

# Automated Change Notification Keeps Everyone in the Know!

*The Knoxville, Knox County, Knoxville  
Utilities Board (KGIS) Experience*



# Presentation Topics



- KGIS
- GIS Community Served
- Drivers for Change Notification
- Capabilities
- Architecture
- Lessons Learned

# Who is KGIS?



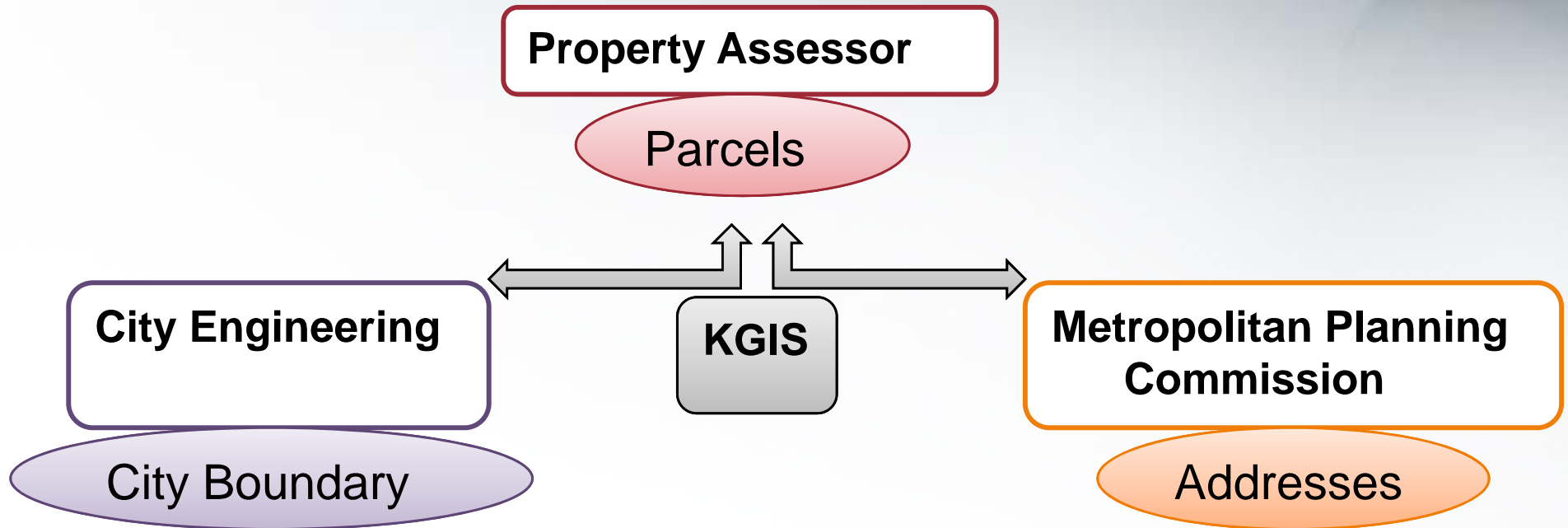
- Knoxville, Knox County, Knoxville Utilities Board GIS (KGIS)
- Chartered in 1985
- Responsible for maintaining single, shared GIS infrastructure and basemap data
- Promotes GIS to support respective agency business needs

# KGIS Serves a Large and Diverse GIS User Community

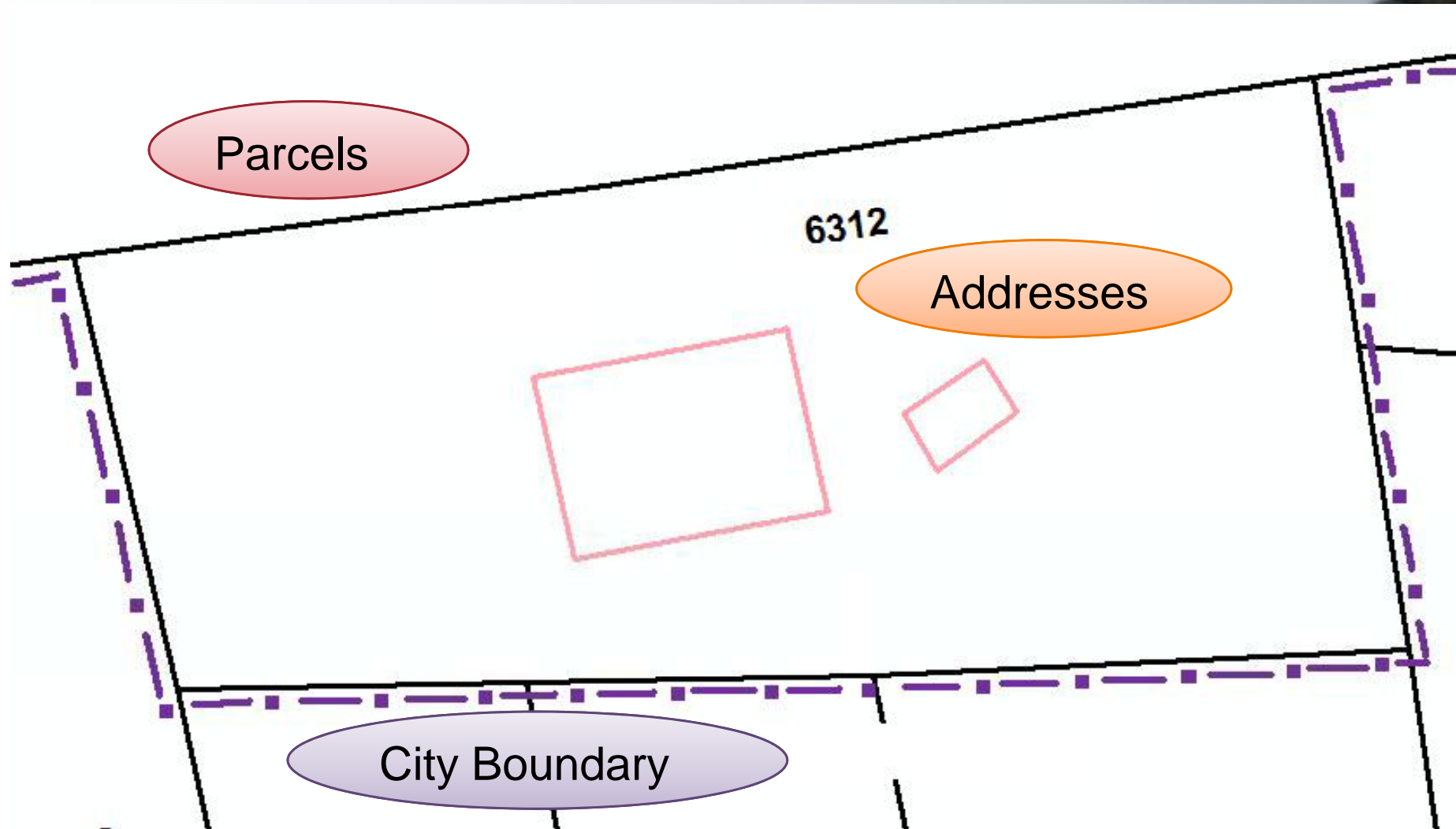


- Public mapping data consumers through web GIS plus data sales, spatial analysis, and custom cartographic services
- Hundreds of agency GIS users rely on KGIS systems to access data vital to their workflows
- Over 50 GIS data editors across 10 departments in 4 agencies

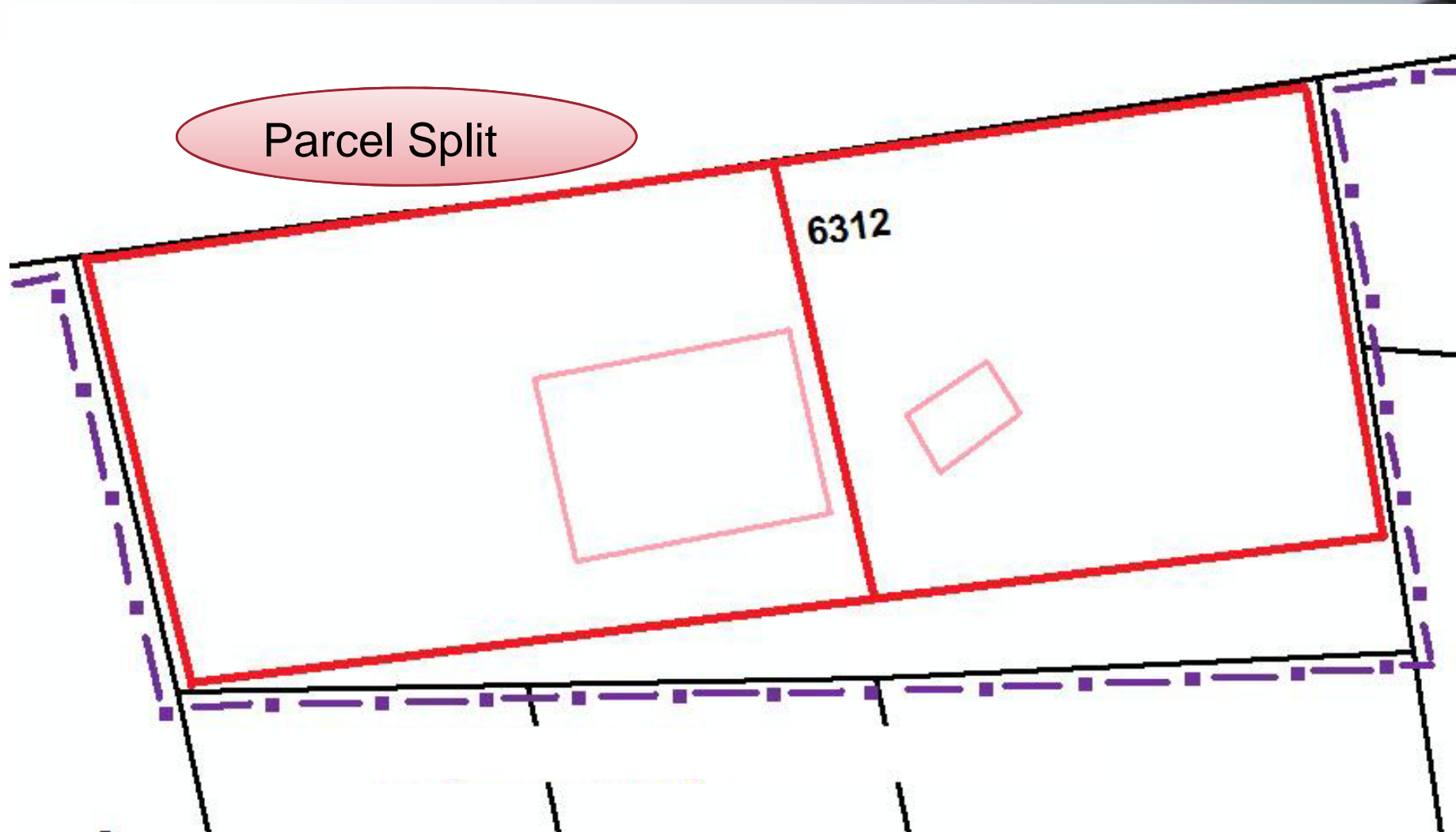
# Change Notification Supports Inter-Department Workflows



# Parcel and Address Maintenance Workflows Inter-Related



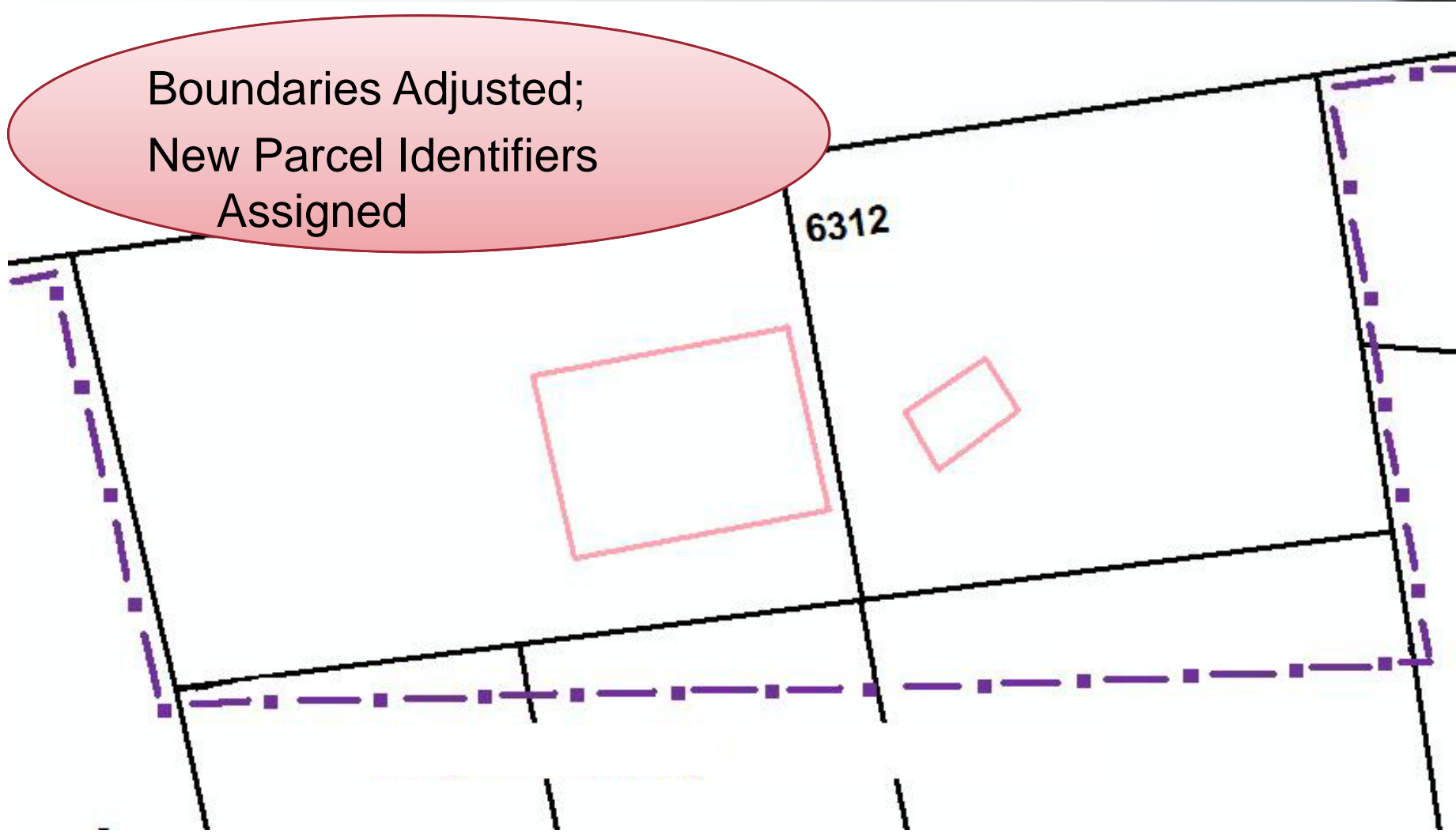
# Property Assessor Responsible for Edits such as Parcel Splits



# Address Editors Need to be Notified of Parcel Split

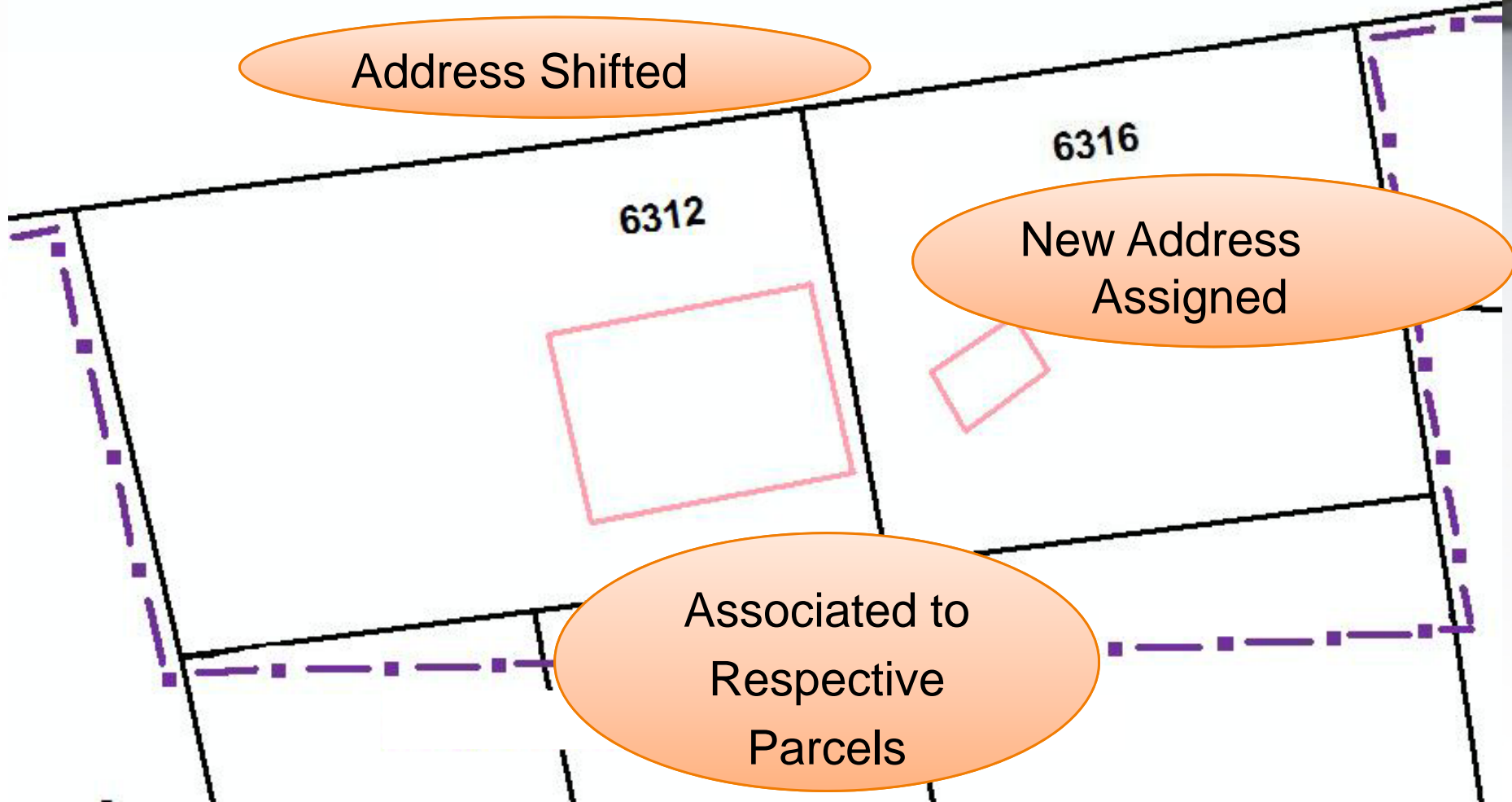


Boundaries Adjusted;  
New Parcel Identifiers  
Assigned





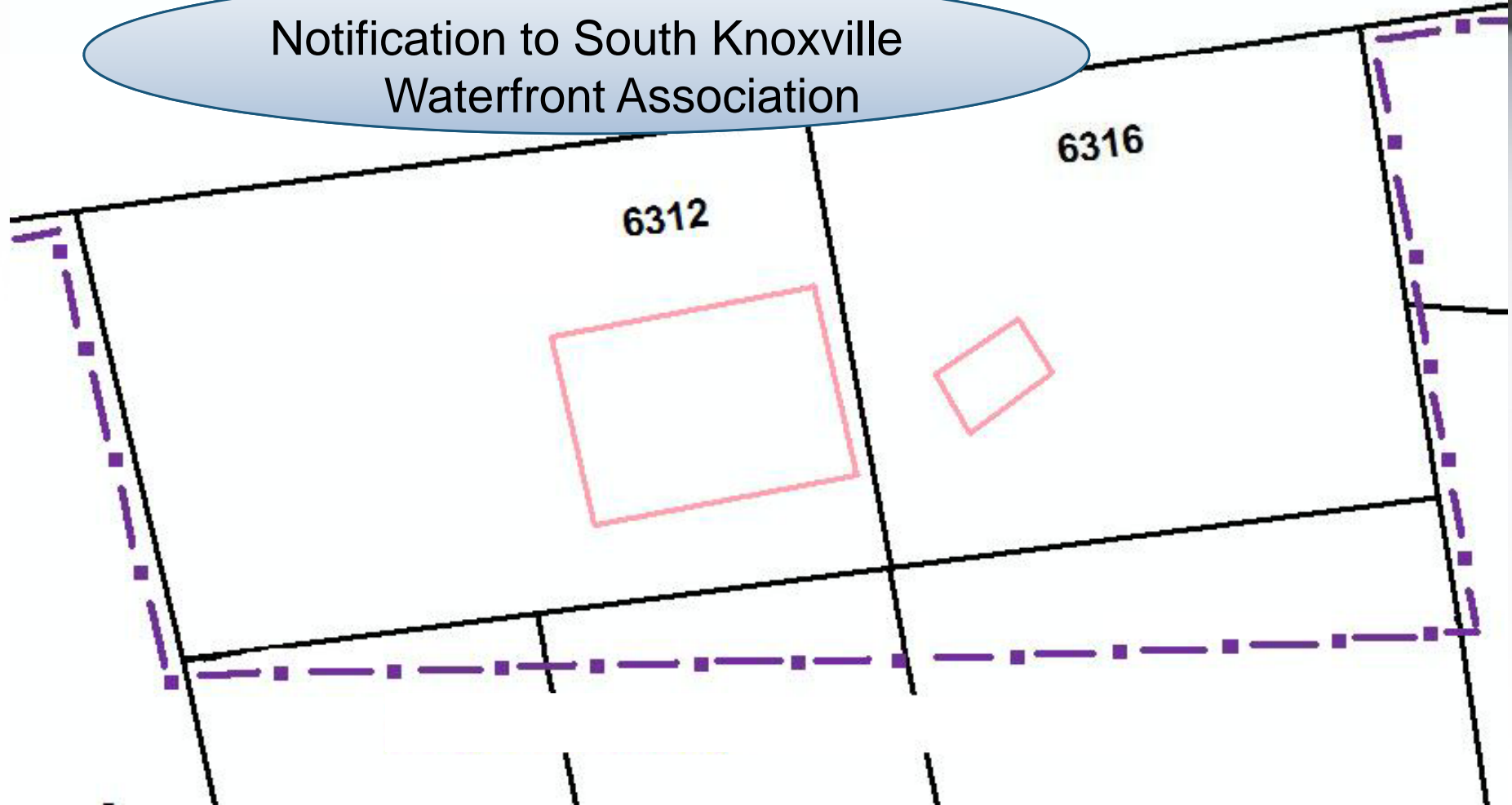
# Create New Address and Associate Addresses with Correct Parcels



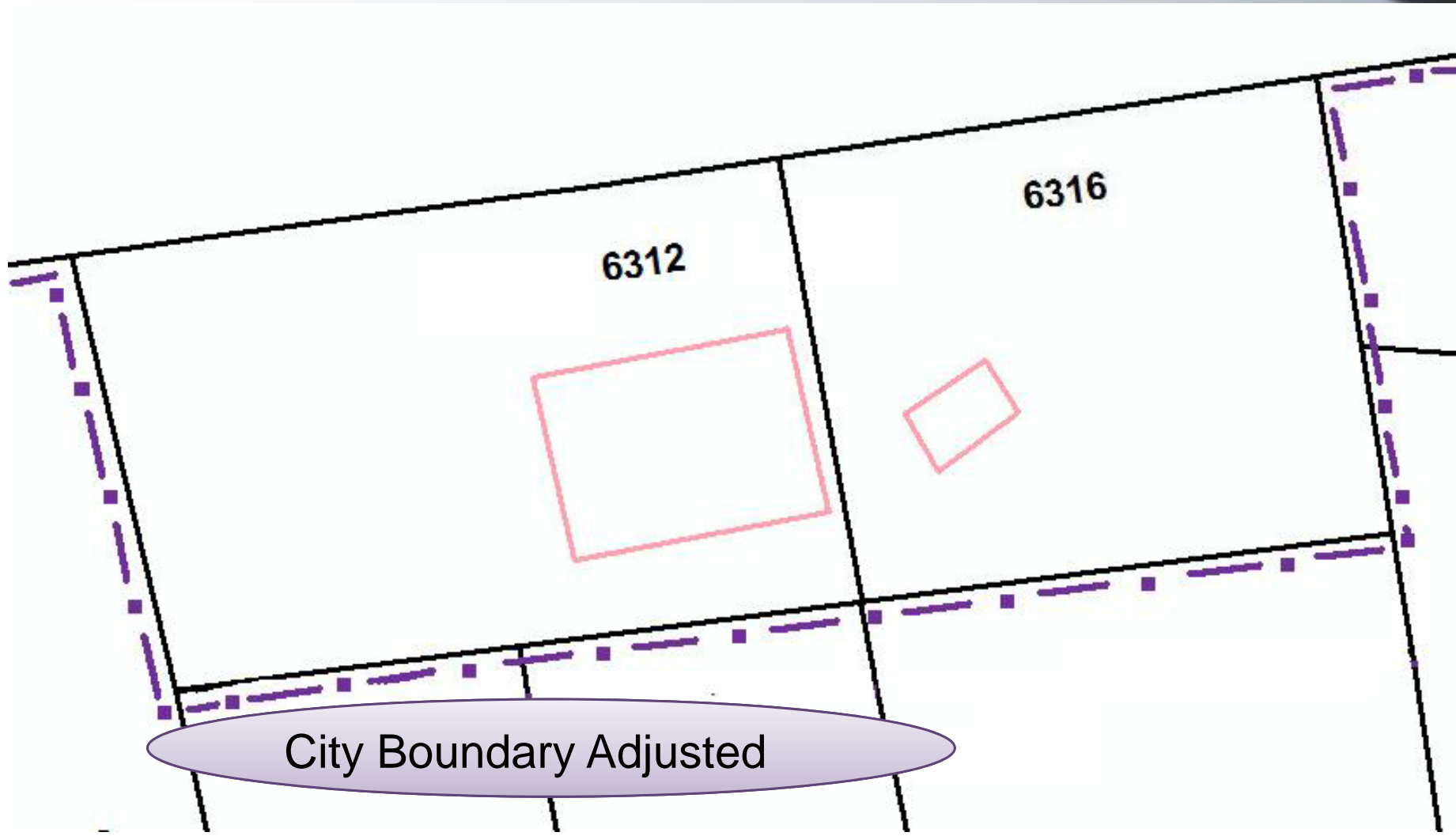
# Stakeholder Groups Need to Know When Addresses and Parcels Modified



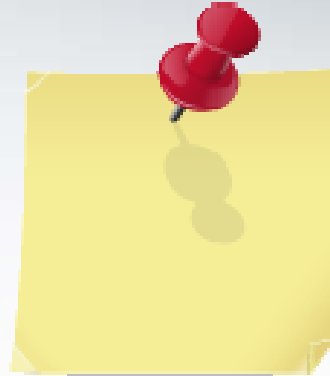
Notification to South Knoxville  
Waterfront Association



# Other Data Owners Need Notification

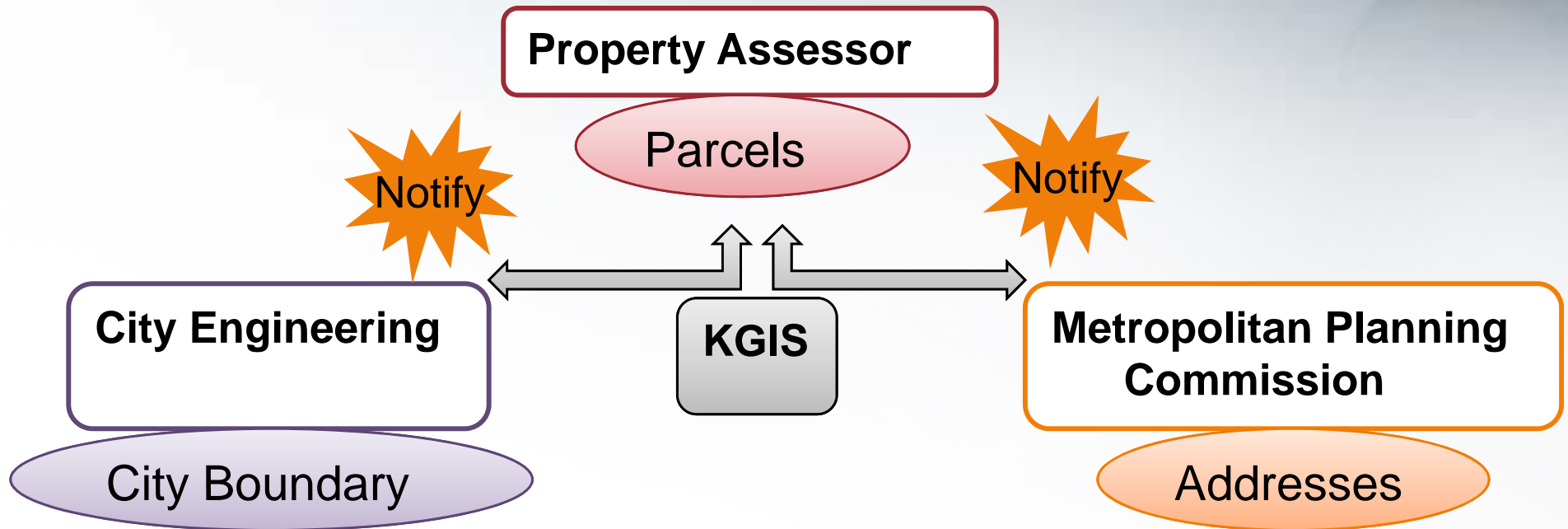


# Previous Notification Handled Manually

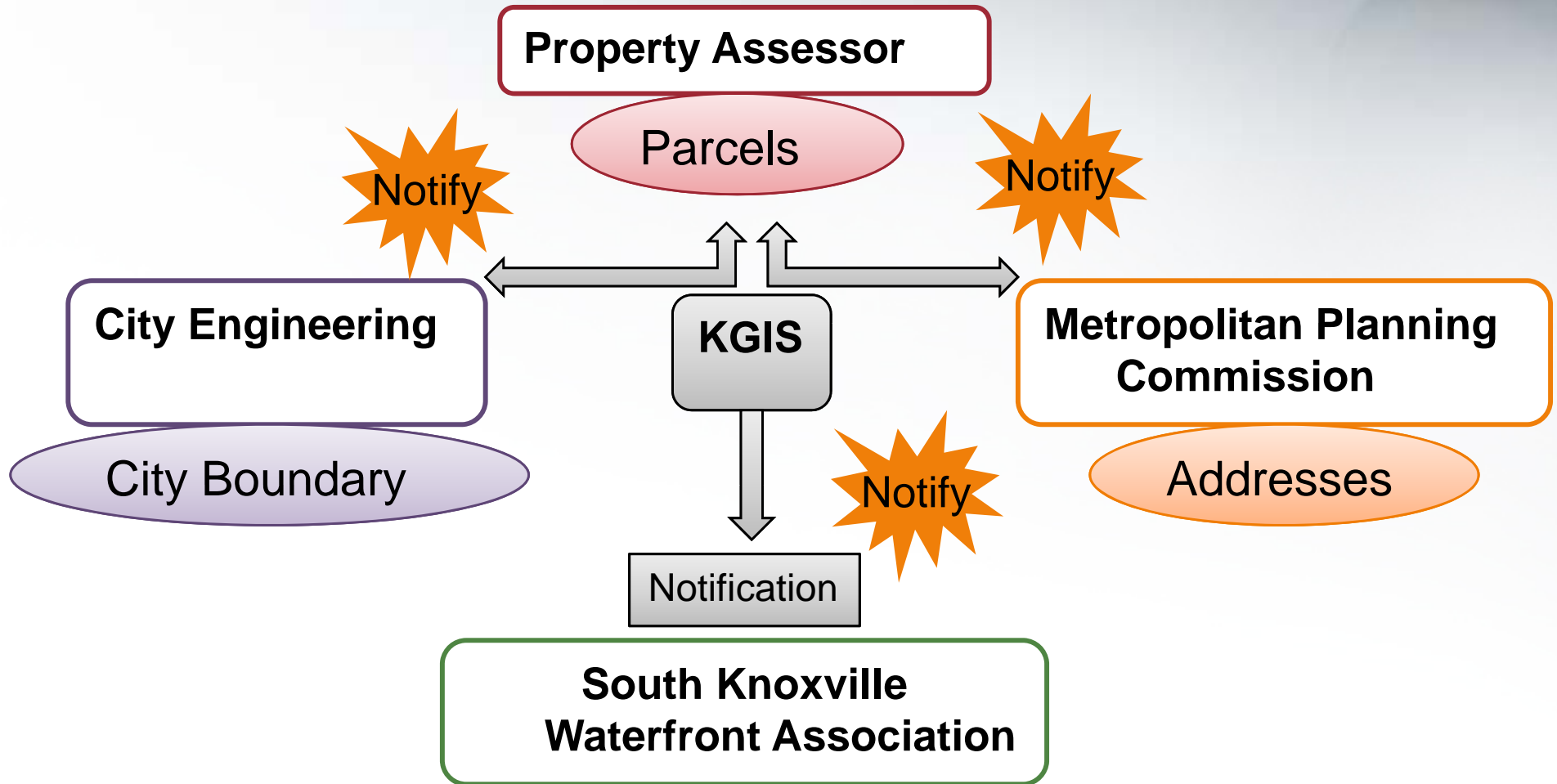


A better way?

# Automated Change Notification Supports Inter-Department Workflows



# Automated Change Notification Supports External Agency Notification



# Change Notification Envisioned to Support a Number of Scenarios



- Individuals that share data maintenance responsibility for a feature class or dataset
- Assess spatial data integrity between dependent classes not in the same feature dataset
- Administrators of other systems that maintain similar data (such as addresses) but without an automated interface with the GIS
- Not intended to replace existing tools that support very linear workflows
  - For example, reviewer approvals of edits for example

# Users Subscribe to an Event



**KGIS** KGIS *Lite* Maps   KnoxNetWhere Mapping

Home   Online Tools   KGIS Map   Products   Projects   KGIS Internal   Admin

Tuesday, May 05, 2009   Logout   **Keith G. Stump**

You are here: Online Tools » Change Notification

TopPane

**ChangeNotification**

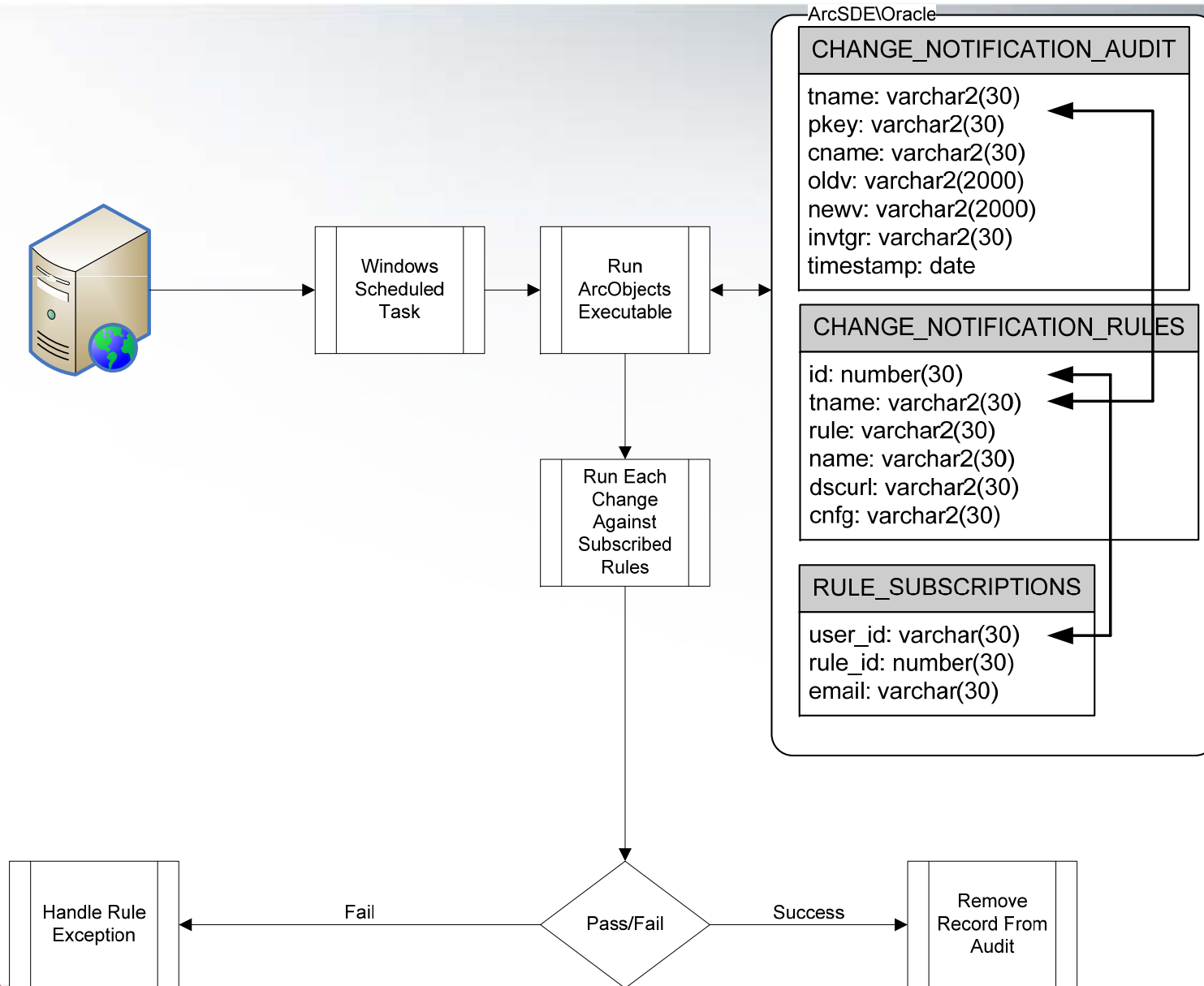
Subscribe to Rules:

Available	Assigned
Addresses in South Waterfront	Parcel Feature Insert
City Storm Line Insertions	Parcel Feature Update
City Storm Line Modifications	New Subdivision Plats
City Storm Line Deletions	
Address Modifications	
Address Deletions	
Parcel Type Change	
Address Insertions	
Parcel Intersects Street	
Parcel Feature Delete	
Address PARCELID empty	

Update   Cancel



# Notification System Evaluates Data Changes Against Rule Criteria



# E-mail Notification Lists Edits Conforming to Event Subscriptions



Hello KGISNET\jbarnett, You are being notified of the following edits detected by the change rules you subscribed to:

**Address Modifications (KGIS.ADDR\_ADDRESSPT\_KNO\_H2)**

Key (record ID)	Key2	Column	Old Value	New Value	
38455	1605 ELLISON LN	Record has been updated.			<a href="#">Map Link</a>
		ADDRESS_STATUS	2	4	
		DATE_OFFICIAL_CHANGE		15-OCT-08	
		MODIFIED_BY	SJM	hill	
		DATE_ATTRIB_MODIFIED	27-JAN-00	15-OCT-08	
		PARCEL_LOC_FLAG	1	0	
38457	1609 ELLISON LN	Record has been updated.			<a href="#">Map Link</a>
		MODIFIED_BY	SJM	hill	
		DATE_ATTRIB_MODIFIED	27-JAN-00	15-OCT-08	
		PARCEL_LOC_FLAG	0	1	
37720	1612	Record has been updated.			



# Users Access List of Data Changes Through ArcMap Utility



The screenshot shows the ArcMap interface with a map of a residential area. The 'Layers' panel on the left lists various data layers, including 'KGIS\_ADDR\_KNO\_Topology', 'Address Number Annotation', 'Address Point', 'Intersections', 'Street Name Annotation', 'Streets with Direction', 'Streets', 'Block Range Tics', 'Knox County Zipcodes', 'Lots', 'Subdivisions', 'Parcels', 'Incorporated Areas in Knox County', 'Construction Lines', 'Orthos', 'Property', 'Property Anno', 'Property Anno Rare', 'Parcel Cartography', 'Parcel Map Groups', 'Planimetrics', 'Miscellaneous Text', 'Apparent Property Lines', 'Building Footprints in Knox County', 'Swimming Pools', 'Telecomm Towers', 'Transmission Towers', 'Transmission Lines', 'Greenways', 'Structures', 'Transportation', 'Hydrology', and 'Topography'. The map shows streets like Debbie Rd and Diane Dr, with various parcels and buildings. A utility window is open at the bottom, displaying a table of data changes. The 'STATUS' column in the table is circled in red.

Zoom To Feature	Zoom To Envelope	Help	STATUS	RULE NAME	TABLE NAME	PRIMARY KEY	KEY	COLUMN	OLD VALUE	NEW VALUE	TRIGGER
			UNREAD	Address Insertions	KGIS_ADDR_A...	272383	1234 Yellow Bri...	OBJECTID		272383	INSERT
			UNREAD	Address Insertions	KGIS_ADDR_A...	272384	321 Blast-A Way	OBJECTID		272384	INSERT

Filter: View UNREAD Description: Record has been inserted.

# Users Can Update Event Status Through ArcMap Utility



Event Notification Reviewer

Zoom To Feature	Zoom To Envelope	Help	STATUS
			UNREAD
			UNREAD
			UNREAD
			UNREAD
			UNREAD
			UNREAD
			UNREAD

Filter: View UNREAD      Description: Record has been inserted.

# How Does Change Notification Work?



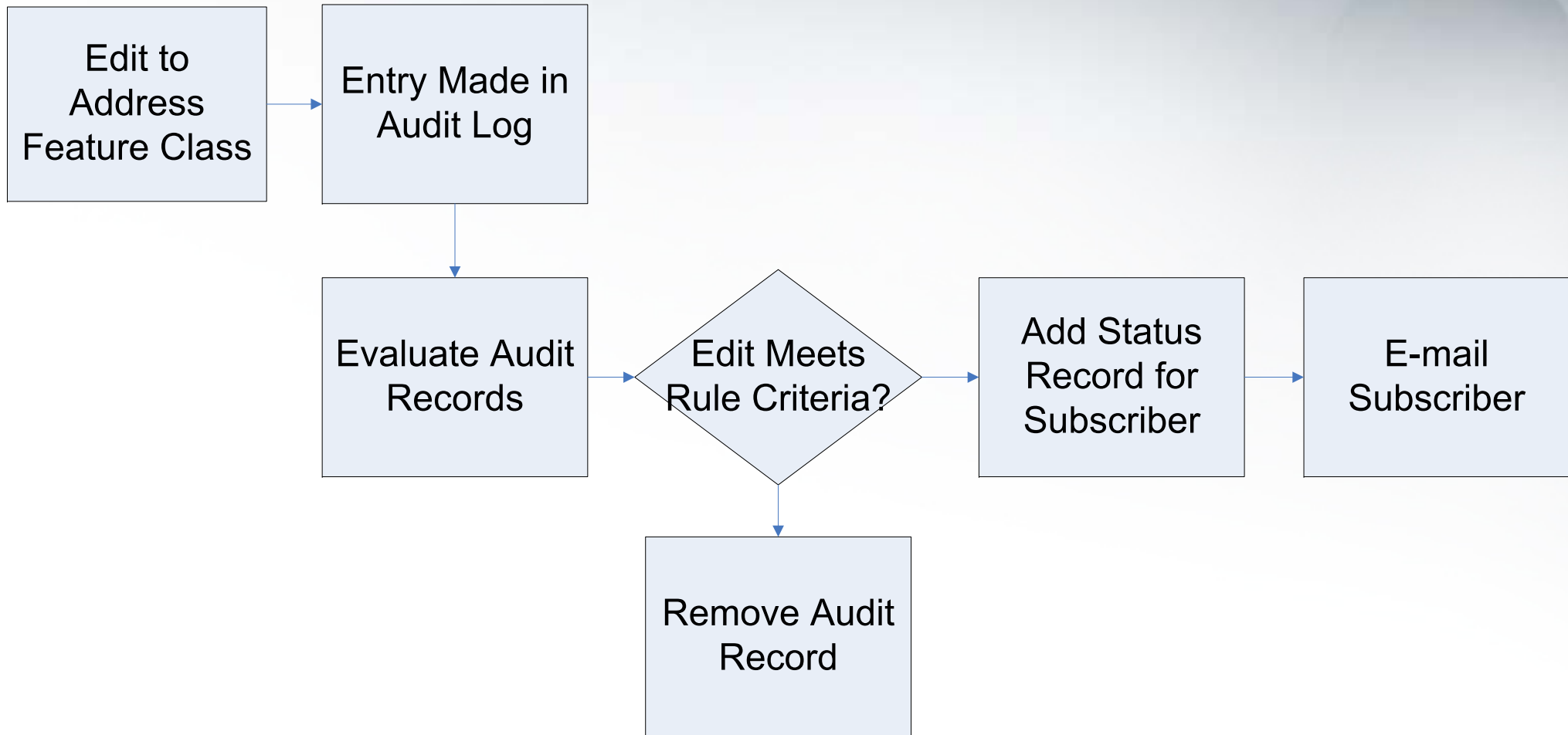
- Components
  1. System Tables
  2. Oracle Triggers and Stored Procedures
  3. Change Evaluator
  
- User Interfaces
  1. Subscription Form
  2. E-mail
  3. ArcMap Reviewer Utility

# Administrator Establishes Rules



- Adds rule to Rules Table
  - This is the list of rules users may subscribe to
- Establishes Oracle database triggers and stored procedures for tables that participate in the rule

# Evaluator Compares Data Edits Against Rule Criteria



# How is it Being Used Today?



- New Parcels (and Address Alignment)
- New Stormwater Outfall Locations (and Data Attribution)
- New Subdivisions (and Utility Service Connection Alignment)



# How Can it be Used?



- Public Land Inventory
- Street Name Changes
- Re-Zoning Applications
- City Boundary Changes
- Maintenance of routing dataset

# Lessons Learned?



- Versioned feature classes difficult to deal with
  - Developed approach dependent on Archive Class
  - Tradeoff is additional administration when modifying feature class schema
- Approach that relies on database triggers and stored procedures is difficult to administer
- Need to balance frequency of evaluation process to manage size of audit and subscription tables

# Changes for the Future...



- Allow users to select notification frequency
  - Daily, weekly, immediately, etc.
- Allow users to specify an area of interest
  - Currently administrator can establish rules for a specific area
- Improve error handling
  - Service can fail without appropriate error message capture or administrator notification
- Add ability to update status through web map
- Migrate to use ArcGIS Server license

# Successes?



- Flexible design handles complexity of inter-department workflows and data relationships
- Minimizes need for intensive and infrequently executed batch processing / topology checks
- Overcomes lack of institutional workflow checks / balances with a technical workaround
- Supports enhanced management oversight