

Essential business agility for the digital oilfield

#### Maximise Productivity through Technology

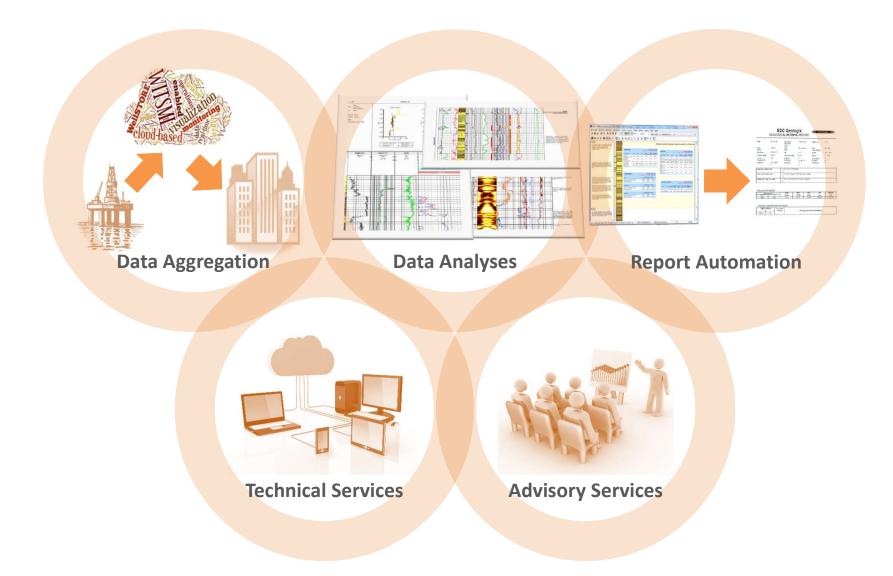
Geospatial Automation, Asset Lifecycle Management & Risk Management

#### Dr. Piyush K Pandey



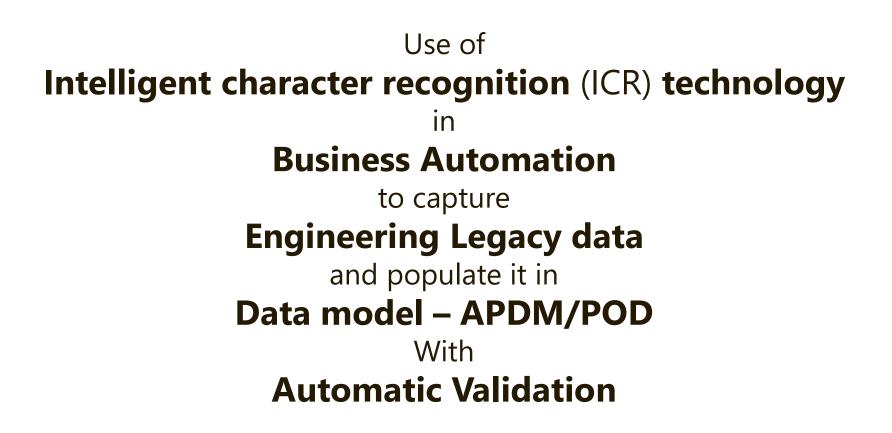
## Geologix Offerings







### **Objective of Presentation**



## Oklahoma Natural Gas Operations

- 2,800 miles transmission lines
  - Gathering system from 128 fields
  - Distribution system feeds 38 plants

- 2000 MMcfd peak capacity
  - 4-42 inch pipeline diameter
  - 1100 psi MAOP
  - Five underground storage facilities
  - 8 interstate receipt connections with combined capacity of 375 MMcfd

# Oklahoma Gas – Objective



- Optimize the project scheduling, project maintenance & expansion
- Integrity Management
- Real time update of Network information
- Knowledge based intelligent operation of Network
- Data sharing with Local and Federal Govt.
- Centralized database of the assets for planning and maintenance
- Ad-hock integration of operational/maintenance work order with network

#### **Current State**



#### • Old data:

- paper print type writer, Computer print
- Electronic records word, XIs files, PDFs

#### • Old drawings:

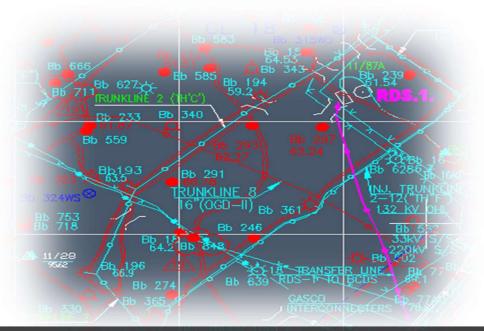
- Paper print PDFs Alignment sheets, As-build, plot plan etc
- Electronic format AutoCAD (CAD not GIS)

#### • Quantum:

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- A4 Size ~ 84,000
- A3 Size ~ 12,000
- A1 Size ~ 800
- A0 Size ~ 120
- Electronic records files ~ 23,000
- Electronic drawings ~ 8,000

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### **Overall Goals**



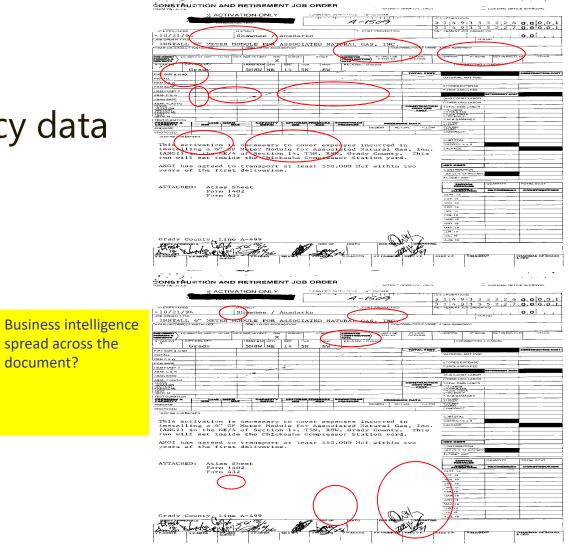
- > Capture the data from every source and match it
- > Migrate the final data in to Pipe Data model APDM (GDB)
- After field verification move the data in to POD (made as per integrity application compliance)

# **Biggest Challenge**

document?



- Paper based legacy data
- Data digitization





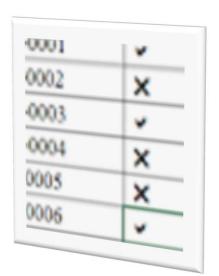
#### **Smart Technological Automation**

**Technology:** Intelligent Character Recognition(ICR)

- Recognizes the image patters
  - Type writer fade words
  - Alpha numeric combination
  - Signature
  - Ink Stamp on paper
  - Check box (tick and Cross)
  - Hand writing
  - Local language (not used in current project)

#### Deployment

- ICR was included in the program to apply the ICR routine at predefined location on the "paper form"
- Probability matrix was allocated to every field of ICR operation







# Logical Grouping of Data



#### Following records were scanned/linked to assets life cycle model

- 1. Alignment Sheets
- 2. Memorandums
- 3. AFE (Authorization for expenditure)
- 4. Material Estimates
- 5. Construction Job Orders
- 6. Plats
- 7. Capital Job Orders
- 8. Bill of Materials (BOM)/ Estimate Sheets
- 9. Construction and Retirement Job Orders
- 10. Retirement Job Orders
- 11. Pressure Test Reports.
- 12. Pressure Control Reports
- 13. Completion reports

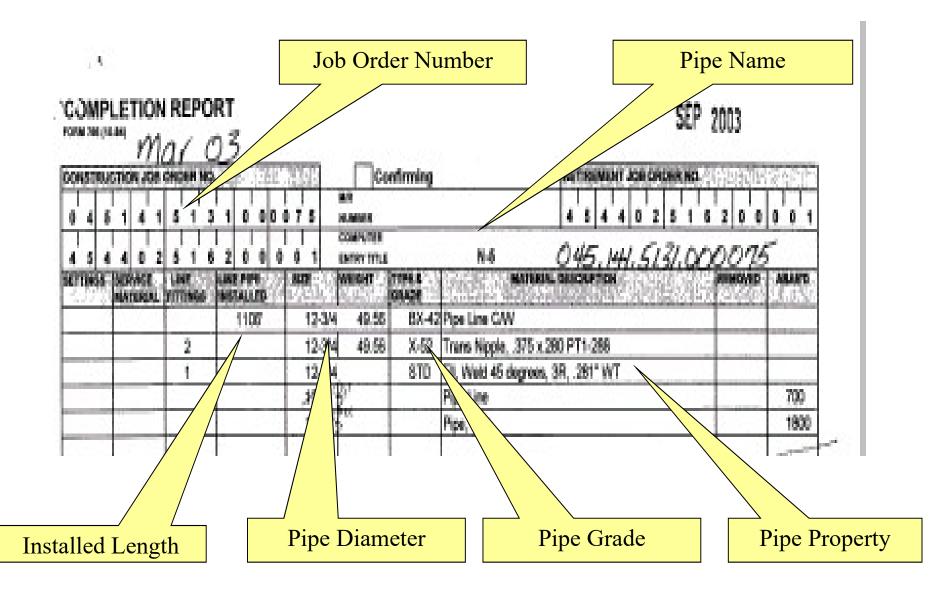
## Data Grouping as per Business



- i. ..../pipe\_name/AFE/
- ii. .../....../Alignment Sheets
- iii. .../...../BOM (Bill of Materials)
- iv. .../...../ CJO\_1 (Construction Job Order )
- v. .../...../ CJO\_2 (Capital Job Order )
- vi. .../...../CR (Completion Report)
- vii. .../...../CRJO (Completion and Retirement Joborder)
- viii. .../...../GIR (Gate Installation Report)
- ix. .../....../IR (Improvement Requisition)
- x. .../...../JCR (Job completion report)
- xi. .../...../ME (Material Estimate)
- xii. .../....../Memorandum
- xiii. .../...../MTO (Material Transfer Order)
- xiv. .../...../Others
- xv. .../...../Pressure Control
- xvi. .../....../PTD (Pressure and Transmission Division)
- xvii. .../....../ PTR (Pressure Test Reports)
- xviii. .../...../RJO (Removal Job Orders)
- xix. .../...../RTJO (Removal and tranfer Job Orders)
- xx. .../....../WIR (Weld Inspection Reports)

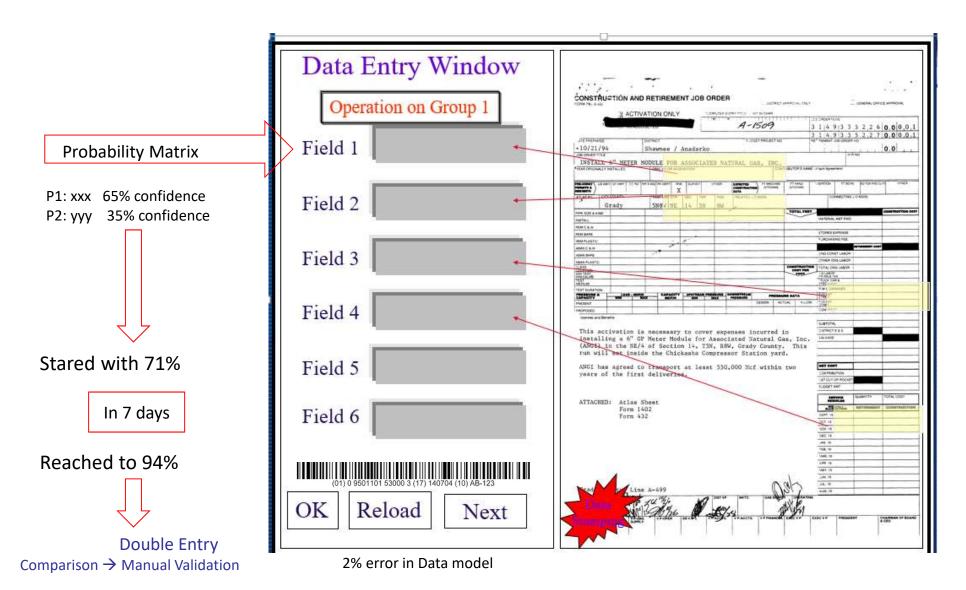


## Intelligence embedded to Location





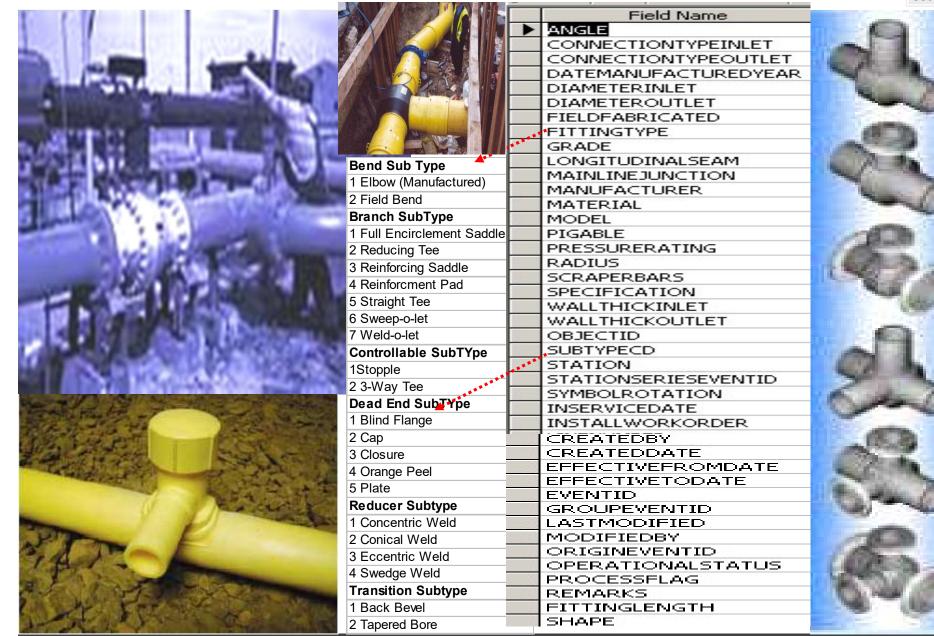
## Automation to capture the data





Field Name	Field Name		Field Name	Geologix
	PRESSURECONFIRMED		OPERATIONALSTATUS	
CPENTITY	PRESSUREFUTUREDESIGN		XRAYPERCENTAGE	_
CPMETHOD -	PRESSUREGRANDFATHER		CPYEARINSTALLED	
CPPROJECT -	PRETEST		SMYSPERCENT	-
CURRENTPRESSURETESTYEAR	SMYSPIPE		SMYSPERCENTGRANDFATHER	-
CURRENTUPRATEYEAR	SPECIFICATION		TEMPFACTOR	-
	UNCASEDROADFACTOR		LENGTH	
DESIGNFACTOR	UNCASEDROADMAXPRESSURE		SHAPE	-
DESIGNMAXPRESSURE	WALLTHICKNESS		SHAPE_Length	-
DIAMETEROUTSIDE	OBJECTID			
DOTCLASS	SUBTYPECD			
ELECTRONICALLYSURVEYABLE	BEGINSTATION			
GIRTHJOINTTYPE	ENDSTATION	No.		1
GRADE	BEGINSTATIONSERIESEVENTID	-		TALL
HCAAREA	BEGINMILEPOST	(4) 2 <i>2</i>		
INTERNALCOATING	ENDMILEPOST			
JOINTCOATINGBRAND	INSERVICEDATE		The second se	
JOINTCOATINGTYPE	INSTALLWORKORDER			
JOINTFACTOR	LINENUMBER			
LONGITUDINALSEAM	CREATEDBY			
MANUFACTURER	CREATEDDATE			and the second sec
MAOPLINE	EFFECTIVEFROMDATE			and the second se
MAOPSEGMENT	EFFECTIVETODATE			
MAOPSYSTEM	EVENTID			
MAOPSYSTEMVALVE	GROUPEVENTID			
MATERIAL	LASTMODIFIED			
MATERIALDISPLAY	MODIFIEDBY			
ONSTREAMPIGABLE	ORIGINEVENTID			





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## Drawing Grouping as per Business

Drawing  $\rightarrow$  CAD + GIS

#### Source of Spatial Information (CAD)

- Single GIS Grid
- Field Layouts
- Plot plans
- Line Routing Plans
- Site Layouts & Field Area Layouts
- General Facilities
- Electrical layout plans from 132Kv to 33kV
- Profile & Alignment Sheets
- Third Parties data
- Satellite Imagery → updated track and asphalt roads
- FFDs  $\rightarrow$  to be on current

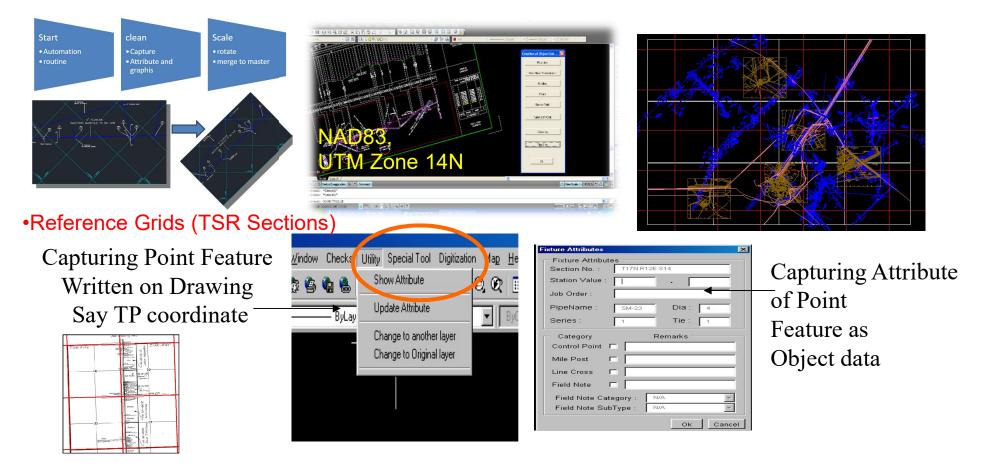
#### **OUTPUT Spatial Data**

- Existing / Future Stations
- Existing / Future Facilities
- MOLs
- Transfer Lines
- Trunk Lines
- Water Lines
- Corridors
- Overhead Transmission Lines
- Main Roads / Tracks
- Cables
- Survey Control Points
- Customer line

### Automation in Drawing

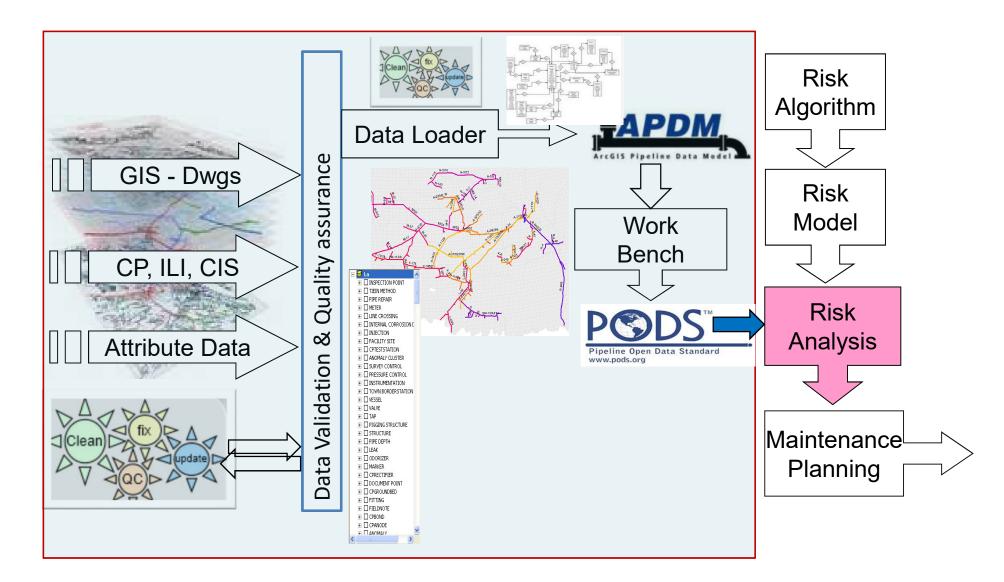


- Scaling  $\rightarrow$  Rotation  $\rightarrow$  joining  $\rightarrow$ Zoning (AOI)  $\rightarrow$  registered image for Digitization
- Automatic extraction of text features (data) from Drawing  $\rightarrow$  in data model



## Pipeline Risk Assessment Process







### Any Question Please ?





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# *innovate inspire*

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