



# **CAMERA DRIVING SYSTEMS, OPTIMAL FEATURES AND EVOLUTIONS**

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Basic and Advanced Instrument for  
Daily Laparoscopic Practice  
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## RATIONALE

**Shortage of personnel**

**ageing in the health system**

**Social healthcare budget restriction**

**political decisions limiting number of surgeons**

**Better operating room condition**

**decreasing stress, fatigue, optimizing ergonomics**

**Better operating field vision**

**image stability, real time hand-scope coordination**

**Optimizing surgical education**

**training, mentoring and tutoring**



# LapMan

## ROBOTIZED CAMERA DRIVING SYSTEM

Dynamic laparoscope manipulator controlled by the surgeon via a LapStick fixed to the handle of a working instrument or by room personnel via the LapLink





## FEATURES AND BENEFITS

**IMAGE STABILITY**

**REAL TIME HAND-SCOPE COORDINATION**

**COST EFFECTIVENESS**

**OPEN TO EVOLUTION SYSTEM**



## LIMITS - DRAWBACK

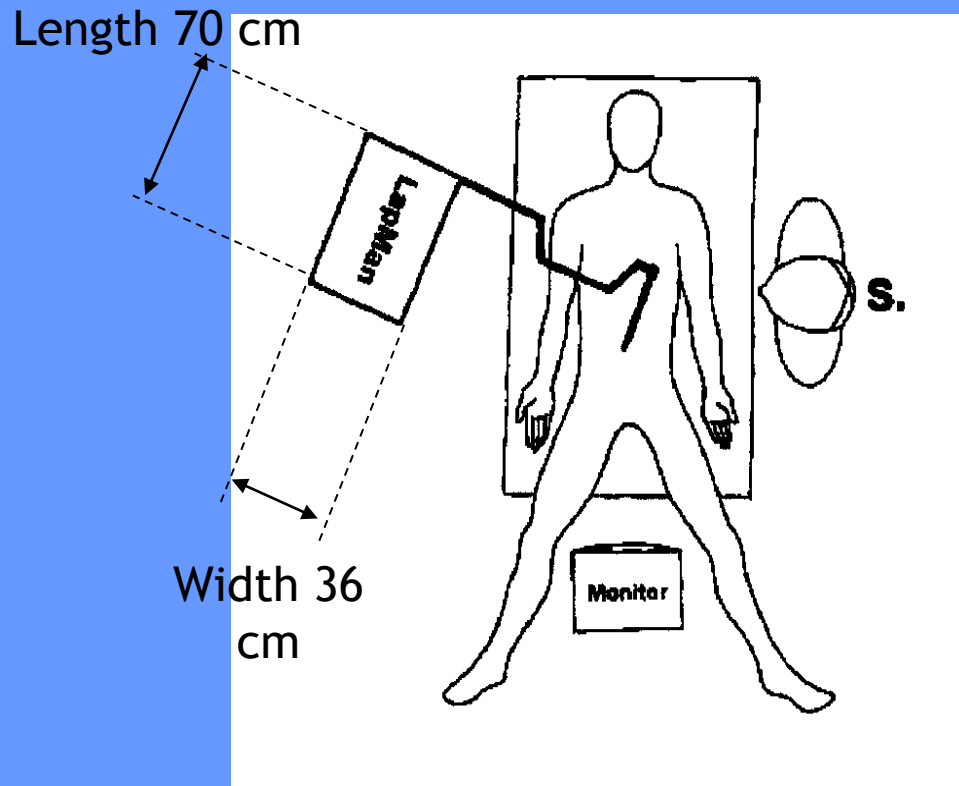
**LIMITED TO SCOPE HOLDING**

**SYSTEM NOT FIXED TO THE OR TABLE**

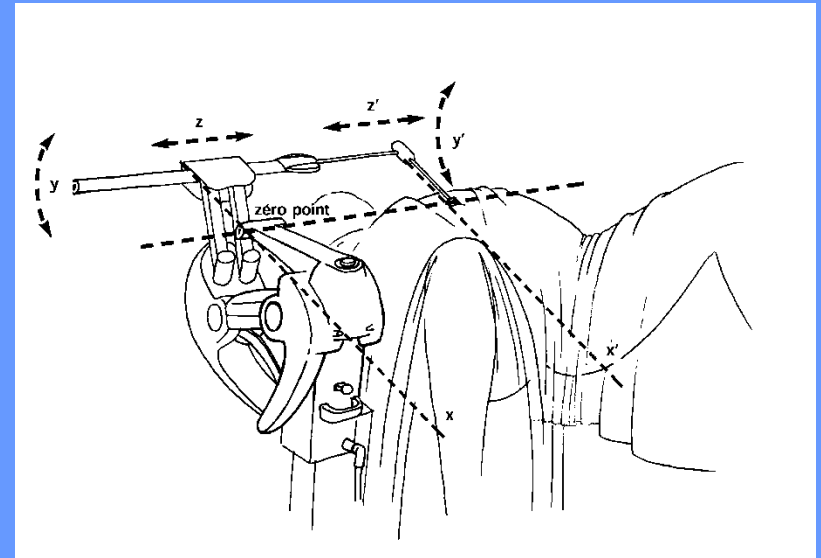
**SURGICAL EDUCATION ISSUES**

**TRAINING OR TEAM**

## LapMan POSITIONING AND SET-UP



LapMan position differs according to procedure to be performed



zero point at level of skin incision for the optic cannula



## CONTROL INTERFACE



LapLink



LapStick

Radiofrequency controlled system  
at the highest safety and regulation level



## BELGIAN CLINICAL TRIAL

### Disciplines

#### Digestive Surgery

lapchole, Nissen, Gastric banding, Gastric bypass, ...  
hernia, inguinal & incisional  
appendectomy  
colo-rectal surgery

#### Urology

prostatectomy  
nephrectomy  
prolaps

#### Gynecology

adnexal surgery  
hysterectomy  
prolaps

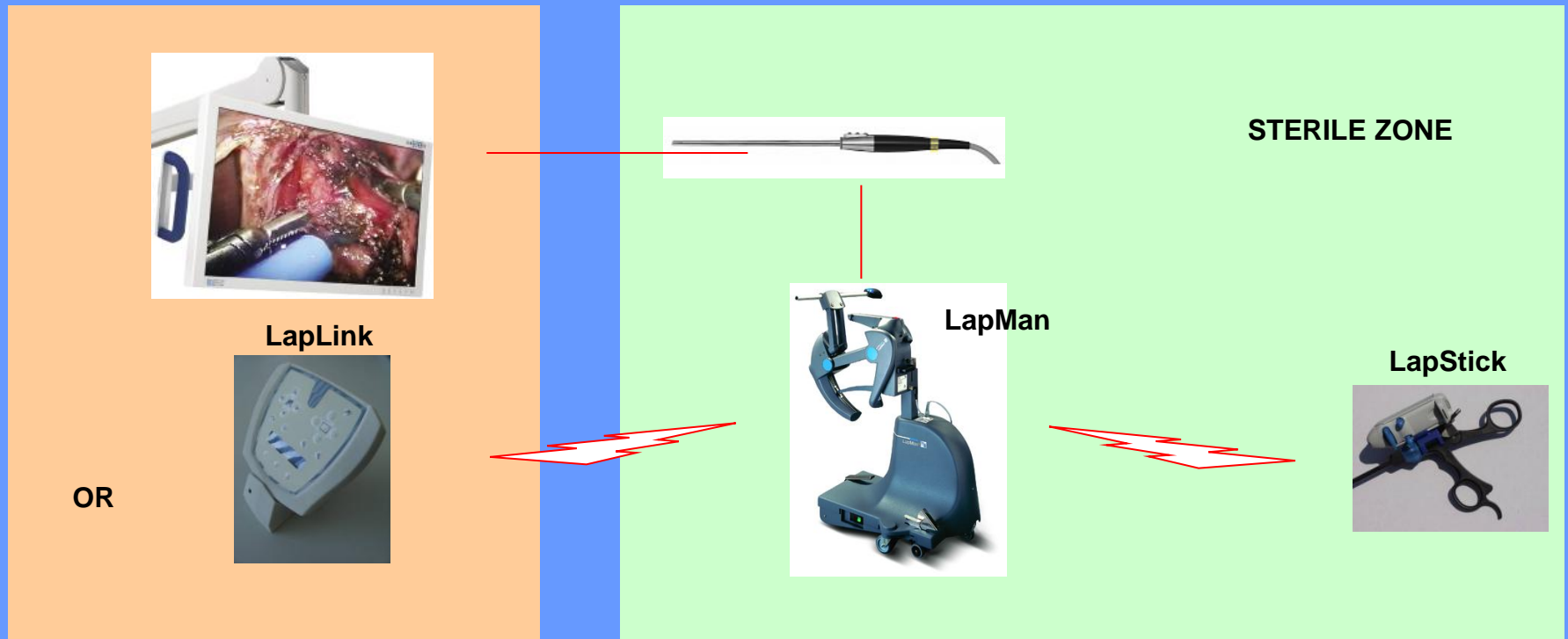
### Cost assessment





## CAMERA DRIVING SYSTEMS, OPTIMAL FEATURES AND EVOLUTIONS

# LAP TEACH REMOTE INTERFACE R&D PROJECT BASED ON LAPMAN TECHNOLOGY



Laparoscopic procedure uses a camera that transmits image from the patient body to a monitor.

**Drawback:** Surgeon doesn't have the control of his own vision (assistant or static arm).

**Solution:** The LapMan holds the camera. The robot is controlled by two remote controls: the LapStick, for the surgeon, and the LapLink, for the OR team.

**Limits:** The LapMan cannot be integrated with other equipments.



## LAPTEACH

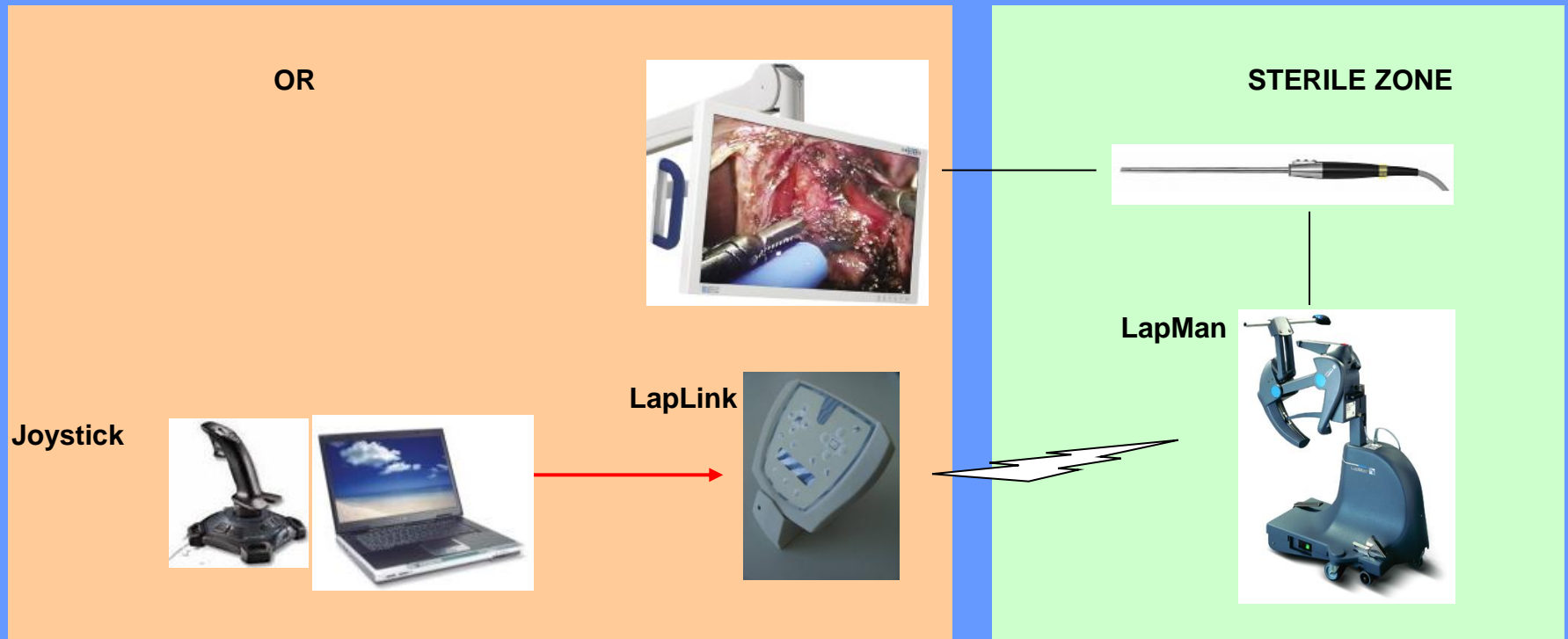
**NEW TELESCOPE MENTORING MODULE DESIGNED FOR LAPMAN, GIVING THE SYSTEM FEATURES TYPICAL OF ADVANCED EDUCATIONAL TOOLS.**

**LAPTEACH ENABLES THE MENTOR TO DIRECTLY ASSIST HIS OR TEAM FROM HIS OFFICE, BY TAKING CONTROL – VIA A JOYSTICK CONNECTED TO HIS PC – OF THE LAPMAN IN THE OR.**



# CAMERA DRIVING SYSTEMS, OPTIMAL FEATURES AND EVOLUTIONS

## LAP TEACH ROAD MAP



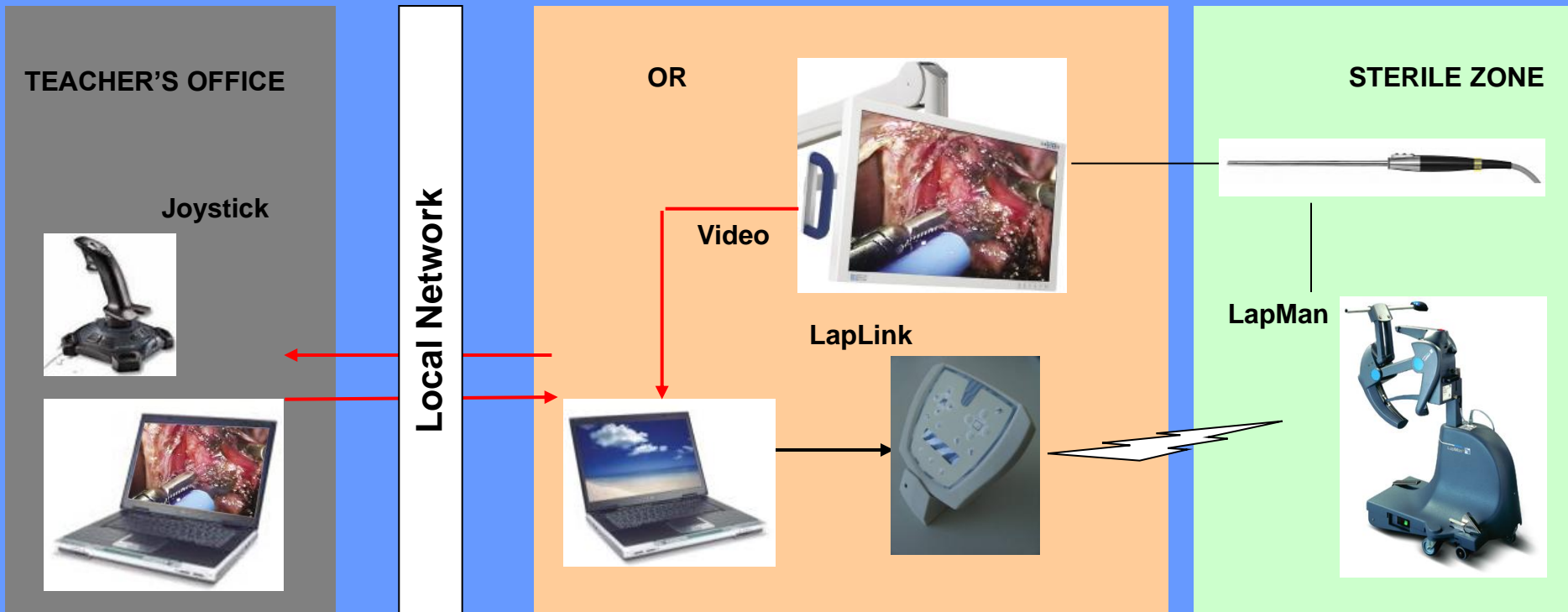
### Development step 1

A PC is connected to the non sterile remote control (LapLink).

**Advantages:** Possibility to interface the LapMan to any control system: voice control, programmed paths, joystick...

**Limits:** No external control

## LAP TEACH ROAD MAP



### Development step 2

An external PC may take the control of the local PC through the local network of the hospital. Video is transmitted to the remote application.

**Advantages:** Tele-operating robot. The external user may control the vision.

**Limits:** One-way information flow



## REMOTE CAMERA CONTROL



**Joystick**



**Footswitch release**



# TELECOMMUNICATION PROTOCOL

## CONFIGURATION: Network Connection



Local Area Connection

PROPERTIES:

Speed 100.0 Mbps

INTERNET PROTOCOL (TCP/IP):

encoding

Server IP

Username

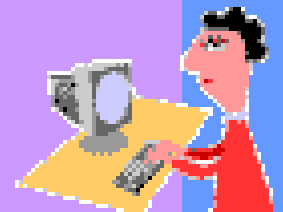


RUN THE APPLICATION

CONFIGURATION OF THE APPLICATION:

Keyboard controls

Joystick controls





# CAMERA DRIVING SYSTEMS, OPTIMAL FEATURES AND EVOLUTIONS

**CAMERA CONTROL  
IS TAKEN BY AN EXTERNAL PC**

**DEVELOPMENT STEP 2**

**KEY ISSUE 1  
HOW TO KEEP SAFETY**

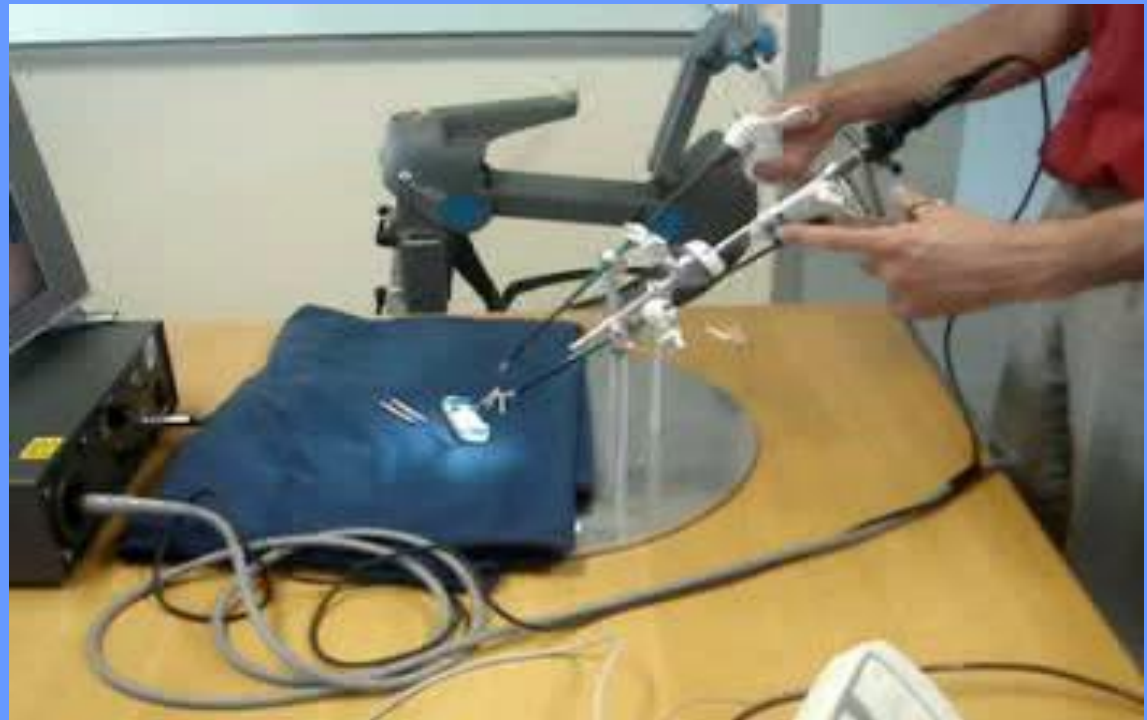


**FOOTSWITCH PEDAL  
TO ENABLE OVERTAKING  
THE CAMERA CONTROL**

**KEY ISSUE 2  
1-WAY INFORMATION FLOW**



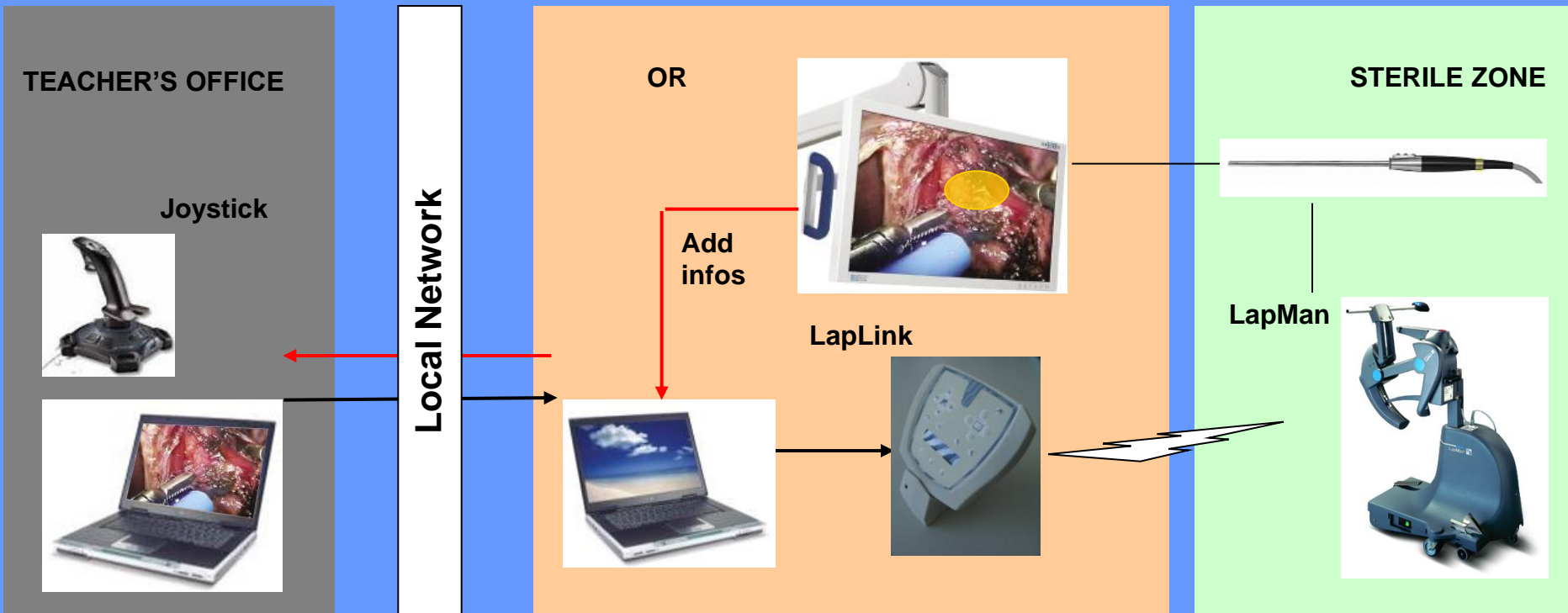
**DIGITAL TECHNOLOGY  
2-WAY INFORMATION FLOW  
HYBRID IMAGE - AUGMENTED REALITY**





# CAMERA DRIVING SYSTEMS, OPTIMAL FEATURES AND EVOLUTIONS

## LAP TEACH ROAD MAP



### Development step 3

The external PC may add visual information on the OR monitor (mouse pointer, text, pictures...).

**Advantages:** Share information and experience. Enhanced reality





## CONCLUSIONS

- 1. New generation camera driving systems should be:  
open and ready to be implemented  
surgeon and OR team friendly  
reliable at the highest level of task**
- 2. A learning curve does exist for surgeons and OR team  
to use properly and safely the dynamic laparoscope  
manipulator**
- 3. In the future, LapTeach evolution module will allow to  
share information and experience through the system  
and perform surgery under enhanced reality vision.**