Web-Distributed, Geo-temporal, Integrated Information Systems
The Apache County Experience

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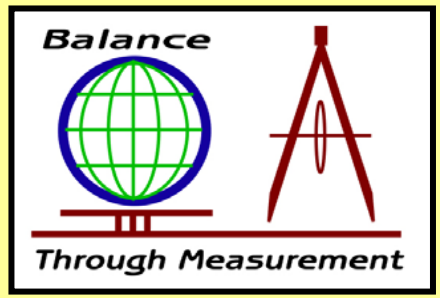
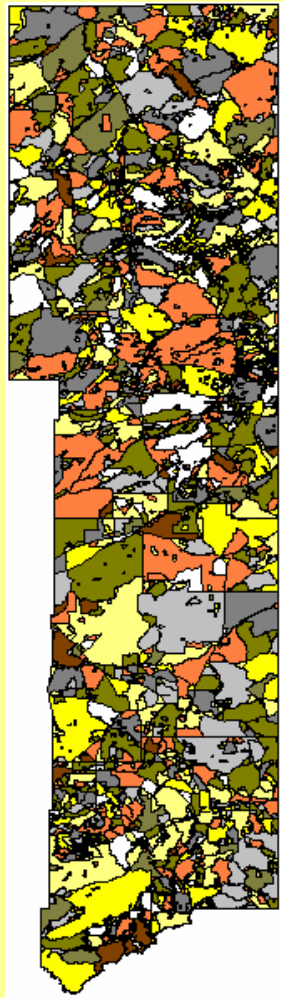


Apache County, Arizona

- North eastern stripe of Arizona
- Three supervision districts with 2 on the Navajo Nation
- District 3 contains 16,000 people
- Land area of 6000 square miles

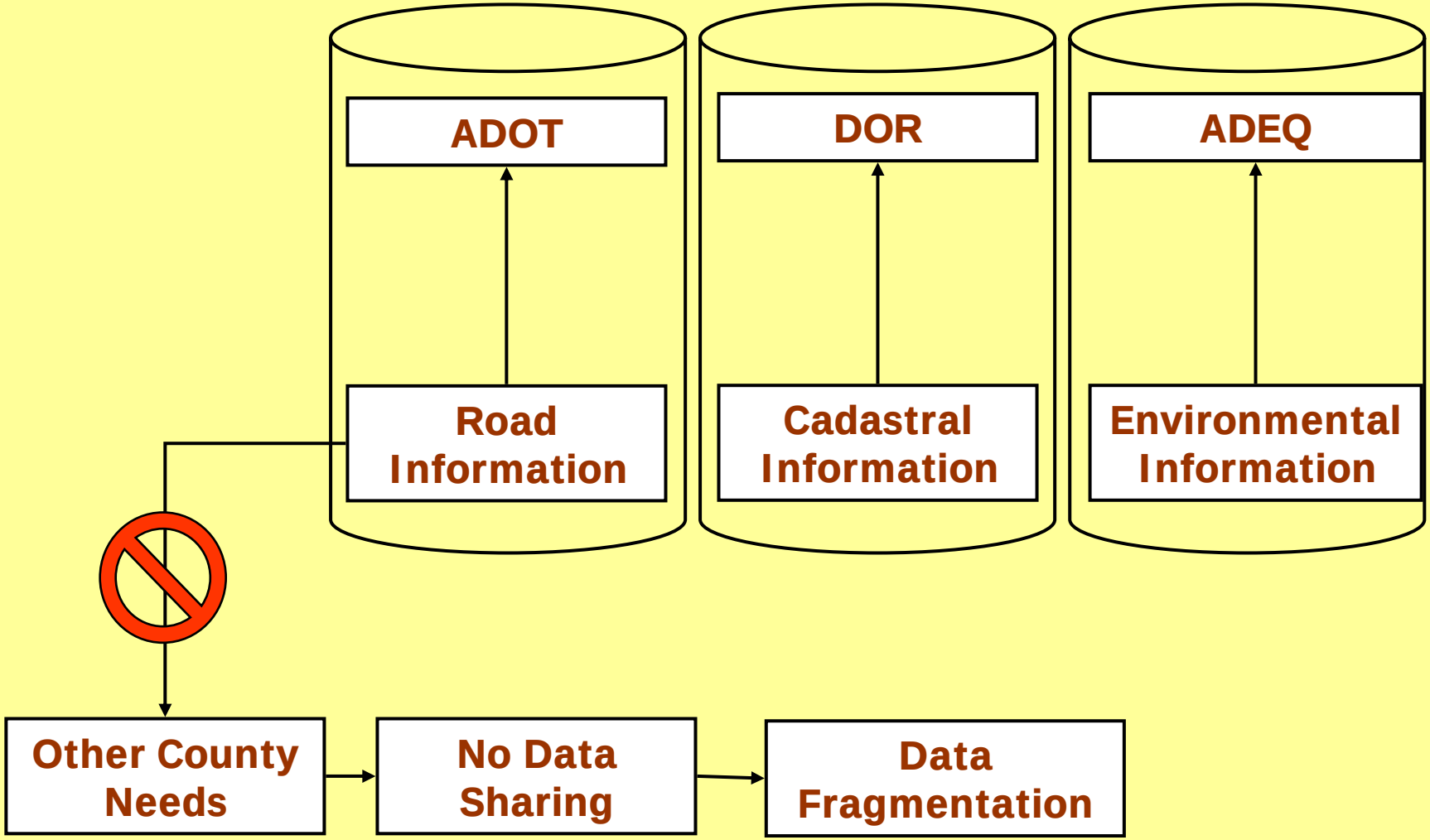


Problem: Considerable land area and field assets to manage with very little funding or human resources

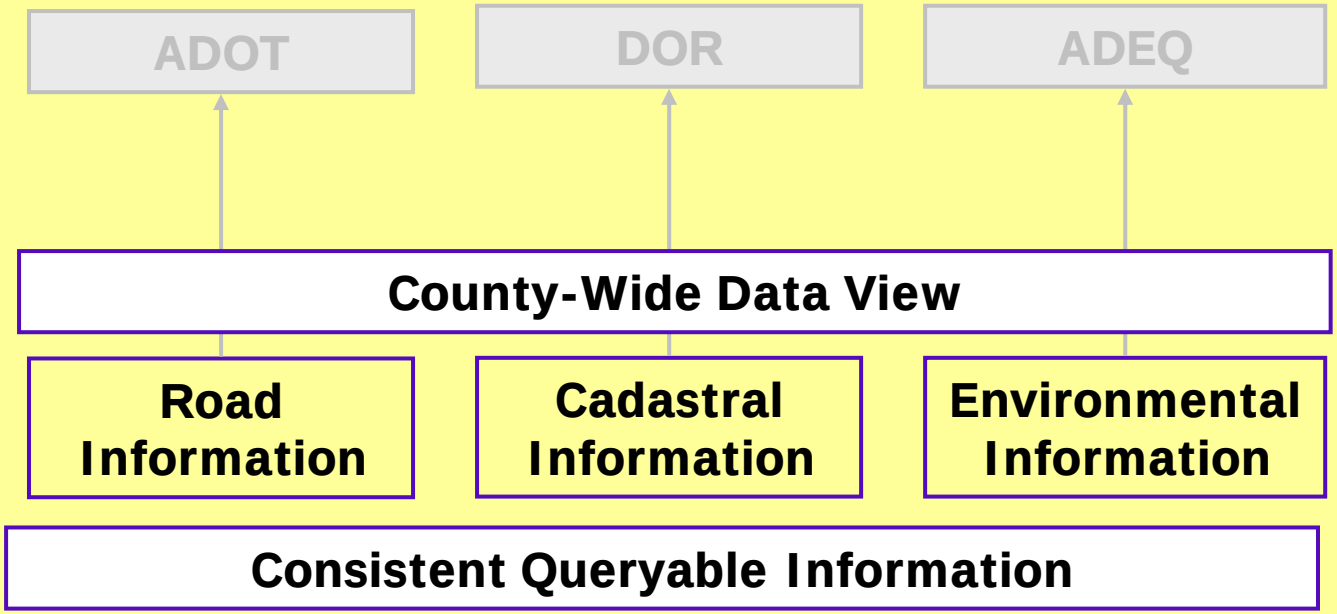
Solution: Lever limited human resources with information resources

Balance Through Measurement

Vertical Over Horizontal Information Flows:



County Information Configured for County Use:



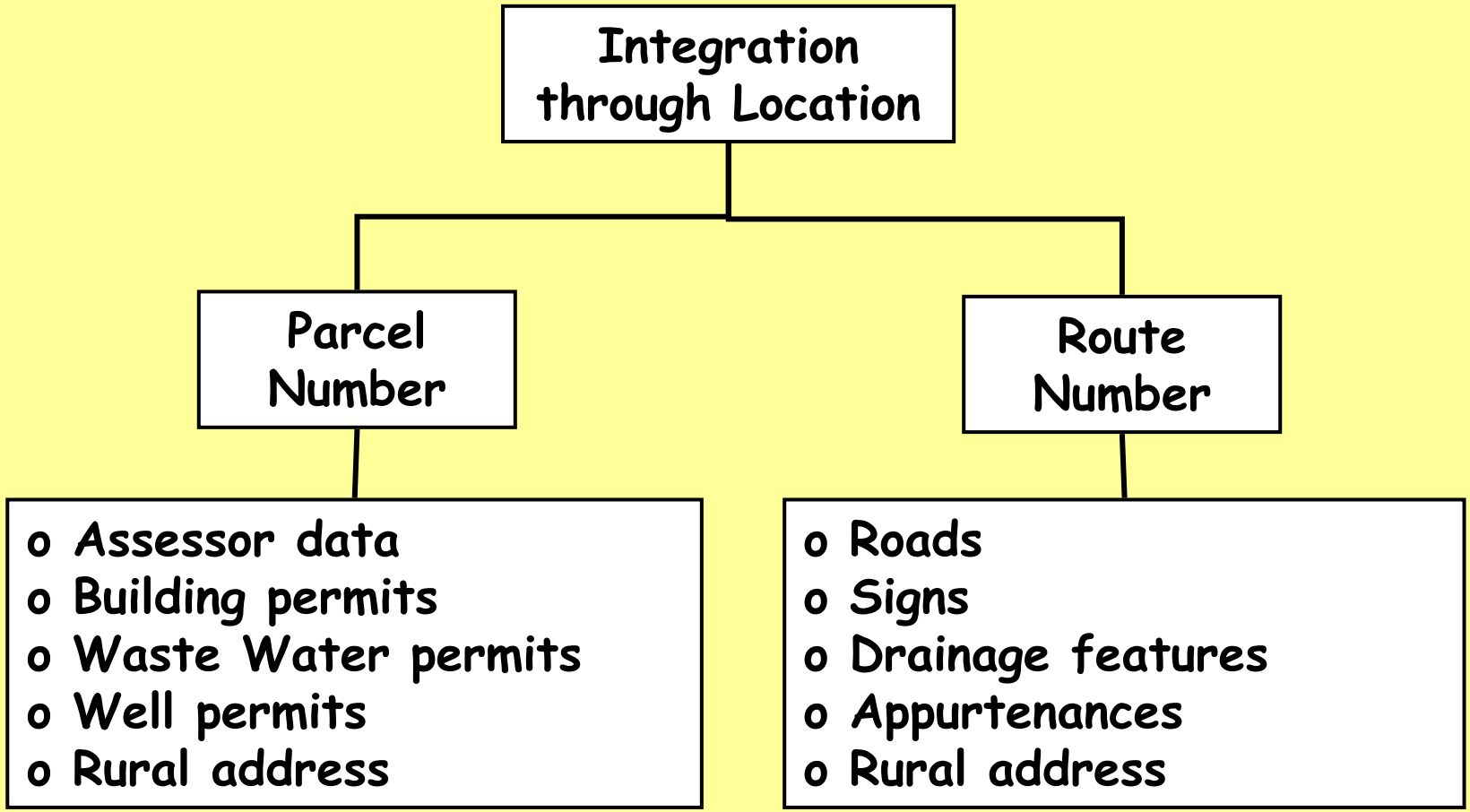
Information System Goals

- Eliminate redundant & duplicate data
- Move to web-distributed environment and eliminate countless desktop applications and their maintenance fees
- Online transactions (OLTP) & online analysis (OLAP) in a temporal environment
- View roadway treatment history
- Exploit field work intuitive knowledge of location
- Reduce the workflow between business units
- Create a similar application feel between units
- Set an anchor to preserve & organize enterprise data

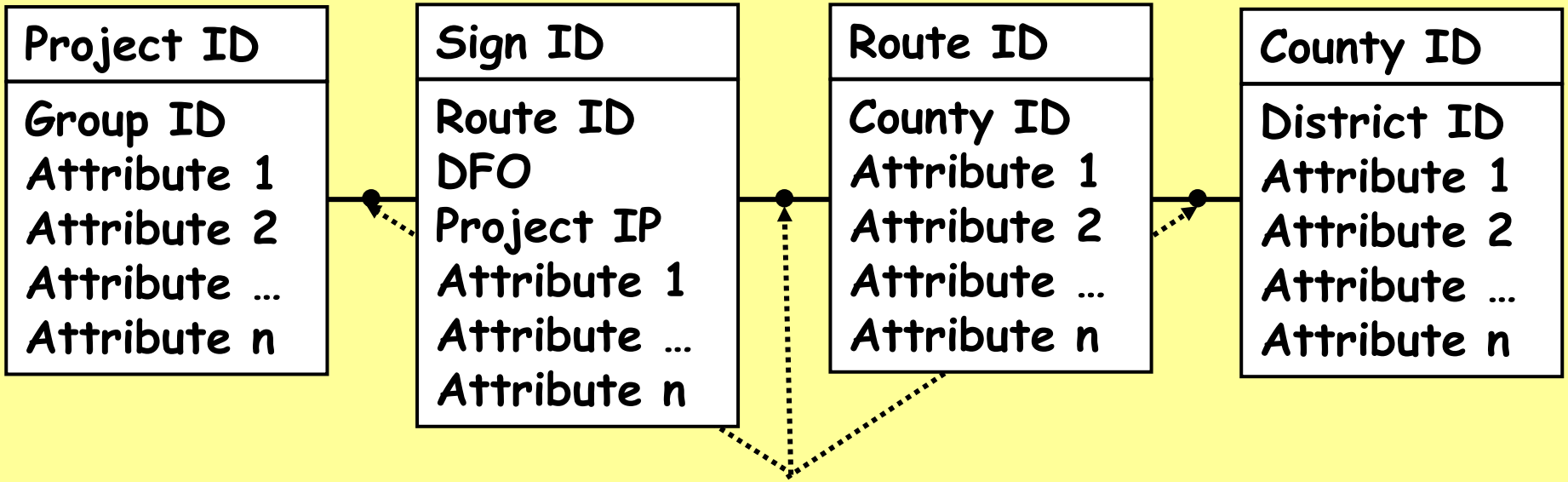
Design Approach:

- Thin-client web environment
- Security manager to match CRUD roles with individual works & one or several dataset views
- Places GIS into a critical IT role

Two Common Location Parameters



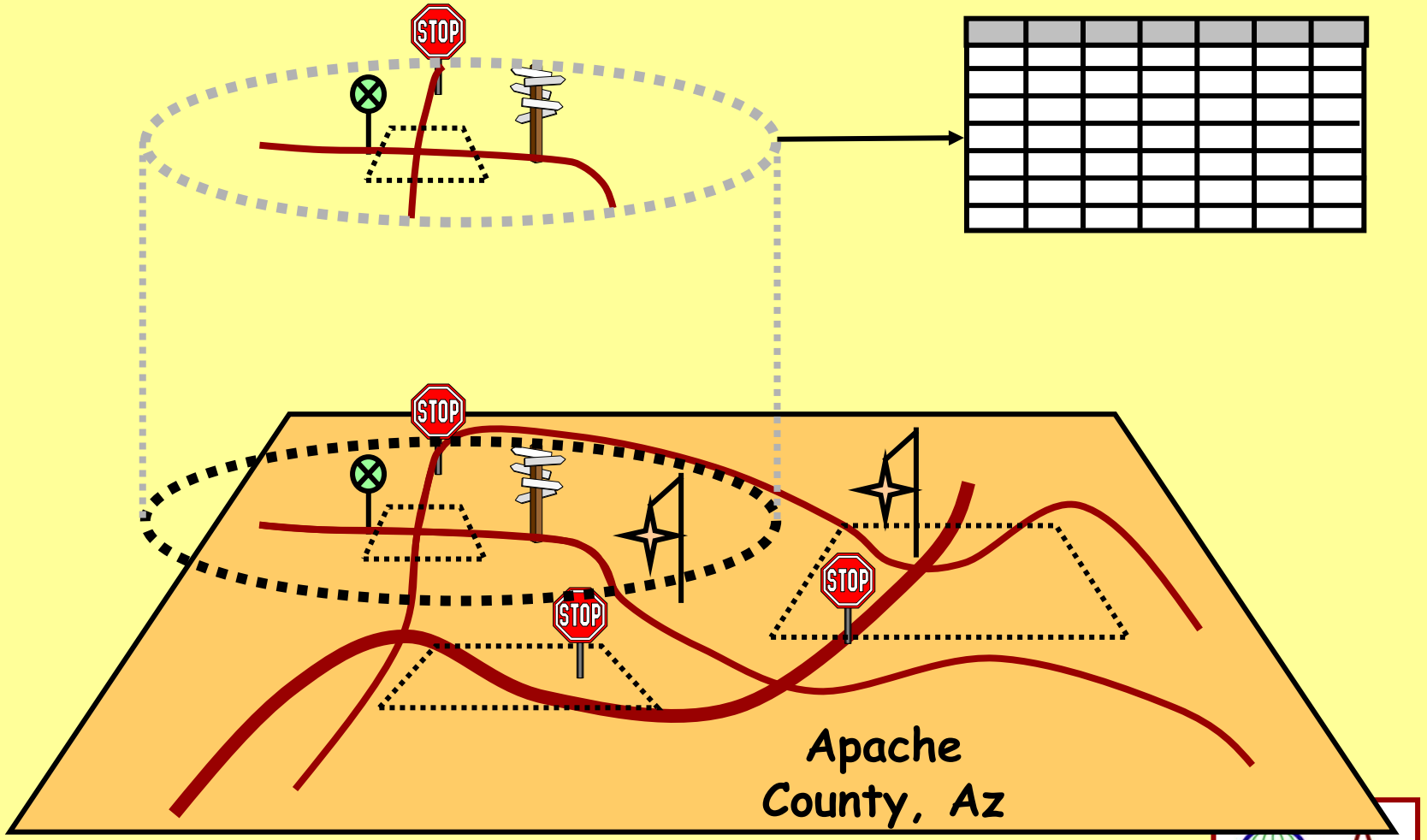
Topology & DB Relationships can be Problematic:



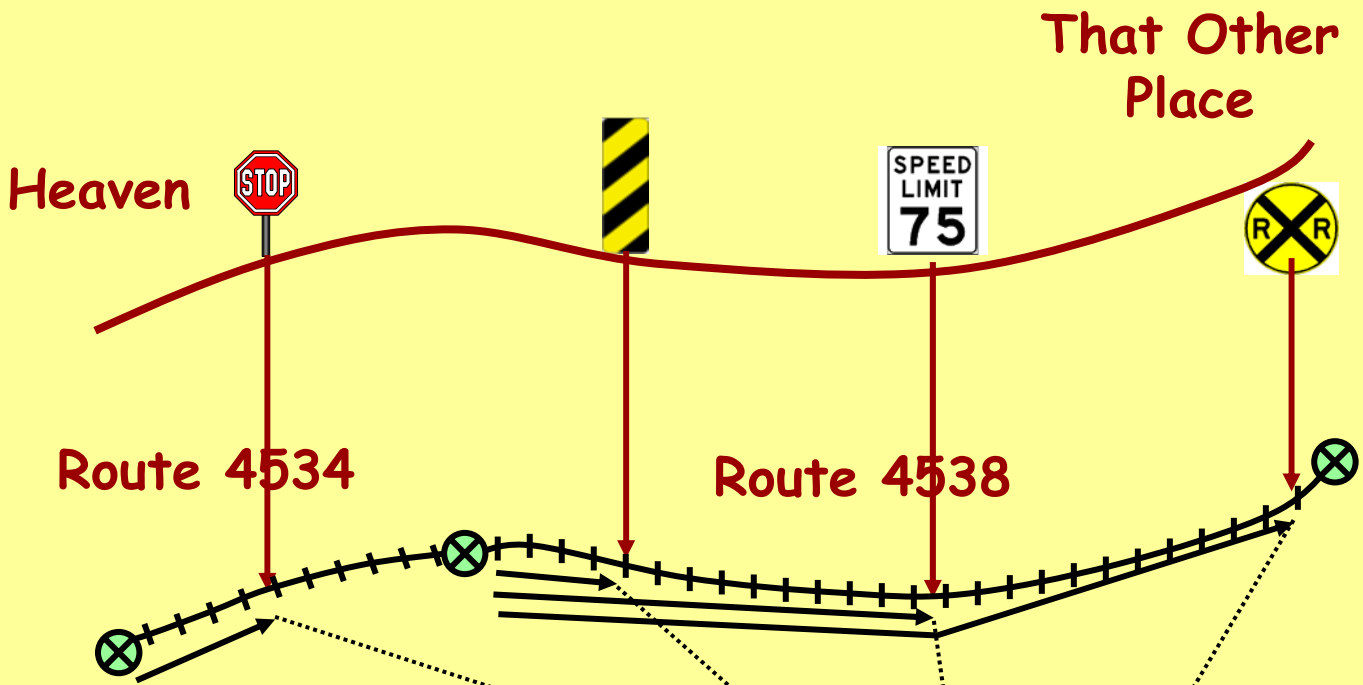
- Spatial topologies emphasize location description rather than through location itself
- Linkages between tables require maintenance
- "Real Data" are separated from "Spatial Data"
- Route systems must be maintained through directionality control and calibration

Balance Through Measurement

True Spatial Intersect Lassos Data within a Graphic Boundary



Relational Data Descriptions in Dynamic Segmentation:



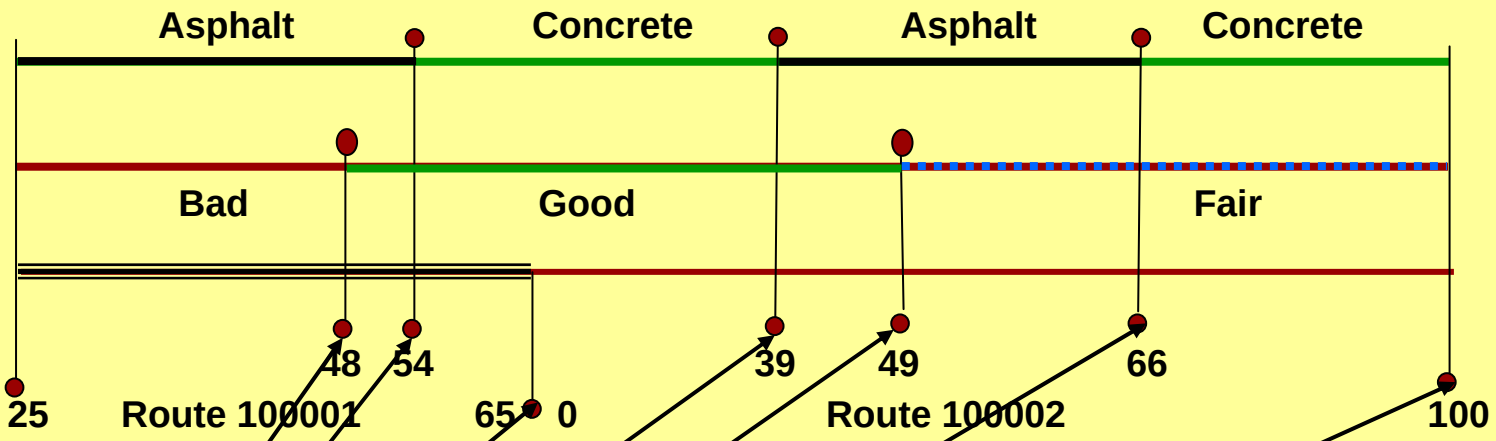
Sign	MUTCD	Text	Route	DFO
1	R1-1	Stop	4534	7.34
2	OM-3R	Marker	4538	4.78
3	R2-1	75	4538	12.03
4	W10-1	RR	4538	26.43

Problems with Relative References:

- Begin points are moved?
- Roadbeds shortened or lengthened?
- Renamed, acquired, or built?
- What if you need a Lat-Long?
- Past crashes referenced to route no longer in place?
- Track pavement through time?
- Create a real-time online transaction system?

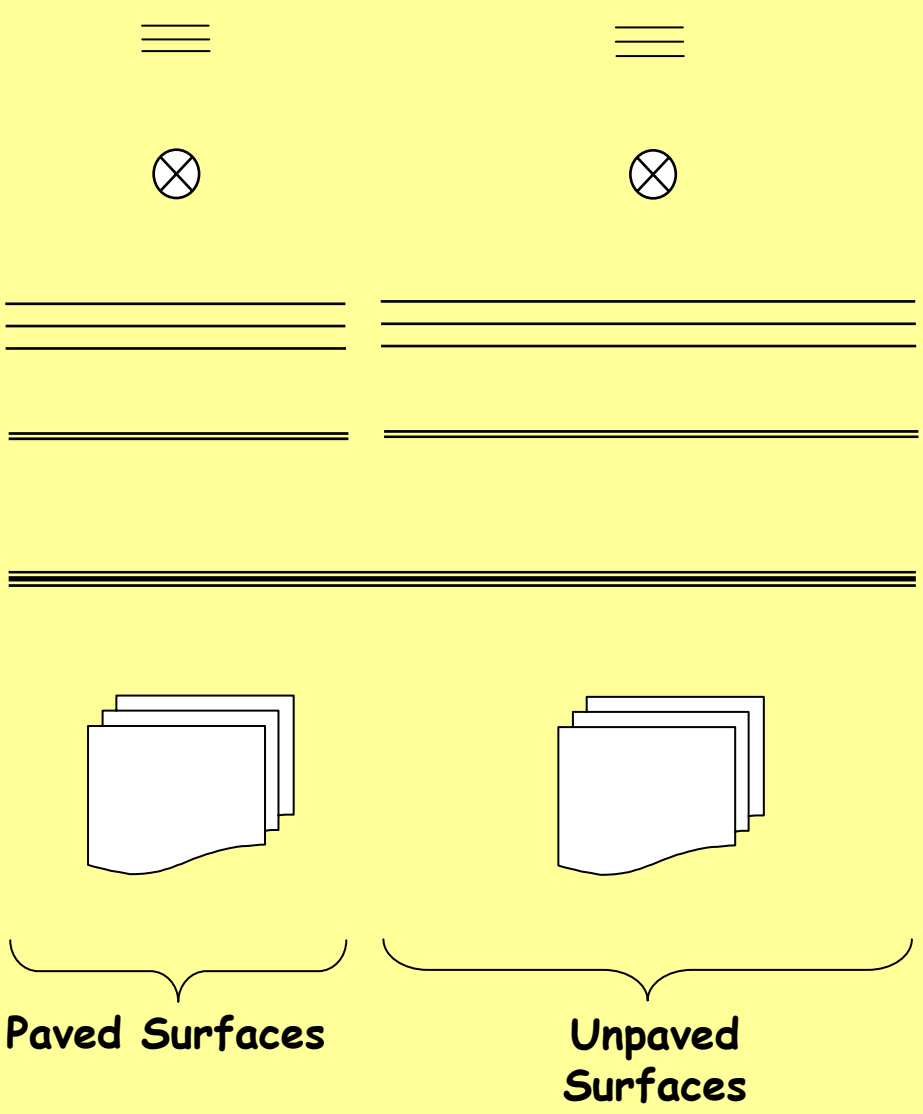
Balance Through Measurement

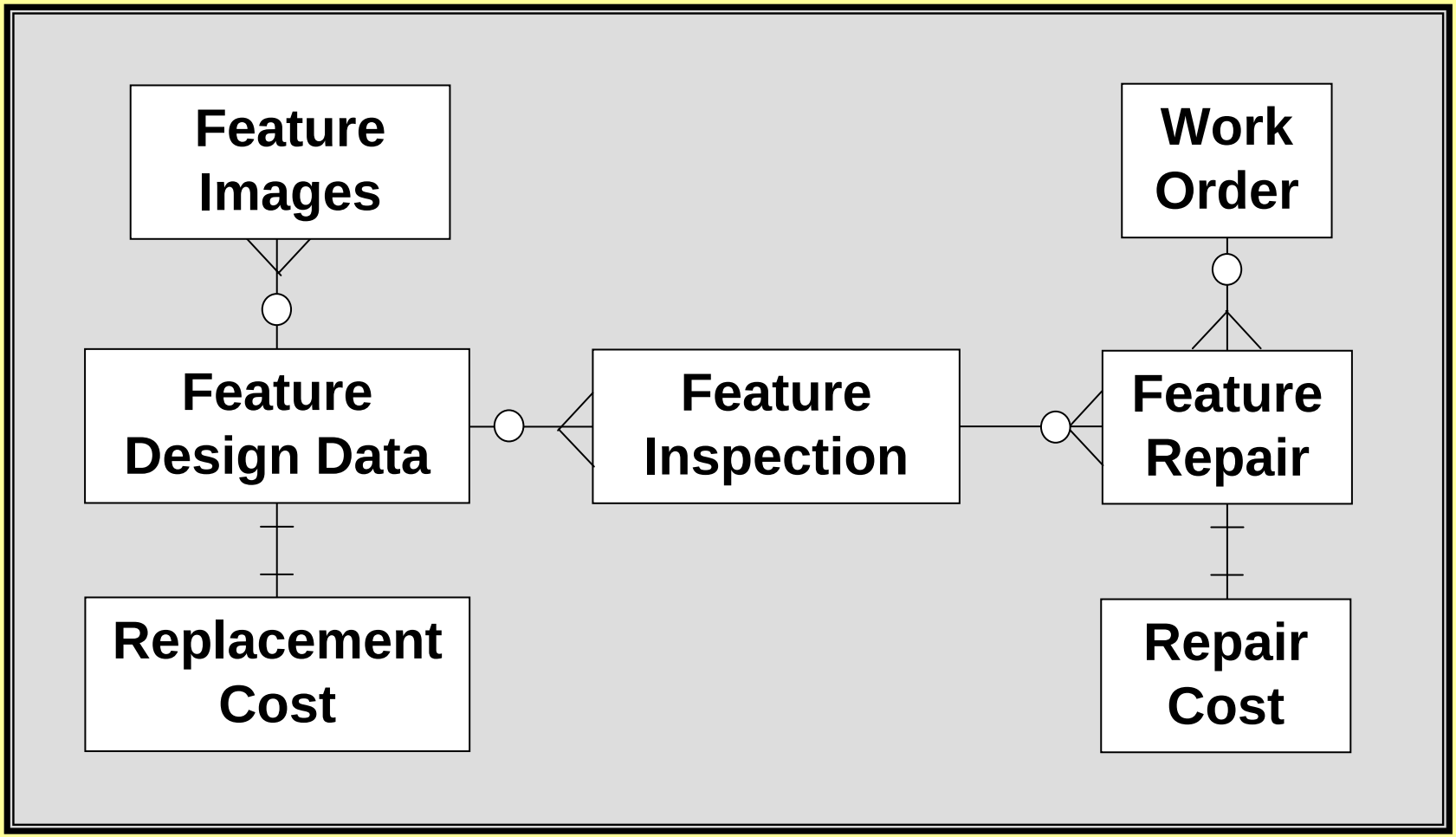
Dynamic Segmentation builds a Picture from Data

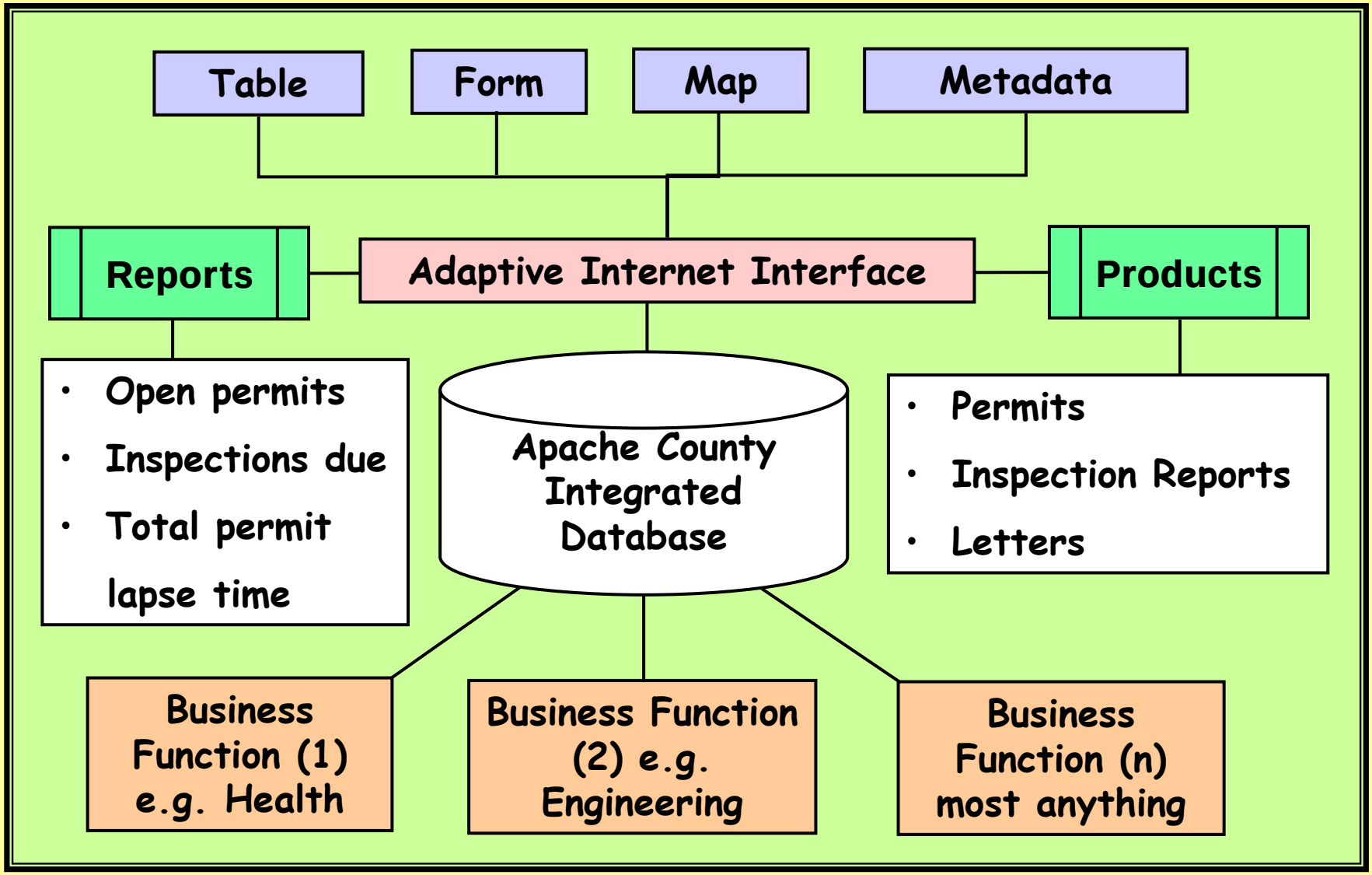


Route	From	To	Surface Type	Surface Condition
100001	25	48	Asphalt	Bad
100001	48	54	Asphalt	Good
100001	54	65	Concrete	Good
100002	0	39	Concrete	Good
100002	39	49	Asphalt	Good
100002	49	66	Asphalt	Fair
100002	66	100	Concrete	Fair

- Time stamp the birth and death of database objects
- Migrate from long-transaction layer editing to short-transaction editing of individual objects within the database
- Facilitates OLTP and OLAP GIS
- GIS adds functionality to IT rather than dragging it down
- GIS is spatial rather the special


Traffic Counts
Traffic Counters
Traffic Data
Surface Treatment Layers
Surface Type Layer
Engineering Data
Roadbed Inventory with Highway Route Name
Inventory Data
Published County Level of Service and Highway Performance
Performance Data
Paved Surfaces
Unpaved Surfaces


Feature Images
Work Order
Feature Design Data
Feature Inspection
Feature Repair
Replacement Cost
Repair Cost



Balance Through Measurement

Benefits:

- Full temporal control is gained through the use of timed-stamped graphic objects.
- An LRS is not required, but data may be written to any LRS of choice.
- Pictures are stored rather than descriptions of pictures.

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