# 10THGLOBAL ENERGY FORUM





















The Path to Knowledge Transfer and Collaboration

Platforms for Connecting Results with Direction in a Changing E&P Landscape







# Our Business





Subsurface Teams
 Deployed Globally

• Diverse Portfolio







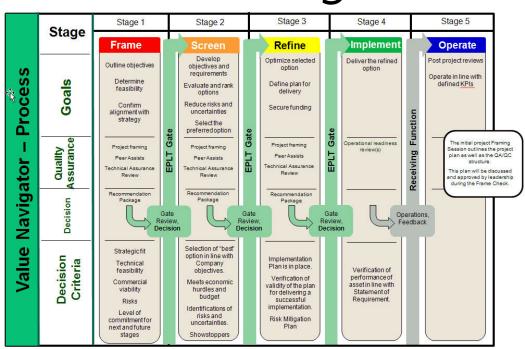
# Context: Strategy and Value



### 3 Pathways



### Value Navigator



# **E&P Strategy Transition**

### Quality Assurance











# Goa



- Develop a common system for subsurface evaluations performed by asset teams throughout the global E&P business
  - Complementary with Value Assurance process
- Subsurface Milestone & Deliverables (SMD) designed to :
  - Provide guidelines for project management and stewardship
  - Define milestones for the delivery of technical products
  - Set standards for integrity of technical products
  - Emphasize timely collaboration, documentation and knowledge transfer



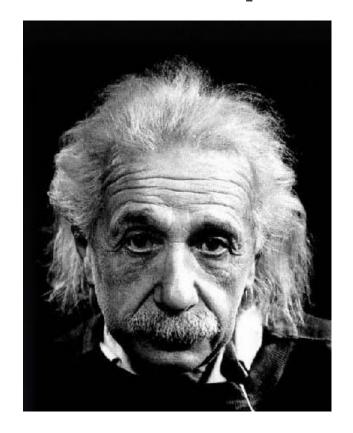




# The Trick



# "Everything should be made as simple as possible, but not simpler."











# Early Versions



### **Guidelines for Subsurface Work**

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Geological and simulation models are the primary basis for Subsurface Uncertainty An necessary to establish some team technical milestones for the subsurface interpretation efforts that result in these key deliverables. This document describes a set of technical a definitions and expectations associated with each.

The benefits of this "process" include:

DESCRIPTION

- Guidelines for project management and stewardship of technical work
- o Setting deadlines for the delivery of technical products
- o Setting a standard for the QC of technical products
- Real-time documentation of results of data collection, interpretation, integration recommendations
- Ensuring that all contributors to the asset-specific work have a clear understand the team and timelines for completing work
- Building a broader awareness and understanding of the results of our work with community
- o Providing a means for ensuring consistency of technical approaches across the

These guidelines can be used for planning purposes and should be adapted to suit the nor interpretation/modeling effort. It is our recommendation that all asset teams will these guidelines.

The Project Technical Team Lead for each asset has the primary responsibility for plan milestones and stewardship.

Some of these milestones represent significant peer assist opportunities. The participan milestone peer assists should be appropriate Geoscience and Reservoir Engineering state experts from outside the project. The peer assists should planned in advance and be helthat allows for incorporation of peer/expert recommendations.

Container Milestone

Properties Milestone

Static Uncertainty
Milestone

Combined Subsurfa
Uncertainty Milestone

Development Scenario
Milestone

Integrated Model TAR

### **Written Guidelines**

FRAMINGSESSION: This milestone represents an opportunity for reservinterpreters and geologic modelers to agree upon projects needs, timelines, general scope of modeling effort. This working session should include all c specific work early enough to incorporate recommendations and suggestion learnings from other projects. This workshop should focus on available data work plans.

- Define model objective(s): purpose(s), use(s), and expectation(s
- o Determine model AOI
- o Determine grid size/cell size
- Well data and well-seismic ties
- o Regional context and previous work
- o Key stratigraphic surfaces (number of surfaces; level of detail)
- o Preliminary EODs
- Early observations regarding reservoir stratigraphy (potentially perm conduits, etc)
- o Key faults and general structural styles
- Early observations regarding structural complexity, fault compar
- General seismic definition of resource
- Identification of data limitations and/or uncertainties
- o Analogs

### CONTAINER MILESTONE:

The objective of this peer assist is to determine if the structural and stratigra appropriate to form the basis of the geocellular model framework. Limitatio interpretation inputs will be identified and decisions on adequacy of geolog purposes will be made. In cases where seismic interpretations were made in conversion takes place in Petrel, detailed QC of depth conversion methods framework in Petrel will be reviewed. Documentation that includes the follower.

### Stratigraphic interpretation

- Demonstration of basis for proposed sequence straigraphic framewo hydrocarbon-bearing intervals into mappable, genetically related pax the model. This includes a review of well-seismic ties on seismic vo incorporating bio-stratigraphic data and/or regional correlation fram
- QC of horizon grids: definition, basis and reflection characteristics (sequence boundaries, flooding surfaces, abandonment surfaces, etc. and consistency
- QC of isochron grids: produced for every interval to be replicated in geologic reasonableness and thickness variation across faults, etc.
- QC of seismic extractions, reservoir visualization products and prelii
  produced for every interval to be replicated in the model reviewed g
  clarity of interpretation

### Structural interpretation

- Demonstration of basis for proposed structural framework that utiliz and observations of local features. This includes a review of all iden and potential compartments.
- QC of TWT or Depth structure maps: produced for every framework in the model

6

- QC of fault networks: definition and basis of interpretations, appropriateness, extents and consistency of throws
- o QC changes in thickness across faults
- o Fault-plane profiles, and fault throw profiles

### Definition of hydrocarbon contacts and distribution

- o Demonstration of know of interpreted fluid contacts from log and MDT data
- Demonstration of rock physics characteristics of hydrocarbon and water bearing reservoir
- Seismic definition of hydrocarbon contacts and aquifer extents

### Geo-cellular model framework

- o Well ties
- Initial Horizon/Fault QC in Petrel
- o Review final isochron maps from Petrel framework
- Review/edit fault throw and changes in thickness across fault in Petrel framework
- o Velocity model QC and depth conversion methodology
- o Alternate depth-conversion scenarios

### PROPERTY MODELING MILESTONE:

This milestone should include a through review of reservoir properties planned as inputs to the geologic model. Where appropriate, a discussion of various scenarios for reservoir description should be explored. Expected technical products include:

- o Description of low-and high-order stratigraphy and finalized, reservoir nomenclature
- Demonstrative of sub-regional context and use of block-wide analogs
- Enhanced visualization and/or volume based seismic conditioning products used to refine reservoir description
- o Description of uncertainties in reservoir description and/or data limitations
- Petrofacies logs (most current vintage)
- Lithofacies interpretations (edited petrofacies) with conventional core and/or sidewall core calibration where available
- o EOD maps (Polygons) for all zones to be relicated in model
- o NTG targets by Zone and EOD and basis for assignments
- o Lithofacies targets by Zone and EOD and basis for assignments
- Preliminary volumetrics in Excel spreadsheet based on GRV from Petrel (by EOD); lithofacies targets (by EOD); average Porosity and Swi (by Lithofacies) and average Bo
- Choice of model layering style(s) (including the need for thin layers to model gas over-running and/or water under-running)
- Discussion of variogram ranges (by EOD and Lithofacies)
- o Identification of seismically-resolvable baffles/barriers and/or high perm streaks
- Conceptually-driven model, analog data set, or approach to be used for sub-seismic architectures including baffles/barriers and/or perm streaks

### FINAL MODEL QC MILESTONE :

This milestone constitutes the final, detailed QC of the base geologic model prior to initiation of the Static Uncertainty Analysis. Expected technical products include:

- Summary documentation of all previous technical milestones and related work
- Demonstration of match between well-based and seismically derived inputs and model characteristics
- Demonstration of match between model NTG and lithofacies to input targets
- o Porosity distributions
- o Poro-Perm relationships
- Satuation
- o Volumetrics (GRV, NRV, HCPV, STOOIP)
- o STOOIP and/or HCPV Maps







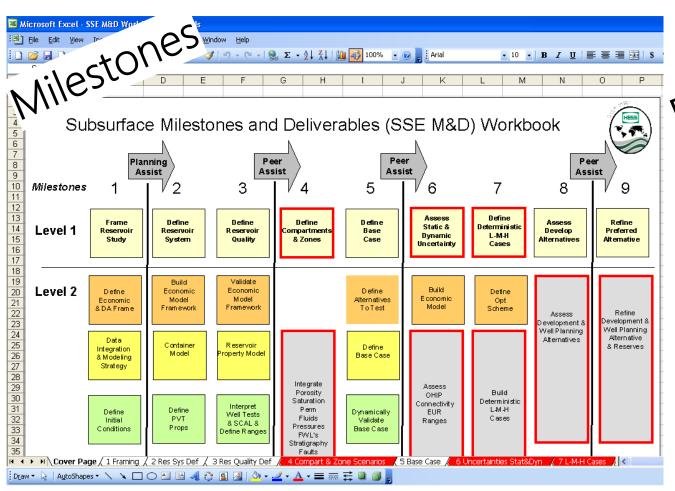




# Next Steps







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		ntainer Mod	el	Fluid Deliverable	Status	zation Comments	Refined Petrophysics I Deliverable	tegrated to Stratigraphic S Status C				
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5	Horizon, isochore/chrons, unconformities		Definition, basis, & reflection characteristics, appropriateness, extents, & consistency	Initial reservoir conditions used for analysis		Pressure, temperature, & fluid composition tables	Integrated results of core and SCAL		XRD, Poap, core- properties, exces based NMR data			
6	Potential stratigraphic compartments		Integrate with fluid pressure & geochem to interpret connectivity & segmentation	Depth gradient plots		GOR/GCR, Pb, Bo/Bg, µo/g, Ro/Rs, fluid densities, compositional With fluid contacts	NMR-refined Sw, PHIT/PHIE, and Perm					
7	Integration of seismic attribute analysis		AVO, etc.	Pressure plots		GOR/GCR, Pb, Bo/Bg, µo/g, Ro/Rs, fluid densities With saturated & undersaturated curves	Summary of basic mechanical properties & log-based physics					
	Updated and integrated Petroleum systems, structural modeling, geo-chemistry, other as required		Demonstrate integration	Organic solids in oil (asphaltene) & AOP*			Porosity and Perm vs. depth relationships					
	QC of depth conversion models & depth converted framework		-Seismic-well ties, velocities, etc. -Velocity model QC & depth conversion methodology	Summary of decontamination corrections			Facies predictions and/or Flow Units					
10	Fault geometries demonstrated		-Fault surfaces, linkages, throw profiles, & thickness changes -Juxtaposition & shale gouge ratio	Summary of EOS parameters		EOS Predicted Pressure with TVD vs. MDT Pressure	Facies-based permeability					
11	Structural Framework Interpretation		-Concept demonstrated -Basis utilizing both sub-regional trends & -Basis utilizing both sub-regional trends & -Board fault networks (TWT/Depth) replicated in modelFault extents, tip-outs, etc. demonstrated	Eolipse input tables / properties		Compositional gradient model & predictions PVT, MBAL PVT, "AOP - Asphaltene Onset Pressure						
	Diagrams to show structural segments that may represent potential compartments		Integration with fluid pressure & geochem to interpret connectivity & segmentation									
	Evlauation of fine-scaled features		Examples: sub-seismic faults, fractures, & deformation bands, etc.									
	Fluid Contacts & Distribution		Demonstrated integration of log, pressure, rock physics, seismic attributes, geochemistru									
	Geomodel Framework & Pillar Grid		-Demonstrate that the structural framework appropriately reflects geoscience interpretation & data -Vell ties, initial horizon/fault QC, isochore									





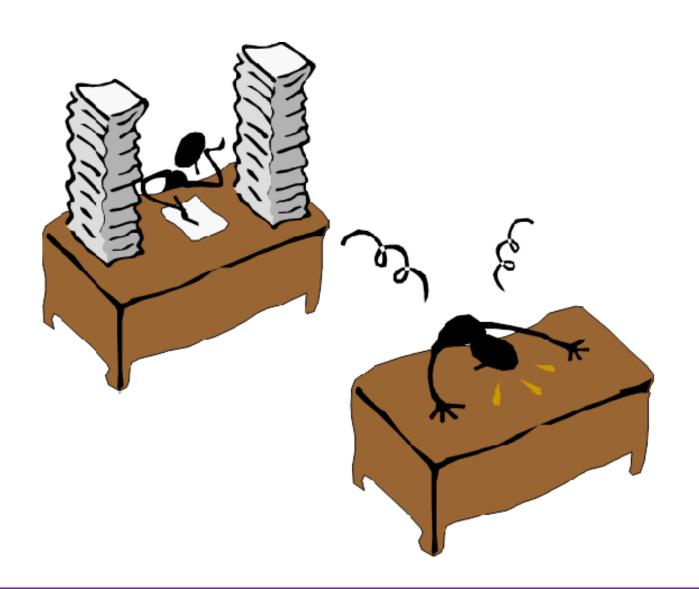






# The Problem





# Content was good, but implementation was difficult

- Amount of material was overwhelming
- Products were dull
- User case was not compelling
- Delivery was awkward
- Maintenance was impossible



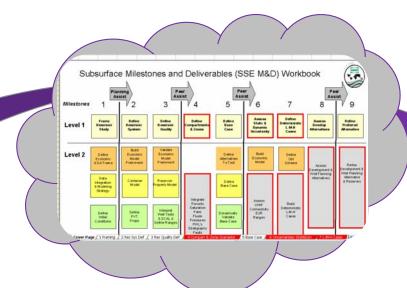








# Inspiration





### SMD

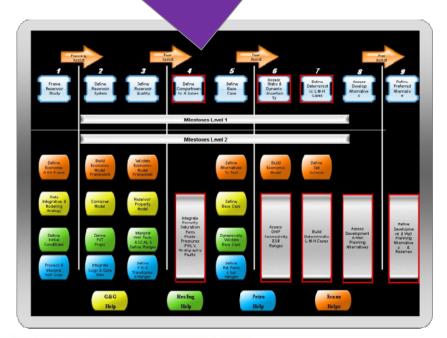
Cover page graphic



Popular Tablets

•compelling user interface designs









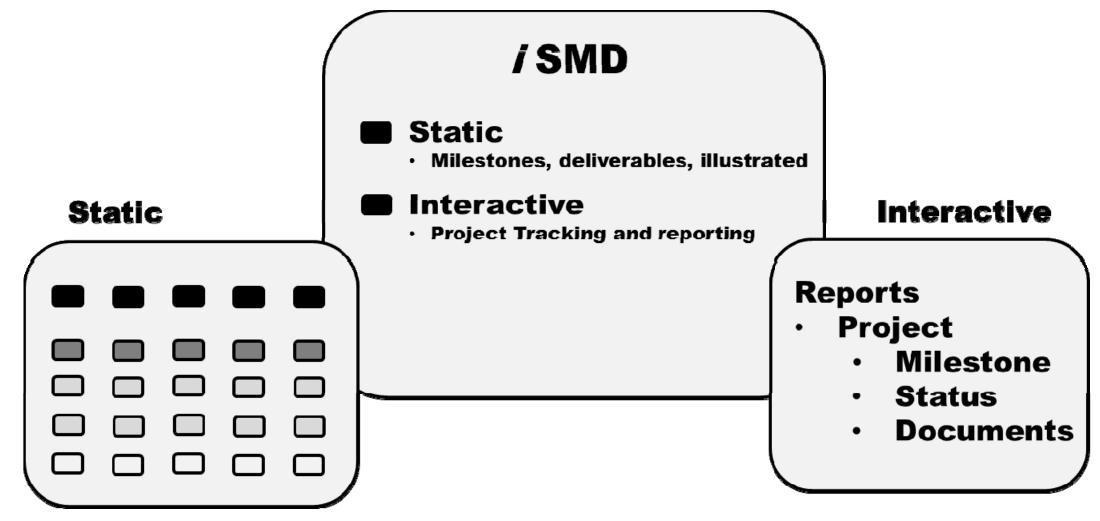






# The Concept















# Technology Platform



Intranet Solution ...

- ✓ Scalable
- ✓ Secure
- ✓ Intelligent
- ✓ Configurable
- ✓ Fast

Technology Implementations Focused on ...

- ☐ Knowledge Management Systems/Bases
- ☐ Business Decision Support Systems
- Opportunity Inventories
- ☐ Ideas/Innovation Information Management
- ☐ Lead & Prospect Lifecycle Management

Leverages the following Standard Microsoft Technologies ...



















# Implementation Challenge





- High quality information content
  - Tried, true & tested
- Alignment with the new Hess E&P strategy.
  - Success possible only if tools are clearly identified with the goals of the E&P strategy
- Deployment
  - immediate user access within the Hess desktop environment on a global basis
- Usability
  - tools that complimented current workflows
  - required little training
  - compelling user interface

Uptake & Impact









# PathFinder





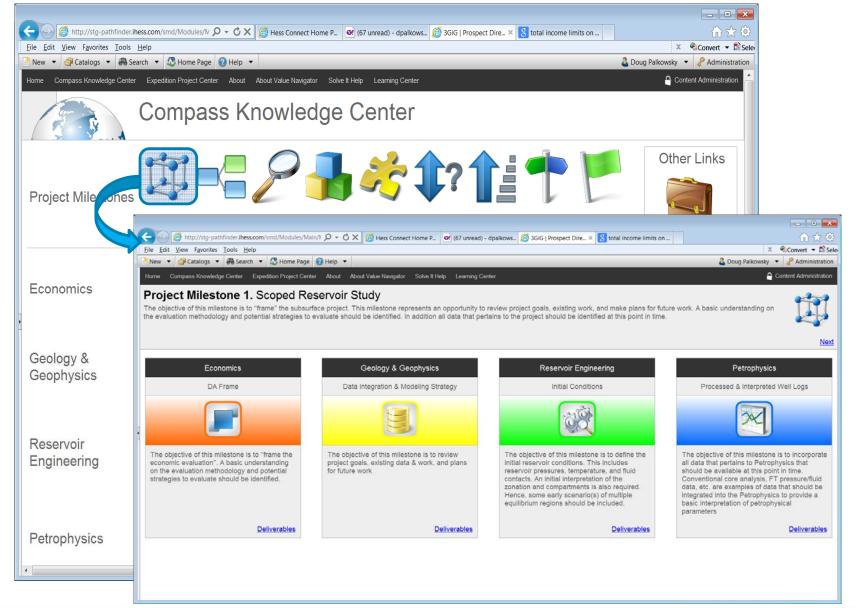






### Compass Knowledge Center – Milestone Descriptions











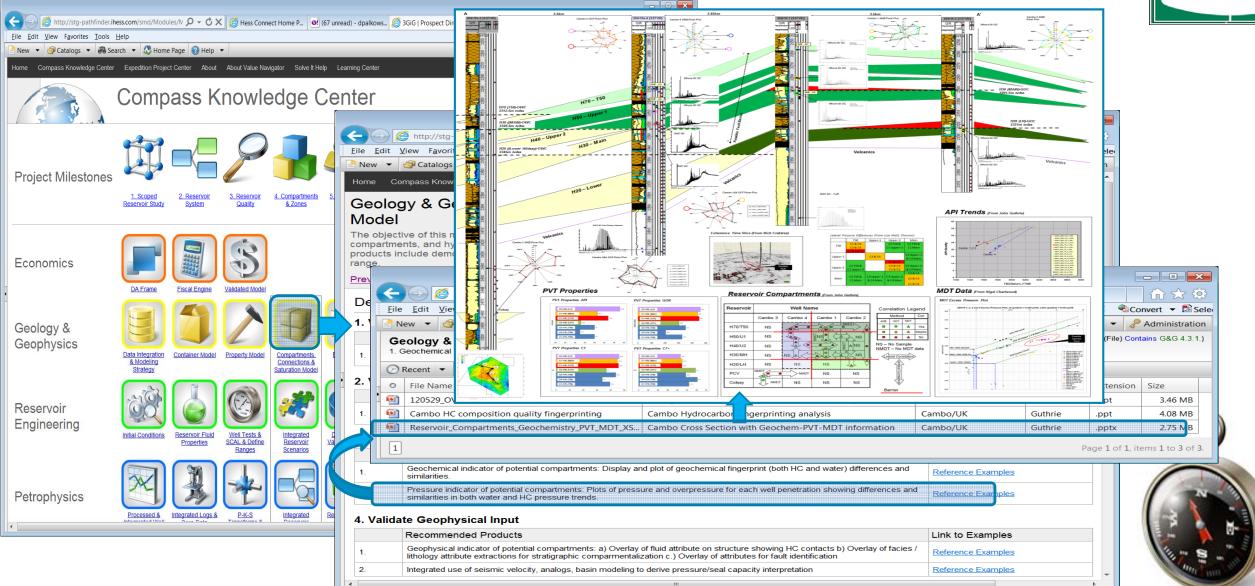






# Compass Knowledge Center – Deliverable Examples







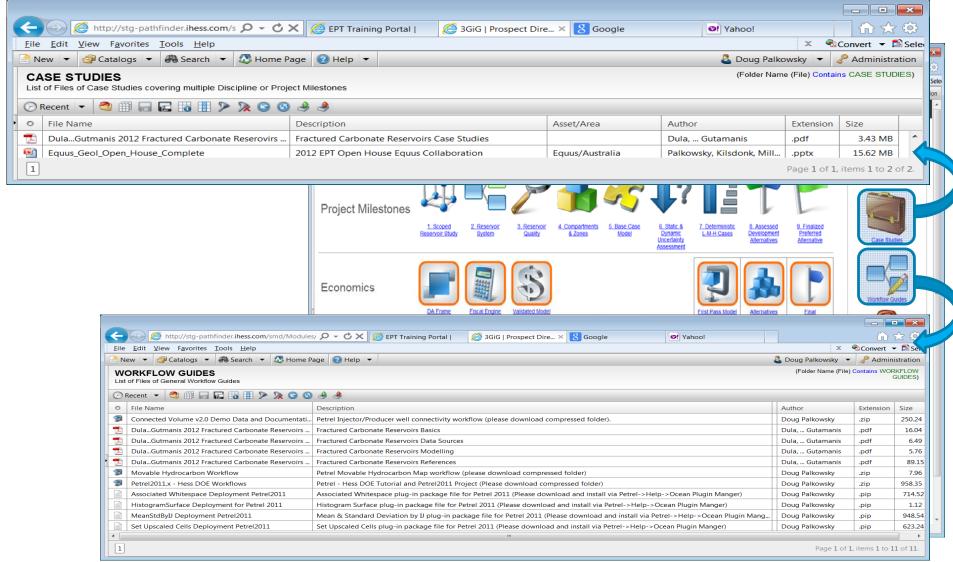




### Compass Knowledge Center –

Case Studies / Workflows











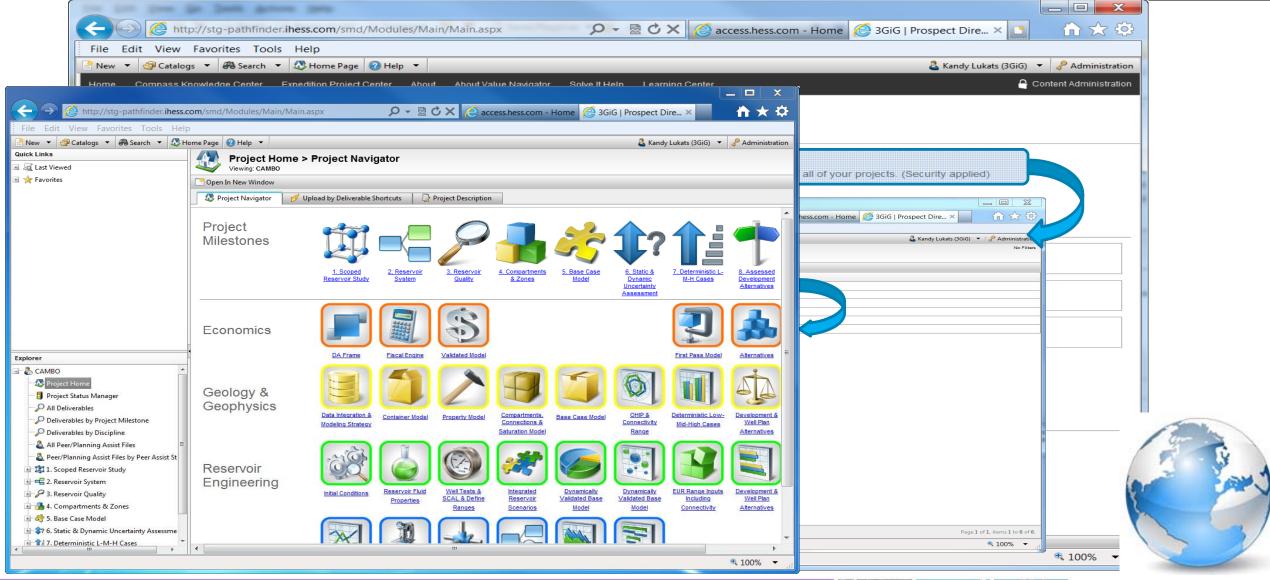






### Expedition Project Center – Secured Project Access





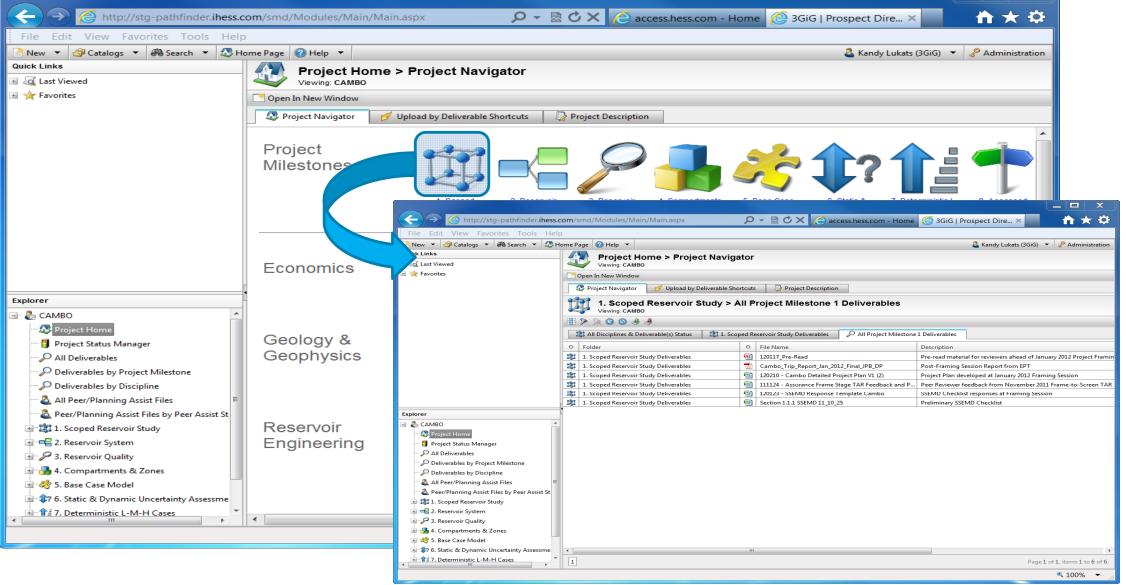






## Expedition Project Center – Adding Documents







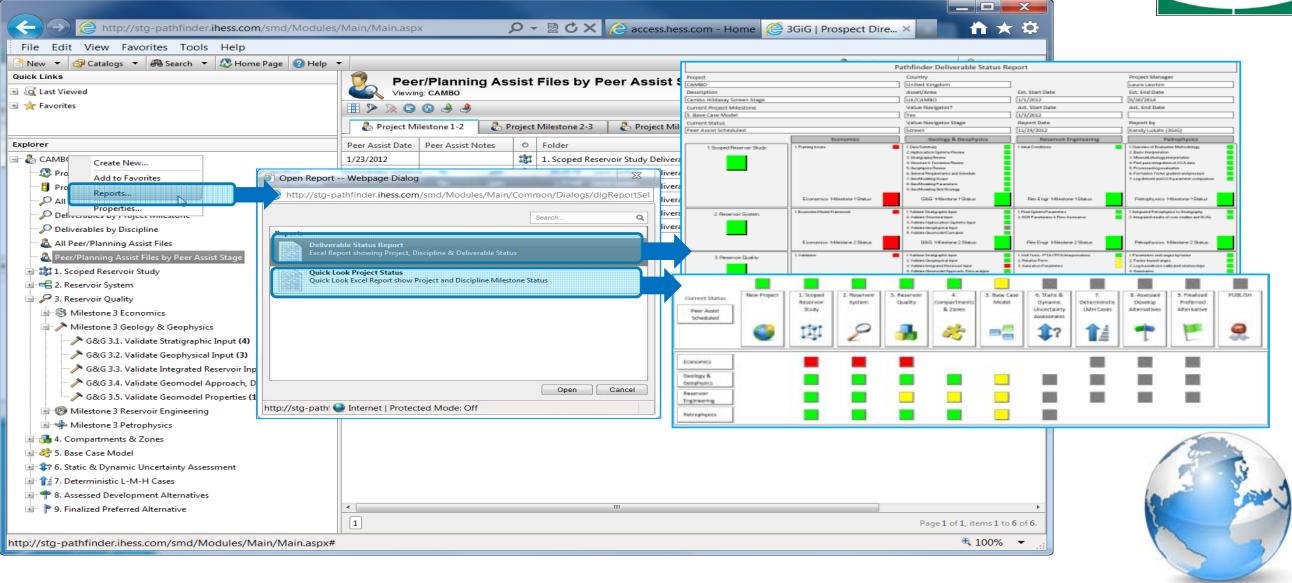






### Expedition Project Center – Status Reports













# Development Timeline



			2009 2010					2011				20					13		Product Vision		
Early Versions	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
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# Conclusions







Subsurface Milestones & Deliverables

Tools for the Hess E&P Strategy







- 1. Link to Company Goals
- 2. Immediate Access
- 3. Simplicity & Usability
- 4. Compelling User Case



















# Thank You!





