



What is GIS

University of Tsukuba
Graduate School of Life and Environmental Science
April 21st, 2011

Copyright© ESRI Japan Corporation. All rights reserved.



What is GIS?

What do you image of GIS?

Gas Insulated
Switch

Groupe
Interventional
Speciale

Geographic
Information System

2



What is GIS?

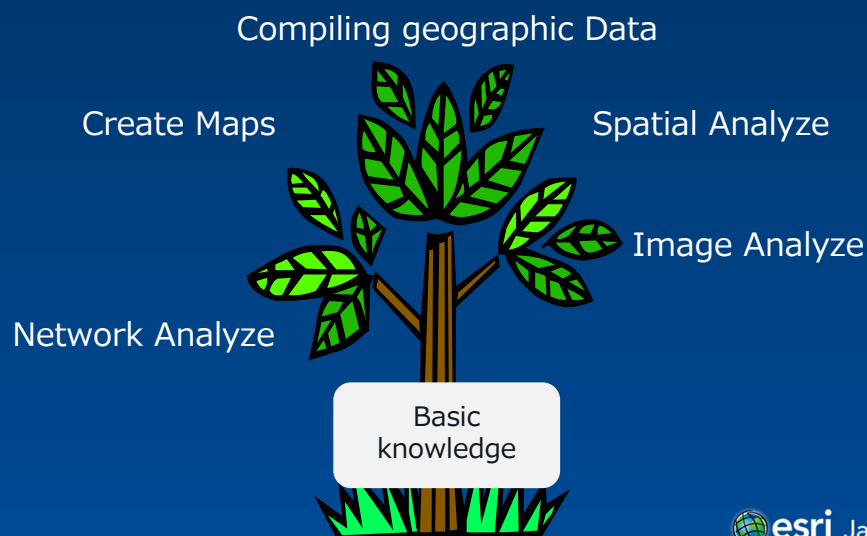
<Overview>

- A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.
- GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

3



Basic knowledge

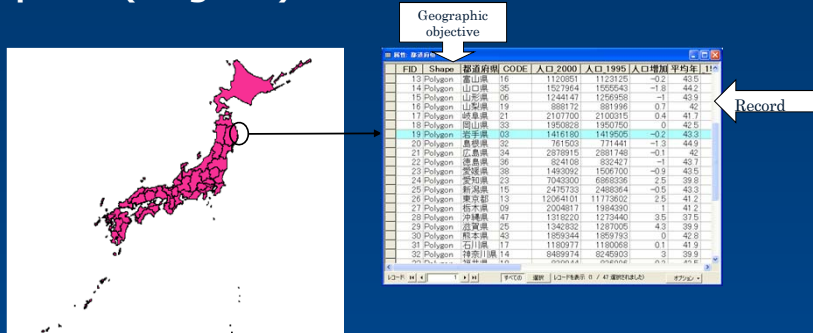


4



1-1 What is GIS?

- Spatial (diagram) data + tabular

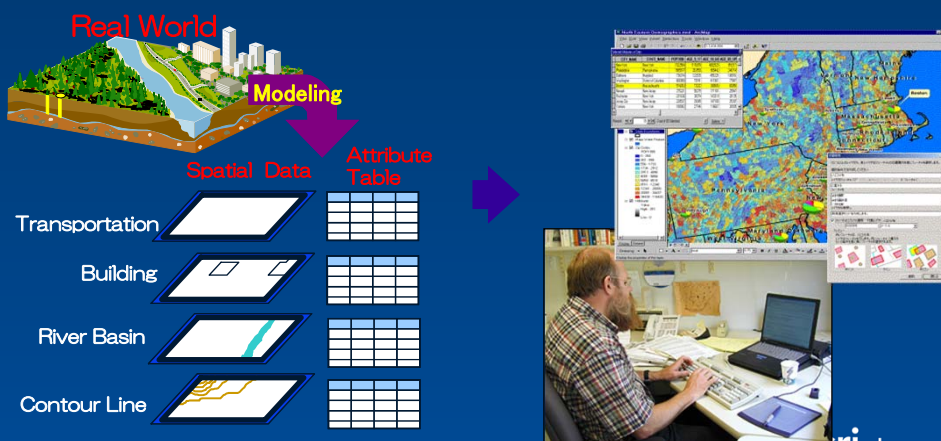


- Represent location is Point, Line, and Polygon
- Information about a geographic feature in GIS
- Describe the geographic objects



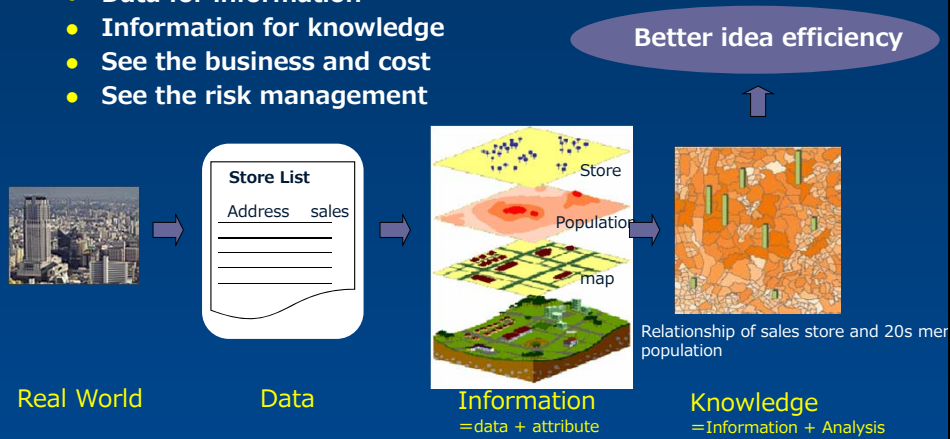
Why GIS?

Many of the spatial relationships between layers can be easily derived through their common geographic location.



What can you do with GIS?

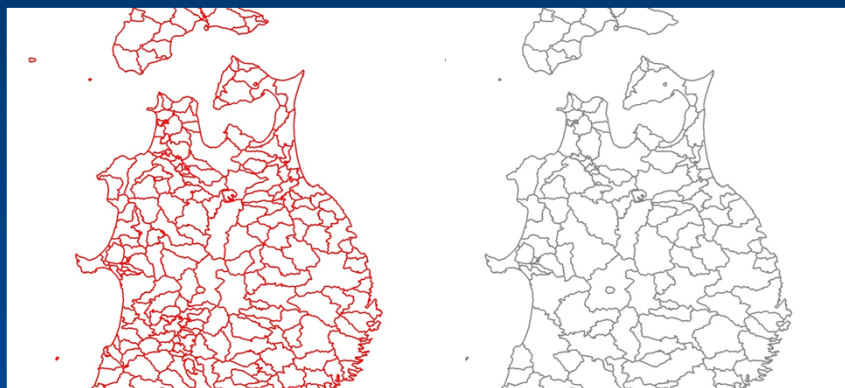
- Data for information
- Information for knowledge
- See the business and cost
- See the risk management



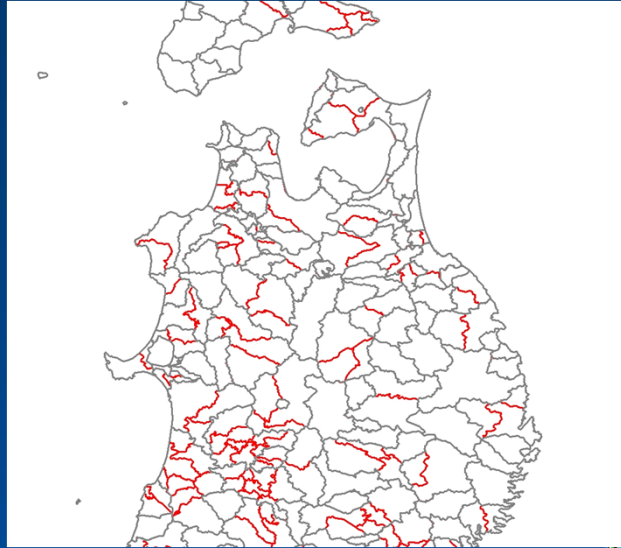
1. Find a feature- people use maps to see where or what an individual feature is.
2. Finding patterns- looking at the distribution of features on the map instead of just and individual feature, you can see patterns emerge.



What is the difference between those map?



When you pile up...

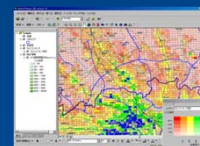
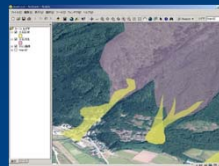
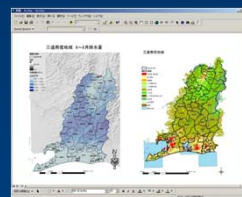


esri Japan

1-2 Case Study

- GIS use many industries

- Business
- Defense and intelligence
- Education
- Health and Human Services
- Mapping and charting
- Natural Resources
- Public Safety
- Transportation
- Utilities and Communications



10

Copyright© ESRI Japan Corp.,2007

esri Japan

1-2 Case Study: Convenience store candidate new store

《theme》

- Create a new convenience store for profit

If you are owner, where do you create a new convenience store?

11

Copyright© ESRI Japan Corp.,2007



1-2 Theme

- a) a densely populated district
 - Single? Household?
- b) Close to station

(Answer)

(a), (b) City extended by both

12

Copyright© ESRI Japan Corp.,2007



1-2 Solution

(a) Extracting the city of more than 300,000

→ It is not necessary to use GIS

City	Population	Area
Yokohama	3,598,493	434,573,413
Kawasaki	1,340,470	142,805,402
Chiba	928,875	2,728,387,413
Fukuoka	1,411,655	341,632,641

(b) Find the location 3km to 5km distance from station

→ It is necessary to use GIS

13

Copyright© ESRI Japan Corp.,2007



1-2 By combining the data from another

- **County sales data**
 - Narrow down the location in the county of less than 20 million yen in sales from candidates
- **Competitor data**
 - There is no competitors entering places from the proposed site
- **Demographic Data**
 - Where there are narrow demographics of purchases

14

Copyright© ESRI Japan Corp.,2007



1-3 Solve problem for GIS

- GIS=critical thinking skills, analytic abilities, and communication skills

What and How GIS is to solve problem?

<Subject>

- 1) Is there anything you find ? (Location)
- 2) Where is it ? (Condition)
- 3) How they change ? (trend)
- 4) Are they any spatial patterns ?
- 5) If that happens... ? (simulation)

15

Copyright© ESRI Japan Corp.,2007



1-3 1) Is there anything you can find? (location)

- To get information about the specified location



To specify the location, the place name, zip code, address, latitude and longitude

16

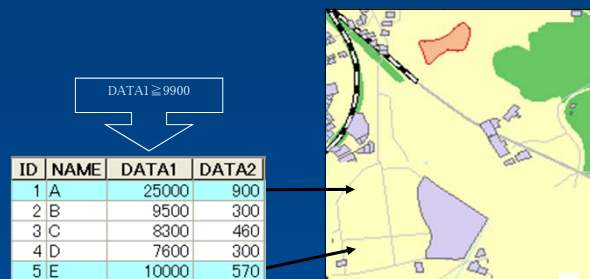
Copyright© ESRI Japan Corp.,2007



1-3 2) Where is it? (condition)

To find a location that meets the criteria

ex) Over an area of 2000 square meters, the land is not forest, located within 100m from the road, find a vacant lot to build a soil type suitable for large buildings



17

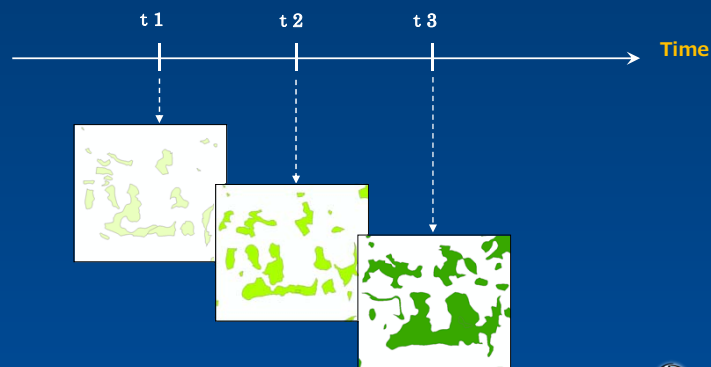
Copyright© ESRI Japan Corp.,2007



1-3 3) How they change? (trend)

Analyze changes over time

ex) How it has changed forestry area from 5 years ago from over 10 years.



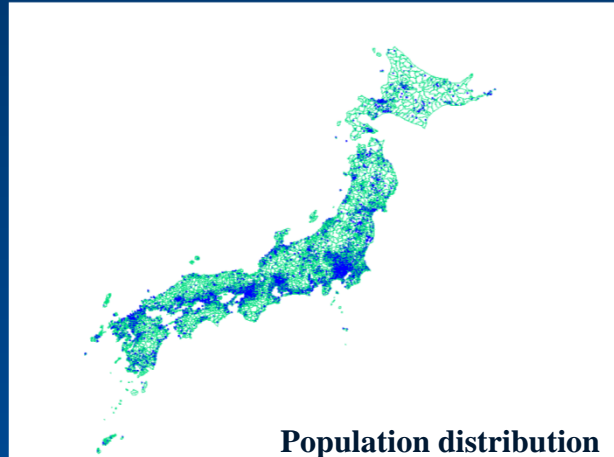
18

Copyright© ESRI Japan Corp.,2007



1-3 4) Are they any spatial patterns?

■ Analyze geographical trends



19

Copyright© ESRI Japan Corp.,2007

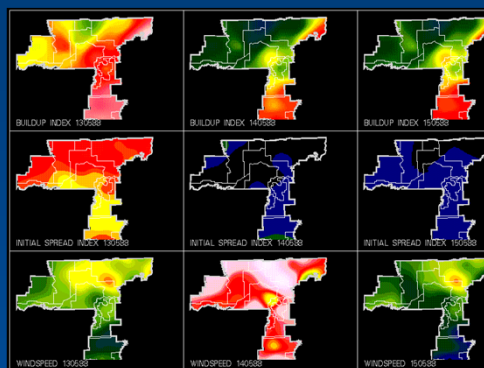


1-3 5) If that happens... ? (simulation)

To verify a pseudo-event phenomena

ex) How to proceed if a fire breaks out how the fire spread? What happens to victims?

Fire simulation



20

Copyright© ESRI Japan Corp.,2007





Increase Productivity with ArcGIS 10

Copyright© ESRI Japan Corporation. All rights reserved.



ArcGIS

A Complete System for Geographic Information



22

ArcGIS 10

Dramatically Transforming and Improving GIS



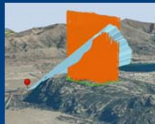
Powerful Mapping and Visualization

- Fast Display
- improved usability
- Faster Performance



New Mapping

- On-Demand Map Books
- ArcGIS Online
- ArcGIS Server



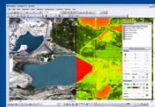
Powerful data Management

- Time Visualization
- 3D Analysis
- Network Analysis



Cloud GIS

- ArcGIS.com
- ArcGIS Server on Amazon



Powerful Imagery

- improved Image
- Massive Dynamic Mosaics



Mobile GIS

- Tablet PC
- iOS

23



ArcGIS 10

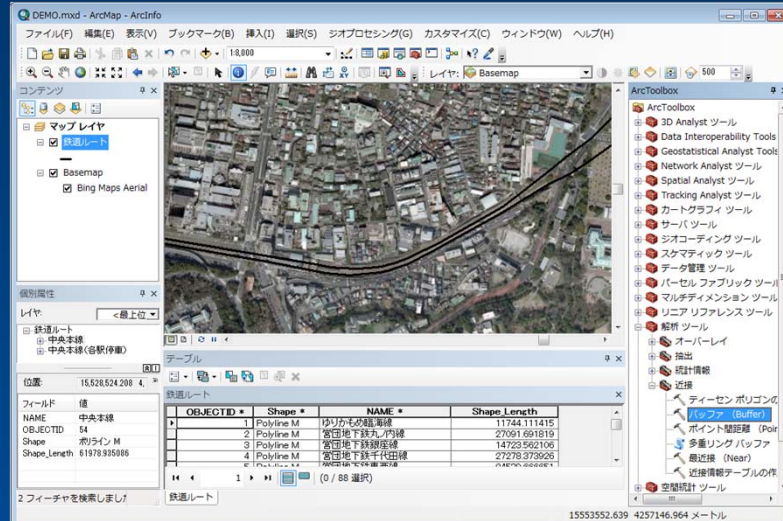
Makes GIS Easier & More Productive

24



Making Desktop GIS easier and more productive

Dockable Window



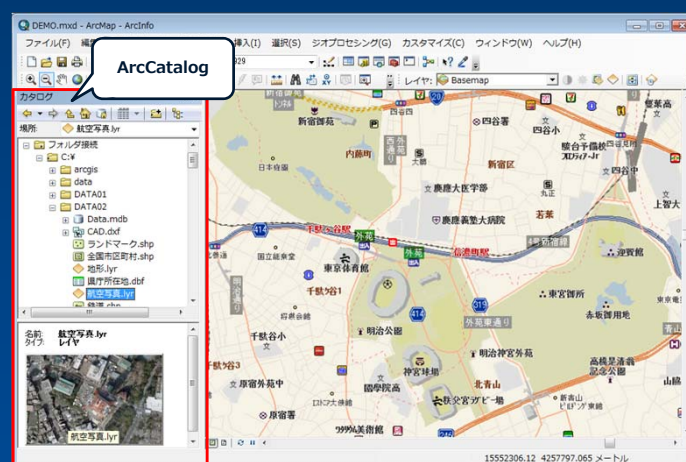
25



Accessing your data

Integrated Catalog

- New Catalog Window build into ArcMap



26



Quick and Easy Search

Search Window

- Search for maps, data, and tools

- Search items

- Local data
 - Enterprise search service
 - ArcGIS Server
 - ArcGIS Online

All items are drag and drop from Search window



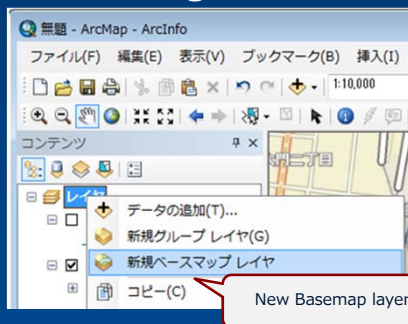
27



Map display and navigation

Basemap layers

- Basemap layers , which allow navigation of the map without having to wait for the map to redraw
- Smooth navigation



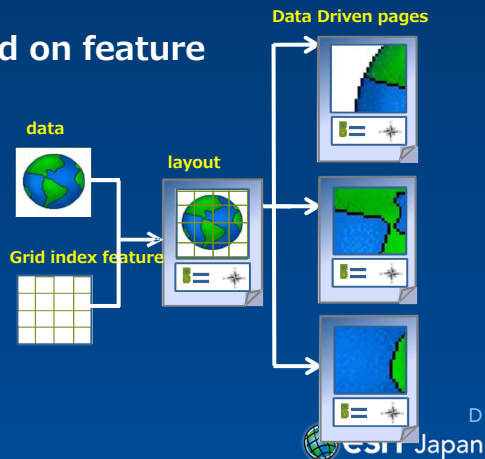
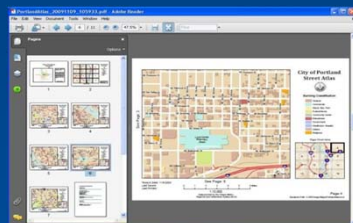
28



Improved map production workflows

Create Map Books, Map Series and Atlases

- Built-in to ArcMap GUI
- Data Driven Pages toolbar
 - Single layout
 - Index feature layer
 - Multiple pages based on feature extents
- Dynamic Layout Text
- Dynamic Locator Maps
- Multi-page PDF export

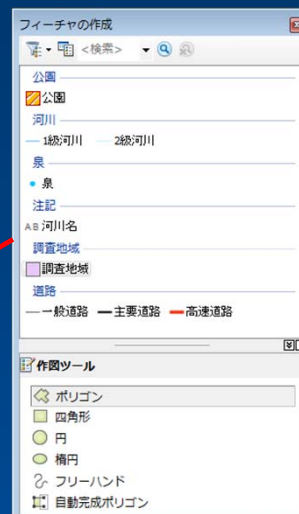
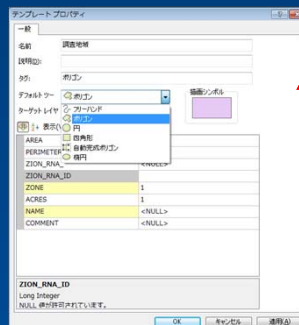


29

New Editing Experience

Create Features window provide centralized access to feature templates and tools used to construct features

- Layer-based
- Streamlined feature construction
- Simplified snapping environment
- Quick access to editing tools
- Efficient attribute update



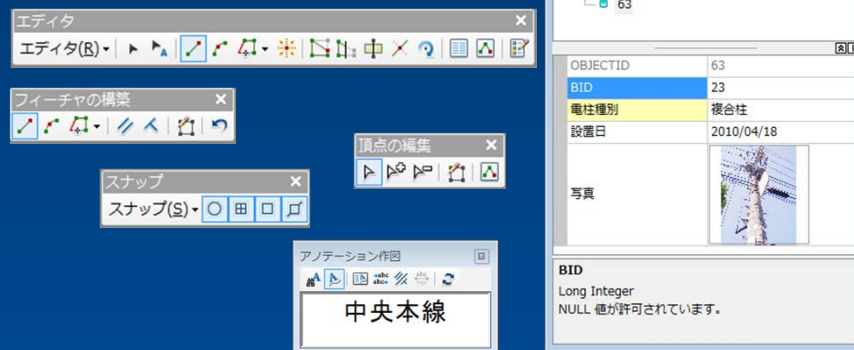
30

esri Japan

Editing Data for faster and easily

The Editor toolbar has been redesigned

- Quick access to editor tools
- Automatic Snapping
- Easy to input data



31



ArcGIS 10 Powerful Geospacing

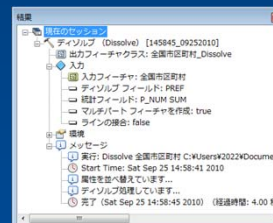
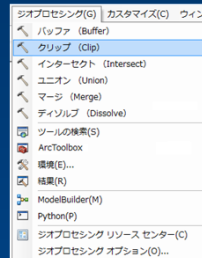
32



Geoprocessing Menu

Easy and quick to access geoprocessing tools

- 6 commonly used tools
- Easily add tools



33

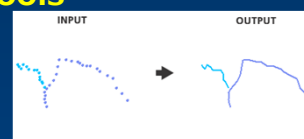


Substantial Tools

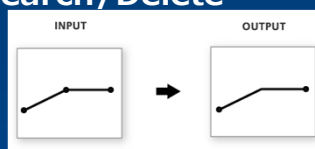
About 130 new geoprocessing tools

- KML → Layer
- Raster → Video
- Export Metadata
- Redundant Record Search/Delete*
- Change the recode

※Need ArcInfo



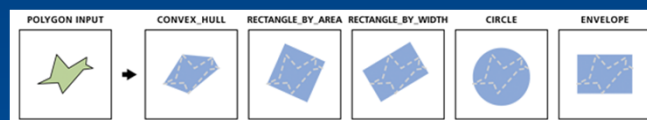
Point → line



Merge for line ※



Create ellipse



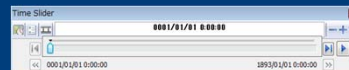
Minimum Bounding Geometry

34

Time aware visualization

ArcGIS Supports Temporal GIS

- Time aware
- Create, interact with, and serve temporal maps
- Unified time experience

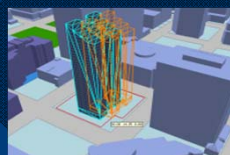


35



Advanced Extensions

3D Analyst



Skyline Analysis



Volumetric Shadows

Spatial Analyst

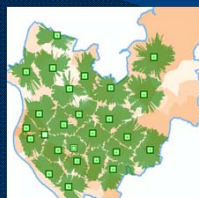


Fuzzy Overlay

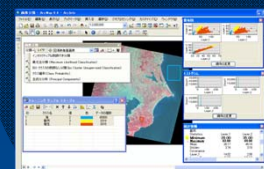
Network Analyst



Time-Based Routing



Location-Allocation



Raster Performance

36

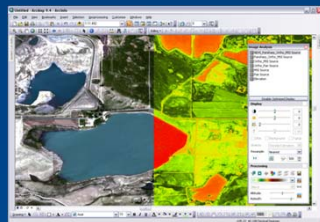
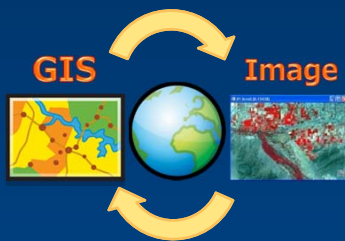


ArcGIS 10 Improve Images

37



ArcGIS Image Solution A Great Imagery Platform



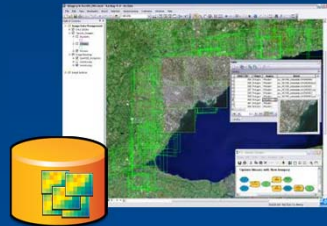
38



Mosaic Datasets - New Geodatabase Data Model

Mosaic Dataset

- Support all types of geodatabases to create or edit using for ArcEditor/ArcInfo
- **Handling of Geodatabase**
 - Raster dataset、footprint、metadata、etc



39



Focused Image Analysis

Image Analysis Window

- **Image display**
 - effects tools
 - symbology tools
 - (gamma level, DRA, stretch, etc)
 - choose the resampling method
 - accelerate raster
- **Processing raster data in ArcGIS**
 - Combining bands
 - Clipping
 - Mosaic
 - Pansharpening
 - Orthorectifying



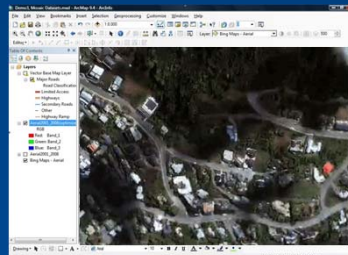
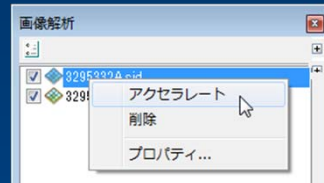
40



Accelerated raster rendering

Smooth and fast showing

- increases the layer's display performance
- Any type of Raster dataset
 - Raster dataset
 - Mosaic dataset
 - Image Service



41



ArcGIS 10 New Sharing

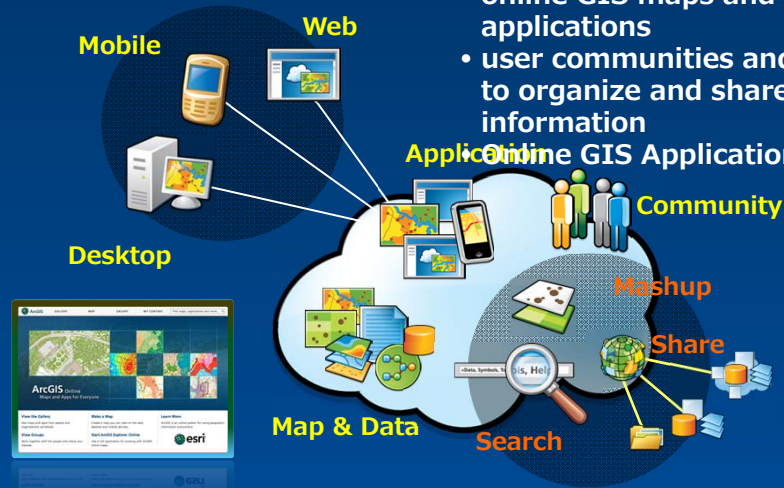
42



Online GIS Web Site

ArcGIS.com

- Web site for working with online GIS maps and applications
- user communities and groups to organize and share information

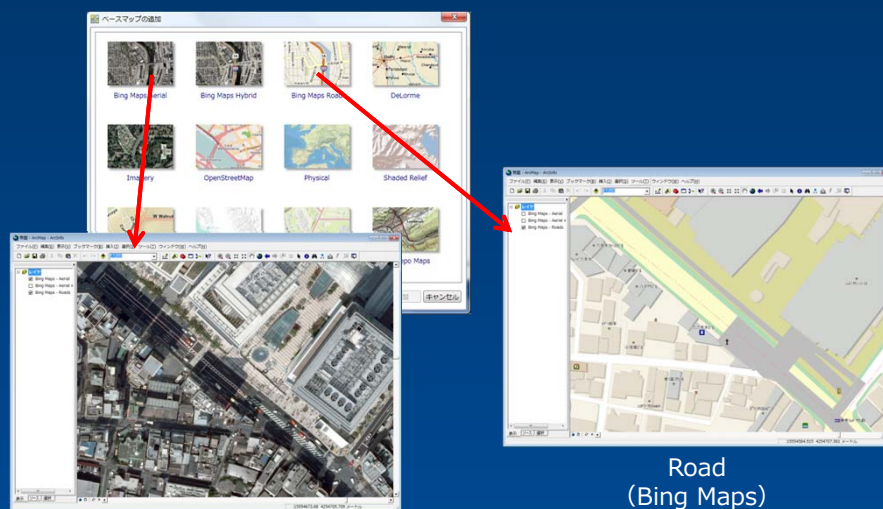


43

esri Japan

Get started immediately with built-in basemaps

ArcGIS Online



Imagery
(Bing Maps)

Road
(Bing Maps)

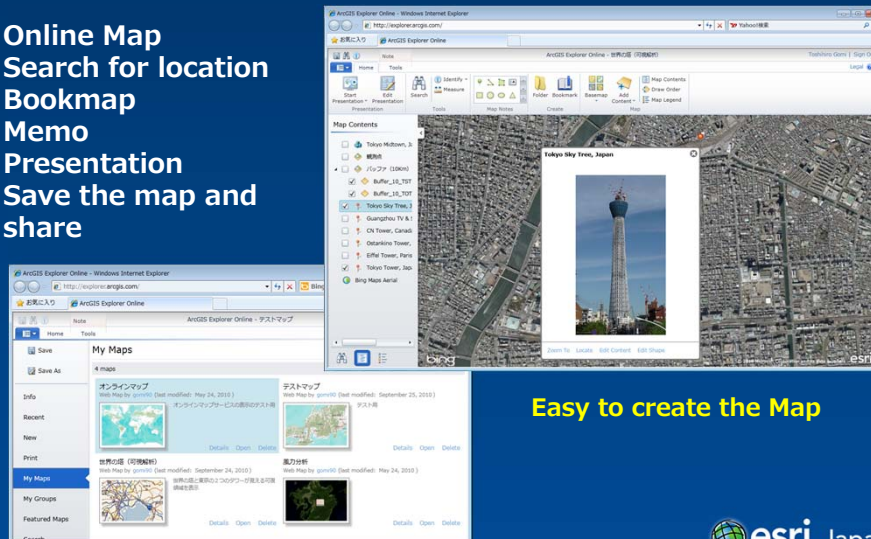
44

esri Japan

Online GIS Application

ArcGIS Explorer Online

- Online Map
- Search for location
- Bookmap
- Memo
- Presentation
- Save the map and share



Easy to create the Map



45

ArcGIS data correction

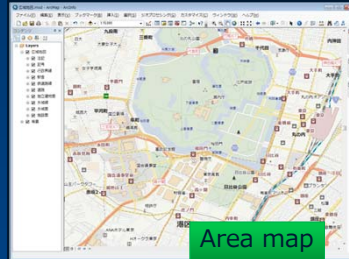


46

Easy to use ArcGIS Desktop

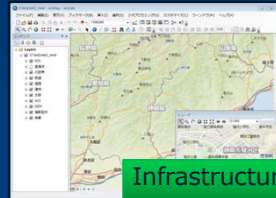
ArcGIS Data Correction Standard Pack2010

✓ Private data



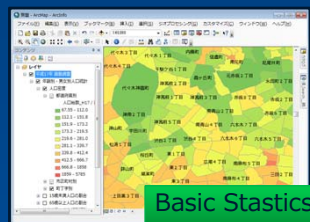
Area map

✓ Public data



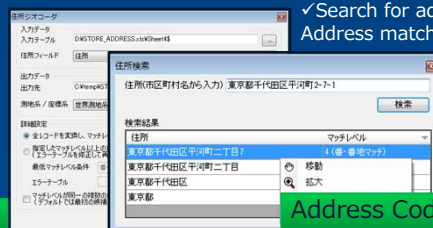
Infrastructure map

✓ H17 Census
✓ H12 Census
✓ Daytime population



Basic Statics

✓ Search for address
Address matching



Address Code

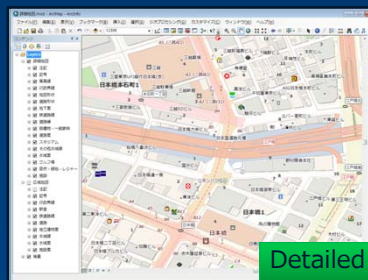
47



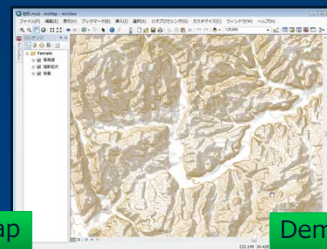
GIS Data Base

ArcGIS Data Correction Premium 2010

✓ Rich POI
✓ Road
✓ Building

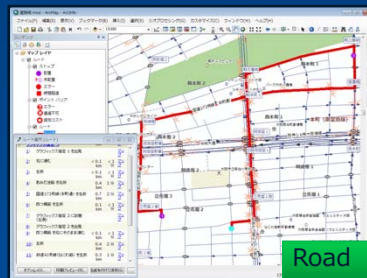


Detailed Map



Dem

✓ Road network set
✓ Traffic Laws



Road

✓ 10mDEM
✓ Counter

48

