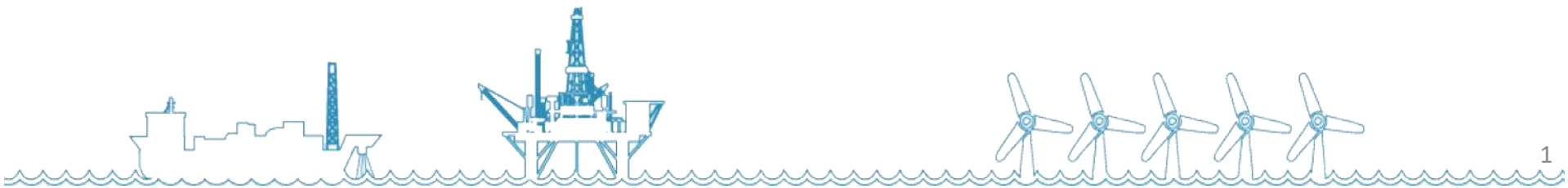


Introduction of Deepstar activities and expectations for Japanese companies

Deep Starのこれまでの取り組みや日本企業への期待



Shakir Shamsy
DeepStar Director



DeepStar Overview

DeepStar

- is the industry's longest running and most successful offshore technology development consortium
- has generated significant value by providing technology transfer to its members and the industry
- will be needed more by major operators and the industry for collaborative technology development in the future

DeepStar Overview (cont.)

DeepStar's primary goals are to:

- improve the profitability, execution, operability, flexibility and reliability of existing offshore production systems technology
 - i.e., enhance existing technology
- enable and assure cost effective **continued service** of producing assets
- ensure correct technology availability at the correct business **intercept** time
- develop and implement technology to enable production in areas that are currently technically unproven with the specific goal of developing the technology required for economic production in offshore

DeepStar Overview (cont.)

- work to ensure the **Acceptance** of offshore technology by:
 - facilitating the development of industry standards & practices as appropriate
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- act in a facilitator role,
 - providing a forum and a process for discussion, guidance, and feedback with contractors, vendors, operators, and academia regarding offshore production system technology capability gaps
 - promoting standardization of component interfaces

DEEPSTAR®

A Global Offshore Technology Development Consortium



DeepStar introduction and expectations for Japanese companies

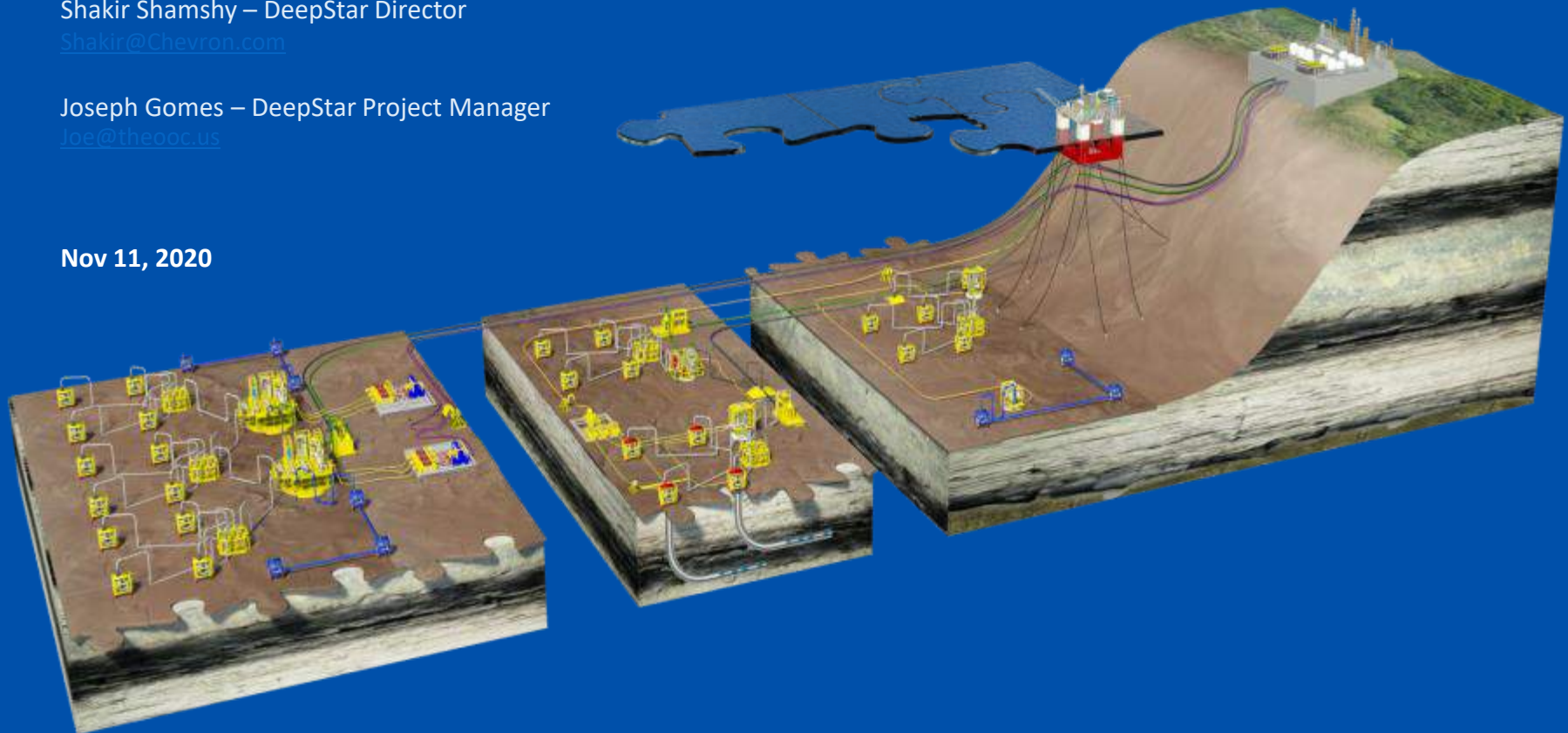
Shakir Shamshy – DeepStar Director

Shakir@Chevron.com

Joseph Gomes – DeepStar Project Manager

Joe@theooc.us

Nov 11, 2020





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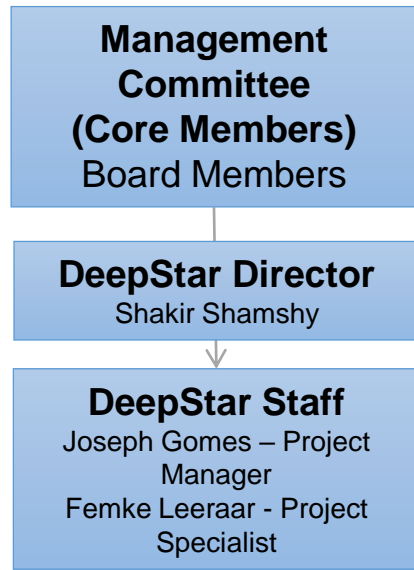
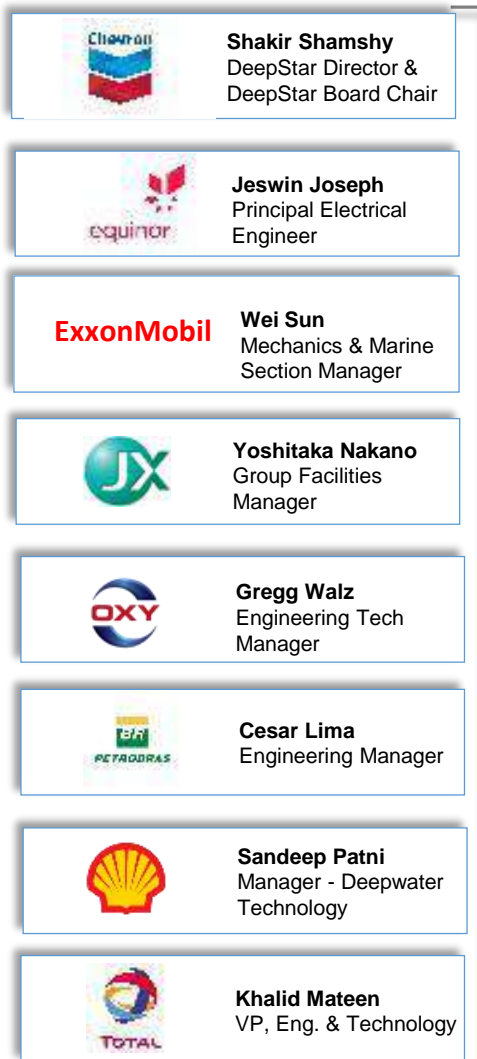


DeepStar Overview (cont.)

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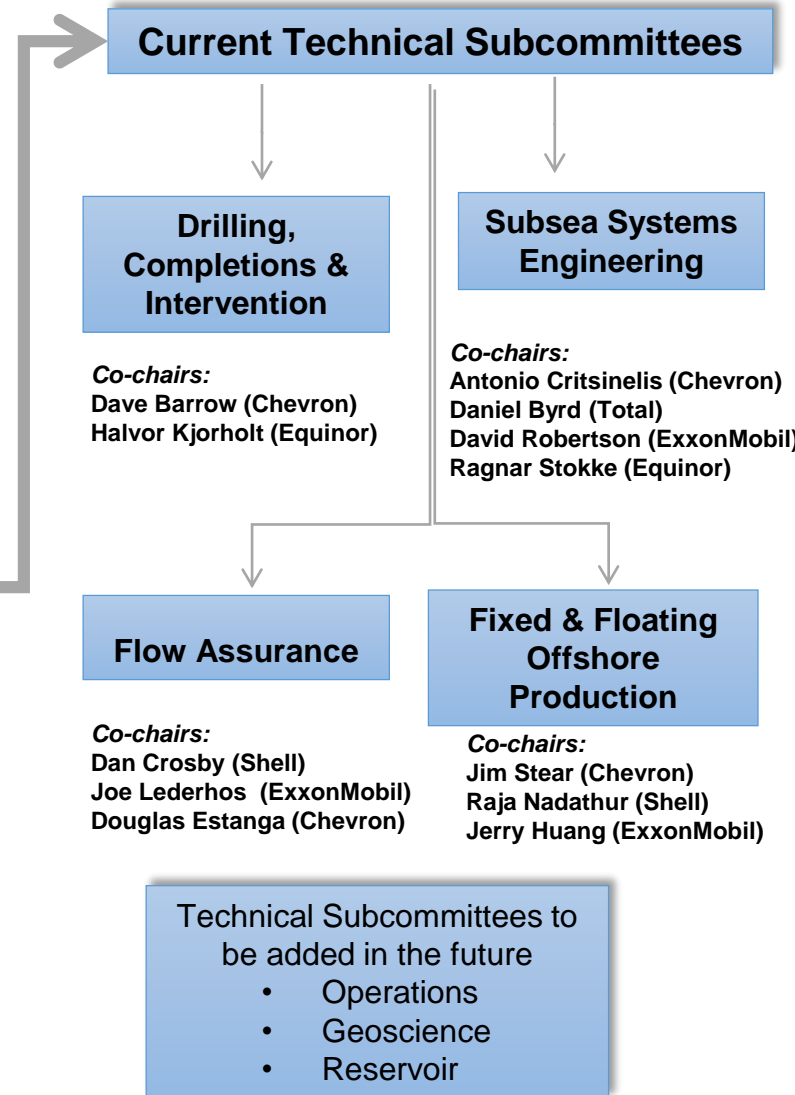


DeepStar[®] Board & Management Structure



Potential Participants

- AkerBP
- Apache
- Aramco
- BP
- CNOOC
- EcoPetrol
- ENI
- HESS
- LLOG
- INPEX
- MOECO
- Murphy Oil
- PEMEX
- PETRONAS
- Tullow Oil
- Woodside





DeepStar Program Framework



Core Program

Funding Membership Fees



Satellite Program

Participants Fees



Partnership Program – The Nippon Foundation DeepStar Partnership

(connected to Core Program)

External Funds, i.e. government funding



Core Program

- Core projects are funded with the membership fees from Core Members and Associate Members
- Members of the Core Program access to The Nippon Foundation DeepStar partnership projects

Satellite Program

- Certain Core projects spin out as Satellite projects by interested Members
- Non-DeepStar members can participate in Satellite projects (with higher fee)

Partnership Program

- Currently have The Nippon Foundation partnership projects along with Core program
- Working on partnership terms with US Department of Energy (DOE)

DeepStar Programs in 2020 and beyond



DeepStar 2020 Program Projects

(The Nippon Foundation partnership projects)

Fixed & Floating Offshore Production

- Acid Gas Removal (AGR) and Re-injection Project
- Flow-Induced Vibration Predicting Method Study for Subsea Flowlines/Risers
- Reducing operational and capital risks through unified FPSO process & turbomachinery automation solution development
- Standardization of Inspection to Enable Digital Twin (Data Standardization Tool Development for Floating Facilities)

Subsea Systems Engineering

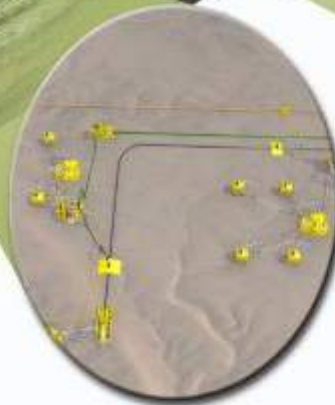
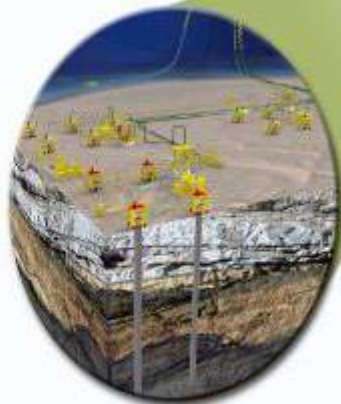
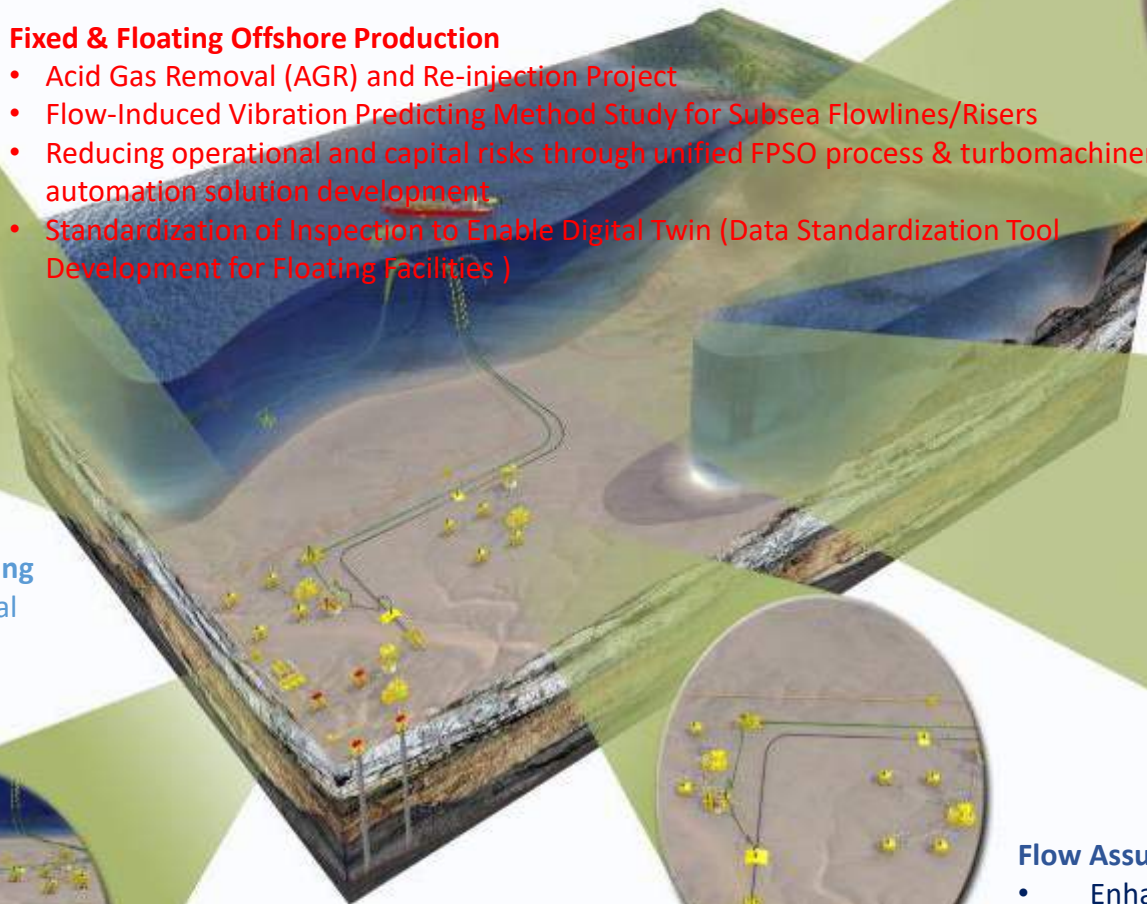
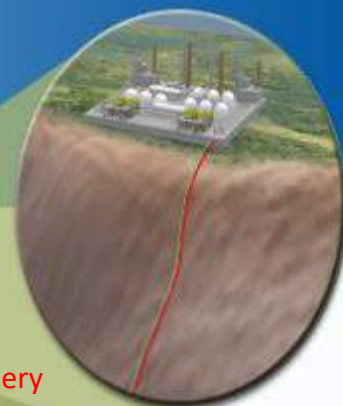
- Subsea Omni Directional Optical Wi-Fi System

Drilling, Completions & Intervention

- ESP with Magnetic Drive System (MDS) for Deep Water
- Establishment of cost-effective P-T sensor equipped flowable ball
- Smart Dissolvable Plugged Nozzle Assemblies (DPNAs)

Flow Assurance

- Enhanced Flowback Technology
- Prevention and Remediation of Asphaltene Deposition and Hydrate Formation at Field Conditions



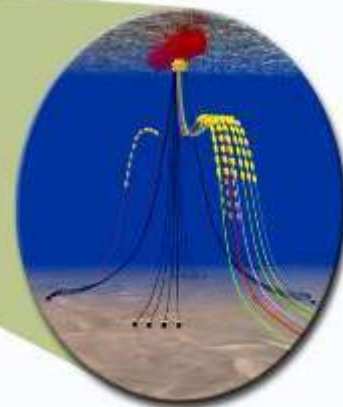
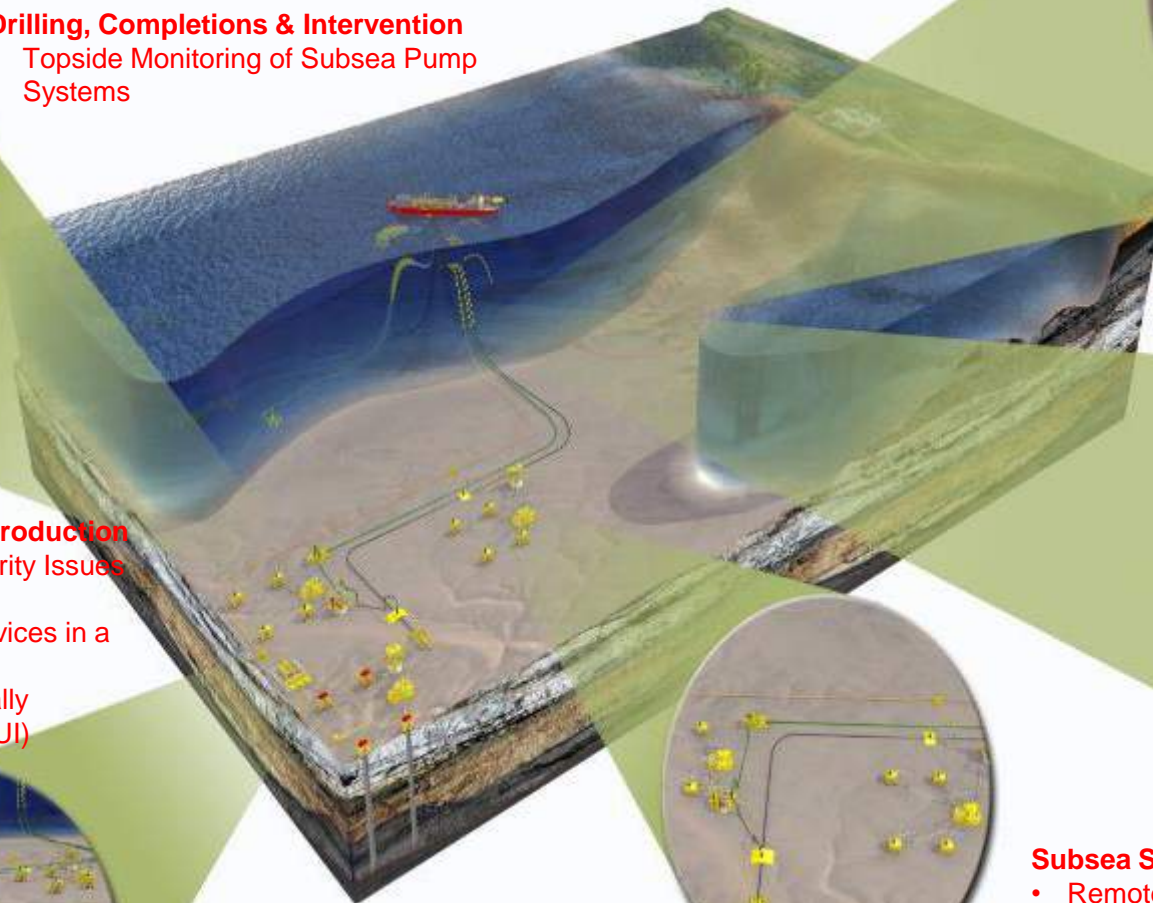


DeepStar 2020 Program Projects (cont.)

(Core projects added in Aug 2020)

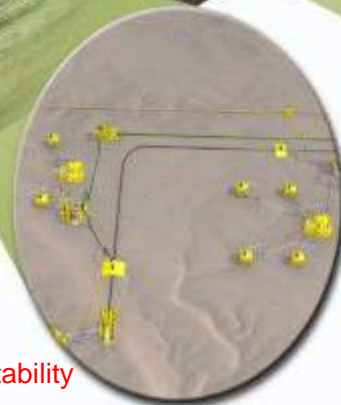
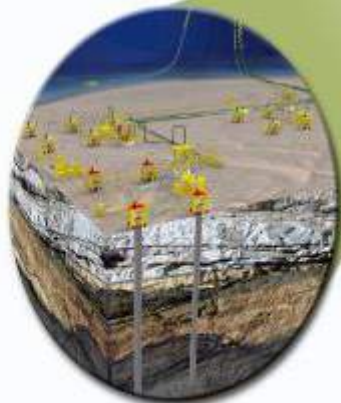
Drilling, Completions & Intervention

- Topside Monitoring of Subsea Pump Systems



Fixed & Floating Offshore Production

- Database of Mooring Integrity Issues and Lesson Learned
- Management of Safety Devices in a NUF Environment
- Floating Production Normally Unattended Installation (NUI)



Flow Assurance

- Hydrate Formation and Transportability in Co2 Rich Systems
- Hairy-Nanoparticles to Prevent Asphaltene Deposition in the Near-Well Region
- Optimal facility operability envelope in erosion / corrosion environment

Subsea Systems Engineering

- Remote zero carbon power for electric subsea operations
- AUV Interface Standards Phase 3
- Application for Thermoplastic Composite Pipe in Deepwater
- Subsea Large Particle Detector
- AUV Collision De-Risking via Simulation



DeepStar activities

- Nov 4 – Dec 4, 2020: Submission of phase 1 interim reports of NF DeepStar partnership projects and phase 2 funding request forms/one-pager
- Dec 5, 2020 – Jan 29, 2021: Reviews, evaluations, and approvals for phase 2 projects of the NF DeepStar partnership
- February 2021: Quarterly DeepStar Subcommittee Meeting
- **May 7, 2021: DeepStar Technology Symposium (Houston)**
 - **NF and Japanese companies will be invited to present**
- May 2021: Final & Interim Reports for NF DeepStar projects
- May 2021: Quarterly DeepStar Subcommittee Meeting
- August 2021: Quarterly DeepStar Subcommittee Meeting
- November 2021: Quarterly DeepStar Subcommittee Meeting
- December 2021: Interim Reports for NF DeepStar projects



DeepStar required reports & presentations

Project Documents: (Phase 1), (Phase 2)

- Monthly Reports: (12), (24)
- Quarterly Presentations: (4), (8)
- Interim Report(s): (1), (3)
- Final Report: (1), (1) DeepStar Presentations

 **DeepStar 2020**
Monthly Progress Report

CTR: 2020: _____ Delivery Date: 04/30/2020 Budget: \$500K

Please submit your monthly report via email to Asuka Usuda (UsudaA@nipc.or.jp) with a copy to the Japan Marine Gasification of Project Manager and to the Director by the 15th. The report should be submitted in the following format: [Project Title]_Company Name

2020 Technical Feedback / Inquiry (CTI) (available for: 01/01/2020 - 03/31/2020)

To be added (or cancelled) in contract:
 Inquiry: _____
 Start Date: _____

Contact	Email	Phone
Organization	Email	Phone
Project Manager	Email	Phone
Search System	Search System ID	Search System ID

January April July October
 February May August November
 March June September December

As Data Necessary & Accomplishments:
 As follows Please send Month: _____

Executive Action:
 Amount Expended:
 Amount Completed:

Agenda

- Welcome / Introductions
- Status and General Progress
 - Project Action Items
 - Scope of Work
 - Project Results
- Technical Discussion
- Areas of Concern
- Summary and Action Items Update



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[Project Title]
 DeepStar® 2020
 CTR # 20XXX;
 DRAFT / FINAL REPORT



DeepStar® Director: Shigeru Shimizu
 Project Manager: Kazuhiko Otsuka
 Project Coordinator: _____
 Name (Individual) & Company: _____
 Contractor: _____
 [Address]
 [City, state, zip]
 Principal Investigator: _____
 Name & contact info: _____

[Date]



DeepStar NF project management structure

- **Project Contractors: Japanese companies**
- **The Nippon Foundation local (Houston) contact: Kenji Okimoto**
- **Project Champion(s): DeepStar Operators**
- **Working Group Member(s): DeepStar Members**
- **Subcommittee Chairs: from DeepStar focus areas**
 - **Fixed & Floating Offshore Production**
 - **Subsea Systems Engineering**
 - **Flow Assurance**
 - **Drilling, Completions & Intervention**
- **Subcommittee Members: DeepStar Members**

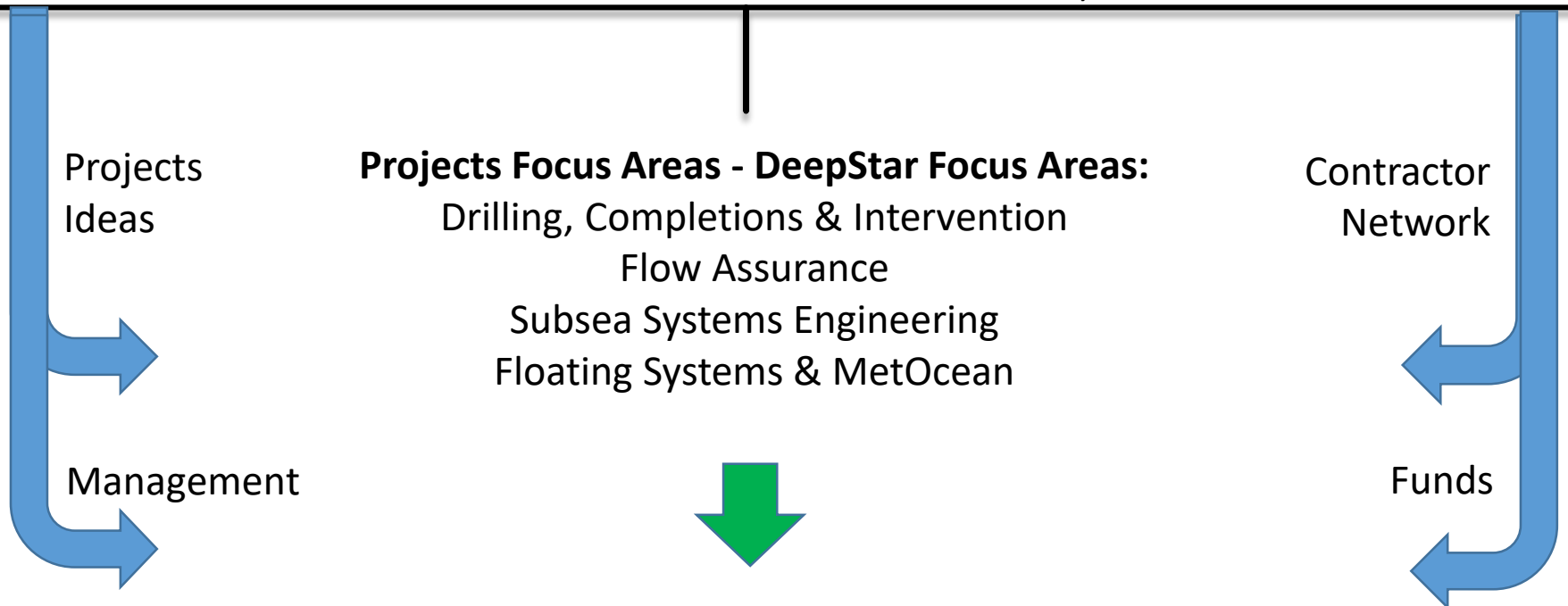


The Nippon Foundation & DeepStar Partnership

Advisory Committee

DeepStar CORE Members

(Anadarko, Chevron, CNOOC, Equinor, ExxonMobil, JX Nippon, Petrobras, Shell, Total, and Woodside)



Partnership Funding and Time:
The Nippon Foundation: \$10 million, 2019 – 2022

Technology Service Providers:
Japanese technology companies and international technology companies



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2019 Projects

(June 2019 – June 2020)

Phase 1 (\$1.6 million):

1. nanoActive Enhanced Flowback Technology (EFT) for Offshore Application (19121) – *Nissan Chemical & Sumitomo*
2. Improved Chemical Injection System (19122) - *Yokogawa*
3. Demonstration of Capability of Inspection Tool Unit (ITU) mounted on AUV (19131) – *KHI*
4. Qualification of High-Pressure Super Duplex Stainless Steel (SDSS) Umbilical Tubing (19132) – *Nippon Steel*
5. Subsea Omni Directional Optical Wi-Fi System (19133) - *Shimadzu*
6. Underwater Wireless Power Transfer (19134) – *NEC*
7. Acid Gas Removal (AGR) and Re-injection Project (19141) – *JGC*
8. Development for long term protection paint and performance evaluation (19142) – *Nippon Paint*
9. Fixed Equipment Integrity Operating Windows based on Facility Operating Conditions (19143) - *MHI*
10. ESP with Magnetic Drive System (MDS) for Deep Water (19151) - *MHI*



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2020 Projects

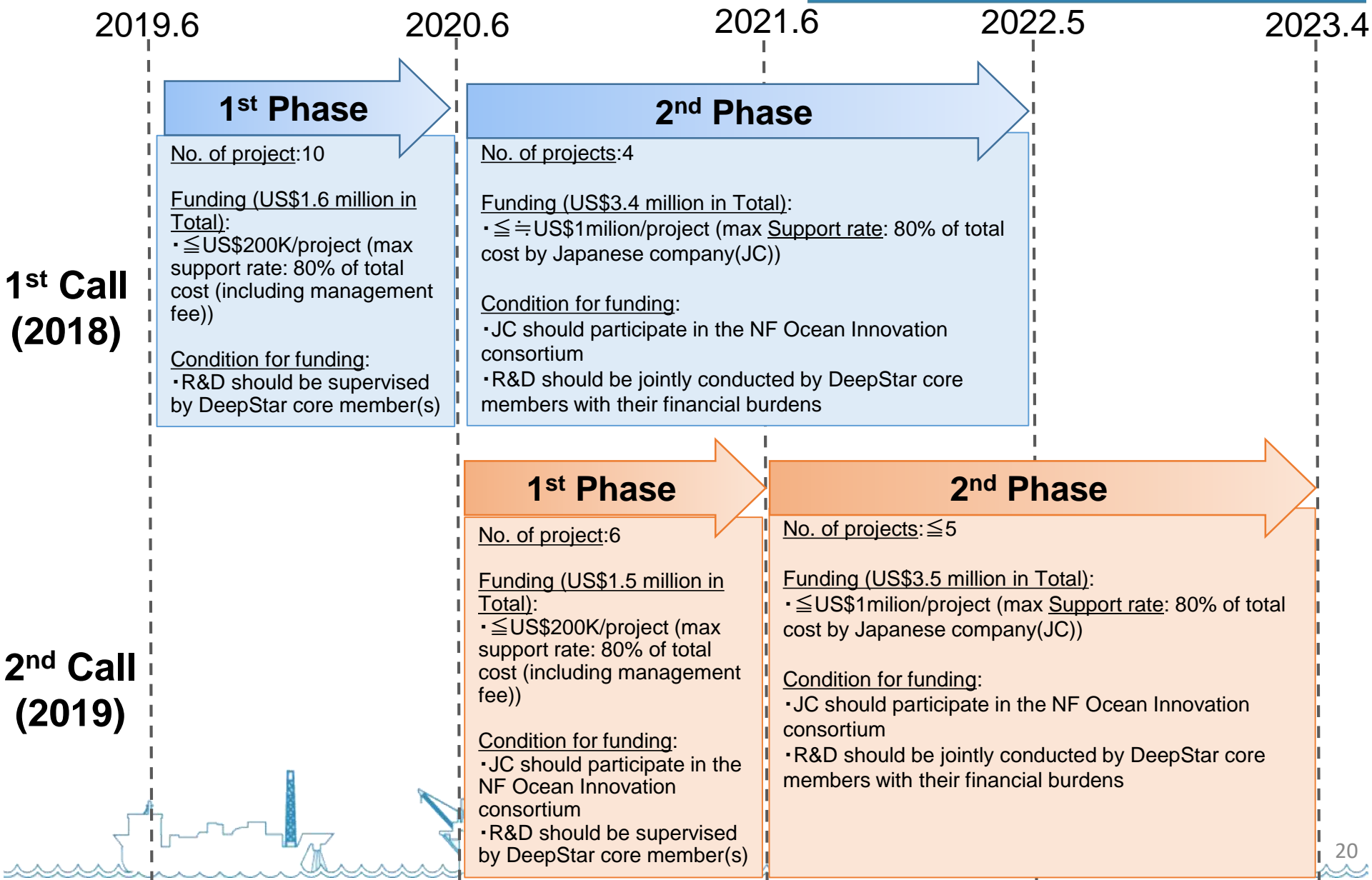
(June 2020 – June 2021)

Phase 1 (\$1 million):

1. **Prevention and Remediation of Asphaltene Deposition and Hydrate Formation at Field Conditions - Assessment and Modeling – (20122) – Yokogawa Electric Corp**
2. **Data Standardization Tool Development for Floating Facilities – (20144) - Mitsubishi Heavy Industries**
3. **Flow-Induced Vibration Study for Intelligent Production Integrity Operating Window (Ip-IOW) module – (20143) - Mitsubishi Heavy Industries**
4. **Reducing operational and capital risks through unified FPSO process & turbomachinery automation solution development – (20142) - Yokogawa Electric Corporation**
5. **Establishment of cost-effective monitoring method for HPHT reservoir and downhole by using P-T sensor equipped flowable ball – (20152) - Nagano Keiki Co**
6. **Smart Dissolvable Plugged Nozzle Assemblies (DPNAs) to be installed on Limited Entry Liners with Tracer Release Capability for Extended Reach Deviated Wells – (20153) - Daido Steel Co**

Phase 2 (\$3.3 million) of selected projects started in 2019:

1. **ESP with Magnetic Drive System (MDS) for Deep Water – (20151) - Mitsubishi Heavy Industries**
2. **Acid Gas Removal (AGR) and Re-injection Project – (20141) - JGC Corp**
3. **Subsea Omni Directional Optical Wi-Fi System Demonstration of Layout Free & flexible Directional UOWC system – (20133) - Shimadzu Corp**
4. **nanoActive EFT (Enhanced Flowback Technology) for Offshore Application - (20121) - Nissan Chemical Corp**



DeepStar- The Nippon Foundation Partnership

Next Program

(2022 & beyond)

DeepStar Overview (cont.)

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 - promoting standardization of component interfaces

NF- DeepStar Next Program (2022 & beyond) Plans

- Targeting to sign MOU in May 2021 and start the projects in May 2022 for next Program
- Themes for next Program:
 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 Contact Information

General contacts

Shakir Shamsy – DeepStar Director

Shakir@Chevron.com

Joseph Gomes – DeepStar Project Manager

Joe@theooc.us

Femke Leeraar – DeepStar Project Specialist

femke@theooc.us

Technical sub committee contacts

Drilling, Completions & Intervention co-chairs

Dave Barrow: DBarrow@chevron.com & Halvor Kj rholt: halkj@equinor.com

Flow Assurance co-chairs

Daniel Crosby: Daniel.Crosby@shell.com & Douglas Estanga: Estanga@chevron.com

Joe Lederhos: joe.p.lederhos@exxonmobil.com;

Subsea Systems Engineering co-chairs

Daniel Byrd: daniel.byrd@total.com & Antonio Critsinelis: ACritsinelis@chevron.com &
David Robertson: david.robertson@exxonmobil.com & Ragnar Stokke: ragst@equinor.com

Fixed & Floating Offshore Production Subcommittee co-chairs

Jerry Huang: Jerry.Huang@exxonmobil.com & Raja Nadathur: Varadarajan.Nadathur@shell.com &
Jim Stear: James.Stear@chevron.com

www.theDeepStar.com