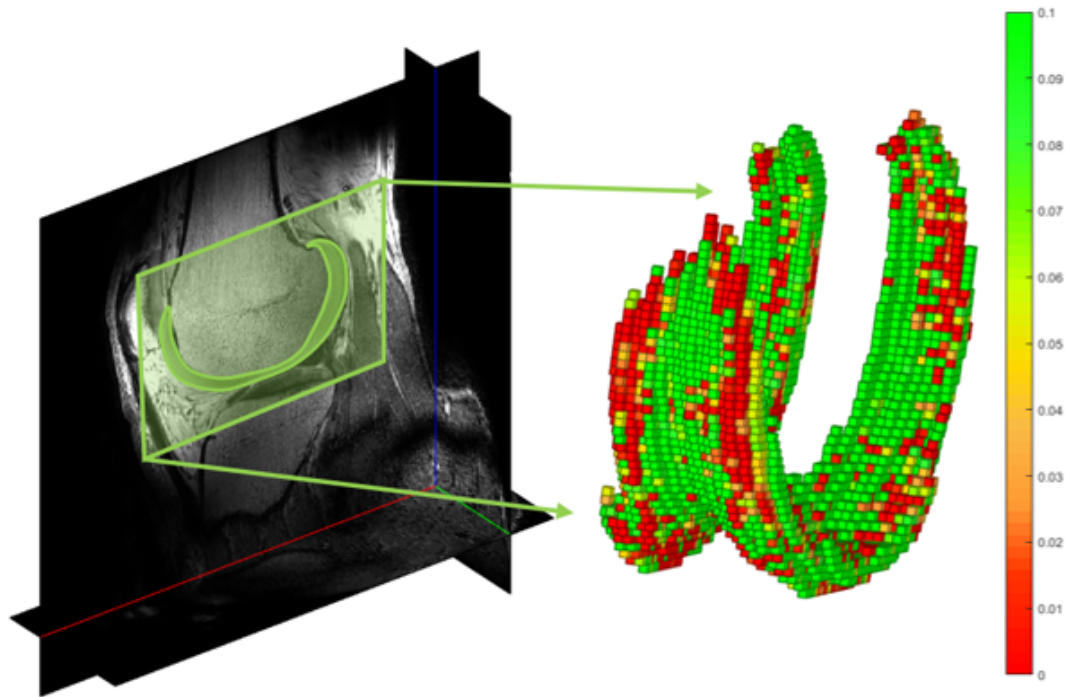# Automatic 3D quantitative maps of knee cartilage

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Within this project of the 7T MRI group in collaboration with the orthopaedics department we make various quantitative MRI scans of cartilage, for instance T1rho, gagCEST or diffusion MRI. We want to use these scans to get more insight in the cartilage quality of patients. What we do now after we acquire the data is a lengthy, time intensive, manual segmentation of the cartilage, which can take up to several hours. The most important segmentation is that of the cartilage, which is a challenging tissue to segment because of the thin, flowing structure.

We would like to (semi-)automate this process and after that make automated 3d quantitative maps of the cartilage, for instance the one visualized in the figure. This visualization can be made from the information of one specific sequence, which could be a good starting point. However, ultimately, we hope to combine everything in one quantitative map of the cartilage, based on various sequences. This 3d quantitative map could be an ideal tool for an orthopeadic surgeon to plan his surgery, or assess the treatment outcome.

This project entails several goals, depending on the length of the project and availability:
- Automate segmentation of cartilage, in high resolution morphological images or lower resolution quantitative images
- Registration of segmentation to other sequences made in the same scan session
- Create automated 3d quantitative maps based on one sequence
- Combination of multiple quantitative maps