

# Cyflymu Accelerate

## AN INNOVATION CASE STUDY

### PERSONALISED VIRTUAL SURGERY FOR OPTIMISED KNEE ARTHRITIS TREATMENT – AN INNOVATION CASE STUDY

**PROJECT DURATION:** 16 months

**PARTNERS:** TOKA, Cardiff and Vale University Health Board and Cardiff University

**PROJECT AIM:** To enhance high tibial osteotomy surgical planning software through the use of biomechanical and imaging data

## OVERVIEW

Osteoarthritis affects nearly 9 million people in the UK; the knee being a commonly affected joint. High Tibial Osteotomy (HTO) is an effective treatment for younger knee osteoarthritis patients as it preserves the native joint by re-aligning the tibia and redistributing the painful high-pressure regions within the knee. However, patient outcomes are still dependent on the accuracy of the procedure, and current solutions are a one-size-fits-all approach.

This project proposes to address this problem, by introducing a bespoke surgical planning tool. The intention is to enable surgeons to precisely achieve the planned correction using a combination of intuitive 3D planning and custom-made, minimally invasive devices for superior patient comfort. Such a result could lead to a significant improvement in clinical treatment options, which will ultimately enhance the patient experience.

A team of researchers, industrial partners and clinicians will collaborate to inform iterations to existing surgical planning software. Patients scheduled for HTO surgery at Cardiff and Vale Orthopaedic Centre, will be recruited as volunteers to take part in a study to collect biomechanical and knee joint imaging data pre- and post-surgery. This data will be used to inform changes to the planning software.

**Accelerate** is facilitating the delivery of this clinically focused project, through the provision of academic expertise in musculoskeletal biomechanics and imaging, project management, and support for research nurse time to aid patient recruitment. This is enabling the industry partner, TOKA, to implement bespoke changes to their surgical planning software, and bring their own industry-specific expertise to enhance the project outcomes and post project commercial developments.



The Dynamic Biplane Imaging and Biomechanics Laboratory at the Musculoskeletal Biomechanics Research Facility, School of Engineering, Cardiff University  
(image courtesy of <https://www.cardiff.ac.uk/engineering/research/facilities/musculoskeletal-biomechanics-research-facility>)



## OUTCOMES

- Pioneering evidence driven treatment decision making for knee osteoarthritis surgery
- Integrate research findings into novel HTO surgical planning software for better diagnosis and personalised treatment
- Case studies
- Showcasing of clinical research facilities within Cardiff, and their impact upon industry and NHS Wales
- Seeding of future work
- Peer reviewed publications

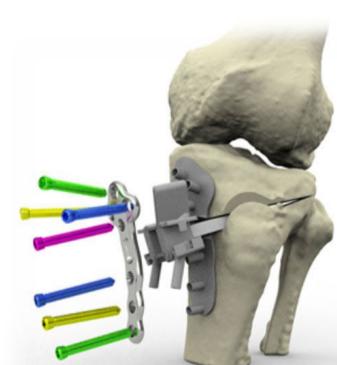


## FUTURE IMPACT

- Changes to clinical practice within NHS Wales
- Improved patient outcomes through a personalised surgical approach
- Commercial development opportunities within Wales
- Opportunities for further collaboration between project partners



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TAILORED OSTEOTOMY KNEE ALIGNMENT



Images courtesy of TOKA Ltd