



**Marie Curie Doctoral position at:**

- Università Degli Studi di Roma Tor Vergata (Italy)
- SINTEF - Trondheim (Norway)
- HSL - Trento (Italy)

## **ESR11 - Image guided navigation technology in endovascular interventions: AM generated mock-ups**

**Keywords:** Additive manufacturing (AM), training, patient specific model, endovascular therapy, navigation, surgical planning, surgical guidance, teaching.

**General framework:** 14 Early Stage Researchers (ESRs) will be offered doctoral positions as part of the MeDiTATe project, which is funded through the H2020 program: Marie Skłodowska-Curie Actions (MSCA) Innovative Training Networks – European Industrial Doctorate. The whole MeDiTATe project aims to develop state-of-the-art image based medical Digital Twins of cardiovascular districts for a patient specific prevention and treatment of aneurysms. The individual research projects of each ESR within MeDiTATe are defined across five research tracks: (1) High fidelity CAE multi-physics simulation with RBF mesh morphing; (2) Real time interaction with the digital twin by Augmented Reality, Haptic Devices and Reduced Order Models; (3) HPC tools, including GPUs, and cloud-based paradigms for fast and automated CAE processing of clinical database; (4) Big Data management for population of patients imaging data and high fidelity CAE twins; (5) Additive Manufacturing of physical mock-up for surgical planning and training to gain a comprehensive Industry 4.0 approach in a clinical scenario.

The work of each ESR, hired for two 18 months periods (industry + research) and enrolled in a PhD programme, will be driven by the multi-disciplinary and multi-sectoral needs of a multi-disciplinary research consortium (clinical, academic and industrial) which will offer the expertise of Participants to provide scientific support, secondments and training. Recruited researchers will become active players of a strategic sector of the European medical and simulation industry and will face the industrial and research challenges daily faced by clinical experts, engineering analysts and simulation software technology developers.

During their postgraduate studies they will be trained by the whole consortium receiving a flexible and competitive skill-set designed to address a career at the cutting edge of technological innovation in healthcare. The main objective of MeDiTATe is the production of high-level scientists with a strong experience of integration across academic, industrial and clinical areas, able to apply their skills to real life scenarios and capable to introduce advanced and innovative digital twin concepts in the clinic and healthcare sectors.

**Description of the ESR project:** The main objective for ESR 11 is to implement and test navigation technology in endovascular interventions, thereby enhancing efficiency and efficacy of image guided minimal invasive therapies. Such technologies aim at reducing OR procedure time and complications, while minimizing the contrast dose to the patient and radiation exposure to the patient and clinical personnel. Accurate patient specific anatomical models for planning and guidance of Endovascular Aneurysm Repair (EVAR) procedures will be generated through the fusion of information from available image data. 3D printed patient specific models for pre-surgical planning and intraoperative guidance will be created mimicking tissue characteristics with advanced materials through additive manufacturing (AM) to support the training of clinicians by providing complex anatomical models to inspect prior to procedure and also for teaching purposes. The models will also be used to support testing and validation of methods implemented for planning/navigation.

**Additional Information:**

ESR 11 will be enrolled in the PhD programme of the University of Rome “Tor Vergata” (Italy). The ESR 11 individual project will be realized in: (a) SINTEF, Research group Medical technology (Norway), supervisor Dr. Thomas Langø; (b) HSL (Italy), leading company for Additive Manufacturing and Advanced CAE simulation, supervisor: Dr. Pierluigi Di Giovanni. Two one-month secondments are foreseen at ARMINES and at HSL.

**Benefits, salary and duration:**

The selected candidate will receive a salary in accordance with the MSCA regulations for ESR. The gross salary includes a living allowance (€3,270 per month, subject to MSCA country correction coefficient, i.e. 130.6 % for Norway and 104.4 % for Italy), a mobility allowance (€600 per month), and a family allowance (€500 per month, if the researcher has family by the date of recruitment, regardless of whether the family will move with the researcher or not). The guaranteed funding is for 36 months (i.e. EC funding).

**Eligibility criteria:**

Applicants can be of any nationality and must hold a Master of Science degree (or equivalent) in engineering. They need to fully respect both eligibility criteria (to be demonstrated in the Europass CV): (a) Early-Stage Researchers (ESRs) must, at the date of recruitment by the beneficiary, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. (b) Conditions of international mobility of researchers: Researchers are required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. At the time of selection by the host organization, researchers must not have resided or carried out their main activity (work, studies, etc.) in Italy for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account.

**Candidate profile:** Candidates with background in biomedical engineering, image processing, biomechanics and computational fluid dynamics/computational solid mechanics are encouraged to apply for this position. Good programming skills (C++ and/or Python) are needed. Excellent knowledge of written and spoken English is required.

**How to apply:** Send CV, cover letter, BSc and MSc degrees, and letters of recommendation to all the following recipients: [biancolini@ing.uniroma2.it](mailto:biancolini@ing.uniroma2.it), [thomas.lango@sintef.no](mailto:thomas.lango@sintef.no) and [pierluigi.digiovanni@consultants.hsl-italia.com](mailto:pierluigi.digiovanni@consultants.hsl-italia.com).