




ConocoPhillips

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*A Global Approach to
Building a GIS Strategy*

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ConocoPhillips

METHODOLOGY

GIS Strategy Study Methodology

Maturity Model by Carnegie Mellon



Current State Review

Future State Review

Roadmap

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

Six Categories

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

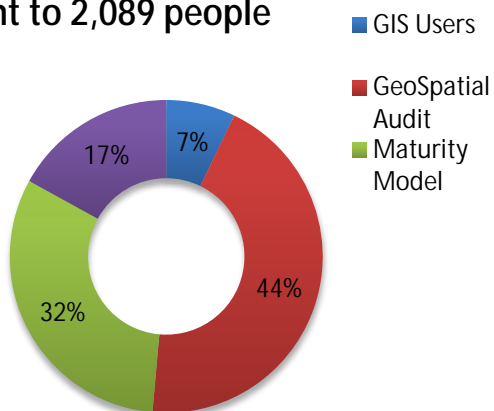
Proven Methodology to Benchmark ConocoPhillips



GIS Strategy Study Methodology

Data Gathering Approach

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



Interviews: 100+ interviews, 200+ people



SURVEYS

Quantifiable Measures

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

INTERVIEWS

Corroborates Survey Quality Information

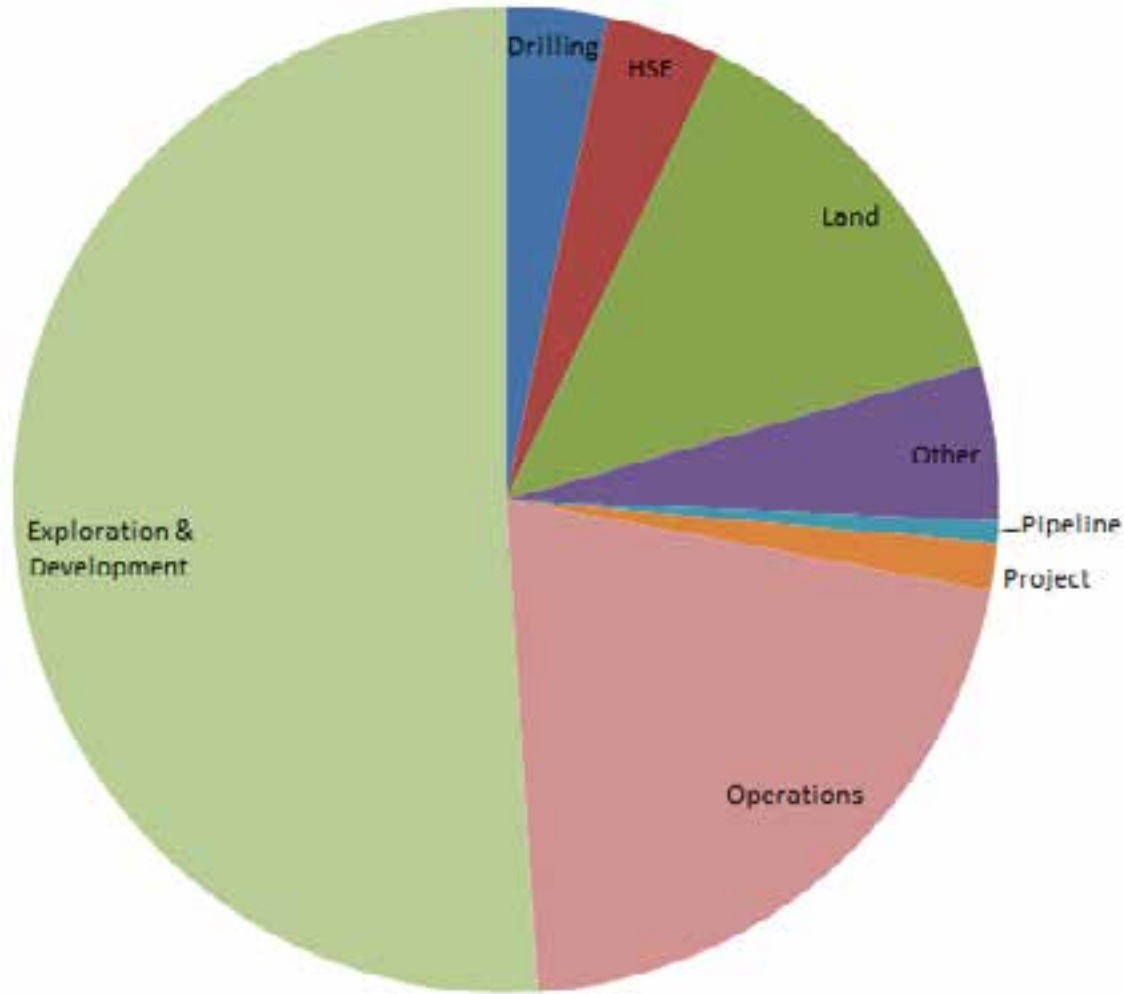
- Subsurface Exploration/Development
- IT
- Facilities/Pipeline
- Operations
- Land
- GeoTechs
- G&RE

DOCUMENTATION

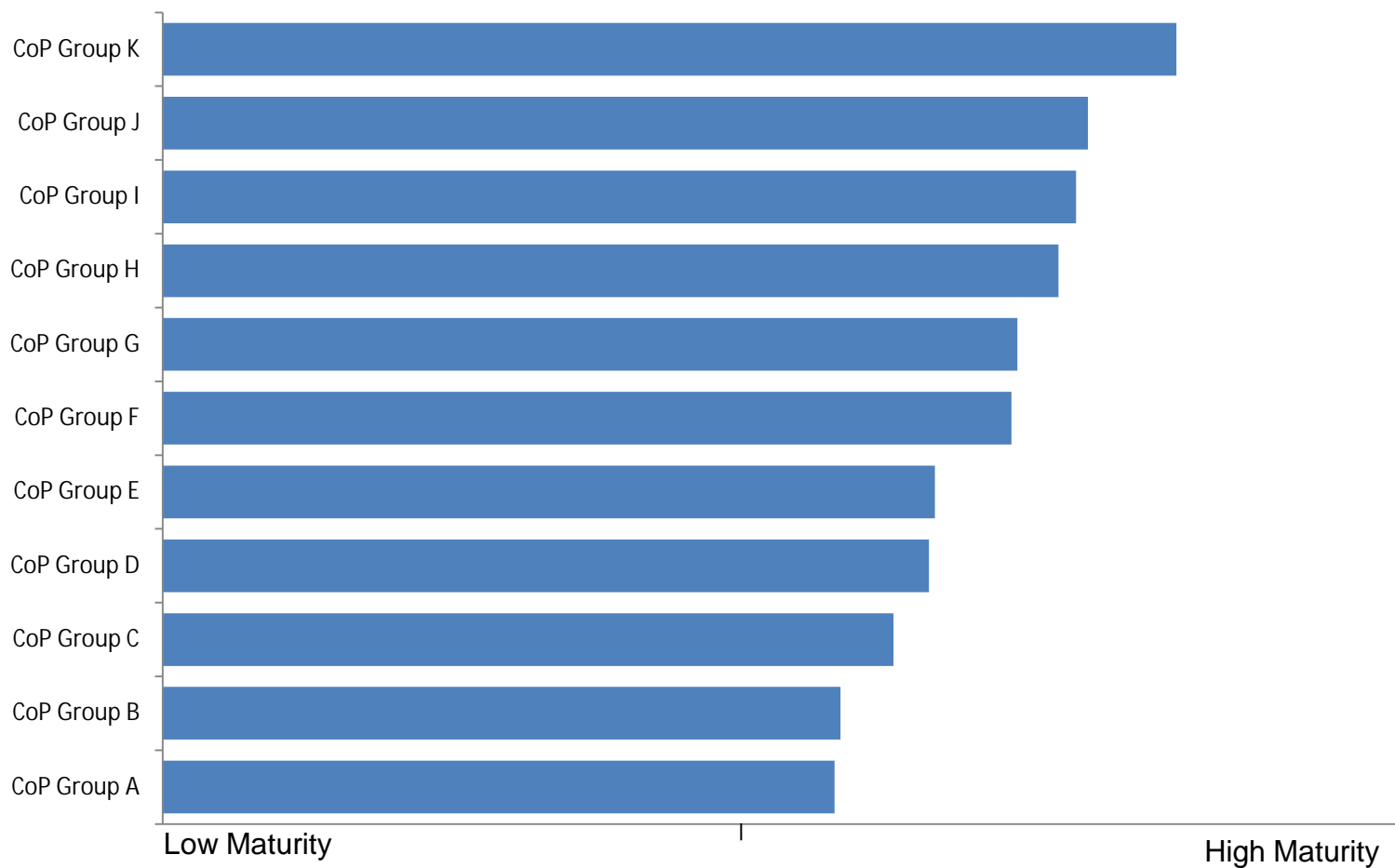
- Hardware Architecture
- GeoSpatial Services & GeoSpatial Networks of Excellence
- Best Practices Documentation

FINDINGS

Who uses GIS at ConocoPhillips?



CoP Groups are at Different Stages of Overall Maturity



Industry Leading Best Practices

NOC

- Clear vision
- GIS team aligned with the business
- Early Technology Adoption
- Skilled GIS support staff
- Career paths

Major

- GIS as a discipline
- Multi-tier support model
- High standardization of GIS Workflows
- Investment in staff development
- Internal GIS Training

Major Independent

- Clear vision
- Centralised GIS services group
- Web-GIS system to provide common data access
- Standards for data, map products

Small Independent

- 'On the shoulder' embedded support
- Tight integration between data & applications support
- Close alignment with business
- Teamwork

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

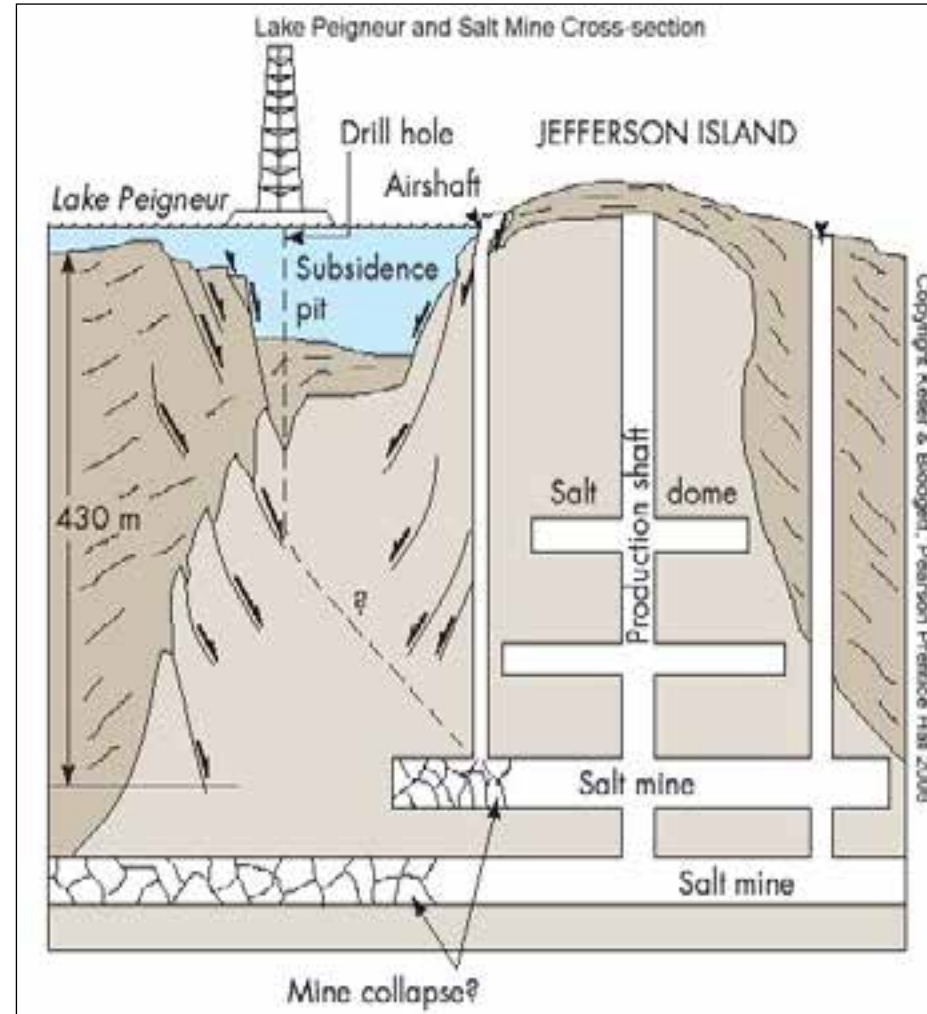


VALUE OF GIS TO THE BUSINESS

Incorrect Positioning - Drained Lake Peigneur

Lake Peigneur 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

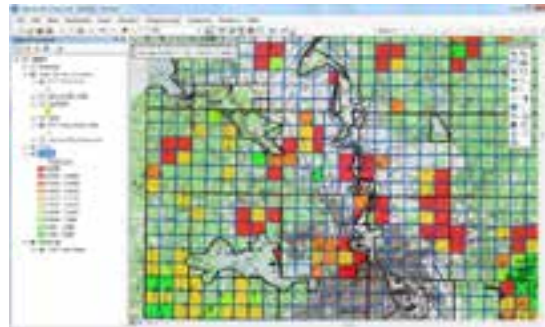


Relating GIS to Business Management

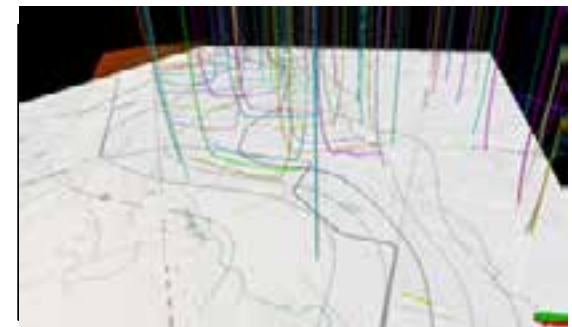
GIS exploits spatial geo-reference data that lets you visualize, query, analyze, collaborate on and understand spatial data



Exploration



Land Positioning & Royalty Payments



Planning Wells



Pipeline Routing & Maintenance



Emergency Response



Environmental

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

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

Examples of Value add Workflows

ENVIRONMENTAL EMERGENCY RESPONSE



GIS Workflows

Environmental Assessments

Emergency Response Compliance

VALUE

Compliance

EXPLORATION



Exploration Appraisal

Play Fairway Analysis

Seismic Survey planning

Acreage/Lease/Land Analysis

**Strategic
Growth**

LAND DEVELOPMENT/PLANNING



Land Property Mapping

Land Access Agreements

Geological well planning for
Unconventionals

Pipeline Planning

Compliance

**Strategic
Growth
Risk Mitigation**

OPERATIONS SURVEYING



Maintenance scheduling

Pipeline/Facilities Management

Pipeline Corrosion Management

Gathering System Analysis

Pipeline Regulatory Compliance

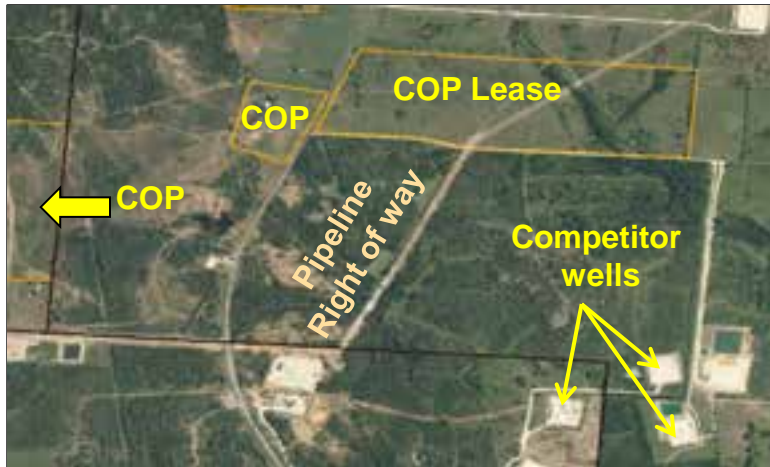
Surveying : Pipeline, wells, land, etc

Routing

**Efficiency
Gains**

Compliance

Land



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

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 reliable position wells

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

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

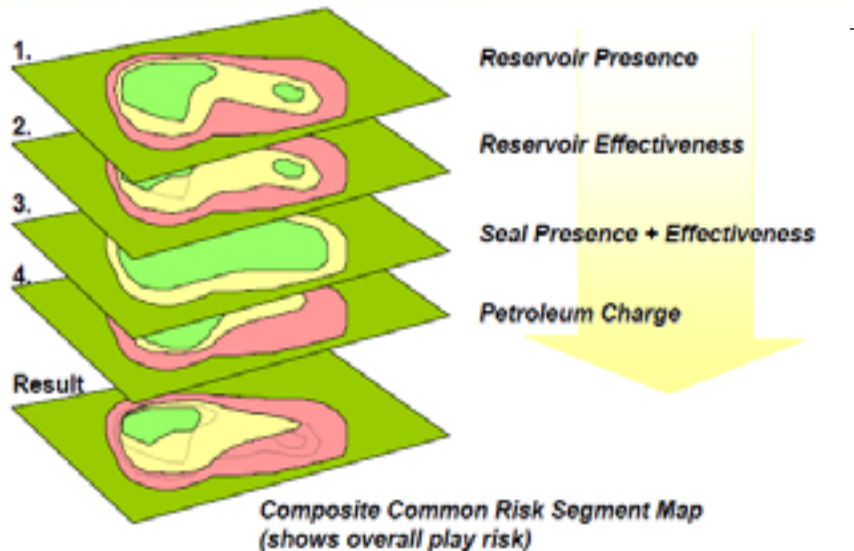
Situation and Challenge

- § 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 Arctic 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

Exploration Play Fairway Analysis



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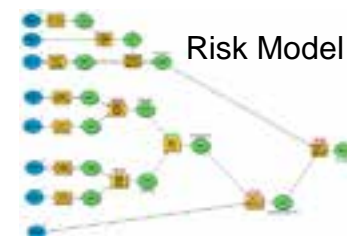


Situation and Challenge

- 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

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