Titolo:	**PROTECH - Piattaforma RObotizzata di TEleoperazione per la CHirurgia mininvasiva**
Durata:	**36 months**
Data avvio:	**May 2023**
Data chiusura:	**April 2026**
Costi ammissibili:	**1.409.700,00 €**
Ente finanziatore:	**Ministero delle Imprese e del Made in Italy - MIMIT (precendete MISE)**
Partner:	

Project descrption:

Minimally invasive surgery is a clinical method that guarantees effectiveness of intervention, reduction of complications and risks for the patient, reduced hospitalisation time with high recovery capacity, and reduced operating costs for healthcare facilities. Contributing to the success of mini-invasive surgical methods are those technologies that, referring to the areas of ICT (Information and Communication Technology), IoT (Internet of Things) and CPS (Cyber Physical Systems), allow to overcome complex problems often encountered during the surgical phases, namely need for intra-operative medical imaging; reduction of the amount of ionising radiation administered during pre- and intra-operative imaging; reduction of errors and increase in accuracy; need to simplify percutaneous access techniques performed with the aid of augmented and virtual reality navigation; reduction of post-operative complications; reduction of risks. In the last years, surgical robots have found increasingly wide application in minimally invasive surgery, mainly due to their great ability to reach anatomical districts of interest with high precision through small skin incisions or natural orifices. Specifically, neurosurgery could benefit from the innovative technologies of robotics, advanced sensor technology and remote surgery. These methods, in a synergistic approach, would allow the maximization of effectiveness of surgery, risks reduction and also training of future neurosurgeons optimization. In this perspective, when robotic surgery is combined with multimodal navigation of preoperative and intraoperative imaging, dedicated sensor technologies, simulation systems and communication technologies, all the most desirable requirements for surgery in an integrated and connected operating room are met:

- precision, thanks to collaborative anthropomorphic robotics
- mini-invasiveness and optimisation, thanks to virtual navigation and the possibility of planning the approach to an anatomical target;
- certainty in reaching the target thanks to realtime imaging and the measurement of parameters that can provide reliable confirmation when the target point has been reached;
- remote operability, i.e. the possibility of remotely operating one or more devices in the room, thanks to the tools made available by advanced communication technologies;
- remote expertise, thanks to augmented reality and holographic viewers that can make a remote expert actually participate, introducing him/her into the current surgical context;
- reproducibility and standardisation, thanks to the possibility of storing all the activities of connected room devices and the possibility of reproducing them as simulation for teaching

and training.
With the PROTECH project, all these aspects are to be studied and developed. The basis of the project will be the clinical requirements of the application cases and the technological-functional models studied by the 'Carlo Besta' Neurological Institute, which will characterise the clinical context. The latter is mainly represented by the need to get with a probe needle inside the brain tissue in order to take a tissue sample or carry out a treatment. The aim is to perform this “task” safely, as minimally invasively as possible and with the certainty of having reached the target, even in the scenario where the surgeon is not physically present in the room. Mini-invasiveness and safety will be ensured by the possibility of planning the trajectory and navigating it with the help of a collaborative robotic arm, Masmec's primary objective. Target certainty will be ensured by an optical fibre that will measure the fluorescence gradient (University of Sannio) and the degree of blood flow (University of Naples Federico II). Tele-operability will be implemented with augmented reality tools, holographic viewers, haptic interfaces and communication technologies, another goal of Masmec. Ensuring the correct use of the platform in the clinical environment will come through the training and simulation infrastructure designed and implemented by EMAC.