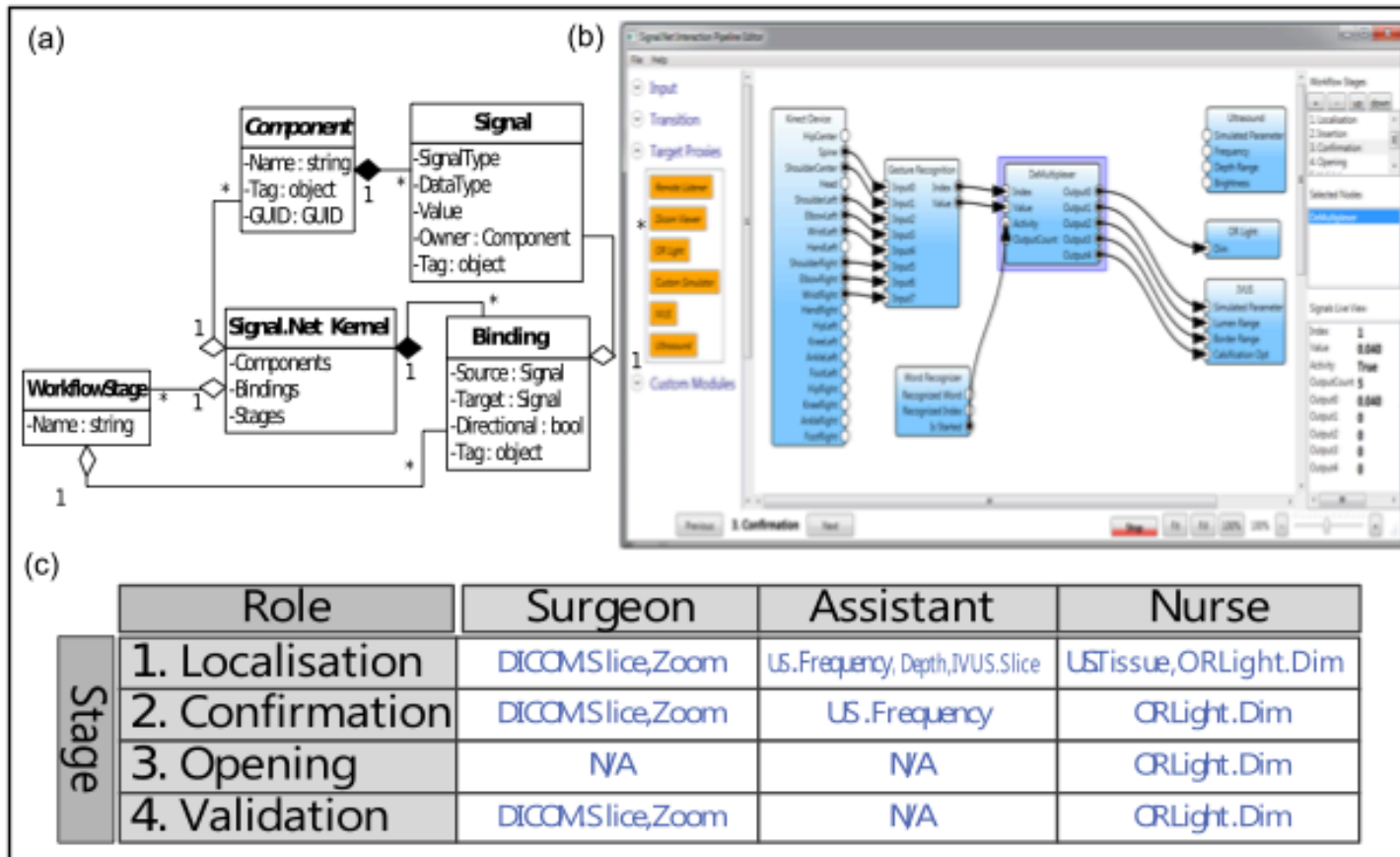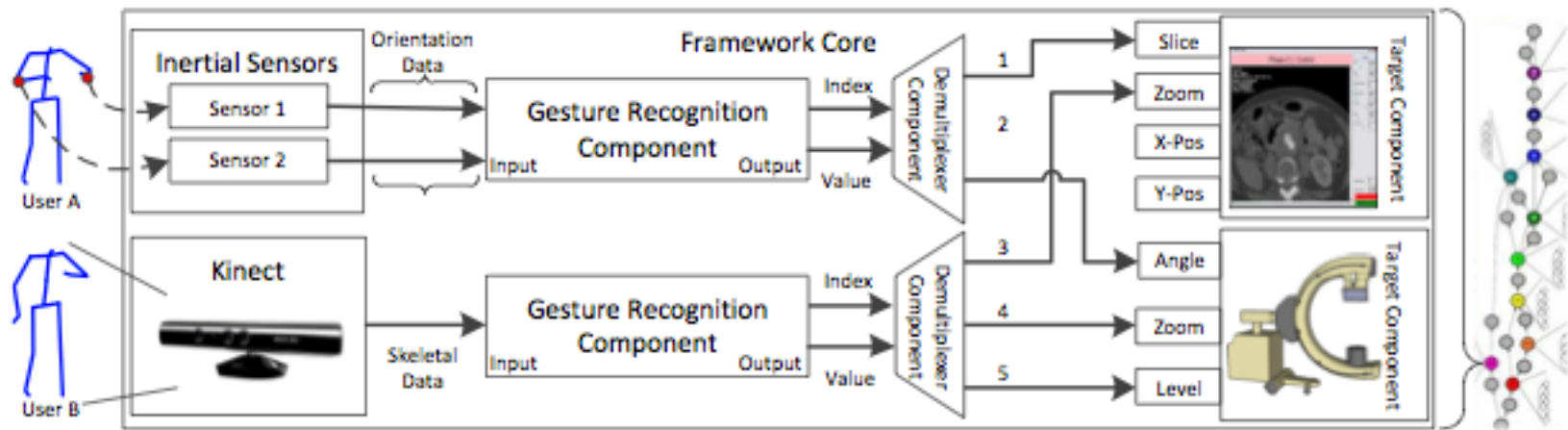# Workflow Analysis @ TUM (M2CAI – MICCAI Workshow)

A User-Centered and Workflow-Aware Unified Display for the Operating Room

Ralf Stauder[1], Vasileios Belagiannis[1], Loren Schwarz[1], Ali Bigdelou[1], Eric Söhngen[2], Slobodan Ilic[1], and Nassir Navab[1]

HCI Design in the OR: A Gesturing Case-study

Ali Bigdelou[1], Ralf Stauder[1], Tobias Benz[1], Aslı Okur[1], Tobias Blum[1], Reza Ghotbi[2], and Nassir Navab[1]

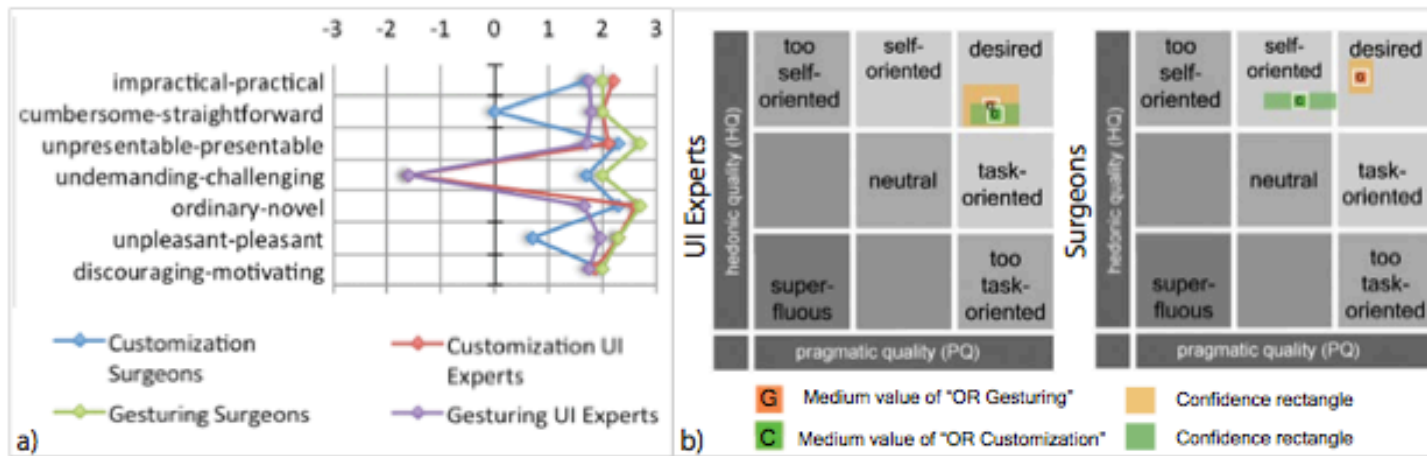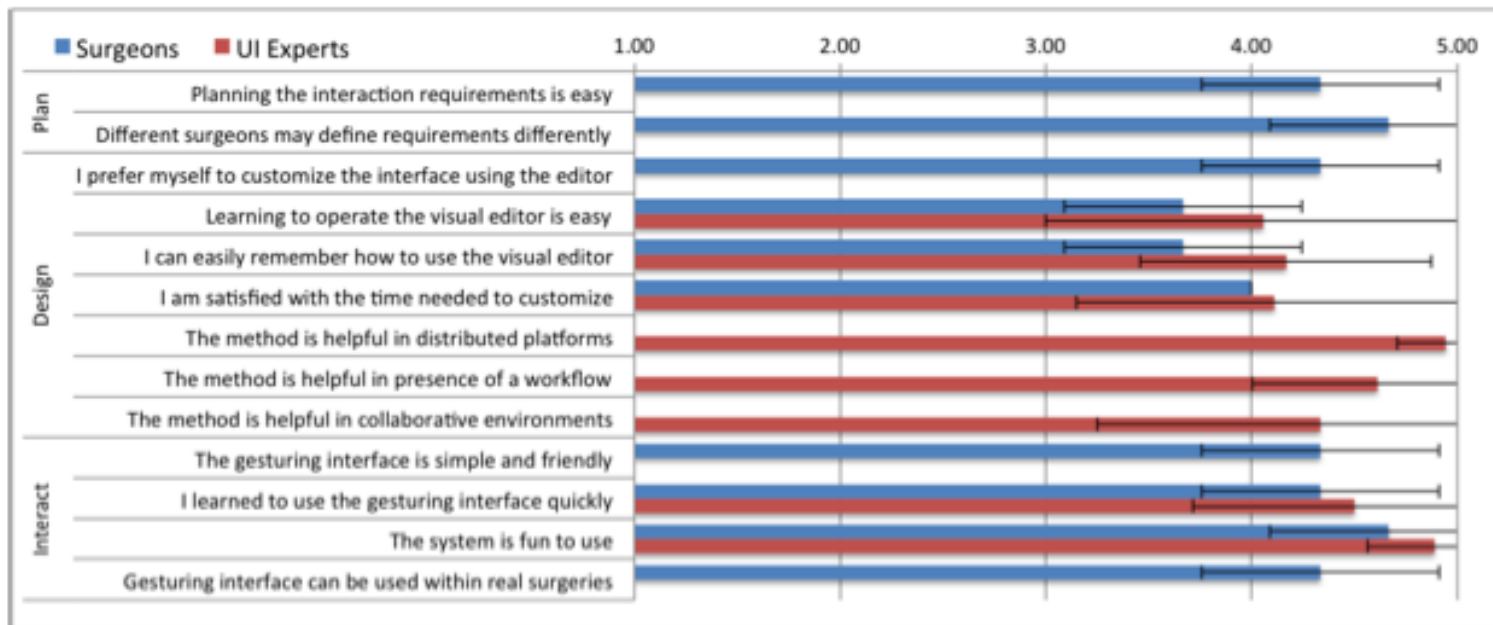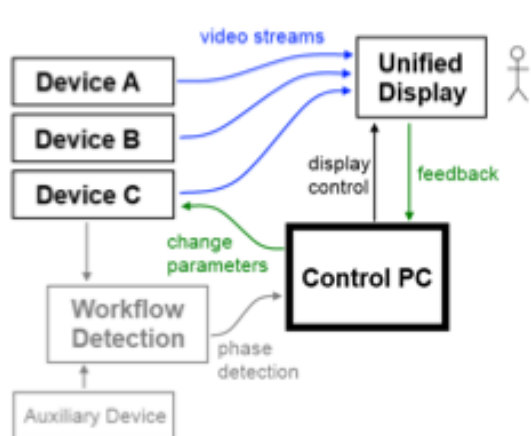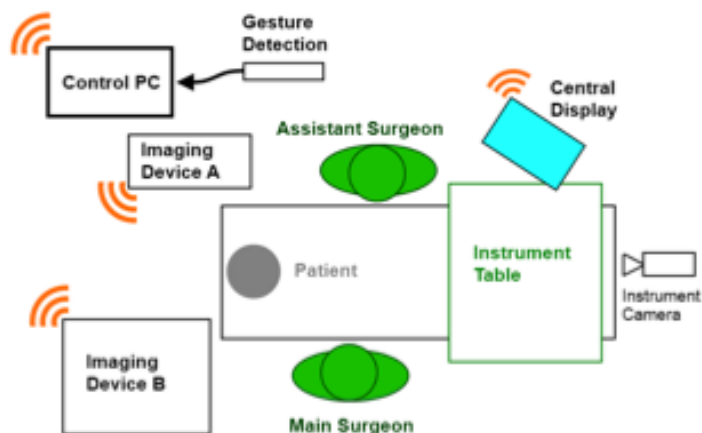| Role	Surgeon	Assistant	Nurse
Stage			
1. Localisation	DICOM.Slice,Zoom	US.Frequency, Depth,IVUS.Slice	US.Tissue,ORLight.Dim
2. Confirmation	DICOM.Slice,Zoom	US.Frequency	ORLight.Dim
3. Opening	N/A	N/A	ORLight.Dim
4. Validation	DICOM.Slice,Zoom	N/A	ORLight.Dim

Fig. 4: AttrakDiff: a) Selected word pairs. b) Generated HQ-PQ diagrams.

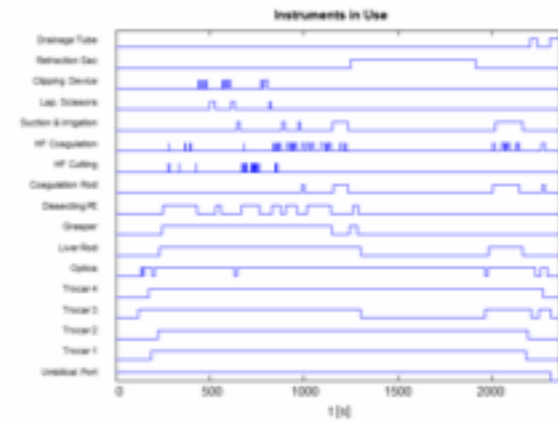Fig. 1: A schematic view of our system. a) Interaction of the components. b) Layout of the examined OR.

(a)

(b)

| #	Phase	Visible Imaging Source
1	"safe-surgery" check	DICOM images
2	Ultrasound check	Ultrasound image
3	3D SPECT image acquisition	3D SPECT video
4	Incision planning	
5	Incision, approaching tumor	DICOM images
6	Tumor removal	DICOM images
7	Marking of tumor margins	
8	Sentinel lymph node detection	DICOM images
9	Lymph node identification and localization	3D SPECT video
10	Confirmation for absence of radioactivity	3D SPECT video
11	Suturing	

Fig. 4: Short description of the surgical workflow used in our experiment.
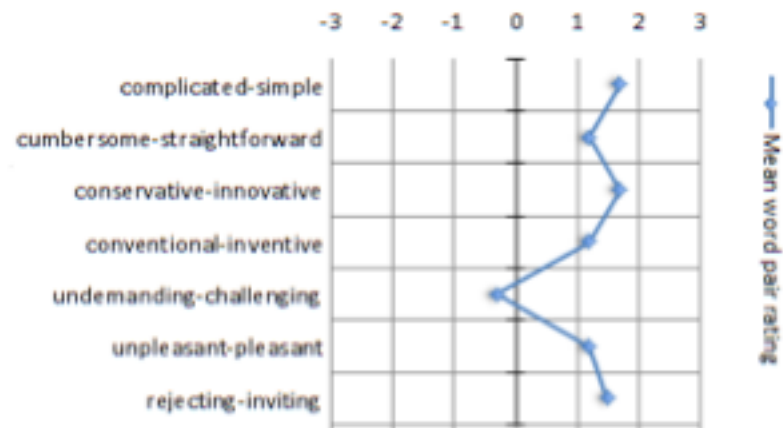
Fig. 5: a) Portfolio displaying the mean value (P) and confidence interval (transparent rectangle) of the usability test's results of our prototype. b) Selected word pairs of the questionnaire and their mean score.