

Oil and Gas Regulatory Mapping

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What We'll Cover:

- Overview Coal Bed Methane (CBM) permitting
- The pre-project state
- The desired state
- Technology challenges
- Conclusions

Permitting for Coal Bed Methane (CBM):

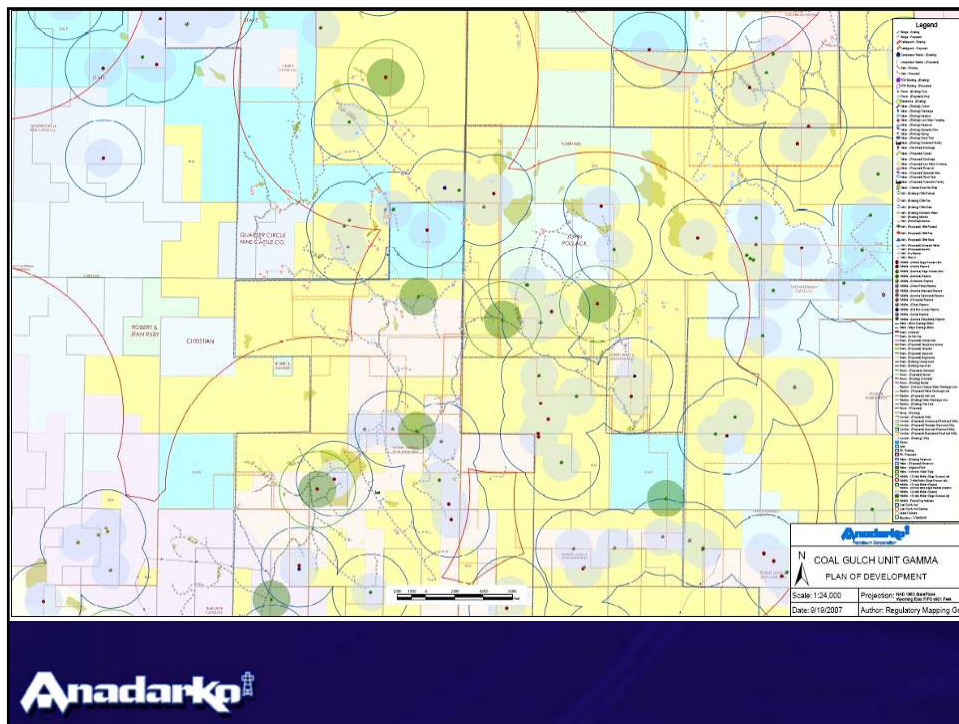
- **CBM is an important part of Anadarko's business.**
- **CBM permitting is different**
 - *Accelerated development*
 - *Specific requirements*
 - *Significant restrictions*



Permitting for Coal Bed Methane (CBM):

- **Creating a Plan Of Development (POD):**
 - *Leasehold secured*
 - *Multiple surveys (wildlife, vegetation, proposed access, etc.) are conducted by consultants as allowed by access constraints.*
 - *Survey data are collated by the Regulatory Permitting Team mappers.*
 - *Required maps and reports are assembled to BLM specifications and submitted for approval.*
 - *May require adjustments to meet BLM requirements.*
 - *POD is developed as permitted and planned.*

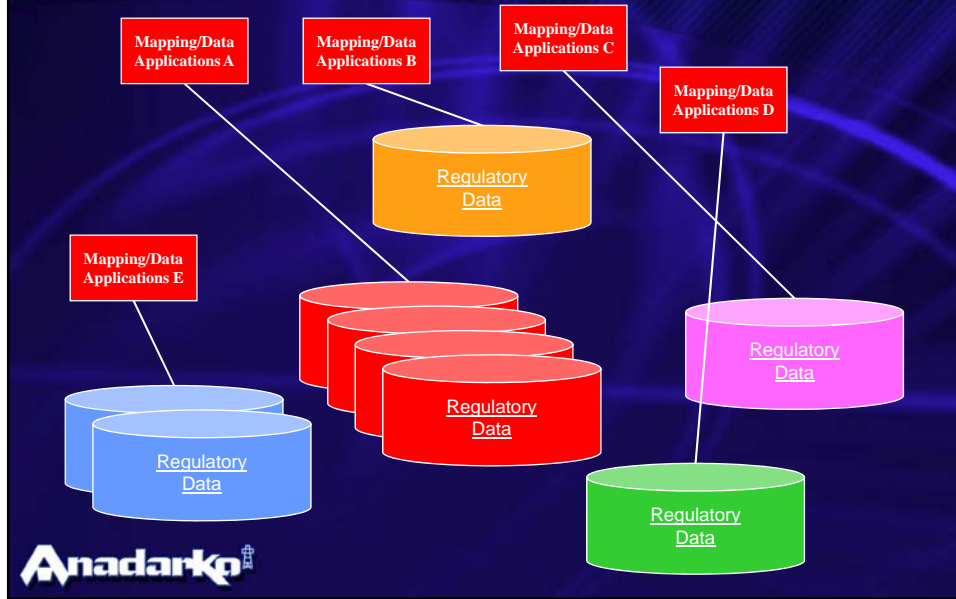




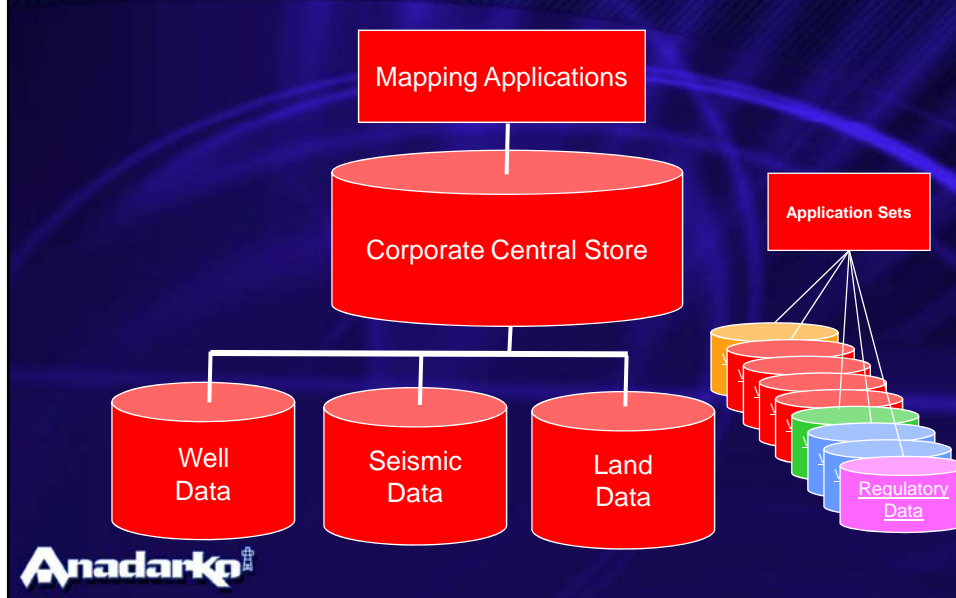
The Pre-project State:

- Over time, data were collected and supplied in several applications, formats and schemas.
- Each POD was assembled as a project.
- POD project files were kept in disparate locations on disk. Over time these locations were changed due to several factors.
- Result:
 - *Hard to find data*
 - *Often requires format conversion*
 - *Inconsistent schemas (or none at all)*
 - *Almost impossible to map several PODs*

The Pre-project State:



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The Pre-project State:

▪ Results

- *Inconsistent data*
- *Long cycle time for BLM Permit approval*
- *Overwhelming workload*

▪ Effects

- *Hindrance to expanding mapping throughout lifecycle.*
- *Hindrance to expanding mapping support geographically.*
- *Hindrance to compliance with Onshore Order Number 1 request for digital data submissions.*
- *Necessitates excessive collaboration among individuals in multiple offices*



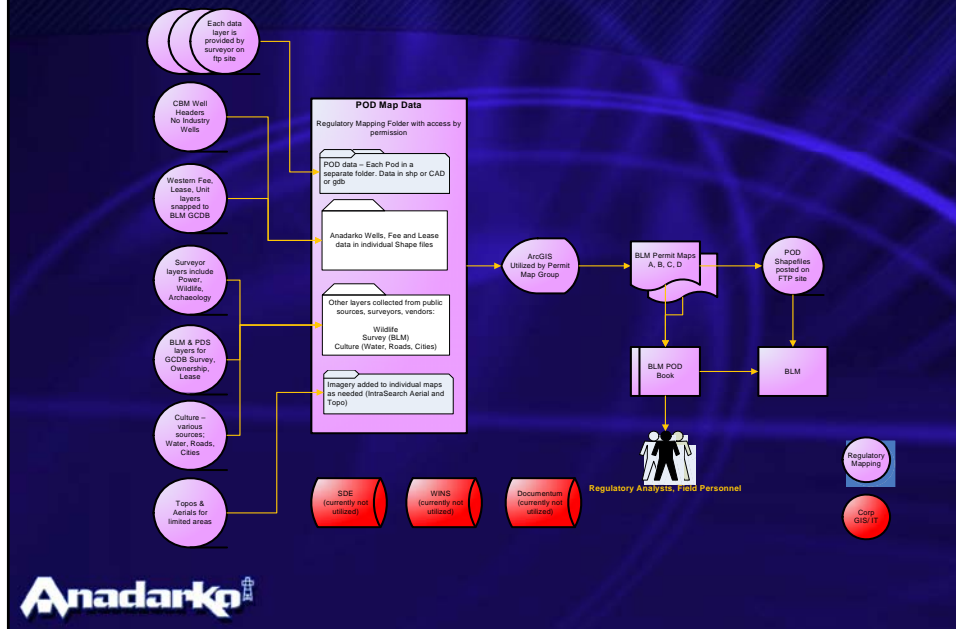
The Pre-project State:

▪ Challenges include:

- *Collecting and visualizing the information is a complex task.*
- *Gathering and symbolizing the infrastructure for one POD is tedious.*
- *Creating an overview map of POD projects is difficult, lengthy and non-performant.*
- *The process for the permit mapping has not been efficient and repeatable.*
- *A solution must also be scalable to support mapping throughout the lifecycle of managing oil and gas field assets.*



Pre-project Data Workflow

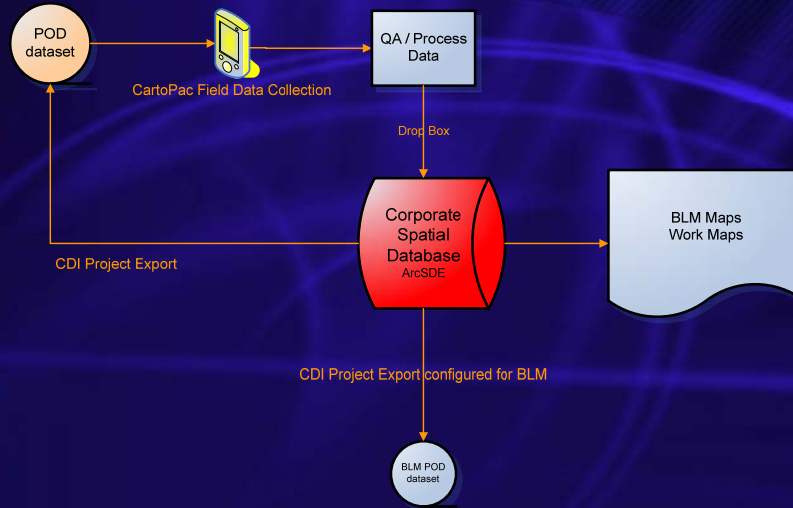


The Desired State:

Design goals:

- Standardize data model for regulatory data
- Collect data in the field in a consistent with the data model
- Design to accommodate BLM's e-commerce plans
- Centralize data in a master repository
- Enable users with mapping resources
- Reduce Regulatory Mapper workload from other departments.
- Implement workflows that are scalable throughout the lifecycle and geographic regions.
- Leverage the corporate investment in imagery and other data.

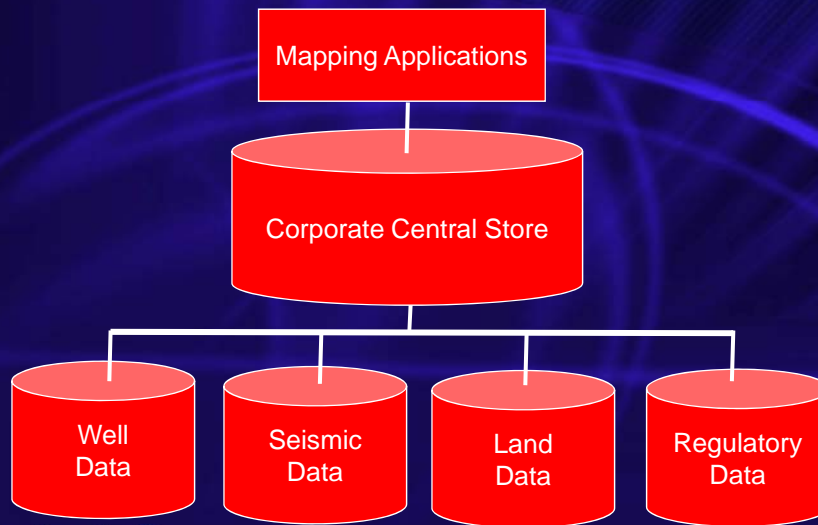
Desired Field Data Collection Workflow



Proposed Solution

- Treat Permit Data no differently to other E&P spatial data types at Anadarko (e.g. Land, Seismic, Wells, Pipeline, etc)
- Centralize in a secure store with other corporate data, accessible to multiple users.
- Empower users with applications to access and map this data. Depending on mapping skills and needs, web-based and desktop.
- Provide Permit Mapping group with the tools and processes to load and manage permit data

Proposed Solution



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Technology Hurdles

- Design data model
- Field Data Collection in the standard data model
- Centralize data storage
- Synchronize incremental field data with central repository
- Deliver digital maps to remote offices

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Regulatory Data Model Goals

- Standard Fields for all types of Data
- Additional Fields for specific data types
- Standard lookup lists (domains)
- Standard Symbology (subtypes & style library)
- Store all data for entire lifecycle in one model



Regulatory Data Model Organization

Well
Corridor
Culture
Disturbance
Other
Pipeline
Power
Reclamation
Water
Wildlife



Field Data Collection: Why Cartopac ?

- **Supports ESRI geodatabase**
 - *Standard lookup tables drive drop down menus and required fields*
 - *Plain English field names for display*
 - *One data storage format throughout entire workflow*
- **User Interface**
 - *Intuitive*
 - *Common workflow for Pipeline and Field data collection models*
 - *Field Collection Activities (Roles) to simplify operator experience*
- **Intuitive Workflow**
 - *Integration with ESRI ArcMap for download and upload*
 - *Integration with Pathfinder office for efficient post processing*
 - *One place to call for hardware, software and data model support*
- **Corporate Standard**



Field Data Collection Challenges

- **Platform**
 - *Cartopac developed on Mapping Grade (Windows OS) platform*
 - *Workflow to collecting data using Survey Grade GPS*
 - *Memory – using roles and activities to reduce memory demands*
- **Simultaneous Data collection**
 - *Cannot collect multiple features simultaneously*
 - *Designing forms and symbols to record complex information during a single feature collection process (Corridors)*
- **Data Model Updates**
 - *Additions must go through change control – cannot dynamically add to the database – using 'OTHER' to capture additions*
 - *Discovered differences in historical field data collection and future usage standards*



Conclusion

- **Field Data collection of standard data model supports the full lifecycle of mapping and data usability**
- **Standards drive scalability, maintainability and usability:**
 - *Standard data model*
 - *Standard field collection process*
 - *Standard symbology*
 - *Standard lookup tables*
 - *Standard maps*
- **Performance is critical**
- **Training is critical**



Thanks

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- *Mike Harris, Barry Walter, Glenn Vlass (SDT), Mark Saunders (SDT)*



Questions?

