According to a first aspect, a device is provided. The device has a processing unit configured to process X-ray images. A software program is executed by the processing unit to perform the following steps.

First of all, a first X-ray image is received which is a projection image of an at least partially visible object. Then, a model of the object is received, and the model is applied to localize the object in the first X-ray image, and a point is identified in the first X-ray image, wherein a 3D position of the point relative to the object is known.

Like the first X-ray image, a second X-ray image is received which is a projection image of an at least partially visible tool together with the at least partially visible object. The model of the object is again applied to localize the object in the second X-ray image. In relation to the tool, a coordinate system is defined, and an axis is determined and identified in the coordinate system.

Finally, a 3D position and orientation of the tool relative to the object is determined based on the second X-ray image, a 3D model of the tool, the localized object, knowledge that the 3D position of the point relative to the object is the same when generating the first X-ray image and when generating the second X-ray image, and knowledge about the distance between the point and the axis.

According to another aspect, a method of assisting in musculoskeletal surgery is provided, the method comprising the steps of: receiving a first X-ray image being a projection image of an at least partially visible object, receiving a model of the object and apply the model to localize the object in the first X-ray image, identifying a point in the first X-ray image, wherein a 3D position of the point relative to the object is known, receiving a second X-ray image being a projection image of an at least partially visible tool together with the at least partially visible object, applying the model of the object to localize the object in the second X-ray image, defining a coordinate system in fixed relation to the tool, determining and identifying an axis in the coordinate system, and determining a 3D position and orientation of the tool relative to the object based on the second X-ray image, a 3D model of the tool, the localized object,

knowledge that the 3D position of the point relative to the object is the same when generating the first X-ray image and when generating the second X-ray image, and knowledge about the distance between the point and the axis.

As used herein, an “object” may be any object at least partially visible in an X-ray image, e.g., an anatomical structure or an implant. When considering the “object” as an implant, it will be understood that the implant may already be placed within an anatomical structure. A “tool” may also be at least partially visible in an X-ray image, e.g., a drill, a k-wire, a screw, or the like. In a more specific example, with the “object” being a bone, the “tool” may also be an implant like a bone nail which is intended to be, but not yet inserted into the bone. It can be said that a “tool” is an object which shall be inserted, and an “object” is an anatomical structure or an object like an implant which is already place within the anatomical structure. It is again noted that the present invention does not require the use of any reference body or tracker.