

## How to scale up and commercialise research and development

### The Technology: Surgical planning through simulations

The Spine Biomechanics Group at Balgrist University Hospital ('Balgrist') is based in Zurich, Switzerland. With close academic links to the University of Zurich and ETH, the group has published a number of original scientific manuscripts. One such project involves the use of biomechanical simulations to aid in the planning of spinal surgeries. Complications of spinal surgery can lead to increased patient morbidity. Using computer simulations can improve decision making around screw placements and minimise the risk of intra-operative complication.

### The bottleneck: 3D models of spines

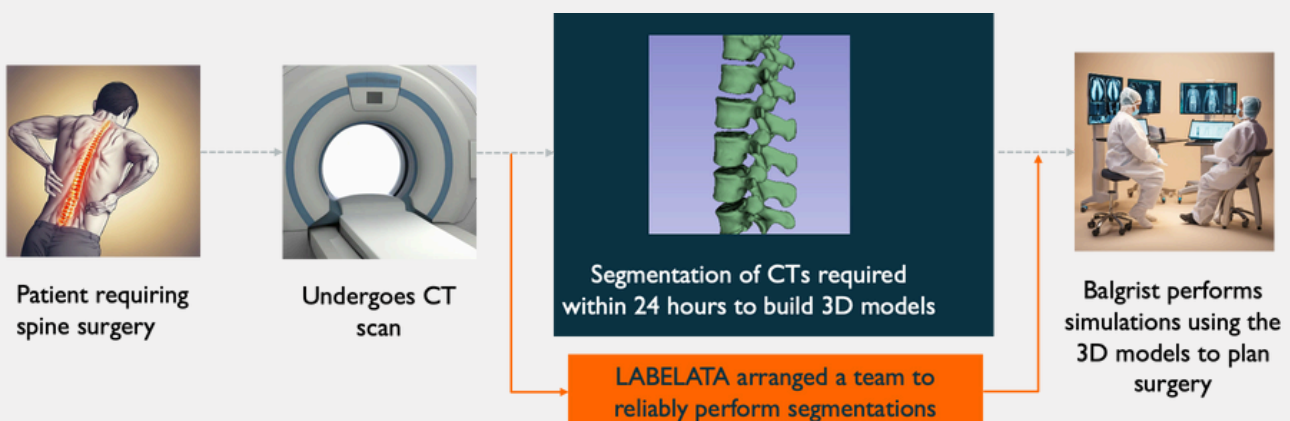
Simulations require 3D models of the spine derived from CT scans. Given the complexity of the spine, anatomical variants and range of pathology, it is not possible to fully automate high quality segmentation currently. To help build 3D models of the spine, Balgrist partnered up with Labelata to train a team of medical experts to develop semi-automated 3D models of the spine with manual corrections where required.

### The challenge: Developing a reliable 24 hour segmentation service

Clinical radiologists and allied imaging technologists are in short supply and often lack the time or capacity to perform labour intensive manual segmentations. Small scale academic projects may involve one or two enthusiastic radiologists as co-authors but this is not scalable.

Typically a patient will have a pre-op CT scan a few days before their planned operation. Generating a high quality segmentation within a short timescale is crucial so that the 3D model can be developed, and simulations can be run on this model prior to the surgery.

Medical data labelling, unlike other labelling tasks, requires a significant level of knowledge, expertise and a high level of precision. The volume of data generated from a single cross-sectional study such as MR or CT is vast and involves complex 3D anatomy. High quality manual image segmentation can be time consuming and expensive.



# Labelata's Solution

## Step 1: Leveraging our network of medical experts including consultant radiologists and imaging technologists

Labelata assembled a team of experts competent in using a variety of open source segmentation tools including 3D Slicer, a specialized program allowing for faster segmentation through semi-automated processes.

Supervised semi-automated segmentation is the quickest and most accurate process to generate complex high quality segmentations at scale and speed whilst also maintaining precision.

Our team have worked on a variety of projects and have the technical abilities to fully leverage the potential of a variety of open source labelling tools. Labelata's expertise can save clients both time and money by eliminating the need to train medical experts who maybe unfamiliar with complex labeling tools.

## Step 2: Maintaining high quality through quality assurance

Maintaining high quality requires a motivated team and robust quality assurance protocols. Labelata's network consists of various tiers of expertise including:

- Medical students & doctors in training
- Allied imaging technologists and physiotherapists.
- Board certified consultant radiologists who provide training and oversee the quality assurance processes.

Clear channels of communication between team members allows cases to be allocated to the most suitable team members with consultant radiologists on hand to deal with more complex cases.

## Step 3: Ensuring timely delivery

Unlike the client's prior solution of relying on volunteers or surgeons from the clinic on an ad-hoc basis, our network of experts can be assigned a rota to ensure they are available to complete the segmentations on a timely basis.



[HTTP://WWW.LABELATA.CH](http://www.labelata.ch)

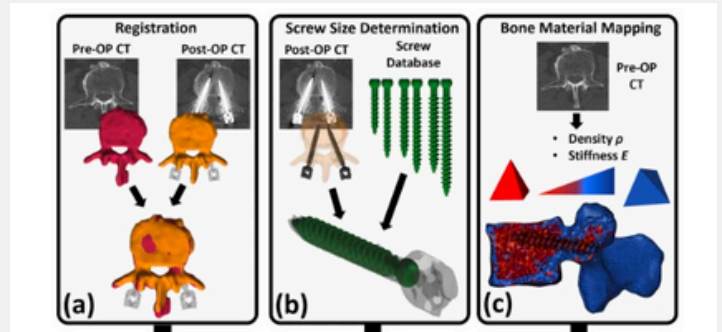


[INFO@LABELATA.CH](mailto:info@labelata.ch)

# The conclusion: Going from research to clinical application

Labelata has supported the Spine Biomechanics Group to publish multiple clinical studies and provided the expertise and reliability to scale their products. They have now created a spin-off to commercialise their research.

## Extract from clinical study mentioning Labelata



*"Lumbar vertebrae were manually segmented from preoperative and postoperative CT images (Fig. 2a). Additionally, screws and cages (whenever present) were segmented from the postoperative images (Fig. 2b). Image segmentation was performed by a professional segmentation and labelling company (Labelata GmbH, Zürich, Switzerland)."*

Fasser, MR., Gerber, G., Passaplan, C. et al. Computational model predicts risk of spinal screw loosening in patients. European Spine Journal 31, 2639–2649 (2022).

## What's next?

This case study highlights the value of outsourcing complex segmentation tasks and not only relying on in-house clinical teams who may not be able to scale up activity alongside clinical work. Labelata has both the clinical and technical expertise to aid image segmentation projects across a variety of modalities.

*"The streamlined process and timely execution of Labelata's 24 hour segmentation service gives me confidence to integrate Labelata into clinical applications and help scale up and commercialise our research"*



**Jonas Widmer, Head of Spine Biomechanics, Balgrist University Hospital & CTO at Moving Spine AG**