Offshore Energy Safety Advisory Committee (OES_AC)

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DeepStar™
A Global Deepwater R&D Consortium

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Presentation Outline

- Vision, Value & Strategy
- Organization, Structure & Process
- R&D Projects
  - General scope, size and duration
- Lessons Learned
- Summary
20 Years of Deepwater R&D Excellence

DeepStar is a Research & Development collaboration between oil companies, vendors, regulators and academic/research institutes started in 1991

- **Vision**
  Premier global forum to execute development and adoption of deepwater technology projects

- **Value**
  Leverage financial and technical resources to:
  - Deliver technology needs
  - Build deepwater technical competency

- **Strategy**
  Technology development aligned with business needs
  Transfer and apply technology to deepwater assets
  Gain acceptance of deepwater technologies by industry, standards organizations and regulators
DeepStar Project Evolution

1991 through 2011 – 20 years of Technology Development *

- Semi as a Production Host (Phase 1**)
- Subsea Production in 2000-4000 ft (Phase 3)
- Production in 6,000 ft (Spars & TLP’s) (Phase 6)
  - Mooring and Riser Analysis
  - VIV
  - Flow Assurance
  - Metocean
  - Subsea & Systems Engineering
- Complete Development Scenarios for 10,000 ft (Phase 8 through Phase 10)
  - Dry Tree Systems
  - Subsea Components & System Integration (w/long distance TB)

Throughout the Phases, input to standards’ organizations (API RP, DNV, ISO) & industry best practices

* World Oil supplement
** each Phase – 2 years
# DeepStar Members

## Phase X Participants

- Chevron
- bp
- TOTAL
- Petrobras
- nexen
- Statoll
- Marathon Oil Corporation
- ConocoPhillips
- MAERSK OIL
- Anadarko Petroleum Corporation

## Phase X Contributor Members

- 2H Offshore Inc.
- 3D at Depth
- Aergy US Inc.
- Advanced Production & Loading Inc.
- Aker Field Development
- Alan C. McClure Associates, Inc.
- Alcoa
- America Bureau of Shipping
- AMOG Consulting Inc.
- Applus RTD
- Baker Hughes Corporation
- Blade Energy Partners, Ltd.
- Bluewater Energy Services B.V.
- BMT Reliability Consultants, Ltd.
- Bureau Veritas Marine Inc.
- Cameron
- Champion Technologies, Inc.
- The Consortium for Ocean Leadership
- COTEC Inc.
- CSI Technologies, LLC

## Honorees and University Collaboration

- Colorado School of Mines
- Cranfield University
- Ensenada Center for Scientific Research and High Education
- Florida State University
- Heriot Watt University
- King’s College – London
- Louisiana State University
- Massachusetts Institute of Technology
- Memorial University of New Foundland
- New Mexico Institute of Mining & Technology
- Norwegian Technical University – Trondheim
- Pennsylvania State University
- Rice University
- Texas A&M University
- University of California Santa Cruz
- University of Florida
- University of Miami
- University of São Paulo
- University of Texas
- University of Tulsa

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DeepStar Organization

Champions and Working Committees:

• Each Technical Project within DeepStar requires an Operating Company “Champion” who technically monitors the contractor performing the work

• Working Committee volunteers support the Champion by participating in contractor selection process, review meetings, reviewing technical reports and providing guidance to the contractor during performance of the work

• Participation in Technical & Working Committees, Chairmen and Champions are voluntary by member organizations

• 1000 + Subject Matter Experts (SME) to draw for experience and expertise
DeepStar Processes

**Project Identification: (business need driven)**

- All projects ideas start with preparation of a CTR (Cost, Time & Resources) Summary Sheet at the Technical Committee Level

- CTRs are generated by:
  - Operator SMEs who see a business need within their operations
  - Vendors / Service companies who see opportunities for improvements
  - Academics who see potential applications for their work

- CTRs are discussed, vetted and consolidated (as needed) into distinct CTRs

- CTRs are ranked and prioritized by the Technical Committees

- Management Committee votes on portfolio of R&D projects

- Approved projects are bid, negotiated, contracted and managed utilizing industries’ best practices
DeepStar Processes

Tech Transfer is an important part of each project:

• DeepStar Website (www.DeepStar.org)

• Subject Matter Experts project involvement

• Monthly Project Reports

• Quarterly Meetings

• Project Working Committee Meetings

• Workshops

• Conferences

• Papers
DeepStar Projects

Projects are business need driven:

- $100 MM over 20 years. Phase X - 30 projects & $8.6 MM budget

- Typical projects are stage-gated
  - Low TRL (Technology Readiness Level) 1-5 (proof of concept)
  - 12-24 months duration
  - Single prime contractor (some with multiple subs)
  - $250K– $1 MM
- Projects cover subject matter areas of
  - Subsurface (Reservoir & Geosciences)
  - Flow assurance
  - Vessels, Riser and Mooring systems
  - Drilling & Completions
  - Met-ocean
  - Subsea Systems
  - Systems Engineering
DeepStar collaborates with other R&D organizations to avoid duplication of technology development efforts:

- RPSEA in USA (Public Money) – DeepStar has developed the technology roadmaps and development strategy for this initiative
- DEMO 2000 and PetroMax in Norway – (Public money) This R&D program is now limited
- PRAC is a Newfoundland, Canada R&D program (Public Money) – Focused on Canadian – principally arctic needs
- Procap 3000 is a Petrobras – Brazil based R&D Initiative (Private Money)
- ITF is a UK based JIP facilitator (Private Money)
- DEA (Drilling Engineering Association) is a JIP Facilitator for Private Money
- PRCI (Pipeline Research Council International) is a JIP Facilitator for Private Money
DeepStar Other Involvement

- Stood up RPSEA UDW Program and provided organizational structure, technical review processes and expertise for first four years of operation. SMEs from DeepStar member organizations continue to support active projects.

- API Task Force responding to DOI call for comment on OESI.

- Engaged with providing support to industry efforts (MWCC, etc.) and feedback to members of OES Advisory Committee and subcommittees.

- Members provide technical input to various standards’ organizations and technical committees (IADC, API, ISO, etc.) as well as the recently launched API Center for Offshore Safety.
DeepStar Lessons Learned

DeepStar projects are Business case driven:
• Business drivers include integrity management, reliability, efficiency, waste minimization and safety of operation

• Collaborative approach generates better results and helps drive adoption

• Champions & Working committees (In-kind SME input is extremely valuable)

• Roadmaps
  • Goal / endpoint
  • Identify / track existing relevant technologies and capabilities (global), then leverage
  • Gap analysis

• Projects are prioritized and phased (stage gate) with milestones and metrics
  • Scalable solutions that are flexible and adaptable
  • Systems engineering approach
  • Life cycle; IMR (inspection, maintenance and repair), operability & training requirements
  • Prototype, field test, demo and commercialize

• Stakeholder governance with strong & transparent management processes and clearly delineated regarding CoI & IPR policies
  • Strong programmatic approach with portfolio management
  • Relevancy, continuity & sustainability are important success factors (20 years)
DeepStar Lessons Learned

Experience with industry managed versus government managed R&D:

- Industry projects are business case driven and solve real / actual needs

- Government contracting, procurement, and administrative reporting protocols
  - Slow projects down & add time to schedule
  - Increases costs
  - Causes SMEs to lose interest / focus
  - Contribute to scope creep
  - Disconnect R&D results from market
  - Diminishes program relevancy

- Market pull with industry managed projects ensures commercialization
  - Industry consortium members are in the business of manufacturing, marketing, distributing, inspecting, maintaining / repairing
  - Speed to market is improved as operator solution based R&D is more likely to be adopted and deployed
  - R&D done w/o market connectivity can flounder and end up in binders on bookshelves

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DeepStar Summary

- Twenty years of successfully identifying and leading deepwater technology development and application
  - $100 MM of projects
  - 325+ technical reports
  - 1000 + Subject Matter Experts
  - 90+ member organizations provide ample opportunities for field test and demo

- Collaborative, bottoms-up process for identifying R&D projects helping ensure R&D is focused on prioritized value-added projects

- Timely and cost effective R&D utilizing best practice processes and procedures
  - Procurement & Contracting
  - Portfolio & Project Management
  - Tech Transfer & Commercialization

- Global collaboration with other organizations to leverage learning's and minimize duplication / overlap
DeepStar: A collaborative R&D model

Questions?