

## CLIENT

Elekta (Medical Intelligence)

## PRODUCT

iGUIDE™

## CHALLENGE

One of the obstacles to achieving accuracy in the delivery of radiation therapy is patient positioning under linear accelerator. While modern 3D volume imaging can remove uncertainties arising from organ motion, it takes patient positioning system to complete the IGRT localization chain by enabling accurate and remote geometric correction of any discrepancies observed. Our challenge was to design and implement control software which can drive the robotic patient positioning system and achieve sub-millimeter 6D conformal positioning accuracy, thereby allowing clinicians to reduce margins with confidence, escalate dose and move towards hypofractionated treatment regimes.

## RESULT

Visual and intuitive iGUIDE software aids the user with clinical workflows and ensures accurate positioning of the robotic couch to the defined isocenter co-ordinates based on correctional data received from on-board 3D volume imaging system, using all six degrees of freedom. iGUIDE uses high-precision real-time optical tracking camera to monitor treatment room and validate the absolute table position, and inhibits treatment if tolerances are exceeded. R&D prototype extension to iGUIDE has been developed, which enables radiation therapy of moving target in the lung area.

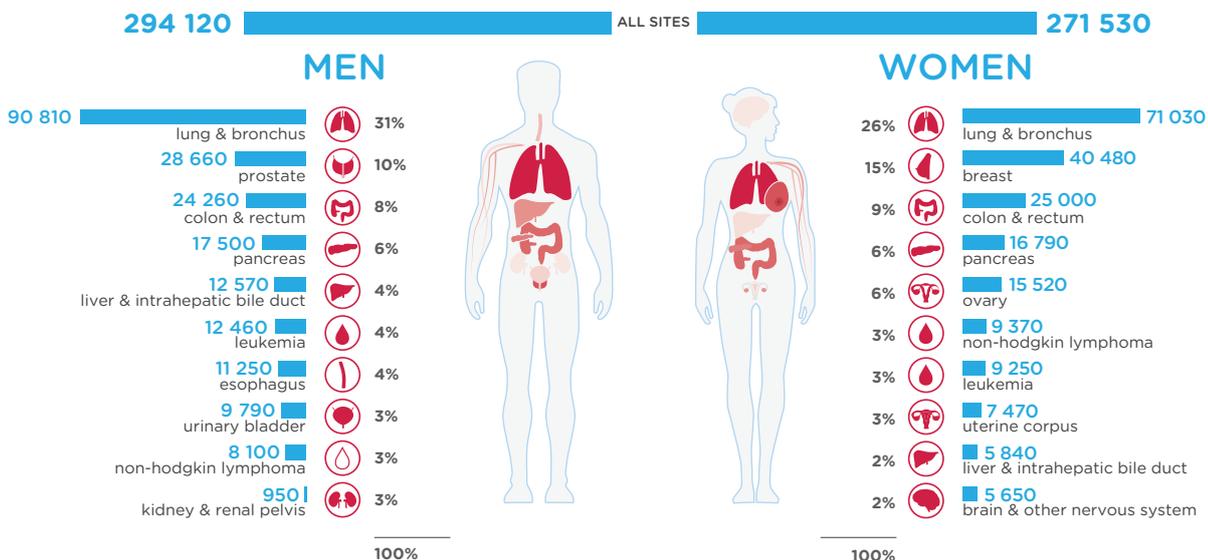
## TESTIMONIAL

“What has been started as a cooperation with strong research focus about a decade ago meanwhile has transformed into a firm and trustful collaboration on software development for use in medical devices with all subsequent consequences (such as ensuring compliance to key regulatory standards). The iGUIDE software is a key component of our HexaPOD evo RT System now since 2006, meaning that worldwide several hundred of hospitals are using the system on a daily basis. One of Elekta key values is long-term relationships - this is with the focus to our customers but internally also includes suppliers and partners. We see Rubedo Sistemas as a reliable and mature long-term partner to Elekta for further development and continuous maintenance of tailored application software in the context of Radiotherapy treatment, esp. patient positioning aspects.”

**DR. MICHAEL ROTH**  
 Director of R&D, Elekta PSC Schwabmünchen  
 Elekta | Medical Intelligence Medizintechnik GmbH



# ESTIMATED DEATHS

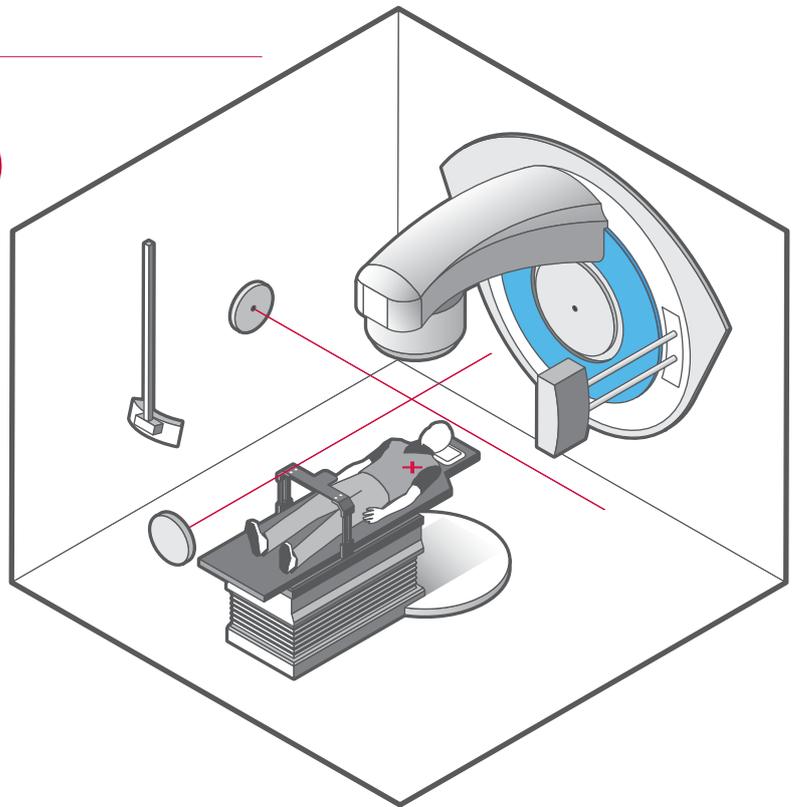


## iGUIDE

### 1

#### Patient Alignment

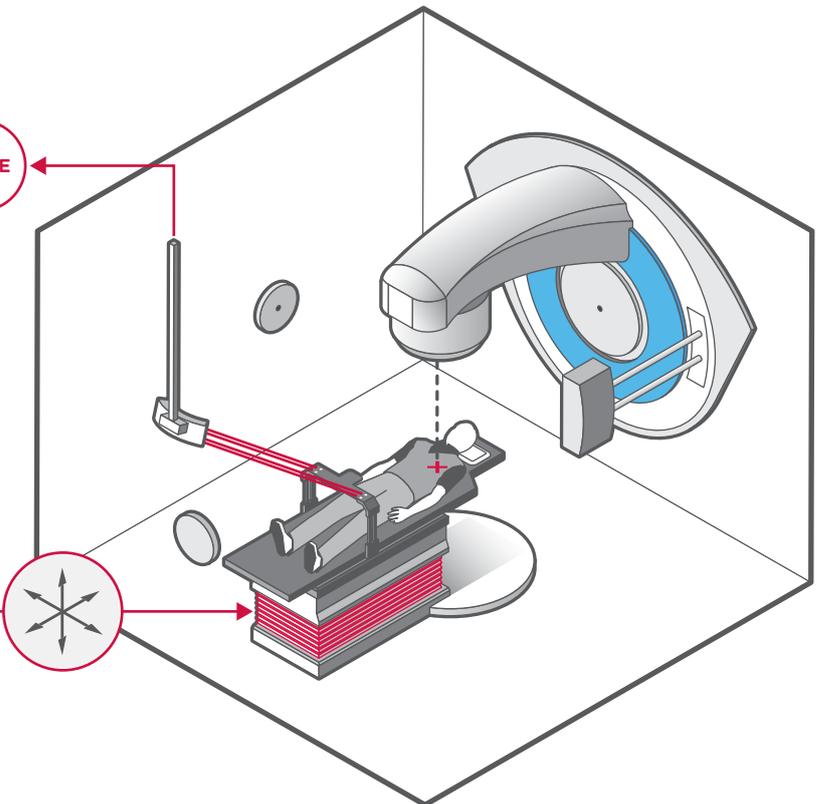
Patient's prescription is selected on iGUIDE software; the patient lies down on the treatment couch and gets aligned to their body markers using the room lasers.



### 2

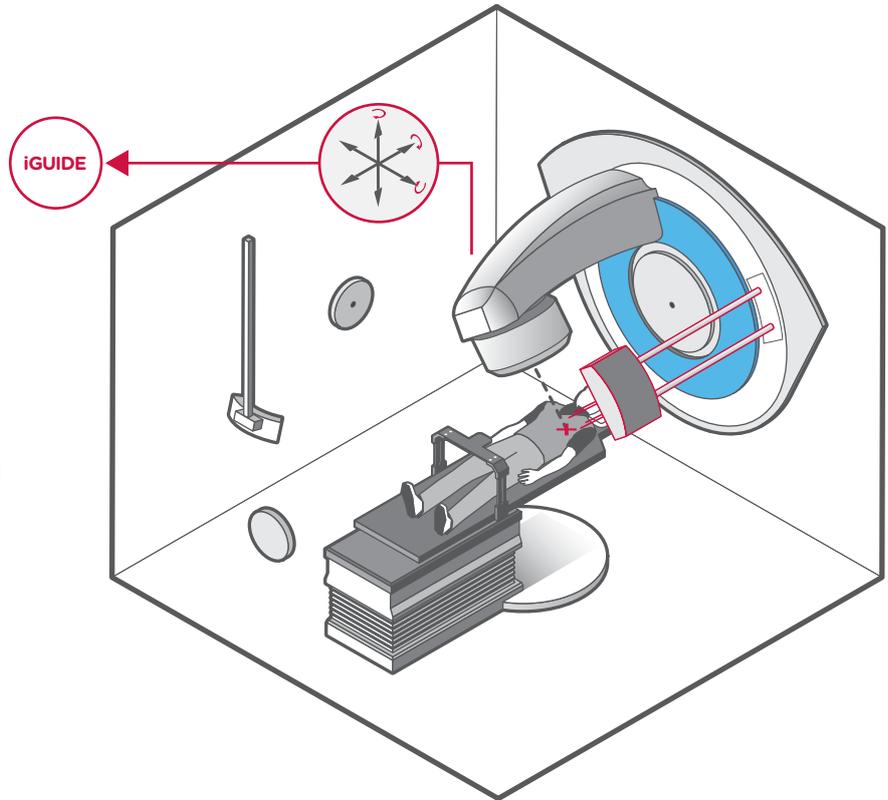
#### Prepositioning in 3D

Once aligned to body markers, the iGUIDE software registers the patient and automatically prepositions them in 3D bringing tumor roughly into the isocentre.



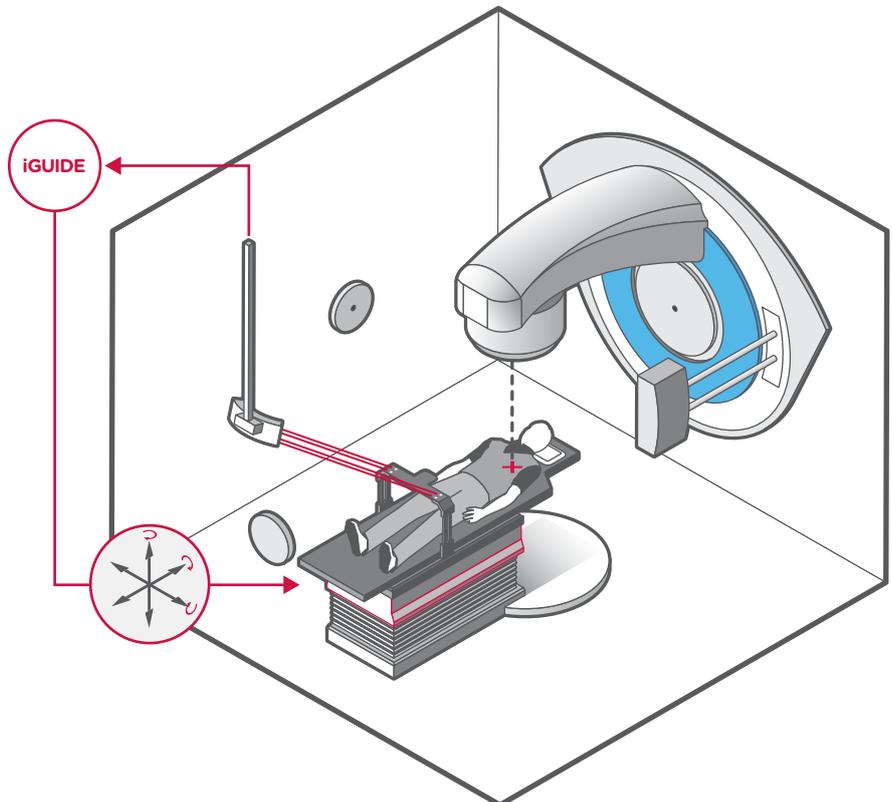
### 3 Imaging in 6D

Tumor image is acquired using an integrated volume imaging system (or equivalent); 6D positional error (translational and rotational offset) is calculated and sent to the iGUIDE software for positional error correction.



### 4 Positioning in 6D

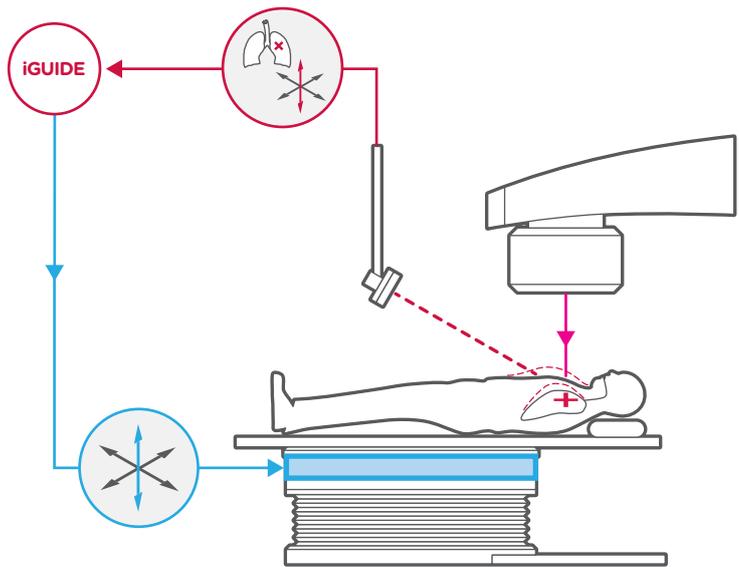
iGUIDE software automatically moves the robotic couch to the corrected isocentre position as defined by the imaging system and monitors the ultimate position for deviations until actual treatment starts.



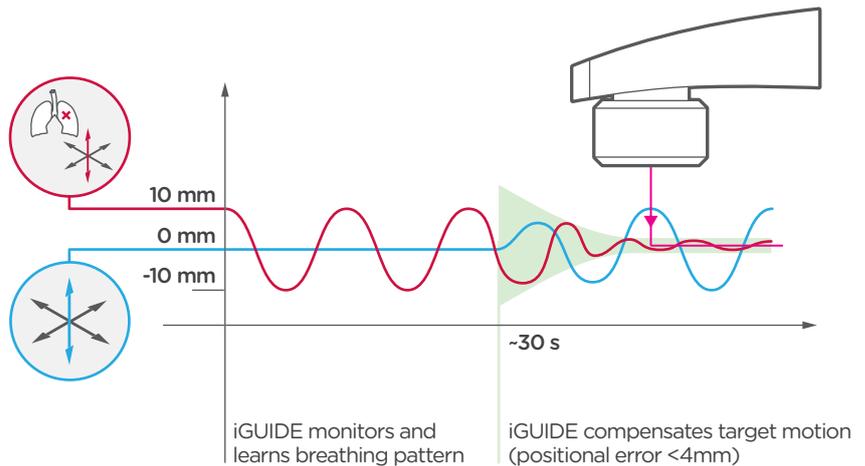
# iGUIDE

## 5 Moving Target Compensation\*

iGUIDE software monitors patient's chest as they breathe freely during treatment delivery and compensates against tumor excursion caused by organ (lung) motion in real-time.



\* Prototype implementation



### SOLUTION / PROCESS

Design management process is ISO 9001:2008 certified, ISO 12207:2008 and SW 68 compliant, and is based on Rational Unified Process. SysML/UML was used on all modeling domains: business and system requirements, architecture and test cases. All modeling domains can be traced from each other. Formal design reviews and risk management were performed. R&D part of the project was partially funded by the EU through the National Support Programme.

### BUDGET

1 000 000 EUR

### DURATION

> 36 months

