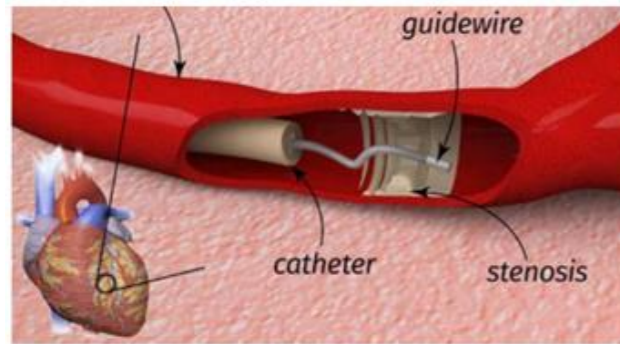


Use Case – Public Pocket Profile, Healthcare

Device and patient safety

Interacting device-tissue digital twins

Healthcare Use Case



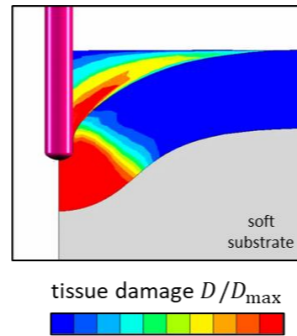
This use case focusses on decreasing the time to market of safe medical devices.



UPSIM Solutions: Development of credible and accurate interacting device-tissue digital twins by embracing modeling & simulation as strategic capability including V&V and optimization.

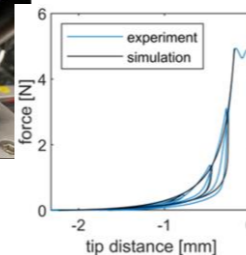
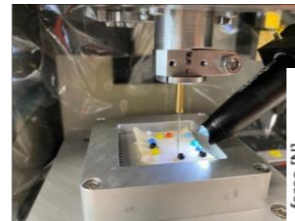
Device-tissue interaction

- ✓ Experimentally validated tissue damage and puncture model
- ✓ Real-time physics-based device-tissue interaction simulator



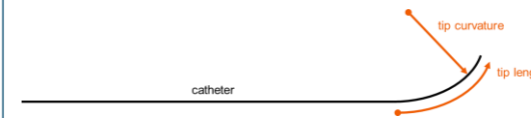
Characterization and validation experiments:

- ✓ Puncture threshold force
- ✓ Tissue damage characterization

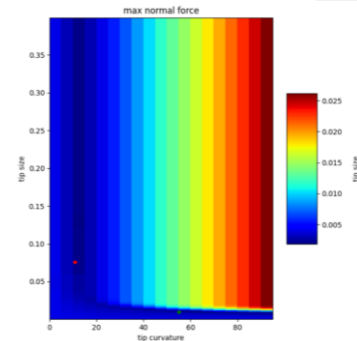


Design optimization

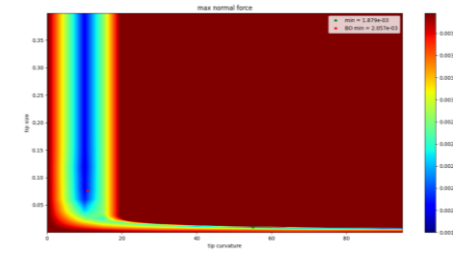
Optimization approach: minimize contact force by variation of tip curvature and tip length during device insertion in a 180° geometry



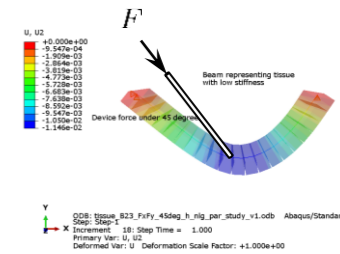
Landscape:



Optimum:

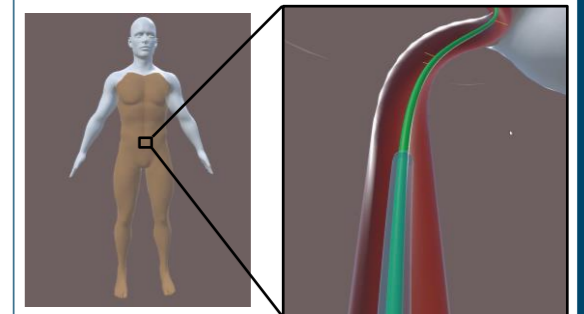


Reduced order models



Generated NN model to predict x- & y-displacement (left & right) → mean accuracy 99,5%, 40.000x faster than Abaqus calculation

DT visualization



Real-time visualization using Unity engine through direct coupling to physics-based simulator