Managing Smart Assets

Training Needs for Collaborative Decision Making

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SPE DISTINGUISHED LECTURER SERIES

is funded principally through a grant of the

SPE FOUNDATION

The Society gratefully acknowledges those companies that support the program by allowing their professionals to participate as Lecturers.

And special thanks to The American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) for their contribution to the program.
Expectations from Energy Industry

- Sustainable Base
- Environmentally Clean Operation
During The Next 100 Years
With Carbon Management Initiatives
Fossil Fuels Will Still
Continue As Major Sources for
Global Energy Supplies
For Oil and Gas: What is needed to push the Peak Production to the Future?
Roadmap

- Find **New Feedstock**
- Improve **Economics**
  - Invest in **New Smart Technologies**
  - Invest in **Manpower Development**
Feed stock for Oil and Gas Resources?

- Extend Recovery Factors in Mature/New Fields
- Explore and Produce From Harsh Operating Environments
- Invest in Unconventional HC Resources
Improve Economics and Extend Life of Current Assets

• Slow Decline From Mature Fields
  • Invest in Information Technologies
• Invest in Smart Oilfield Operations
  • Improve Reliability/Uptime
  • Reduce Re-entry
  • Standardize- Plug and Play Engineers
• More Assets with Limited Workforce
• Implement New Collaborative Training and Decision Support Systems
Catch up with the use of Information Technologies

Electronic Warfare  
Medical Fields  
Space Missions
Invest in Smart Oilfield Technologies

Smart Oilfields
Smart Wells
Real Time Operations
Fuzzy Logic
Subsea Robotics
Real Time Remote Operations
Sensor Nets
Intelligent Completion
Immersive Visualization
Data Mining
Grid Computing

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Focus on Maximum Contact Wells

Multi-Laterals
Join the Evolving Paradigm of Smart Asset Management
Take Remedial Steps To Solve The Problem Of The Aging Workforce
Manpower Issues

- Recruiting Top Talents
- Training for Adaptation of Information Technologies
- Conducting Operations in Collaborative Fashion
Improve Oil Industry’s Image

- Past Practices
- Low Tech Reputation
Eliminate Low Tech Practices

- Inefficient Operations:
  Abandoned fields after 15-30% recovery factor
- Poor Preventive Maintenance
- Poor Data Management
- Disconnected Decision Support Systems
Incentives for Change

- Reduce Human Error
- Reduce Re-entry cost
- Reduce Cost
- Implement Automation
- Improve Decision Making
Integrated Oil and Gas Assets

- Upstream
  - Subsurface
  - Wellbores
  - Surface
- Transportation
- Processing
- Marketing
First Steps in Industry’s Response

Reservoir Oriented Viz Rooms
Information Technology

- Visualizing By-Passed Oil
- Integrated Asset Management
- Small Foot Print
- Multidisciplinary Collaboration
Upstream Decision Support Systems

Are we behind?

Future

Present

Past
Integrated Asset Management

Global Scale

Local Scale

- Production
- Development
- Exploration
- Global Talent Pool
- Processing
- Transportation
- Marketing
The Changing Face of the Industry
The High Tech Oil Industry

- New Biz Drivers
- Focusing on Technology Gaps
- Urgency
- Implementation Pathway
- Role of Universities, Professional Societies, and Companies
- Improved Prospects in Environment, Security, Safety monitoring
For

- Improved Productivity
- Quick Access To Data
- Reduced Mundane Work
- Reduced Human Error

Against

- Cost
- Job Security
- Chances of Failure
- Disruption
Integrated Decisions Support System

Combine

- Technical Feasibility
- Economic Feasibility
- Environmental Feasibility
- Social Feasibility
Incentives

Minimize and Reduce Uncertainty
Provide Real Time Access To all Data
Make Decision in an Real Time Integrated Environment
Eliminate Silo Style Decision Making

- Fuzzy Expectations
- Decision with Missing Information
- Hasty Elimination of Options
- Lack of Integration
Technology Enablers...

Transformational Technologies
  – Smart Hardware
  – Information Technologies

Real Time Decision Support System
  – Data Mining
  – Immersive Visualization
  – High Performance Computing
Providing Integrated Decision Support System Training

- Role of Universities
- Role of the Operating Companies
- Role of Service Companies
- Role of Professional Societies
Current SPE Standards Needs Augmentation: Competency for Petroleum Engineers

- *Petroleum engineering sub-disciplines:*
  - drilling,
  - completion/
  - production/facilities,
  - Formation evaluation
  - Reservoir
  - Economics.
Managing the Manpower Problem

- Engineering Isolationism
- Interdepartmental Disconnects
- Multidisciplinary Participation
- Core Competencies
Need for Hybrid Petroleum Engineers

Operating and Designing New Systems
Innovating New Solutions
Building Default Systems
**Working Collaboratively and Globally**
Thinking in Non-Traditional Ways
Skills of The Hybrid Petroleum Engineer

- Well Versed in Information Technologies
- Knows how to Defines the Solution at the Right Level
- Can Operate in Asset Decision Environment
What Do we Need?

Managing Resources with Immersive Visualization, transparency and Control

Employing Integrated Asset Management
Emerging Hybrid Curriculum

- Modeling of Virtual Environments
- Visualization of Huge Data Sets
- Asset Modeling Training
- Collaborative Working over Distance
- Integrated Virtual Reality and Haptics
- Decision Support with Continuous Feedback
Case for Collaboration

Cannot Expect Adequate Solutions from:

- a single individual,
- a single discipline or,
- disconnected multi skilled experts
Step 1 - Introduce Remote Learning

- Virtual Classrooms
- Decision Support Centers (Local-Global)
- Internship on Remote Operation
  - Cultural Issues
  - Reliability
  - Risk
Step 2 - Collaboration

Expand the Comfort Zone of Verbal And Written Communication

Expect Working on a Common Intellectual Effort

Expect Working with Others Who May Not Be Immediately Connected
Goals for Collaborative Training

- Building Collective and Core Competencies
- Faster Problem Solving worldwide
- Implementing Best Practices
- Accessing Remote Experts for Problem Solving
Manpower Planning - Operators

- Identifying and Empowering Champions
- Mentoring New Recruits
- Re-Training the Experienced
- Emphasizing on Team Building
- Educating Staff on Working With All Data
- Educating Staff on Working With Risk Based Decisions
Culture Change

- Communicate and Learn from Mistakes
- Align Objectives
- Promote Trust in Integrated Systems
CiSoft’s Model

- Educational Opportunities in Smart Oilfield Technologies
- MS in Smart Oilfield Technologies
- Certificate Education for Experiences Engineers
- CiSoft Academy for Summer Interns

http://cisoft.usc.edu
Modules

- Collaborative Decisions Support Systems
- Remote Sensing
- Remote Operations and Control
- Work Process Definition and Automation
- Immersive Visualization
- Data Management
USC’s Program

Smart Oilfield Technologies

- PTE 586
  Intelligent and Collaborative Oilfield Systems Characterization and Management

- PTE 587
  Smart Completions, Oilfield Sensors and Sensor Technology

- PTE 588
  Smart Oilfield Data Mining

- PTE 589
  Advanced Oilfield Operations with Remote Visualization and Control
Summary

- Need For Joint Efforts By SPE/Universities/Companies To Augment PTE Curriculum With Smart Oilfield Technologies
- Need For Training New Engineers In Collaborative Decision Support Centers