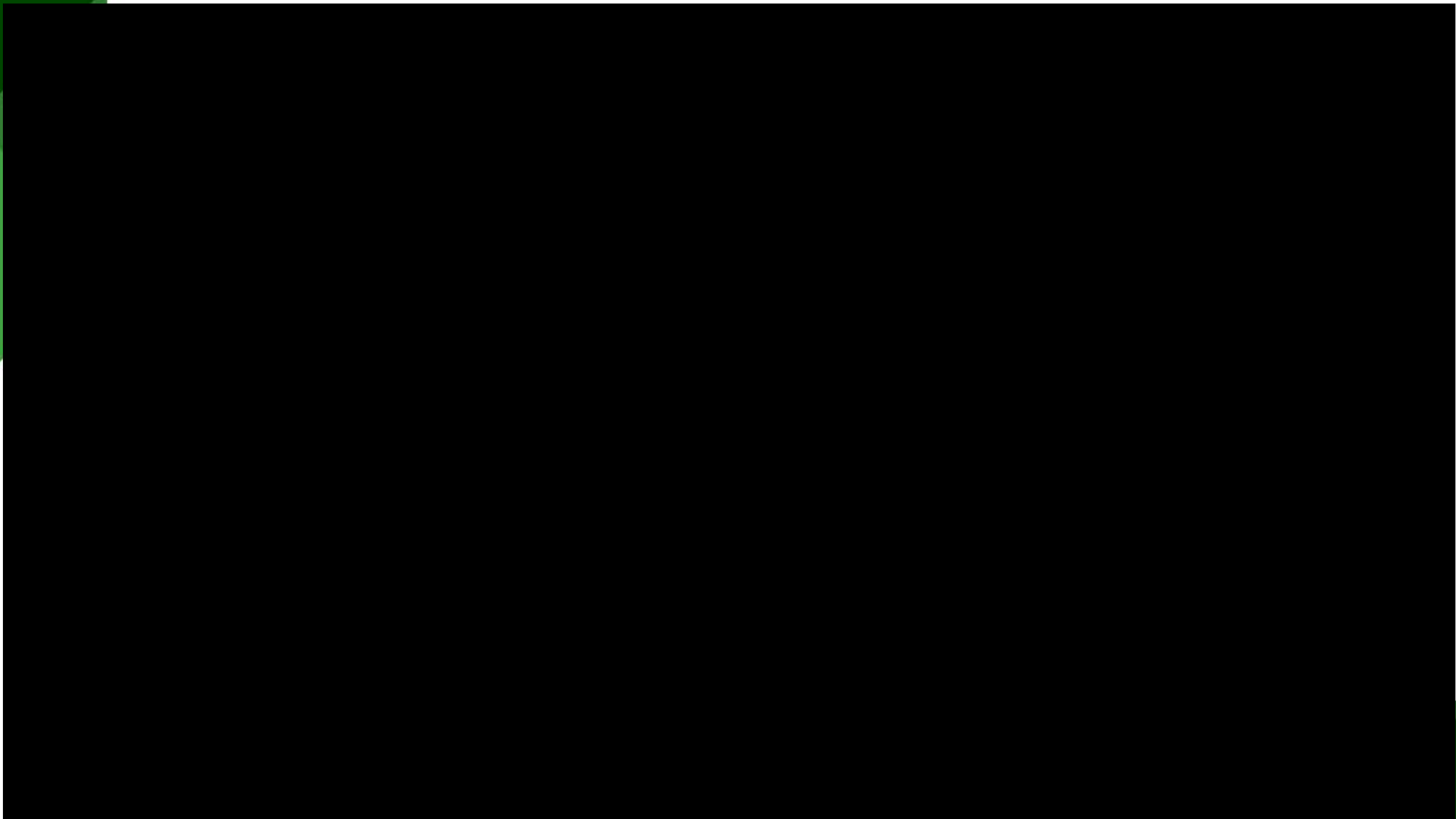




The image is a composite graphic. On the left, there is an aerial photograph of the Great Pyramids of Giza in Egypt, with the dense urban landscape of Giza in the foreground. On the right, there is a green-tinted aerial photograph of a modern city, likely Atlanta, showing a mix of residential and commercial buildings. A diagonal line separates the two images. Overlaid on the green-tinted city image is the text "Atlanta Airport Case" in a white, sans-serif font.

# Atlanta Airport Case





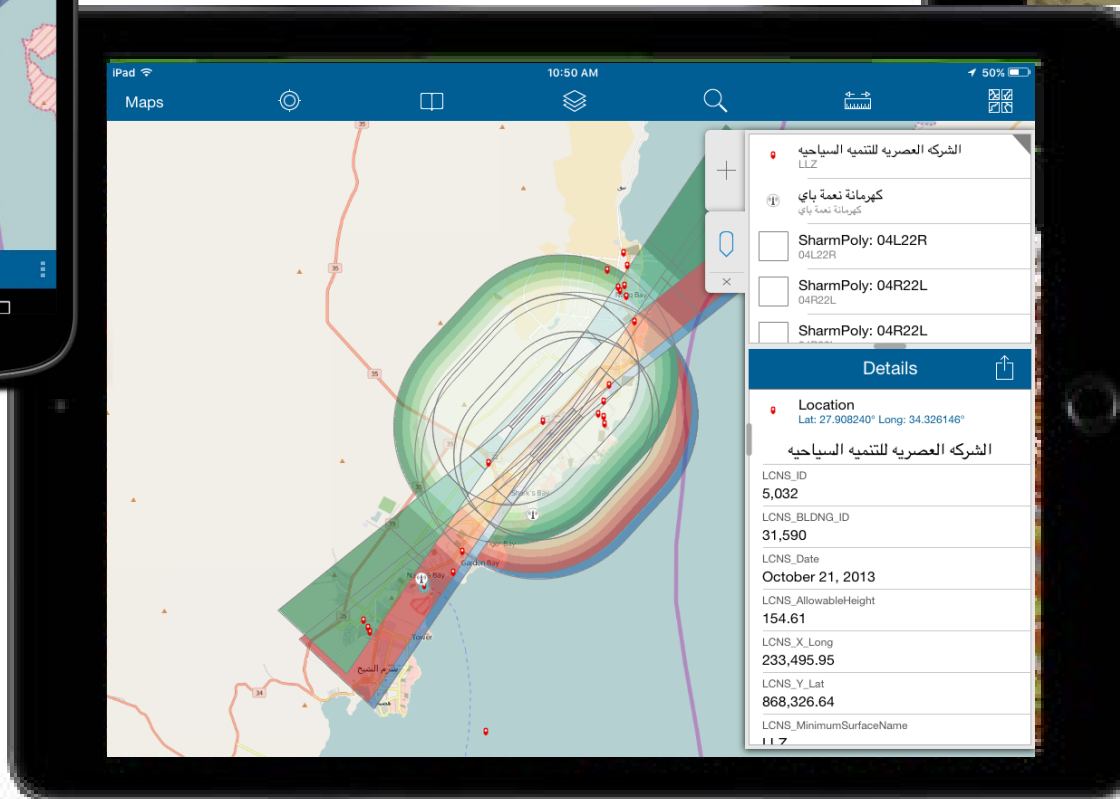
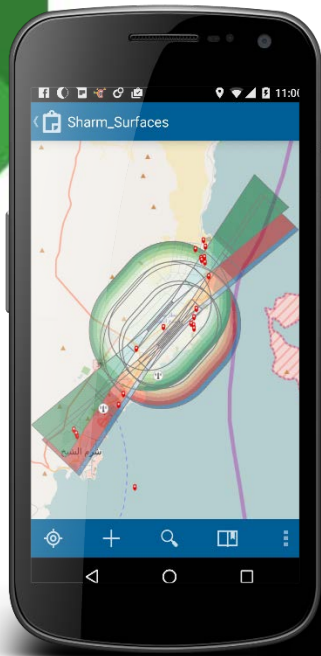




Live Demo

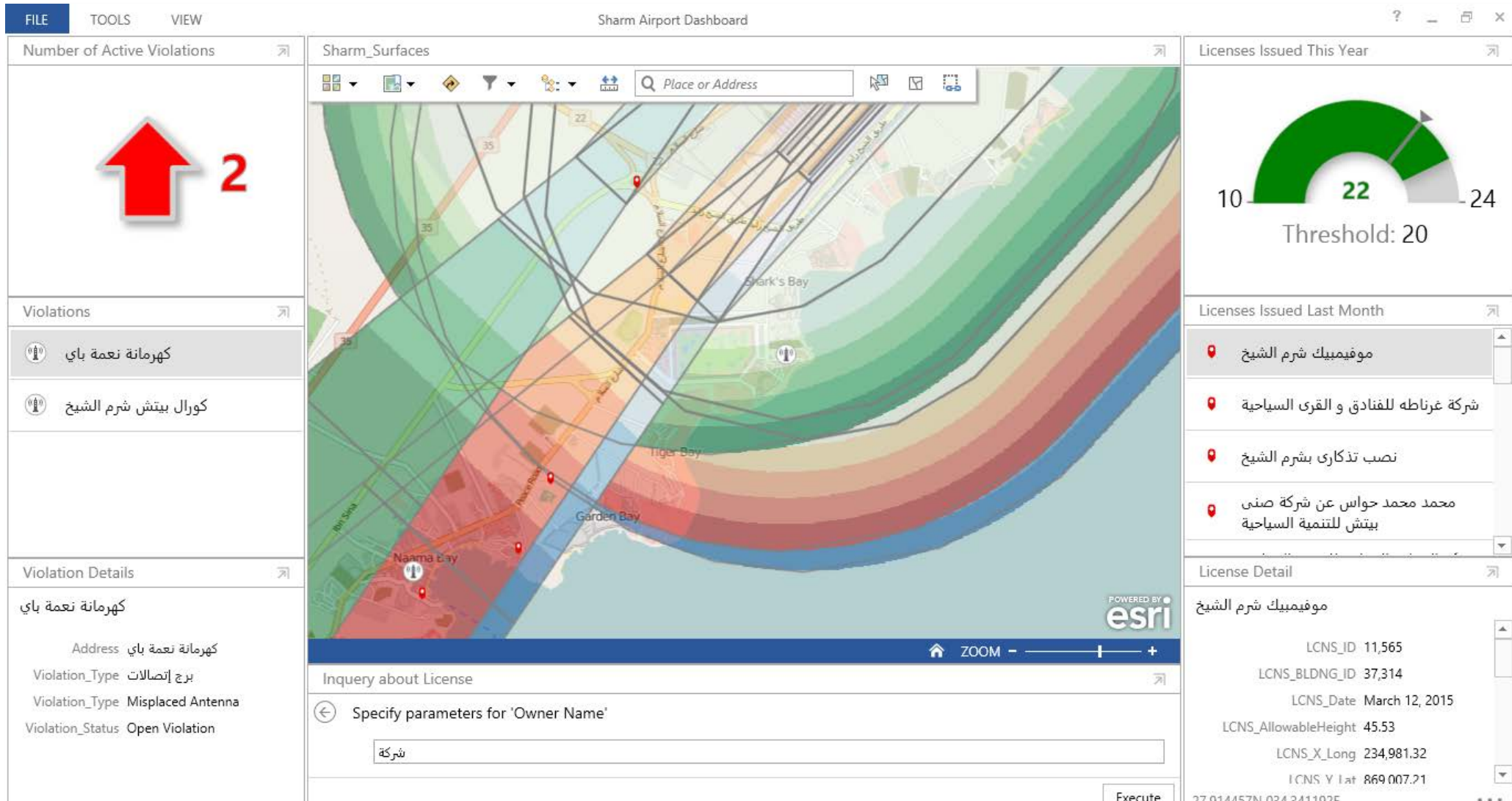


# Obstacle Monitoring in field





# Violations Dashboard



# Airport Utilities Viewer

**Sharm Airport Utilities Viewer** with Web AppBuilder for ArcGIS

Esri World Geocoder

Layer List

Operational Layers

- ☒ Electricity - Points
- ☒ Electricity - Lines
- ☒ Telephone - Points
- ☒ Telephone - Lines
- ☐ Sewer - Points
- ☐ Sewer - Lines
- ☐ Water - Points
- ☐ Water - Lines
- ☒ Buildings
- ☒ Grid
- ☒ Navigation Aids

30m

27.980 34.387 Degrees

Map data © OpenStreetMap contributors, CC-BY-SA

POWERED BY esri

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(1 of 3)

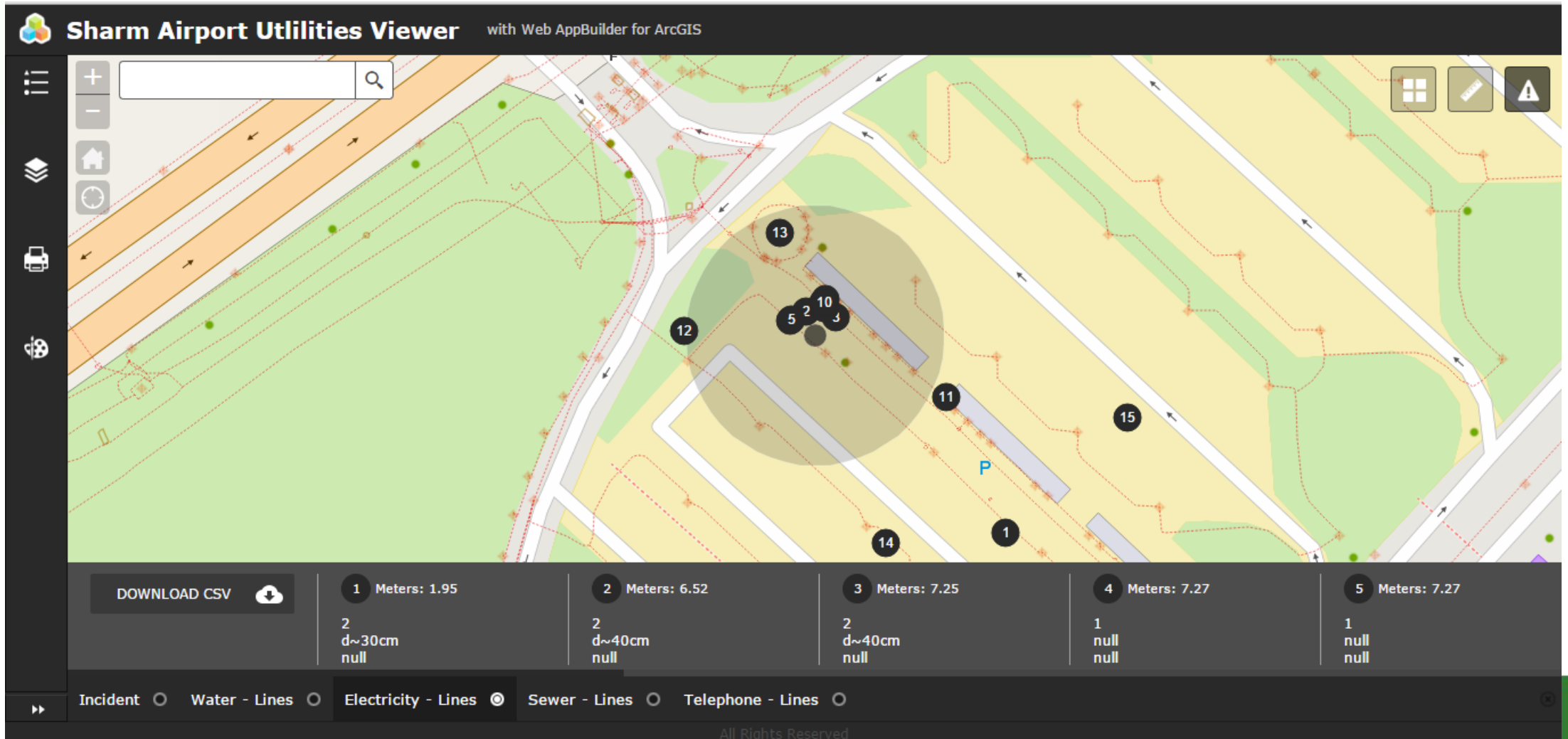
**Telephone\_line: d~60cm**

Acc_Class	2
Depth	d~60cm
Fcode	389
date_proj	July 23, 2008
check_	
Name	1
Material	9
Tell_linetype	17
Tell_linecount	9

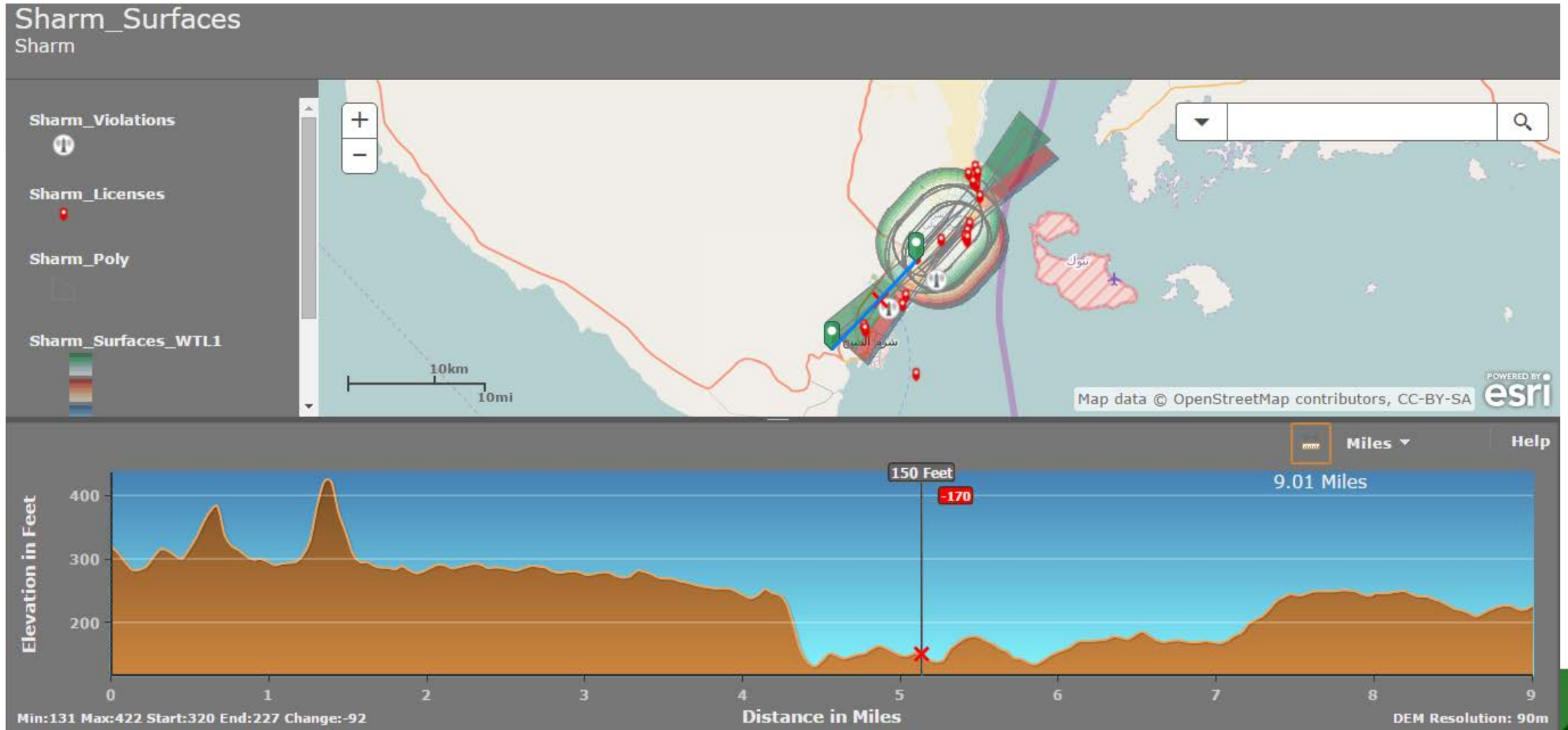
[Zoom to](#)



# Incident Management



# Surface Profiler







# Discussion



# Thank You

