

# HEROL

## Computer and Robotic assisted maxillofacial surgery

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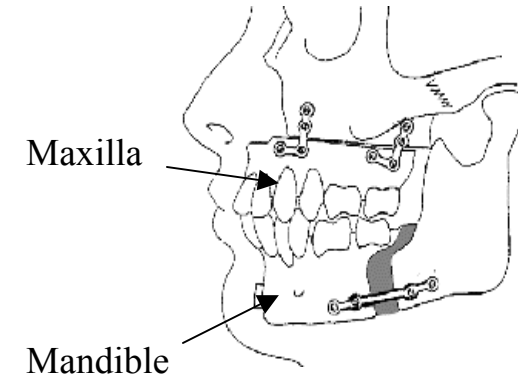


# Context

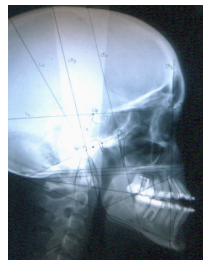
## Definition

Orthognathic surgery : surgical repositioning of

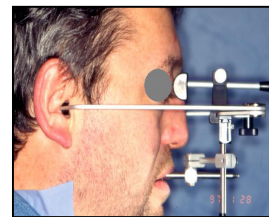
- Maxilla
- Mandible
- Fragment



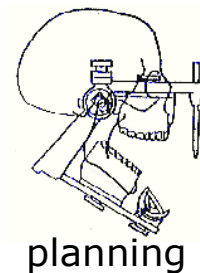
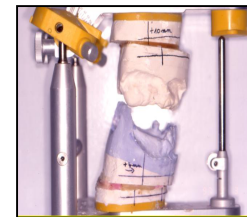
## Current method



Cephalometric  
analysis



measurement

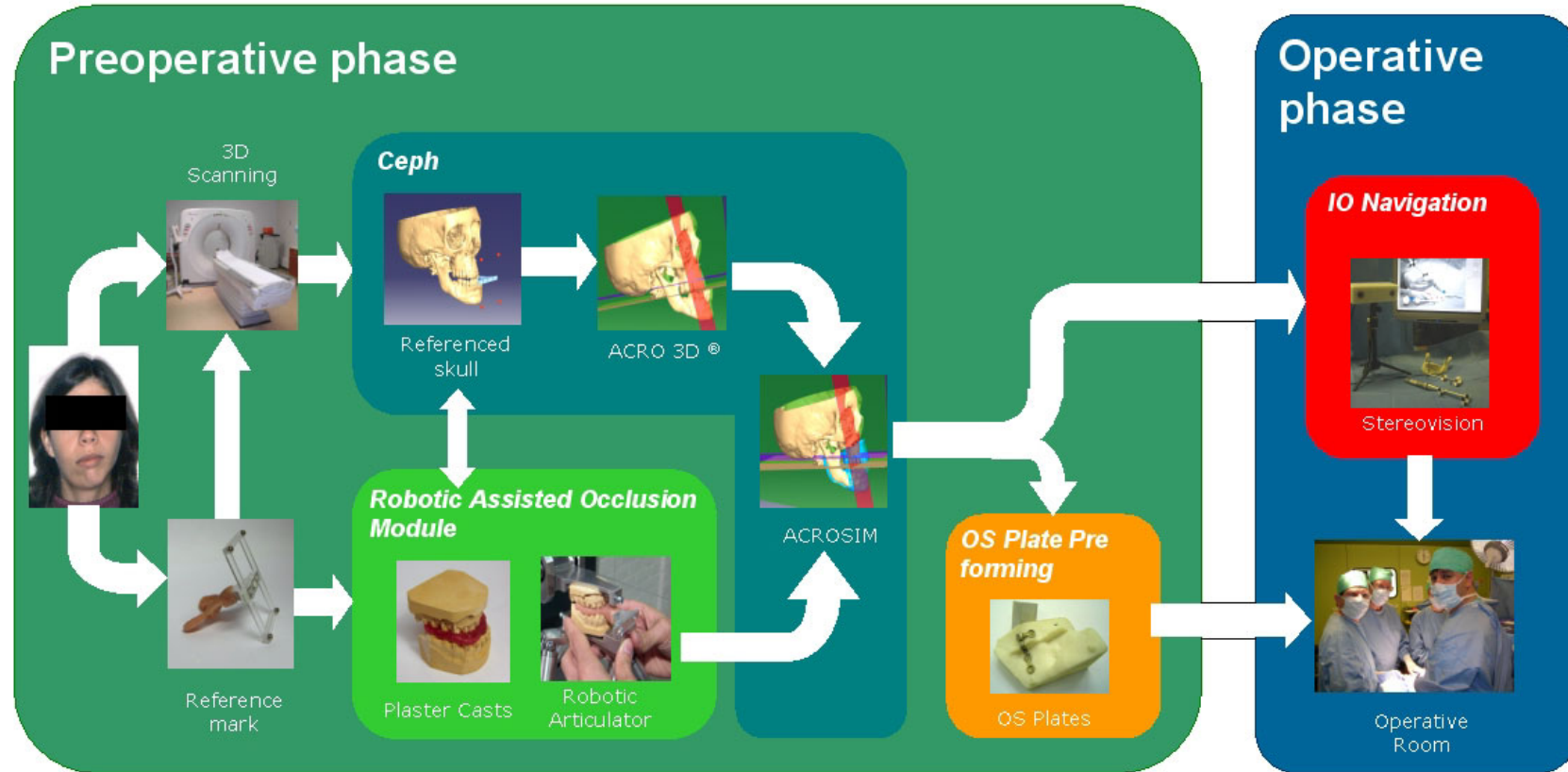


planning



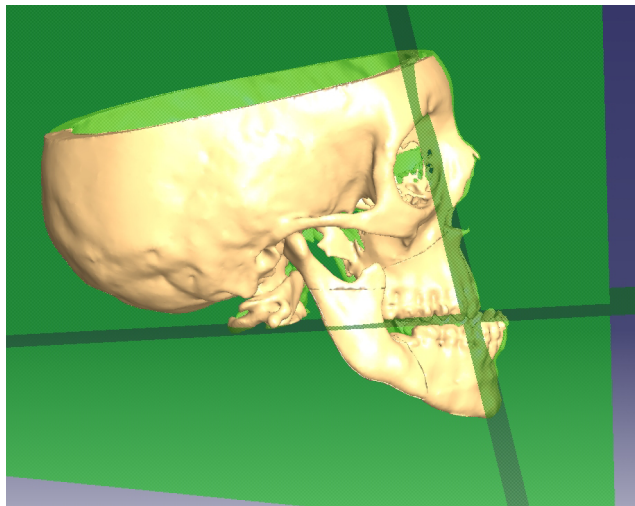
splint

# Proposed Solution



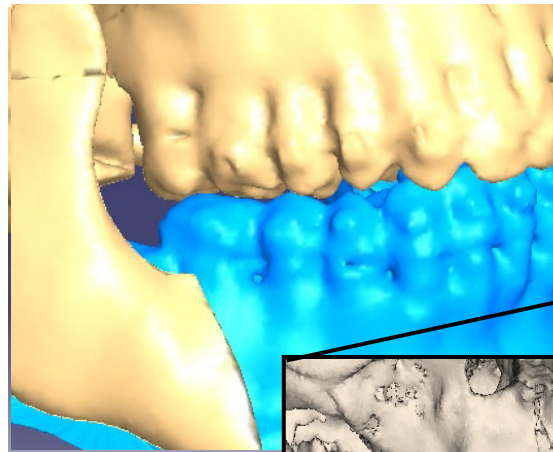
# Determining the position of the occlusion

How to put jawbones in occlusion?

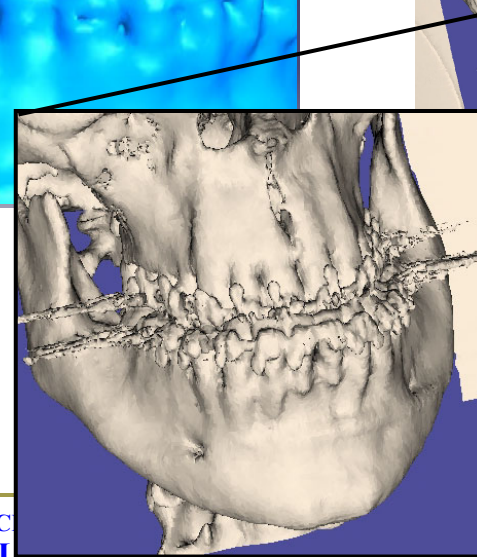
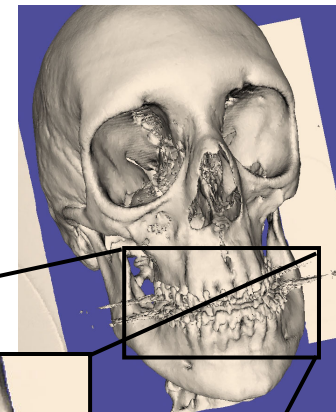


Initial position

Software solution ?



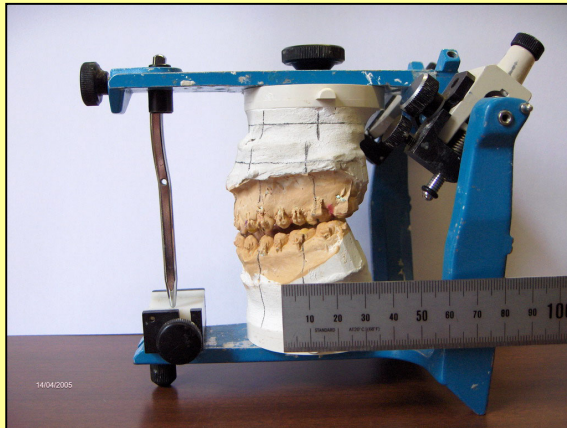
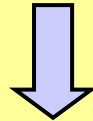
Fillings artefacts



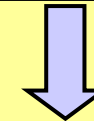
# Determining the position of the occlusion

Selected method  $\Rightarrow$  Plaster casts

Current method



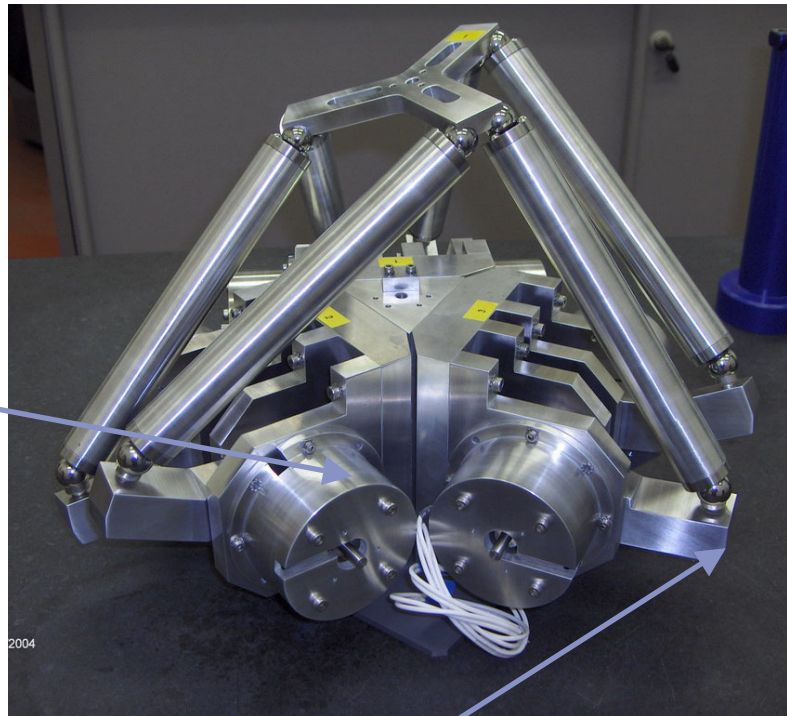
Desired method



Measurement  
Fixation  
Easy to use  
Accurate

# Determining the position of the occlusion

6 degrees of freedom / hand manipulated / Zero backlash



Magnetic brakes

Magnetic spherical joint

Topology selection

Optimization/selection of the structure

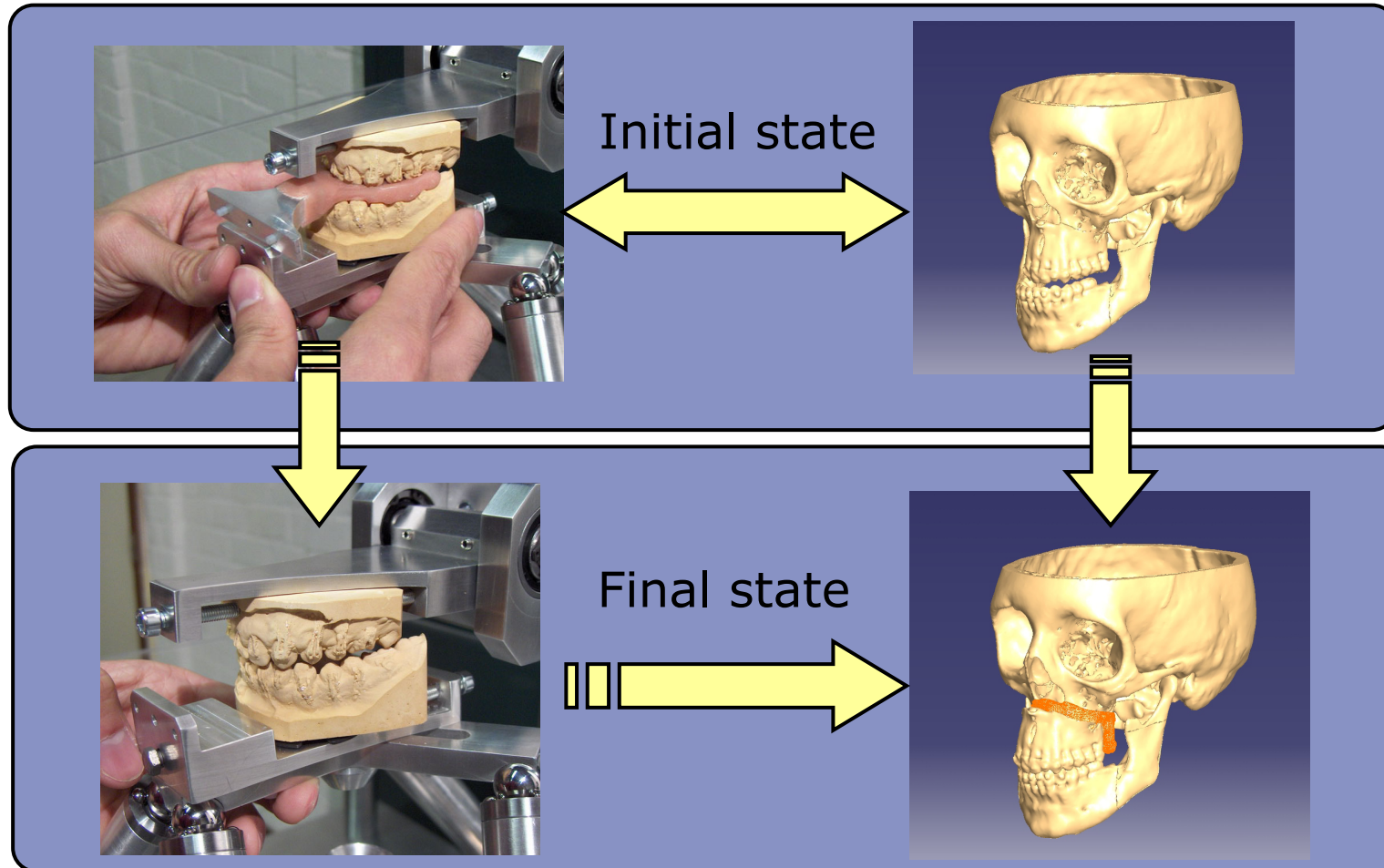
(Electro)mechanical design

Real time programming

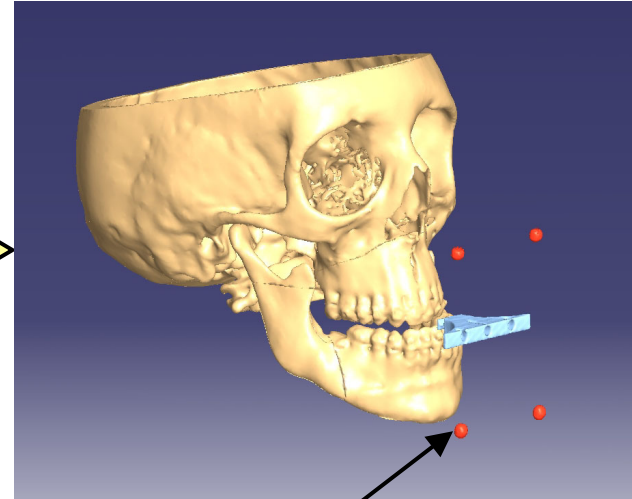
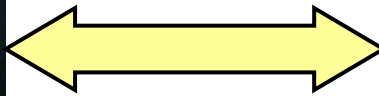
Calibration

Validation

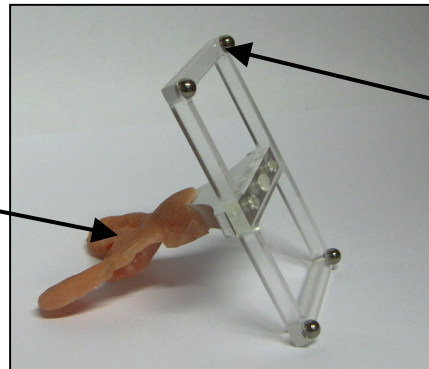
# Determining the position of the occlusion



# Determining the position of the occlusion



splint

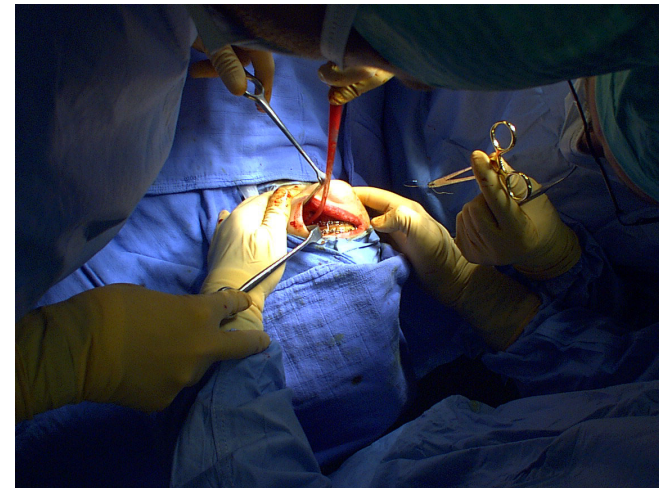
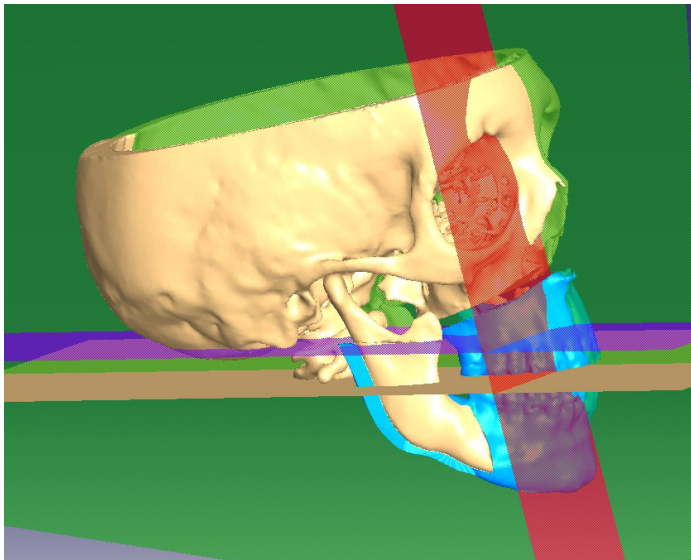


Titanium balls



# Transfer to the Operating Room

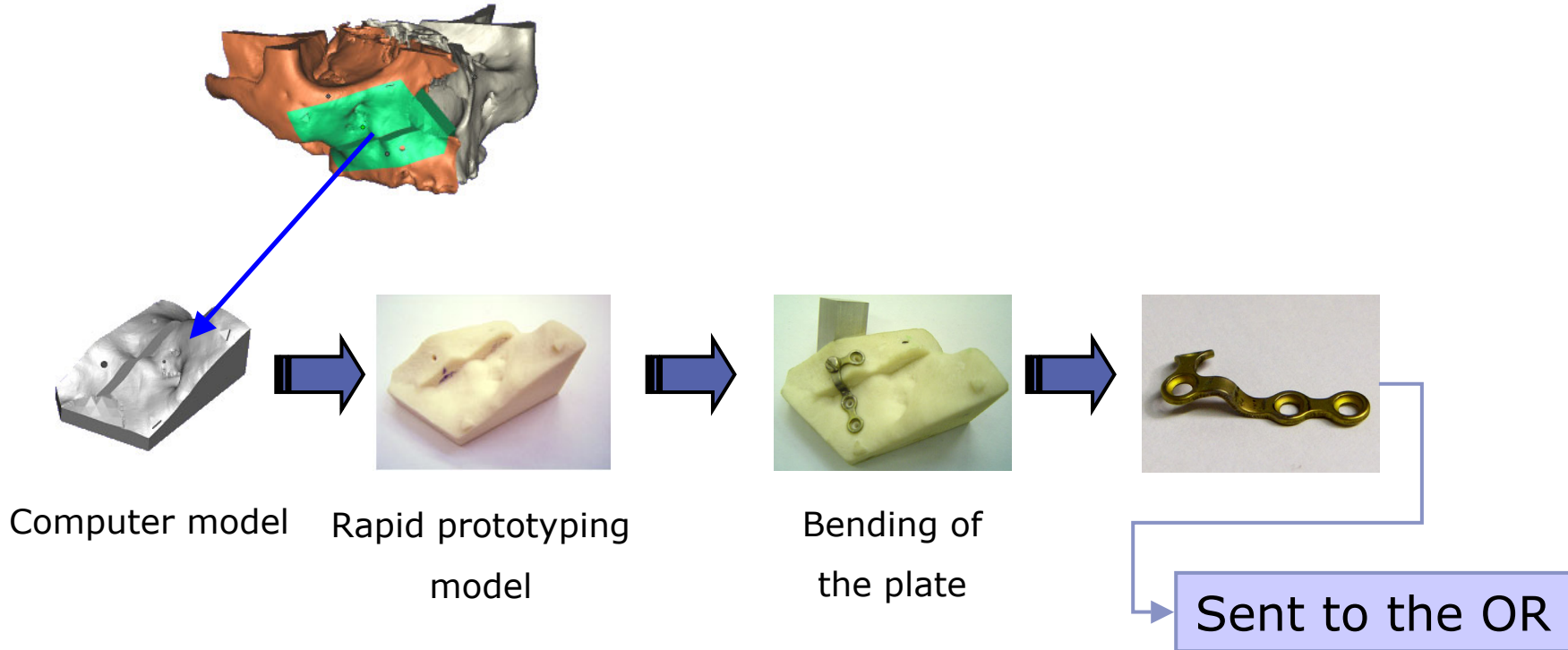
How to transfer to the simulation to the OR?



# Transfer to the Operating Room

Pre-bending of osteosynthesis plates following the simulation results

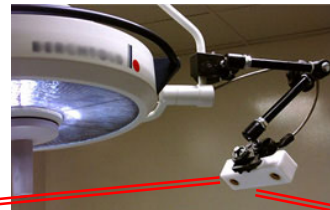
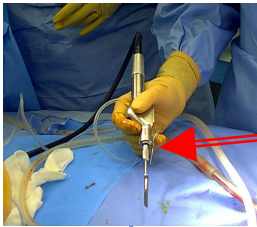
Area selection for plates



# Surgeon Guidance in the OR

New scheme : no splint required

Guided osteotomies



Guided positioning of pre-formed plates



Visualization of simulated components

Plans

Positions of bones

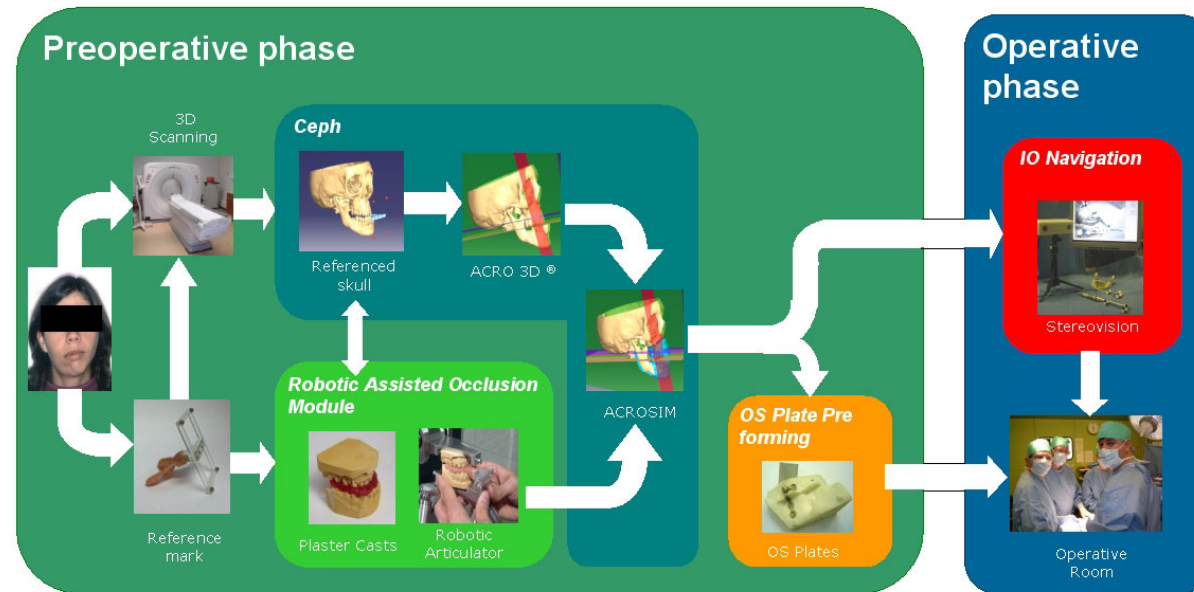
Tooth Root

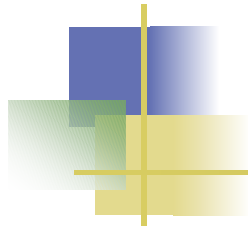
# State of the project

- Validations

- Test of ergonomy

- ...





# HEROL

Computer and Robotic assisted maxillofacial surgery

From diagnosis to OR

**Thank you for your attention**

