

E&P Geospatial Workflows: framework and business information structure

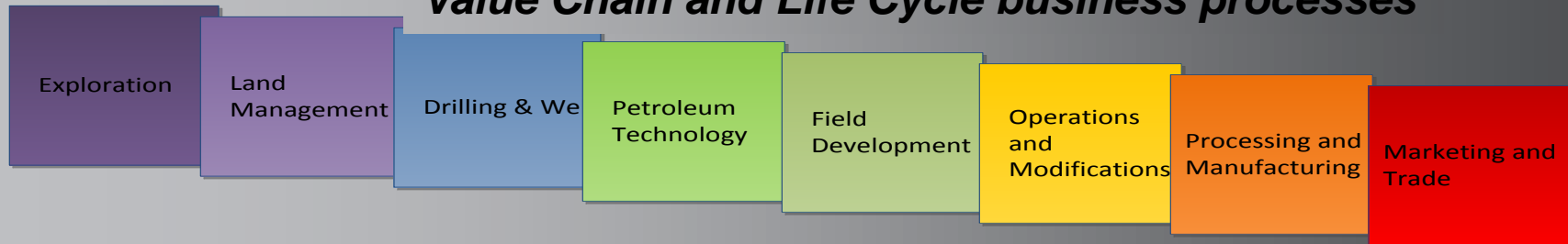
PUG Steering Committee

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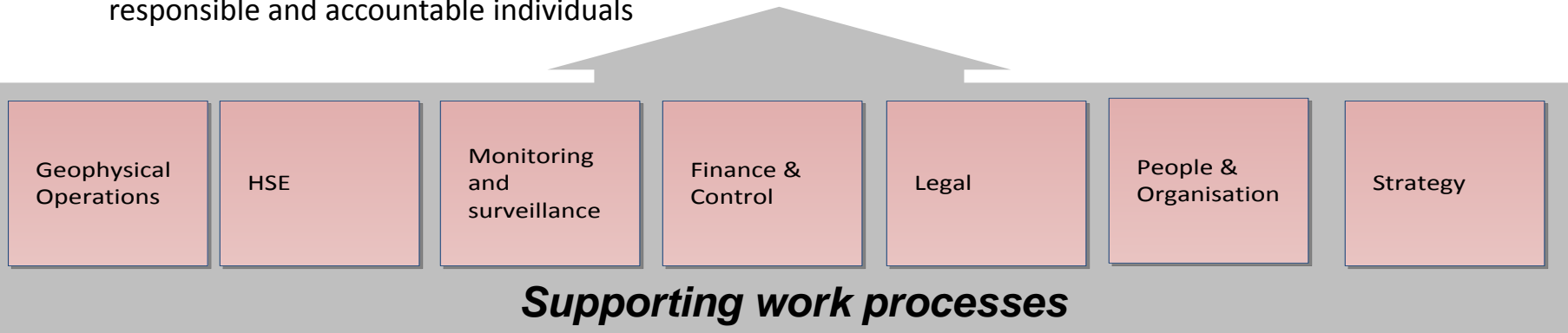
Tore Hoff, Workflows Chair

E&P workflows

Value Chain and Life Cycle business processes



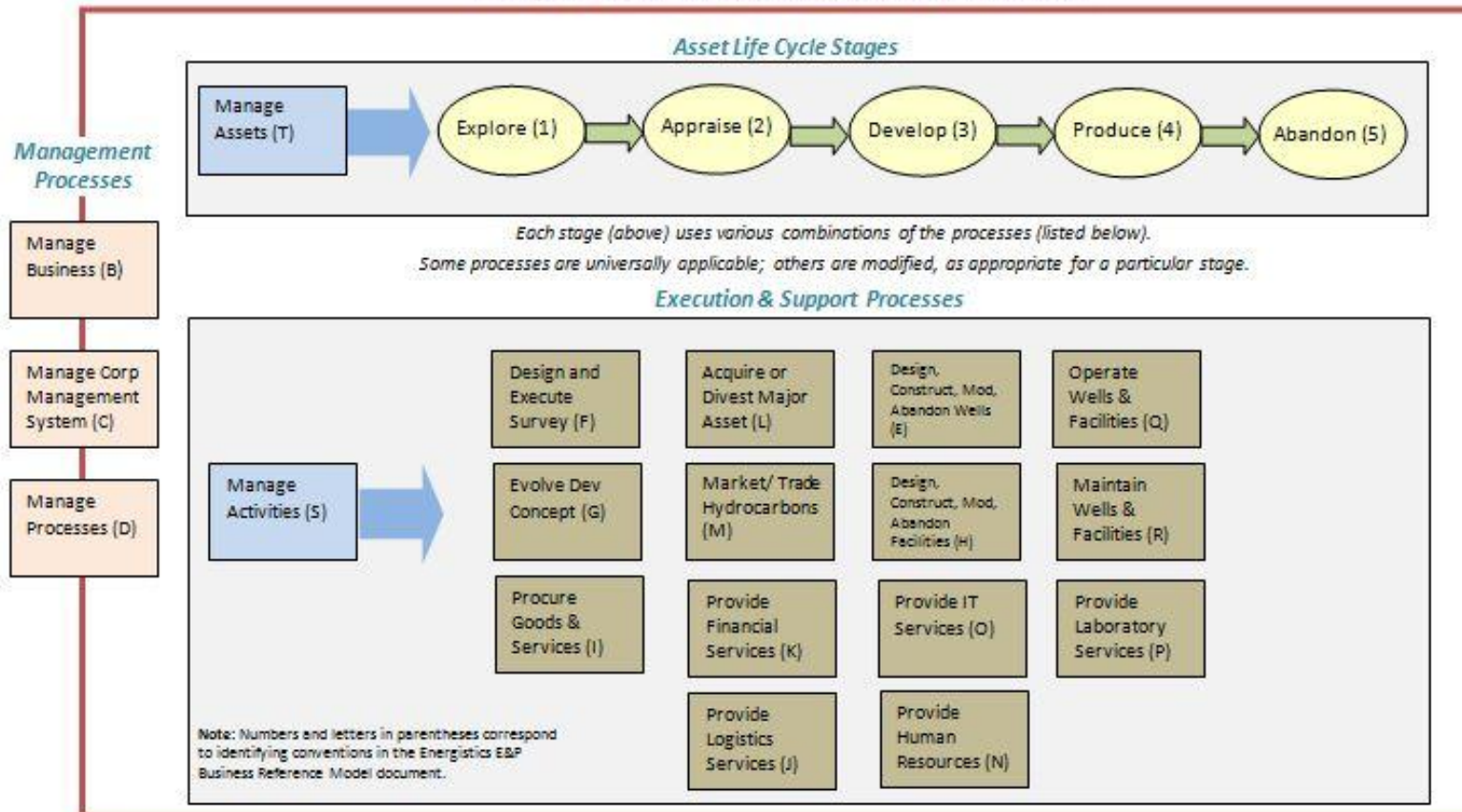
- Most Oil & Gas companies have a value chain with (more or less) business processes
- Small independent companies also have these, but maybe organised them as outsourced tasks with responsible and accountable individuals



- Oil & Gas companies also have a set of supporting work processes

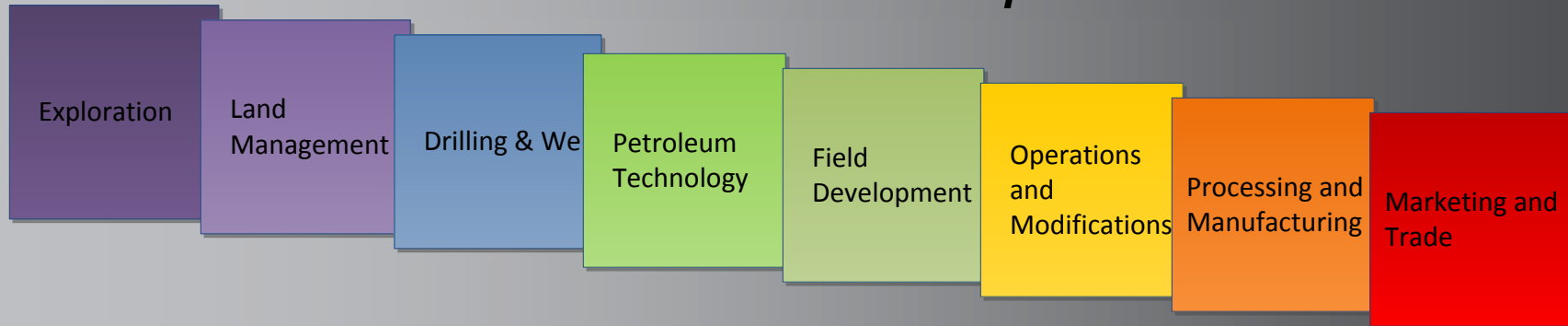
Example: Energistics generic E&P business process reference model

Energistics E&P Business Process Reference Model



E&P workflows

Value Chain business/work processes



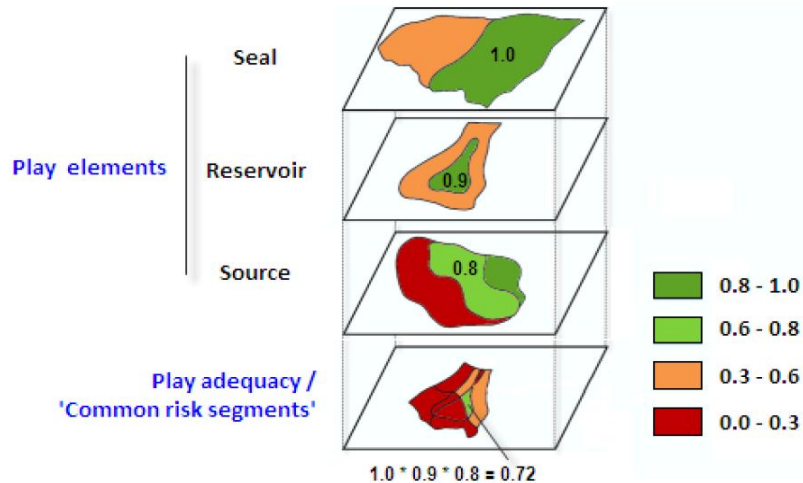
- Regardless of how the business processes or life cycle is organised, each of the business process are responsible for respective deliverables
- Deliverables are represented by decisions based on data and information
- This data and information are collected, produced, manipulated, analyzed and presented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

What we will build:

GIS Workflows in the E&P Life Cycle

	<p>Exploration & Appraisal</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Play Fairway Analysis • Prospect Analysis • Basin Analysis • Link to additional workflows
	<p>Development & Planning</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Well planning for unconventionalals • Link to additional workflows
	<p>Land</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Land Property Mapping • Land Access Agreements • Link to additional workflows
	<p>Operations</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Operations maintenance scheduling • Daily tracking of contracted vessels on the water • Gathering System Analysis • Surveying Pipeline, well, land surveying • Link to additional workflows
	<p>Pipeline & Facilities</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Pipeline/Facilities Management • Pipeline Corrosion • Link to additional workflows
	<p>Environmental Assessment</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Environmental Assessments • Environmental Reporting of Wildlife • Link to additional workflows
	<p>Emergency Response</p>	<p>Business Case</p>	<ul style="list-style-type: none"> • Emergency Response Compliance • Iceberg Tracking • Link to additional workflows

Play Fairway Analysis – Business Case



Source: [ExproDat GIS eBook](#)

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 fair way model.

KEY BUSINESS VALUE

- Reduce play uncertainty by x%
- Improve decision through multiple iterations

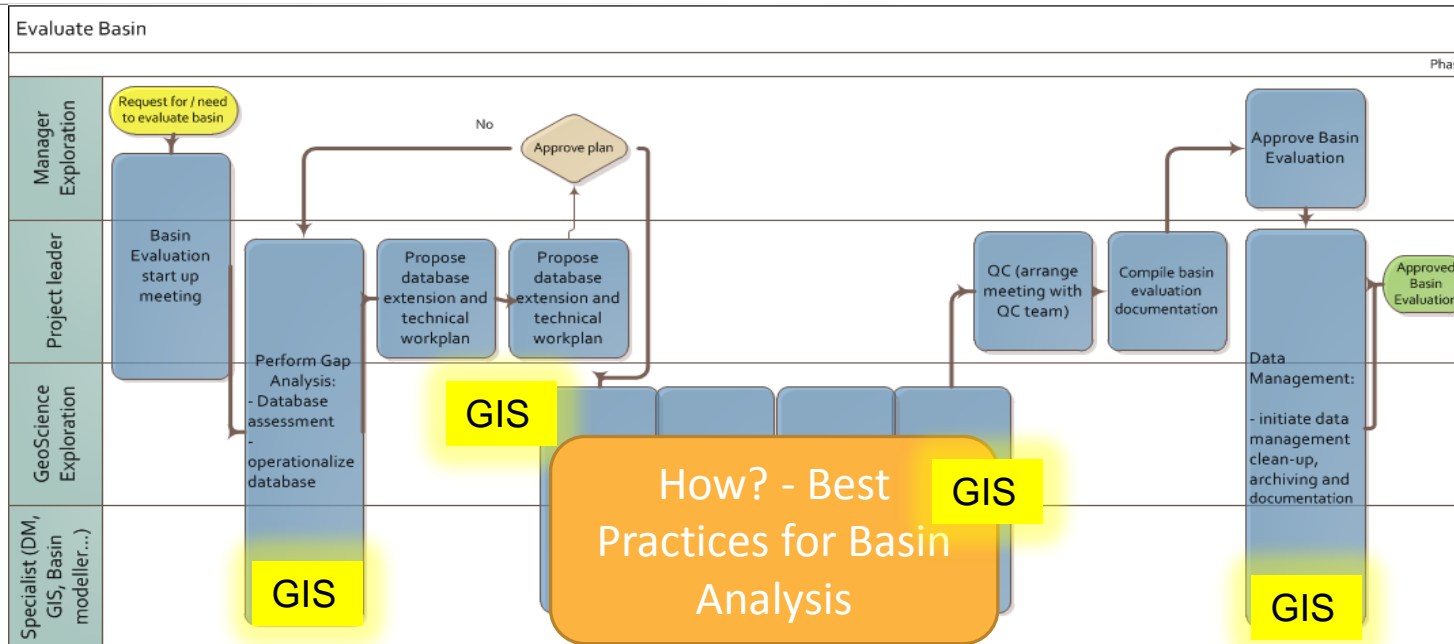
GIS Workflow

- 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.

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

Business process: Basin Analysis



Example

- 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