

# Foundational Asset Knowledge at PG&E

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- **UDC Gas Transmission Pipeline Integrity Reference Framework**
- **Where Linear Referenced Asset Management Fits at PG&E**
- **System Architecture of Gas Transmission (GT) GIS and Asset Management (FAK)**



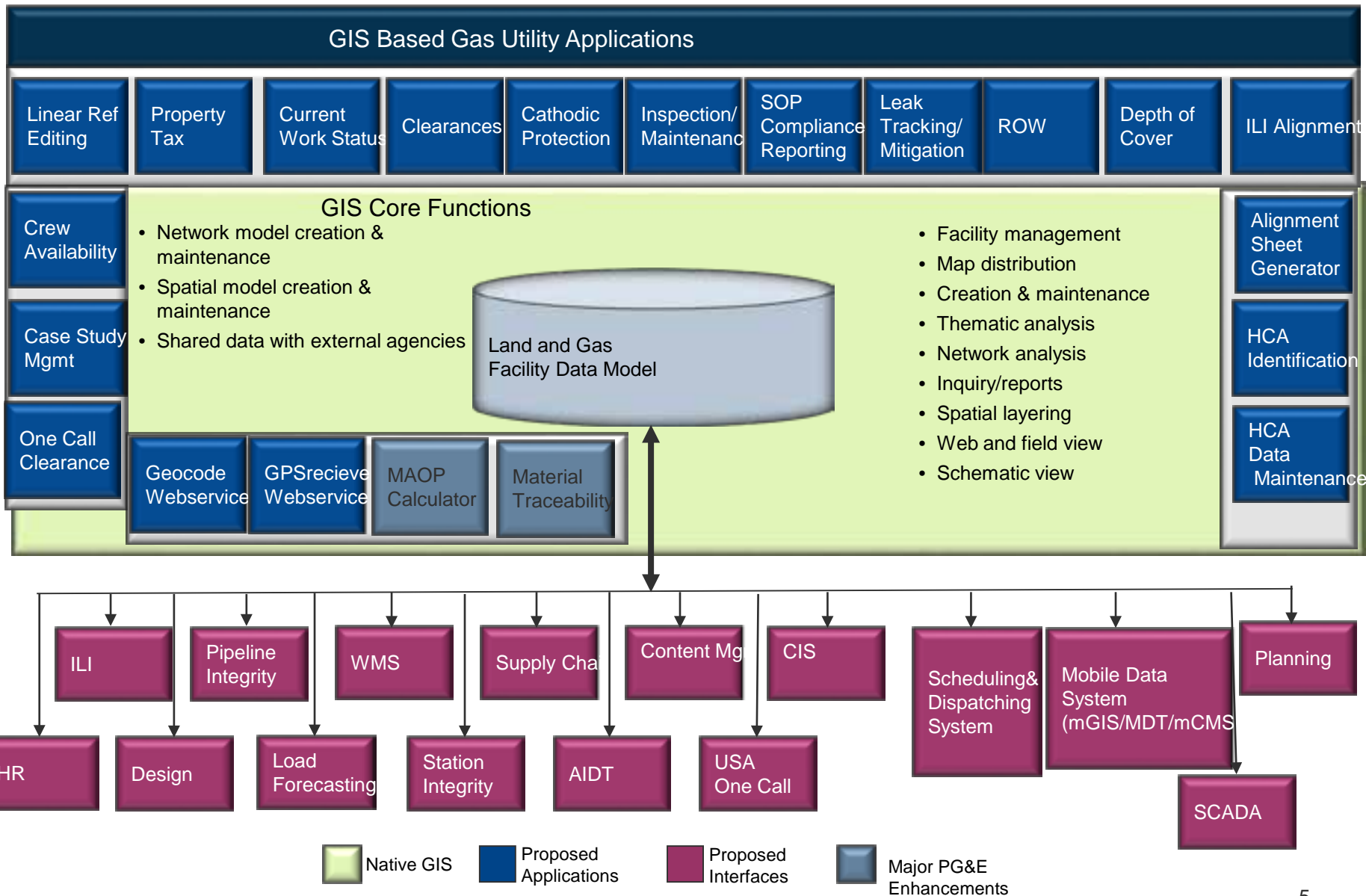
Concepts and Technologies

# UDC PIPELINE INTEGRITY REFERENCE FRAMEWORK



# Benefits of UDC's Reference Architecture

- EAM with linear asset management (LAM) functionality
- Linear Asset Repository managed by GIS, EAM, and Content Management
- Single software framework to build applications to support asset management and survey planning, monitoring and compliance reporting for leak surveys, CP surveys, valve inspections, regulator inspections
- GIS Centerline editing paradigm to support linear asset management and pipeline integrity event management
- Fully integrated field workforce environment bringing mGIS, work order and document management functionality
- Single software framework (spatially enabled BI) to support asset manager and operations center
- Case Study Management environment reused for planning, integrity management and operational awareness



	GIS	EAM	MWM mGIS	CMS	IM	Engr	SCADA	Spatial BI
As-Built Recording	● X	X		X				
Preventative Maintenance	● X	X	X	X				X
Corrective Maintenance	● X	X	X	X				
Engineering Planning	● X	X	X			X		X
Integrity Management	● X	X	X	X	X		X	X
OPS Awareness	● X	X	X			X	X	X



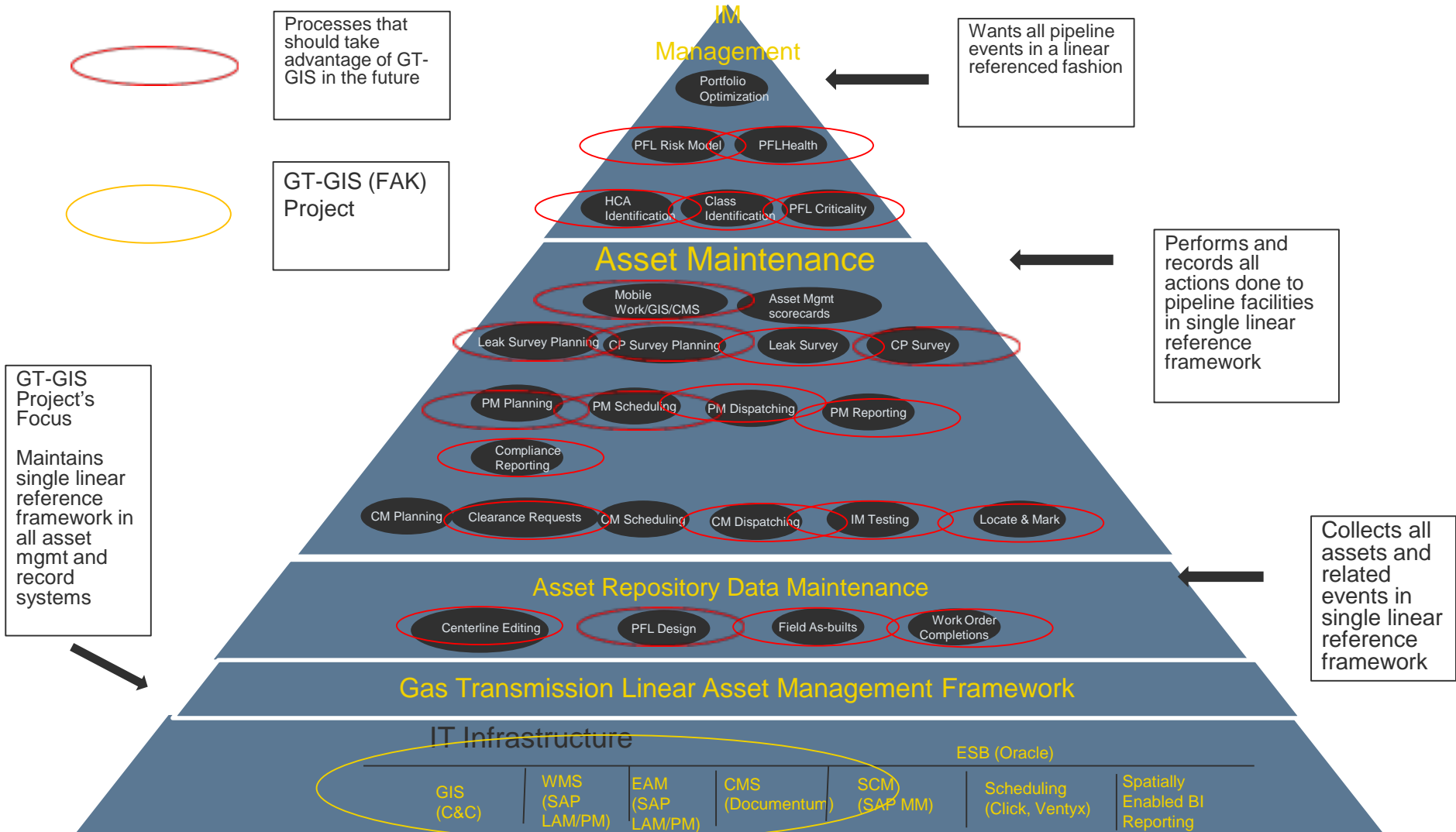
Where Business and Technology Meet

# PG&E'S GT IMPLEMENTATION ROADMAP



# Transmission Gas Roadmap

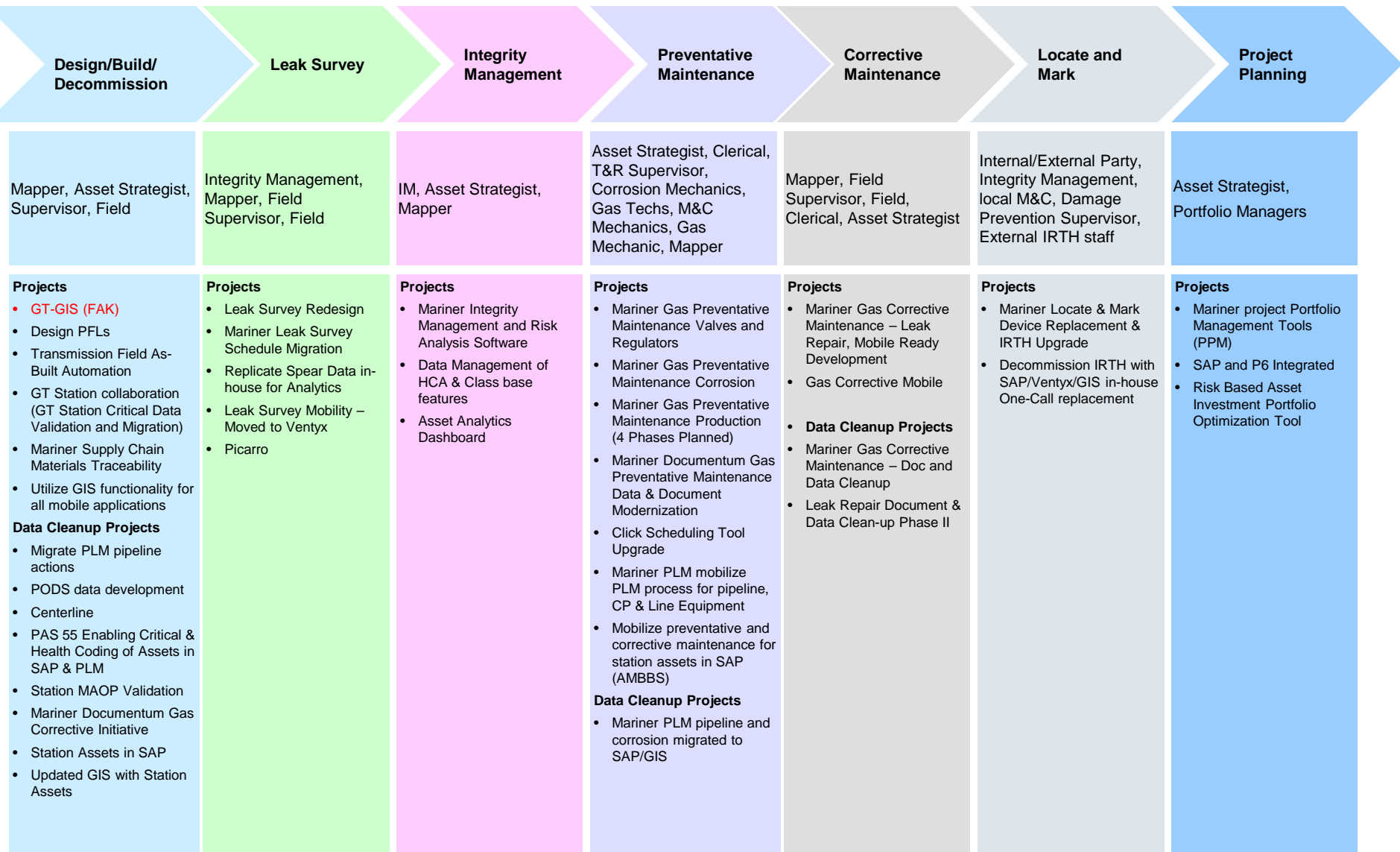
Where Linear Referencing Fits at PG&E







# GT Business Area Roadmap

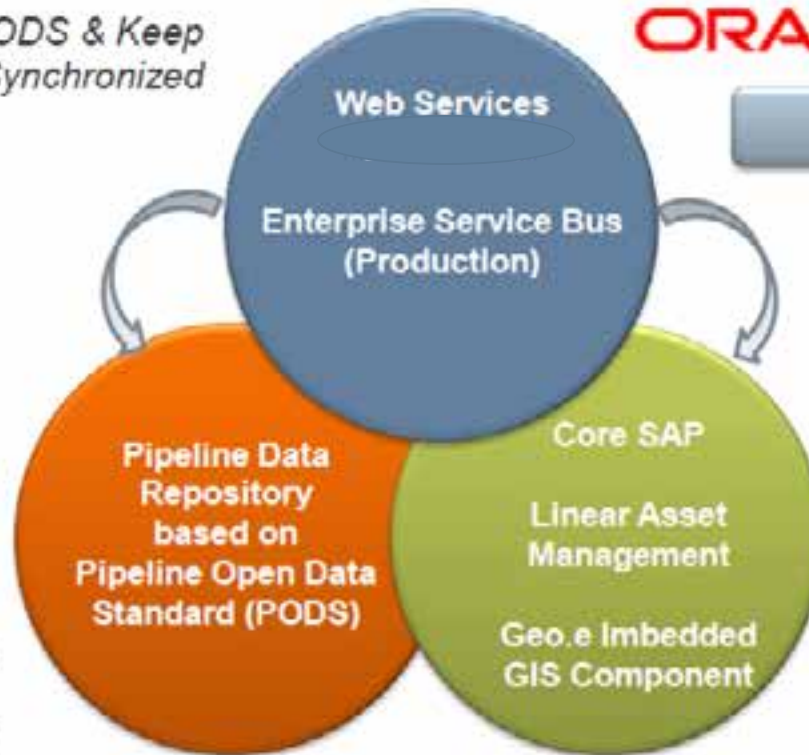


*Ability to Maintain PODS & Keep  
PODS & SAP Synchronized*



**INTREPID**  
**PODS**

- Enhanced GIS Platform
- ✓ Pipeline Data Repository
  - ✓ Pipeline Linear Reference Measurement Support
  - ✓ Industry-wide Applicability



**ORACLE**

Synchronization



GIS Asset Repository

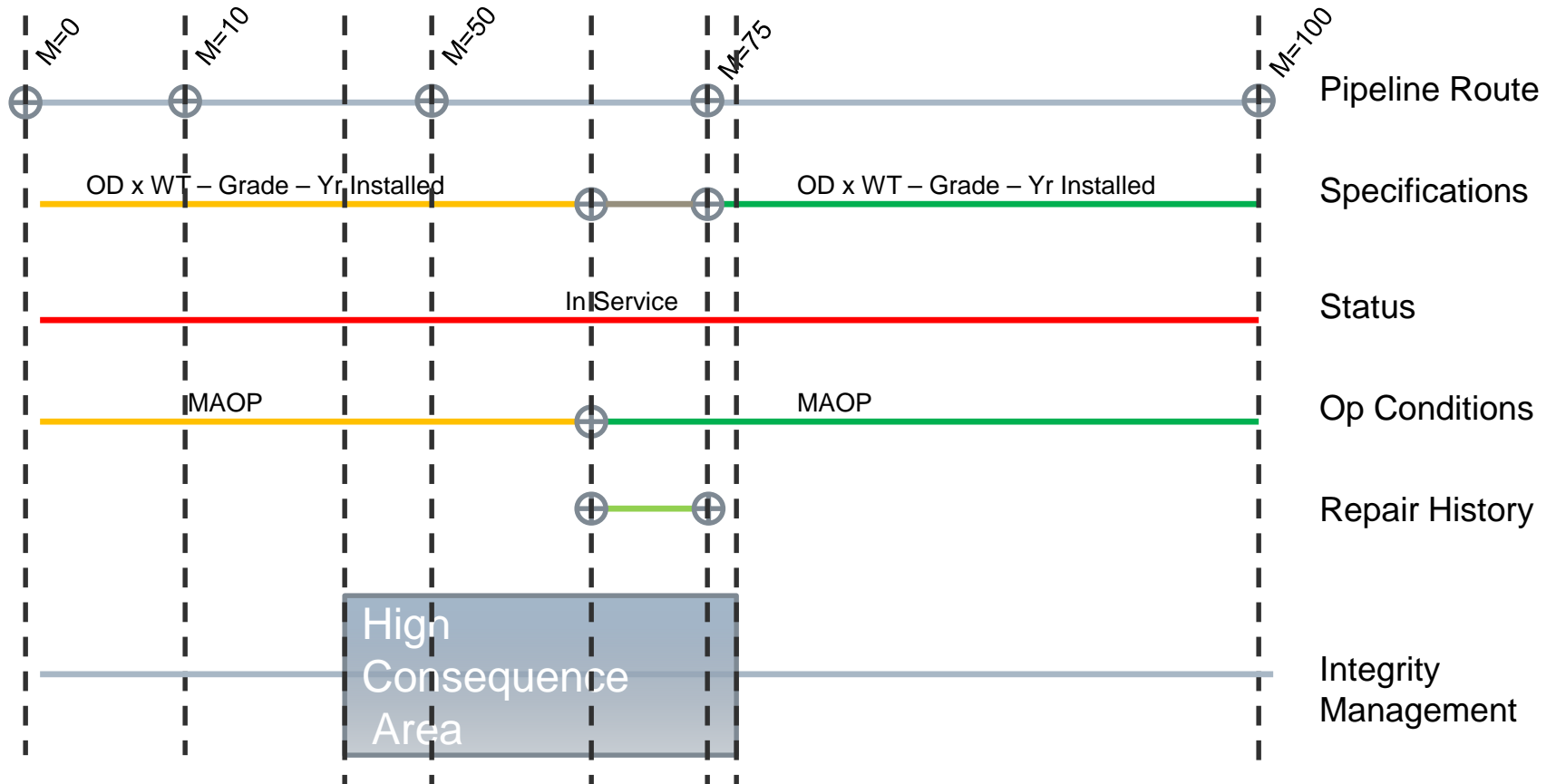
Work Order Management

# Linear Reference GIS Platform (Intrepid)

The screenshot displays the Intrepid GIS interface. At the top, a toolbar includes navigation icons and a 'Class' dropdown menu. Below this is a table with columns for 'Absolute Station', 'End Absolute Station', 'Event Type', 'Description', and 'Dist'. A red circle highlights a specific row in the table. To the right, a map shows a pipeline route in green and blue over a terrain map of Emerald Lake Hills. A callout box on the right lists associated documents: Face Sheet, Drawings (e.g. As-Built), Bill of Material, STPR, Other Documents, and Inspection Form.

Absolute Station	End Absolute Station	Event Type	Description	Dist
1481.0	1481.0	START	START	0.00
1481.0	1481.0	DOT Class	DOT Class	0.00
1481.0	1481.0	PI	PI	0.00
1481.0	1481.0	PI	PI	0.00
1481.0	1481.0	PI	PI	0.00
1481.0	1481.0	Pipe	1481.0' D.D. X 0.375' W.T. GR. Unknown. Sely 85430x 20. 1.56C	0.00
1481.0	1481.0	Flow	1481.0' D.D. X 0.375' W.T. GR. Unknown. Sely 85430x 20. 1.56C	0.00
1481.0	1481.0	PI	PI	0.00
1481.0	1481.0	Pipe	1481.0' D.D. X 0.375' W.T. GR. Unknown. Sely 85430x 20. 1.56C	0.00
1481.0	1481.0	DOT Class	DOT Class	0.00
1481.0	1481.0	PI	PI	0.00
1481.0	1481.0	Pipe	1481.0' D.D. X 0.375' W.T. GR. Unknown. Sely 85430x 20. 1.56C	0.00
1481.0	1481.0	Pipe	1481.0' D.D. X 0.375' W.T. GR. Unknown. Sely 85430x 20. 1.56C	0.00

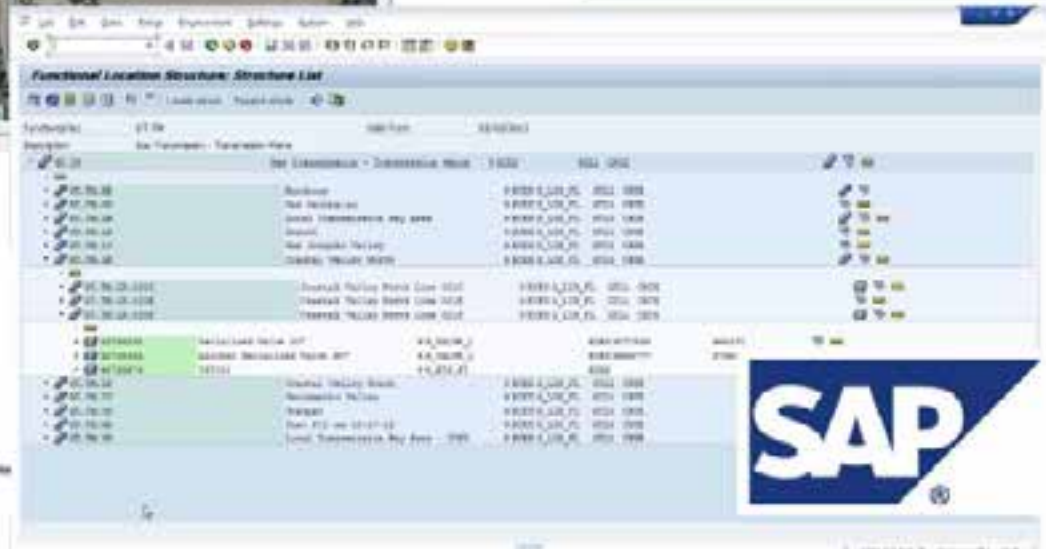
Consolidate pipeline data attributes and all associated documents within a component-based GIS System of Record → **Traceable, verifiable and complete records**





**Work Order Management**

**GIS Asset Repository**



**Linear**- resembling, represented by, or consisting of a line or lines.

([www.thefreedictionary.com/linear](http://www.thefreedictionary.com/linear))

An **asset** is a plant, machinery, property, buildings, vehicles and other items that have a distinct value to an organization.

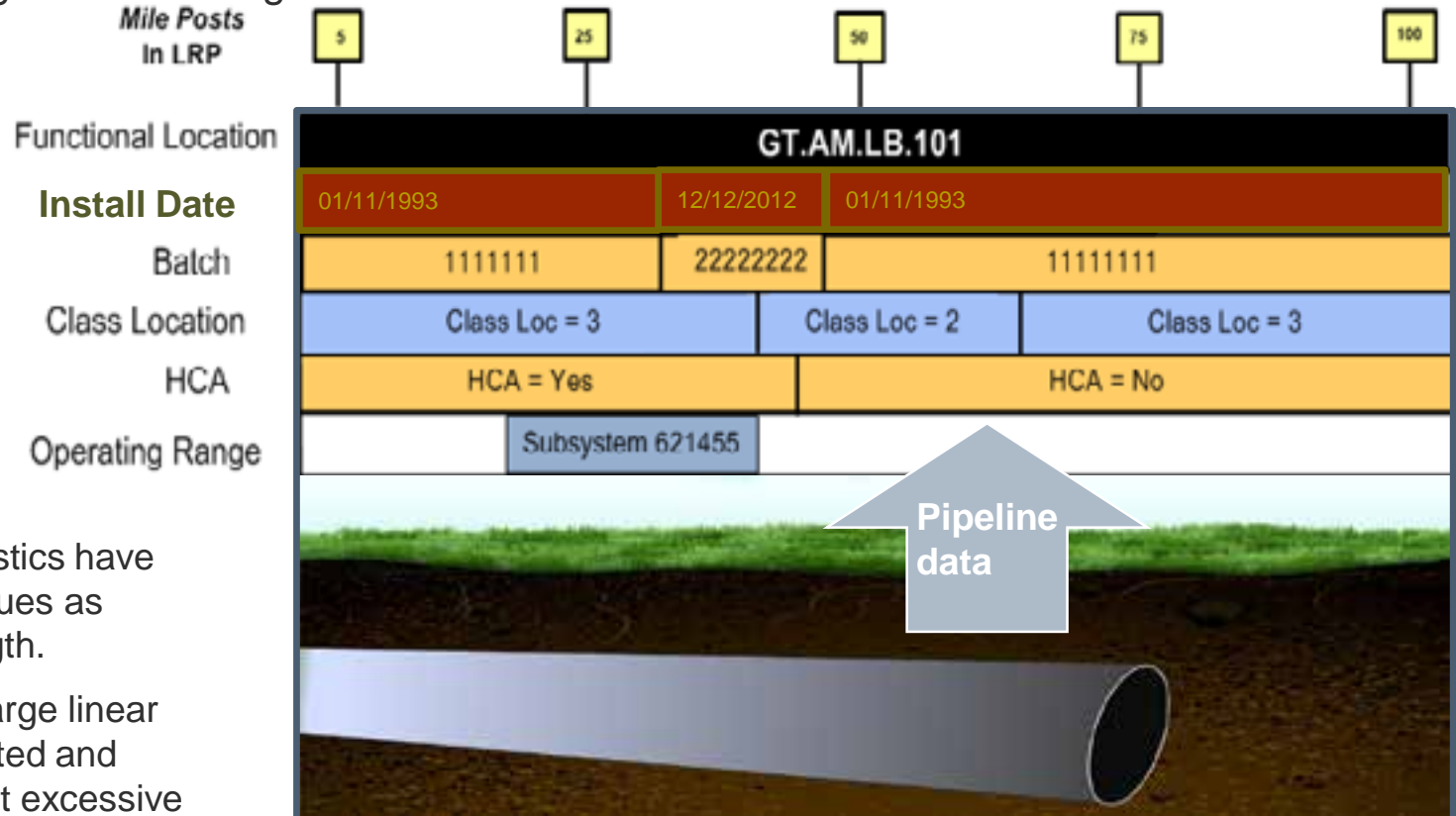
**Linear Assets** – assets resembling, represented by, or consisting of a line or lines (of continuous length). Linear assets can be roads, pipeline, transmission lines, rail track or any other equipment or structures whose purpose is to move or allow the movement of material, products or services.

**Linear Asset Management (LAM)**- systematic and coordinated activities and practices through which an organization optimally and sustainably manages its linear assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan for asset integrity management.

- Pipelines move water, oil, gas, sewage etc...
- Transmission Cable, move energy/electricity
- Roads allow the movement of vehicles



Linear Distributive Characteristics (LDC) allow for many characteristic assignment to a single linear Functional Location or Equipment with attributes (range event) that are independent regardless of length.



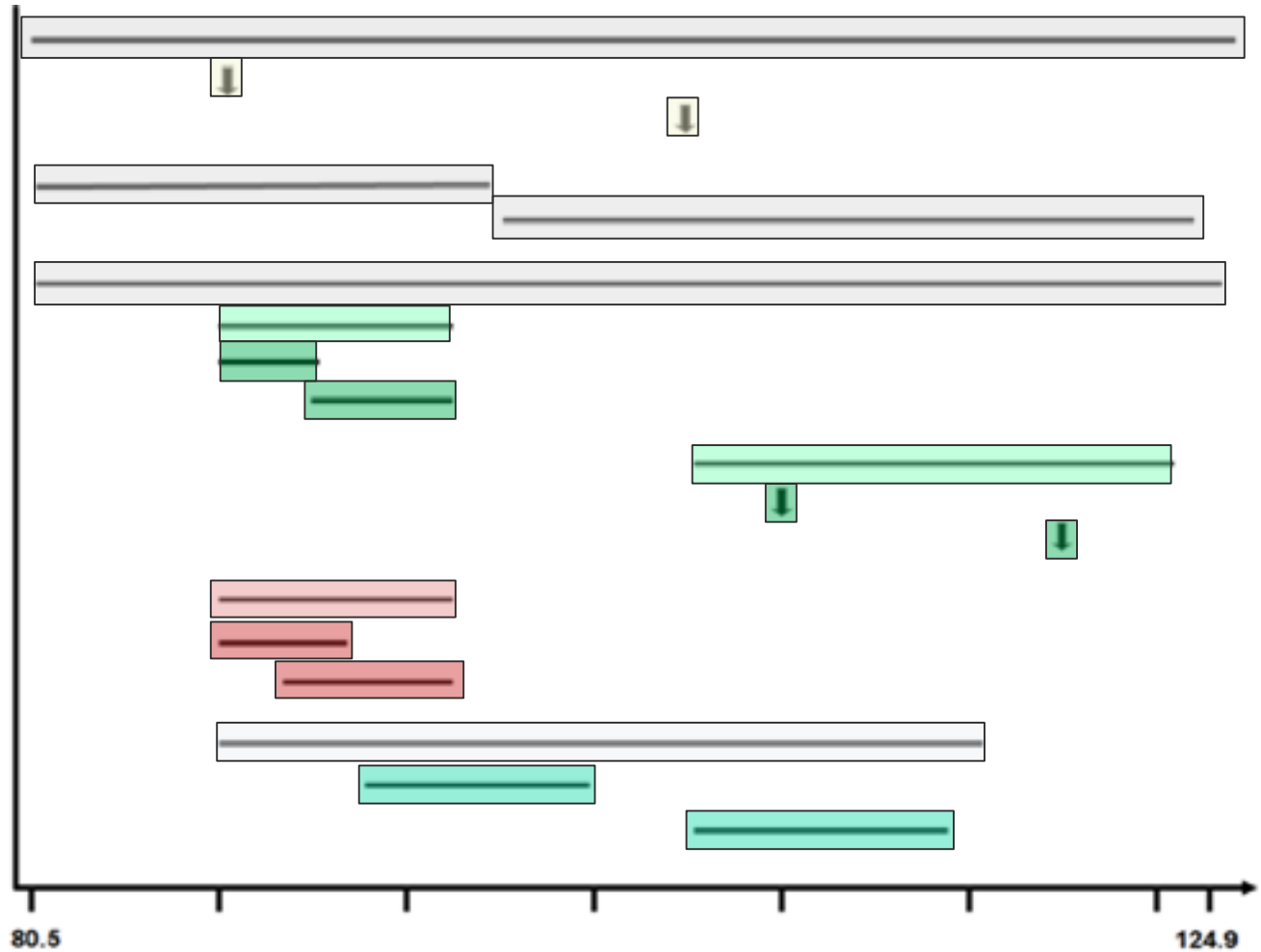
- Linear characteristics have multiple single values as prescribed by length.

This allows very large linear objects to be created and maintained without excessive segmenting of the asset structure.

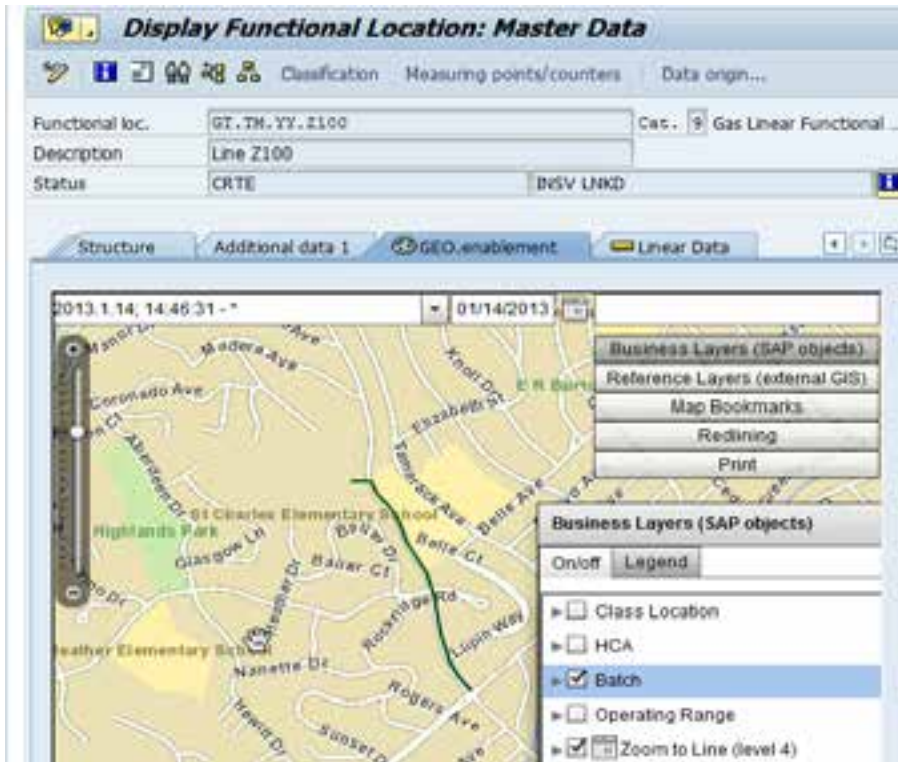




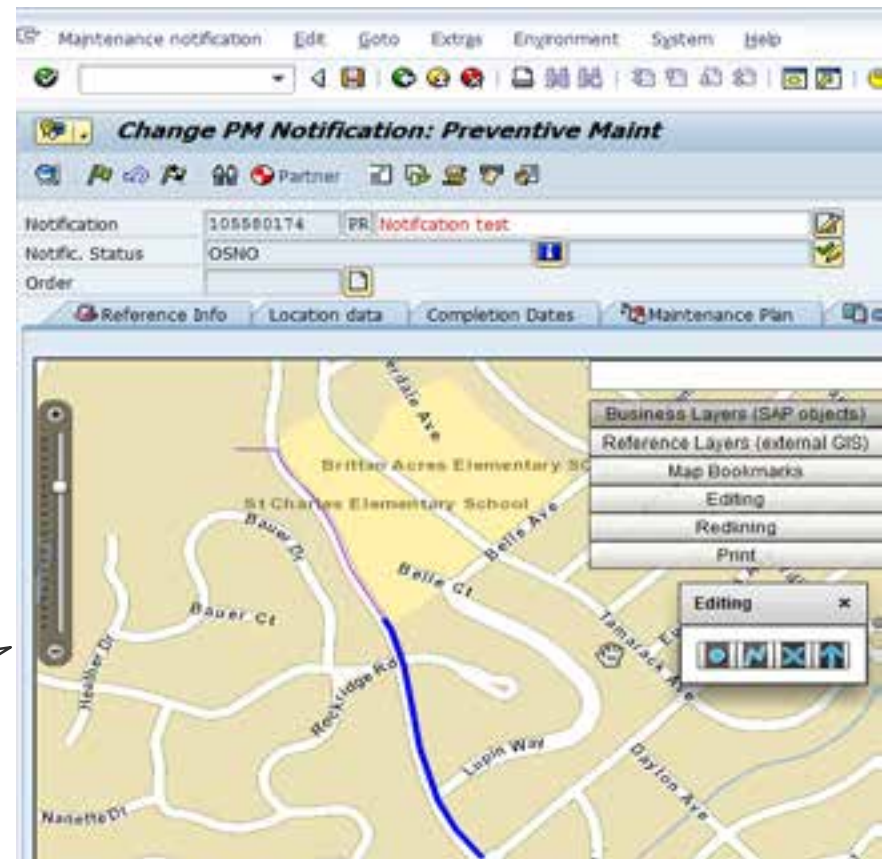
Func. Loc. A8-100
Equip. S02519
Equip. S02656
Char: thickness 35 mm
Char: thickness 40 mm
Char: hardness 5 °
Work order: 901951
Operation 0010
Operation 0020
Work order: 901989
Operation 0020
Operation 0020
Notification 1007423
Item 001 : onsite inspection
Item 002: surface damaged
Meas. Point: soil ph value
Meas. Doc: 5.4 %
Meas. Doc: 5.8 %



# GEO.e Local View on Functional Location and Notification

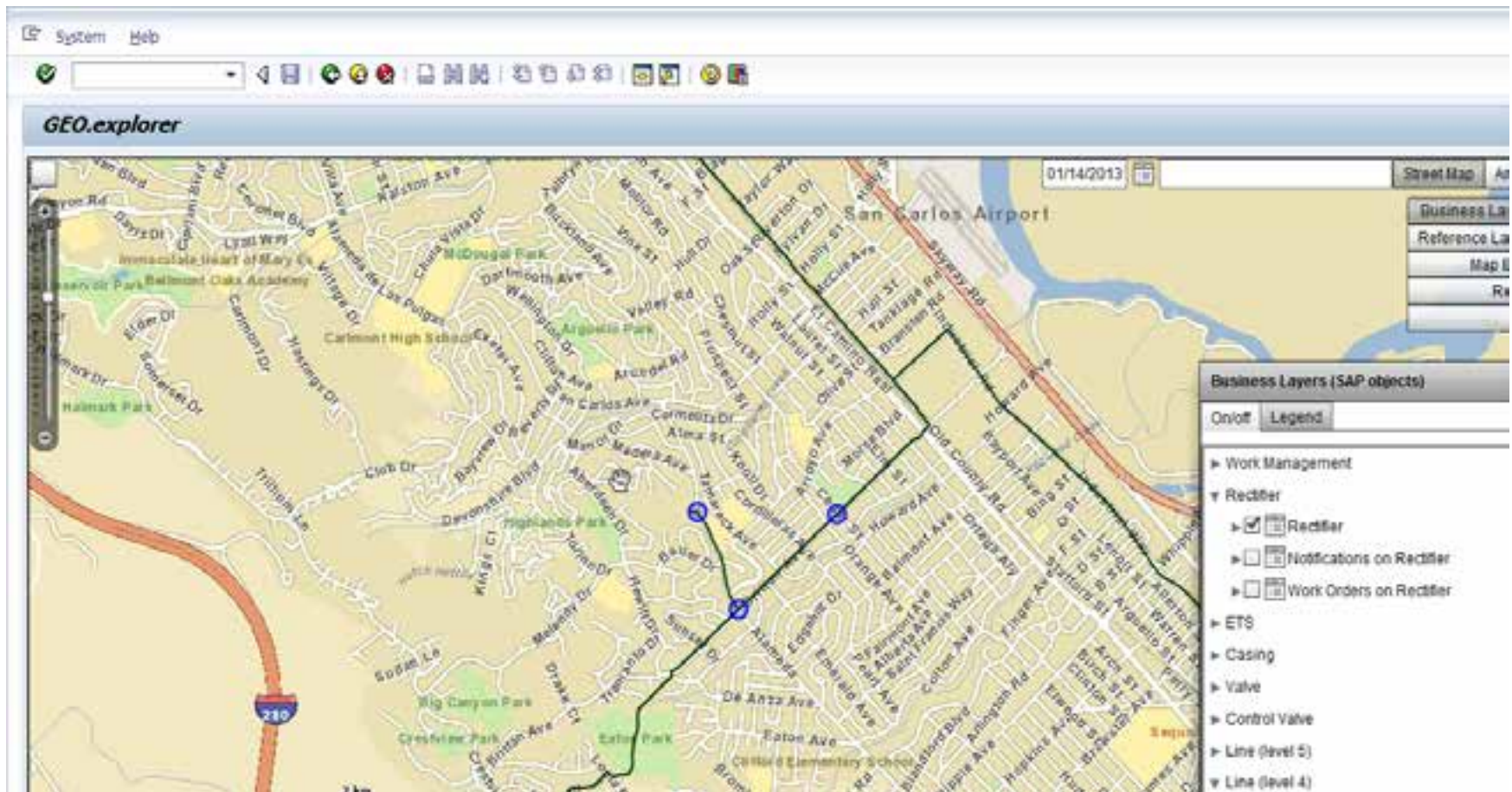


§ GEO.e tab on Functional Location  
 § Display Business Layers  
 § Shape based on Key Dates



§ GEO.e tab on Notification  
 § Zooms to Appropriate level (in this case 0-1200' of 2300' line)  
 § Click and drag to edit Notification Start / End Point

- Quick Search on Business Layer View
  - Work Orders, Notifications, Equipment
  - Double-click to open Object







# PG&E's Technology Heat Map

Function	GIS Intrepid	EAM SAP LAM	MWM mGIS Ventyx SAP WM	CMS Documentum	IM IRAS	Engr SynerGEE	SCADA PI	Spatial BI SAP DW
As-Built Recording	● X	X		X				
Preventative Maintenance	● X	X	X	X				X
Corrective Maintenance	● X	X	X	X				
Engineering Planning	● X	X	X			X		X
Mark & Locate	● X	X	X	X				
Integrity Management	● X	X	X	X	X		X	X
OPS Awareness	● X	X	X			X	X	X

Linear data improvements to EAM (Enterprise Asset Management) will enhance work processing, by improving all five stages of the work order life cycle.

**Initiation**-Locating equipment within the asset hierarchy is easier and more logical, aiding in **equipment ownership** at the technician level.

**Closeout**-Entering history against the right piece of equipment is critical in developing a **continuous improvement** culture.



**Planning**-More accurate asset data facilitates better job planning **reducing non-value added** tasks and windshield time.

**Execution**- When work is planned and scheduled better, overall asset integrity is improved facilitating **process safety**.

**Scheduling**- Better defined availability of **resources** (labor, materials, services, tools, equipment) within current operational constraints to meet the identified workload.

# Thank You

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