

Enterprise Asset Management (EAM) Driven GIS: An Alternative Approach

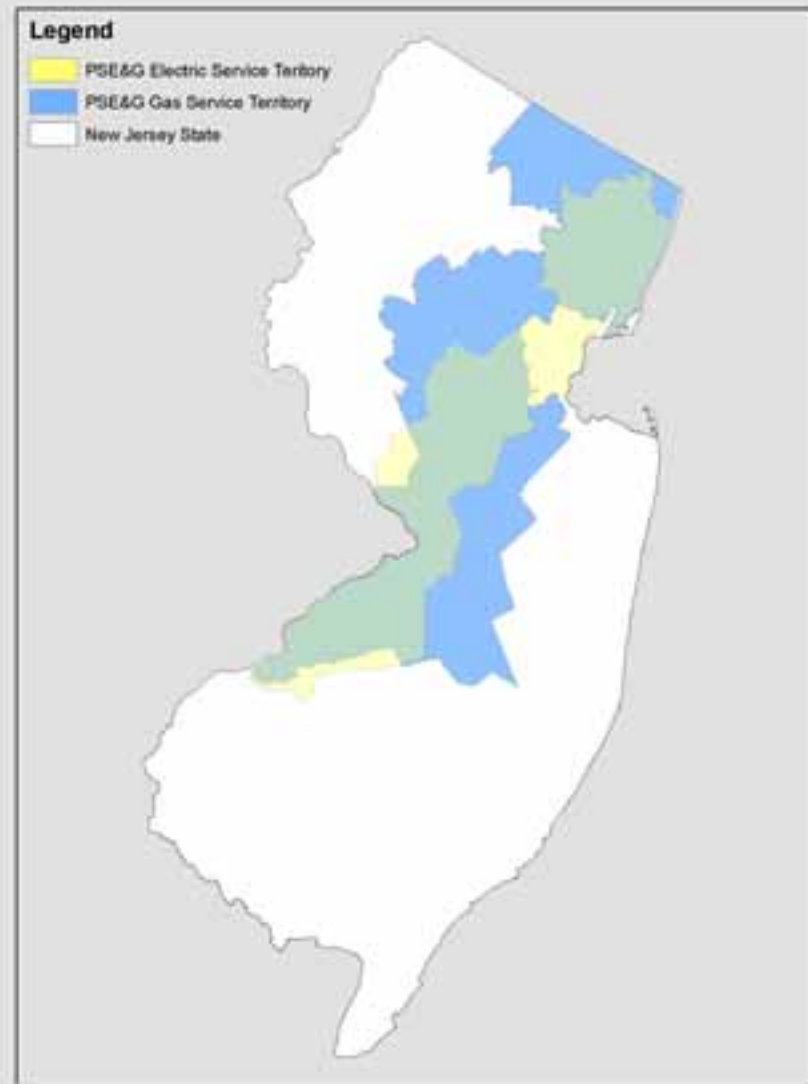
**Mike Casella – PSEG Service Corp.
Steve Kerr – Velocitie Integration Inc.**

Presentation Outline

- Overview of PSE&G and its GIS solutions
- Typical approaches to EAM/GIS integration
- PSE&G Gas Delivery's approach to integration
 - Business systems in place
 - Goals
 - Business process
 - Technical solution
 - Results
- Wrap-up

PSE&G

- New Jersey's largest gas and electric utility
- Serves over 1.7 million gas customers
- Service territory covers 2600 square miles
- Subsidiary of Public Service Enterprise Group (PSEG)
- Work Order volumes:
 - Valve Inspections: 4500/yr
 - Leak Investigations: 10,500/yr
 - Leak Repairs: 7000/yr
 - Damaged Pipe: 900/yr
 - Valve work orders: 520/yr
 - Main work orders: 2100/yr
 - Service work orders: 23,000/yr



Overview of GIS activities at PSE&G

- PSE&G Electric Delivery has a mature GIS, utilizing ArcGIS and ArcFM
- Electric GIS was implemented in 2001 as part of an outage management initiative
- In 2005, PSE&G Gas Division moved from paper wall maps to an ArcGIS/ArcFM implementation
- Integration with corporate asset management system (SAP) was a priority for Gas
- Attend session “Innovative Tools for Data Reconciliation” for details on the Gas conversion and migration project

Typical approaches to EAM/GIS Integration

- There are many approaches to EAM / GIS integration. They can be classified into three basic options
 - Option #1 – Unintegrated systems
 - Option #2 – GIS drives EAM
 - Option #3 – EAM drives GIS

Option #1 – Unintegrated Systems

Engineer / Tech Designs
in CADD¹ package
or on paper



Asset and work order information
get entered into EAM & WM



Features are digitized into GIS



Note:

1. CADD = Computer Aided Design & Drafting. Microstation is used by PSE&G Electric Delivery.

Option #1 – Unintegrated systems

- **Disadvantages:**
 - Lots of duplicated work
 - Greater potential for inaccurate data
 - Usually GIS updates lag far behind actual construction

Option #2 – GIS drives EAM

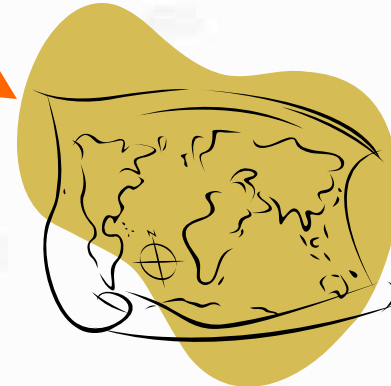
Engineer / tech creates work order directly in GIS based design package



Asset and work order information get created in EAM & WM



Features are already in GIS, final drafting is limited to as-built conditions



Option #2 – GIS drives EAM

- Advantages:
 - Near one-time entry in GIS based application (e.g. ArcFM Designer)
 - Asset information and work order information gets propagated to EAM and WM systems
 - This option results in the least amount of duplicate work (vs. options #1 and #3)
 - Achieves goal of most GIS/EAM implementations
- Disadvantages:
 - Complex, costly and risky to implement in the first phase of a GIS implementation

Option #3 – EAM drives GIS

Engineer Designs
in CADD package



Asset and work order information
get entered into EAM & WM



Features automatically created in GIS



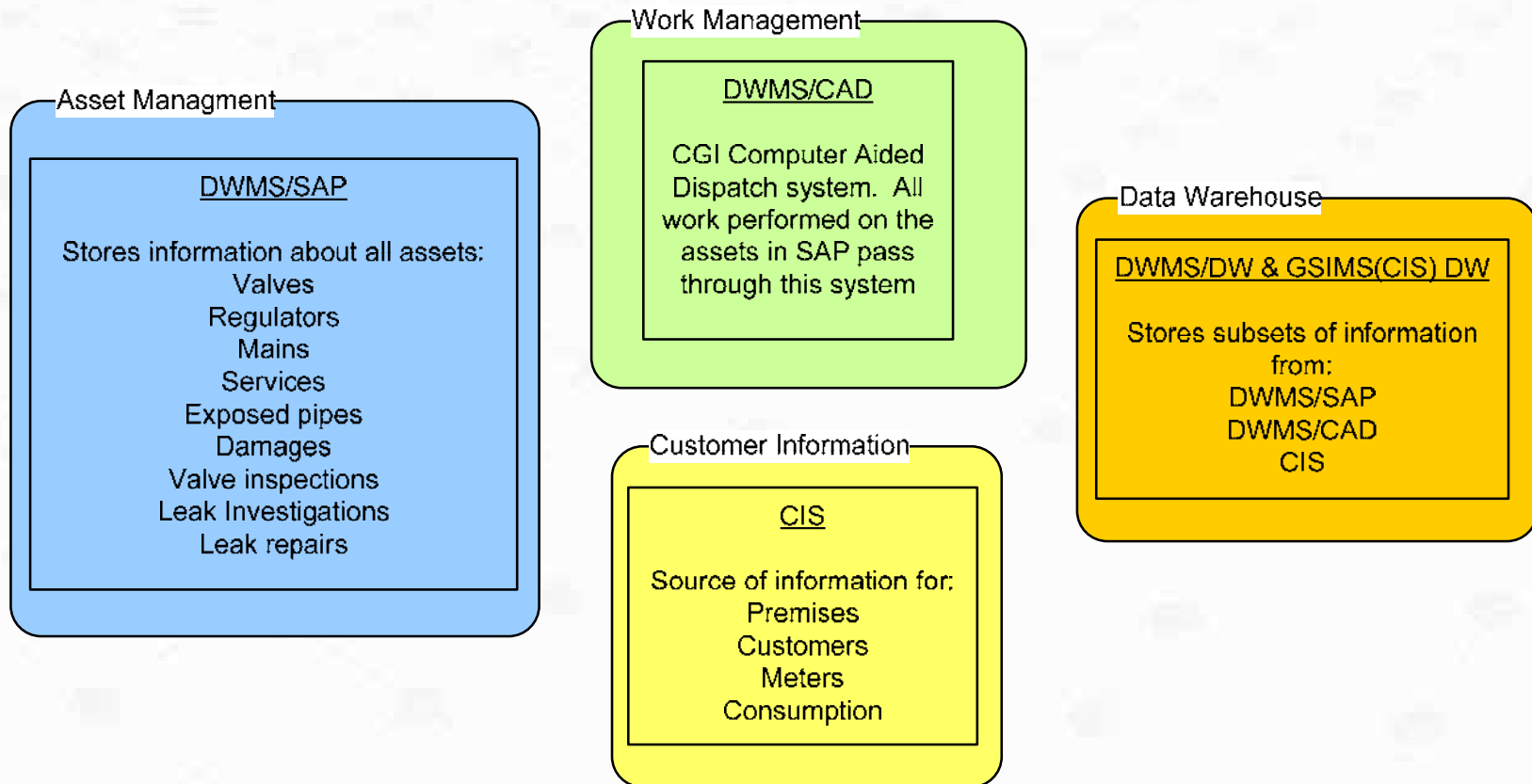
Features are connected
and repositioned in GIS



Option #3 – EAM drives GIS

- Advantages
 - Can be implemented without changing the EAM and WM systems or processes
 - Can be implemented with little impact on engineering and operations departments
 - Keeps GIS and EAM synchronized in a timely fashion
- Disadvantages
 - Duplicate effort in all systems (design in CADD, enter into Work Management and reposition features in GIS)

PSE&G EAM Systems



Need for EAM/GIS Integration

- With introduction of GIS, it was vital to keep the GIS synchronized with the existing EAM & CIS systems, including:
 - Mains, valves, regulators, services
 - Exposed pipes
 - Leak investigations, leak repairs
 - Service lines, service points, meters, premises
 - Inspections
- Need timely update of GIS to provide accurate and current maps
- Need to minimize impact of GIS maintenance on existing staff

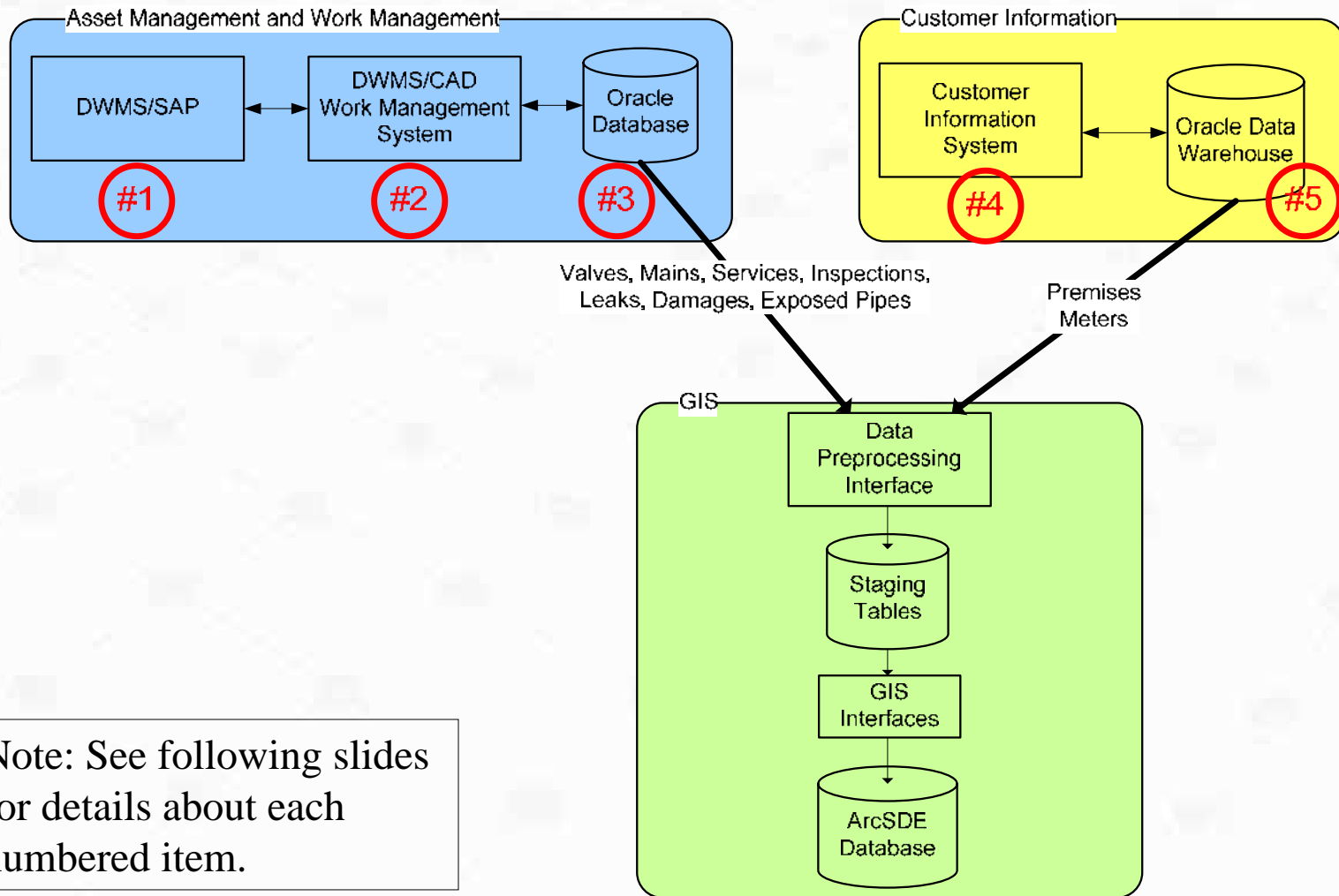
Goals of PSE&G Gas EAM ↔ GIS Solution

- Keep GIS current with assets existing in the field
 - Accuracy: information is correct, reduce/eliminate data entry errors
 - Completeness: all SAP information for assets is available in GIS
- Minimize the time required for GIS clerks to update GIS using as-built drawings
 - Eliminate need to draw from scratch
 - Eliminate excessive data entry (50 attributes per feature)
- Develop solution in a short timeframe without impacting the production SAP system

PSE&G's EAM ⇔ GIS Solution

- Based on time constraints, option #3 (EAM driven GIS) was chosen
- Interfaces between asset management system and GIS is highlighted on the remaining slides

Interface Overview



Note: See following slides for details about each numbered item.

SAP to GIS interface

- #1: The “owner” or “system of record” of the following data is DWMS/SAP:
 - Valve Inspections
 - Leaks and Leak Repairs
 - Valves, mains, services, regulator stations
 - Damages and exposed pipes
- #2: DWMS/CAD system used for all work orders and is tightly integrated with DWMS/SAP, thus all changes to facilities are available in the DWMS/CAD Oracle database
- #3: Interface to GIS uses DWMS/CAD database rather than going directly to SAP
- Interface searches DWMS/CAD database for completed work orders, inspections and leaks

CIS to GIS Interface

- #4: The “owner” or “system of record” for the following data is the Customer Information System:
 - Premises
 - Accounts
 - Meters
 - Meter readings (consumption)
- #5: Customer Information is regularly copied to the GSIMS data warehouse
- Interface searches for changes to the premise and meter data in the data warehouse

Individual interfaces

- Preprocessing Interface:
 - Copies data from DWMS/CAD and DWMS data warehouse to GIS-owned local Oracle database
 - Only required data is copied (reducing record counts from millions of records to hundreds of records)
 - All done in PL/SQL
 - Greatly reduces time required for subsequent processing

Individual Interfaces

- Facility Interface

- Processes DWMS/CAD work orders that have been completed and approved
- Creates new valves, regulators, mains, services, exposed pipes
- Marks facilities for abandonment
- Does not connect new features to existing features
- Mains get created parallel to street centerlines
- Services get created perpendicular to cartways

Individual Interfaces

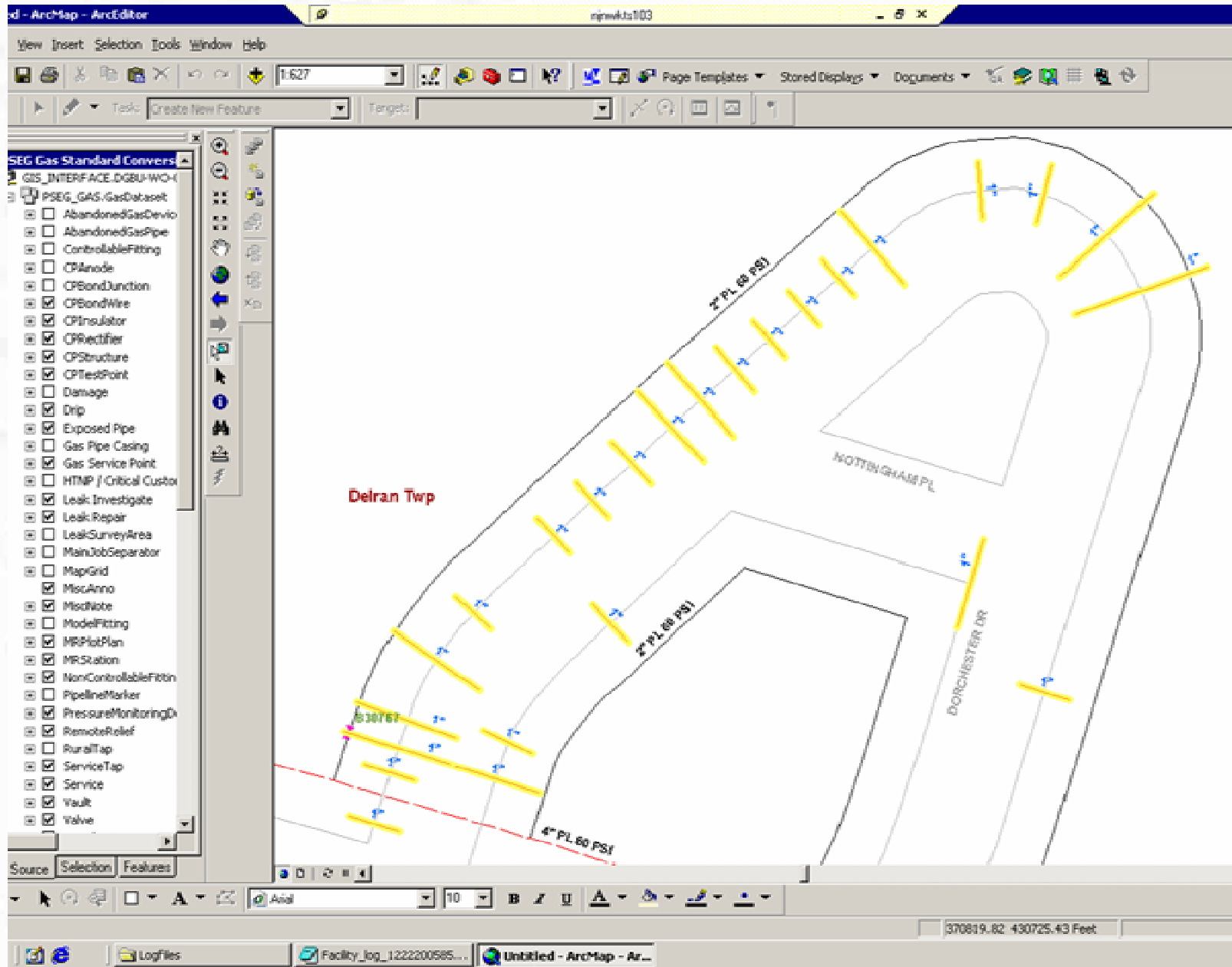
- Leak/Damage Interface
 - Processes records that have been approved
 - Creates new leak investigations as features in GIS
 - Copies leak inspection results for leaks already in GIS
 - Creates new leak repair features and relates to GIS mains or services
 - Creates new damage features and relates to GIS mains or services

Individual Interfaces

- Inspection Interface
 - Copies Valve inspection information to the GIS
 - Associates information to GIS valve
- Customer Data Interface
 - Synchronizes GIS premises and meters with the CIS premises and meters
 - Relates premises to GIS service points, based on address matching
 - Creates service points for premises at new service addresses

Sample results of the interface

- The following diagram shows the results of the interface's processing of a work order.
- Real world work order involved creation of 25 new services.
- Interface created 25 services in a version within the Arc SDE database.
- Services were geocoded to a location on the street and then centered perpendicular to the cartways.
- User then uses ArcMap to reposition the services, attach to the mains and post to the production version of the database.
- 45-50 attributes of each service were copied by the interface from the SAP/CAD system.



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Notes about the solution: Geocoding

- Location of facilities:
 - Each work order has an address
 - Location of new features is determined by **geocoding** the address
 - This gives an approximate location for the facility
 - GIS clerk will be responsible for moving the facilities to the exact locations (using as-built drawings for reference)
 - Accurate address data and GIS landbase is vital to the success of this interface
 - SAP address entry screens have custom GIS address validation processing, helping to ensure that addresses processed by the interface are usable and more likely to match

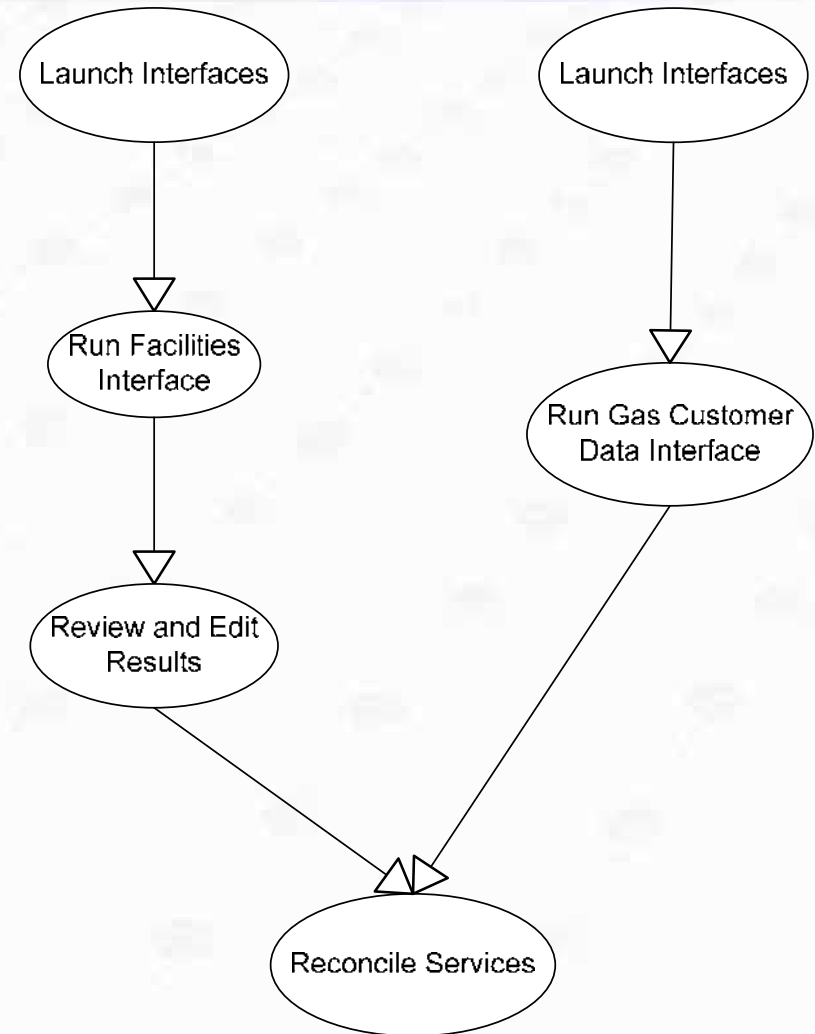
Notes about the solution: Use of Versions

- **Work Orders:**
 - Each work order is created in a separate version
 - Version can contain new or updated valves, mains, regulators, services, exposed pipes
- **Non work order updates**
 - Each run of the leak interface will create new leak investigations, leak repairs and damages, one version per PSEG district
 - Each run of the inspection interface creates one version per district
 - Each run of the Customer interface creates one version per district

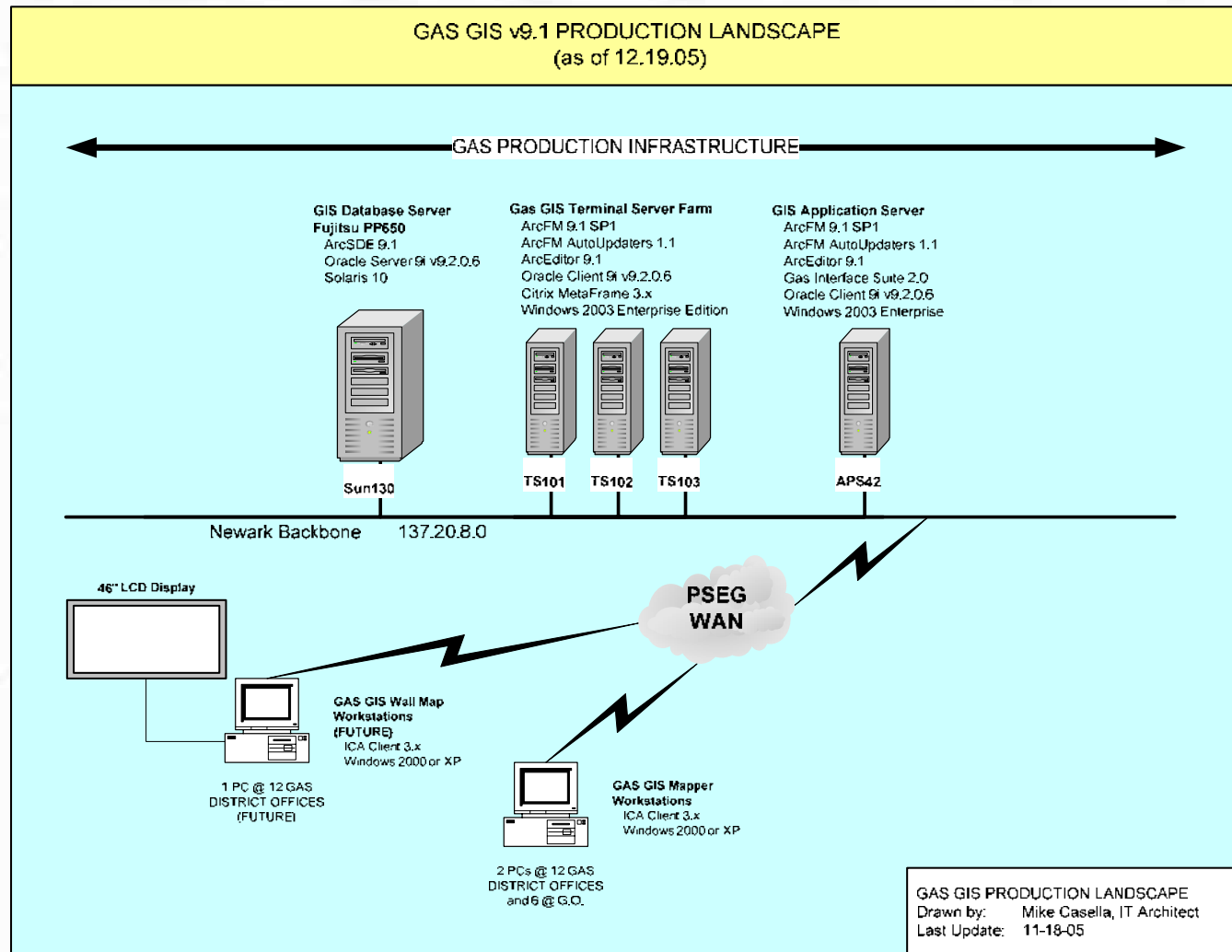
Another Tool – Service Reconciliation

Relating Customer/Meter Info to Service Data

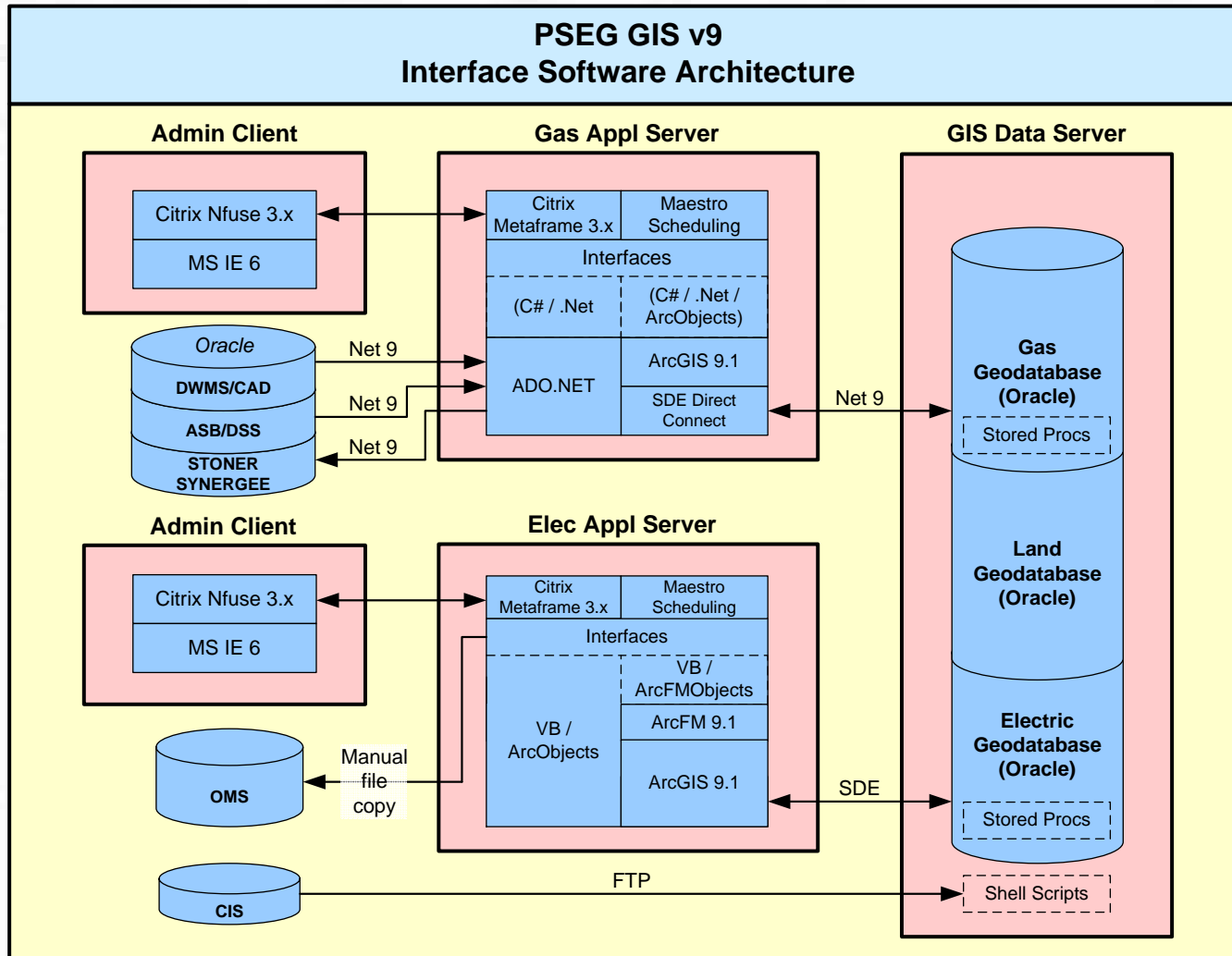
- Service lines get created in GIS via Facility Interface
- Service points get created in GIS via Customer interface
- Can have multiple premises related to a single service point
- Can have multiple service points related to a single service line
- Interface relates service points to services where possible
- Reconcile Services is a custom ArcMap based tool that the user can use to automatically relate service points to service lines (if addresses match), repositioning and snapping the service points to the end of the service line



Gas GIS Production Landscape



Interface Software Architecture



Business Results

- Stay tuned
 - The system has just recently been deployed, so metrics are not available
 - Initial indications are that the system is achieving the stated business goals for accurate and complete facilities data and reduced time to complete Gas GIS updates

Questions?

- Visit us in VELOCITIE's Booth (#1812)

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