

GIS and Surveying

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Agenda

Technology

Platform

Web Services

Infrastructure Lifecycle

Data/Accuracy

Challenges

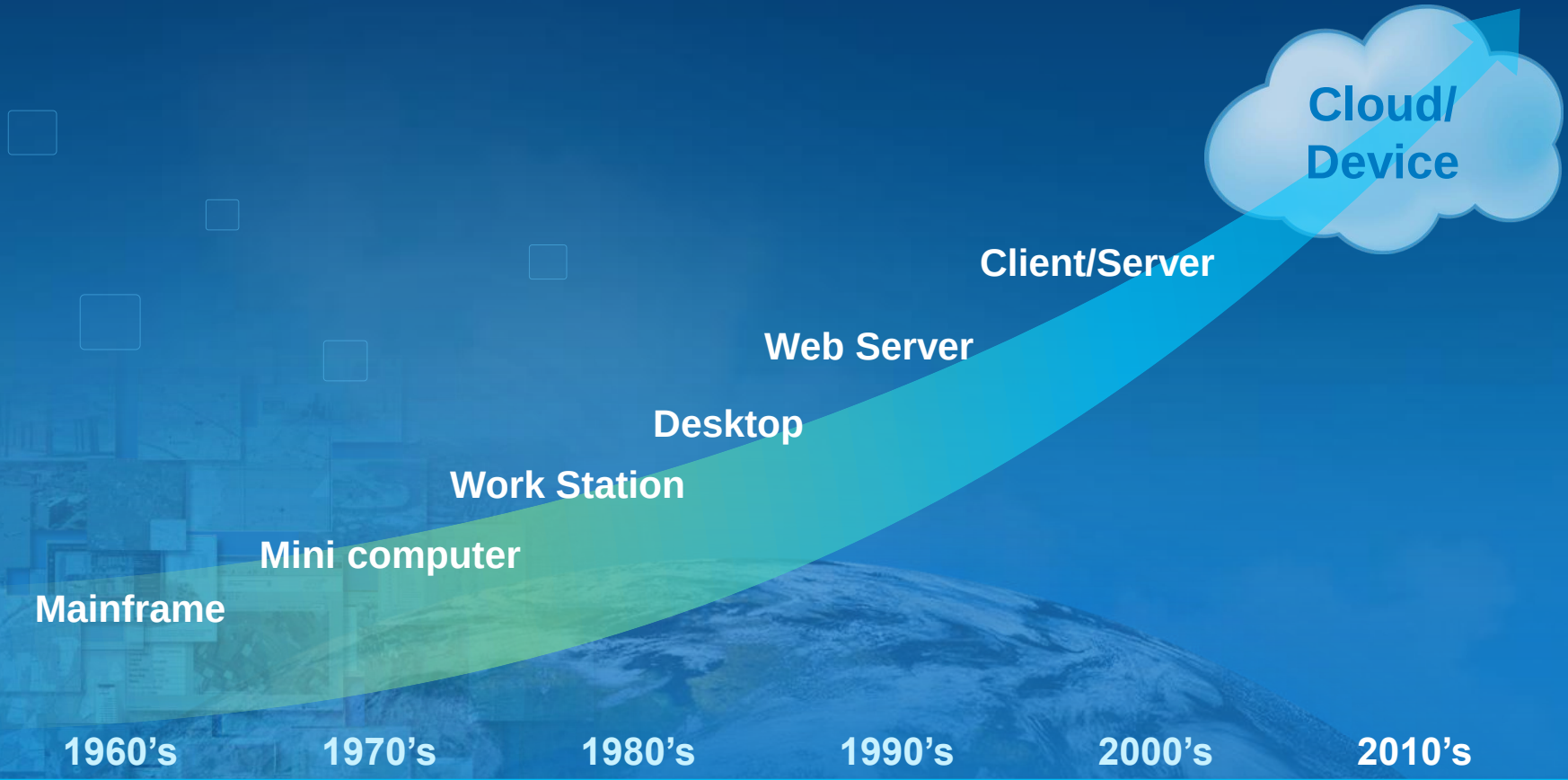
Parcel Data

Web Services ☺

Opportunities

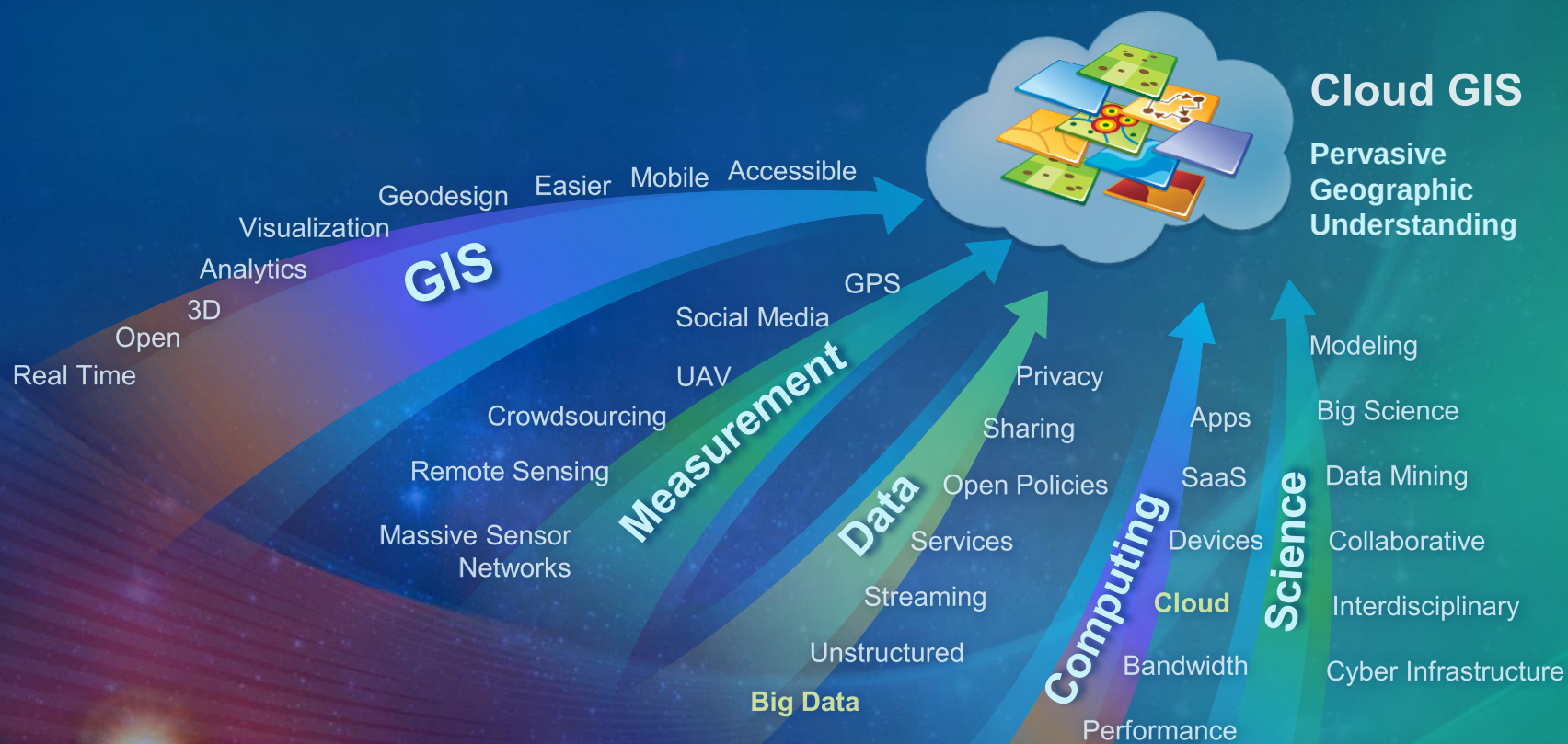
Platforms Evolve

A New Architecture



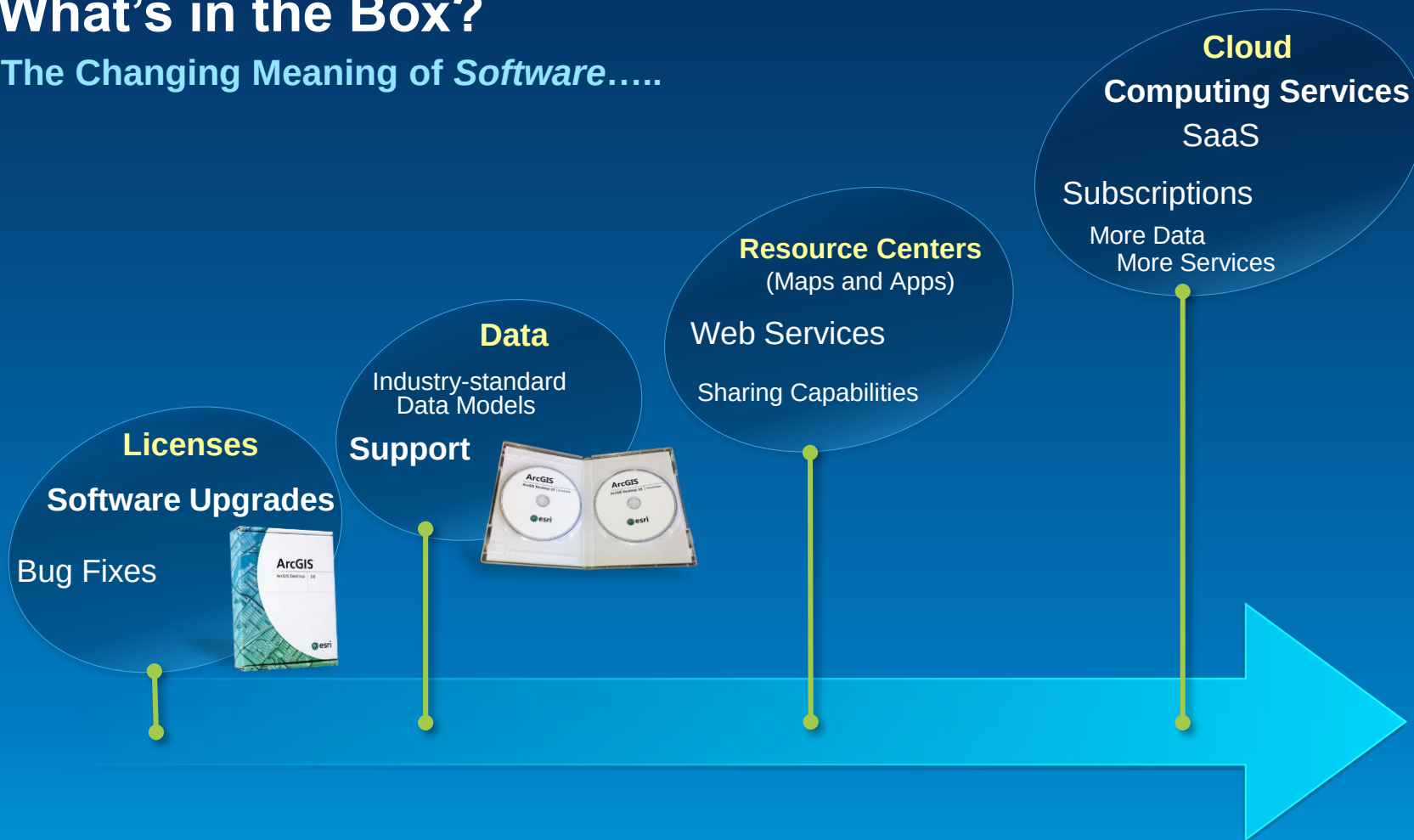
New platforms, new opportunities.....

This Platform Leverages Many Trends



What's in the Box?

The Changing Meaning of *Software*.....



New Markets, New Opportunities. . . .

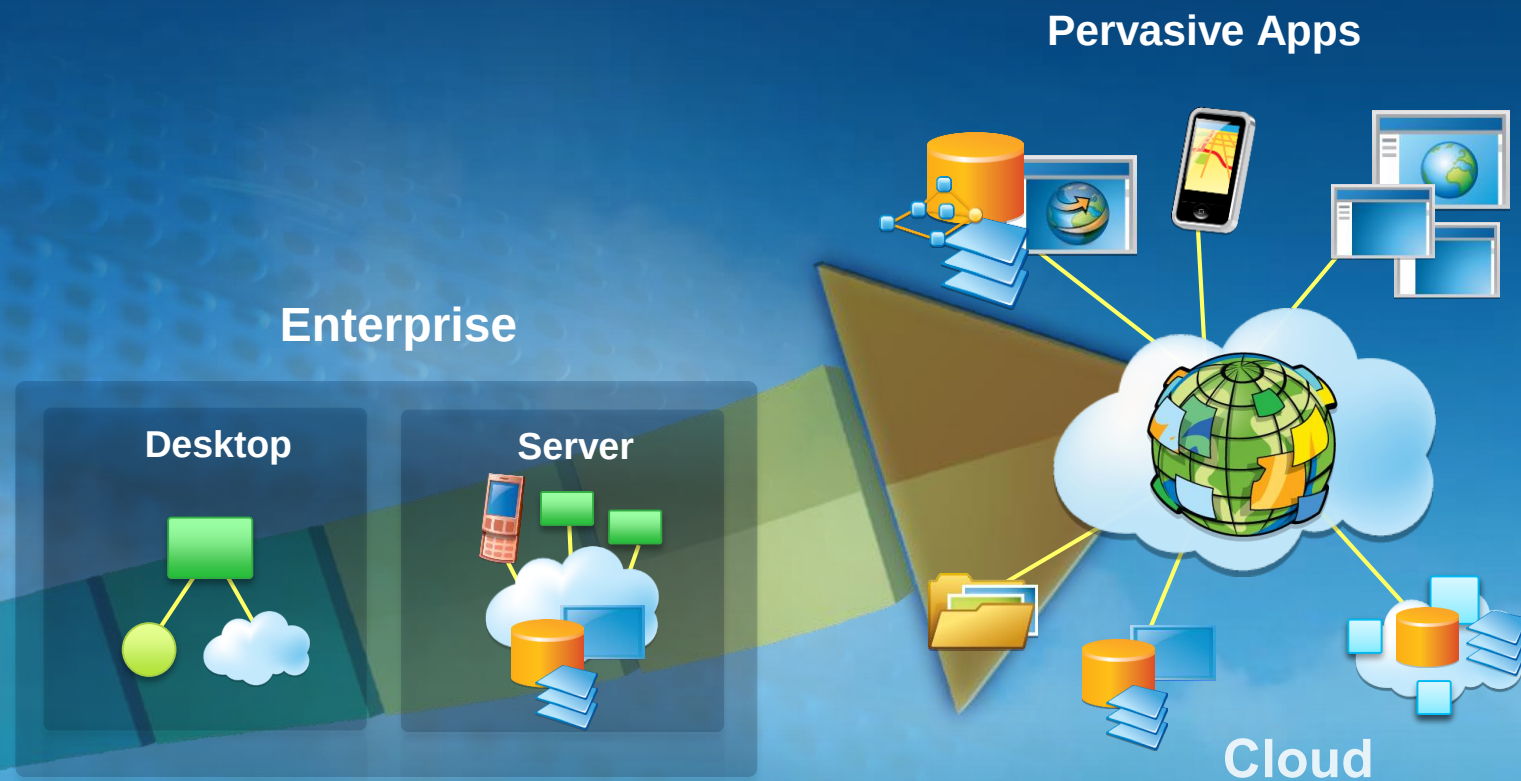
What is GIS?

Don't trust everything you hear....

- Geographic Information System
- Garden International School (Malaysia)
- Gas-Insulated Switchgear
- Gastrointestinal Series
- Geeky Internal Stuff (databases)
- General Information Services
- General Information Session
- General Investigative Section (Canada RCMP)
- Generalized Iterative Scaling
- Genome Institute of Singapore
- Gentran Integration Suite (Sterling Commerce)
- Geodata Interoperability Specification
- Geographic Imaging Solutions
- Geographic Information Services
- Geographic Information Solutions
- Geographical Imaging Software
- Geographical Information Services
- Geographical Information System
- Geographical Intelligent Survey
- Geographisches Informationssystem (German)
- Geophysical Information System
- Georeferenced Information System
- Geoscience Information Society
- Geospatial Information System
- Geosynchronous Meteorological Satellite
- Gisborne, New Zealand (airport code)
- Global Inbound Service
- Global Indexing System
- Global Information Society
- Global Information Solutions
- Global Infrastructure Services
- Global Investment Systems
- Goddard Information System
- Google Image Search
- Government Information System
- Graphics Information System
- Greatness Is Simplicity
- Green Iguana Society
- Group Index and Schedule
- Group Information Session(s)
- Group Interference Suppression
- Groupe Interventional Speciale
- Gruppo d~ Intervento Speciale
- Guaranteed Income Supplement
- Guidelines Implementation Staff
- Gunbound International Server

GIS is Now a Platform

Connects and Leverages



Providing Webmaps and Tools. . . .

This Platform Integrates All Types of Information



*Web Maps Normalize The Information . . .
... And Make It Accessible Widely*

Web Services

Quick, but very important definition

WFS – Web Feature Service

WMS – Web Mapping Service

Geoprocessing Services

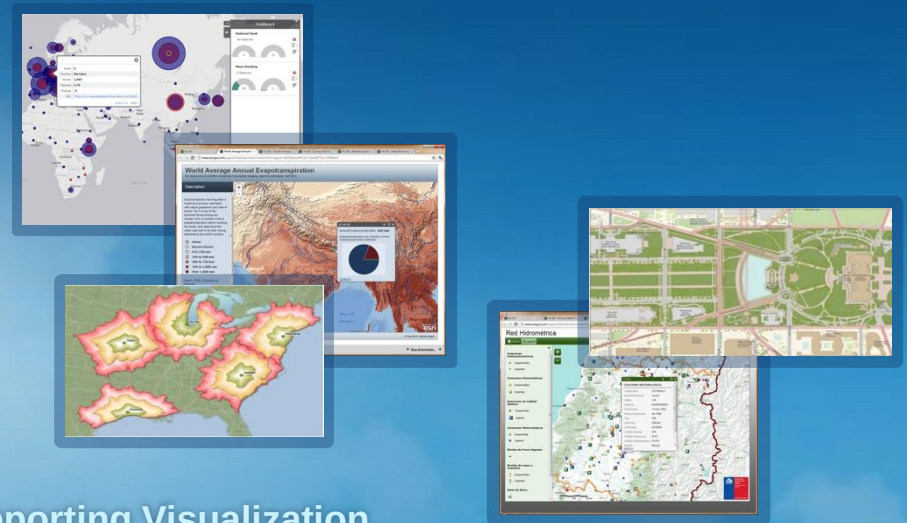
- are application components
- communicate using open protocols
- are self-contained and self-describing
- can be used by other applications

Web services power web maps, open standards.....

Web Maps are the New Medium

Providing Intelligent Maps to Everyone

Any Device



Supporting Visualization,
Query, Editing, and Analysis

Dynamic

Making Dynamic Geographic Information Available Anywhere

Web GIS Enables New Apps

Supporting Common Tasks

- Collection / Editing
- Viewing
- Mapping
- Analysis
- Awareness
- Communication
- * Offline Use

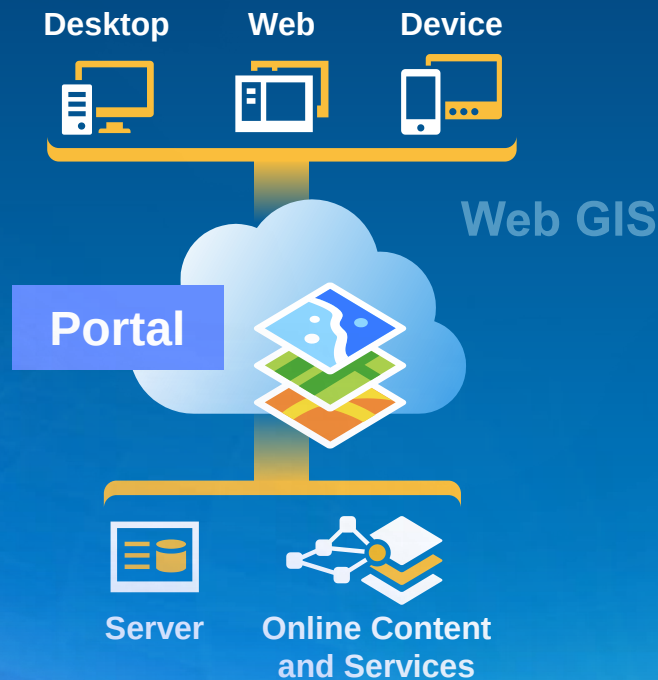
Multiple Devices



GIS Is a Comprehensive Platform

For Mapping, Analyzing and Managing Geographic Information

Simple
Open
Configurable



Everything is Changing . . .

(Right or Wrong)

557190

Document Number

State Bar of Wisconsin Form 1-2003
WARRANTY DEED

Document Name

THIS DEED, made between Lloyd L. Luethe as trustee of the Lloyd L. Luethe
1998 Revocable Trust U/A dated 5/20/98 ("Grantor," whether one or more),
and Ronald William Luethe ("Grantee," whether one or more).

Grantor, for a valuable consideration, conveys to Grantee the following described real estate, together with the rents, profits, fixtures and other appurtenant interests, in Monroe County, State of Wisconsin ("Property") (if more space is needed, please attach addendum):

Part of the Southeast Quarter of the Southwest Quarter and the Southwest Quarter of the Southeast Quarter, Section 30, Township 16 North, Range 2 West, Monroe County, Wisconsin, more particularly described as follows: Commencing at the Southwest corner of the Southeast Quarter of the Southwest Quarter (SE $\frac{1}{4}$ of SW $\frac{1}{4}$); thence easterly along the South line of the forty, 1,102 feet, more or less, to GPS waypoint, Lat. 43.827330, Long. -90.666967, which is the point of beginning; thence continuing easterly along the South line of said Section 30, 1,592 feet, more or less, to GPS waypoint, Lat. 43.827326, Long. -90.660929; thence Northerly 487 feet,

CONTINUED ON REVERSE SIDE

Grantor warrants that the title to the Property is good, indefeasible in fee simple and free and clear of encumbrances except: recorded easements for utility and municipal services, recorded restrictions and covenants, all other matters of record and those items which would be disclosed by a current survey.

REGISTER'S OFFICE
County of Monroe, WI

Received for record this 30th
day of Dec A.D., 2005
at 10:10 o'clock A M.

[Signature] Registers
000033

FEE
77.25 (P)
EXEMPT

Recording Area 13rd

Name and Return Address
Jay S. Carmichael
Carmichael & Quartermont, S.C.
916 Oak Street, P.O. Box 725
Tomah, Wisconsin 54660

Parcel Identification Number (PIN)
This is not homestead property.
(is not)

(Right or Wrong)

State Bar of Wisconsin Form 1-2003
WARRANTY DEED

REGISTER'S OFFICE
County of Monroe, WI

Received for record this 30th
Dec A.D., 2005

County, Wisconsin, more particularly described as follows: Commencing at the Southwest corner of the Southeast Quarter of the Southwest Quarter (SE $\frac{1}{4}$ of SW $\frac{1}{4}$); thence easterly along the South line of the forty, 1,102 feet, more or less, to GPS waypoint, Lat. 43.827330, Long. -90.666967, which is the point of beginning; thence continuing easterly along the South line of said Section 30, 1,592 feet, more or less, to GPS waypoint, Lat. 43.827326, Long. -90.660929; thence Northerly 487 feet,

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GIS Headlines

GIS

Natural Disasters

Elections

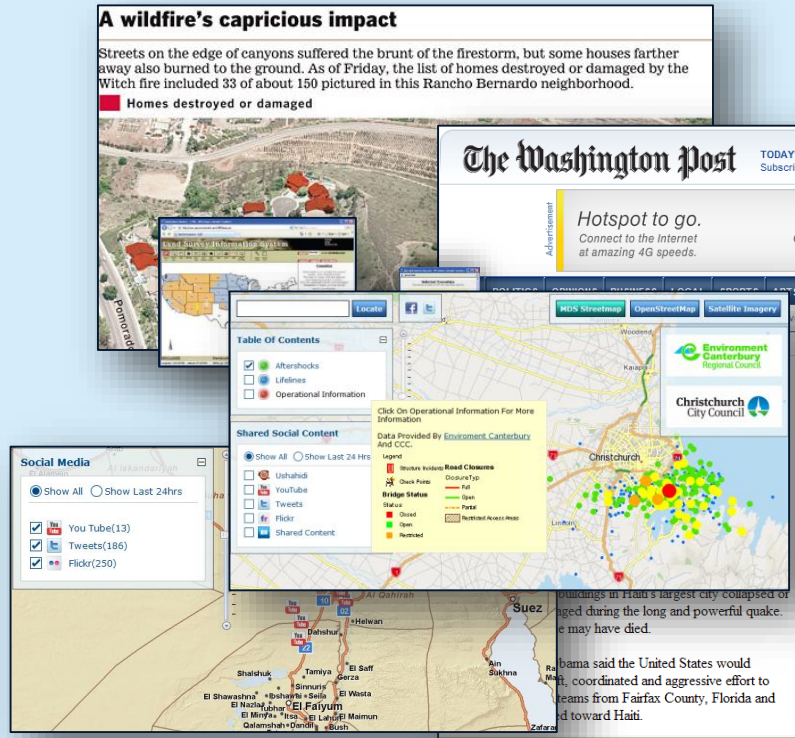
Redistricting

National Projects

Budgets

Foreclosures

Census



"You only have to have one big loss to have to build a bigger mousetrap to keep your product from walking away."

FRANK WILLIAMS, CHIEF EXECUTIVE OFFICER,
BALBY VIEW CHAPTER OF THE SOUTHERN CALIFORNIA BUILDING INDUSTRY ASSOCIATION

GPS

CONTINUED FROM D1

tracking devices, which run from about \$100 to \$500 per item, on other valuables: laptops, telephones, a construction equipment.

Knorringer said sever builders are using GPS but he would not name KB Home as so far only developer ident Inland law enforcement cles as using the de Home officials decline ment.

dustry Association, said builders are changing their tactics to deal with appliance theft. Appliances are not added to most homes until as late as possible, close to the sale, he said. Some

identify the item's location, or send out an alert when the device is moved out of a specific area, Waltz said. Once the device is triggered, it can send a text message or e-mail.

GPS devices deter thieves

TRACKING BOWLERS: We can't tell who or how many, say building officials, who warn criminals to stay away.

BY JOHN ASBURY
THE PRESS-ENTERPRISE

gians. The building industry has responded by equipping appliances with tracking devices that can help locate stolen items through global-positioning system technology.

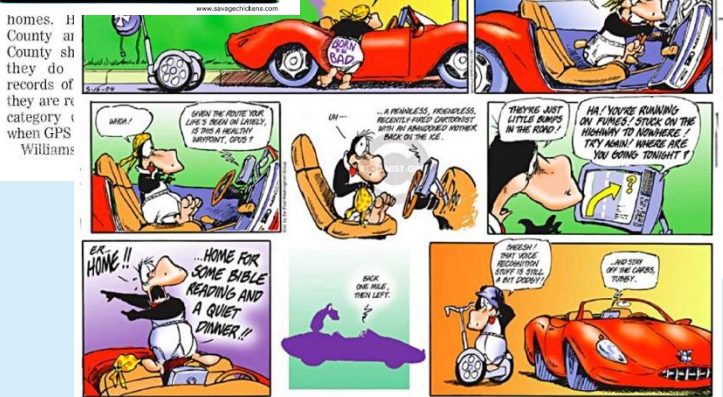
A stove stolen from a new development in Lake Elsinore

ipped about how often this happens, they agree it is a useful tool. "You only have to have one big loss to have to build a bigger mousetrap to keep your product from walking away," said Frank Williams, chief executive officer

used, or how successful they have been. Neither the builders who install the devices, nor Inland sheriff's departments that respond to calls about thefts, keep data specifically on how many appliances are stolen.

Williams said tracking devices aren't just used in new, vacant homes; they're also being installed more frequently on property in foreclosed homes, at bank-owned properties and on construction sites.

Individuals can also use GPS



Baby Jesus thieves beware

Churches, citizens turn to technology to protect displays

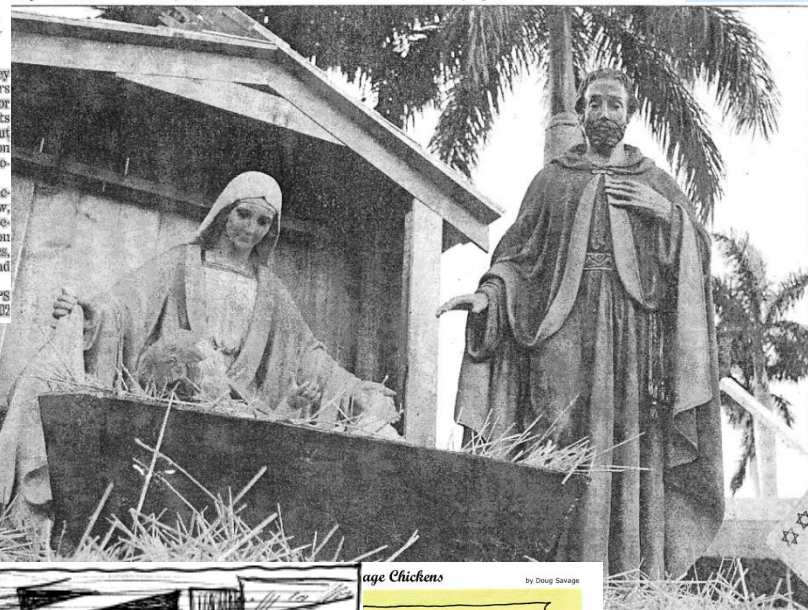
BY ERIC GORSKI
THE ASSOCIATED PRESS

sap-
vity

Jesus worth almost \$500. Police have obtained the tape. "They took the family Jesus," said Gloria Herrera, 48, a Catho-

Rabbi Yochanon Goldman of Lubavitch of Center City, a Philadelphia-area branch of the Chabad Lubavitch movement,

Jesus from a public display last week also took the concrete block and chain that was supposed to act as a deterrent.



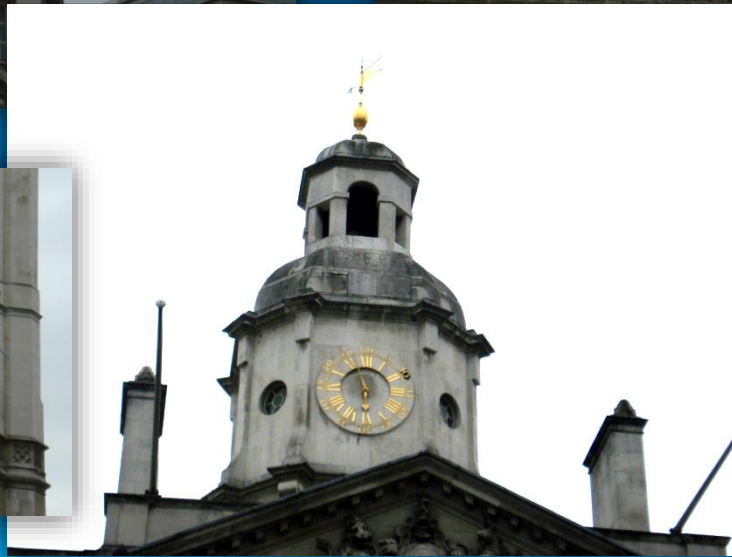
THE ASSOCIATED PRESS

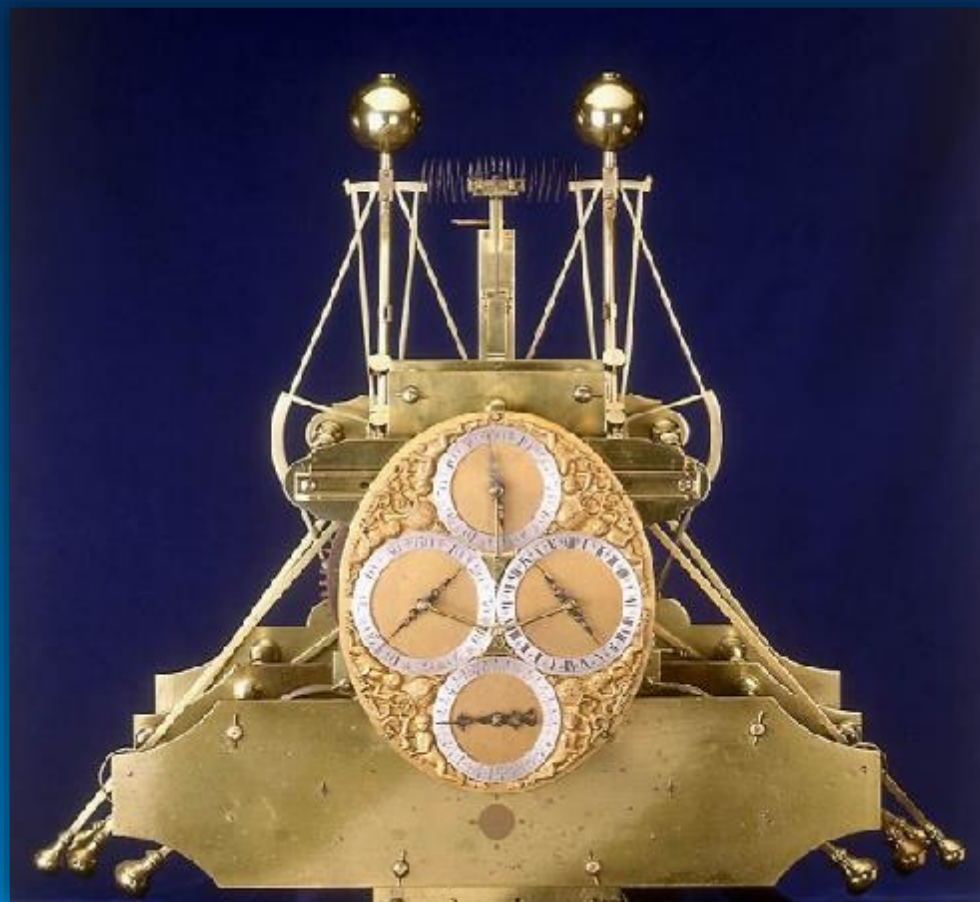


Another little change.....













Precise Timing

... for three bucks.



Marcasite style
watch Black Leather
Band Sweep 2nd



~~Buy it~~ Now

\$2.99 \$3.47

5d 23h 23m



V068 Disney Shrek
Red Quartz Watch
Bangle



~~Buy it~~ Now

\$1.00 \$5.50

21h 15m



V076 Disney Shrek
Pink Quartz Watch
Bangle



~~Buy it~~ Now

\$1.00 \$5.50

1d 04h 55m



mens watch



~~Buy it~~ Now

\$2.00 \$4.50

3d 13h 27m



mens watch



~~Buy it~~ Now

\$2.00 \$4.50

3d 13h 27m







Time / Accuracy

Technology is closing the gap



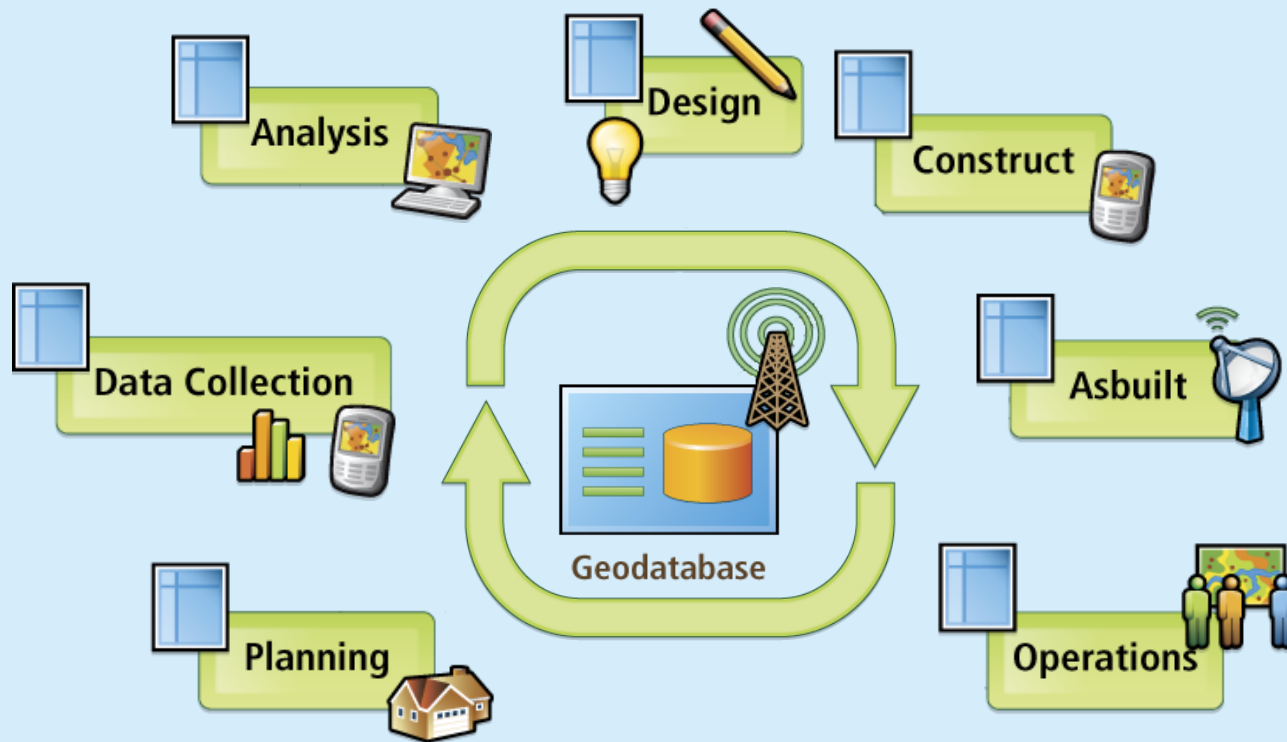
What is *Software*?



Infrastructure Lifecycle

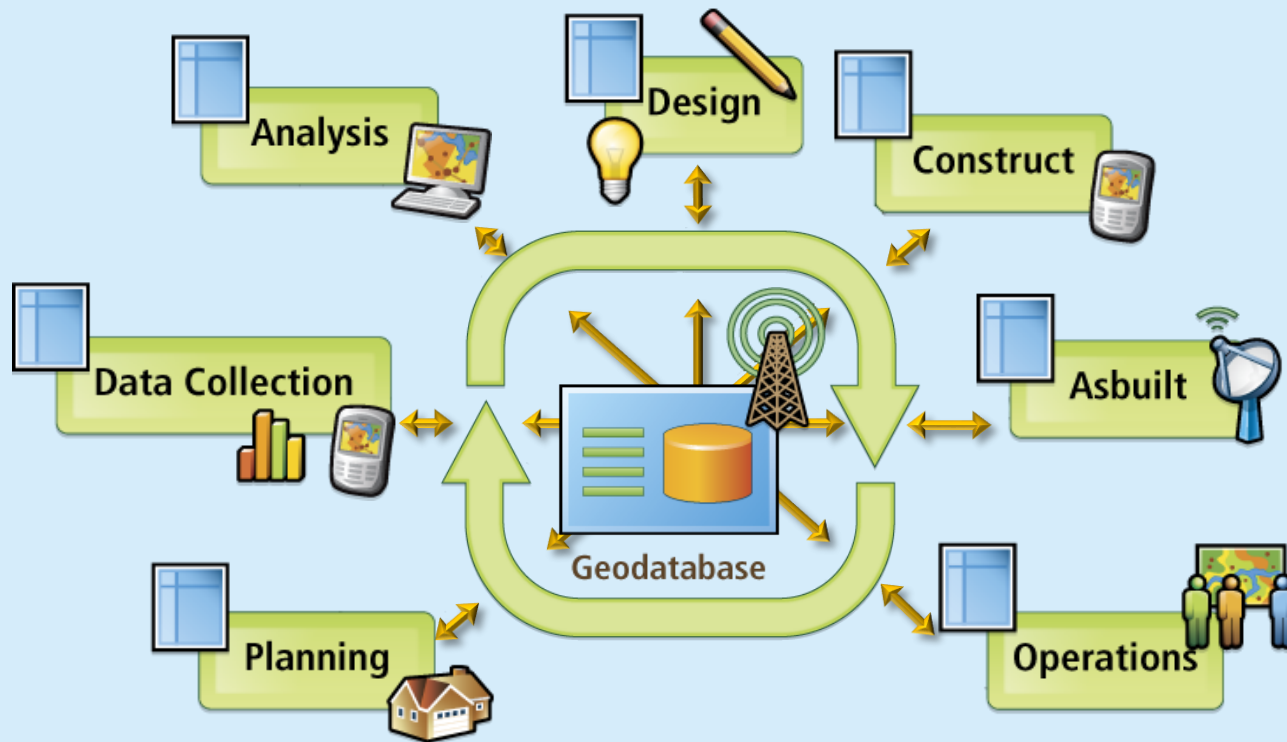


Infrastructure Lifecycle



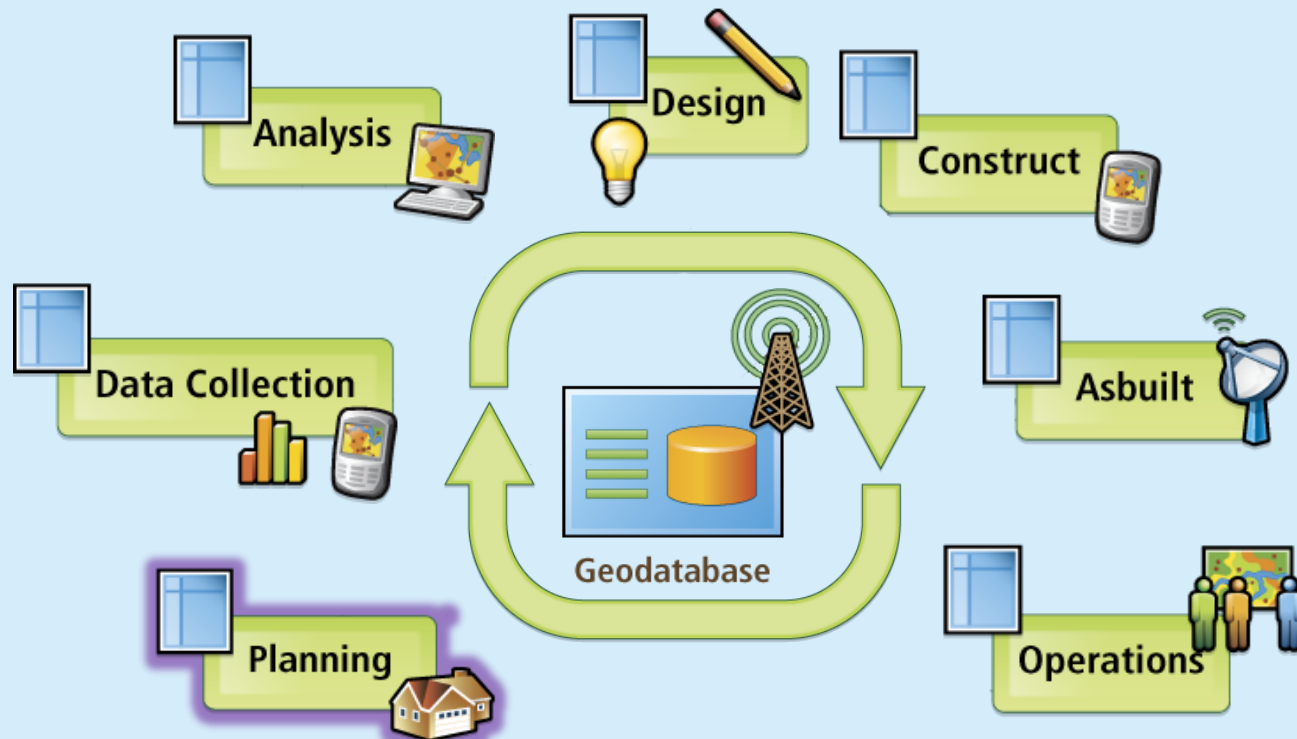
GIS Supports the entire infrastructure lifecycle

Infrastructure Lifecycle

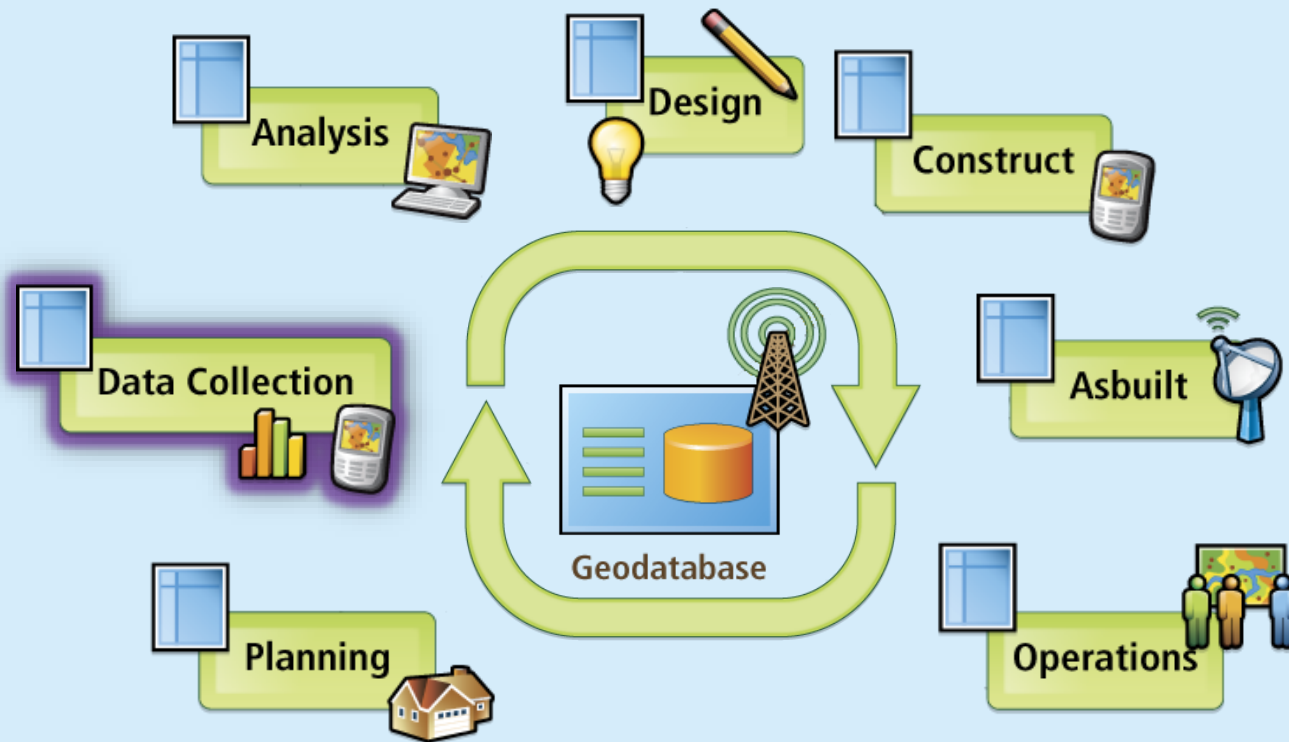


Improves Planning, Management and Decision Making

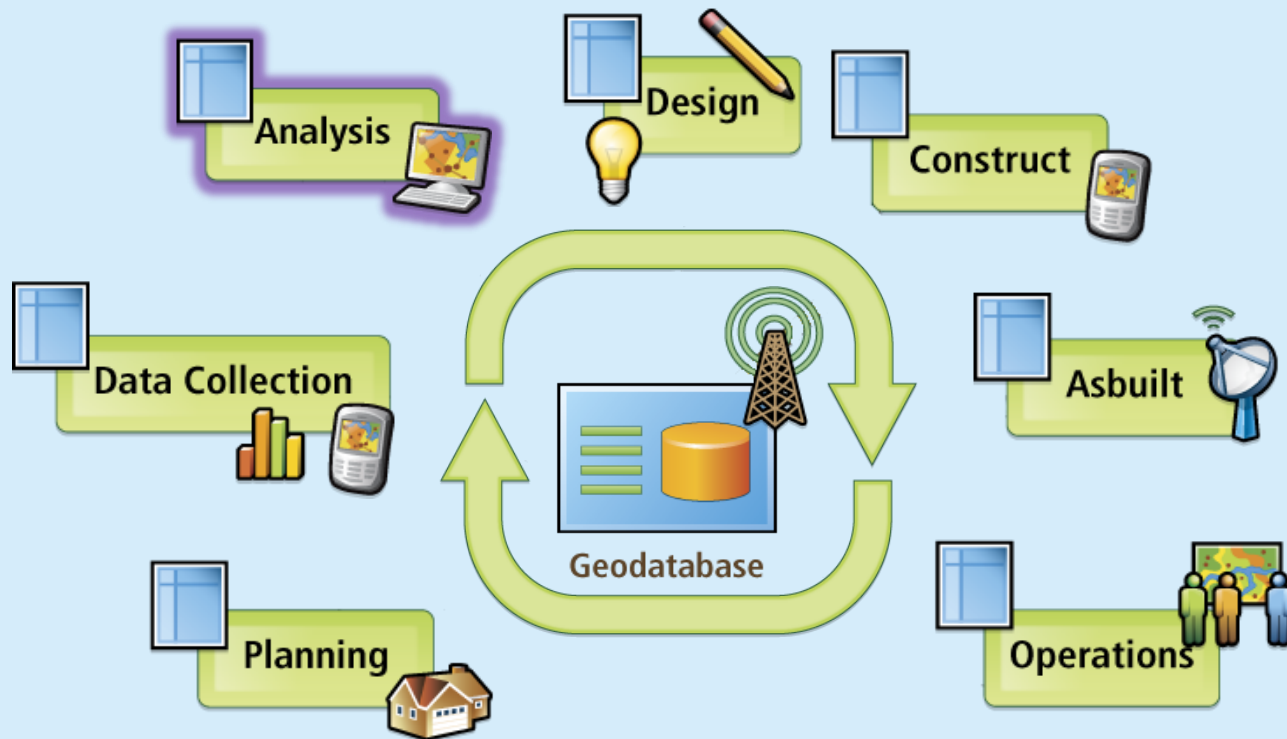
Planning



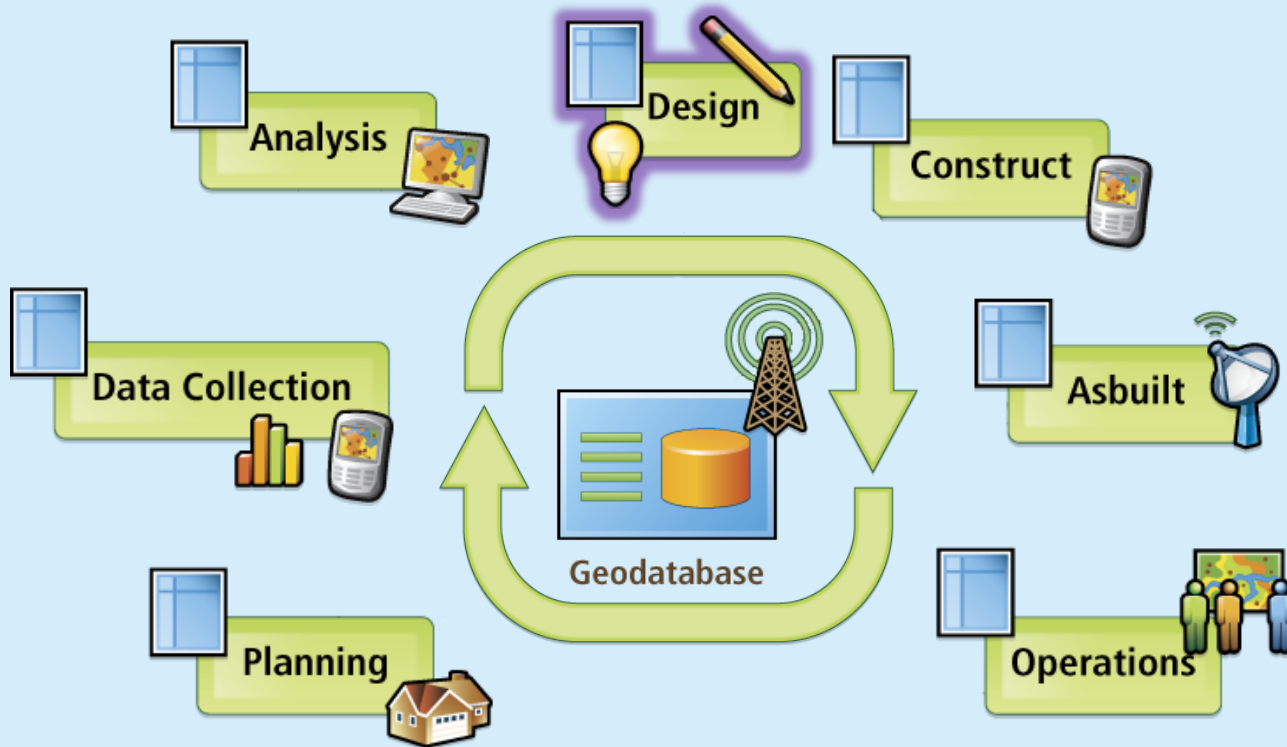
Data Collection



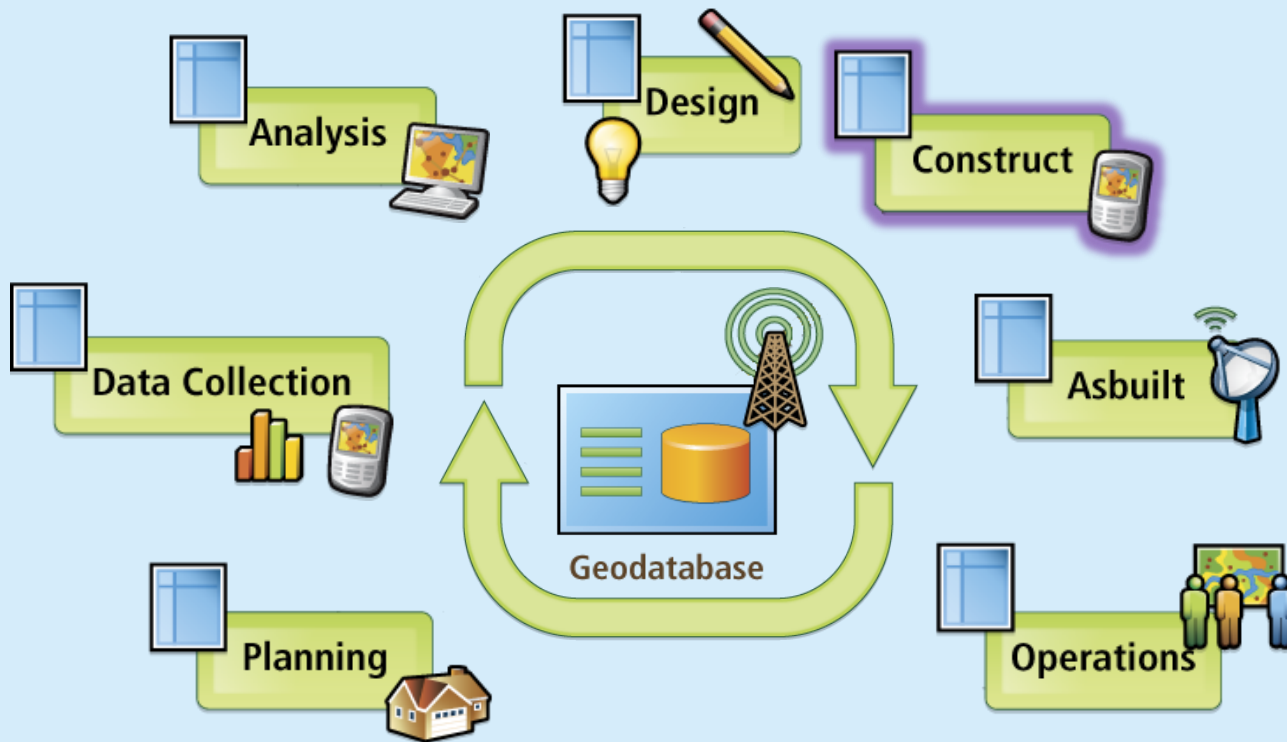
Analysis



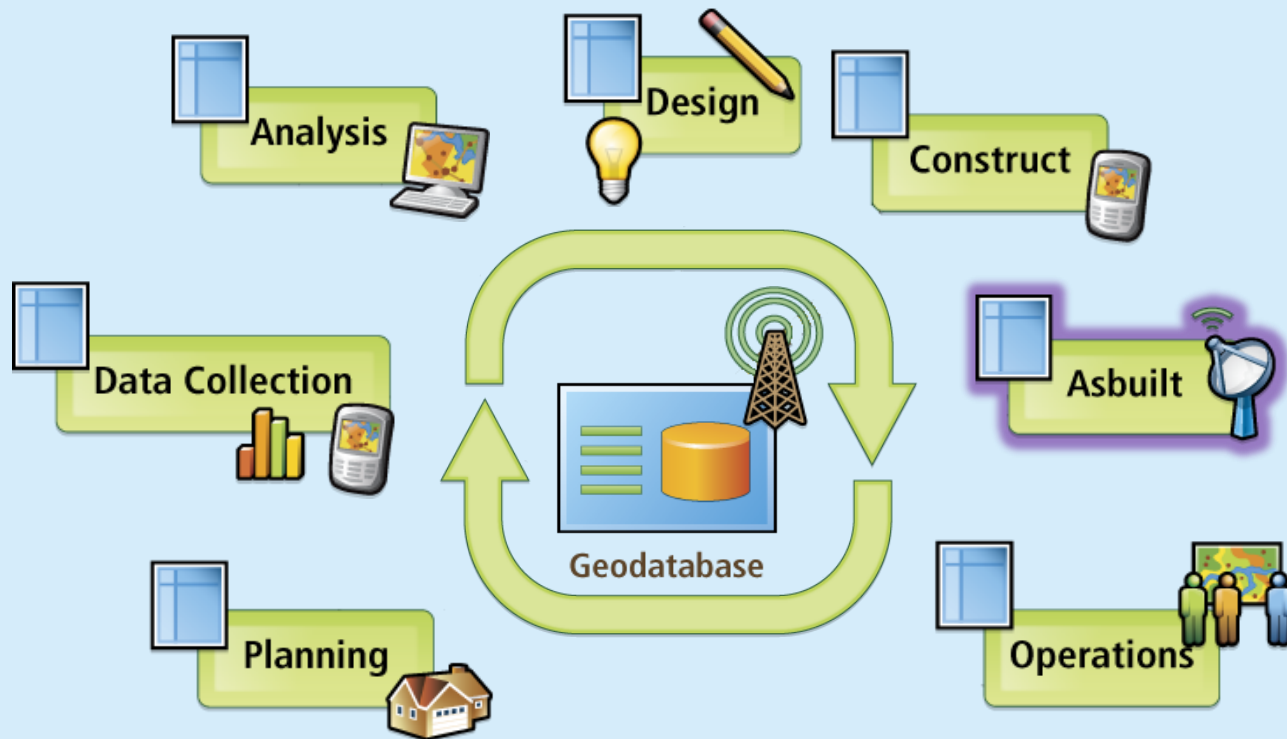
Design



Construction



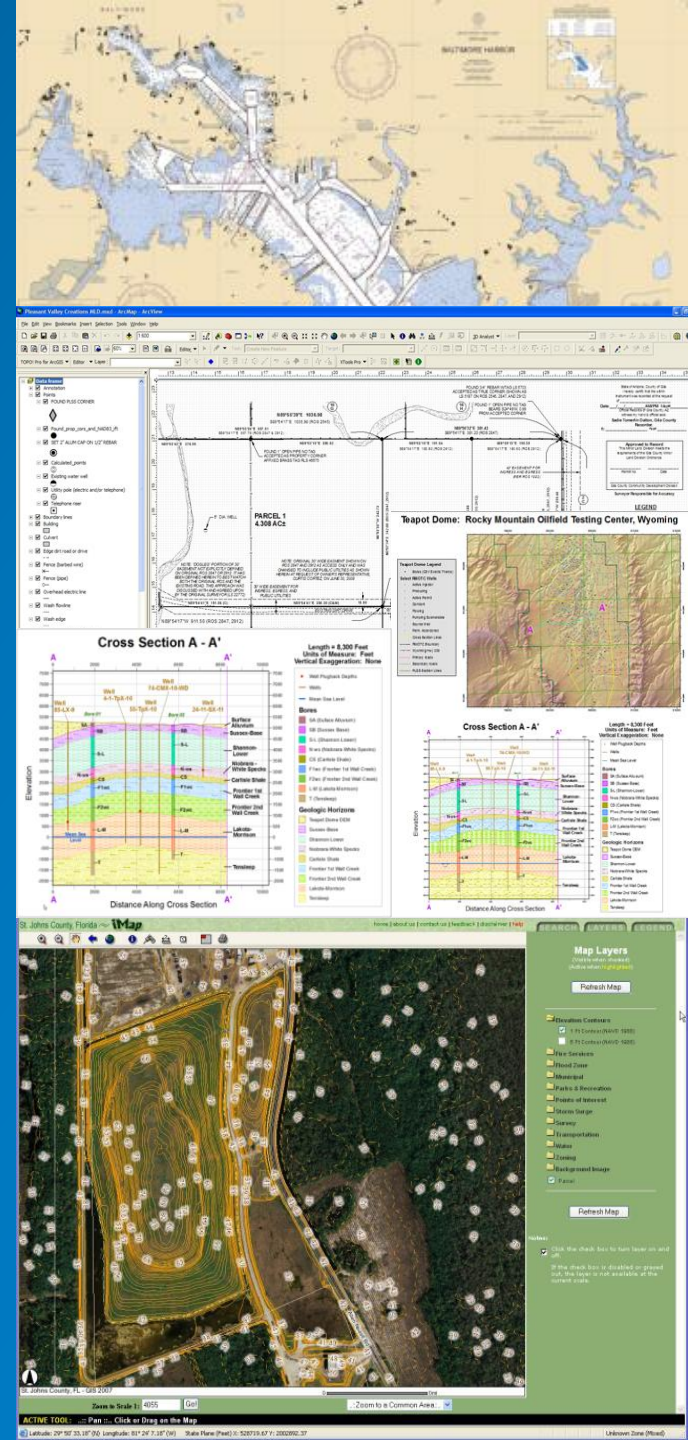
Asbuilt



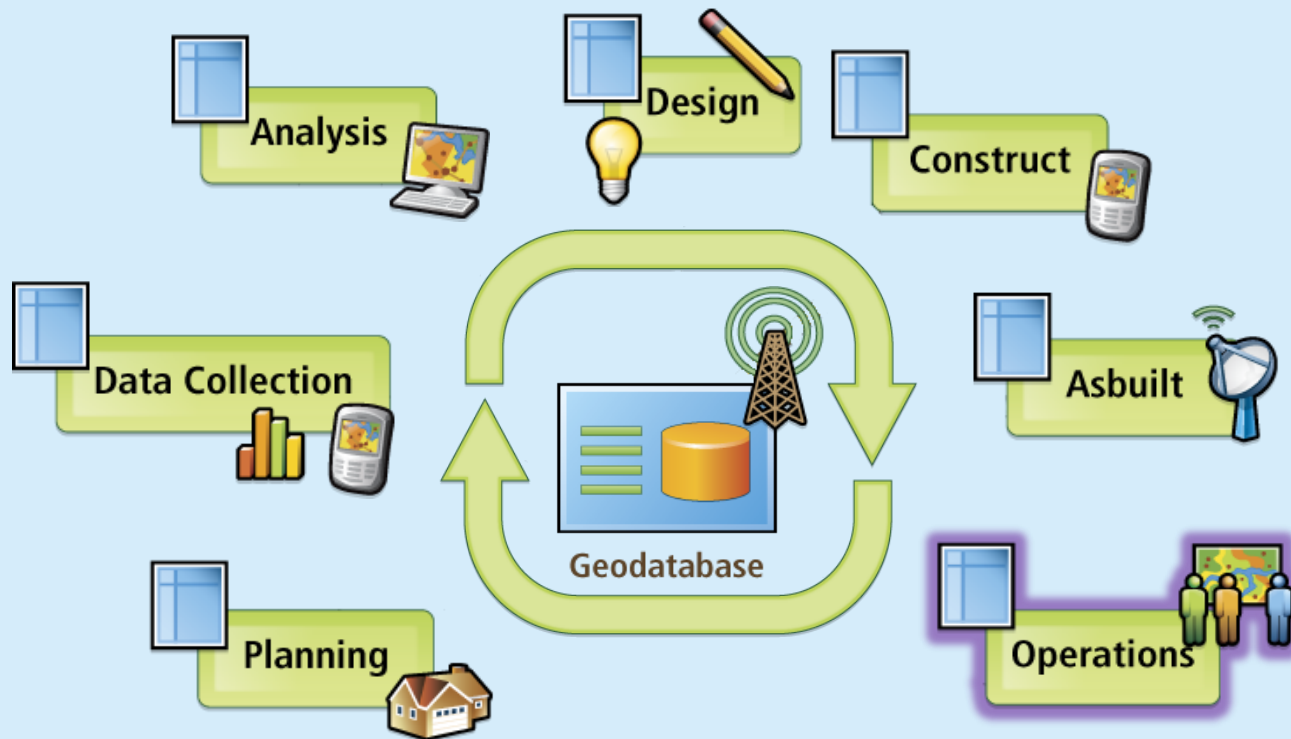
Asbuilt

- Asset Location
- Asset Attributes
- Survey Control
- Aerial Photography
- History Maintained
-

Asbuilt Data Builds GIS

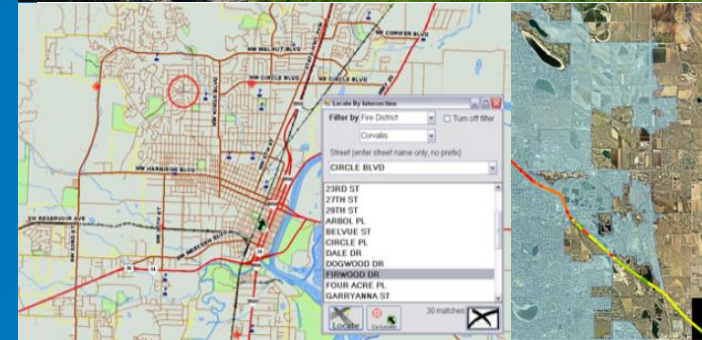


Operations



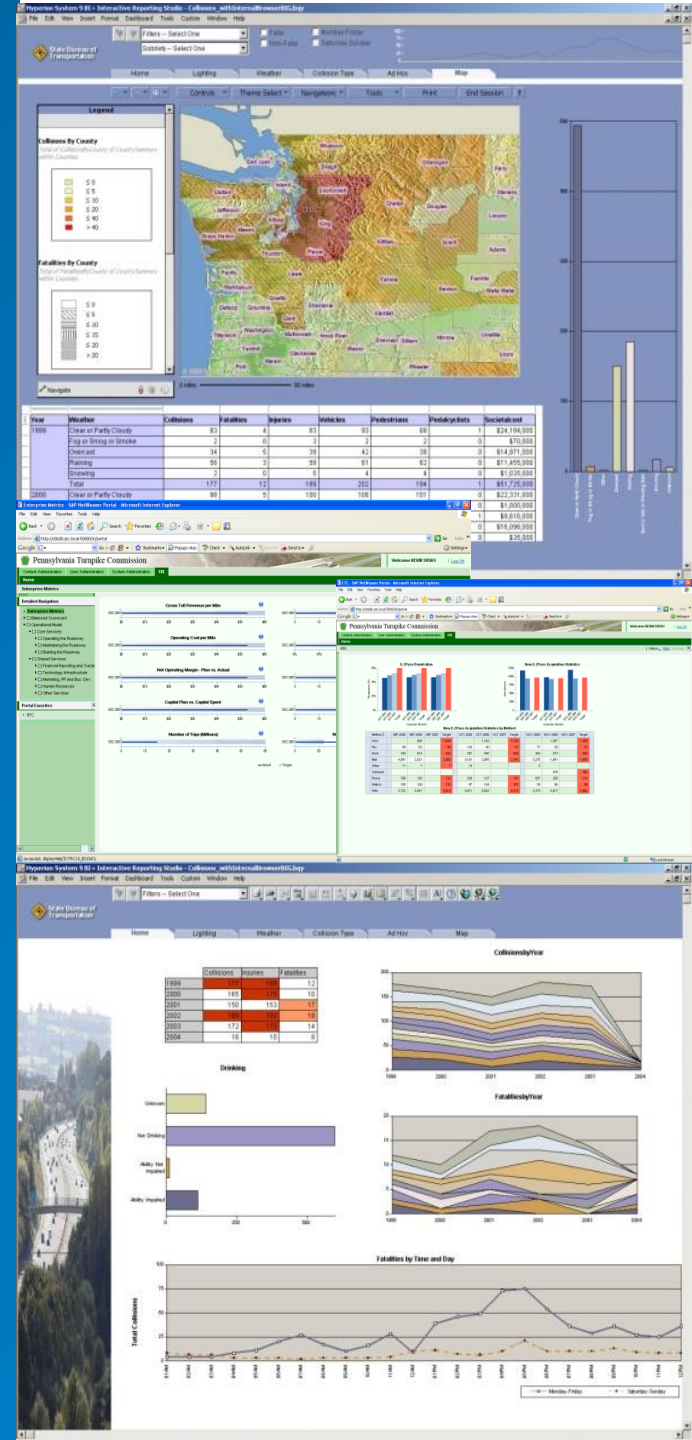
Operations and Maintenance

- Intelligent Transportation
- Real-Time Asset Tracking
- First Responders
- Tax Zones
- Risk Assessment

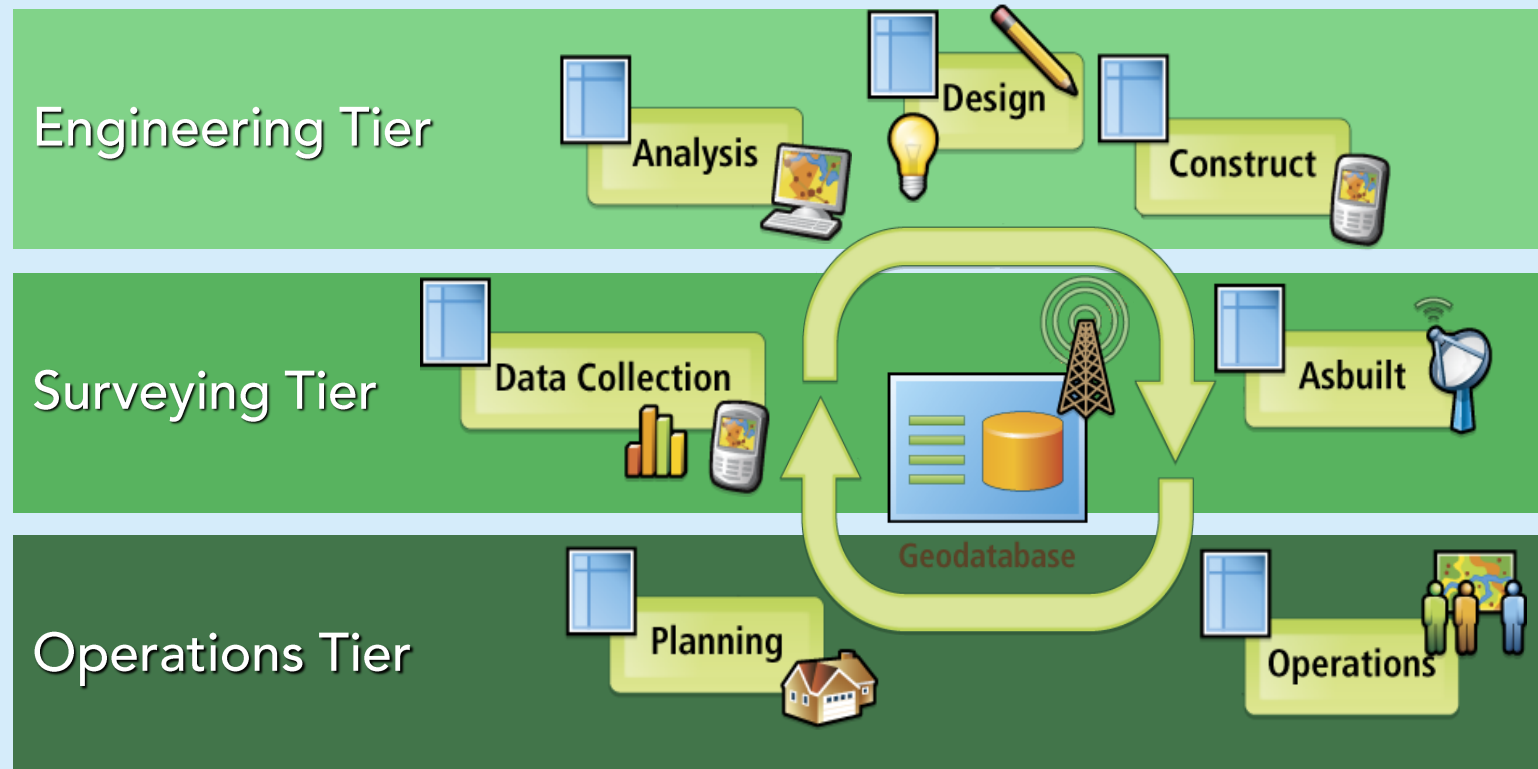


Operations and Maintenance

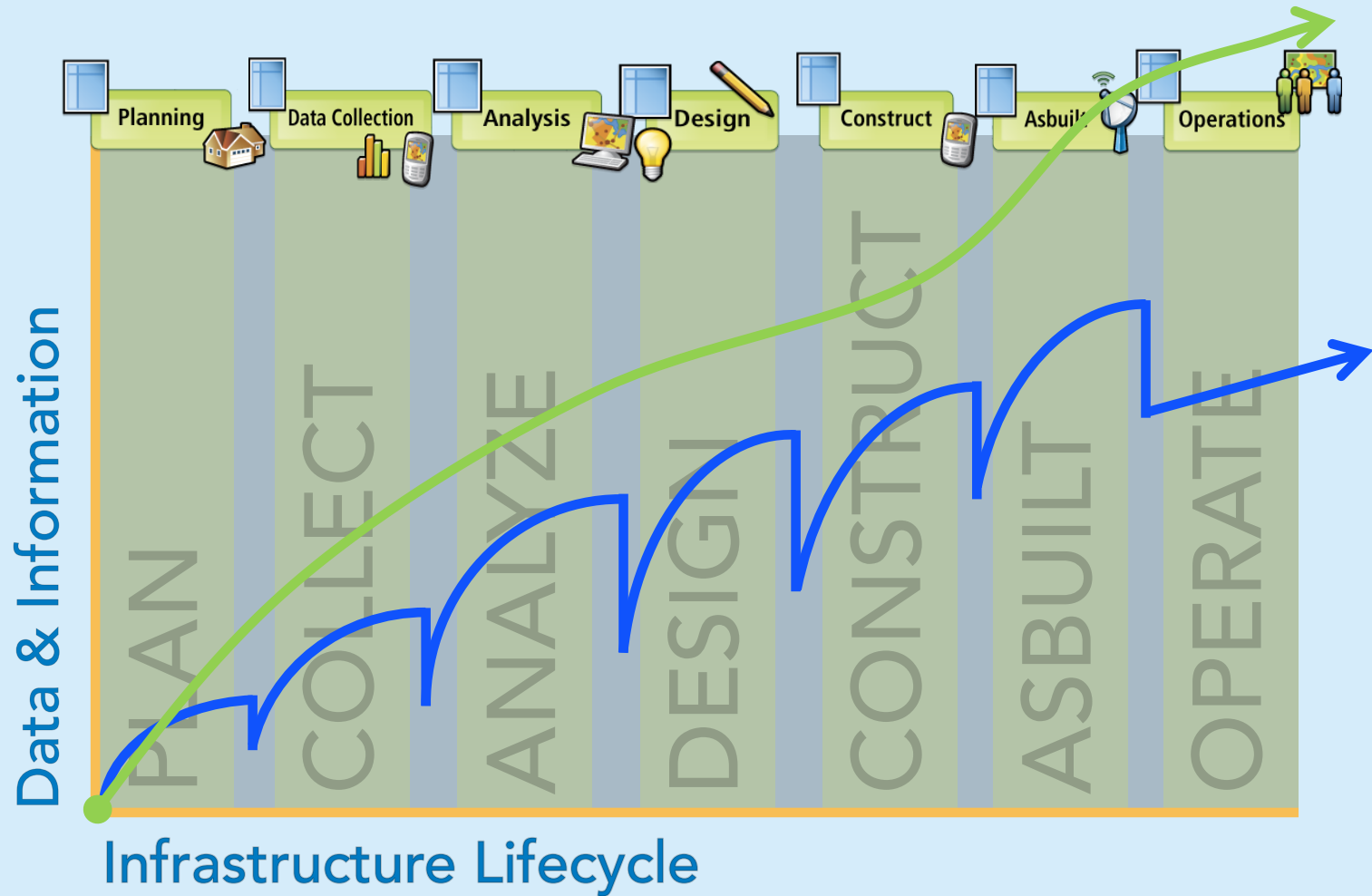
- Real-Time Costs Analysis
- Executive Dashboards
- Key Performance Indicators



Infrastructure Lifecycle



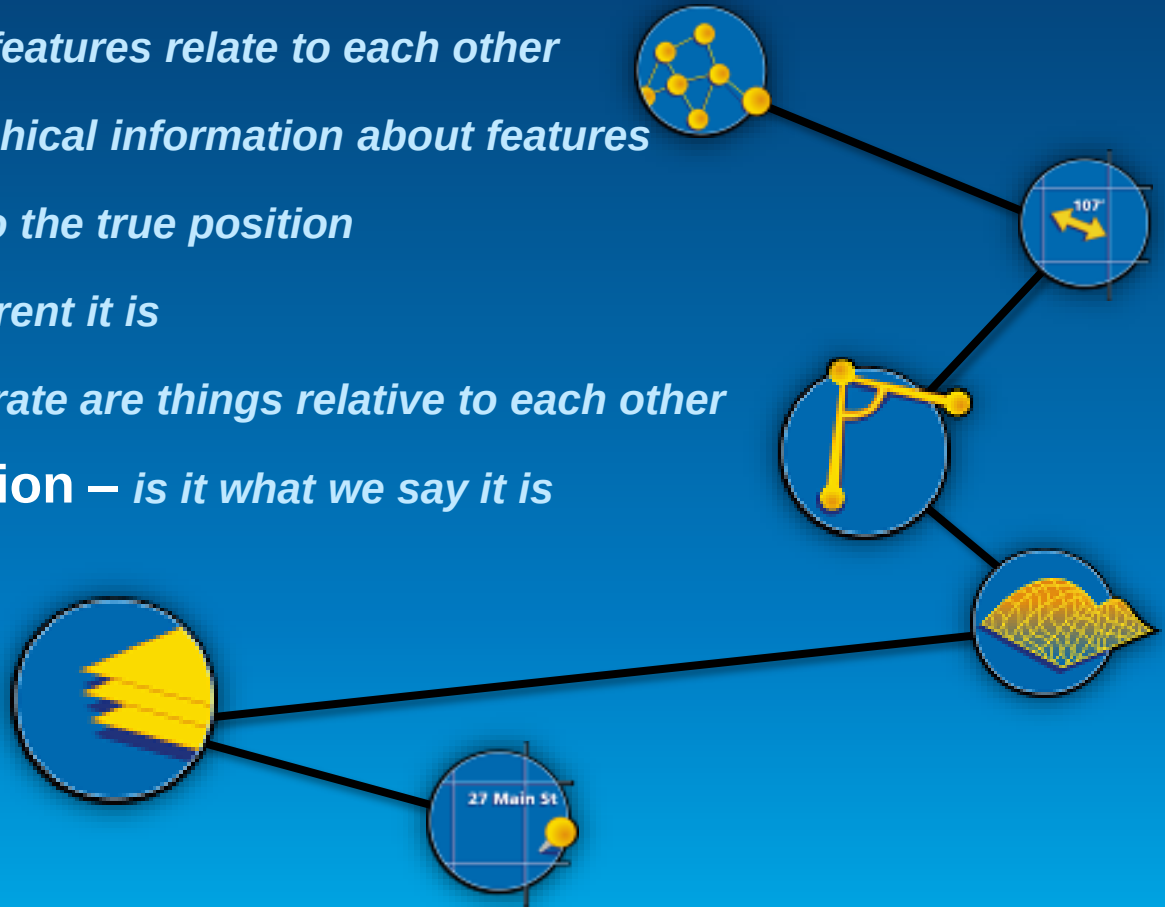
Data Management with Enterprise GIS



Types of Data Accuracy

Measures of data correctness

- **Topological** – *how features relate to each other*
- **Attribute** – *non-graphical information about features*
- **Spatial** – *nearness to the true position*
- **Temporal** – *how current it is*
- **Relative** – *how accurate are things relative to each other*
- **Feature Identification** – *is it what we say it is*



...data maintained in a structured environment

Types of geographic data

Data best stored and managed in a database

VECTOR

Land Ownership

Transportation

Surface Waters

Boundaries

Geodetic Control

RASTER

Elevation
Imagery
Land cover
Soils
Vegetation
Slope
Others ...

SURVEY

Parcel Fabric

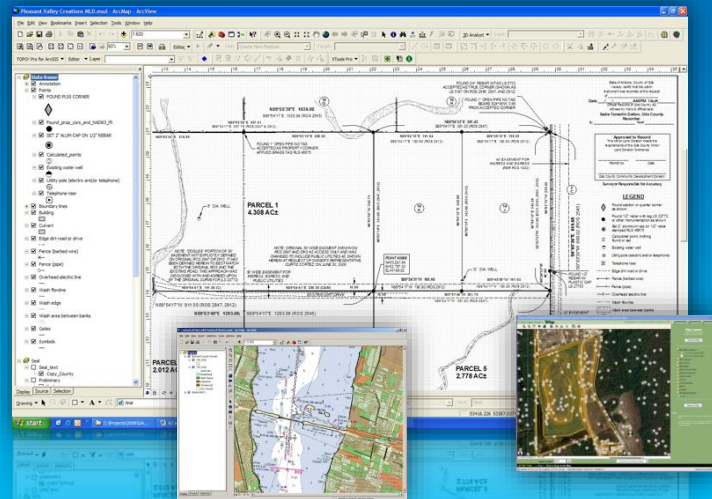
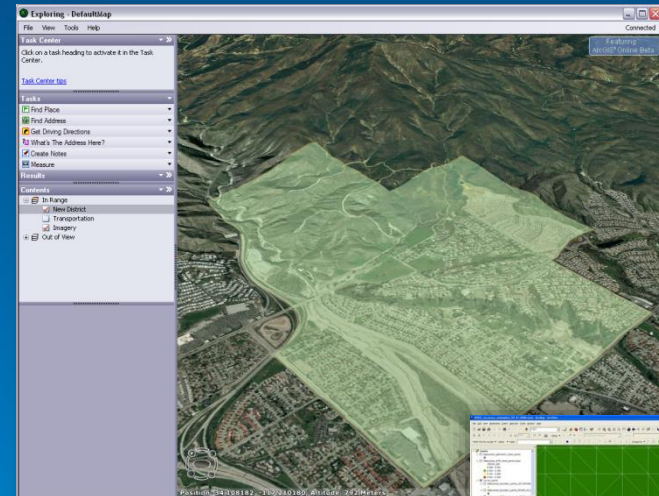
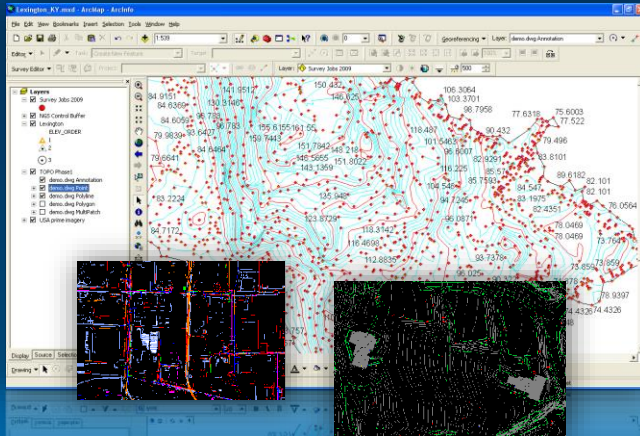
Control

Total Station

GPS

Record Measurements

... Special editing tools for each data type



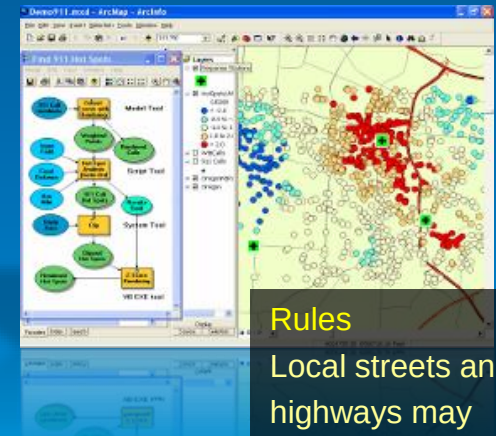
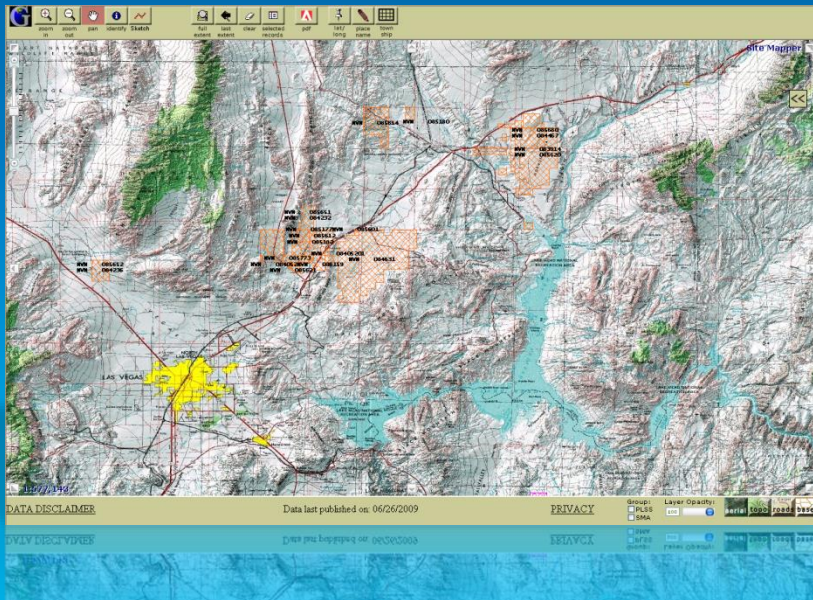
Components of geographic data

Properly structuring data powers new uses. . .

ATTRIBUTES

Attributes of NGS Control Data							
QUAD	LATITUDE	LONGITUDE	POS_DATUM	POS_SRCE	ELEVATION	ELEV_DATUM	DATA_SRCE
FORD (1993)	37 57 07. (N)	084 21 51. (W)	NAD 83	SCALED	277.01	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON EAST (1993)	38 02 28.29417(N)	084 25 12.15270(W)	NAD 83	ADJUSTED	299.32	NAVD 88	http://www.ngs.noaa.gov
COLETOWN (1993)	37 57 33.26431(N)	084 24 55.94106(W)	NAD 83	ADJUSTED	320.	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 02 31.11953(N)	084 35 59.20505(W)	NAD 83	ADJUSTED	296.	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 02 18.28578(N)	084 35 56.50797(W)	NAD 83	ADJUSTED	297.38	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 02 19.87823(N)	084 35 59.85823(W)	NAD 83	ADJUSTED	297.	NAVD 88	http://www.ngs.noaa.gov
COLETOWN (1993)	37 56 10.55031(N)	084 24 01.97120(W)	NAD 83	ADJUSTED	317.1	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 02 16.70125(N)	084 36 15.37216(W)	NAD 83	ADJUSTED	297.62	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 01 50.45819(N)	084 36 44.81290(W)	NAD 83	ADJUSTED	290.29	NAVD 88	http://www.ngs.noaa.gov
GEORGETOWN (1993)	38 08 52.32082(N)	084 31 51.65122(W)	NAD 83	ADJUSTED	277.64	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 00 43.06555(N)	084 33 04.19777(W)	NAD 83	ADJUSTED	330.2	NAVD 88	http://www.ngs.noaa.gov
LEXINGTON WEST (1993)	38 00 42.58094(N)	084 33 05.36773(W)	NAD 83	ADJUSTED	330.2	NAVD 88	http://www.ngs.noaa.gov

BEHAVIOR



Rules
Local streets and
highways may
not intersect

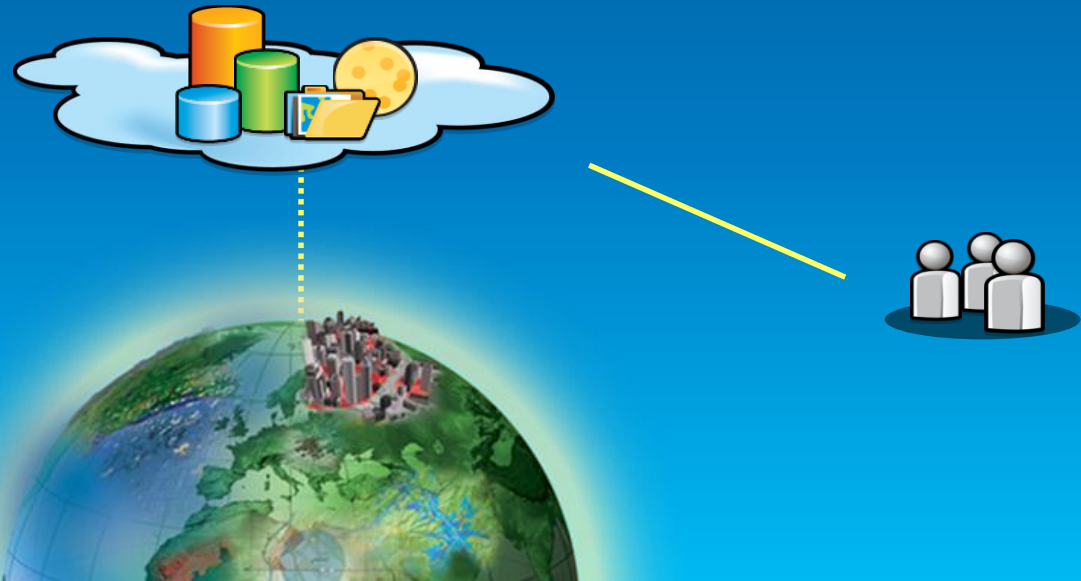
GEOMETRY

. . . not all from the same source . . .

Why were GIS built?

Single uses – focused solutions.....

- Electric networks
- Addressing
- Emergency vehicle routing
- Storm tracking
- Wildfire management
- Telco networks
- Gas distribution systems
- Pipeline systems
- Mining
- Tax mapping
- Parcel management
- Zoning maps
- Assessor maps
- Land use planning
- Sensitive environmental sites
- Manage survey control
- Many more reasons



Initial GIS Specifications

Originally single use, now multipurpose

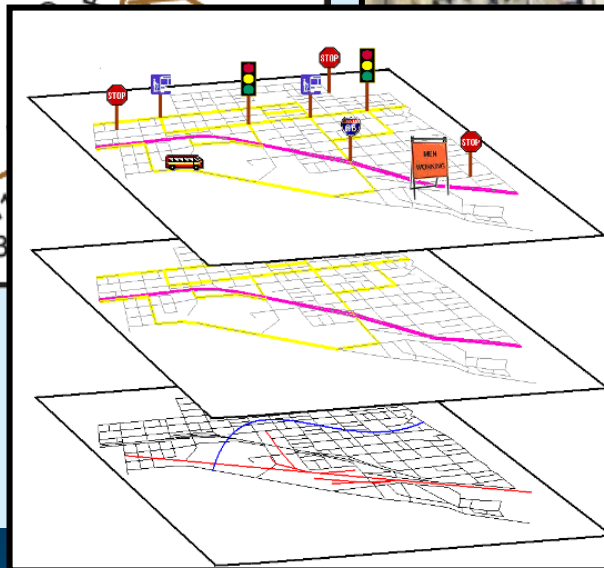
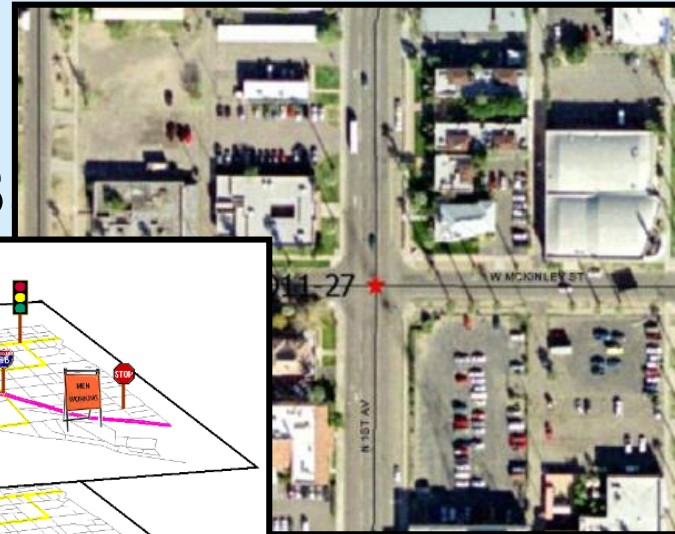
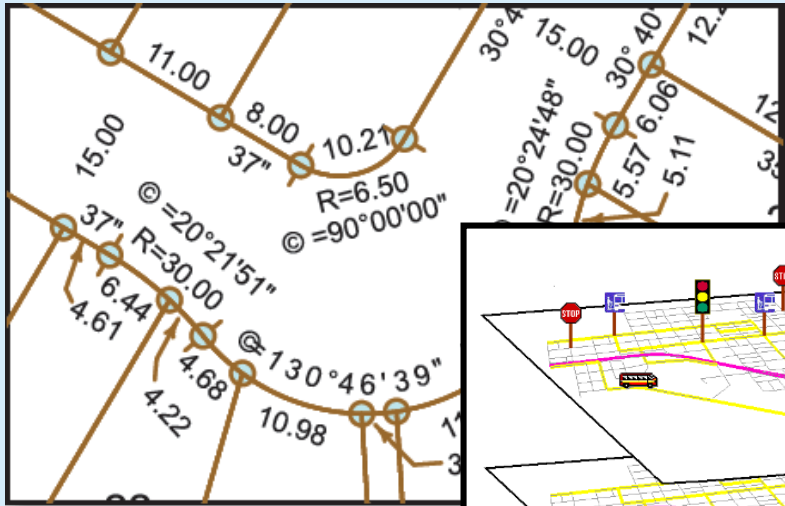
- Particular initial uses
- Uses and applications grow over time
- Data eventually becomes unfit for new purposes



Parcels



Most layers register to...



Tiers of lot/parcel data management

Ink on film, sketch, etc.

COGO/CAD

Survey controlled parcel fabric

Tiers of lot/parcel data management

Ink on film, sketch, etc.

COGO/CAD

Survey controlled parcel fabric

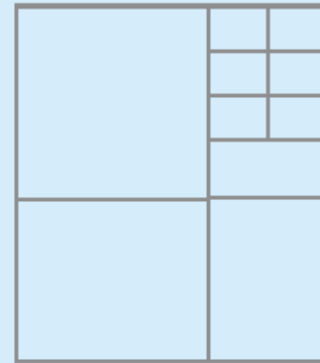
2.235484000		
2.235484000		
Abstract		

Tiers of lot/parcel data management

Ink on film, sketch, etc. –
Scan/Digitize

COGO/CAD

Survey controlled parcel fabric

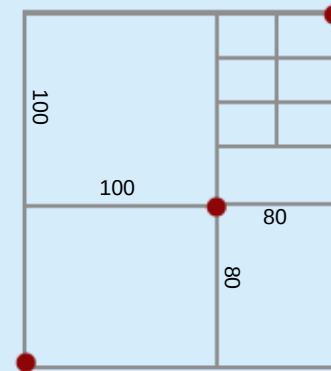


Tiers of lot/parcel data management

Ink on film, sketch, etc.

COGO/CAD – dimensions used for data entry

Survey controlled parcel fabric



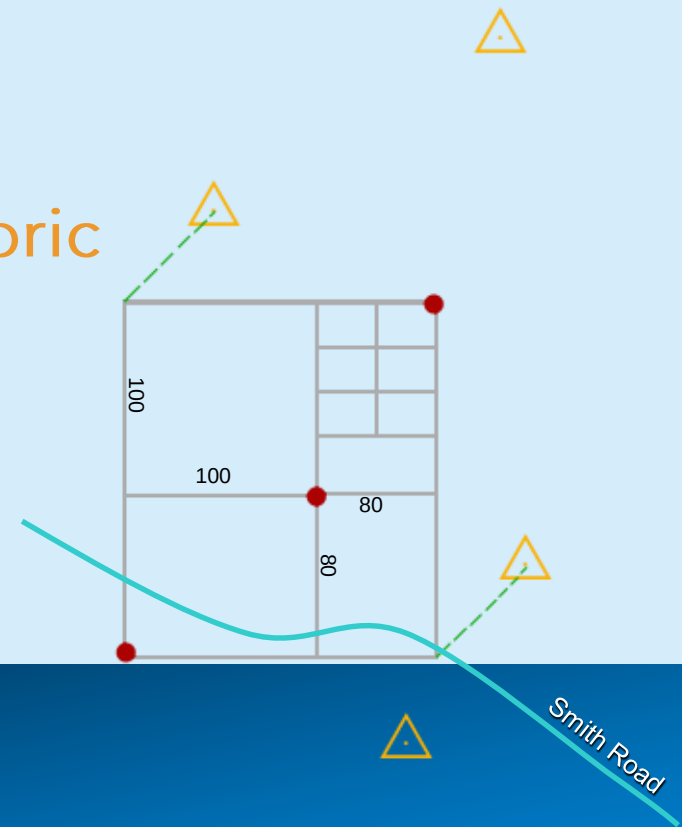
Tiers of lot/parcel data management

Ink on film, sketch, etc.

COGO/CAD

Survey controlled parcel fabric

- Plan Dimensions (COGO)
 - Control points
 - LSA
 - Associated Data
- Layers Adjusted



Tiers of lot/parcel data management

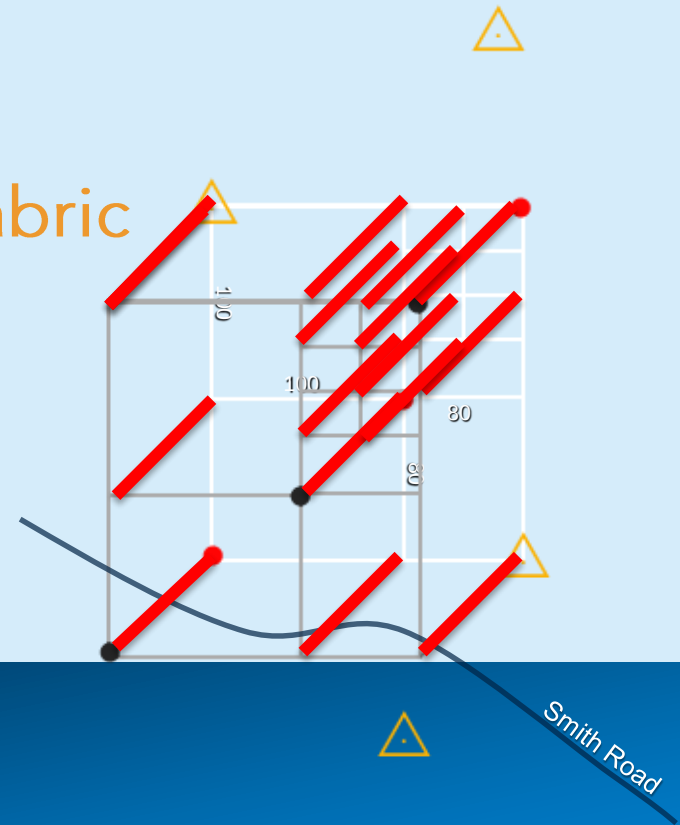
Ink on film, sketch, etc.

COGO/CAD

Survey controlled parcel fabric

- Plan Dimensions (COGO)
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- LSA
- Associated Data

Layers Adjusted



Tiers of lot/parcel data management

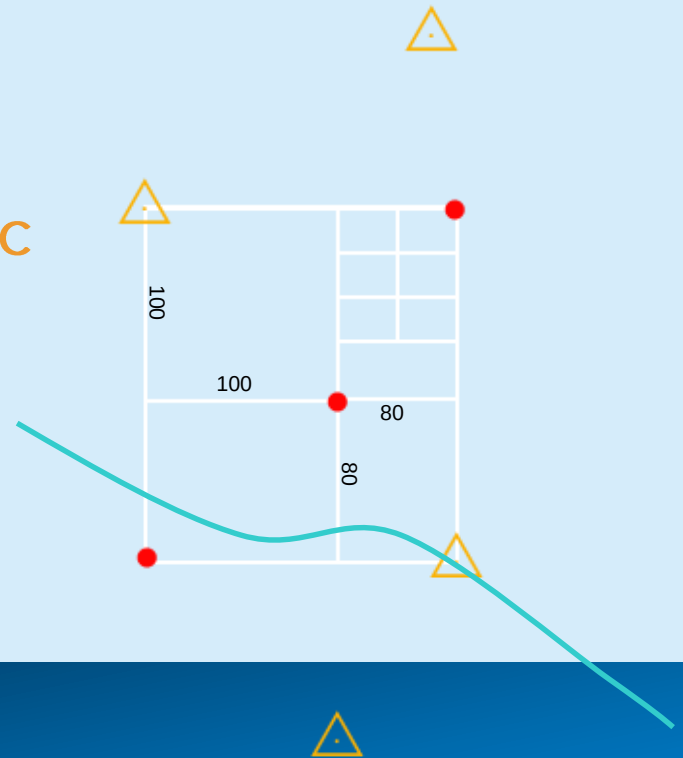
Ink on film, sketch, etc.

COGO/CAD

Survey controlled parcel fabric

- Plan Dimensions (COGO)
- Control points
- LSA
- Associated Data

Layers Adjusted



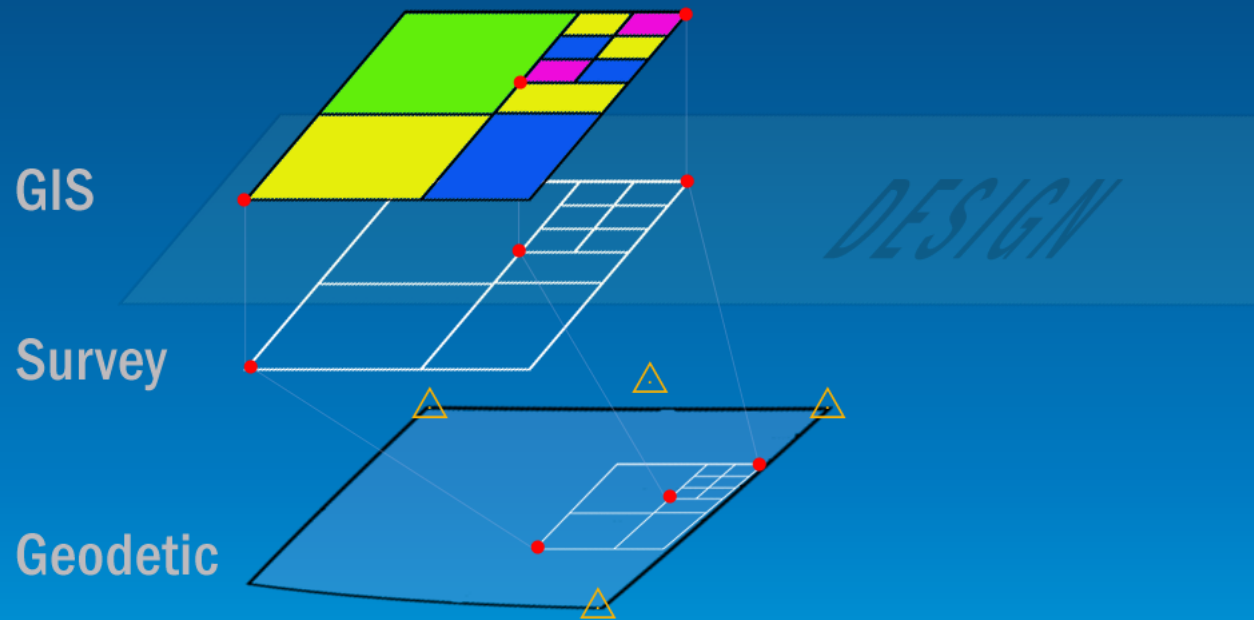
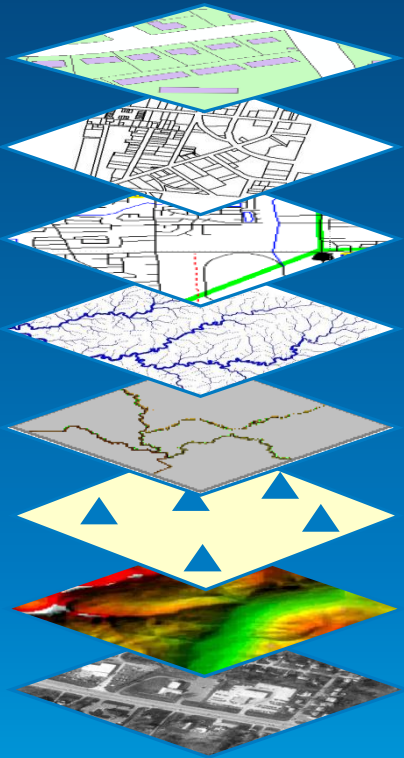
Before and After LSA



Survey-based parcel adjustment aligns parcels on orthos

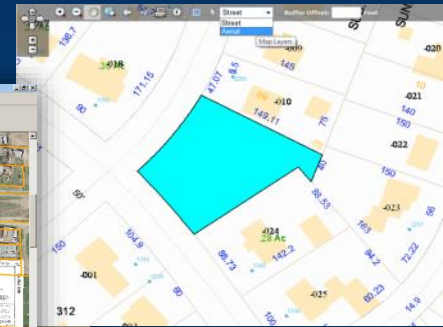
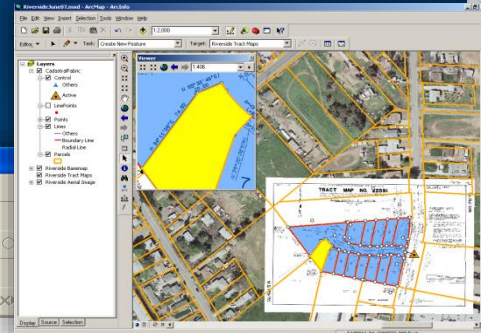
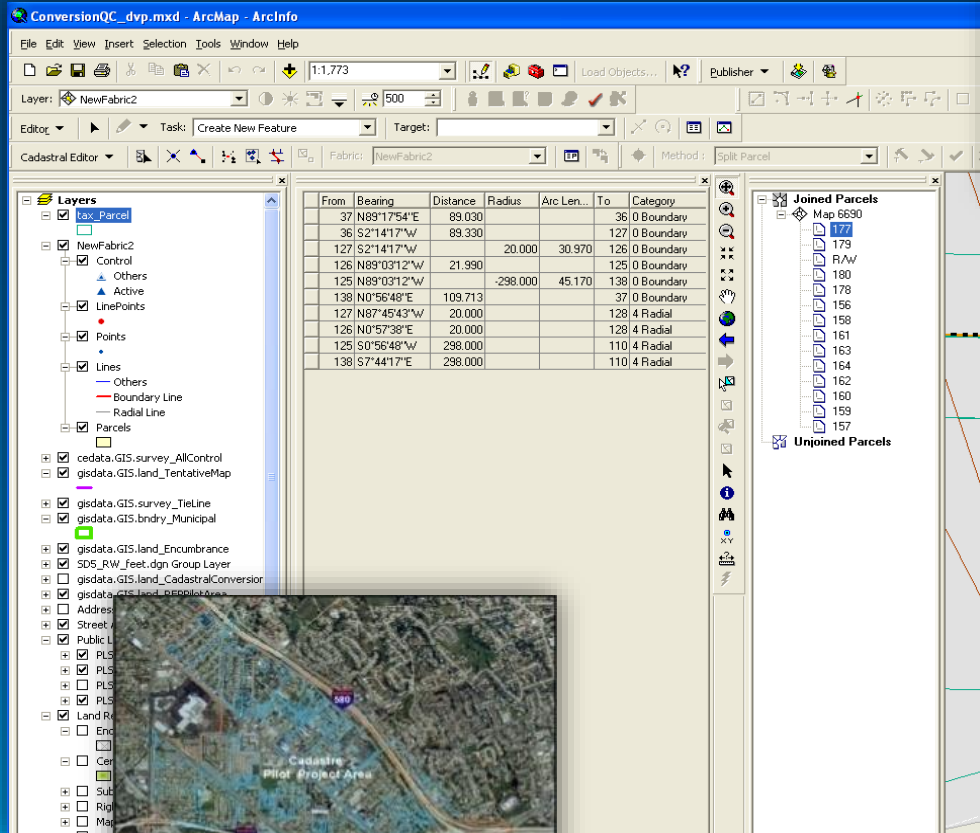
Parcel Fabric Technology

Leveraging the accuracy of record measurements in GIS . . .

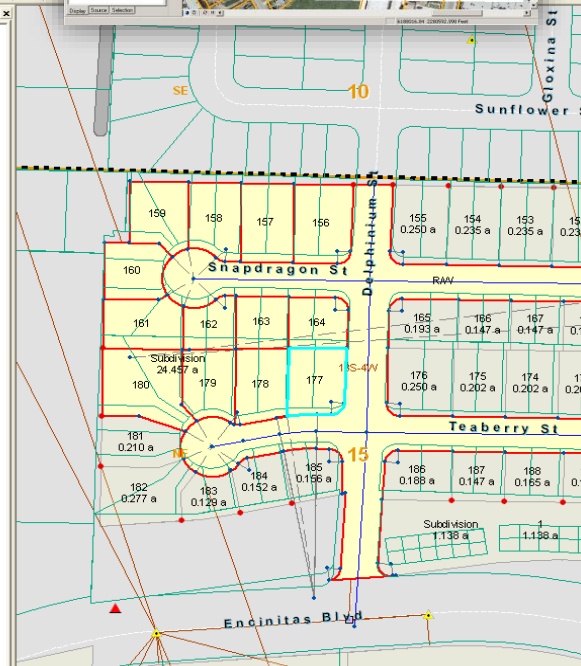


The Next Generation

High accuracy GIS . . .



Parcel Management
City of Encinitas



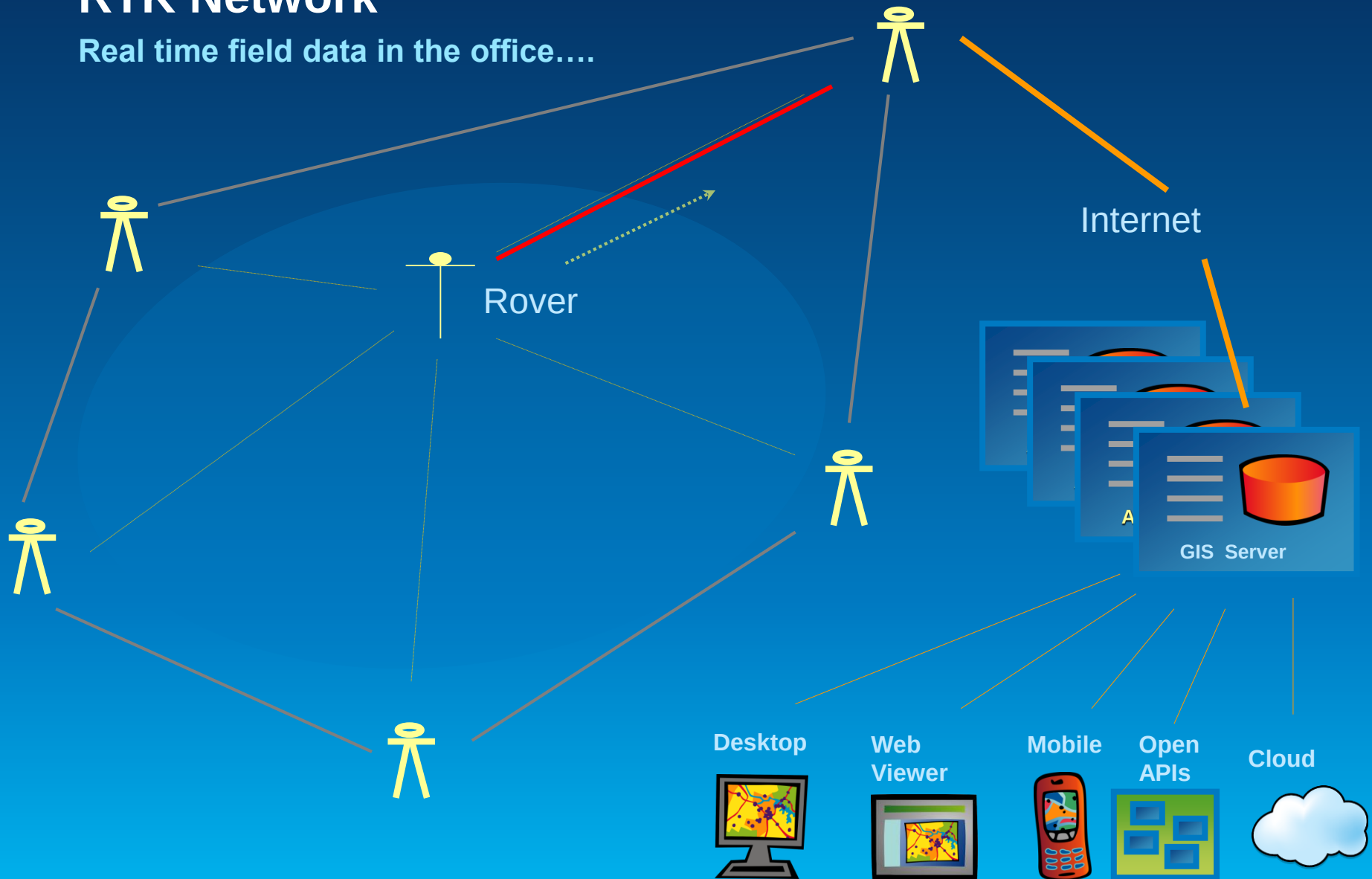
Leveraging Survey Accuracy in GIS . .

. . . Using GIS Tools for Survey Integration



RTK Network

Real time field data in the office....



Summary

Web Services

WFS – Web Feature Service

WMS – Web Mapping Service

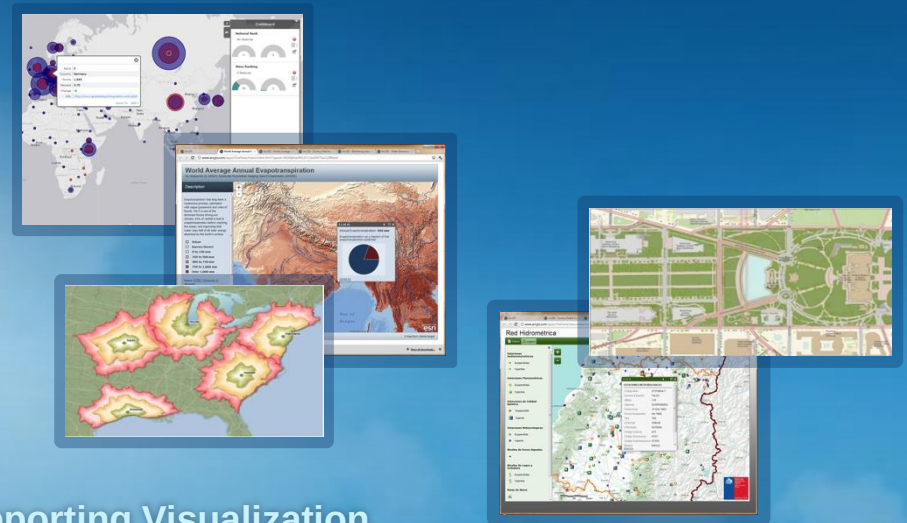
Geoprocessing Services

Web services power web maps, open standards.....

Web Maps are the New Medium

Providing Intelligent Maps to Everyone

Any Device



Supporting Visualization,
Query, Editing, and Analysis

Dynamic

Making Dynamic Geographic Information Available Anywhere

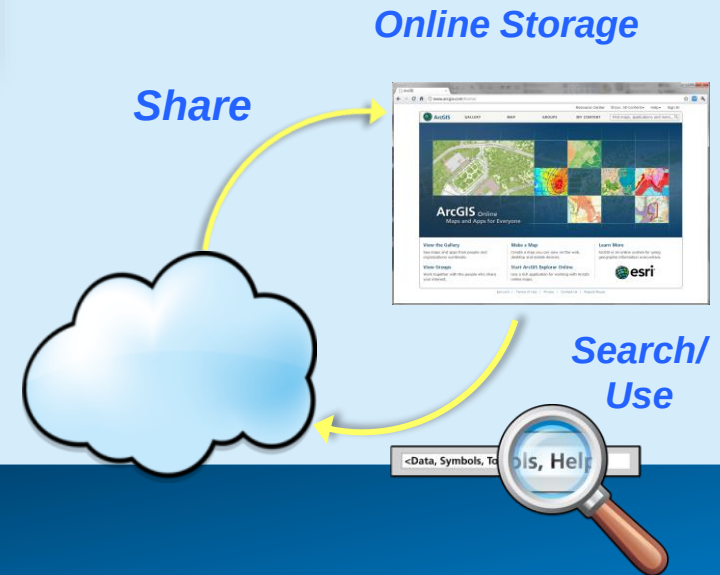
Online Data Services

CONTENT



WFS
WMS

SHARING



Online maps and apps . . .

FindAControl

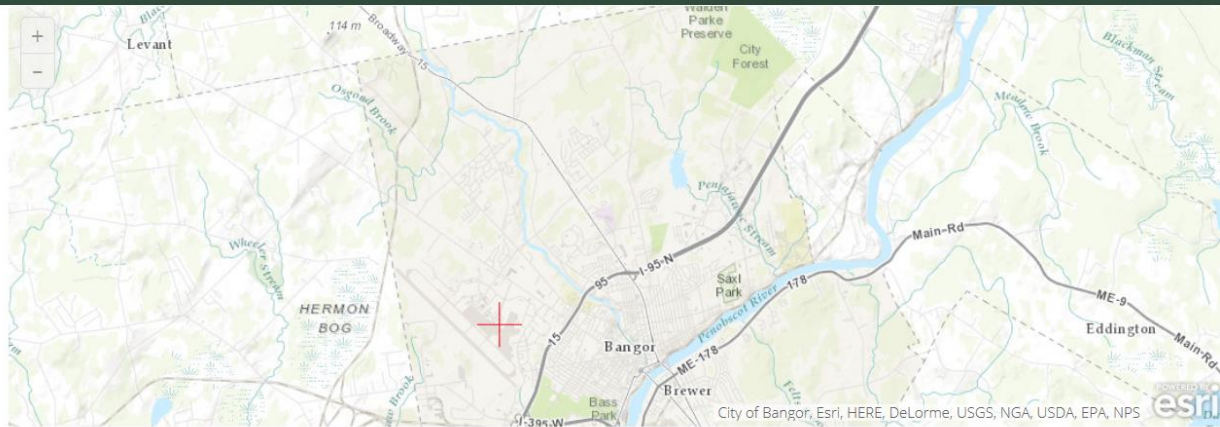
<http://historicalmaps.arcgis.com/usgs/>

USGS Historical Topographic Map Explorer



Go to a location to the location you want to explore, then Click on a place to see its historical maps.

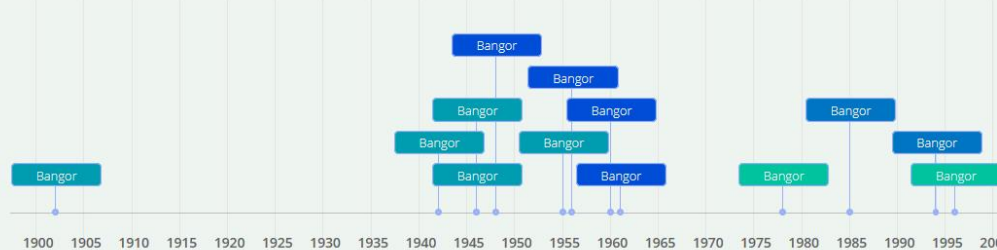
Q bangor maine



2

Click timeline maps to view in main window.

Historical Map Scales



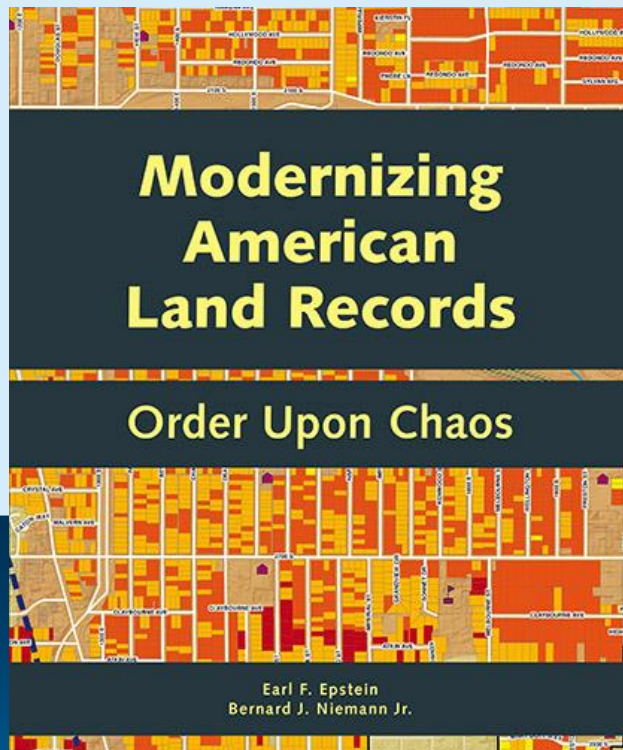
How do we take advantage?

Survey is critically important.....

- Parcels
- Cloud
- Connected Field
- Leverage Enterprise GIS
- Build Systems
- Ongoing Data Quality Improvement

. . . .Its time to leverage GIS for all of your business. . . .

www.esri.com/landing-pages/book-offer/land-administration





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