



GIS FOR PIPELINE ASSETS MANAGEMENT

**SPEAKER: BANU PRAKASH CHITRALA
HUSAM EDDEAN JAMIL**

ADNOC GAS PROCESSING



HSE MOMENT

ADNOC LIFE SAVING RULES

HSE MOMENT



LIFE-SAVING RULES

<div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>WORK AUTHORIZATION</p> <p>Work with a valid permit when required</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>CONFINED SPACE</p> <p>Obtain authorization before entering a confined space</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>ENERGY ISOLATION</p> <p>Verify isolation and zero energy before work begins</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>BYPASSING SAFETY CONTROLS</p> <p>Obtain authorization before overriding or disabling safety controls</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center;"> <div style="margin-left: 10px;"> <p>WORKING AT HEIGHT</p> <p>Protect yourself against a fall when working at height</p> </div> </div>	<div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>SAFE MECHANICAL LIFTING</p> <p>Plan lifting operations and control the area</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>TOXIC GAS</p> <p>Follow the rules for working in toxic gas environments</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>DRIVING</p> <p>Follow safe driving rules</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>LINE OF FIRE</p> <p>Keep yourself and others out of the line of fire</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center;"> <div style="margin-left: 10px;"> <p>HOT WORK</p> <p>Control flammables and ignition sources</p> </div> </div>
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All ADNOC staff and contractors must adhere to the Life-Saving Rules, at all times. Violations may result in disciplinary action, up to dismissal, in line with ADNOC's HR Policy.

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Abu Dhabi National Oil Company

قواعد الحفاظ على الحياة

<div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>عمليات الرفع الآمن</p> <p>التخطيط السليم لعمليات رفع المعدات الثقيلة وبقائه بعيداً عن مجال التحمل المعلقة</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>الغازات السامة</p> <p>إتباع قواعد السلامة عند العمل في الأماكن المعرضة لتسرب الغازات السامة</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>القيادة الآمنة</p> <p>إتباع إجراءات القيادة الآمنة</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>مصادر الخطر</p> <p>حافظ على نفسك والآخرين بإبقاء بعيداً عن مصادر الخطر</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center;"> <div style="margin-left: 10px;"> <p>العمل الساخن</p> <p>السيطرة على المواد القابلة للاشتعال ومصادر الاشتعال</p> </div> </div>	<div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>تصريح العمل</p> <p>الحفاظة على صلاحية وسريان تصريح العمل في الأماكن التي تتطلب ذلك</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>المناطق المغلقة</p> <p>الحصول على تصريح لدخول الأماكن المغلقة</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>العزل الآمن</p> <p>مراجعة الاحتياطات اللازمة في عزل مصادر التيار الكهربائي قبل بدء العمل</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="margin-left: 10px;"> <p>تجاوز ضوابط الأمان</p> <p>الحصول على إذن مسبق قبل إتقان أو تجاوز ضوابط السلامة والأمان</p> </div> </div> <div style="display: flex; justify-content: center; align-items: center;"> <div style="margin-left: 10px;"> <p>العمل في الأماكن المرتفعة</p> <p>استعمال معدات خاصة للحماية من السقوط أثناء العمل في الأماكن المرتفعة</p> </div> </div>
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يجب على جميع موظفي ومقاولي أدنوك الالتزام بقواعد السلامة والحفاظ على الحياة في جميع الأوقات. تنفيذاً مع سياسة الموارد البشرية في أدنوك، فإن الإخلال بقواعد الحفاظ على الحياة بعد سلوفاً خاطئاً وستنجم العنصرية التي قد تصل إلى حد الفصل من العمل.

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AGENDA



- INTRODUCTION
- PIPELIEN LIFE CYCLE – GIS ROLE
- GEOSPATIAL DATA MATURITY; SURVEY, GDB MODEL, RESULTS
- LESSONS LEARNT (SURVEY)
- GIS PORTAL

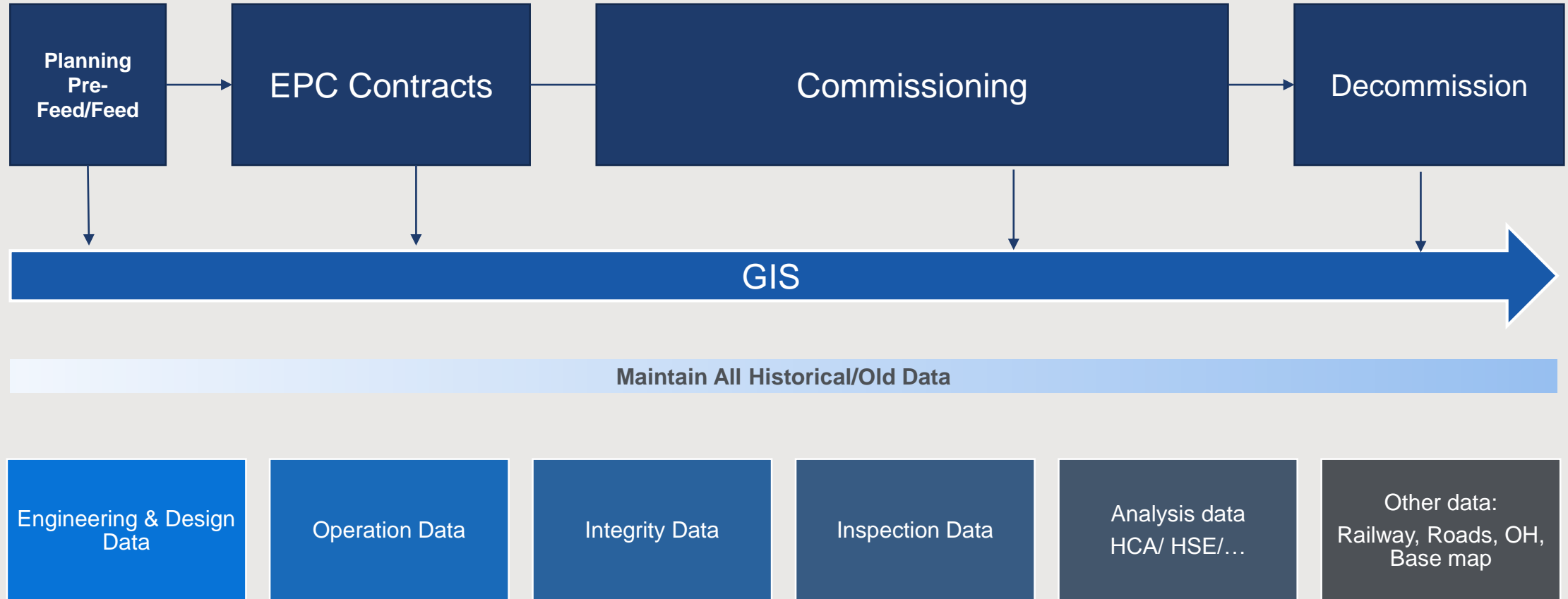
INTRODUCTION

OVERVIEW



- GIS at ADNOC Gas
 - Triggers; business needs (Operations & Maintenance), eNOC, CRS, Geomaturity
- Enterprise GIS Implementation Roadmap development
 - As Is Study, Gap Analysis, enterprise GIS Implementation Plan
- Enterprise GIS Implementation Phases
 - Phase 1; Enterprise GIS Foundation – Infrastructure & (Geospatial) Data
 - Phase 2; Business Applications
 - Phase 3; Business Integrations

PIPELINE LIFE CYCLE – GIS ROLE



GEOSPATIAL DATA MATURITY

PIPELINE DATA SOURCES; WHY SURVEY?



- As-built drawings / Pipe books
- Inspection Data – ILI Survey
- Satellite Imagery
- Survey

- Need for Survey – Geospatial data of pipelines was:
 - Incomplete
 - Inconsistent
 - Outdated
 - Multiple sources
 - Unreliable / Inaccurate

GEOSPATIAL DATA MATURITY

SURVEY METHODOLOGY

- **Topo survey**

- Corridor features like fences, fence gates, KM markers, Other markers, crossings, stations, etc.

- **Pipeline Survey (AG/UG)**

- UG pipelines – Ground Penetrating Radar (GPR) techniques.
- AG pipelines – Traditional Topo survey techniques

- **Specifications**

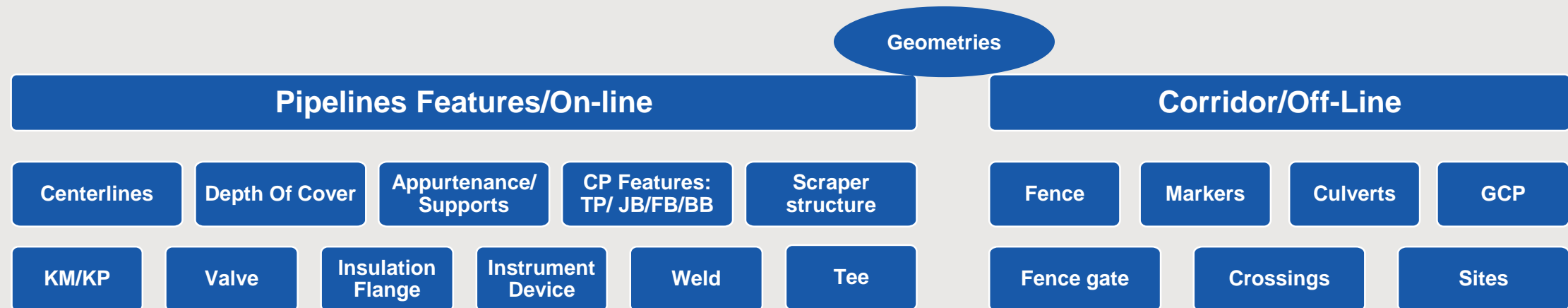
- Connect to AD GRS network
- Survey in UTM WGS 84 (Zone 39 & 40) projection
- Accuracy tolerance (+/- 15cm)



GEOSPATIAL DATA MATURITY



GEOSPATIAL FEATURES



Attributes

- Pipeline Name,
- Pipeline Tag, Product Type,
- Pipeline Length,
- Above/ Under Ground segments,
- Valve Tag & Type,
- Support Tag & Type,
- Crossing Type & name,
- Scrapper Tag & Type,
- CP feature Tag & Types,
- Fence owner, Gate Width,
- Site Name and type
- Depth Of Cover, Ground Level and ROW level
- Wall thickness
- Material Type

GEOSPATIAL DATA MATURITY

GEODATABASE MODEL - MIGRATION; APDM TO PODS



The ArcGIS Pipeline Data Model (APDM v6.0)

Abstract & Metadata Classes

Metadata

APDM Core Classes

Additional Classes

- Structures/Buildings/Identified Sites
- Foreign Line Cross
- Generic Tables
- Operational and Regular
- Operational and Facility Announcements
- Facility Segments
- Sitekeys
- Site Location

Contents | Preview | Description

Name
Analysis
Encroachments
Operations
Transmission
Activity
Anomaly_ILI
Anomaly_ILI_StationSeries
CPReading
CPREADING_StationSeries
DCVG
DCVG_StationSeries
DepthOfCover
DepthOfCover_StationSeries
DocumentsLink
DocumentsLink_StationSeries
ECDARReading
Weld
Weld_StationSeries

D:\GIS\GIS Enterprise\GDB\CLV.gdb

Pipeline Open Data Standard

PODS 6.0 Final Physical Data

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GEOSPATIAL DATA MATURITY

DELIVERABLES



- **Raw Data**

- Downloaded from survey equipment for all corridors

- **Geodatabase**

- Pipeline online / offline features delivered as GDB;
 - Individually in both UTM Zone 39 & 40
 - Mosaic in UTM Zone 39

- **Detailed Project Report (DPR)**

- Documentation on project approach, method statement, GDB model, teams, equipment used, certification, project lessons, etc.

GEOSPATIAL DATA MATURITY

ACCURACIES



The survey data is verified against existing historical excavations/trail pits done by AGP NOC teams.

- 95% of data falls in sub-meter positional accuracy
- 97% of data falls in sub-meter accuracy for depth of cover

LESSONS LEARNT



CONSTRAINTS / STOPPERS	CONSTRAINT DESCRIPTION	SOLUTIONS / WORKAROUNDS
TECHNOLOGY LIMITATIONS	<ul style="list-style-type: none"> GPR can detect pipelines buried within 4-6mtrs Positional accuracy declines with depth Can't detect non-metallic pipelines 	As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally/ trial pits / satellite images / aerial photos as reference
ACCESS TO FACILITIES	Access Permits to sensitive installations	As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally / trial pits / satellite images / aerial photos as reference
TERRAIN	Pipelines/facilities in Sand dunes/Sabkhas/HDD locations	As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally/ trial pits / satellite images / aerial photos as reference
WEATHER	Hot & humid desert conditions	Start early and take mid-day breaks
NON - STANDARDIZATION	Potential results of non-standardization due to multiple survey teams; <ul style="list-style-type: none"> Requirements understanding in multiple teams. chances of multiple raw data formats. 	<ul style="list-style-type: none"> Requirements briefing sessions Standard template for raw data capture.

GIS PORTAL



START NAVIGATION SELECTION DRAW OUTPUT DATA ANALYSIS

Visible Layers ? ? ? ? ? ? ? ? ? ?

Zoom In Zoom Out Pan Identify Box Selection Clear Selection Print Export Map Image Coordinate Search Map Overlay

NAVIGATION SELECTION OUTPUT COORDINATE Map Overlay

ADNOC

Quicksearch

View: ADNOC

Basemaps: Basemap English

Scale 1: 150,000

QUERIES TABLE OF CONTENT LEGEND

- Select -



THANK YOU

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