



# From Filing Cabinet to Integrity Management Resource Collecting Useful Data

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# Integrity Management - Collecting Useful Data

- **Regardless of Business Driver, Integrity Management is a Best Practice**
- **Examples are Related to Pipelines, but Applicable to Utilities Also**
- **Enterprise Facility and Integrity Management GIS Databases**
- **Traditional Data Collection Efforts**
- **Integrity Management Data Requirements**
- **Forms Applications**
- **Collecting Data From Existing Paper Documents**
- **Survey Data Collection**

# Enterprise GIS Databases

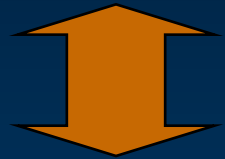
- **Should Cover both Facilities and Integrity Management**
- **Gas Transmission Database Models**
  - ESRI's ArcGIS Pipeline Data Model – APDM
  - Pipeline Open Database Standard – PODS
- **Gas Distribution Database Models**
  - ArcGIS Gas Distribution
- **Electric Transmission Database Models**
- **Electric Distribution Database Models**
- **Linear Referencing vs. Network and Geographic**

# Traditional Data Collection Efforts for Pipeline Operators

- In-Line Inspections
- Physical Inspections
- Repair Documentation
- Patrol Logs
- Crossing Reports
- Aerial Patrol Surveys
- Leak Reports
- GPS Surveys
- Pre-Construction Surveys
- As-Built Surveys

# Integrity Management Data Requirements

- **Data Must Have a Spatial Reference**
- **Geographic**
  - Line Identifier
  - XY Coordinates



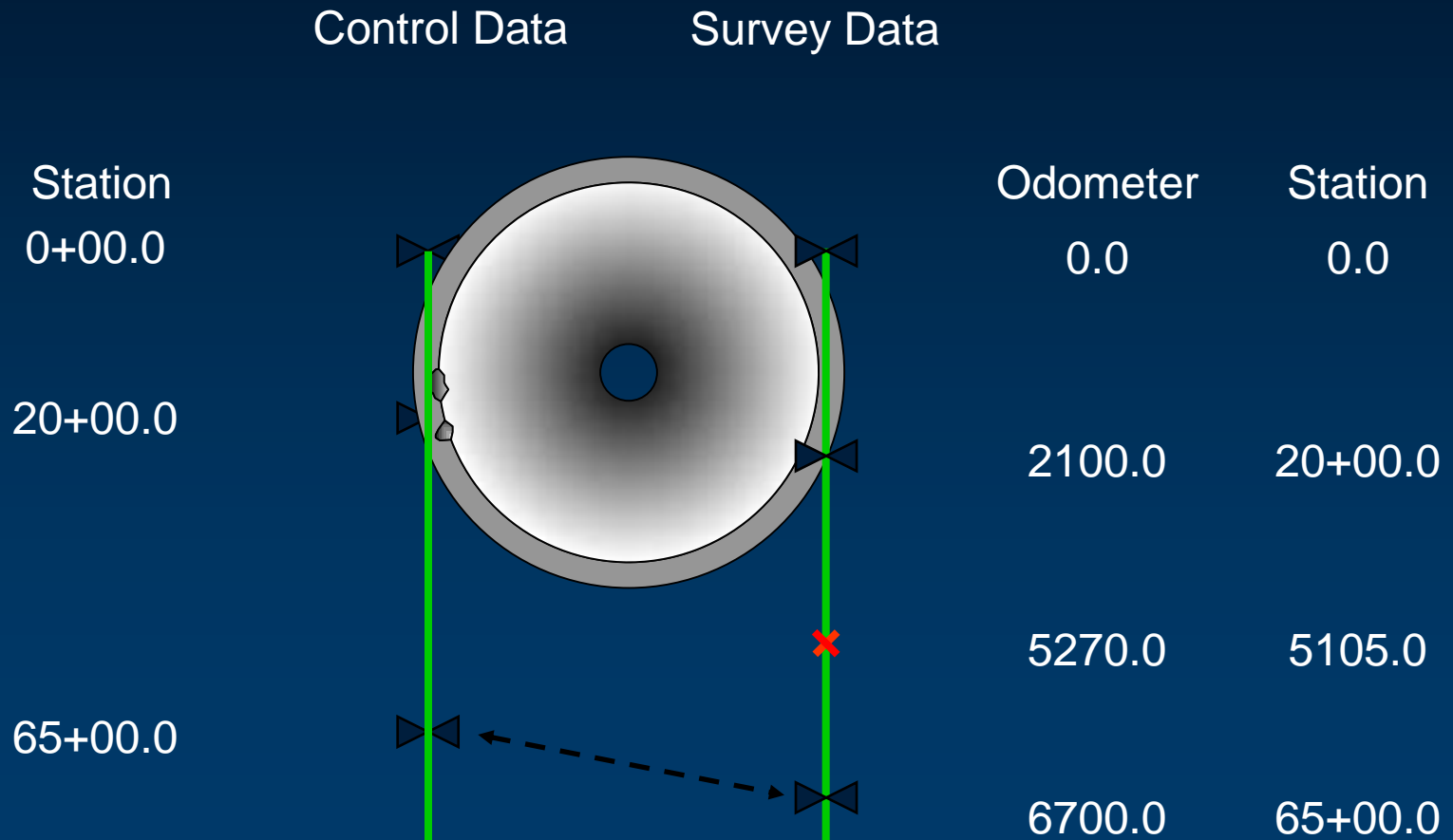
- **Linear Referencing**
  - Line Identifier
  - Line Stationing – Point and Linear Events

# Integrity Management Data Requirements

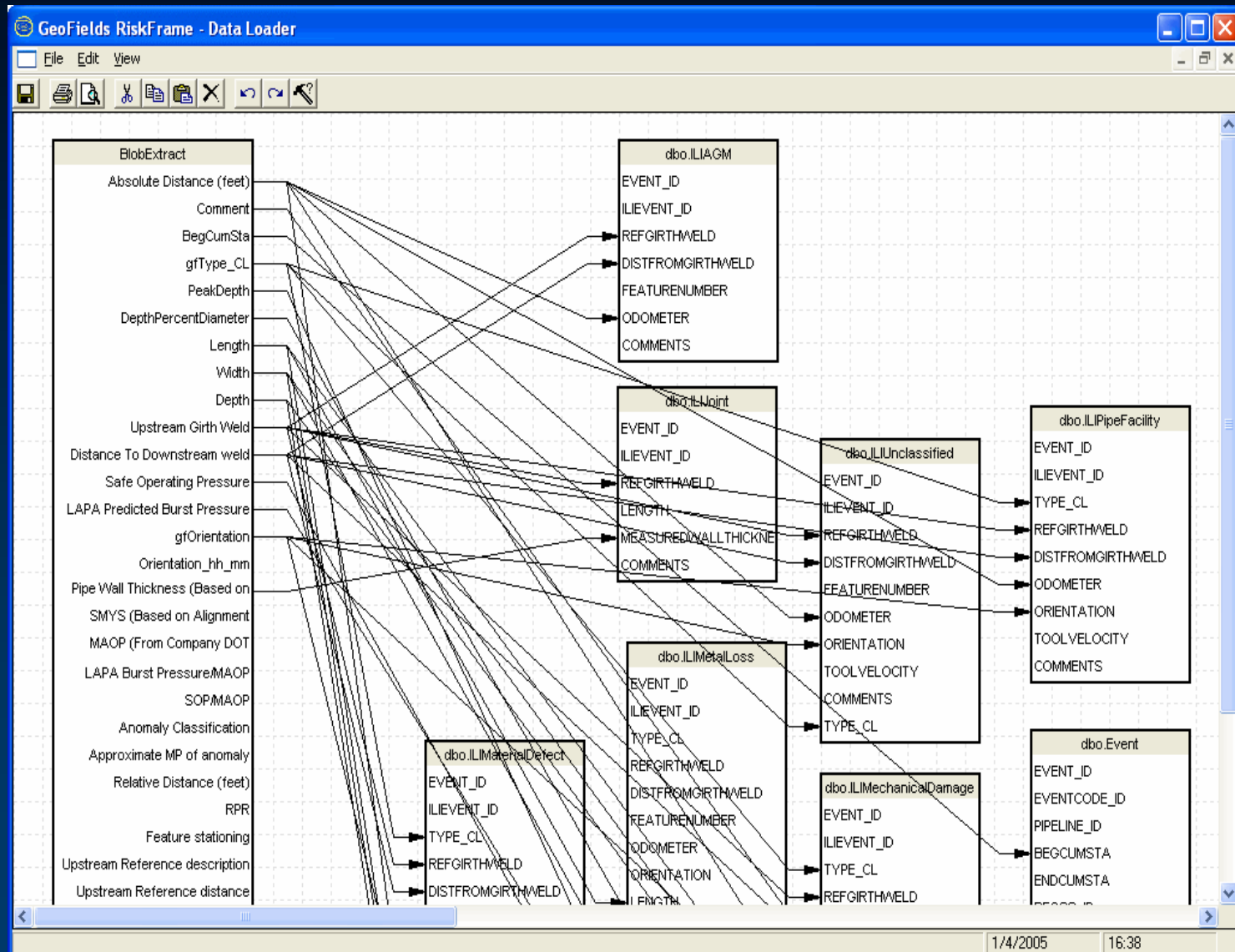
- **In-Line Inspection Data**
  - Use a Data Alignment Application
- **Physical Inspection Data**
  - Collect from Field with Line ID and XY or Station Number
- **Repair Data**
  - Collect from Field with Line ID and XY or Station Number
- **Maintain Relationships between In-Line Inspections, Physical Inspections, and Repairs**
- **Existing Paper Document Data Collection**
  - Collect with Line ID and Station Number
- **Facility Data from GPS, Pre-Construction, and As-Built Surveys**
  - Collect XY along with Line ID and Station Number

# Data Alignment - In-Line Inspection Data

- Create a Spatial Reference by Converting Odometer to Stationing



# Publishing the In-Line Inspection Data





# Forms Application - Physical Inspection Data Collection

**PIPELINE INSPECTION AND REPAIR - Maintenance Record**

**PEOPLE AND DATES**

Report Type: Permanent Repair (P)    Anode/Test Point Installation (I)    Date Started: 7-10-04    Date Completed: 7-16-04

**LOCATION INFORMATION**

System: Sun East    Pipeline: 12" APL 4 River x-ing    Pipe Diameter: 12"    Call Serial Number: 1

**INSPECTION INFORMATION - Required for ALL Pipe or Coating Repairs (Complete all boxes)**

From Sta of Excavation (R17): 2.0000    To Sta of Excavation (R18): 5.0000

To Longitude of Work (R21):    To Latitude of Work (R22):    Feet of Ditch (R23):

**REPAIR INFORMATION - Required for ALL Pipe or Coating Repairs (Complete all boxes)**

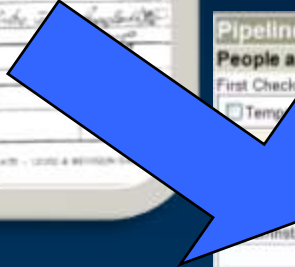
From Sta of Excavation (R17):    To Sta of Excavation (R18):    To Longitude of Work (R21):    To Latitude of Work (R22):    Feet of Ditch (R23):

**CONTACT INFORMATION**

Installer (R6):    Repair File Number (R7):    Line X-ing File Number (R8):    Comments (R9):

**ROUTING INFORMATION**

Inspector (R10.1):    Municipality (R13):    County (R14):    State (R15):    SPLP Line Depth (R16):



**Pipeline Inspection and Repair**

**People and Dates**

First Check All that Apply for this Form (R1)

Temporary Repair     Permanent Repair     Anode/Test Point Installation

Report Type (R1)    Date Started (R3)    Date Completed (R4)    Contractor Performing Work (R5)

Installer (R6)    Repair File Number (R7)\*    Line X-ing File Number (R8)\*    Comments (R9)

**Location Information**

System (R10.1)    Pipeline (R10.2)

Sun East    12" APL 4 River x-ing

Pipe Diameter (inches) (R11)    Call Serial Number (R12)

Municipality (R13)    County (R14)    State (R15)    SPLP Line Depth (inches) (R16)

From Sta of Excavation (R17)    To Sta of Excavation (R18)    From Longitude of Work (R19)    From Latitude of Work (R20)

2.0000    5.0000

To Longitude of Work (R21)    To Latitude of Work (R22)    Feet of Ditch (R23)

Save    Next

# Forms Application - Repair Data Collection

**PIPELINE INSPECTION AND REPAIR - Maintenance Record**

**PEOPLE AND DATES**

Permanent Repair (R1)  Anode/Test Point Installation  Temporary Repair

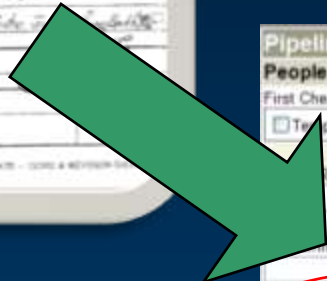
**LOCATION INFORMATION**

**INSPECTION INFORMATION - Required for ALL Pipe or Coating Repairs (Complete all boxes)**

**REPAIR INFORMATION - Required for ALL Pipe or Coating Repairs (Complete all boxes)**

**CONTACT INFORMATION**

**ROUTING INFORMATION**



**Pipeline Inspection and Repair**

**People and Dates**

First Check All that Apply for this Form (R1)

Temporary Repair  Permanent Repair  Anode/Test Point Installation

Report (R2) Date Started (R3) Date Completed (R4) Contractor Performing Work (R5)

Installer (R6) Repair File Number (R7)\* Line X-ing File Number (R8)\* Comments (R9)

**Location Information**

System (R10.1) Pipeline (R10.2)

Sun East 11112

12" APL 4 River x-ing

Pipe Diameter(inches) (R11) 1-Call Social Number (R12)

Municipality (R13) County (R14) State (R15) SPLP Line Depth(inches) (R16)

From Sta of Excavation (R17) To Sta of Excavation (R18) From Longitude of Work (R19) From Latitude of Work (R20)

2.0000 5.0000

To Longitude of Work (R21) To Latitude of Work (R22) Feet of Ditch (R23)

Save Next

# Forms Application – Paper Document Data Collection

Sunoco Forms - Windows Internet Explorer  
http://whitney/sunoco/main.asp

GeoFields  
Welcome phan.

### PIPELINE INSPECTION AND REPAIR - DO Maintenance Record

Webb on Error Mail

#### PEOPLE AND DATES

First Check All that Apply for this Form (R1)  
 Temporary Repair  Permanent Repair  Anode/Test Point Installation

Date of Report (R2) \_\_\_\_\_ Date Started (R3) \_\_\_\_\_ Date Completed (R4) \_\_\_\_\_ Contractor Performing Work (R5) \_\_\_\_\_

Welder/Installer (R6) \_\_\_\_\_ Repair File Number (R7)\* \_\_\_\_\_ Line X-ing File Number (R8)\* \_\_\_\_\_ Comments (R9) \_\_\_\_\_

#### LOCATION INFORMATION

System (R10.1)  Pipeline (R10.2)  
Sun East  \_\_\_\_\_

Pipe Diameter (Inches) (R10.2) \_\_\_\_\_ 1 Call Serial Number (R11) \_\_\_\_\_

Municipality (R13) \_\_\_\_\_ County (R14) \_\_\_\_\_ State (R15)  SPLP Line Depth (Inches) (R16) \_\_\_\_\_

From Sta of Excavation (R17) \_\_\_\_\_ To Sta of Excavation (R18) \_\_\_\_\_ From Longitude of Work (R19) \_\_\_\_\_ From Latitude of Work (R20) \_\_\_\_\_

To Longitude of Work (R21) \_\_\_\_\_ To Latitude of Work (R22) \_\_\_\_\_ Feet of Ditch (R23) \_\_\_\_\_

Save Next

TYPE	DESCRIPTION	DATE	STATUS
INSPECTION	PIPELINE INSPECTION	7/17/04	COMPLETE
REPAIR	PIPELINE REPAIR	7/14/04	COMPLETE
INSPECTION	PIPELINE INSPECTION	7/14/04	COMPLETE

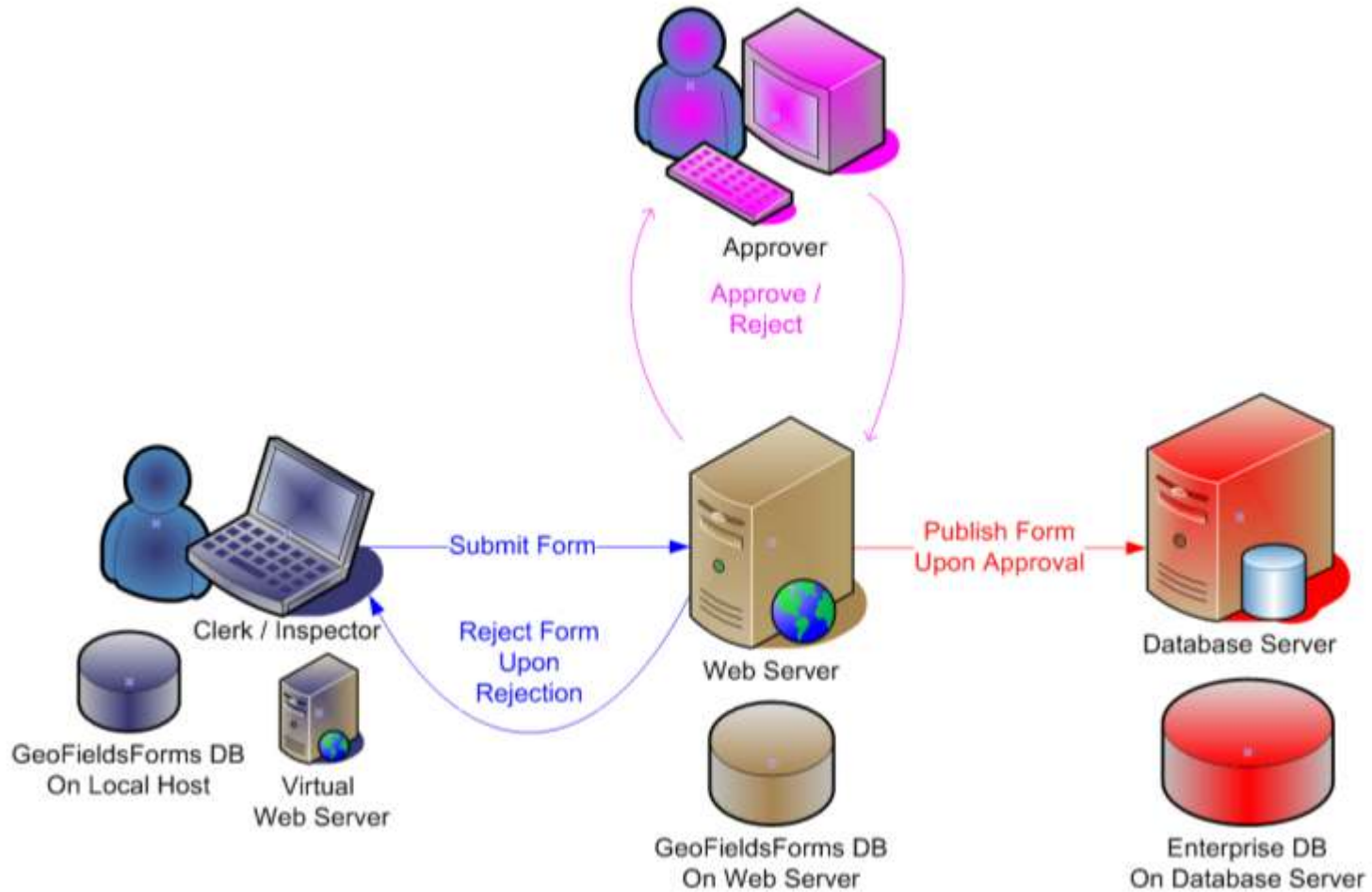
CONTACT INFORMATION  
Name: \_\_\_\_\_ Title: \_\_\_\_\_ Phone: \_\_\_\_\_

ROUTING INFORMATION  
Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

\* Check Mark - See any required information provided on this form for REQUIRED to be completed. 03/04/04

10000 (A37) - 10000 & WITHIN DATE 1000

# Forms Application – Workflows and Form Approval



# Forms Application – Managing the Digital Forms

Forms - Windows Internet Explorer

Address: http://demo1/Forms

**GeoFields** Log Out

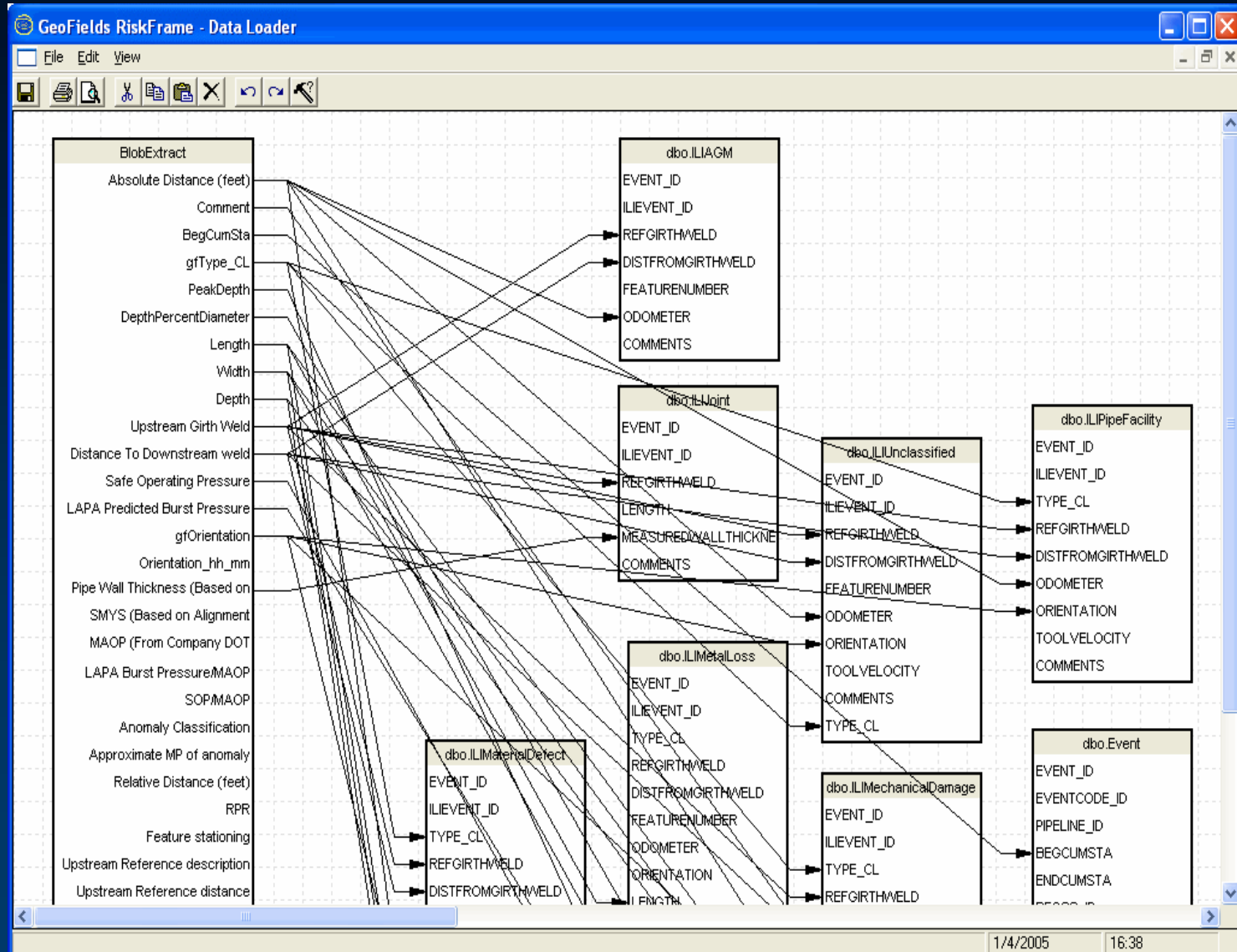
Upload Archive

### My Tasks

Description	Type	Status	Revised	User	
<a href="#">Jim's inspection</a>	Facility Inpect and Repair	Submitted	10/25/2006	phan	
<input type="text" value="Pipe inspection"/>	<input type="text" value="Maintenance Record"/>	<input type="text" value="Incomplete"/>	10/24/2006	<input type="text" value="phan"/>	
<a href="#">Facility inspection</a>	Facility Inpect and Repair	Approved	10/24/2006	phan	
<a href="#">Earl's Inspection</a>	Visual Inspection and Foreign Line Crossing	Complete	10/24/2006	phan	
<a href="#">Repair after break</a>	Pipeline Inspect and Repair	In Process	10/18/2006	phan	
<a href="#">Recoat of East line</a>	Pipeline Inspection and Repair	Incomplete	10/11/2006	phan	
<a href="#">Inspection of pipe under I-85</a>	Maintenance Record	New	10/26/2006	phan	
<a href="#">Bill's repair to pump 3</a>	Visual Inspection and Foreign Line Crossing	New	10/26/2006	phan	
<a href="#">Jim's South bend inspection</a>	Facility Inpect and Repair	New	9/25/2006	phan	
<a href="#">Saves Pipeline Inspection</a>	Pipeline Inspection and Repair	Incomplete	10/26/2006	phan	

Description	Type	Status	Revised	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Filter My Tasks"/>

# Forms Application – Publishing the Data



# Survey Data Collection - Intelligent Survey Forms

- **Separate into Features**
- **Collect Attributes Feature by Feature**
- **Use “Required” Fields Whenever Possible**
- **Use Coded Drop-Down Lists**
  - Use for Line Identification
  - Use for Type Codes
- **Format Text Fields with Length**
- **Limit the Number of Text Fields**
  - Use for Comments
  - Use for Facility Serial Numbers
  - Use for Facility Names and Descriptions
  - Use for Road Names, Waterway Names, etc.
- **Format Numeric Fields with 00.00**
  - Station Numbers
- **Collect Lines as a Series of Points**

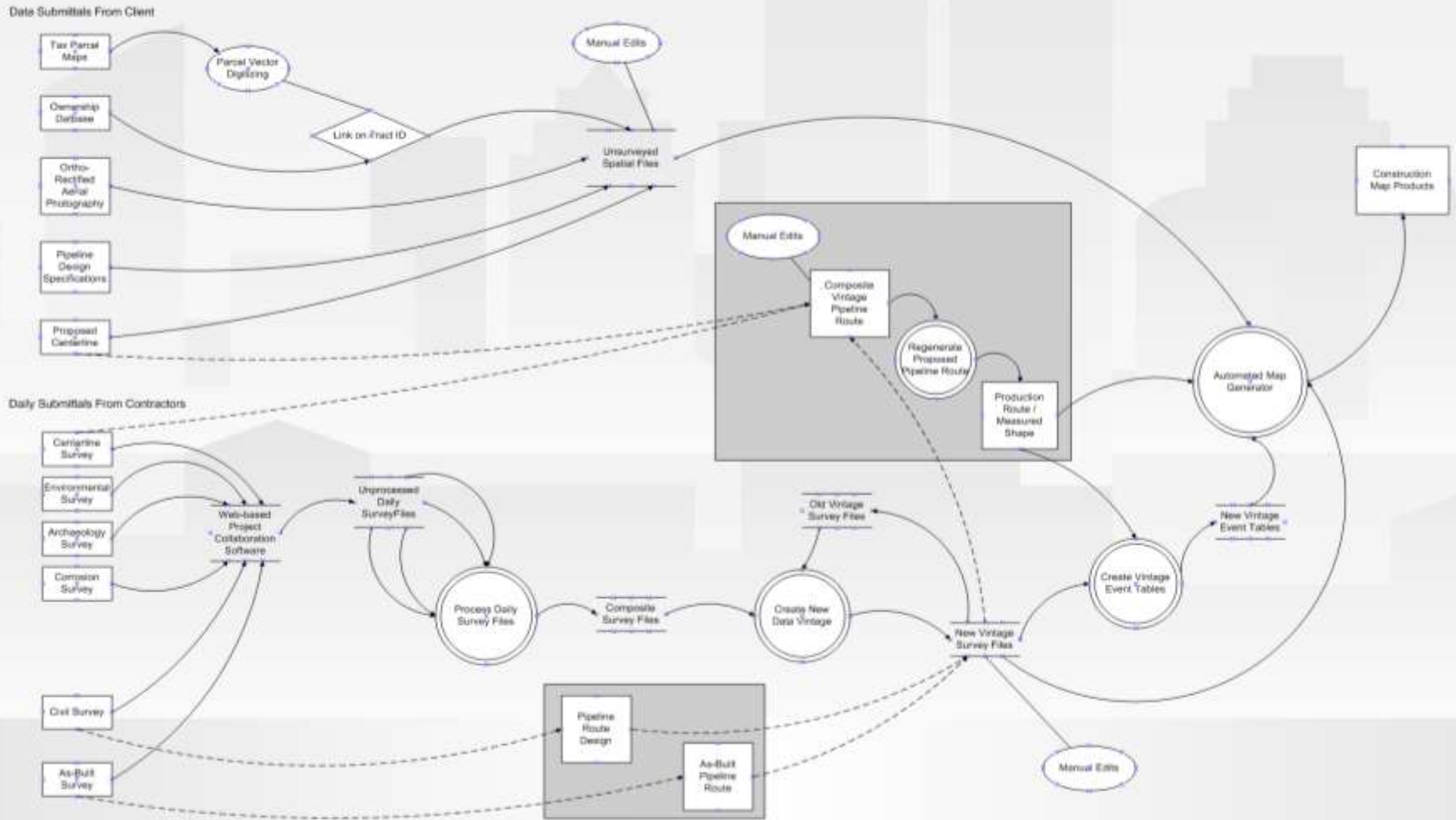
# Survey Data Collection - Survey Procedures

- **Document All Survey Procedures**
- **Consult Survey Managers and Crews when Writing Procedures**
- **Conduct Training for Survey Crews**
- **Get Buy-In from Survey Managers and Crews**
- **Go To the Field and Verify Procedures**
  - Eliminate Inefficiencies
  - Make Job Easy for Surveyors
- **Collect Lines as a Series of Points**
  - Pipelines – PI to PI
  - Electrical Transmission Lines – Pole to Pole
  - Crossings – 2 or 3 Points
  - Anything that Goes Along the Right-of-Way
  - Avoid Meandering



# Survey Data Collection - Post-Processing Survey Data

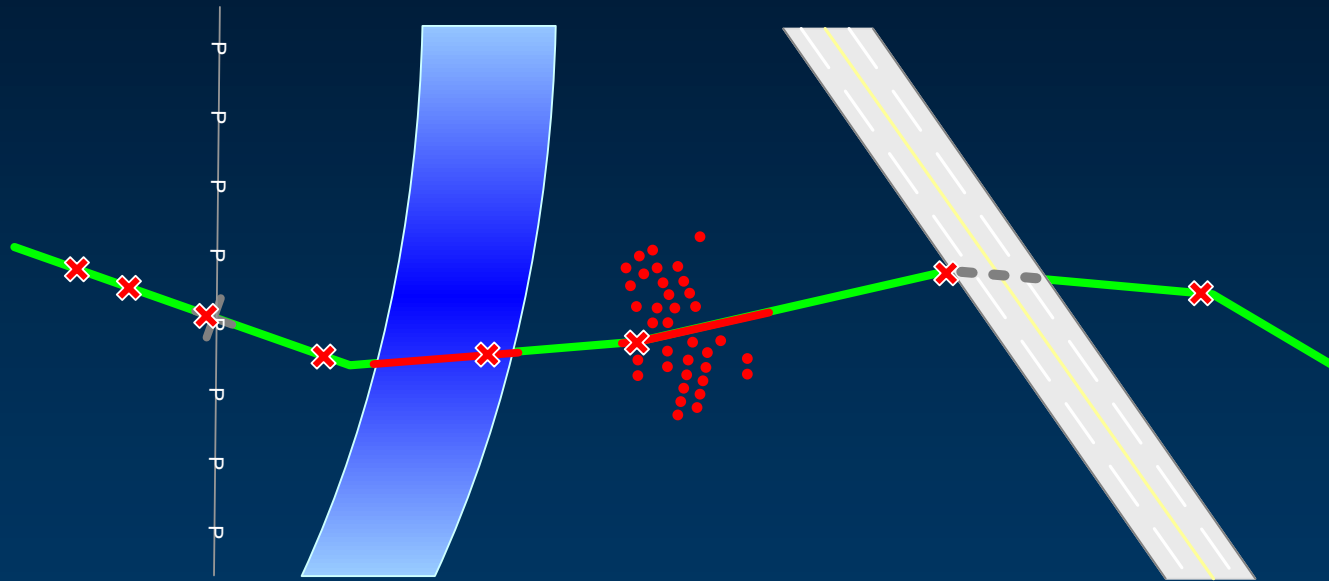
## Pipeline Construction Project Data Management Data Flow and Processes



# Survey Data Collection - Loading Survey Data

- **Plan the Survey**
- **Create Intelligent Forms – Data Dictionary**
- **Write Procedures**
- **Train Survey Crews**
- **Collect Only What You Need**
- **Perform Post-Processing**
- **Do All of This, and Loading the Data is Easy**

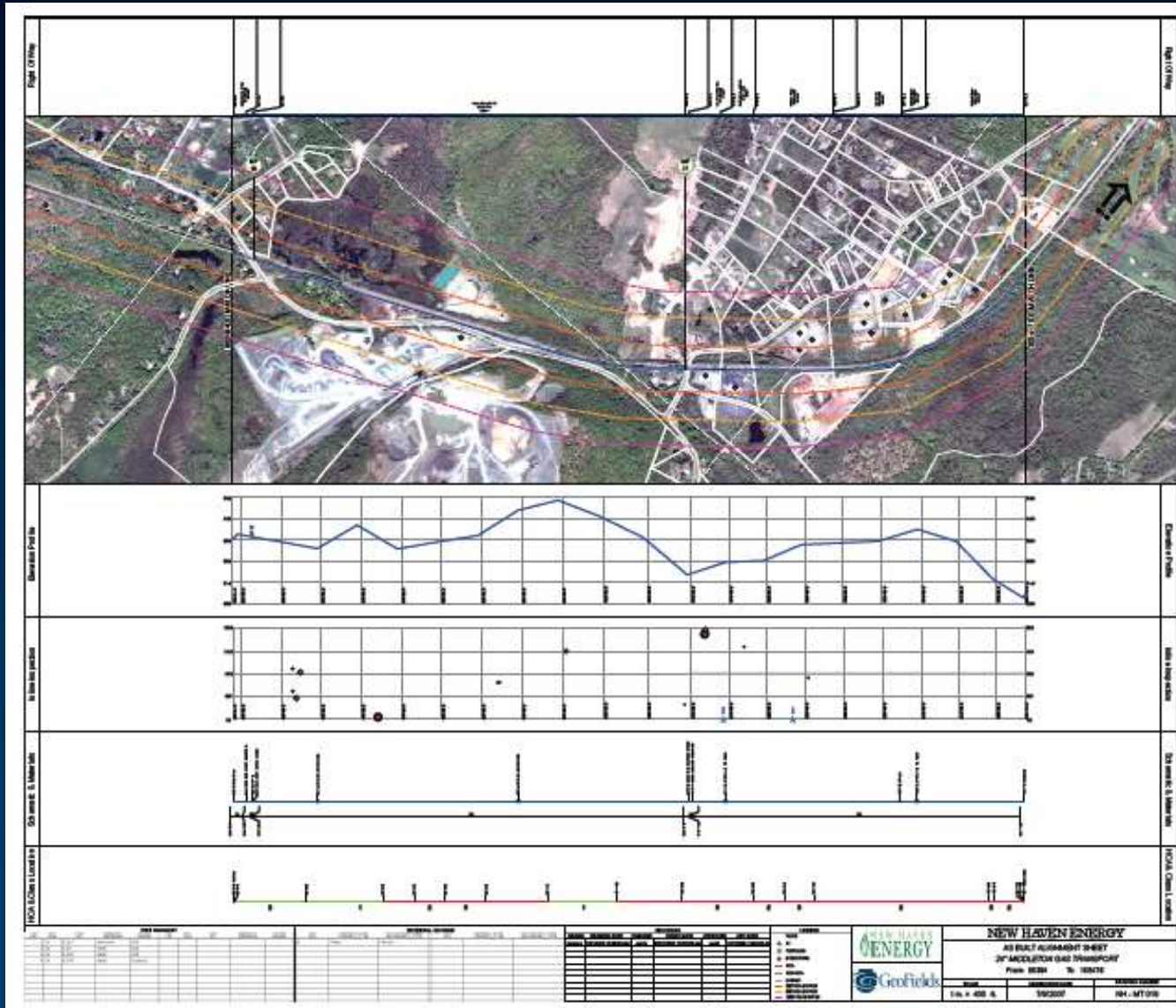
# Integrity Management – Analyze the Data



# Integrity Management

- **Good Data Makes it Easy**
- **Track Efforts from Beginning to End**
- **Perform Relational Analyses**
- **Perform Spatial Analyses**
- **Focus on Good Reporting**

# Integrity Management - Reporting





# From Filing Cabinet to Integrity Management Resource Questions and Answers

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