FORTISSIMO PLUS

FFPLUS SUCCESS STORY:
BUSINESS EXPERIMENTS

FROM SUPERCOMPUTER TO SURGEON'S DESK: SAFER AORTIC SURGERY

ORGANISATIONS

LivGemini develops software for cardiovascular surgical planning. **RBF Morph** is the technology expert for mesh morphing and simulation. **The University of Rennes** and affiliated hospital surgeons are the clinical domain experts, contributing imaging and cardiovascular knowledge. **INSA Lyon** is the biomechanics expert, specialising in vascular graft materials and linking engineering evidence with clinical needs.

THE CHALLENGE

Around 20% of vascular graft procedures require secondary intervention because grafts are poorly adapted, compromised or incorrectly sized. Surgeons need patient-specific predictions of graft deformation after suturing, but high-fidelity finite-element analysis can take days on a workstation. Testing anatomical and graft variations requires many simulations in parallel, making HPC essential for clinically acceptable speed and scale.

Technology used: HPC, FEM, AI
Industry Sector: Medicine

THE SOLUTION

PANDORA used 900,000 core-hours on the Leonardo supercomputer to create a virtual population of 3D aortic anatomies and run commercial graft implantation simulations in parallel. HPC produced the varied training data that standard workstations could not generate in practical timescales. The results were distilled into an AI surrogate model in LivGemini's software, predicting graft behaviour in seconds, while a classifier flags unreliable configurations before use.

THE IMPACT

LivGemini gains a differentiated digital-health product: secure, on-site software that turns HPC-derived biomechanical evidence into rapid graft assessment. Converting research-grade simulation into a clinical workflow creates an estimated €8.8 million annual recurring revenue opportunity within four years and strengthens its position in personalised cardiovascular care.
Surgical teams can compare graft options, sizing and post-suturing deformation before operating, improving traceability and reducing reliance on generic guidance. Subject to clinical validation, more precise matching could help reduce avoidable complications and secondary interventions, which affect around 20% of procedures. Each avoided aortic re-intervention is estimated to save €25,000-30,000 in repeat surgery, intensive care and extended stays. PANDORA also shows how HPC-generated evidence can advance validated in-silico methods for medical devices, while clinicians use the resulting model locally without direct supercomputer access.

BENEFITS

- HPC cuts high-fidelity graft prediction from days to seconds.
- Surgical planning falls from 40-50 minutes to under 5 minutes.
- Improved graft matching targets the 20% secondary-intervention burden.
- Each avoided re-intervention could save hospitals €25,000-30,000.
- Commercial sales are predicted to generate €8.8 million annual recurring revenue in four years.

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