SUMMARY

For PRM systems, the main cost drivers - apart from the cost of the system itself - are installation, operation/maintenance and survey costs. There are many decisions to be made during the system development and design phases that will heavily impact these follow-on costs. Flexibility is key. Offshore O&G fields differ in water depth, reservoir depth, bottom conditions, currents, water temperature, distance to subsea and/or topside infrastructure and also the level of existing ocean bottom obstructions such as pipelines, cables, moorings etc. It is important that the PRM system is flexible, i.e. the basic technology and components that make up the system should allow for tailored solutions to fit the specific site where it is to be installed.
Introduction

There is an increased focus in the industry on cost reduction, also for systems that have a relatively high perceived ROI, such as the case for PRM installations. For PRM systems, the main cost drivers - apart from the cost of the system itself - are installation, operation/maintenance and survey costs. There are many decisions to be made during the system development and design phases that will heavily impact these follow-on costs. Flexibility is key. Offshore O&G fields differ in water depth, reservoir depth, bottom conditions, currents, water temperature, distance to subsea and/or topside infrastructure and also the level of existing ocean bottom obstructions such as pipelines, cables, moorings etc. It is important that the PRM system is flexible, ie. the basic technology and components that make up the system should allow for tailored solutions to fit the specific site where it is to be installed.

Flexible Sensor Networks

One of the main challenges for the PRM technology to be successful, and become a standard tool for the reservoir management, is the installation technology. This is partly due to the general cost of the installation, and partly due to interference with other infrastructure on the seabed, and the obstruction to other activities at the field. To reduce the installation cost, the installation technology has to be made more efficient. This can for instance be technology for simultaneous deployment and trenching of the cables, or other time saving technologies.

The issues related to interference with other infrastructure at the seabed may partly have the same solution as discussed above. If the system can be installed and removed in a controlled and efficient way it will be possible to install the cables close to other infrastructure, and remove them if so determined by other activities at the field. For instance if a new pipeline has to be installed it may be required to remove some of the cables. This will require technology for efficient removing and reinstallation of these cables. This will also require a system design that allow sensor cables to be divided into sections with wet-mateable connectors, such that only smaller parts of the system has to be removed.

There are a number of trade-offs to consider when selecting to use wet-mateable connectors for a PRM system: System Reliability; fewer connectors is better. System Installability; more connectors is better. System Repairability; more connectors is better. System Cost; fewer connectors is better. The system architecture and design should allow the fitting of connectors when and where they are needed.

Industry initiatives for standardization of interfaces, both connector-based and wireless, are also important to increase flexibility and reduce total overall costs. Through standardization, a wider selection of products and components will be available for the operators from which to select. With this added flexibility, overall quality, reliability and maintainability can be realized for the entire subsea factory. This “lego” approach will also improve efficiency and reduce cost for both installation and operation of the subsea components, and will be a prerequisite for universal accept of PRM systems as it has been for the rest of the subsea industry.
Examples

Tool for wet-mate connecting of PRM cables.

Tool for simultaneous deploying & trenching PRM cables.

Site-specific configuration of connectors.

Standards-based PRM system ease integration with existing subsea factory.

References


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