E&P Geospatial Workflows: framework and business information structure

PUG Steering Committee
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Most Oil & Gas companies have a value chain with (more or less) business processes. Small independent companies also have these, but maybe organised them as outsourced tasks with responsible and accountable individuals.

Oil & Gas companies also have a set of supporting work processes.
Example: Energistics generic E&P business process reference model

Energistics E&P Business Process Reference Model

Asset Life Cycle Stages

- Manage Assets (T)
- Explore (1)
- Appraise (2)
- Develop (3)
- Produce (4)
- Abandon (5)

Management Processes

- Manage Business (B)
- Manage Corp Management System (C)
- Manage Processes (D)

Execution & Support Processes

- Design and Execute Survey (F)
- Acquire or Divest Major Asset (L)
- Design, Construct, Mod., Abandon Wells (F)
- Operate Wells & Facilities (Q)
- Evolve Dev Concept (G)
- Market/Trade Hydrocarbons (M)
- Design, Construct, Mod., Abandon Facilities (H)
- Maintain Wells & Facilities (R)
- Procure Goods & Services (I)
- Provide Financial Services (K)
- Provide IT Services (O)
- Provide Laboratory Services (P)
- Provide Logistics Services (J)
- Provide Human Resources (N)

Note: Numbers and letters in parentheses correspond to identifying conventions in the Energistics E&P Business Reference Model document.

Understanding The E&P Life Cycle (energistics.org)
E&P workflows

Value Chain business/work processes

- Regardless of how the business processes or life cycle is organised, each of the business process are responsible for respective deliverables
- Deliverables are represented by decisions based on data and information
- This data and information are collected, produced, manipulated, analyzed and presented
- Most of these data has a spatial component
## What we will build:

### GIS Workflows in the E&P Life Cycle

<table>
<thead>
<tr>
<th>Stage</th>
<th>Business Case</th>
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| **Exploration & Appraisal** | • Play Fairway Analysis  
• Prospect Analysis  
• Basin Analysis  
• Link to additional workflows |
| **Development & Planning**      | • Well planning for unconventionals  
• Link to additional workflows  |
| **Land**                       | • Land Property Mapping  
• Land Access Agreements  
• Link to additional workflows |
| **Operations**                | • Operations maintenance scheduling  
• Daily tracking of contracted vessels on the water  
• Gathering System Analysis  
• Surveying Pipeline, well, land surveying  
• Link to additional workflows |
| **Pipeline & Facilities**     | • Pipeline/Facilities Management  
• Pipeline Corrosion  
• Link to additional workflows |
| **Environmental Assessment**  | • Environmental Assessments  
• Environmental Reporting of Wildlife  
• Link to additional workflows |
| **Emergency Response**       | • Emergency Response Compliance  
• Iceberg Tracking  
• Link to additional workflows |
Play Fairway Analysis – Business Case

**Situation Analysis**

- Geologist map petroleum plays to identify optimal drilling locations. This involves mapping seal, reservoir and source rock and identify numerically the probability of hydrocarbon successes.

- GIS spatial and analytical capabilities has made easier to map the petroleum elements and to automatically run numerous realizations of the play fairway model.

**Business Value**

- X% Increase of geoscientists efficiencies through automation of combination of key data sets, analysis and optimization.

- Consistent mapping and calculation of play fairway risk model

**GIS Workflow**

- GIS is used to capture and analyze petroleum play components e.g. source, reservoir and seal presence maps. GeoSpatial analysis used to assign probabilities to source, reservoir, seal layers and other variables considered.

- GeoSpatial Analysis used to combine the input element risk layers to produce a common risk map.

**Source:** ExproDat GIS eBook
Business process: Basin Analysis

- **Input Data types:**
  - Geological map/interpretation of Reservoir distribution (attributes: type, name, age, facies, depositional environment, thickness, quality, confidence – to calculate associated uncertainty/risk)
  - Geological map/interpretation of Source Rock distribution plus additional migration models (attributes: type, name, age, depositional environment, depth, maturity, TOC content, HC type, quality, confidence...)
  - Geological structural framework; faults, lineaments, tectonics, salt bodies, basalt/volcanics, depth, overburden, sealing and leakage

- **GIS and spatial work:**
  - Convert or transfer data from G&G subsurface tools
  - Edit, manipulate, rename to secure documentation, quality, correct attributes for analysis
  - Perform analysis and validate results
  - Present – create maps of input and result data