

# DEEPSTAR®

A Global Offshore Technology Development Consortium

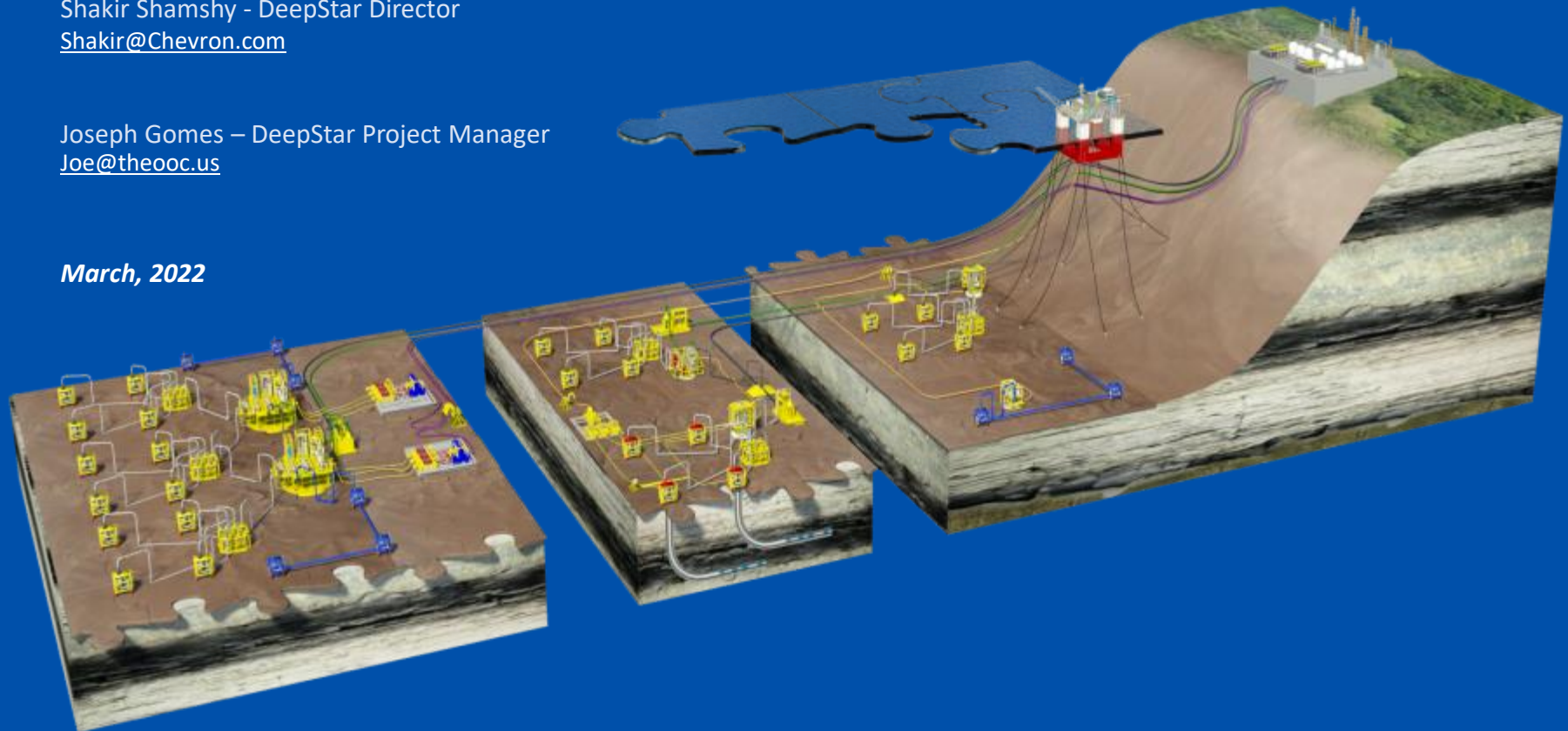


## DeepStar Overview & Updates

Shakir Shamsy - DeepStar Director  
[Shakir@Chevron.com](mailto:Shakir@Chevron.com)

Joseph Gomes – DeepStar Project Manager  
[Joe@theooc.us](mailto:Joe@theooc.us)

*March, 2022*



# DeepStar Membership & Benefits

2021/2022 Core Program Year  
(May 2021 – May 2022)

## Core members/operators

\$100,000 fee annually (May 2021 – May 2022)

## Benefits/leverage value

- **Get over 58 times of leverage value with \$100,000 membership fee to access over \$5.8 million of projects**
  - **Access to more than \$1.2 million of core projects**  
Deliverables & reports for all Core projects selected for the 2021/2022 DeepStar Program year (May 2021 – May 2022)
  - **Access to multi million-dollar of partnership projects**  
Deliverables & reports for over **\$4.6 million** of Nippon Foundation (NF) DeepStar partnership projects from May 2021 to May 2022
- **Influence future partnerships with DOE, and other entities**
- **Collaborative Discussion amongst all technical Subcommittees**
- **Technical forums & workshops to align industry and develop solutions**
  - DeepStar Technology Symposium – May 6, 2022
- **Reduce satellite project administration cost by 25% -**
  - Core Member company pays a discount rate of 10% for the administration fee
  - non-Core Member company pay a 35% administration fee on any DeepStar Satellite project.



## DEEPSTAR® PROJECT

Leading the technology development to meet the industry's deepwater business needs.

### FINAL REPORT RELEASE

Continuing Service Guidance for Aging Floating Infrastructure

Member: DeepStar® Phase XII CTR – 12401 Continuing Service Guidance for Aging Floating Infrastructure

# DeepStar 2022 Technology Symposium

- **DeepStar Members Perspective -**
  - Opening Keynote Speech [Shell]– (Future Technology Development)
  - Contractors Perspective – Subsea7
- **Special Forum Topic**
  - Carbon Efficiency
- **DeepStar 2021 Technology Symposium**
  - Date: Friday, May 6<sup>th</sup>
  - Venue: Chevron auditorium at 1500 Louisiana St., Houston, TX 77002
- **Announcement of DeepStar NF Partnership 2022 Projects**
- **Industry Partnerships**
  - (Hlabs, IADC, OGCI, OOC)





# DeepStar®

## Global Offshore Technology Development Consortium 30 Years of Industry Excellence

### DeepStar Recruiting Members for DeepStar 2021

.....

DeepStar is the industry's longest running and most successful offshore technology development consortium and it has generated significant value by providing technology transfer to its members and the industry. There is an increased need in the industry for an operator-driven, collaborative technology development program.

### DeepStar® Core + Satellite Model

#### Core Program

DeepStar CORE Program focuses on all members' common collaborative technology needs; discusses industry technology issues and develops ideas for larger, elective satellite projects.

#### Satellite Projects

Focuses on elective Satellite Projects in which the technology advancement is aided by collaborative among interested parties.

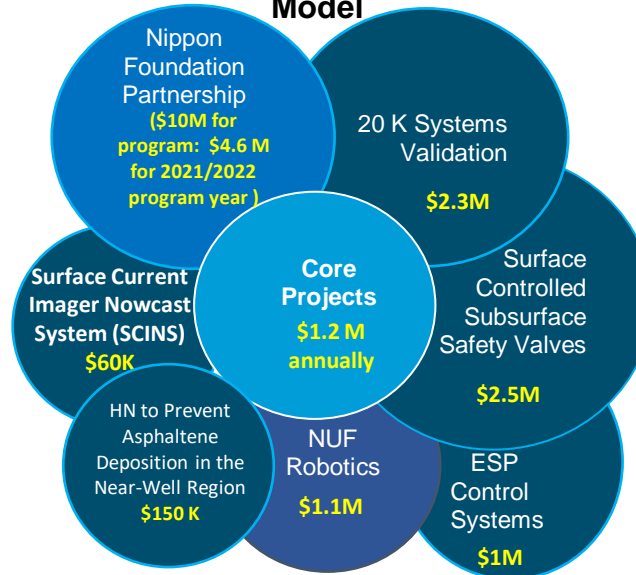
#### 2021/2022 Core Members



#### Potential Participants

Aker BP  
Apache  
Aramco  
BP  
CNOOC  
CPC  
Ecopetrol  
ENI  
LLOG  
INPEX  
MOECO  
Murphy Oil  
PEMEX  
PETRONAS  
Tullow Oil  
Woodside

### DeepStar 2021/2022 Model



#### Value Creation

Business Needs,  
Standardization, Technology  
Commercialization

Technology Acceptance &  
Development

Cost Effective Management

### DeepStar® Technical Subcommittees:

- **Drilling, Completion and Intervention**
    - Dissolvable Drilling Materials
    - Drilling Operations, Monitoring ESPs
    - Surface Controlled Subsurface Safety Vales
  - **Flow Assurance**
    - Asphaltene Deposition Remediation
    - Enhanced Flowback Technology
    - Gas Hydrates Plug Remediation
    - Hydrate Agglomeration in High Salinity
    - Hydrate Formation During Cold Restart
  - **Subsea Systems Engineering**
    - Subsea Large Particle Detector
    - Dewatering method for deepwater
    - Subsea Electrical Fail-Safe Valves
    - Subsea WiFi Systems
  - **Floating Systems & Met-Ocean**
    - Acid Gas Removal and Reinjection
    - Accurate and Reliable Surface Measurement
    - Fiber-Rope for Top & Mudline Mooring
    - Flow Induced Vibration
    - Improving Mooring Integrity
    - Integrity Management
    - Real-time Surface Current Measurements
  - **Autonomous Operations**
    - Management of safety devices in NUF
    - Automation FPSO Process and Machinery
  - **Green House Gas Emissions / Carbon Abatement**
    - Related techs including renewables
- Potential Technical Subcommittees**
- Geoscience
  - Reservoir

### DeepStar Membership Fee

- **Core Member (\$100,000 - annual)**
- **Associate Member (\$15,000 - annual)**

# Present DeepStar Core Members



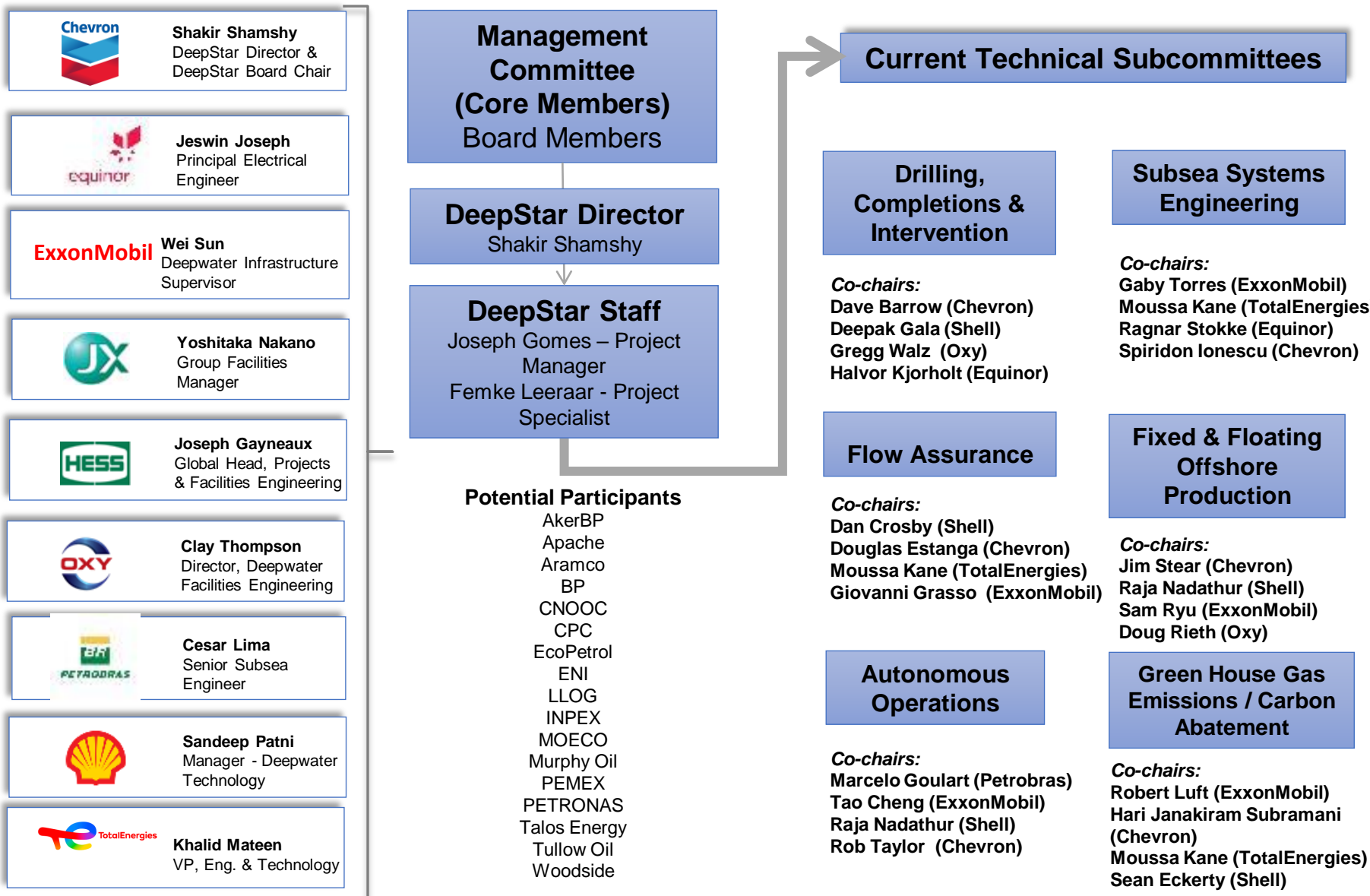
ExxonMobil



## DeepStar Associate Members & Contractors

Aker Solutions	ALTISS Technologies	AMOG Consulting
Baker Hughes A GE Company	Colorado School of Mines	Daido Steel Co.
Det Norske Veritas	FSubsea	Genesis / TechnipFMC
Halliburton	JGC Holding Corporation	JETRO
Mitsubishi Heavy Industries	Nagano Keiki	Nissan Chemical Corporation
Ocean Power	OTM Consulting	Reaction 35 LLC
Rice University	SAIPEM	SBM Offshore
Schlumberger	Shimadzu Corp	Spire Engineering
SOFEC	Stress Engineering	Strohm
Subsea 7	Tridiagonal Solutions	Veros Systems
Yokogawa Electric	University of Tulsa	

# DeepStar® 2021 Board & Management Structure



# DeepStar Program Framework



## Core Program

- **Funded with membership fees from core members, associated members, admin fees from Satellite program and Partnership program**
- **Focused on small projects and multi-phase projects on common industry needs**
- **Set to develop ideas for Satellite program**
- **Core members can participate in Satellite projects with only 10% project admin fee**
- **Proposal due date: May 31, 2021**



## Satellite Program

- **Satellite projects are funded with separate cash calls from the project participants (mainly operator companies)**
- **A Satellite project must be led by at least one DeepStar Core operator company**
- **Non-DeepStar members/operators can participate in any Satellite project with 35% project admin fee**
- **Two participants can start a Satellite project**
- **Proposal due date: anytime**



# DeepStar 2021/2022 Program Projects

(DeepStar Core Program Projects & Satellite Projects)

## Drilling, Completions & Intervention

- Waste Completion Fluids to Clear Brines

## Autonomous Operations

- Management of Safety Devices in the NUF Environment – Stage 2 – Overpressure Protection (PSVs)
- Management of Safety Devices in the NUF Environment – Stage 2 – Fire and Gas detection

## Fixed Floating Offshore Production & Metocean

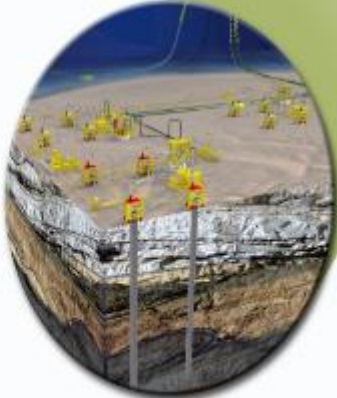
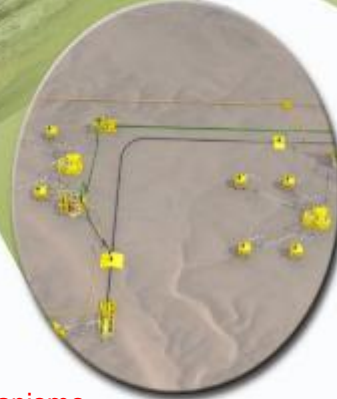
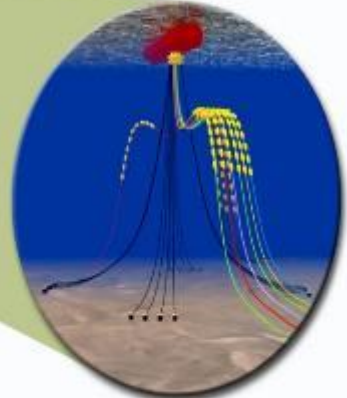
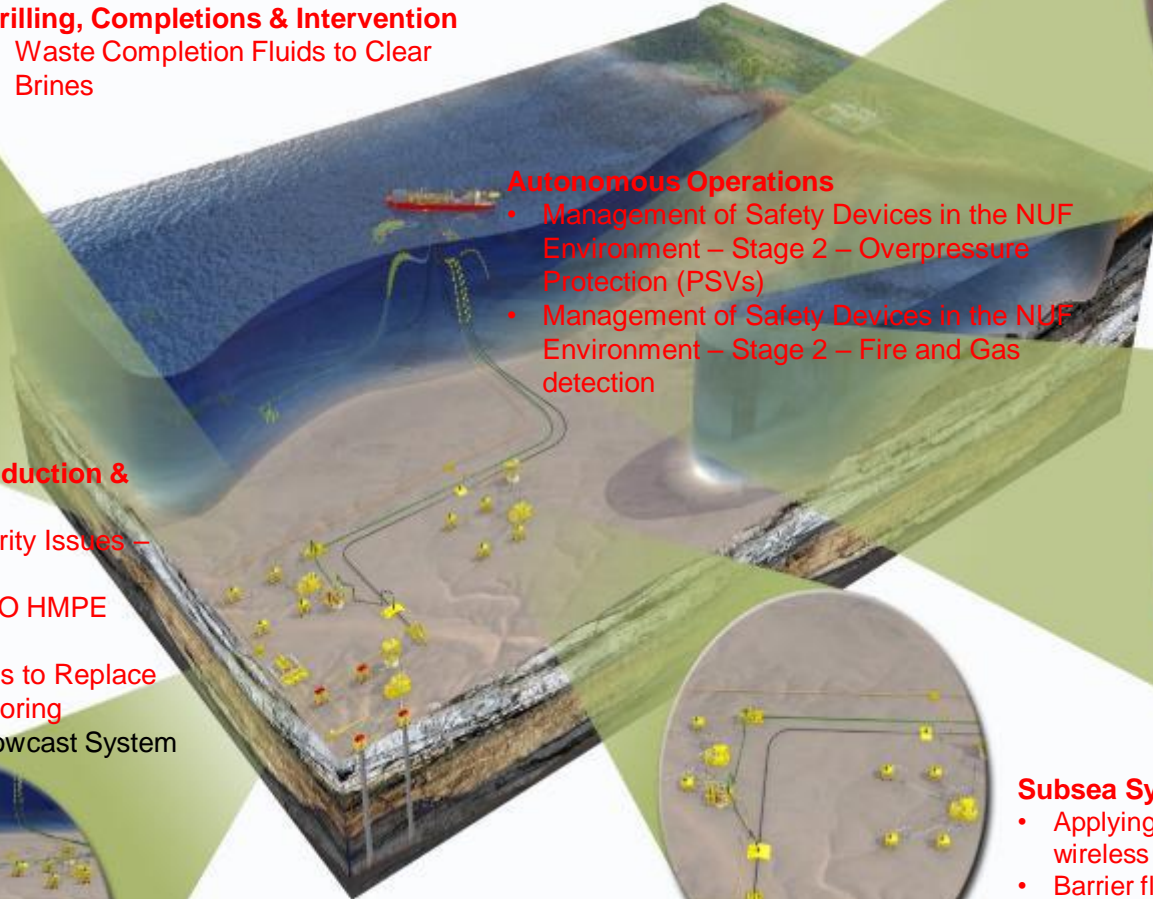
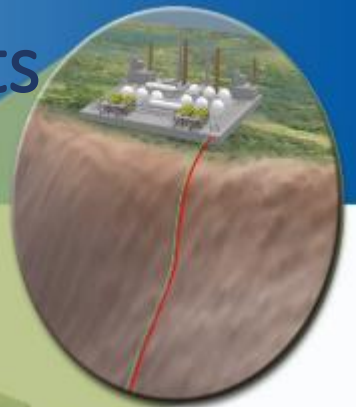
- Database of Mooring Integrity Issues – PHASE 2
- Testing of Serpentina FPSO HMPE Mooring Ropes
- Qualification of Fiber Ropes to Replace Top Chain for Offshore Mooring
- Surface Current Imager Nowcast System (SCINS)

## Flow Assurance

- Effect of JT cooling on hydrate formation and deposition mechanisms
- Large scale, multiphase flow wax deposition for crude oil systems – UPDATED
- Hairy-Nanoparticles to Prevent Asphaltene Deposition in the Near-Well Region

## Subsea Systems Engineering

- Applying Free Space Optics subsea wireless communication
- Barrier fluid-less subsea condensate pump
- Applications for Thermoplastic Composite Pipe in Deepwater
- Analysis of Reliability and Availability of Subsea Chemical Storage and Distribution System
- Gas/liquid separation at high pressure
- Pipeline Plug Phase II: Localization using Acoustics





# DeepStar Program Framework (cont.)



## Partnership Program

### Nippon Foundation (NF) DeepStar Partnership (connected to Core Program)

- Projects are funded with financial support from the Nippon Foundation (80%) & Japanese vendors (20%); and guided with technical support from DeepStar core operators
- Proposals are evaluated, reviewed, and selected by DeepStar; and approved by NF
- Projects are managed by DeepStar (guided by DeepStar champions & chairs)
- DeepStar Core members can access to NF DeepStar partnership projects without additional cost – reports/deliverables are shared with all DeepStar Core members
- Project contractors/vendors are Japanese companies or other companies collaborated with Japanese companies
- Proposal submission time window for the next program: mid-Jan to Jan 31, 2022 (selected projects will start in June 2022)

# Nippon Foundation DeepStar Partnership Projects

## Subsea Systems Engineering (2020 – 2022)

- Subsea Omni Directional Optical Wi-Fi System Demonstration of Layout Free & flexible Directional UOWC system

## Autonomous Operations

- Reducing operational and capital risks through unified FPSO process & turbomachinery automation solution development
- Standardization of Inspection to Enable Digital Twin

## Fixed Floating Offshore Production

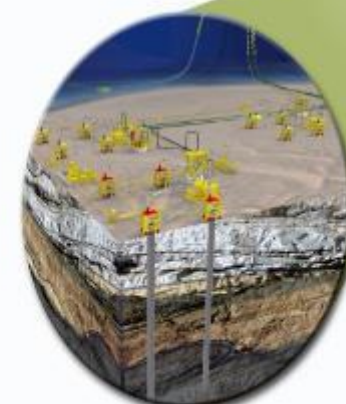
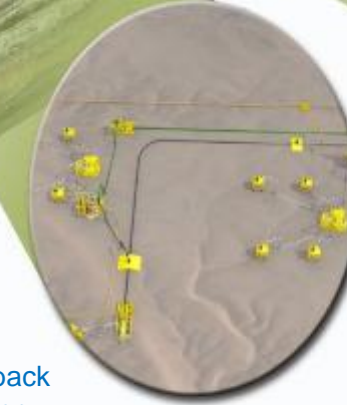
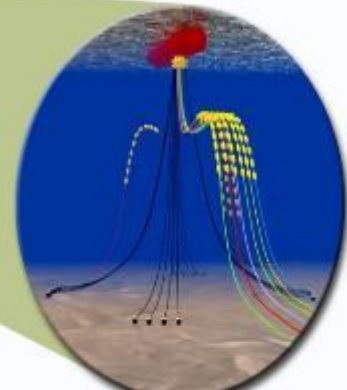
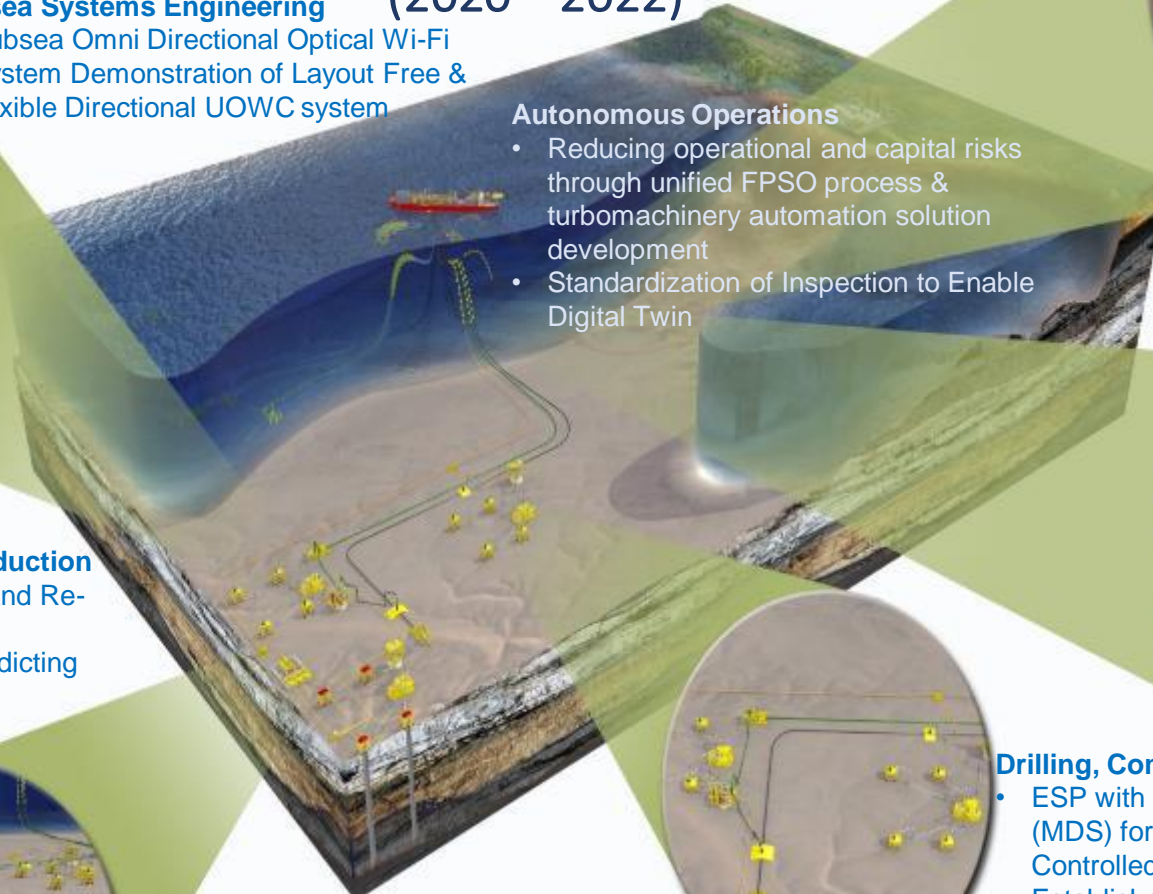
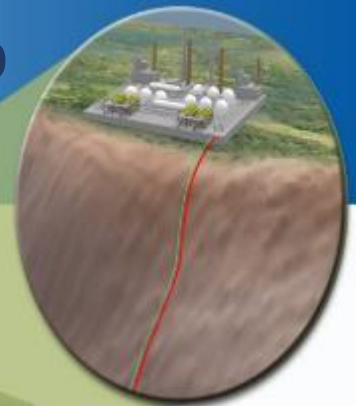
- Acid Gas Removal (AGR) and Re-injection Project
- Flow-Induced Vibration Predicting Method Study for Subsea Flowlines/Risers

## Flow Assurance

- NanoActive EFT (Enhanced Flowback Technology) for Offshore Application - Nissan Chemical Corporation
- Prevention and Remediation of Asphaltene Deposition and Hydrate Formation at Field Conditions - Assessment and Modeling

## Drilling, Completions & Intervention

- ESP with Magnetic Drive System (MDS) for Deep Water Surface Controlled Subsurface
- Establishment of cost-effective monitoring method for HPHT reservoir and downhole by using P-T sensor-equipped flowable ball
- Smart Dissolvable Plugged Nozzle Assemblies (DPNAs) to be Installed on Limited Entry Liners with Tracer - Release Capability for Extended Reach Deviated Wells



# **Nippon Foundation DeepStar Partnership Next Program (2022 - 2026)**

## **Themes to be added**

- 1. Geothermal generation by using high temperature in preserver (renewable energy)**
- 2. Wind power/Ocean current power generation to supply offshore oil & gas production facilities (renewable)**
- 3. Cost reduction technology for flammable gas removal and re injection at production facilities (global warming)**
- 4. Establishment of oil spill drift forecast simulation method by using local ocean current monitoring by aerial drone (marine environment)**
- 5. Hydrogen related technologies**
- 6. Safety related techs including NUF (normally unattended facilities) and robotics**
- 7. Water treatment related technologies**

# DeepStar Nippon 2022 Project [Pending]

## Sorted by Subcommittee

### Flow Assurance

- Hydrogen-Natural Gas Blends Phase Behavior for Safe Offshore Pipeline Transport of Low-Carbon Energy
- Optimization of compression performance of CCUS using process model-based control technology
- New Huff'n Puff process combined CO<sub>2</sub> gas and nanotechnology for offshore fields
- Analytics framework to Predict, Monitor and Manage Wax Deposition and enable carbon emission reduction

### Subsea Systems Engineering

- Wave Energy Harvesting System Utilizing PVDF Piezoelectric Film
- Nanosorbent Technology Platform for the Removal and Recovery of Metals from Produced Water
- Application Study and Field Trial of Omni-Directional Optical Wireless Communication System
- Semipermanent Ocean Bottom Seismic Node for CCS monitoring
- Feasibility Study on combined systems of floating offshore wind, wave energy and subsea battery

### Drilling, Completions & Intervention

- Thermally Stable CRA and Sealing Technology for Enhanced Geothermal Systems

### Autonomous Operations

- UT Drone for offshore inspections
- "PoC of YRSP (Yokogawa Robotics Services Platform) and EX ROVR (explosion proof autonomous inspection robot developed by Mitsubishi)"
- Robotic Intervention During Outages NUF

### Green House Gas

- Carbon Nanotube (CNT) Based Hydrogen Adsorbent for Efficient Storage / Transportation
- Ammonia Production – Offshore Gas Monetization



# DeepStar Contacts



## General contacts

Shakir Shamsy – DeepStar Director: [Shakir@Chevron.com](mailto:Shakir@Chevron.com)

Joseph Gomes – DeepStar Project Manager: [Joe@theooc.us](mailto:Joe@theooc.us) ;

Femke Leeraar - Project Specialist: [Femke@theooc.us](mailto:Femke@theooc.us)

[www.theDeepStar.com](http://www.theDeepStar.com)