

# Innovation and New Technologies in the Upstream Oil & Gas Industry

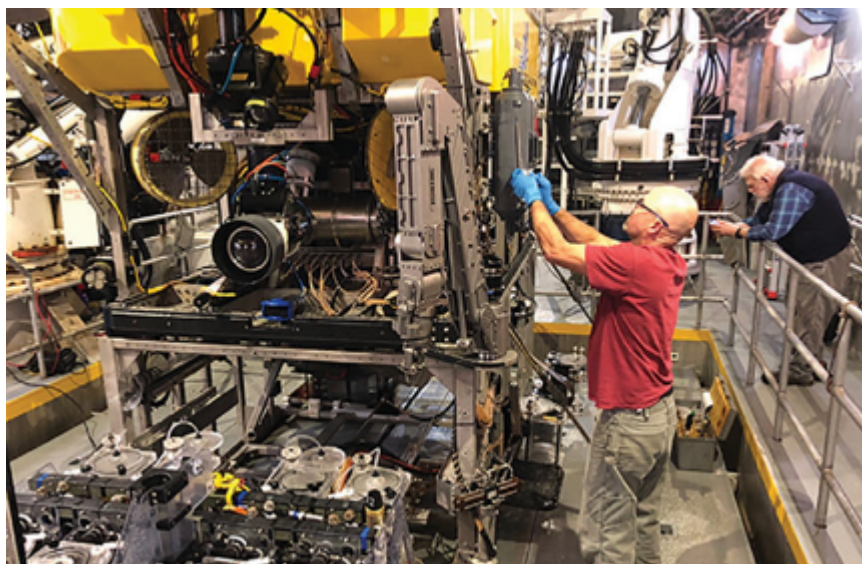
*Authors: Marco Cocchi – Researcher – Campus Bio-medico University of Rome*

*Leone Mazzeo – Researcher – Campus Bio-medico University of Rome*

## 1 Introduction

Oil & Gas reservoir research and exploration requires the utilization and adaptation of a large number of different technologies spread over numerous engineering fields. Because of the intense resource involved in such operation, the *Exploration and Production* sector (E&P) results to be a power-demanding field and particular attention should be paid to make it smarter and more efficient.

In the research of technology updates, upstream, as well as downstream, Oil & Gas industry has always been seeking out external innovations even in the field of informatic technologies and robotics.



**Figure 1: Work-class ROVs: the innovative remote-controlled robots for subsea operation**[\[1\]](#)

In Figure 1 a *work-class ROV* (remote operated vehicle) for subsea exploration is reported during its assembly phase. *ROVs* are made from robotic arms, known as manipulators, a camera, for subsea environment visual analysis, electrical drivers for motion control and batteries or external cables for communication and power delivery. *ROVs* for exploration were introduced during the '70s and represented a significant technology update in their field: thanks to the fact that they can be designed to operate at very high pressure and low temperature conditions, with the respect to human operators, they allowed to discover a high number of new oil fields that previously were thought impossible to be investigated, increasing the opportunities for Oil & Gas companies. The introduction of *ROVs* also decreased the cost of the exploration operations and, on top of the economics aspect, they increased the safety by substituting and replacing human operators.

ROVs represent also an example of technology transfer from external sectors (in this case the military sector) to upstream Oil & Gas operations. Technologies that come into the Oil & Gas sector often enter into a prolific chain of

innovation and become refined commercialized. That was also the case for **ROVs**, that having been incorporated for years in the Upstream sector, found new application for scientific research in marine biology and they have been used over the years to search for famous shipwrecks and discover new marine species.

In the following paragraphs, some of the most important new technologies in the *E&P* sector will be presented and discussed.

[\[1\]](#)

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