Society of Petroleum Engineers

Technical Discipline Categories

Several years ago, SPE organized many of its activities along six primary technical disciplines. While many activities are interdisciplinary, it was necessary to make decisions about the "primary" place SPE would consider these activities. The following illustrates how SPE has described what falls into each technical discipline.

1. Drilling and Completions

- *1.1 Drilling Project Management*
  - 1.1.1 Contracting Strategies
  - 1.1.2 Performance Measurement, Technical Limit
  - 1.1.3 Equipment Integrity, Failure Analysis
  - 1.1.4 Real-Time Data Transmission, Decision-Making
  - 1.1.5 Risk Reduction
- *1.2 Drilling Design and Analysis*
  - 1.2.1 Bit Selection, Performance
  - 1.2.2 Drillstring Design
  - 1.2.3 Torque/Drag Modeling, BHA Performance Prediction
  - 1.2.4 Trajectory Design, Survey Calculation, Collision Checking
  - 1.2.5 Materials Selection (Casing, Fluids, Cement)
  - 1.2.6 Well Control, Blowout Flow Modeling
  - 1.2.7 Pressure Management (MPD, Underbalanced Drilling)
- *1.3 Wellbore Design/Construction*
  - 1.3.1 Wellbore Integrity/Geomechanics
  - 1.3.2 Horizontal/Multilateral Wells
- *1.4 Drilling Equipment and Operations*
  - 1.4.1 Drilling and Well Control Equipment
  - 1.4.2 Drilling Fluids, Handling, Processing and Treatment
  - 1.4.3 Downhole Operations (Casing, Cementing, Coring, Geosteering, Fishing)
  - 1.4.4 Site Operations
  - 1.4.5 Well Control, Blowout Control, Relief-Well Drilling
- *1.5 Completion Planning, Design and Installation*
  - 1.5.1 Formation Isolation
  - 1.5.2 Perforating
  - 1.5.3 Sand Control
  - 1.5.4 Completion Equipment
- *1.6 Intelligent Completions*
  - 1.6.1 Monitoring (Pressure, Temperature, Sonic, Nuclear, Other)
  - 1.6.2 Evaluation of Inflow
  - 1.6.3 Evaluation of Reservoir Behavior/Performance
- *1.7 Fundamental Research in Drilling & Completions*

2. Health, Safety, Security, Environment and Social Responsibility

2.1 HSSE & SR Management

- 2.1.1 HSE Management Systems
- 2.1.2 Reporting
- 2.1.3 Audit and Certification
- 2.1.4 Standards, Regulations and Codes
- 2.1.5 Human Resources, Competence and Training
- 2.1.6 Contingency Planning and Emergency Response

2.2 Health

- 2.2.1 Strategic Health Management
- 2.2.2 Health Impact Assessment
- 2.2.3 Exposure Assessment
- 2.2.4 Industrial Hygiene
- 2.2.5 Community Health Outreach
- 2.2.6 Infectious Diseases (HIV/AIDS, Malaria, Tuberculosis)
- 2.2.7 Noise, Chemicals, and Other Workplace Hazards
- 2.2.8 Ergonomics

2.3 Safety

- 2.3.1 Human Factors
- 2.3.2 Safety in Design and Engineering
- 2.3.3 Operational Safety
- 2.3.4 Transportation Safety
- 2.3.5 Chemical Use and Storage

2.4 Security

- 2.4.1 Facility Vulnerability Assessment
- 2.4.2 Security of Operating Facilities
- 2.4.3 Data and Communications Security

2.5 Environment

- 2.5.1 Global Climate Change/CO2 Capture and Management
- 2.5.2 Air Emissions
- 2.5.3 Produced Water Use, Discharge and Disposal
- 2.5.4 Waste Management
- 2.5.5 Naturally Occurring Radioactive Materials
- 2.5.6 Oil and Chemical Spills
- 2.5.7 Remediation
- 2.5.8 Facility Decommissioning and Land Reclamation

2.6 Sustainability/Social Responsibility

- 2.6.1 Integrating HSE into the Business
- 2.6.2 Environmental and Social Impact Assessments
- 2.6.3 Social Responsibility
- 2.6.4 Community Outreach
- 2.6.5 Partnership and Communication

2.7 Fundamental Research in HSE

3. Management and Information

3.1 Asset and Portfolio Management

- 3.1.1 Reserves Replacement and Booking
- 3.1.2 Economic Analysis Guidelines
- 3.13. Acquisition and Divestiture

- 3.1.4 Portfolio Analysis, Management and Optimization
- 3.1.5 Field Development Optimization and Planning
- 3.1.6 Integrated Asset Modeling
- 3.1.7 Project Economics/Valuation
- 3.1.8 Capital Budgeting and Project Selection

3.2 Risk Management and Decision-Making

- 3.2.1 Risk and Uncertainty Assessment
- 3.2.2 Emergency Preparedness and Training
- 3.2.3 Management Systems
- 3.2.4 Decision-Making Processes

3.3 Strategic Planning and Management

- 3.3.1 Exploration and Appraisal Strategies
- 3.3.2 Benchmarking and Performance Indicators
- 3.3.3 Project Management

3.4 Professionalism, Training, and Education

- 3.4.1 Ethics
- 3.4.2 Personnel Competence
- 3.4.3 Professional Registration/Certification
- 3.4.4 University Curricula

3.5 Information Systems and Data Use

- 3.5.1 Knowledge Management
- 3.5.2 Data Integration/Oilfield Integration
- 3.5.3 Data Security
- 3.5.4 Data Mining
- 3.5.5 Artificial Intelligence

3.6 Research and Development Programs

- 3.6.1 Technology Deployment
- 3.6.2 Technology Valuation

3.7 Energy Economics

- 3.7.1 Resource Potential
- 3.7.2 Unconventional Resources
- 3.7.3 Market Analysis /Supply and Demand Forecasting
- 3.7.4 Energy Policy and Regulation
- 3.7.5 Future of Energy/Oil and Gas

4. Projects, Facilities and Construction

4.1 Processing Systems and Design

- 4.1.1 Process Simulation
- 4.1.2 Separation and Treating
- 4.1.3 Dehydration
- 4.1.4 Gas Processing
- 4.1.5 Processing Equipment
- 4.1.6 Compressors, Engines and Turbines
- 4.1.7 Electrical Systems
- 4.1.8 Human Factors Engineering
- 4.1.9 Heavy Oil Upgrading

4.2 Gas Monetization

- 4.2.1 Compressed Natural Gas (CNG)
- 4.2.2 Liquified Natural Gas (LNG)
- 4.2.3 Gas to Liquids

4.3 Underground Gas Storage

- 4.3.1 Facility Design

4.3.2 Facility Operation

4.4 Measurement and Control

4.4.1 Process Control and Automation
4.4.2 SCADA
4.4.3 Mutiphase Measurement
4.4.4 Pipeline Leak Detection

4.5 Pipelines, Flowlines and Risers

4.5.1 Piping Design
4.5.2 Pipeline Transient Behavior (Water Hammer, Slug Prediction)
4.5.3 Materials and Corrosion
4.5.4 Risers
4.5.5 Offshore Pipelines

4.6 Flow Assurance

4.6.1 Hydrates
4.6.2 Paraffin
4.6.3 Asphaltenes
4.6.4 Scale
4.6.5 Sand

4.7 Platforms and Floating Systems

4.7.1 Siting, Assessment of Hazards
4.7.2 Platform Design
4.7.3 Floating Production Systems
4.7.4 Mooring Systems
4.7.5 Installation Equipment and Techniques

4.8 Subsea Systems

4.8.1 Subsea Production Equipment
4.8.2 Controls and Umbilicals
4.8.3 Flow Assurance in Subsea Systems
4.8.4 Subsea Processing
4.8.5 Remotely Operated Vehicles

4.9 Facilities Operations

4.9.1 Operating Procedures
4.9.2 Commissioning and Startup
4.9.3 Pipeline Pigging

4.10 Facilities and Construction Project Management

4.10.1 Onshore Projects Planning and Execution
4.10.2 Offshore Projects Planning and Execution
4.10.3 Onshore Construction Management
4.10.4 Offshore Construction Management
4.10.5 Cost Estimation and Control
4.10.6 Contracting, Procurement, and Administration

4.11 Fundamental Research in Projects, Facilities and Construction

5. Production and Operations

5.1 Design and Optimization

5.1.1 Tubing and Casing Design
5.1.2 Downhole Tools and Equipment
5.1.3 Downhole Intervention
5.1.4 Monitoring and Control
5.1.5 Wireline, Coiled Tubing and Telemetry
5.1.6 Life-Cycle Management and Planning

5.2 Artificial Lift Systems

5.2.1 Beam and Related Pumping Techniques
5.2.2 Electric Submersible Pumps
5.2.3 Hydraulic and Jet Pumps
5.2.4 Multiphase Pumps
5.2.5 Plunger Lift
5.2.6 Gas Lift
5.2.7 Progressing Cavity Pumps

5.3 Production Enhancement

5.3.1 Well Candidate Recognition
5.3.2 Workovers
5.3.3 Hydraulic Fracturing and Gravel Packing
5.3.4 Acidizing
5.3.5 Scale, Sand, Corrosion, and Clay Migration Control
5.3.6 Produced Water Management and Control
5.3.7 Downhole Fluids Separation and Disposal

5.4 Production Monitoring and Control

5.4.1 Production Logging
5.4.2 Borehole Imaging
5.4.3 Single and Multiphase Flow Metering
5.4.4 Wellbore Seismic

5.5 Oilfield Chemistry

5.5.1 Asphaltenes, Hydrates, Precipitates, Scale, Waxes (Inhibition and Remediation)
5.5.2 Oilfield Water Analysis
5.5.3 Chemical Treatments
5.5.4 Rock/Fluid Interactions
5.5.5 Solids Handling and Disposal
5.5.6 H2S Management
5.5.7 Chemical Tracers

5.6 Multiphase Flow in Wells

5.6.1 Piping and Components
5.6.2 Slug Catchers
5.6.2 Slurry Flow and Erosion

5.7 Operations Management

5.8 Fundamental Research in Production and Operations

6. Reservoir Description and Dynamics

6.1 Reservoir Geology and Geophysics

6.1.1 Exploration, Development, Structural Geology
6.1.2 Faults and Fracture Characterization
6.1.3 Sedimentology
6.1.4 Petrology
6.1.5 Geologic Modeling
6.1.6 Near-Well and Vertical Seismic Profiles
6.1.7 Seismic Processing and Interpretation
6.1.8 Seismic Modeling
6.1.9 Four-Dimensional and Four-Component Seismic
6.1.10 Reservoir Geomechanics

6.2 Fluids Characterization

6.2. Phase Behavior and PVT Measurements
6.2.2 Fluid Modeling, Equations of State
6.2.3 Geochemical Characterization

6.3 Fluid Dynamics

6.3.1 Flow in Porous Media
6.3.2 Multi-phase Flow
6.3.3 Conformance Improvement
6.3.4 Compaction

6.4 Primary and Enhanced Recovery Processes

6.4.1 Waterflooding
6.4.2 Gas-Injection Methods
6.4.3 Gas Cycling
6.4.4 Reduction of Residual Oil Saturation
6.4.5 Thermal Methods (e.g.,Steamflood, Cyclic Steam, THAI, Combustion)
6.4.6 Chemical Flooding Methods (e.g., Polymer, Solvent, Nitrogen, Immiscible CO2, Surfactant, Vapex)
6.4.7 Miscible Methods
6.4.8 Microbial Methods
6.4.9 Steam-Assisted Gravity Drainage (SAGD)
6.4.10 Steam-Solvent Combination Methods
6.4.11 Cold Heavy Oil Production (CHOPS)

6.5 Reservoir Simulation

6.5.1 Simulator Development
6.5.2 Construction of Static Models
6.5.3 Scaling Methods
6.5.4 Visualization Technologies
6.5.5 Evaluation of Uncertainties
6.5.6 Dynamic Model Update Algorithms
6.5.7 Streamline Simulation
6.5.8 History Matching

6.6 Reservoir Monitoring/Formation Evaluation

6.6.1 Well Logging
6.6.2 Core Analysis
6.6.3 Pressure Transient Testing
6.6.4 Drillstem/Well Testing
6.6.5 Well Performance Monitoring, Inflow Performance
6.6.6 Seismic (Four Dimensional) Monitoring
6.6.7 Permanent Downhole Sensors
6.6.8 Tracers
6.6.9 Special Core Analysis
6.6.10 Deep Reading and Crosswell Techniques (e.g., Seismic, Electromagnetic)
6.6.11 Formation Testing (e.g., Wireline, LWD)

6.7 Reserves Evaluation

6.7.1 Estimates of Resource in Place
6.7.2 Recovery Factors
6.7.3 Deterministic Methods
6.7.4 Probabilistic Methods
6.7.5 Economic Evaluations
6.7.6 Reserve Classification

6.8 Fundamental Research in Reservoir Description and Dynamics

6.9 Unconventional Hydrocarbon Recovery

6.9.1 Coalbed Methane (CBM)
6.9.2 Shale Gas
6.9.3 Tight Gas
6.9.4 Oil Sand/Shale/Bitumen

6.10 Management of Challenging Reservoirs

6.10.1 Carbonate Reservoirs
6.10.2 Naturally-Fractured Reservoirs

6.10.3 Geothermal Reservoirs
6.10.4 Gas-Condensate Reservoirs
6.10.5 High Pressure-High Temperature (HPHT) Reservoirs

6.11 Reservoir Engineering of Subsurface Storage

6.11.1 CO2 Sequestration
6.11.2 Natural Gas Storage
6.11.3 Subsurface Waste Disposal