Eelume:
A Resident Subsea IMR Vehicle

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Introducing Eelume
Eelume: the Set Up

LOOP Agreement
Demanding customer
- Demanding customer
- User requirements
- Extensive subsea operation experience
- Access to Statoil’s partners
- Pilot customer

Eelume
Subsea Intervention
- Development of Eelume vehicles
- Technology IPR, patents
- Research projects
- Dedicated team

Experience, Marketing & Sales
- AUV technology and experience
- Industrialisation and manufacture
- Supply chain
- Marketing and sales
- Investments

Expertise, theory, algorithms

Statoil
- Demanding customer

Kongsberg
- AUV technology and experience
- Industrialisation and manufacture
- Supply chain
- Marketing and sales
- Investments

The Research Council
of Norway
- Expertise, theory, algorithms

NTNU AMOS
Centre for Autonomous Marine Operations and Systems
- World class research expertise snake robots
- Theory, algorithms
- MSc, PhD and Post Doc projects and people

Innovation
Norway

Kongsberg Proprietary - See Statement of Proprietary Information

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World Class - through people, technology and dedication

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Introducing Eelume

• Inspection and Intervention when you need it
  – Resident on-site
  – Capable of routine inspection tasks
  – Conduct light intervention tasks
  – Equipped with swappable tools
  – Operated from ship, shore or globally
  – Rapid response to emergency situations
  – No need to wait for an ROV

• Eelume can access places others can’t
  – Flexible body enables it to enter confined areas
  – Small cross-section makes inside pipes accessible
  – Eelume can change shape and hold a posture
  – It can cruise like an AUV or swim bio-mimetically
  – Ability to grasp structures for stability
Introducing Eelume: Where does it fit in?

- **Traditional technology:**
  - WROV
  - IROV
  - Survey Class AUV

- **Eelume:**
  - Capable of inspection, light intervention and some survey tasks
  - Enabler for lower-cost, increased regularity of inspection
  - Enabler for emergency response
Why Use Eelume: What can it do?

Subsea Resident
Designed to live subsea by being connected to a docking station on the seabed

Safer and Greener
A resident solution which can be mobilized 24/7 without the need for a surface vessel

Modular System
Adaptable to a wide range of subsea operations. Modules can be connected in different combinations

Intervention
The vehicle itself is a dextrous robotic manipulator which can carry a range of tools

Long Range
The slender torpedo shaped vehicle can transit over long distances like a survey class AUV

Access Difficult Areas
The flexible and slender body can access and operate in restricted areas of subsea structures
Eelume Example Operations

- **Tethered:**
  - Launched from a WROV tool skid
  - Launched from a USV or ship
  - Direct operation for internal pipeline inspection
  - Inspection
  - Observation
  - Light intervention
  - Emergency response
• Resident:
  - Inspection
  - Observation
  - Valve operation
  - Emergency response
  - Survey
  - Cleaning
Why Use Eelume: Cost Benefit Analysis

• Standby Time is expensive
  – Mobilisation
  – Transit
  – Wait on Weather
  – Standby

• Instant response
  – Resident on template
  – Conduct routine inspection
  – Respond to anomalies
  – Can be operated from platform, FPSO or shore
  – Being available instantly is more cost effective
Eelume 1 (2016)
- Inspection vehicle
- Short configuration
- Forward looking camera
- In water tests completed

Eelume 2 (2016)
- Inspection vehicle
- Long configuration
- 5 sections plus joints
- Forward looking camera plus 360 degree camera
- In water tests completed with demonstrations Q4 2016
Eelume 3

- **Eelume 3 Configuration**
  - Short vehicle
  - Single joint with flexible inspection head
  - 20 cm diameter
  - 500 m depth rating

- **Operations and Applications**
  - Tethered inspection
  - Observation launched from ROV tool skid
  - Potential to attach tooling

- **Schedule**
  - Modules are built
  - Pressure testing underway
  - Assembly and tank test in August
  - At sea tests in September
Eelume 4

• Eelume 4 Configuration
  – Long vehicle
  – 5 sections with joints
  – Tethered
  – 500 m depth rating

• Operations and Applications
  – Tethered inspection
  – Inspection & Intervention
  – Potential to attach tooling

• Schedule
  – Some modules are built
  – Pressure testing in August
  – Assembly and tank test in September
  – At sea tests in October & November
Eelume: Thank You

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