A Global Approach to Building a GIS Strategy

Esri UC
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METHODOLOGY
# GIS Strategy Study Methodology

## Maturity Model by Carnegie Mellon

<table>
<thead>
<tr>
<th>Maturity Stage</th>
<th>Definitions</th>
<th>Characteristics &amp; Typical Issues</th>
<th>Key Steps (for next stage)</th>
<th>Critical Success factors (for next stage)</th>
<th>Business impact (of moving to next stage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Initial</td>
<td>Individual usage of GIS software</td>
<td></td>
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</tr>
<tr>
<td>2. Recognizing</td>
<td>Isolated tactical uses, no standards, little support</td>
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<tr>
<td>3. Defining</td>
<td>Emerging structure for governance, data management, training &amp; support</td>
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<tr>
<td>4. Managing</td>
<td>GIS embedded in business with defined operating model, standards, central support &amp; training</td>
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<tr>
<td>5. Optimizing</td>
<td>Measures used to optimise all aspects of GIS as part of standard business processes</td>
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</tbody>
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**Six Categories**

1. GIS Governance & Awareness
2. Use of GIS
3. Spatial Data Management
4. GIS Technology
5. GIS Support
6. GIS Training & Communications

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**Proven Methodology to Benchmark ConocoPhillips**
GIS Strategy Study Methodology

Data Gathering Approach

Surveys: 11% Total Participation
Sent to 2,089 people

<table>
<thead>
<tr>
<th>BUSINESS UNITS</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
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<tbody>
<tr>
<td>Interviews</td>
<td>100+</td>
<td>200+</td>
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<tr>
<td>People Interviewed</td>
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**SURVEYS**
Quantifiable Measures

- GIS Users
- None GIS Users
- Maturity Model
- GeoSpatial Audit

**INTERVIEWS**
Corroborates Survey
Quality Information

- Subsurface
- Exploration/Development
- IT
- Facilities/Pipeline
- Operations
- Land
- GeoTechs
- G&RE

**DOCUMENTATION**

- Hardware Architecture
- GeoSpatial Services & GeoSpatial Networks of Excellence
- Best Practices Documentation
FINDINGS
Findings

Who uses GIS at ConocoPhillips?
Findings

CoP Groups are at Different Stages of Overall Maturity

CoP Group K
CoP Group J
CoP Group I
CoP Group H
CoP Group G
CoP Group F
CoP Group E
CoP Group D
CoP Group C
CoP Group B
CoP Group A

Low Maturity
High Maturity
## Findings

### Industry Leading Best Practices

<table>
<thead>
<tr>
<th>NOC</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clear vision</td>
<td>• GIS as a discipline</td>
</tr>
<tr>
<td>• GIS team aligned with the business</td>
<td>• Multi-tier support model</td>
</tr>
<tr>
<td>• Early Technology Adoption</td>
<td>• High standardization of GIS Workflows</td>
</tr>
<tr>
<td>• Skilled GIS support staff</td>
<td>• Investment in staff development</td>
</tr>
<tr>
<td>• Career paths</td>
<td>• Internal GIS Training</td>
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</table>

<table>
<thead>
<tr>
<th>Major Independent</th>
<th>Small Independent</th>
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<tbody>
<tr>
<td>• Clear vision</td>
<td>• ‘On the shoulder’ embedded support</td>
</tr>
<tr>
<td>• Centralised GIS services group</td>
<td>• Tight integration between data &amp; applications support</td>
</tr>
<tr>
<td>• Web-GIS system to provide common data access</td>
<td>• Close alignment with business</td>
</tr>
<tr>
<td>• Standards for data, map products</td>
<td>• Teamwork</td>
</tr>
</tbody>
</table>
Findings

Industry Trends and Innovations

GIS being applied in more E&P areas

e.g.
- Exploration
- Land Management
- Pipeline/Asset Integrity
- Production optimization
- Well planning, site location
- HSE, Emergency Response
- Environment
- Logistics e.g. vessel tracking

COP has all of these

GIS is moving to the web

- High usability
- Data as a web feed
- Integrated dashboards e.g. Common Operating Picture for Emergency Response
- Cross-platform compatibility
- Leverage Cloud

GIS is becoming more integrated

- G&G applications (e.g. Petrel, PetroSys, DSG)
- EDMS systems (e.g. SharePoint)
- SAP
- SCADA

GIS is going mobile

- Field data capture incl. drones
- Automatic tagging of photos/videos
- Land navigation - Maps on tablet/phones
- Logistics & journey management
VALUE OF GIS TO THE BUSINESS
Safety Moment
Incorrect Positioning - Drained Lake Peignoir

Lake Peignoir Drilling Disaster (1980)

- Drilling down from the surface of the lake entered the salt mine with a 14-inch drill bit
- Generally accepted - miscalculation regarding the location resulted in the drill puncturing the roof of the third level of the mine
- The resultant whirlpool sucked in the drilling platform, eleven barges, many trees and 65 acres of the surrounding terrain.
- Impact:
  - Permanently affecting the ecosystem
  - Drilling company paid - $44.8 millions in compensation
Relating GIS to Business Management

**GIS exploits spatial geo-reference data**
*that lets you visualize, query, analyze, collaborate on and understand spatial data*

Over 80% of data used in the petroleum business has a Spatial Component
# Findings

## Examples of ConocoPhillips Best Practices

### Governance
- Management Aware & Supportive
- Talent/Succession Planning
- Strategic recruitment

### GIS Workflows
- Pipeline Corrosion
- Exploration
- Emergency Response
- Environmental
- Etc.

### Data Management & Integration
- Strong Data Steward, Users data ownership
- Defined process for managing spatial data
- Data Dictionary

### Technology
- Centralized Deployment
- Geospatial Database Replication

### Support
- Excellence in End-user support
- Embedded in the Business

### Training & Communication
- Geospatial Network of Excellence
- Global Communications Program
- Training: Partner with external providers

**ConocoPhillips is positioned to exploit existing GIS Best Practices**
## Findings

### Examples of Value add Workflows

<table>
<thead>
<tr>
<th>GIS Workflows</th>
<th>VALUE</th>
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<tbody>
<tr>
<td>Environmental Assessments</td>
<td>Compliance</td>
</tr>
<tr>
<td>Emergency Response Compliance</td>
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<th>EXPLORATION</th>
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<tr>
<td>Exploration Appraisal</td>
<td>Strategic Growth</td>
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<tr>
<td>Play Fairway Analysis</td>
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<tr>
<td>Seismic Survey planning</td>
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<tr>
<td>Acreage/Lease/Land Analysis</td>
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<table>
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<tr>
<th>LAND DEVELOPMENT/PLANNING</th>
<th>Compliance</th>
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<tr>
<td>Land Property Mapping</td>
<td></td>
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<tr>
<td>Land Access Agreements</td>
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<tr>
<td>Geological well planning for Unconventionals</td>
<td>Strategic Growth Risk Mitigation</td>
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<tr>
<td>Pipeline Planning</td>
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<th>OPERATIONS SURVEYING</th>
<th>Efficiency Gains</th>
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<td>Maintenance scheduling</td>
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<tr>
<td>Pipeline/Facilities Management</td>
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<tr>
<td>Pipeline Corrosion Management</td>
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<td>Gathering System Analysis</td>
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<tr>
<td>Pipeline Regulatory Compliance</td>
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<tr>
<td>Surveying : Pipeline, wells, land, etc</td>
<td>Compliance</td>
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<tr>
<td>Routing</td>
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### Environmental Explorations

- Exploration Appraisal
- Play Fairway Analysis
- Seismic Survey planning
- Acreage/Lease/Land Analysis

### Land Property Mapping

- Land Property Mapping
- Land Access Agreements

### Geological well planning for Unconventionals

- Geological well planning for Unconventionals
- Pipeline Planning

### Maintenance scheduling

- Maintenance scheduling
- Pipeline/Facilities Management
- Pipeline Corrosion Management
- Gathering System Analysis
- Pipeline Regulatory Compliance

### Surveying : Pipeline, wells, land, etc

- Surveying : Pipeline, wells, land, etc
- Routing
**Situation and Challenge**

- Highly competitive environment of North America land, fast movers
- Fast analysis of land right-of-ways, mineral rights contracts, surface boundaries; households, lakes and rivers, and access to gathering facilities/pipelines
- With a GIS, we can quickly and reliably position wells

**What They Did**

- Created a Land GIS processes to manage CoP’s Land Boundaries, incorporating CoP’s royalty contracts
- Analyzed land opportunities
- Defined the CoP process for assessing land prospects
- Built a group of GIS Professionals
- Strategic alignment with college

**Outcomes & Value**

- Secured a portfolio of 13.8 million net acres
- Fast moving into evolving shale areas
- Ensure accurate payment of mineral right royalties
- Compliance reporting to government and other stakeholders
- CoP GIS Land recognized in the Industry as leaders in GIS
GIS Best Practice

Opening the Arctic Opportunity: Ice Bergs and Sea Ice Floes monitoring

Live Tracking of Marine Vessels, Video feeds from buoy and land sites

What They Did

GIS System that integrates all variables required for safe operations in Arctic conditions real time

GIS System included near real time satellite images which identified and monitor weather conditions, iceberg movements and environment changes

Situation and Challenge

- Extreme harsh conditions
- Short operating windows
- Environmental/Biology assessment
- Oil Spill Response
- Safety of the drilling operations from hazardous ice floes and ice bergs

Outcomes & Value

- Reduce the risk of Artic Operations by building plans based on predictive models for weather, iceberg movements and environmental behavior
- An integrated and up to date presentation of several sources of data and diverse activities including live tracking of marine vessels, ocean conditions and hazardous ice movement
Situation and Challenge

- Risk maps are derived from compound of multiple data sets measuring their interpretation and confidence factors
- These maps take time to generate and all risks need to be taken into account

What They Did

- GIS was used to capture and analyze all play components
- Combine to produce a common risk map.
- Developed play risk model in Model Builder allowing consistent and easy re-execute of multiple model iterations

Outcomes & Value

- Efficient creation of play risk maps to understand uncertainty and decide on best regional prospects
- Multiple risk iterations for improved decisions
- Consistent & Documented play fairway risk model using statistical models and weighted techniques

Source: GIS Best Practice Exploration Play Fairway Analysis

Risk Model

Composite Common Risk Segment Map (shows overall play risk)
Findings

Areas of Focus

- Governance and Communications
- Data and Integration
- Support and Training
- Exploiting Best Practices and Workflows
Conclusions

- Use a Proven GIS Review Methodology with a GIS Consulting Partner
  - Surveys, Interviews, Workgroups

- Discuss GIS in Terms of Workflows and Value, not Technology

- Exploit Existing GIS Best Practices

- Addressing Focus Areas is a Multi-year Journey