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Securing Surface Rights for Oil and Gas Field Development using state-of-the-art GIS Technology

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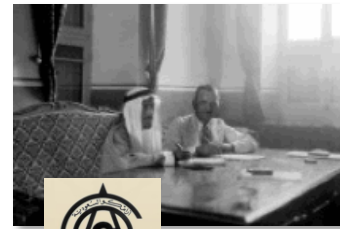


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Introduction

- Saudi Arabian Oil Co. (Aramco) is the world's largest integrated energy and chemicals Company
- Headquarters in Dhahran, Kingdom of Saudi Arabia
- Established in 1933, 1st commercial well discovered in 1938




1933
Oil concession
agreement signed



1938
1st commercial of oil
discovered at Dammam
Well No. 7

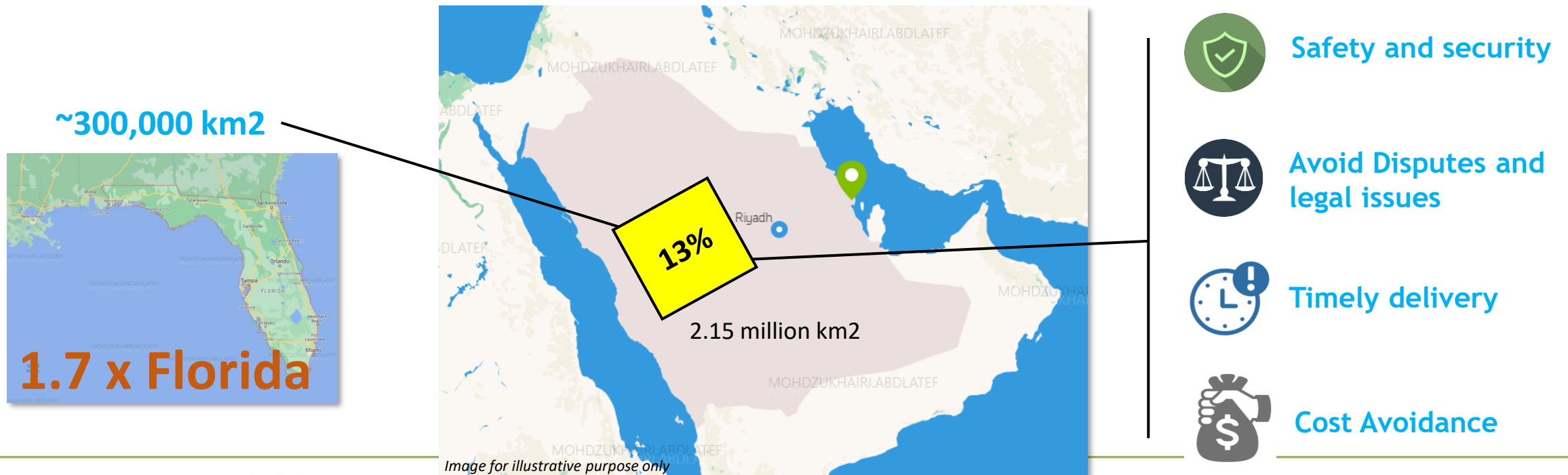


2000s
World's leading integrated
energy and chemicals



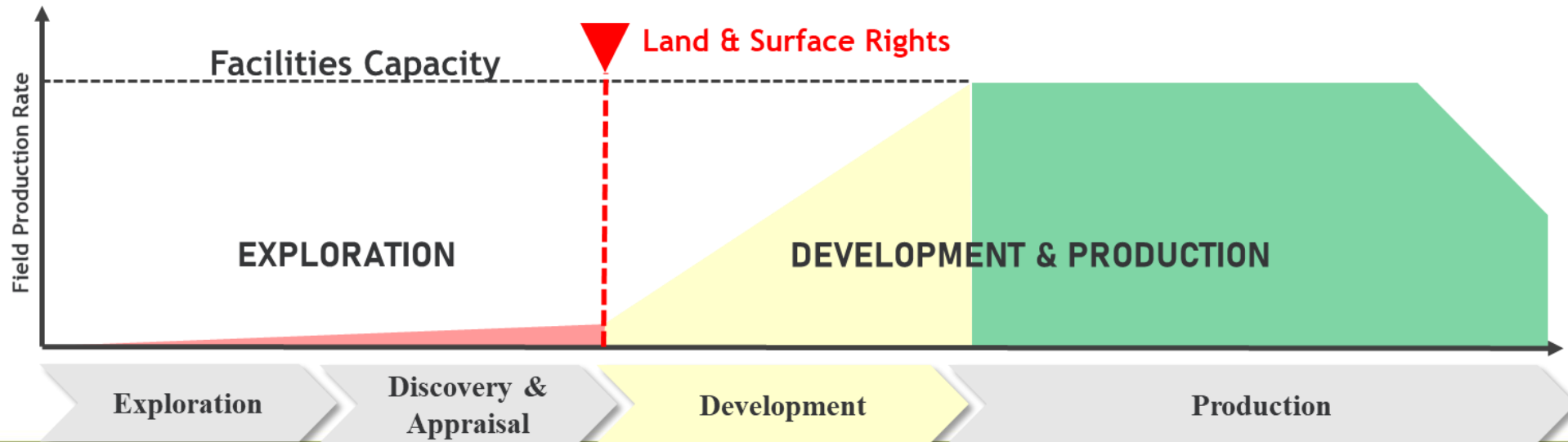
Background

- Operates within more than 13% of Kingdom's lands; explore, develop and produce oil and gas for Kingdom and global supply
- Securing and providing embedded access to land and surface rights is the key to success



Onshore Field Development Lifecycle

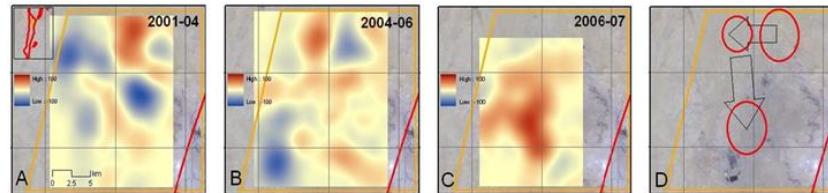
- Hydrocarbon fields could last for 30 years; exploration, discovery, appraisal, development and production
- Field development is a key to ensure surface facilities are intact with subsurface production zones throughout production lifecycle
- Securing lands or surface rights at this stage is important to preserve lifecycle of field



Challenges and Constraints

- **Growth**

- Urbanization
- Expansion
- Diversifications



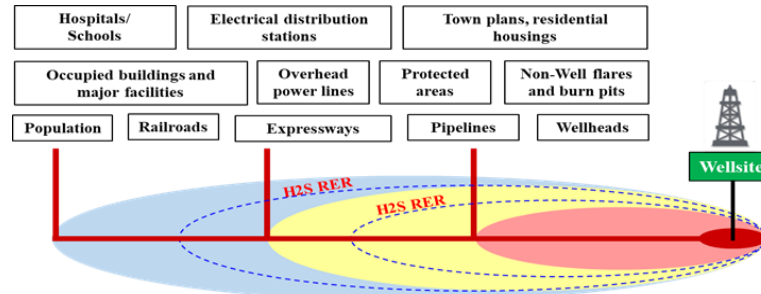
Density change maps of Aramco production sites over period of 6 years due to expansion



Urban growth within Eastern Province, one of the active hydrocarbon activities

- **Spacing Limits**

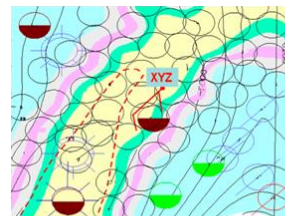
- Company & Non-Company
- Safety limits
- Rupture exposure radius



Parameters affecting Rupture Exposure Radius (RER)

- **Complexity**

- Field layout design
- Land dispute or claims
- Land Jurisdiction



Field-Y layout design with subsurface targets

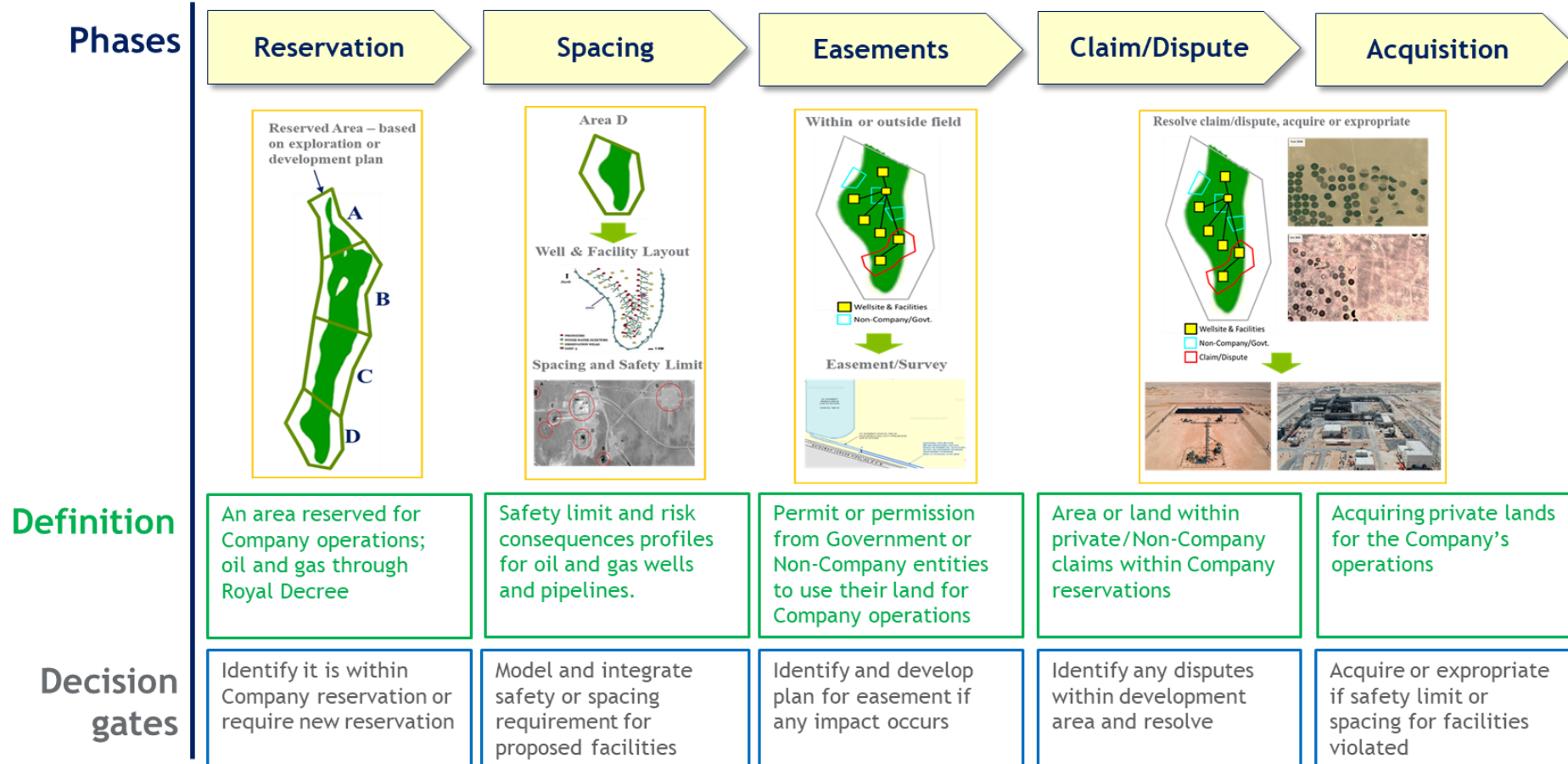


Jurisdictions vs competitions



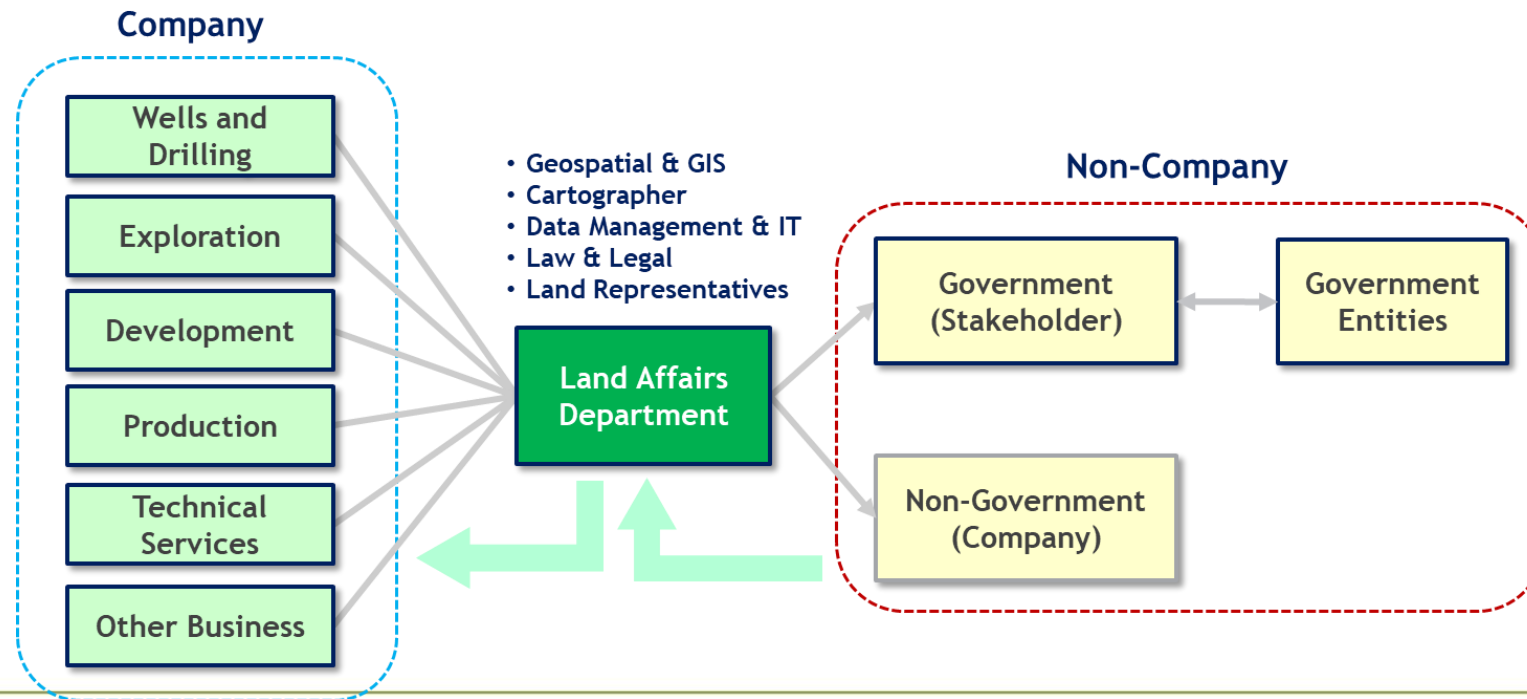
Surface topography affects facility design

Securing Surface Rights Processes



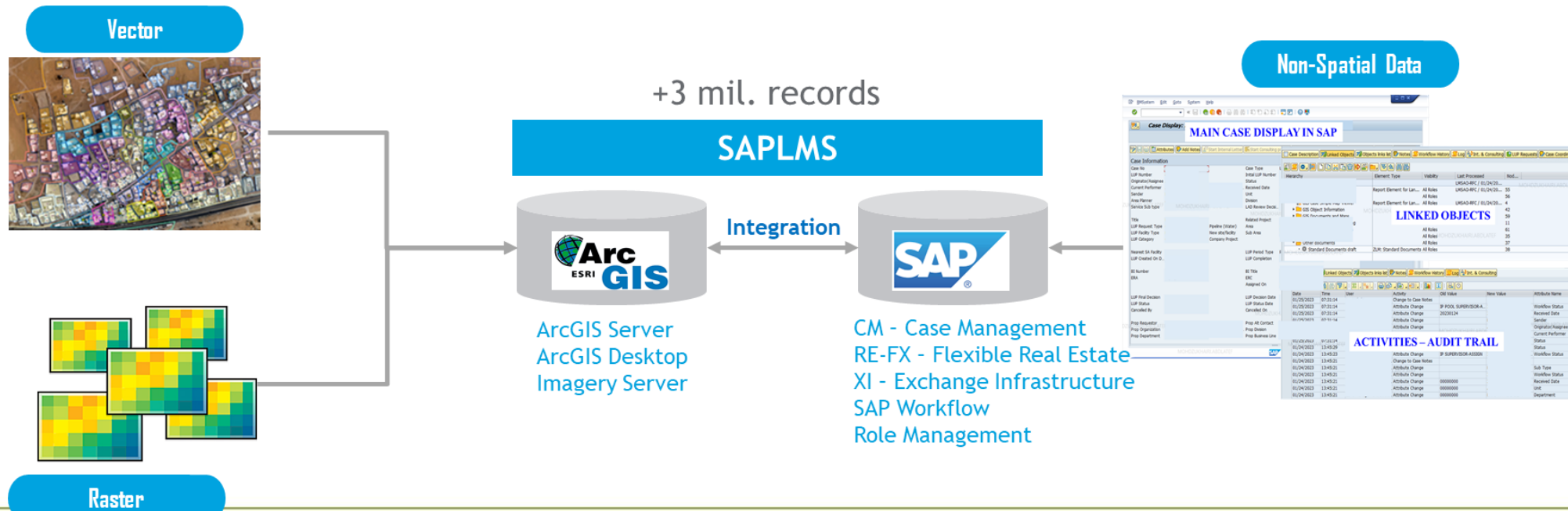
Saudi Aramco Land Affairs

- Saudi Aramco surface rights and land management falls under Land Affairs Department.
- Govern, manage and provide analysis with regards to land jurisdictions in relation to the need for oil and gas operations in the Kingdom



State-of-the-art Integrated Land Management System

- Use integrated system called SAP Land Management System (SAPLMS);
 - **ESRI ArcGIS** - manage geospatial data and its attributes
 - **SAP Case Management (CM) and Flexible Real Estate (RE-FX)** - manage workflows, integration and documentations
- More than 3 million GIS land and surface right records



SAPLMS Components

1. Business processes

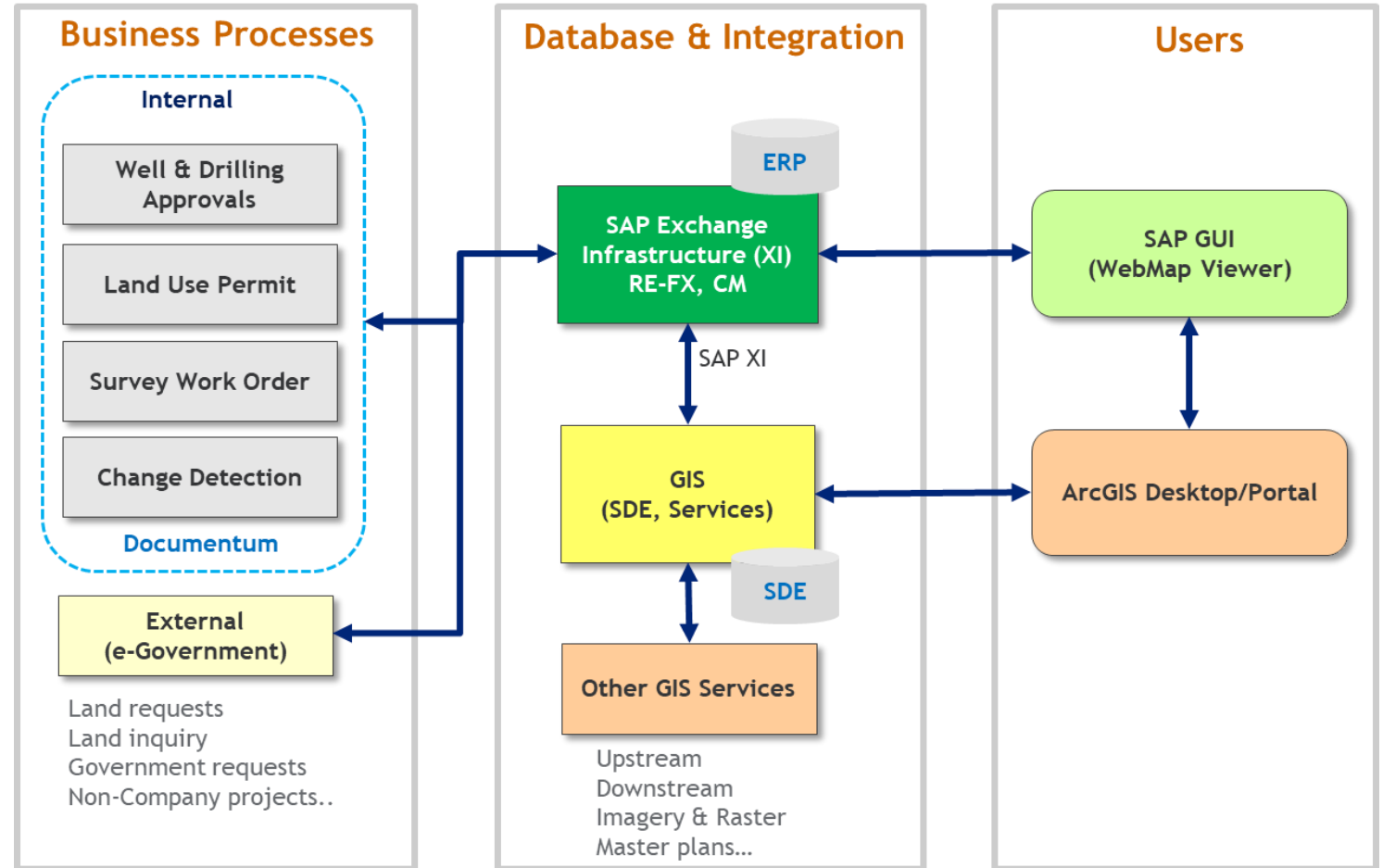
- Wells & Drilling Approval
- Land Use Permits
- Survey Work Order
- Change Detection System

2. Database & Integration

- Geospatial Data & Services
- Document Management System

3. Users Applications

- Desktop
- Portal
- SAP Web GIS Viewer



Geospatial and SAP Data Model

1. >20 Case Types

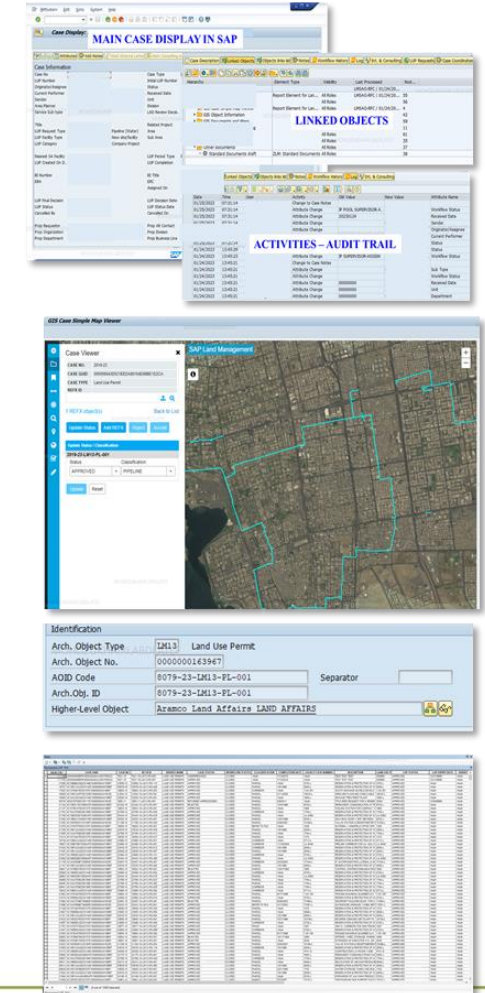
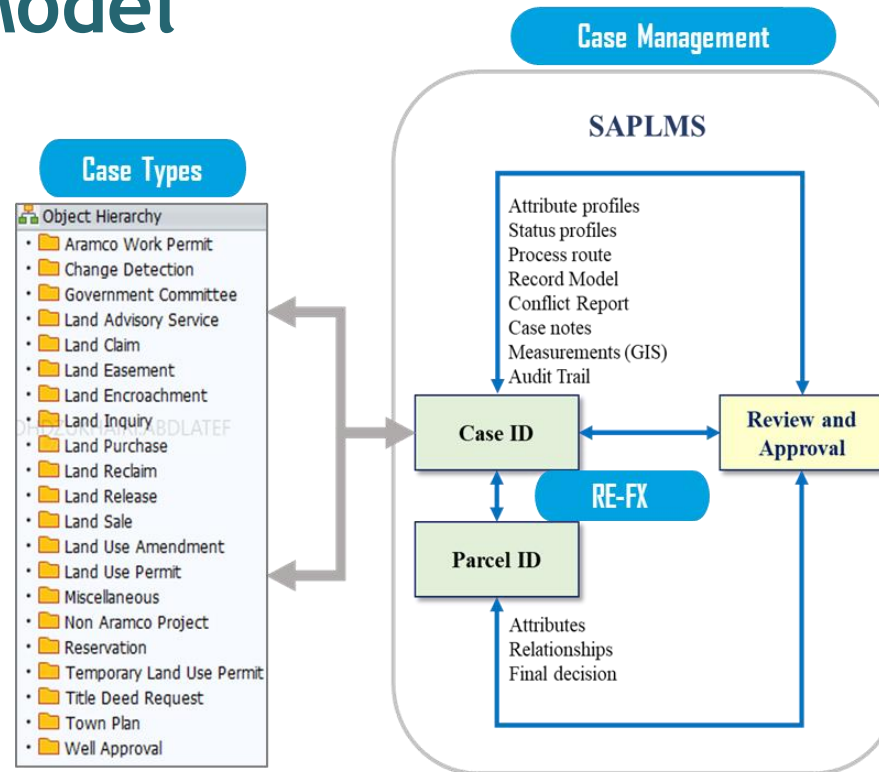
- Business processes
- Unique Identification
 - Case ID - SAP
 - Parcel ID - GIS

2. SAP RE-FX - Real estate Flexible

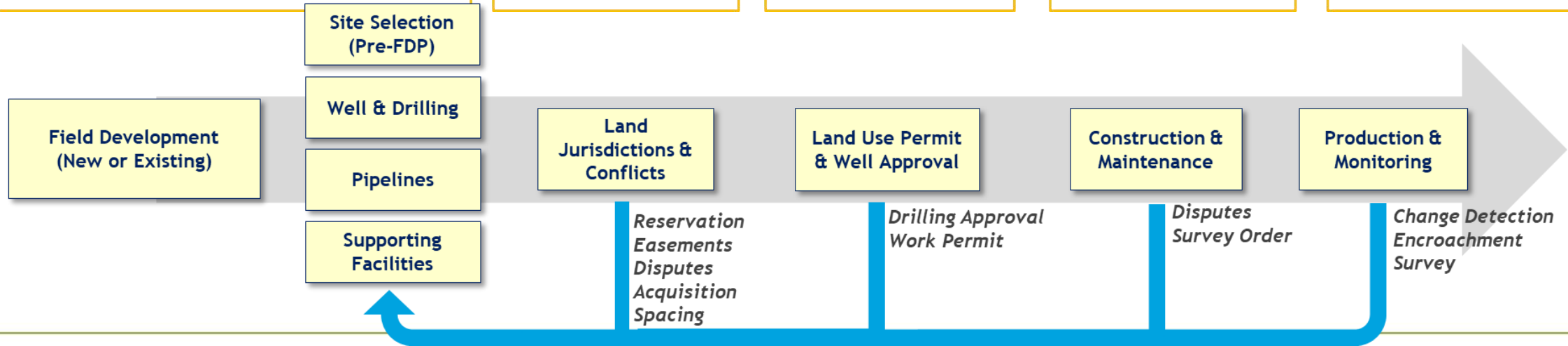
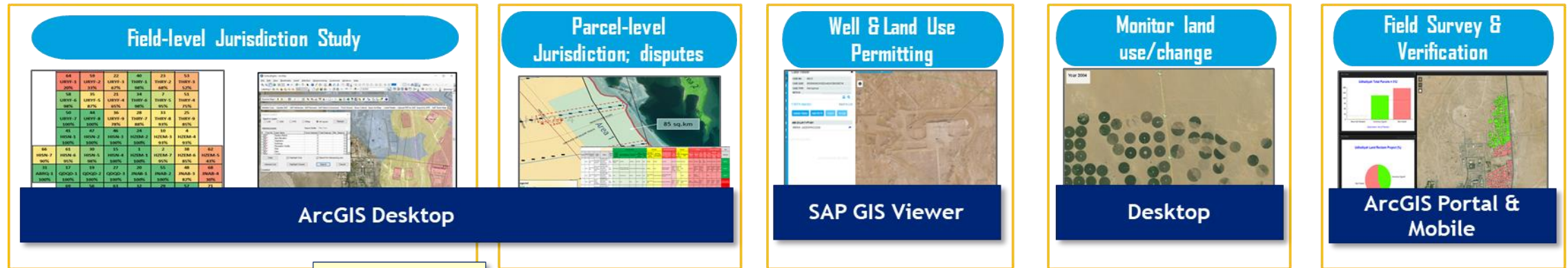
- Process related GIS parcels
- Link Case ID and parcel ID

3. Case Management

- Attribute & status profile
- Record Model
- Process Route
- Function profile
- Audit Trail



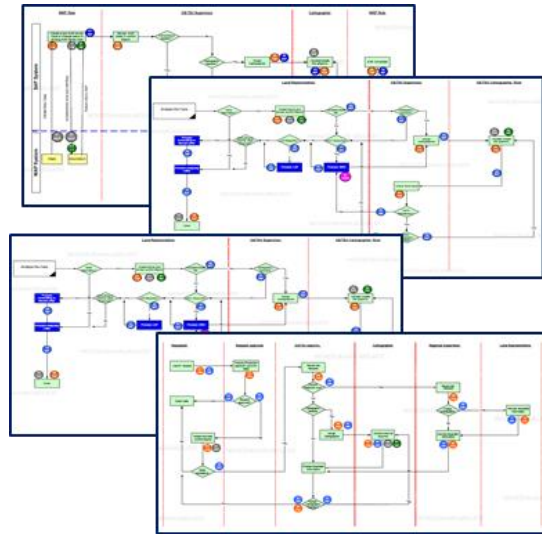
Geospatial Applications: Onshore Field Development Workflows



Summary

Integrate Business Processes

Wells & drilling, land use permitting, Company & Non-Company land records



Project review and approvals

Streamline review and approvals for development plan



Surface rights optimizations

GIS data and system facilitate understanding on surface footprints and jurisdictions allowing optimization during development stage

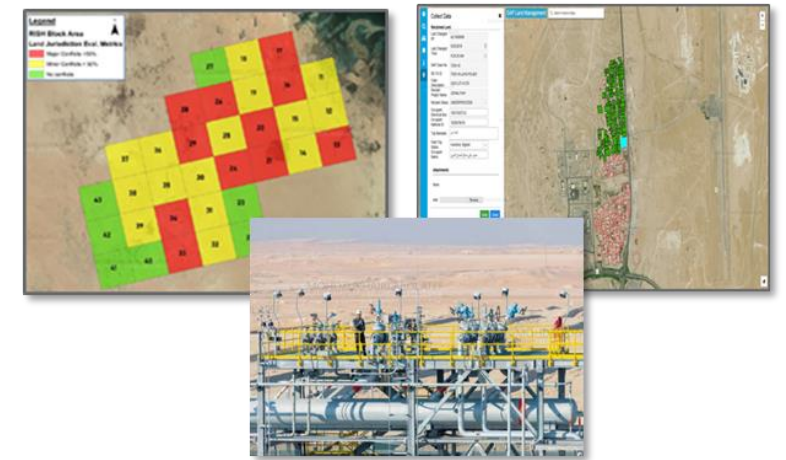




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Thank You

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