

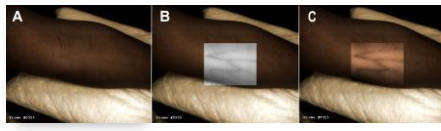
f.wieringa@tno.nl

**TNO** innovation  
for life

# 3D reconstructies in de Laparoscopie

F.P. Wieringa, J.P. van Basten, W. van der Mark, H. Bouma





# Breng 3D verder dan alleen console

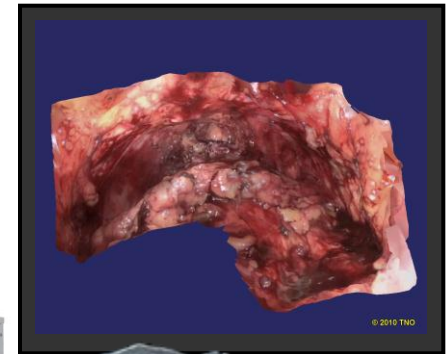
# Volumetrische 3D reconstructie

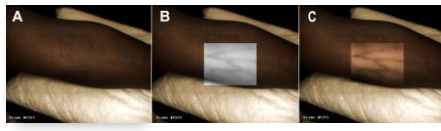
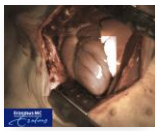


Scope & console: 3D

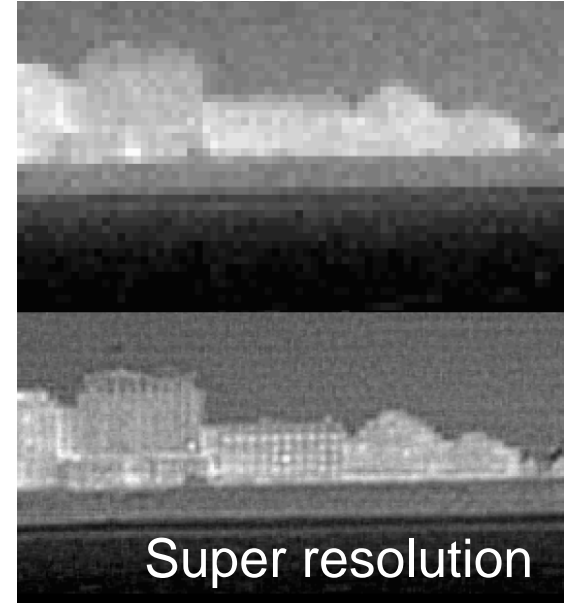
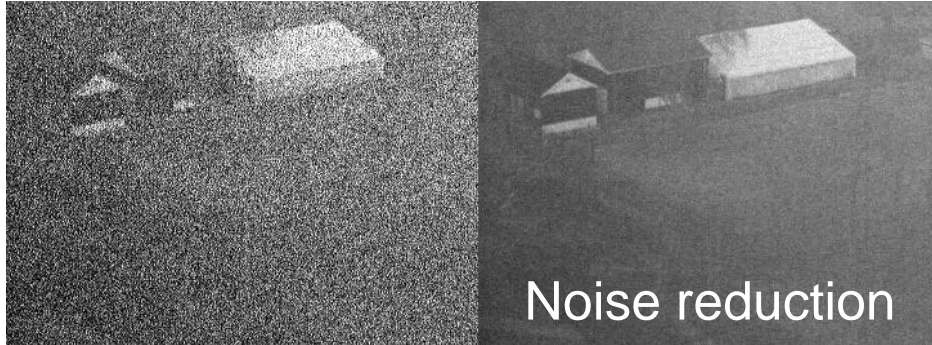


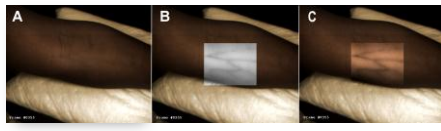
Live  
3D meekijk  
monitor





# Vanuit defensie & veiligheid 10-tallen jaren ervaring





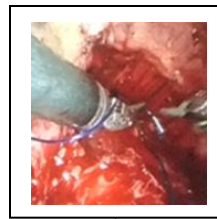
## Bestaand systeem

Da Vinci Robot

Live 3D

Live 2D

Stereo  
endoscoop  
camera



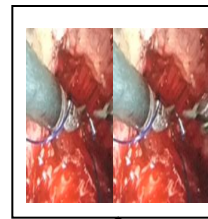
Video

video voor  
L&R apart

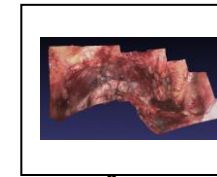
Licht

## TNO toevoeging

Live 3D  
Monitor



Overzicht

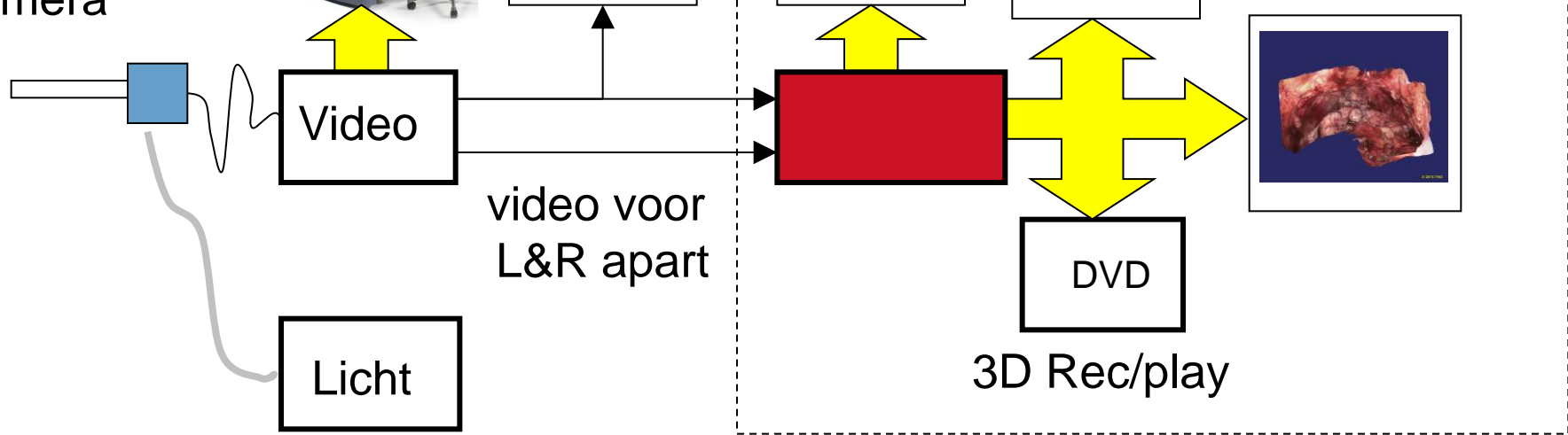


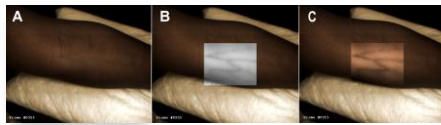
3D volume  
reconstructie



DVD

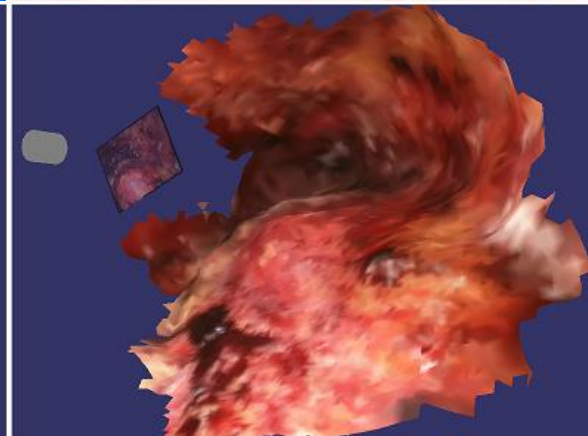
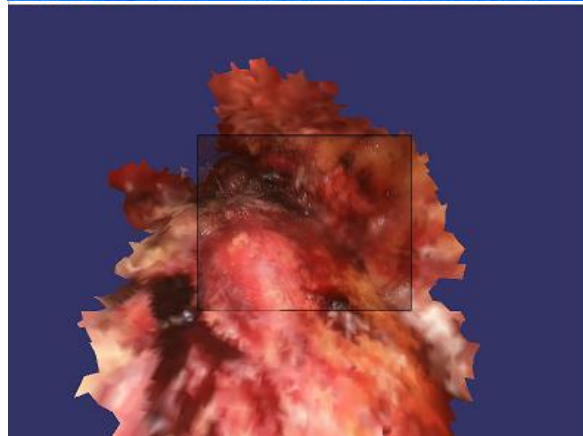
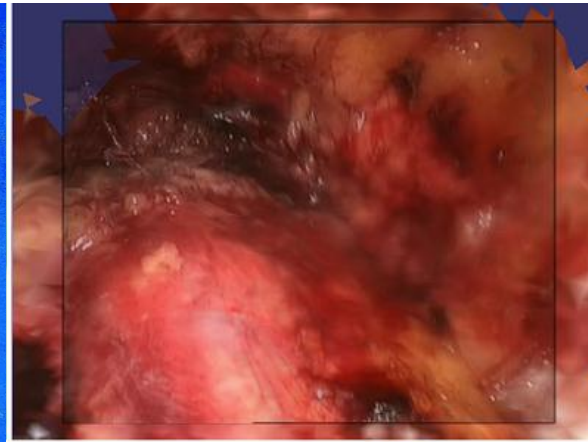
3D Rec/play

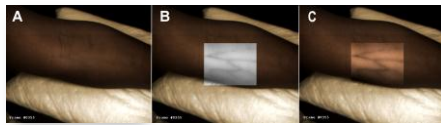




**Het werkt óók met één oog (niet persé stereo nodig)**

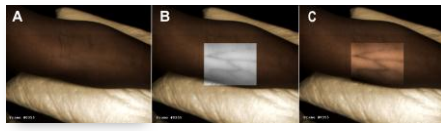
**Dus ook met NORMALE endoscopen zonder modificatie !**





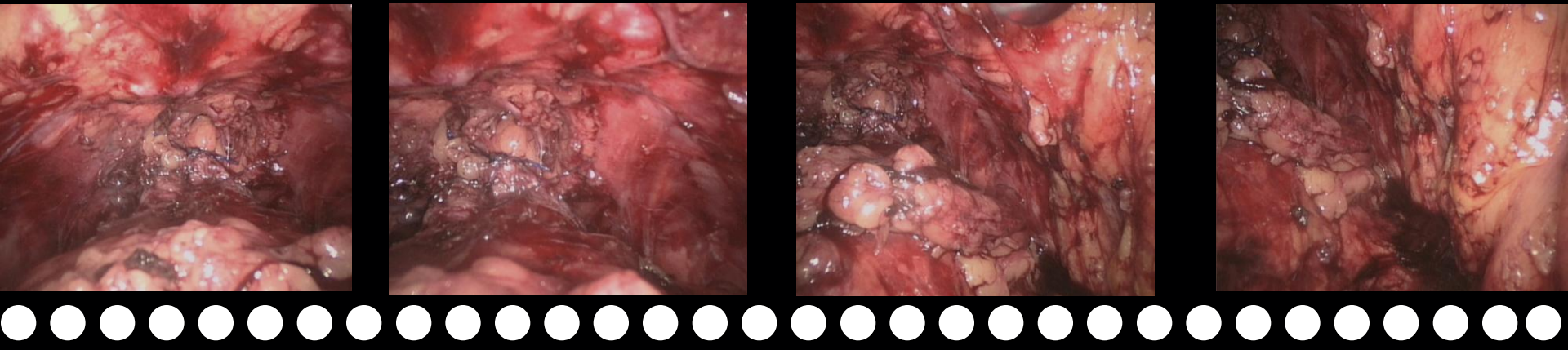
## Alleen calibratie van optiek & processing nodig

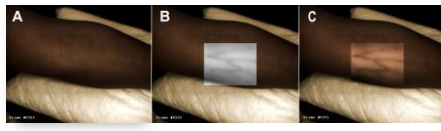
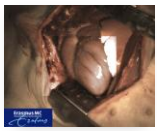




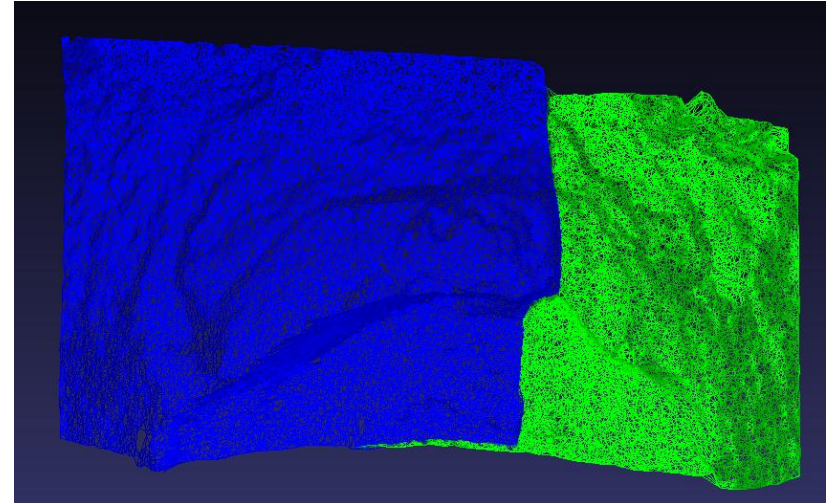
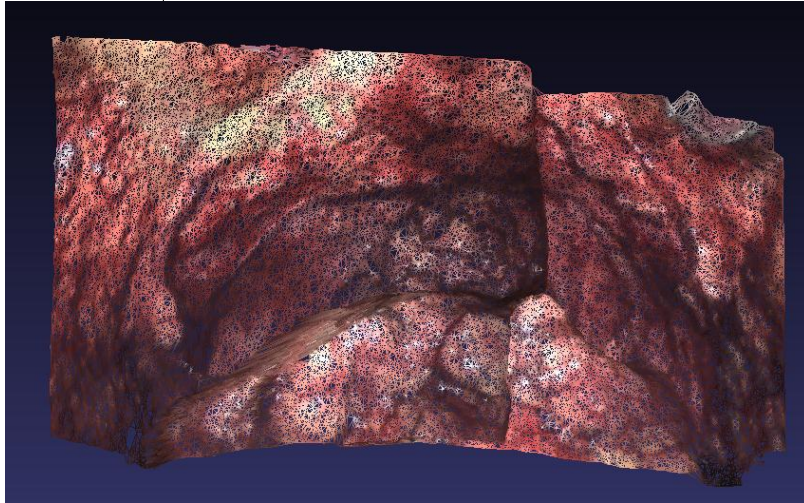
## Stap 1) 2D video signaal binnenhalen

Endoscoopbeeld bestrijkt wijde omgeving in tijdsdomein

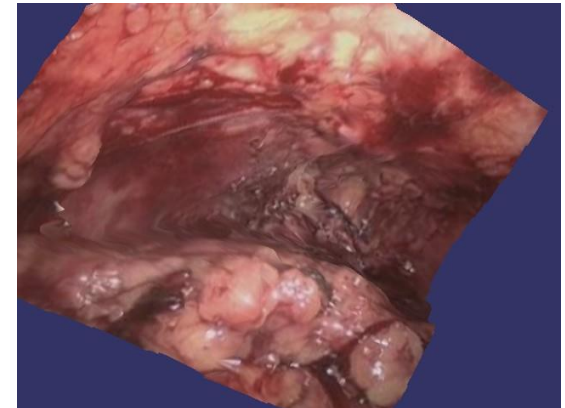
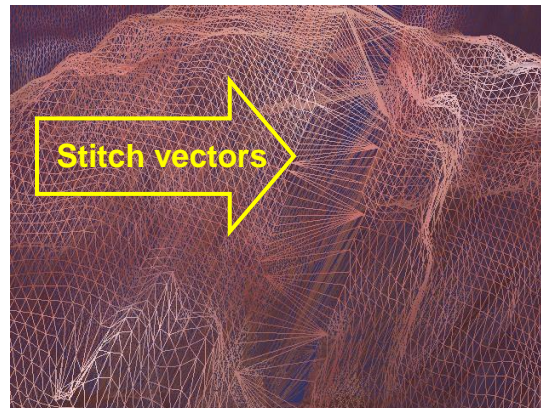
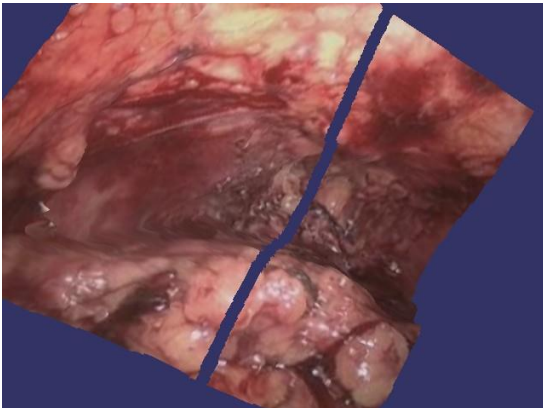




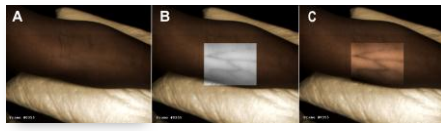
## Stap 2) Snelle navigatie via 3D “landmarks”



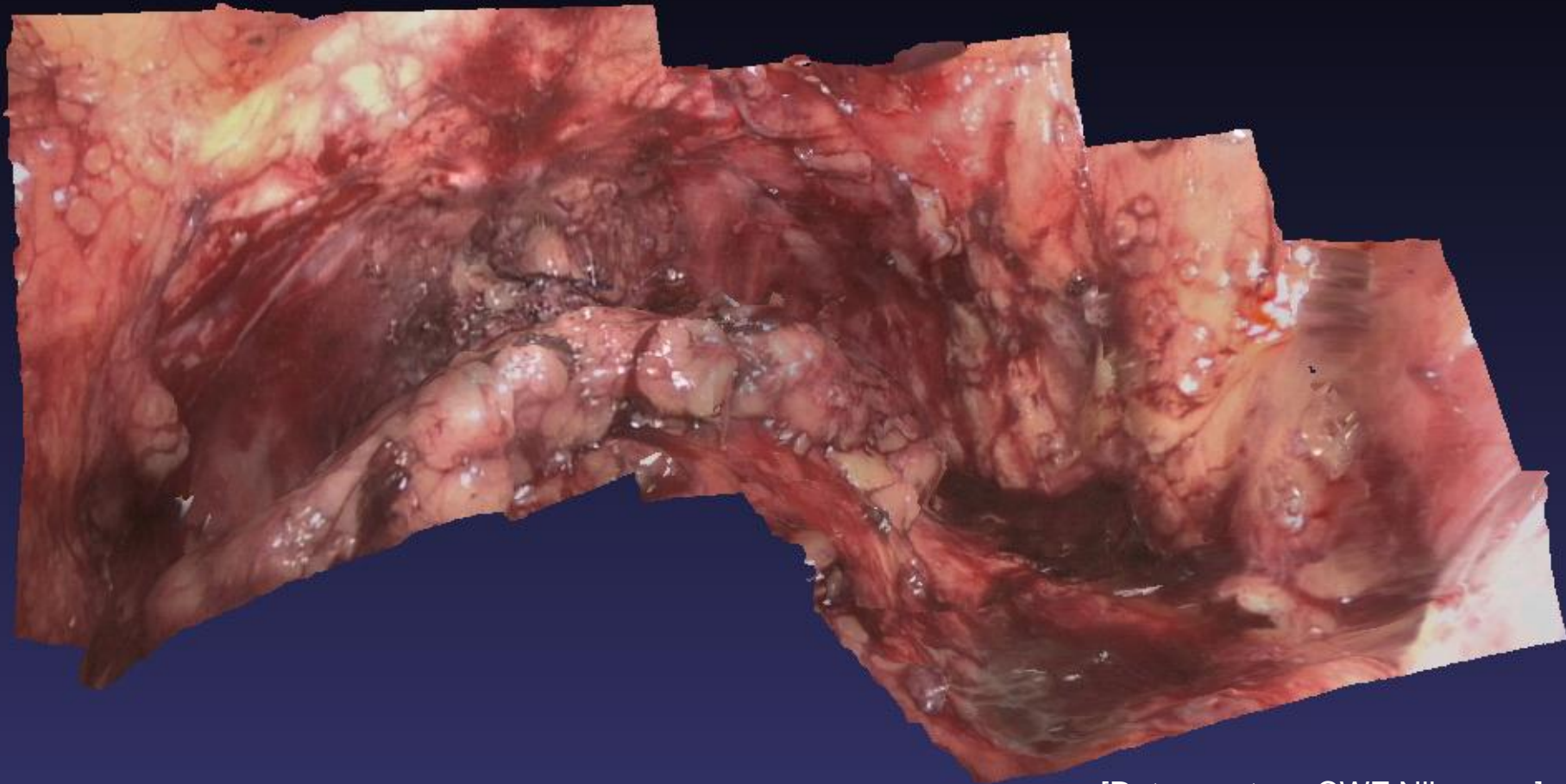
## Stap 3) Samenvoegen oppervlakken



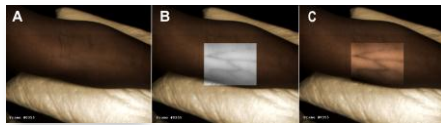
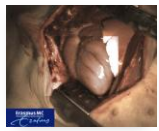




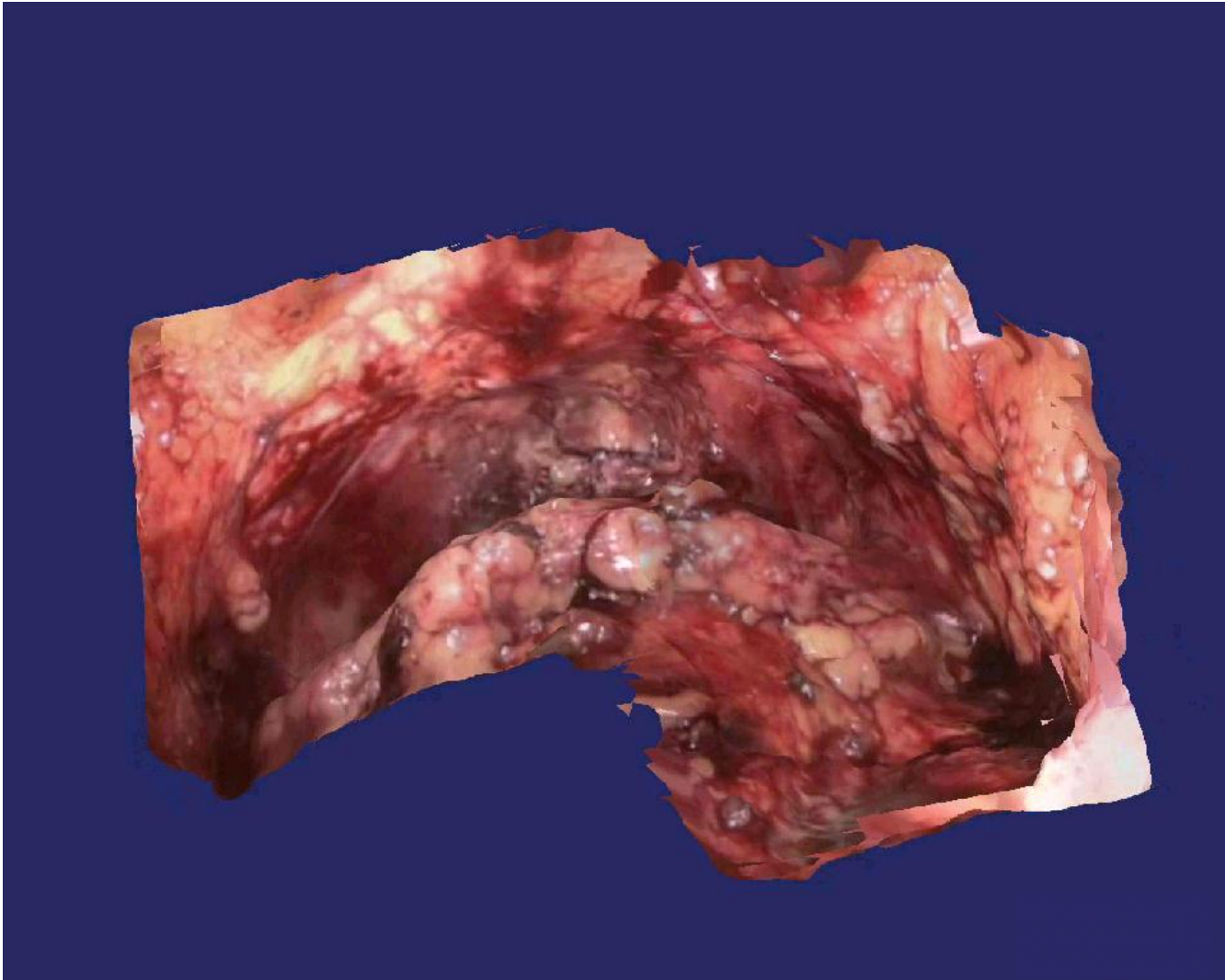
## Resultaat: 3D panorama voor de chirurg

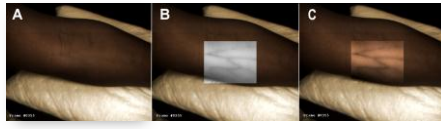
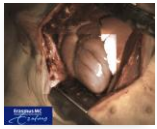


[Data courtesy CWZ Nijmegen]

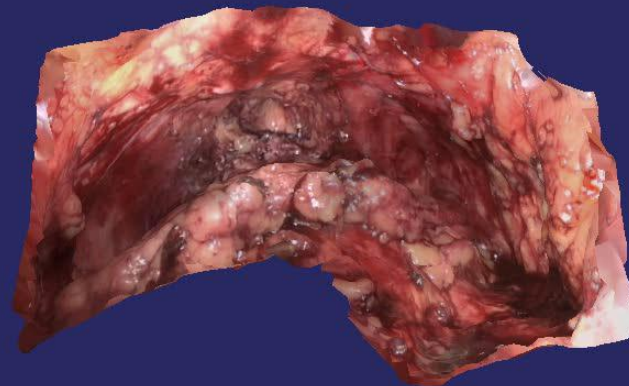


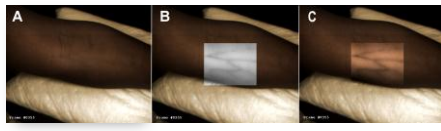
## 3D reconstructie (final stage RALP)



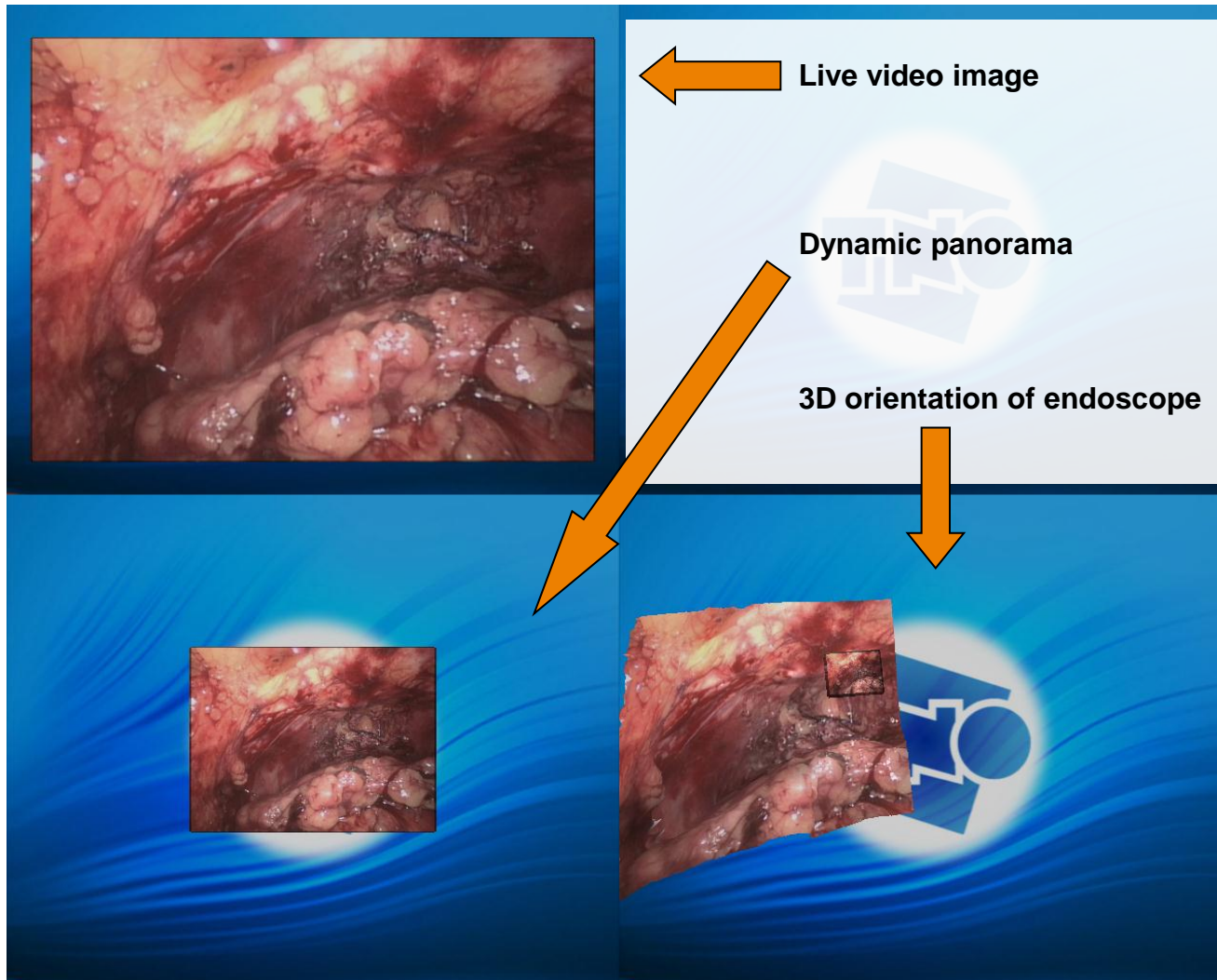


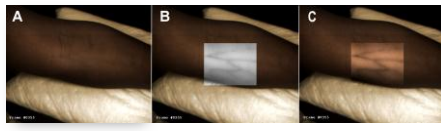
## Met interactieve interface vrij navigeren





## Verschillende dynamische viewmodes





# Toepassingen van 3D reconstructies

## Post processing

- › Educatie
- › 3D-mapping plaatsing canules brachytherapie
- › 3D-mapping fluorescent marked lymph nodes
- › 3D-Anatomische endoscopie atlas

## Real-time

- › Navigatie & Orientatie
- › Panoramisch overzicht
- › Metingen

Bestuur

Echografie

Endourologie

Laparoscopie

Metafylaxe

Min. Invasieve  
Oncologie

Engineering

Scholing

Communicatie

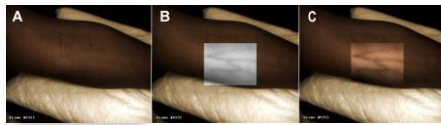
Kinderurologie

Robotica



# Kom zelf kijken bij de demonstratie !





## Met dank aan:

- › CWZ, Nijmegen  
Dr. Jean-Paul A. van Basten, MD  
Instrumentele dienst & OK-crew
- › Radboud, Nijmegen  
Prof. Dr. Frank P.H.A. Vandenbussche, MD
- › LUMC, Leiden  
Prof. Dr. Rob C.M. Pelger, MD





## Medische techniek (ook indien robotisch) vereist Human Factor Engineering .....

