3iA Côte d'Azur
Interdisciplinary Institute for Artificial Intelligence

Ph.D. research topic

- Title of the proposed topic: **Learning Statistical and Biomedical Models for multimodal image analysis – application to Image-Guided Surgical Robotics**
- Research axis of the 3IA: *AI for Integrative Computational Medicine*
- **Supervisor (name, affiliation, email): Pierre Berthet-Rayne pierre.berthet-rayne@caranx-medical.com & Nicholas Ayache, nicholas.ayache@inria.fr**
- Potential co-supervisor (name, affiliation): Hervé Delingette (Inria)
- The laboratory and/or research group: Epione Project-Team at Inria

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Apply by sending an email directly to the supervisor.
The application will include:

- Letter of recommendation of the supervisor indicated above
- Curriculum vitæ.
- Motivation Letter.
- Academic transcripts of a master's degree(s) or equivalent.
- At least, one letter of recommendation.
- Internship report, if possible.

⇨ **All the requested documents must be gathered and concatenated in a single PDF file named in the following format: LAST NAME of the candidate_Last Name of the supervisor_2023.pdf**

- **Description of the topic:**

The objective of this PhD is to contribute to the evolution of robotic surgery by developing novel image processing and modeling techniques that will allow the future generation of surgical robots to become autonomous. More specifically, this PhD will focus on endovascular surgery assistance:

Current endovascular procedures usually require several imaging modalities such as pre-operative CT in 3D for diagnostic and surgery planning (full body + heart), intra-operative ultrasound in 2D to guide the arterial puncture, and intra-operative fluoroscopy in 2D to perform the surgery. Physicians are trained to mentally register the patient anatomy in all the different imaging modalities, but this requires years of training and experience often at the cost of complications for the patient.

During this PhD you will tackle the challenges linked to anatomy segmentation in medical images using AI together with the statistical and biomechanical modeling of deformable structure and multi-modal registration to assist clinicians in their everyday practice, while contributing to the evolution of surgical robots and ultimately providing a better and safer experience for the future generations of patients.