



Traceable, Verifiable & Complete:
**Implementation of GIS-SAP, LAM & GEF for Material
Traceability**

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Session ID 84403

About the Speakers

Jean Melton

- Business Applications Consultant, NorthWestern Energy
- Project Manager for the Gas Transmission LAM implementation in 2018.
- With NorthWestern for 25 years spending 16 years in accounting, enterprise risk management, and internal audit before joining the IT department.

Cyndra Fulton

- Business Applications Technologist, NorthWestern Energy
- Materials lead for the Gas Transmission LAM implementation in 2018.
- With NorthWestern for 2 years in IT with 12 years experience in IT and Accounts Receivable in her career.

About the Speakers

Martin Stenzig

- CTO, Vesta Partners.
- Involved in several GIS – SAP integrations (i.e. PG&E)
- Worked with SAP to scope the Geo Enablement Framework (GEF)

Key Outcomes/Objectives

1. Batched vs. Serialized Material
2. Power of LAM & GEF
3. Things to start early on

Agenda

- Introduction
- Current NWE Landscape
- What is Material Traceability, LAM & GEF and why Implement them
- GIS – SAP Integration
- Materials
- Batched Materials
- Serialized Materials
- LSMW's
- MIGO
- LAM/GEF
- Lessons Learned

INTRODUCTION

We are a fully-regulated electric and natural gas utility serving customers in Montana, South Dakota and Nebraska. NorthWestern is committed to a safe, sustainable energy future, providing more clean energy and delivering it more reliably and more affordably than ever. We utilize a balanced energy mix, integrating renewable resources with traditional energy sources.

718,300
Customers




SERVING 
208 (electric) & 118 (natural gas)
communities in MT

1,557
Employees




\$2M
In charitable donations


\$7.6M
In Low-income energy assistance to
14,342 households


92,500
Avg. calls per month in two contact centers
in Butte MT & Huron SD

19
Walk-in customer
service offices:
7 in MT; 12 in SD/NE



\$150M
In 2018 MT property taxes



\$88.54
Typical NWE residential electric bill per
month – that's more than \$16/month
less than the national avg.



Current NWE Landscape

- NWE has been using SAP since 2000
- MPC live on 4.5b version in May 2000
- NWE – SD/NE operations live June 2002
- Progressive Upgrades Since
- Currently on ECC 6.0 – EPH8 – SP08
 - FI, HR, MM, PM (CU/OAA), SD, PS, WM, BW, CLM, GEF
- ESRI ArcGIS 10.3.1
 - With Linear Referencing for Gas Transmission

What is Material Traceability, LAM & GEF and why Implement them

- DOT's PHMSA (Pipeline and Hazardous Materials Safety Administration) Compliance Advisory
 - Issued in 2011 and 2012
 - Gas Transmission companies are responsible for tracking material down to the lot and serial number for items that are both in the ground and in stores.
- LAM
 - Enables flexibility for a multitude of linear characteristics within standard SAP classification.
 - Provides standard reference fields needed to support Linear Referencing.
 - With OAA, allows costs (both planned and actual) to be split between multiple activities.
- GEF
 - Spatial analysis of work priorities as well as proximity of work.

What is Material Traceability, LAM & GEF and why Implement them

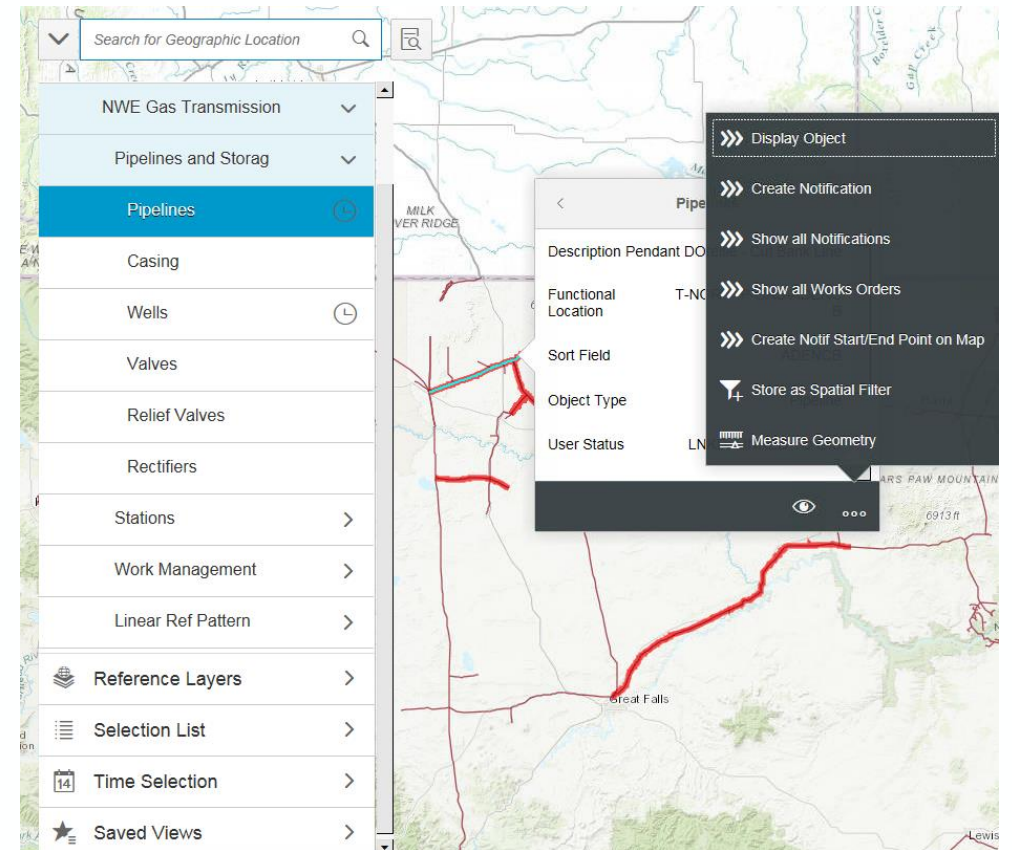
- LAM is functionality within the SAP Plant Maintenance suite that allows assets such as pipelines to be managed as linear objects.
- Key Elements
 - Linear Fields – Start Point, End Point, Length, Unit of Measure, Offsets
 - Linear Reference Pattern (LRP) – relationships to FLOC and EQ, Marker Types, Physical Field References
 - Linear Distributive Characteristics (LDC) – what changes across the length of the asset (i.e. Physical changes, Boundaries, Operating conditions, etc.)
 - Reporting – LAM fields in Selection criteria and Report Output.

The screenshot shows the SAP Linear Data configuration interface. At the top, the 'Functional loc.' is 'T-EAS-PIP-GAS-NLBCOL' and the 'Description' is 'Lake Basin-Absarokee Line'. The 'Status' is 'CRTE' and 'LNKD'. The 'Linear data' tab is active, showing fields for 'Lin.Ref.Pattern' (NLBCOL), 'Start Point' (0), 'End Point' (159,180), 'Length' (159180), 'Unit of Measure' (FT), 'St.Marker' (M1.0), 'End Marker' (M28.3), 'Dist.St.M.' (-5,227), and 'Dist End Marker' (9,873). Below these are sections for 'Offset 1' and 'Offset 2', each with 'Type Offset' and 'UoM Off.' fields. At the bottom, the 'Characteristic Values Linear Data' table is visible, listing various characteristics like 'Pipe Specification', 'Batch', and 'DOT Class' with their respective values, start/end points, and lengths.

| Char. description | Char. Value | Start Point | End Point | Length | UoM |
|--------------------|-------------|-------------|-------------|-------------|-----|
| Pipe Specification | API-5L | 0.000 | 51,498.000 | 51,498.000 | FT |
| Pipe Specification | API-5L | 52,499.000 | 55,299.000 | 2,800.000 | FT |
| Pipe Specification | API-5L | 55,616.000 | 159,180.000 | 103,564.000 | FT |
| Batch | 0000000260 | 87,135.000 | 87,232.000 | 97.000 | FT |
| Batch | 0000000261 | 87,449.000 | 87,527.000 | 78.000 | FT |
| Batch | 0000000288 | 87,871.000 | 88,100.000 | 229.000 | FT |
| Batch | 288 | 87,690.000 | 87,750.000 | 60.000 | FT |
| DOT Class | Class 1 | 0.000 | 92,552.000 | 92,552.000 | FT |
| DOT Class | Class 1 | 100,303.000 | 102,564.000 | 2,261.000 | FT |
| DOT Class | Class 1 | 104,766.000 | 108,918.000 | 4,152.000 | FT |
| DOT Class | Class 1 | 111,980.000 | 112,517.000 | 537.000 | FT |
| DOT Class | Class 1 | 114,271.000 | 129,808.000 | 15,537.000 | FT |

What is Material Traceability, LAM & GEF and why Implement them

- Geo Framework is Map-based functionality within SAP that provides Spatial Analysis Capability of Assets and Work Management Fiori or SAP GUI
- Geometries stored in HANA DB
- Points, Lines, Polygons
- Business and Reference Layers
- Enterprise Search
- Business Actions
- Optional Base Maps



GIS – SAP Integration

Vesta “Mercury” is a software framework for the integration of SAP plant maintenance (PM) with geographic information systems (GIS) such as ESRI and GE Smallworld. It represents Vesta’s collective experience from multiple industries distilled into the essential building blocks of a bi-directional asset management interface for technical objects, characteristics, geometry, and linear data. Compatible with ECC and S/4HANA platforms.

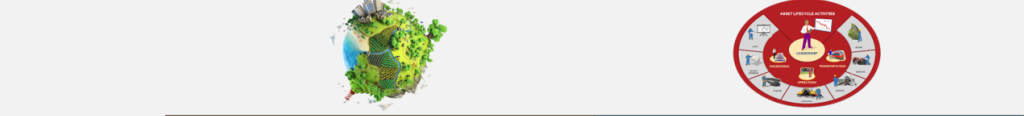
WHAT IS MERCURY?

Mercury is a suite of applications with two essential components: The **Connector**, and **Extractor**. The Connector processes inbound transactions from GIS to SAP, while the Extractor processes outbound data from SAP back to the GIS

Mercury has a graphical user interface and works “out-of-the-box” or with some level of enhancement to create a perfectly-tailored data processing flow

WHY MERCURY?

- Near real-time synchronization between SAP & GIS keeps SORs in aligned
- Eliminates need for dual asset maintenance of SAP and GIS
- Significantly reduces interface development time and TCO
- Runs on ECC or S/4HANA platforms with no need for middleware
- Mercury is optimized for speed and minimal system resources



| | GIS | | SAP | |
|--------------|--|-------------------------|---|--------------------|
| STRENGTHS | Visual analysis | Location awareness | Resource management | Asset traceability |
| | Route optimization | Environmental awareness | Work management | Cost Tracking |
| ROLE/ANSWERS | <ul style="list-style-type: none"> • Where are my assets? • How are they connected? • How is the most effective route to reach them? • Where should new assets be installed? • What major landscape features and attributes are they near (or inside of)? • How can I spatially group assets for efficiency? | | <ul style="list-style-type: none"> • What is the state of my assets? • How do I Plan and Schedule asset inspection and maintenance? • What is the work history against this asset & assets like it? • How do I manage costs associated with asset construction and asset maintenance? • What are my preventive maintenance strategies? | |

WHAT’S INCLUDED?

- Supports linear, point, and polygon geometry
- Uses certified SAP BAPI functions to handle asset master data
- Internal libraries can be mixed-and-matched for different feature requirements
- Essential components: Connector, Extractor and Message Viewer
- Job timing, monitoring and control with SAP O/S process queue
- Web services (SOAP) can be called from essentially any GIS platform

Materials

- Creating the master for the materials to be used is critical to the “what is in the ground” concept.
- Things you’ll need to begin:
 - Complete list of **all materials** associated with the project.
 - Decide what materials will be **batch managed** or **serialized**.
 - **Classes** that will correspond with each type of materials.
 - **Characteristics** that pertain to each specific material.
 - Create 2 serialization **profiles**; one for the materials and one for removing serialization should that request come about during the project.
- Organize materials in a spreadsheet

Batched Materials

- Batched managed materials cannot have inventory in the current or previous posting period.
- Batched materials requires there be no inventory or purchase orders for the batches to be archived and batch management to be turned off.
- Check the batch management box to turn on the batching process for that material.
- A batch can have a quantity of one or multiple for the same material.

The screenshot displays the SAP 'Display Material' interface for material 10011260, a semifinished good. The title bar reads 'Display Material 10011260 (Semifinished good)'. Below the title bar, there are tabs for 'Forecasting', 'Plant data / stor. 1', 'Plant data / stor. 2', and 'Accounting 1'. The main data area shows the material name 'ELBOW, WELD, 16", 45 DEG, 3R WPHY 42' and its description 'Gas Trans/Storage: Utility' and 'Deer Lodge Comp'. The 'General data' section includes fields for 'Base Unit of Measure' (EA, each), 'Unit of issue', 'Storage Bin', 'Picking area', 'Temp. conditions', 'Storage conditions', 'Container reqmts', 'Haz. material number', 'CC phys. inv. ind.', 'CC fixed', 'Number of GR slips' (0), 'Label type', 'Lab.form', and 'Appr.batch rec. req.'. The 'Batch management' checkbox is checked. The 'Shelf life data' section includes fields for 'Max. Storage Period' (0), 'Time unit', 'Min. Rem. Shelf Life' (0), 'Total shelf life' (0), 'Period Ind. for SLED' (D), and 'Rounding rule SLED'.

Batched Materials 001

Classification

Object

Material: 7502945 PIPE, BARE, 10", .250" WALL, GRADE X52
Class Type: 001 Material class

Assignments

| Class | Description | St... | S.. | I... | Itm |
|------------|-------------|--------------------------|-----|-------------------------------------|-----|
| PIPE_BATCH | Pipe Batch | <input type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 10 |

Entry 1 / 1

Values for Class PIPE_BATCH - Object 7502945

General

| Characteristic Description | Value |
|----------------------------|-------|
| Wall Thickness | 0.25 |
| Pipe Grade | X-52 |
| Diameter | 10.75 |
| Coating | Bare |

Inconsistent

Batched Materials 022

Classification

Object

Material: 7502945 PIPE, BARE, 10", .250" WALL, GRADE X52
Class Type: 022 Batch

Assignments

| Class | Description | St... | S.. | I... | Itm |
|------------|-------------|--------------------------|-----|-------------------------------------|-----|
| PIPE_BATCH | Pipe Batch | <input type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 1 |

Entry 1 / 1

Values for Class PIPE_BATCH - Object 7502945

General

| Characteristic Description | Value |
|----------------------------|-------|
| Coating Manufacturer | |
| Coating Date | |
| Coating Applicator | |
| Batch | |
| Seam | |
| Wall Thickness | |
| Pipe Grade | |
| Diameter | |
| Pipe Specification | |
| Coating | |

Inconsistent

Classification

Object

Material: 7502945 PIPE, BARE, 10", .250" WALL, GRADE X52
Class Type: 022 Batch

Assignments

| Class | Description | St... | S.. | I... | Itm |
|------------|-------------|--------------------------|-----|-------------------------------------|-----|
| PIPE_BATCH | Pipe Batch | <input type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 1 |

Entry 1 / 1

Values for Class PIPE_BATCH - Object 7502945

General

| Characteristic Description | Value |
|----------------------------|-------|
| Pipe Manufacturer | |
| Test Date | |
| Test Duration | |
| Test Executor | |
| Test Medium | |
| Test Pressure | |
| Installation Date | |
| Heat Number | |

Inconsistent

Serialized Materials

- Serialized materials are those materials that will also receive an equipment number/record. This option can be set during the material creation process and can also be set for existing materials.
- Serialization can be turned off using a dummy profile and marking the equipment records for inactive/deletion.
- Select the desired profile in the Serial no.profile field. This turns on the serialization process for that material.

The screenshot displays the SAP 'Display Material' interface for material 10021165, a semifinished good. The window title is 'Display Material 10021165 (Semifinished good)'. Below the title bar, there are icons for 'Additional Data' and 'Org. Levels'. The main area features several tabs: 'Plant data / stor. 1', 'Plant data / stor. 2' (which is active), 'Accounting 1', 'Accounting 2', and 'C.'. The material details are as follows:

| | | |
|------------|----------|-------------------------------------|
| Material | 10021165 | ALVE, 4", MOTOR, HP, FLNG, RF, 600# |
| Plant | 2800 | Gas Trans/Storage: Utility |
| Stor. Loc. | 2808 | Deer Lodge Comp |

Below the material details, there are sections for 'Weight/volume' and 'General plant parameters'.

Weight/volume:

| | | | |
|-----------------|-------|-------------|----|
| Gross Weight | 0 | Weight Unit | LB |
| Net Weight | 0 | | |
| Volume | 0.000 | Volume Unit | |
| Size/dimensions | | | |

General plant parameters:

| | | | |
|---|---------------|---------------------|--|
| <input type="checkbox"/> Neg. stocks in plant | | Log. handling group | |
| Serial no. profile | GTMT SerLevel | Distr. profile | |
| Profit Center | P113000 | Stock determ. group | |

Serialized Materials

Classification

Object

Material: 10021165 VALVE, 4", MOTOR, HP, FLNG, RF, 600#
Class Type: 001 Material class

Assignments

| Class | Description | St... | S.. | I... | Itm |
|--------|-------------|--------------------------|-----|-------------------------------------|-----|
| VALVES | ves | <input type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 10 |

Entry 1 / 1

Values for Class VALVES - Object 10021165

General

| Characteristic Description | Value |
|----------------------------|----------------|
| Diameter | 4 |
| Rating Class | ANSI Class 600 |
| Valve Specification | API 6D |
| Valve Type | Motor |
| Operator Type | Actuated |
| Joint Type | Raised Face |

Inconsistent

LSMW's

- We created an LSMW to do the initial load for creation of new material for both batched and serialized materials
- For materials that had no history or inventory, we were able to use mass change to set the batch flag and Serial No. profile
- We created an LSMW for the loading of classes and characteristics
 - Three LSMW runs were used to upload all data
 1. Create characteristics and their values
 2. Create classes and assign characteristics to each class
 3. Assign class and characteristic values to each material master
- We also created an LSMW for copying the 001 class type to the 022 class type for batched materials for the material master record.

MIGO

LAM/GEF

- Created GTS Launchpad (using Liquid UI).
- Created a new O&M Notification Type (GP) and Catalog Codes to go with it.
- Created a new OAA order Type (GT26).
 - Created 4 new Service Products to go with the GT26 order
 - They automatically populate the Operation Activities
 - These mirrored the activities that were used with networks.
 - Linear enablement is not available for network activities.
 - Automated the process of applying settlement rules to each Operation Activity.

LAM/GEF

Lessons Learned

- Start early on:
 - Determining what characteristics will be assigned to each ESRI Feature Class.
 - Reviewing material characteristics that will be on the material master vs. batch or equipment record.
 - The label printing process within SAP for the labels that will be applied to all materials.
 - The review of Functional Locations in SAP vs. Locations in ESRI.
- If possible start your project out on at least SAP Partial Run Time SAP HANA.

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Presentation Materials

Access the slides from 2019 ASUG Annual Conference here:

<http://info.asug.com/2019-ac-slides>

Q&A

For questions after this session, contact us at jean.melton@northwestern.com,
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