Database & Survey Enhancement Applications: Optimizing Project Development Through Data Integrity and Real-time Corrections

Lee Pendegraft

46th General Meeting
October 12th, 2017
San Antonio Texas, USA

Wellbore Positioning Technical Section

ISCWSA
The Industry Steering Committee on Wellbore Survey Accuracy (ISCWSA)

Speaker Information

- Lee Pendegraft
- Technical Advisor for Sperry Survey Solutions
- October 12, 2017
- Halliburton: Sperry Drilling

Speaker Bio

- Halliburton (2017 - Present)
  - NOV (2013 – 2017)
    - Survey Management / Regulatory Specialist
  - Halliburton (2010 - 2013)
    - Survey Analyst / Well Planner
- University of Alaska Anchorage
  - Electrical Engineering / Mathematics
- Houston, Texas
- Specialized in Survey Management Services

Halliburton / Sperry Drilling

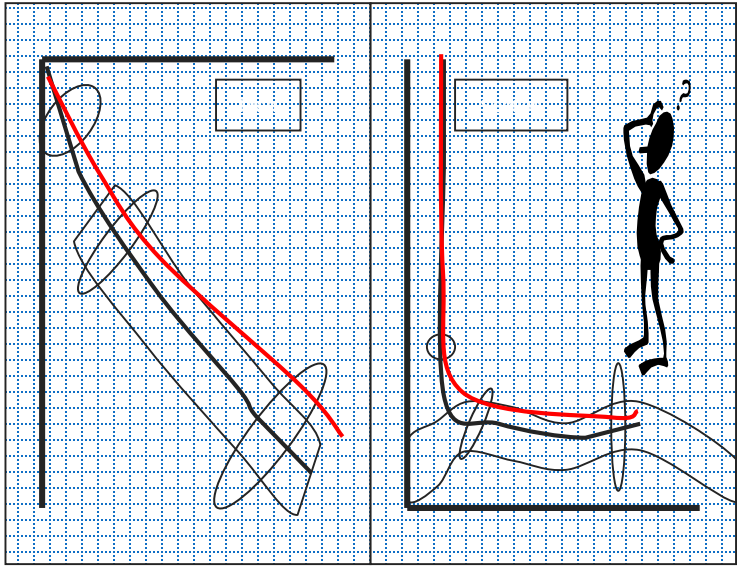
- Survey Solutions Team
- Services Offered
  - Survey Management
    - Real-time / Post-Processing / IFR1 Programs / IFR2 Corrections
  - Database Management
    - Assessments / Audits / Consulting

HALLIBURTON

Sperry Drilling

What Does Your Database Contain?

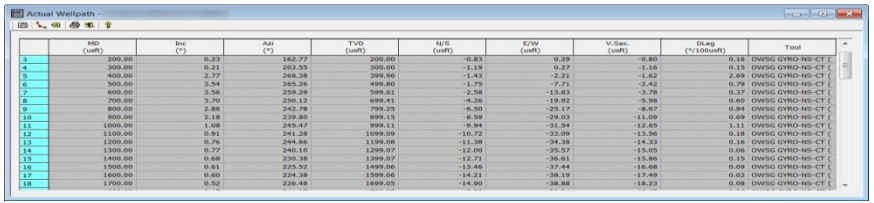
- Operators need a complete and accurate database to depend on for operations



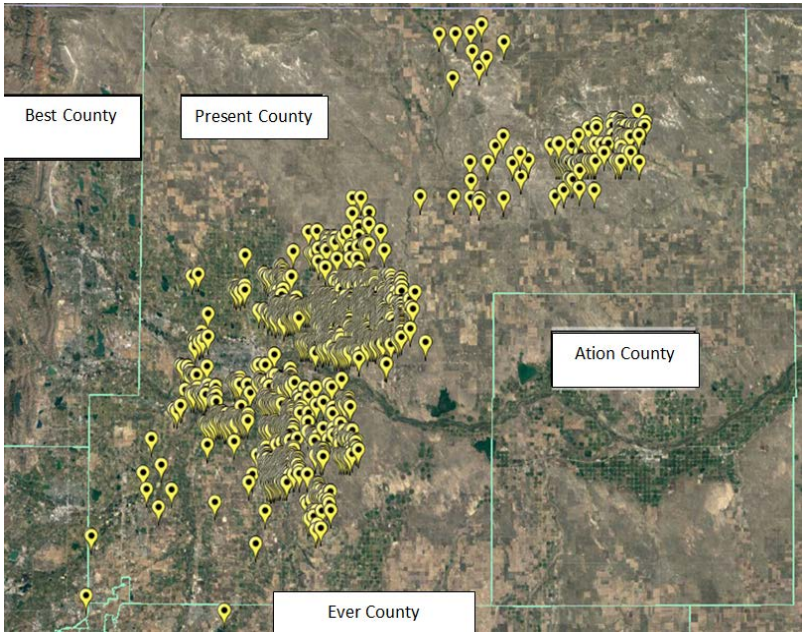
- This means populating a database by digitalizing available data from many sources

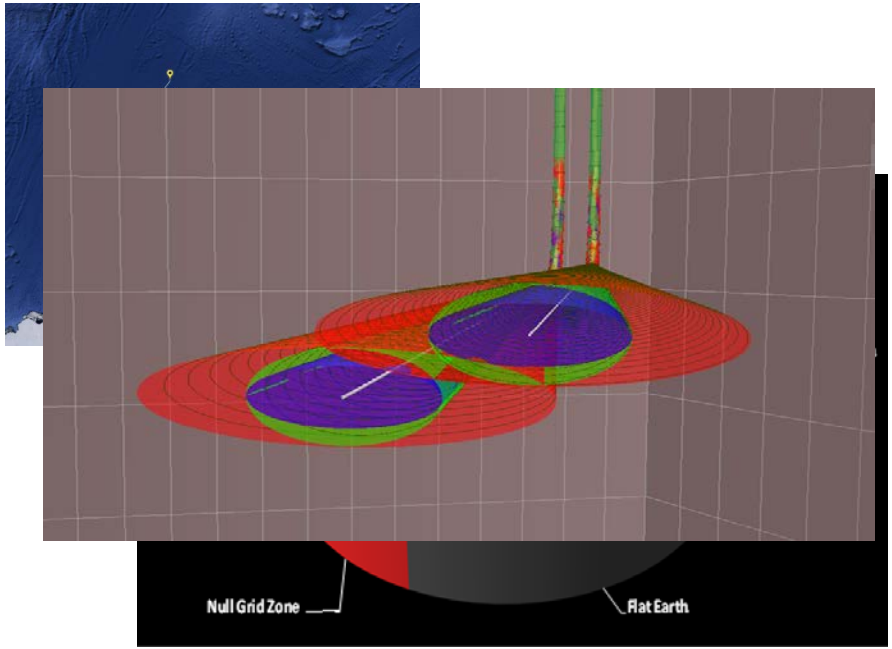
RAILROAD COMMISSION OF TEXAS

BSEE
Bureau of Safety and Environmental Enforcement



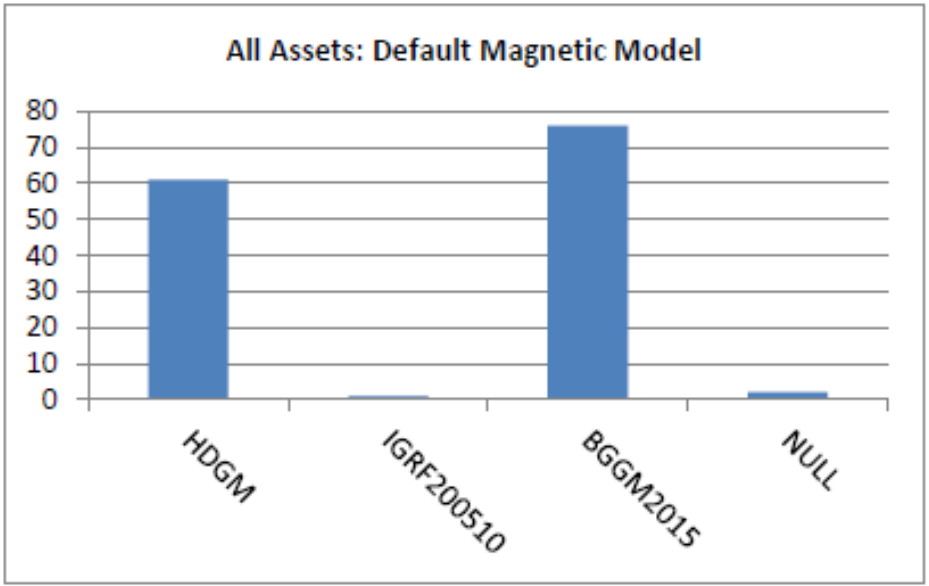
The Problem: Is the database accurate after a historical data import?



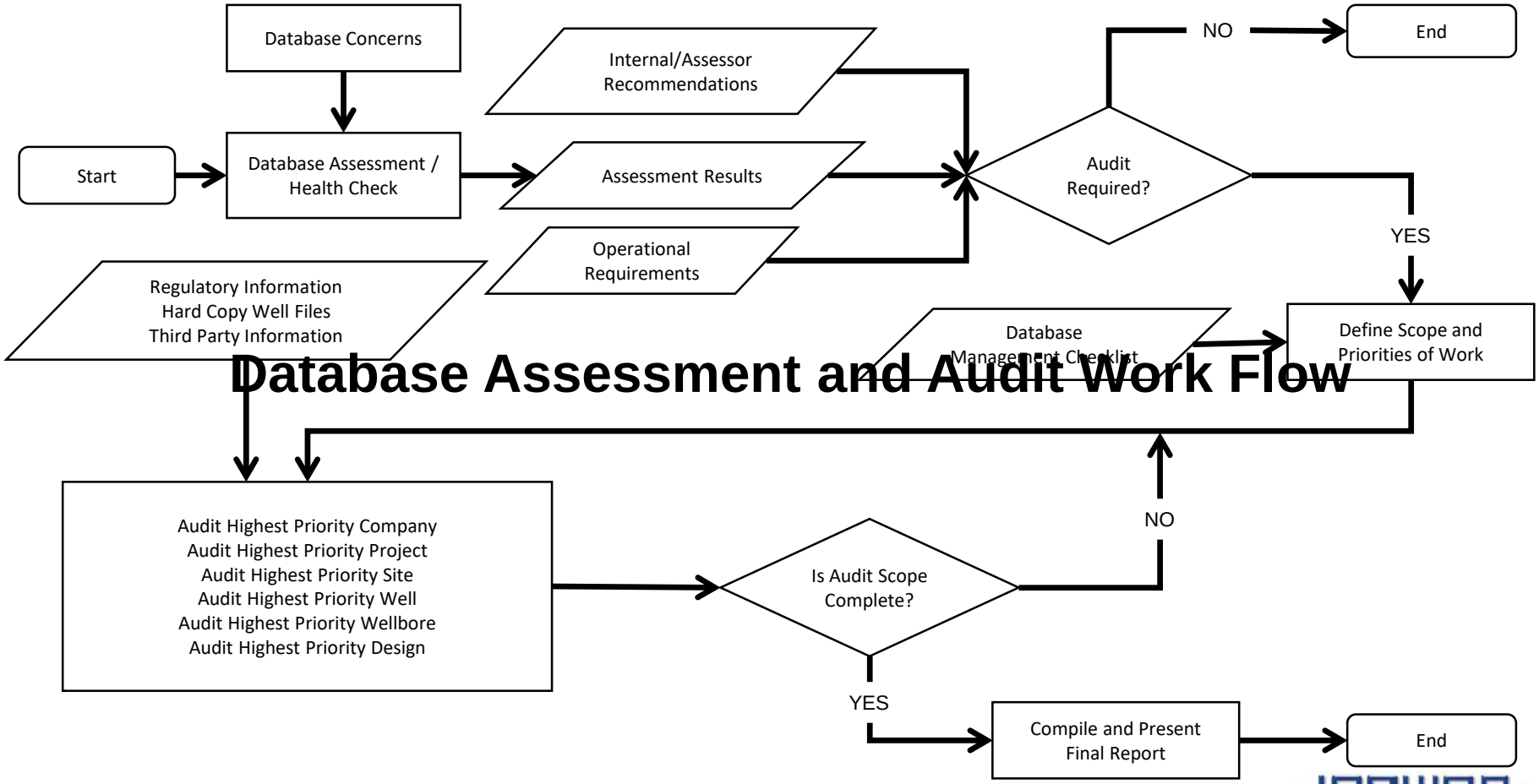


- How do we go about fixing/checking this data?

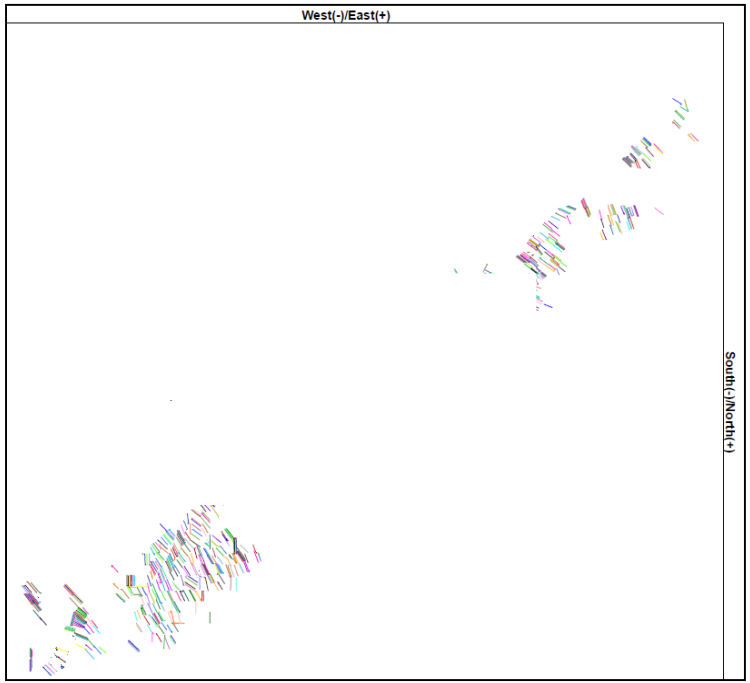
The Solution: Database Assessments and Auditing Techniques

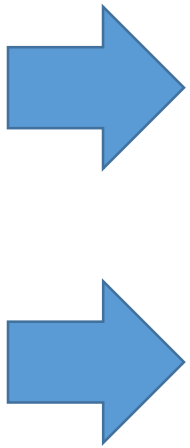


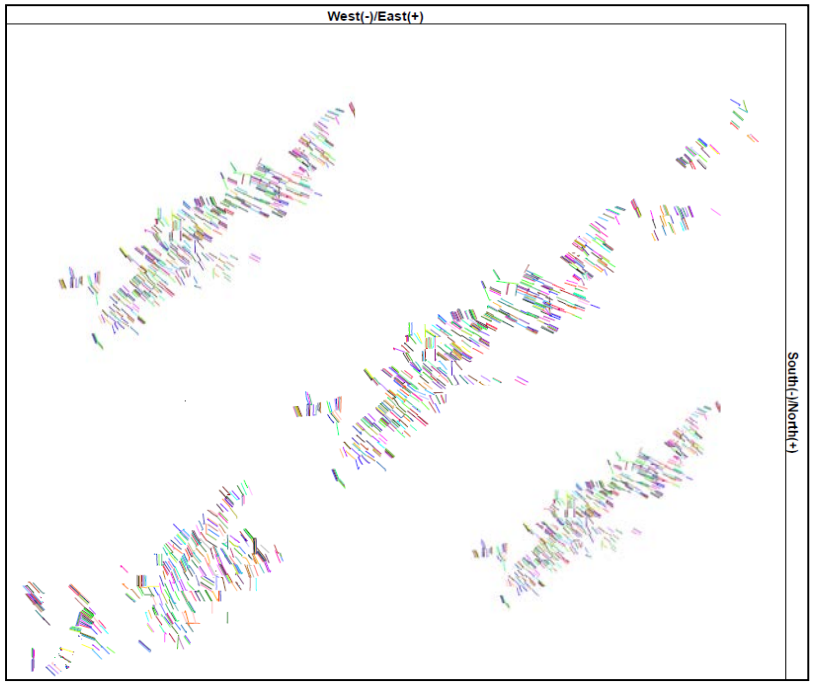
- Identify the software package you are using to tailor your assessment techniques
- Query appropriate fields from the database to perform your assessment and plan your audit
- Analyze results to structure and execute a database audit


Database Concerns
Internal/Assessor Recommendations
NO
End
Start
Database Assessment / Health Check
Assessment Results
Audit Required?
YES
Operational Requirements
Regulatory Information
Hard Copy Well Files
Third Party Information
Database Management Checklist
Define Scope and Priorities of Work
Database Assessment and Audit Work Flow
Audit Highest Priority Company
Audit Highest Priority Project
Audit Highest Priority Site
Audit Highest Priority Well
Audit Highest Priority Wellbore
Audit Highest Priority Design
Is Audit Scope Complete?
NO
YES
Compile and Present Final Report
End

Incomplete Database Population







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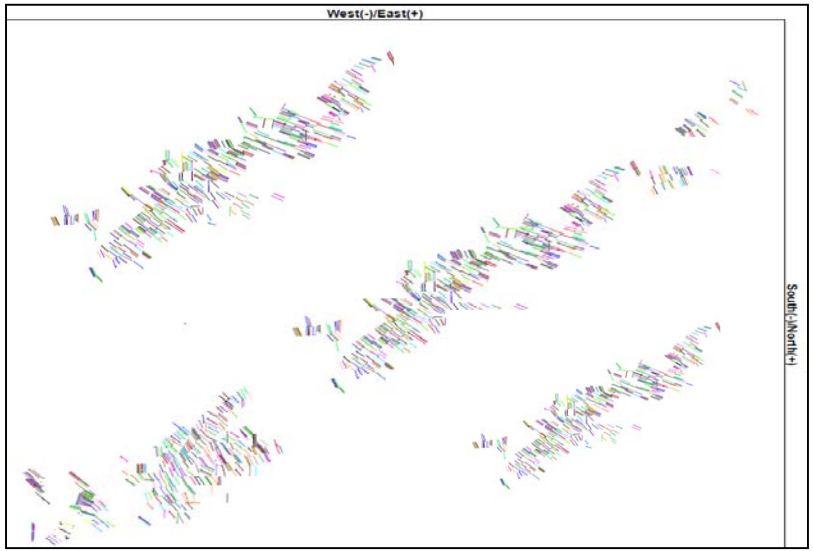


Goal

- Decrease the lateral spacing in the field
- Avoid confusion caused by acreage intermixed with several other operators

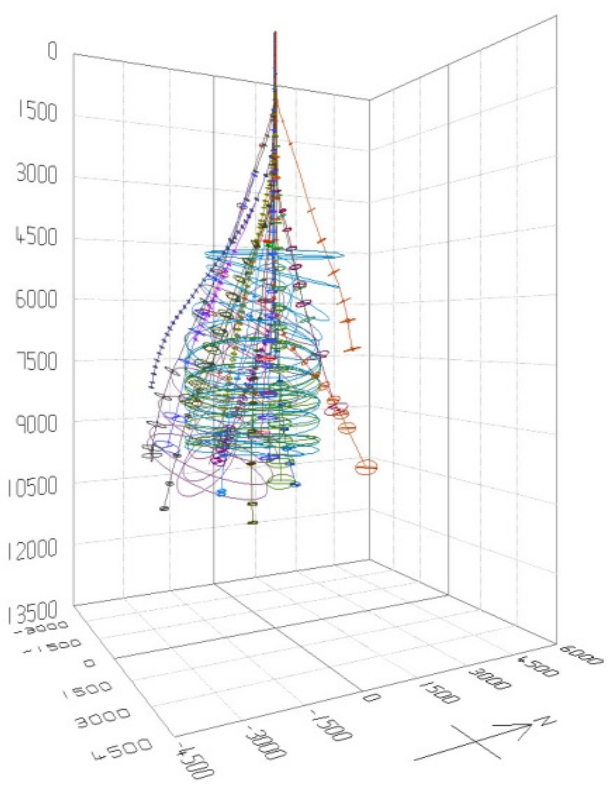
Strategy

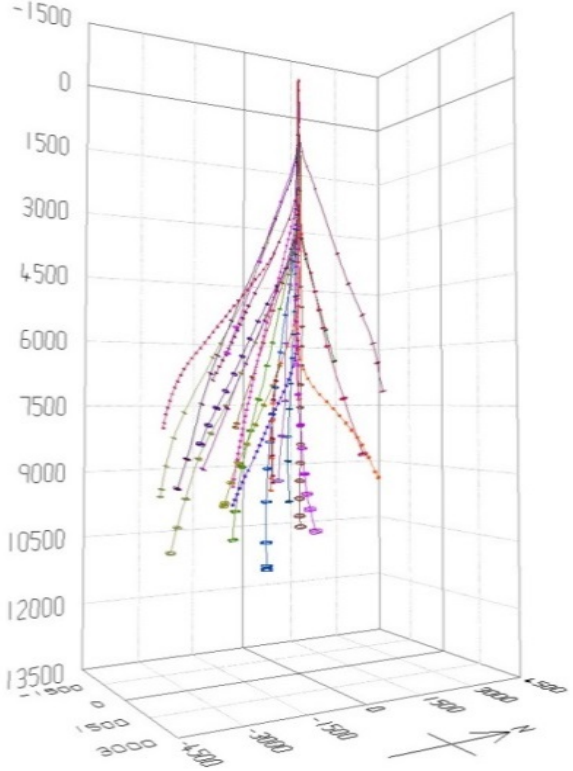
- Develop the standard procedures for entry of wellbore positional data into the database
- Conduct a deep dive for data on legacy wells from regulatory and third party data sources
- Digitize data for all wells, from all operators, in the area in order to make practical operations possible

Benefits

- Wells in asset are audited and entered in to the database for use with operations
- Planning efficiency increases, engineering lost time is reduced, which increases productivity
- Anti-Collision scans able to accurately represent the field

Make Your Asset Drillable Again





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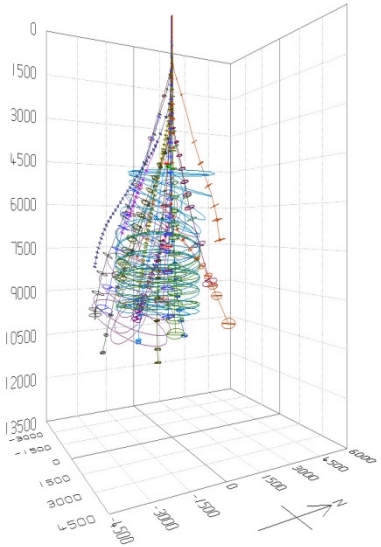
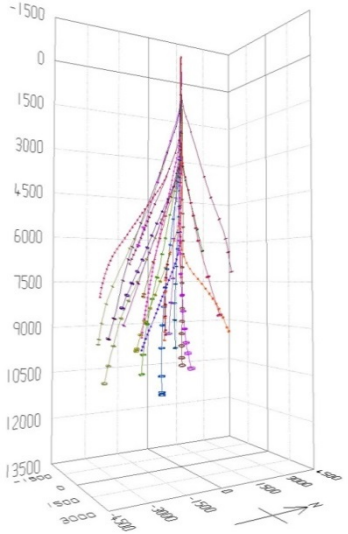




Goal

- Drill additional wells without anti-collision concerns.
- Improve error ellipses for the life of the asset
- Increase production from the pad

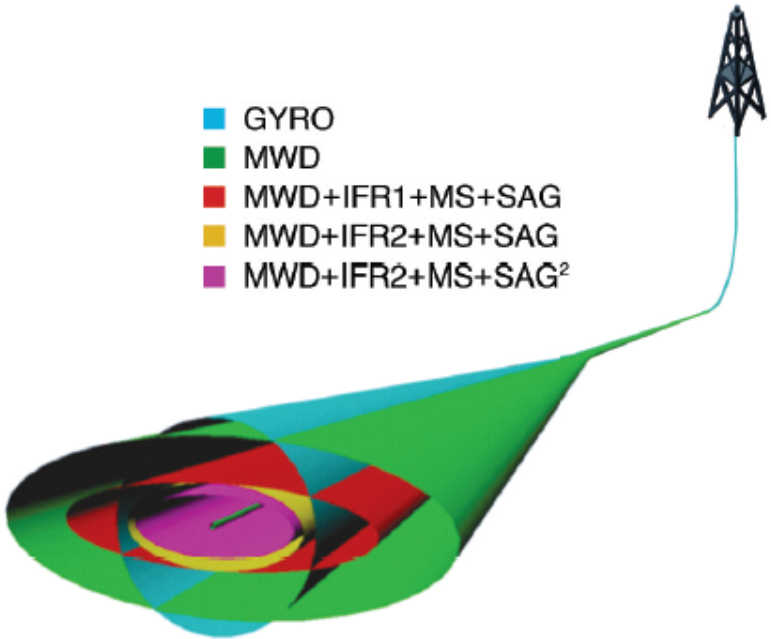
Strategy

- Optimize an audit to a single pad
- Identify correct survey tools used by studying hard copy reports and online regulatory data
- Assign casing, and all other pertinent information, by reviewing the driller's daily reports

Benefits

- Ellipse of Uncertainty dimensions are drastically reduced
- New wells are able to be planned without anti-collision concerns
- Additional wells able to be drilled in the future

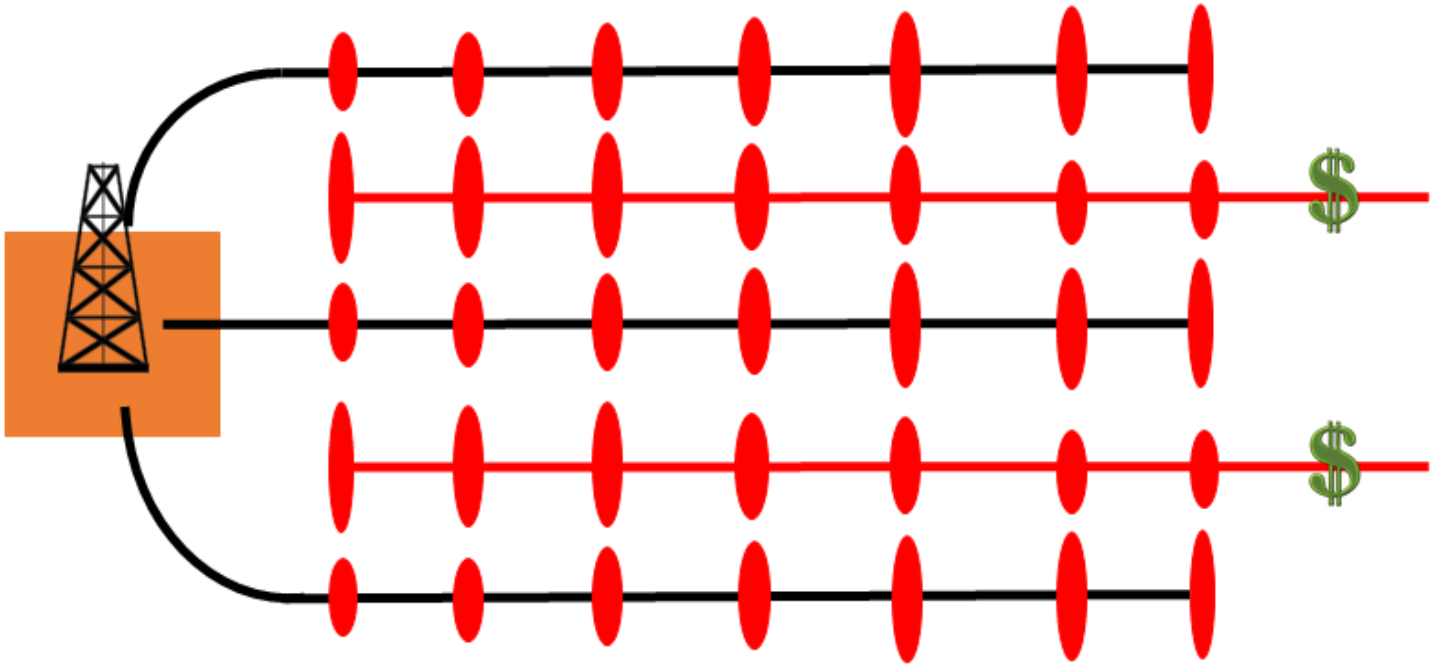
Survey Enhancement Applications



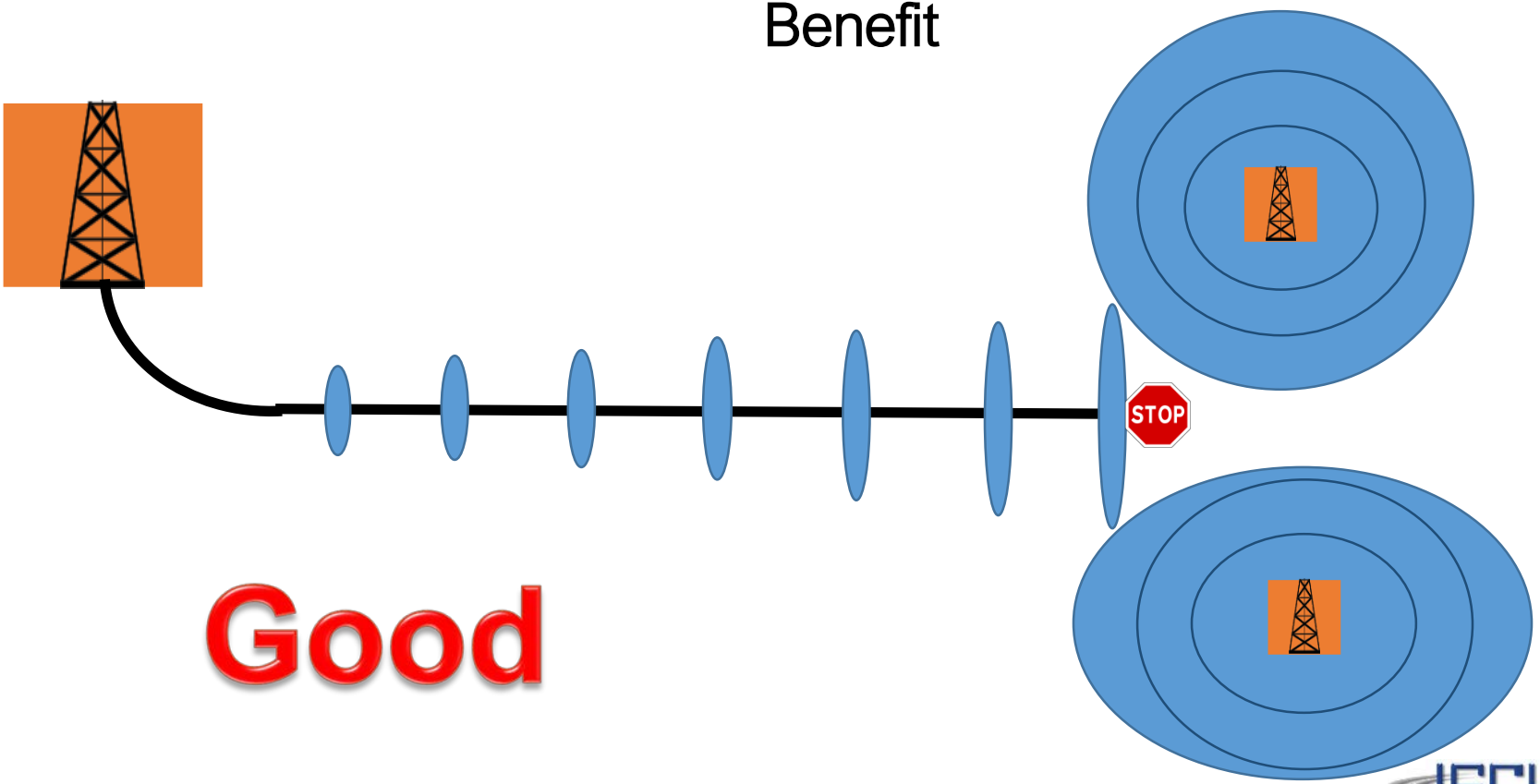
By utilizing advanced survey correction methods

- Enables enhanced tool-codes for your well-plans
- Survey accuracy and quality is increased
- Efficiency in planning new wells
  - More wells in an area
  - Tighter spacing
  - Helps mitigate AC issues

Optimize Field Development



Combining Database and Survey Enhancements for Maximum Benefit



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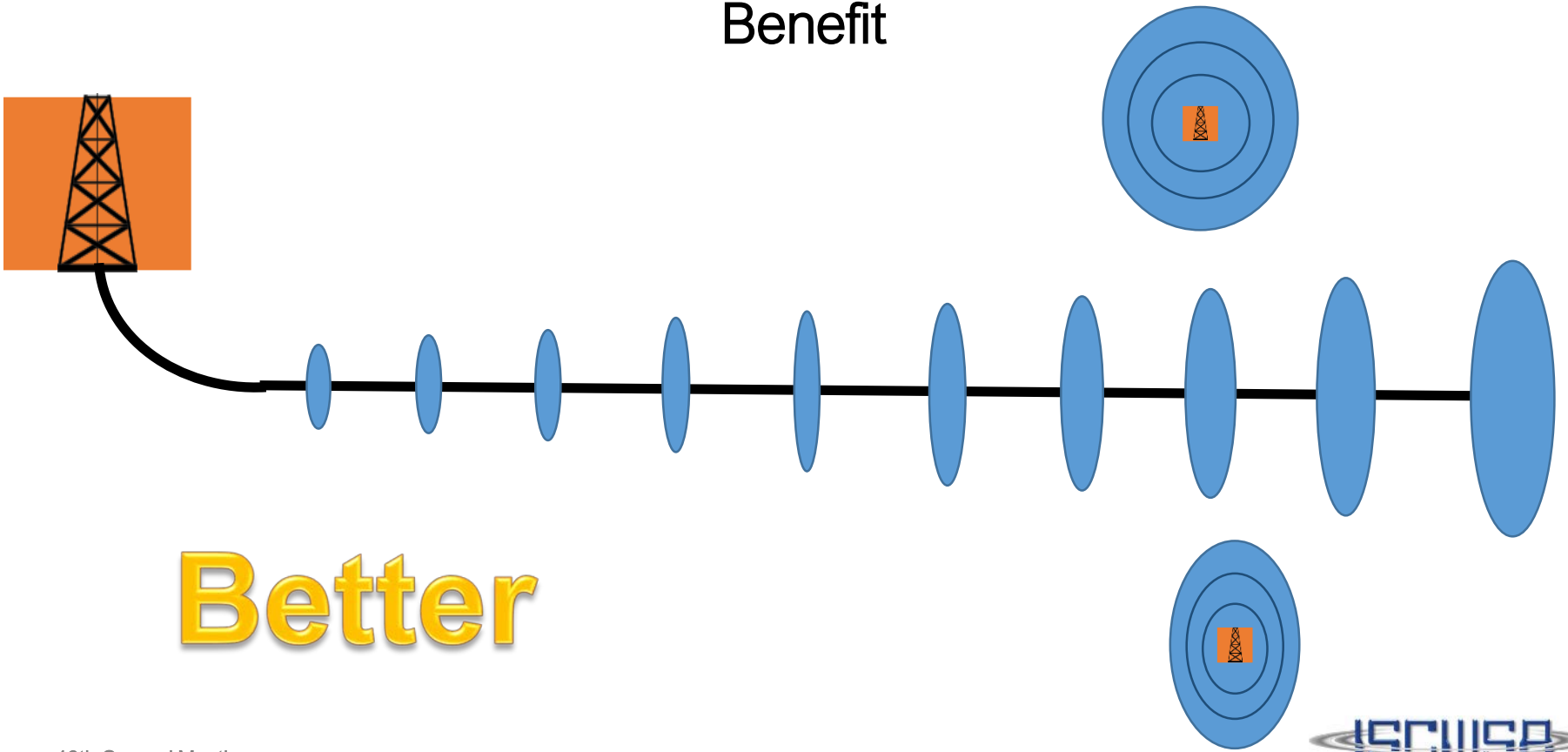

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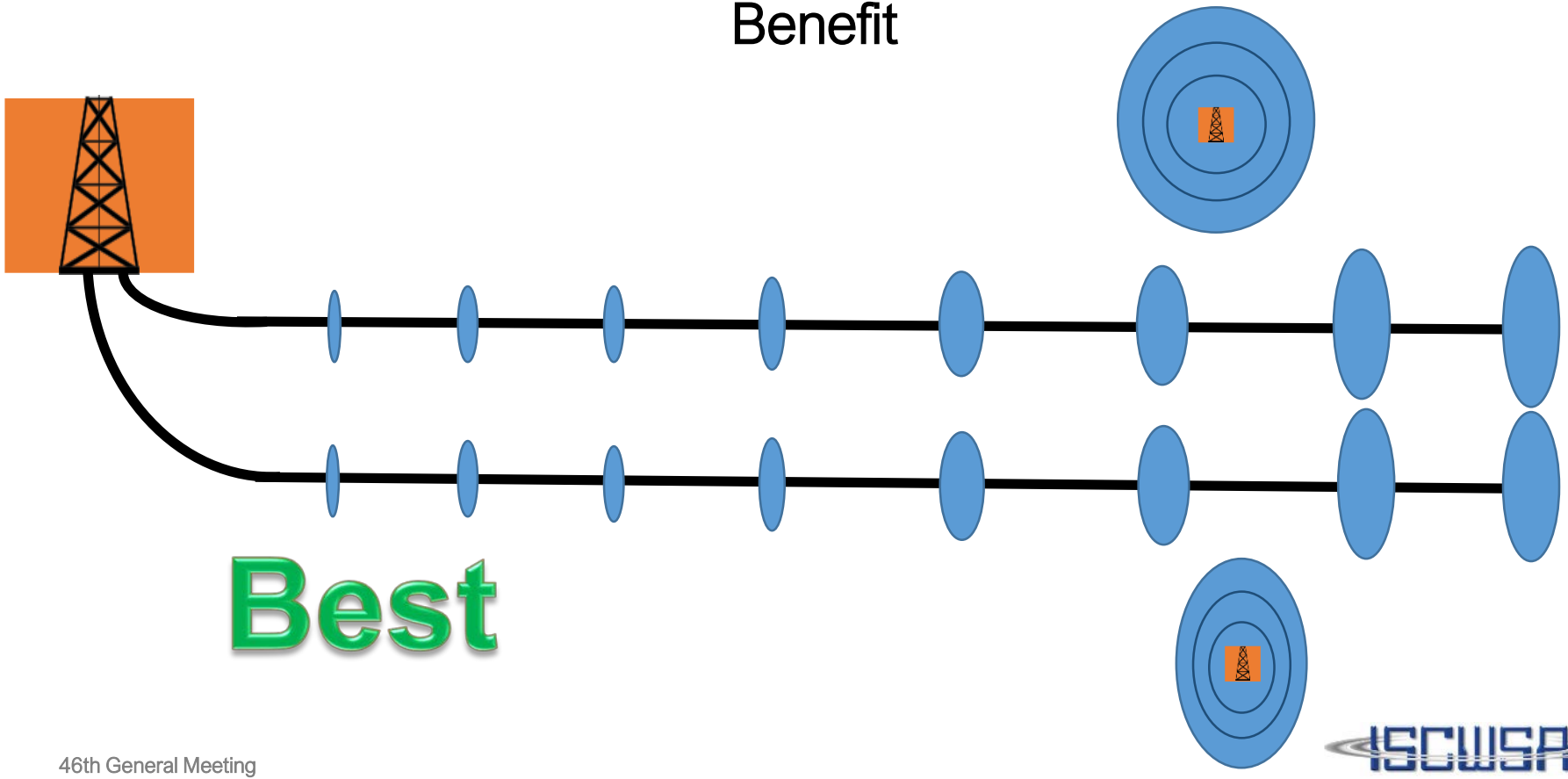

Accuracy

- Accurate database relating to Wellbore Position
- Database content is validated against multiple sources
- Directional surveys are corrected for accurate well placement

Efficiency

- Cleanup of database reduces calculation time of connected engineering applications
- Allow for engineers to validate their data, and eliminate lost time due to inaccurate models
- More wellbores able to be drilled from single pad
- Reduce non productive times and unneeded trips out of hole

Safety

- Anti-collision calculations are based on accurate data
- Eliminates potentially unknown safety concerns
- Identify potential problems in real-time with the foundation of solid historical data

Operate With Confidence!!

Confidence

Operating accurately, efficiently, and safely will guarantee maximum value returned on investment from an asset

Thank You!

Questions?