# EXPECTED RESULTS

DexROV will implement and evaluate novel undersea intervention paradigms that should allow safer, more cost effective and time efficient operations with Remotely Operated Vehicles (ROV). The outcomes of the project will be evaluated in a series of tests campaigns, culminating in a 1,300 meters deep representative trial in the Mediterranean Sea.

# PROJECT'S ID CARD

## FUNDING SCHEME

Horizon 2020 "Blue Growth" programme
(Grant #635491)

## FUNDING AMOUNT

4.6 Million Euros

## PROJECT DURATION

42 months (March 1st 2015
to August 31st 2018)

## CONSORTIUM

spaceapplications SERVICES

comex

JACOBS UNIVERSITY

ISME
Integrated Systems for Marine Environment

idiap
RESEARCH INSTITUTE

GRAAL Tech

CONTENT MATTERS EJR-QUARTZ

Co-funded by the Horizon 2020
Framework Programme
of the European Union

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## CONTACT

info@dexrov.eu

## WEBSITE

www.dexrov.eu

**EFFECTIVE DEXTEROUS ROV OPERATIONS IN PRESENCE OF COMMUNICATION LATENCIES**

# DexROV

# OBJECTIVE

DexROV aims to demonstrate the feasibility and viability of a novel concept of ROV operations with delocalized supervision for deep sea inspection and maintenance interventions in domains such as: energy (oil & gas, wind farms, tidal power), communication infrastructures, science (geology and biology), archaeology, wreck recovery, etc.

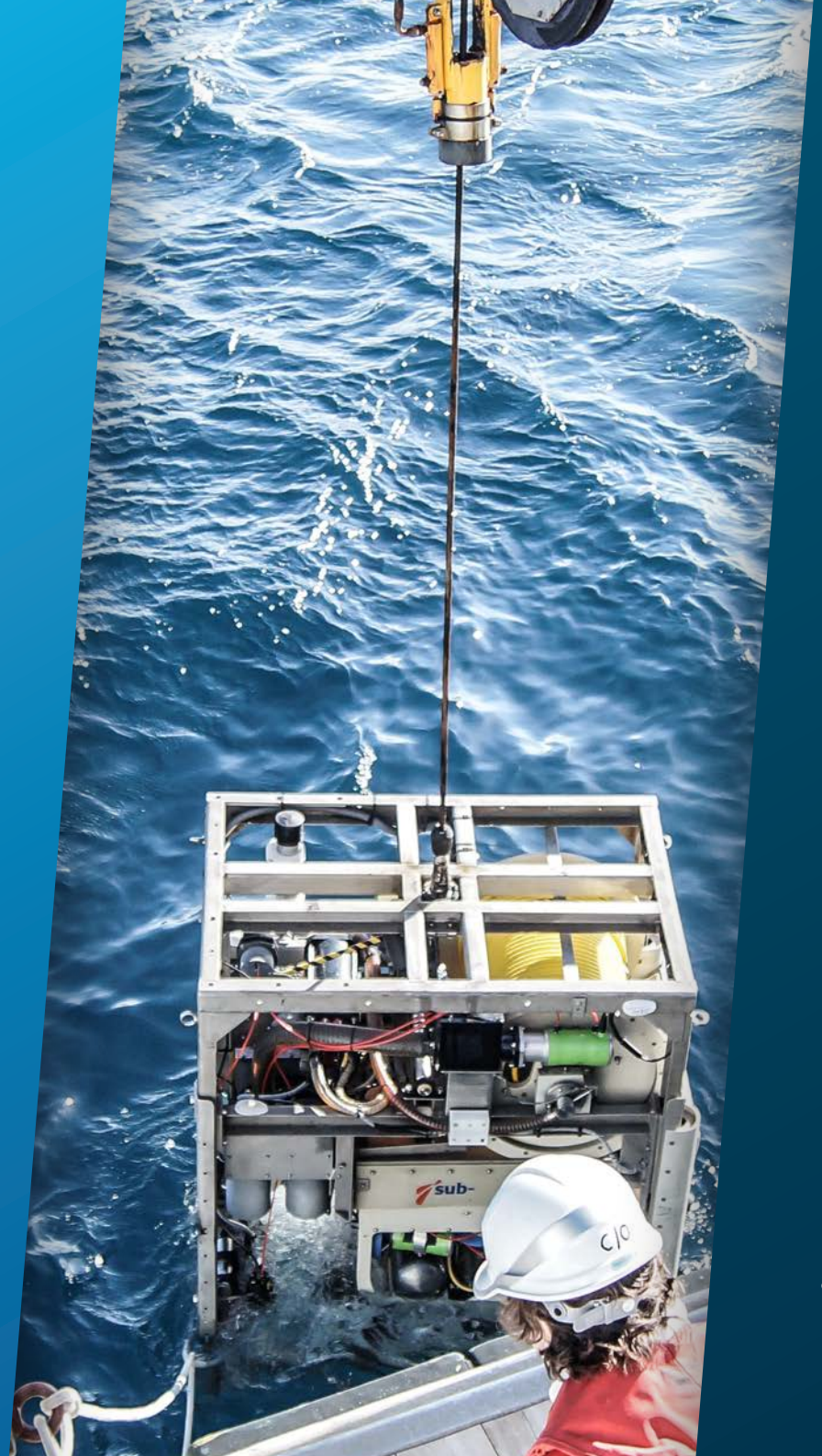
## MAIN CHALLENGES INCLUDE

### UNDERSEA PERCEPTION AND MODELING

Perceiving and modeling underwater structures and environment is a difficult duty. Dust floating in water tends to impair visual sensors, while the accuracy of acoustic perception solutions is limited. Significant resources of the project are devoted to developing techniques for acquiring high quality 3D models in near real time.

### NAVIGATION AND MANIPULATION CONTROL

Advanced control schemes are required in DexROV to navigate the ROV platform and position its arms with sufficient precision, while compensating for perturbations (currents). Autonomous navigation (dynamic positioning), station keeping and manipulation abilities are necessary.




### DEEP WATER CAPABLE DEXTEROUS MANIPULATORS

Conventional underwater arms and grippers are usually designed for heavy duty activities, and are unable to perform tasks requiring high dexterity. DexROV will develop new deep water rated dexterous manipulator arms and effectors with near human hand like manipulation and grasping abilities.

### FAR DISTANCE TELEOPERATION

Operating a ROV from a far distance, through a satellite communication link, implies the presence of significant latency that prevents conventional teleoperation. DexROV mitigates this concern with a temporal decoupling between (1) offshore ROV operations and (2) onshore human operations supervision. This relies on advanced simulation technologies, and novel machine learning tools that DexROV will purposely develop.

### HAPTIC USER INTERFACES

Human operators will be given the possibility to instruct the ROV operations through a double haptic exoskeleton arm and hand interface. In interaction with the simulation environment, performed manipulation actions will be interpreted in ROV compliant tasks, and achieved in a semi-autonomously manner by the ROV.