



  
**ConocoPhillips**

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*A Global Approach to  
Building a GIS Strategy*

**Esri Petroleum Conference  
April 2014**

  
ConocoPhillips

# GIS Strategy Study Methodology

## Maturity Model by Carnegie Mellon



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

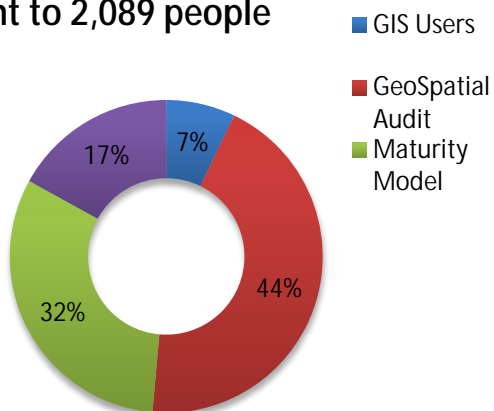
**Proven Methodology to Benchmark ConocoPhillips**



# 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

## Industry Leading Best Practices

### NOC

- Clear vision
- GIS team closely aligned with the business
- Adoption of latest technology
- Skilled GIS support staff
- Clear geospatial career paths

### Major

- Clear ownership: GIS is a discipline
- Well defined multi-tier support model
- GIS workflows embedded in business processes, high standardization
- Large investment in staff development
- Internal Learning Center, GIS Course Director

### Major Independent

- A clearly communicated vision
- Centralised GIS services group
- Separation of back & front office support
- Well-designed web-GIS system to provide common data access
- Strong standards for data, map products

### Small Independent

- Centralised corporate data mgt.
- 'On the shoulder' embedded support
- Tight integration with technical applications support
- Strong business buy-in
- Teamwork

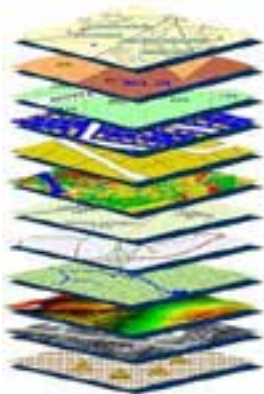
## Industry Trends and Innovations

### GIS being applied in more E&P areas

e.g.

- Land Management
- Exploration
- 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

- Provide simple, common access to key data
- High usability
- Data as a web feed: plug & play, live integration, no data duplication
- Integrated dashboards e.g. Common Operating Picture for Emergency Response
- Cross-platform compatibility
- Leverage elastic benefits of Cloud (e.g. ArcGIS Online)



### GIS is becoming more integrated

Direct links with

- G&G applications (e.g. Petrel, PetroSys, DSG)
- EDMS systems (e.g. SharePoint)
- SAP
- SCADA
- Field data capture incl. drones

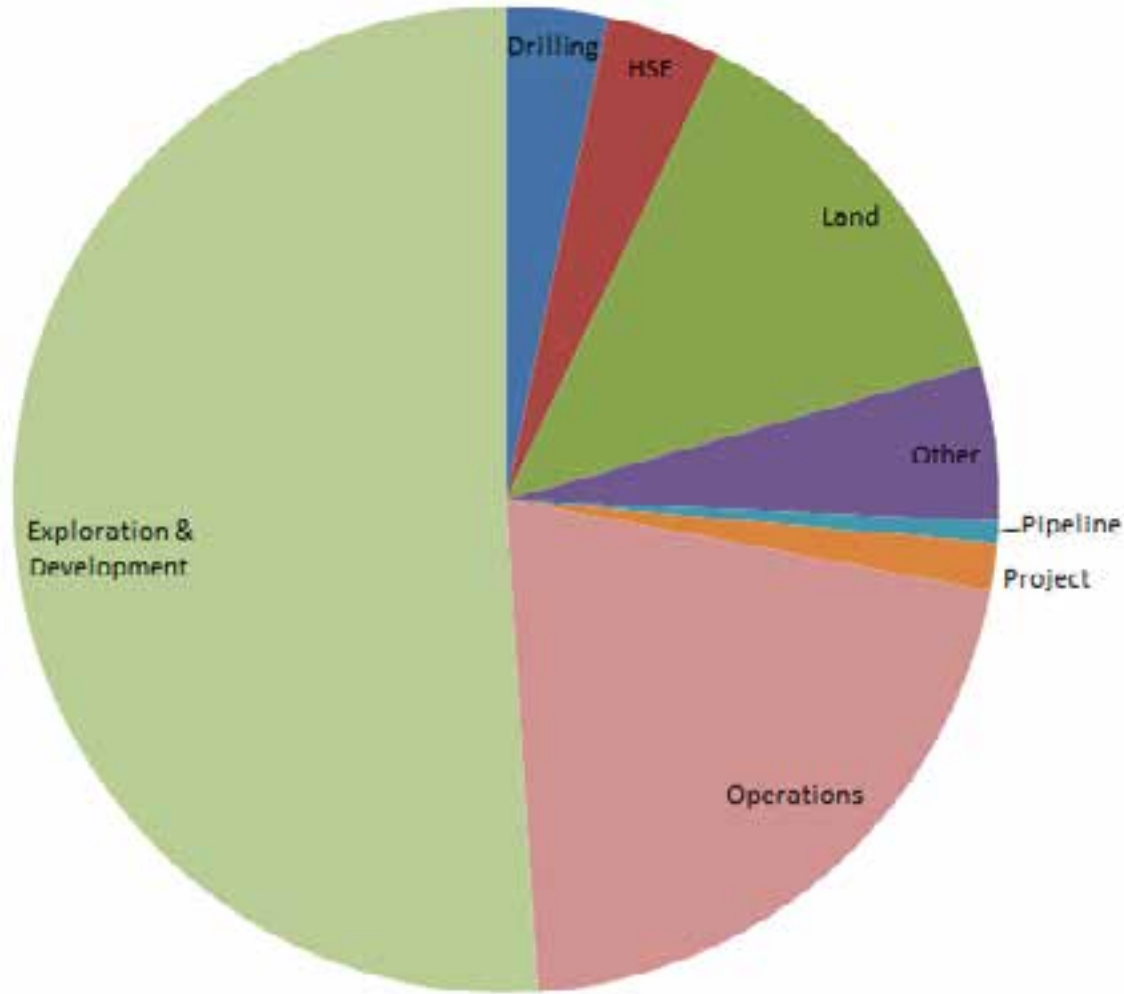


### GIS is going mobile

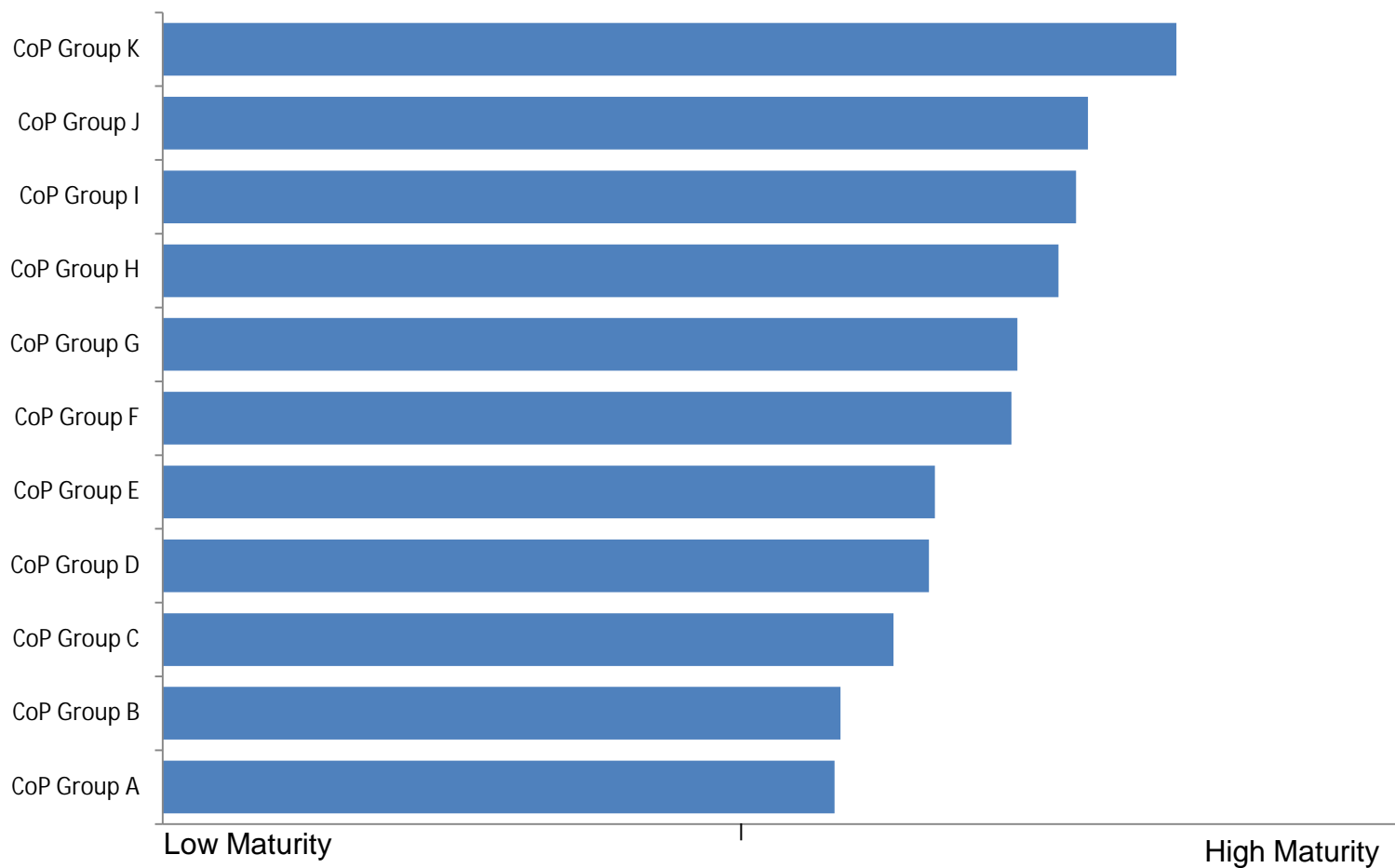
- Simple field data capture for Land, Pipeline, Operations, HSE, Geology
- Automatic tagging of spatial data e.g. photos
- Seamless sync with office database
- Land navigation (e.g. directions to well sites)
- Logistics & journey management
- Office productivity e.g. maps on tablet



# Who uses GIS at ConocoPhillips?



## CoP Groups are at Different Stages of Overall Maturity



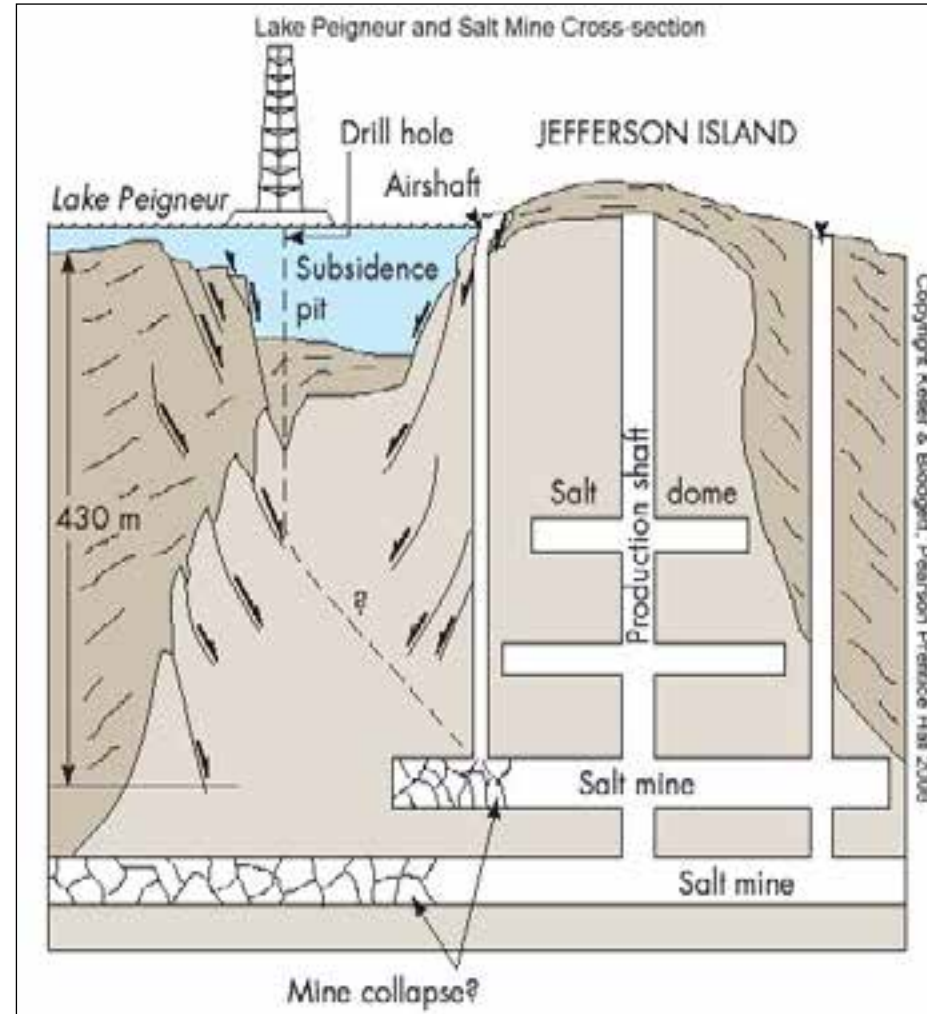


# Presenting to Stakeholders

## 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

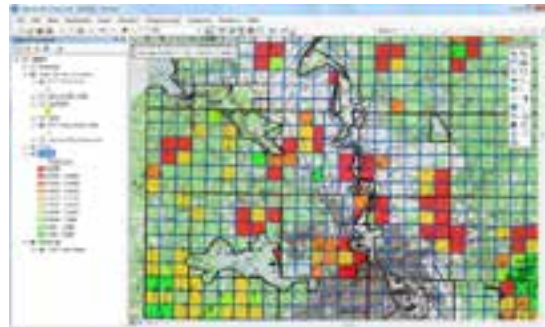


# Relating GIS to Business Management

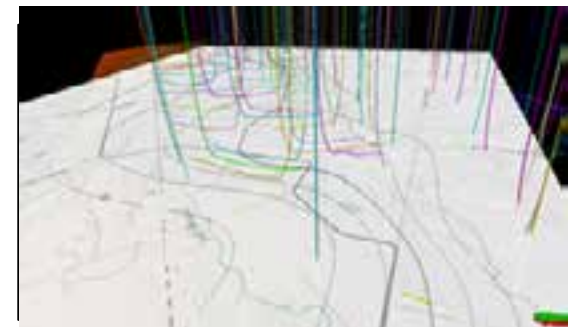
*GIS exploits spatial geo-reference data that lets you visualize, query, analyze, collaborate on and understand spatial data*



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

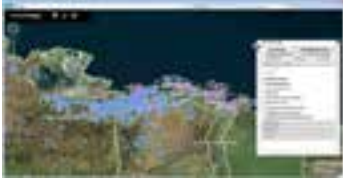
### Training & Communication

- 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

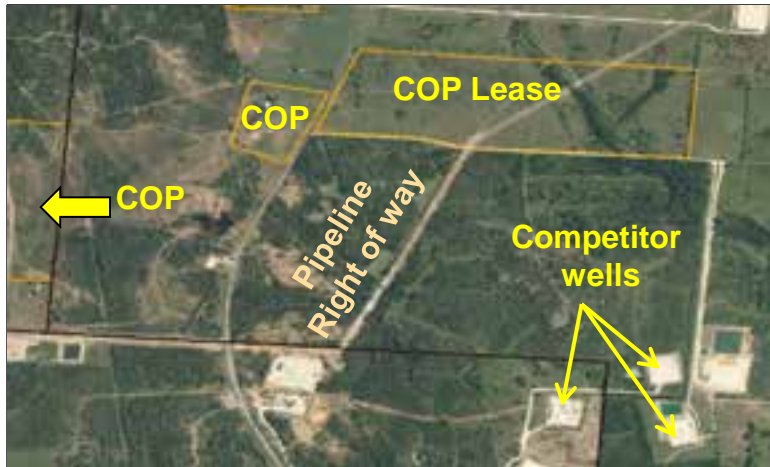
Routing

**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.

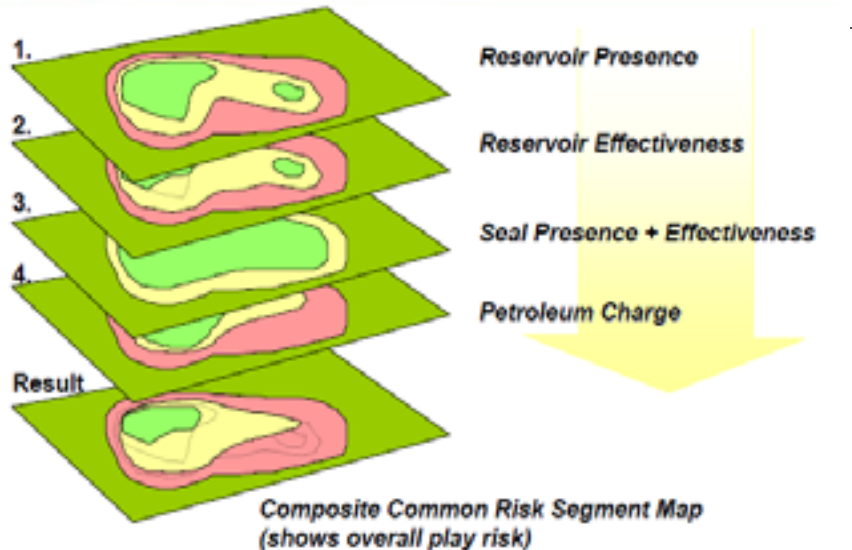
### Situation and Challenge

- § 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



Source:

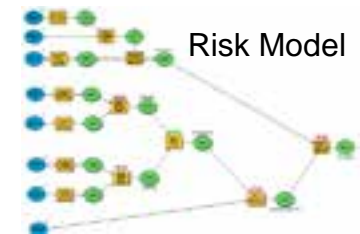


### Situation and Challenge

- 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