Globalisation of Healthcare by Virtualisation of Hospitals

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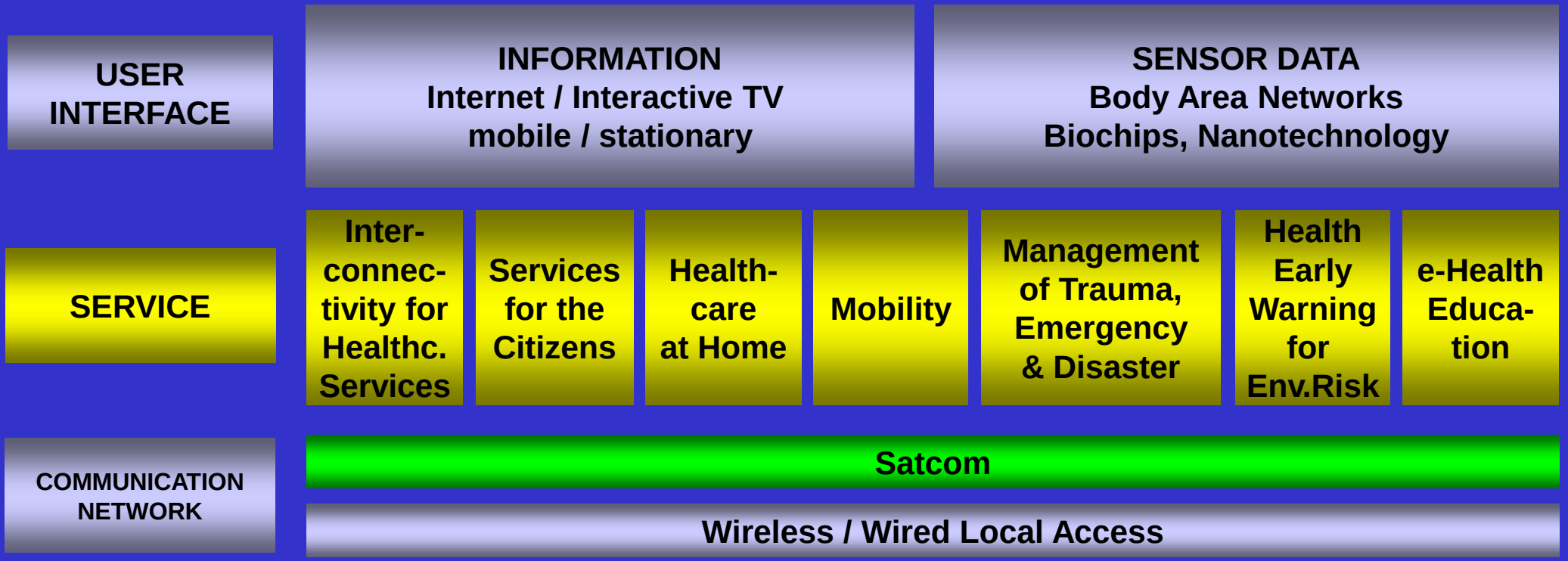
What is Charité?

- Largest university hospital in Europe:

  ~3,200 beds in 107 clinics and institutes

  ~127,000 inpatients, ~500,000 outpatients yearly
- 12,800 employees, including 4,000 scientists
- 7,500 students
- State-of-the-art business enterprise:
  - 1,100 million € annual budget, including
  - 331 million € for research and education

What is Global Health?

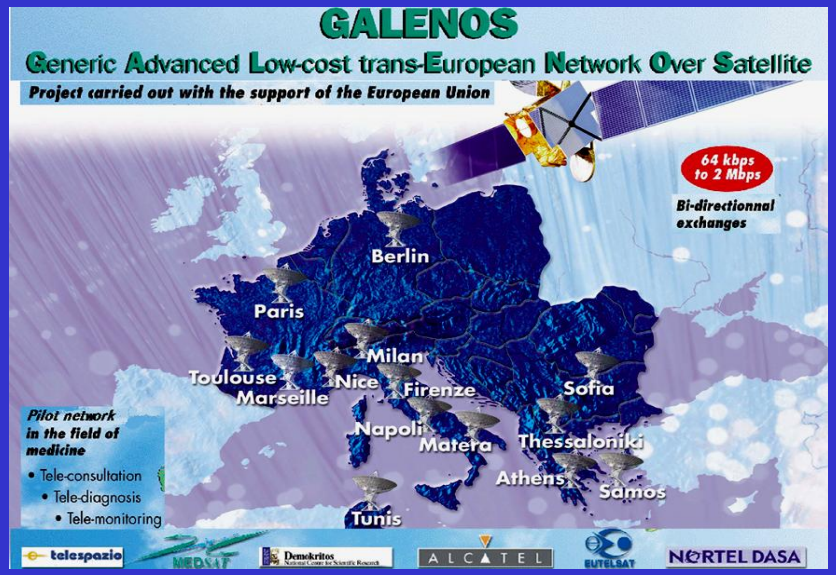


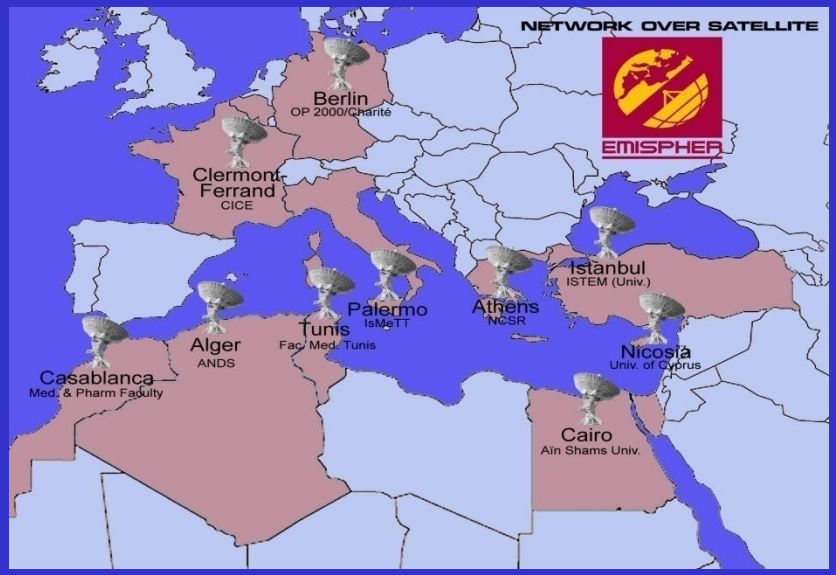
Developments expected in 5-10 yrs (selection from 36 topics)*

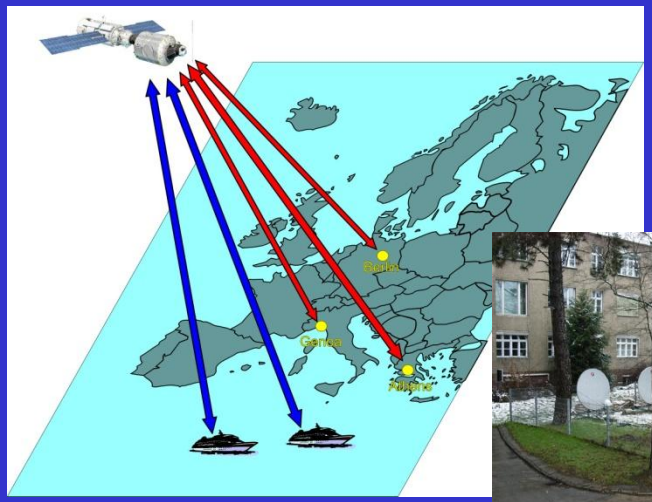
- Virtual Reality integral part of medical education & training
- Ambient Intelligence at home allows telemonitoring
- Implantable EPR chip
- Computer-assisted planning for Adaptive Radiation Therapy
- Speech control for daily routine in OR
- Expert systems for decision support
- Nursing robots

*Source: “Future IT for Healthcare”, May 2007, Fraunhofer ISI & ZEW

Satellite-based Networks for Global Healthcare







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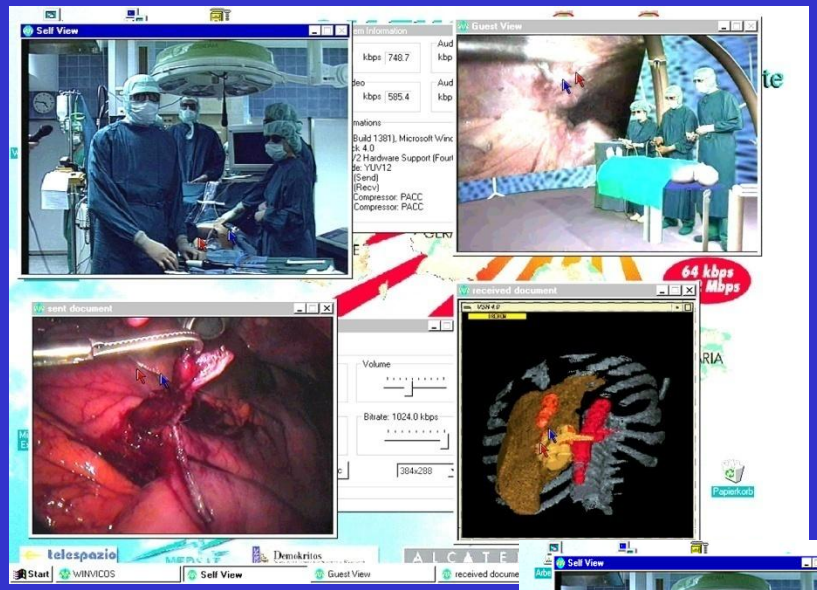
Real Time Digital Medicine



- Telesurgery (including laparoscopy)
- Pre- and post-transplant consultation
- General Teleconsultation for second opinioning
- Teleteaching, Teletraining & Tele-education

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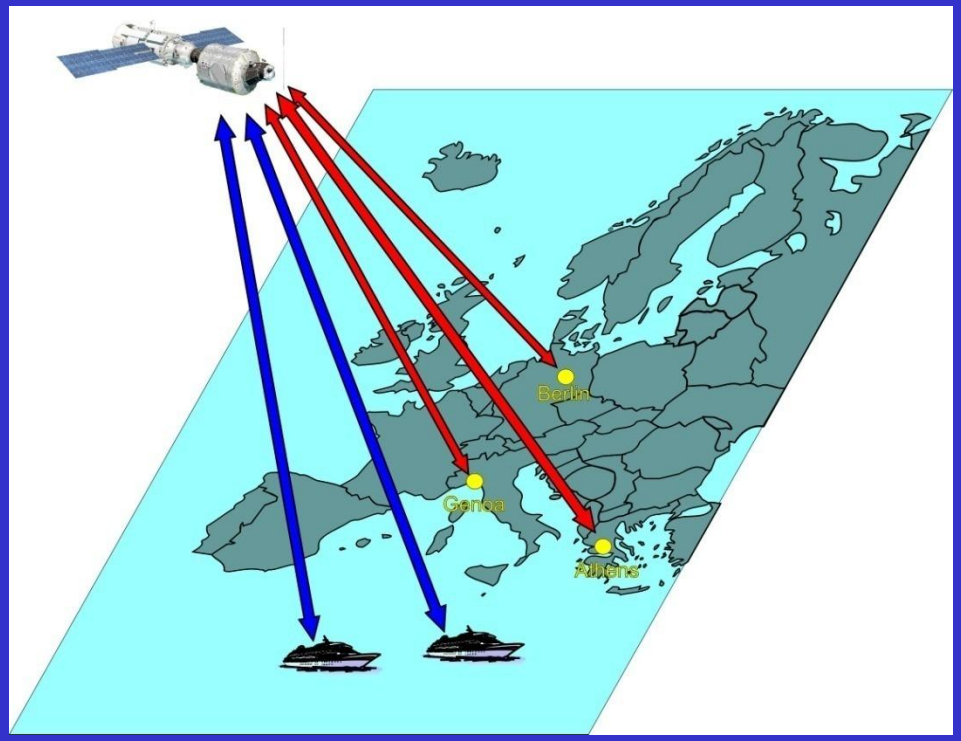
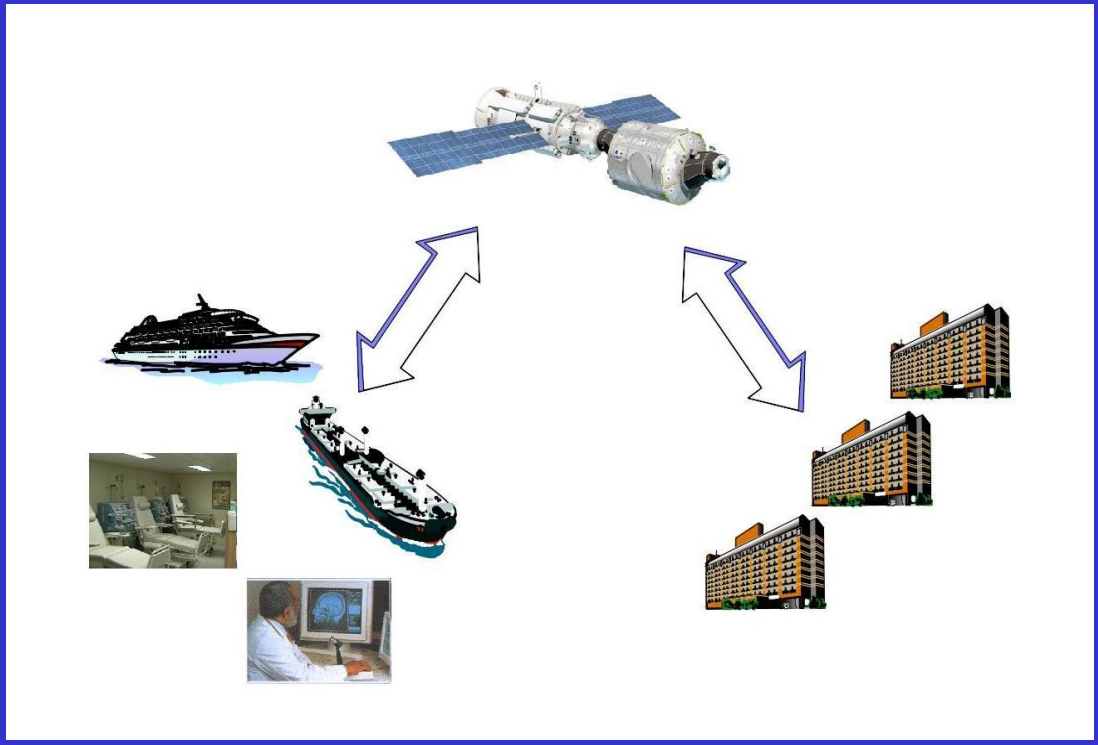
MEDASHIP Satellite Network





Telemedical Applications in MEDASHIP

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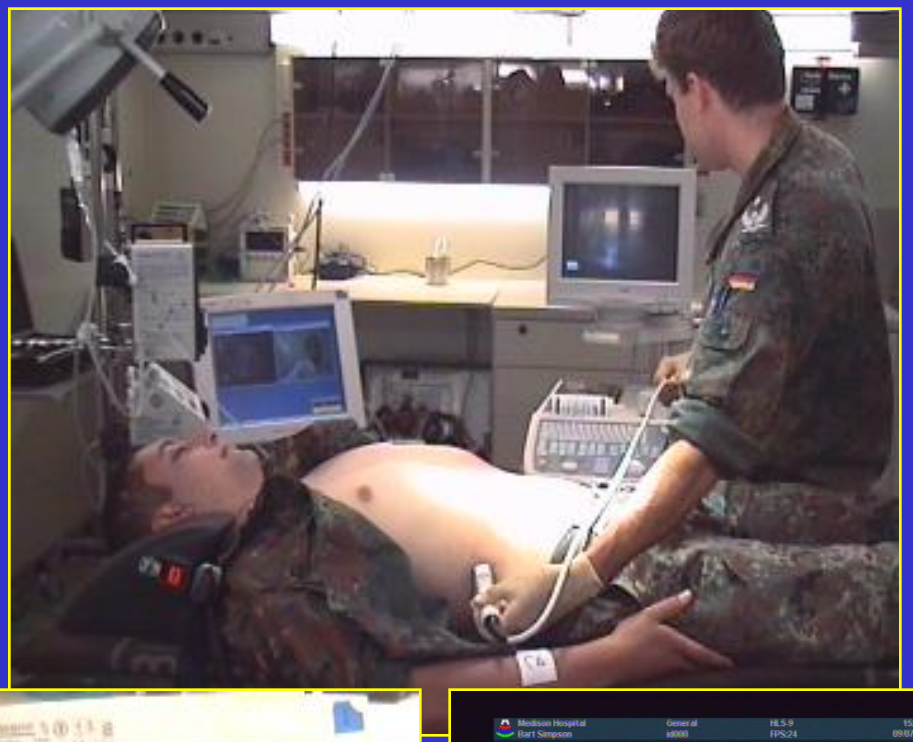
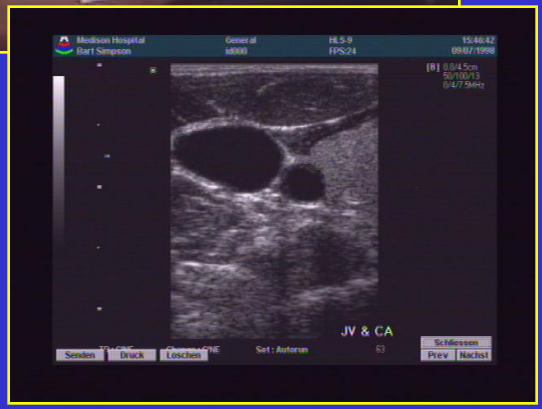
Teleconsultation and Telesonography during triage





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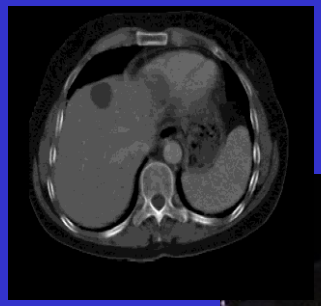
e-Health for u-Health – real-time Telemedicine in VH

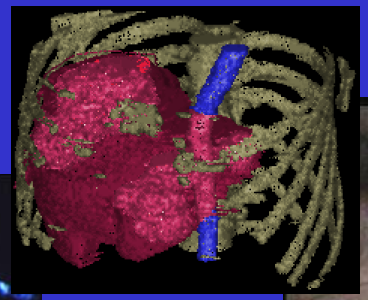
- provide the best possible patient care at any site
- optimal use of all available medical resources
- contribute towards standardised treatment protocols (disease management and evidence-based medicine)
- allow the wide use of interactive real-time telemedical services for medical e-learning
- contribute to bridge the quality gap in patient care:
  - between Centres of Excellence and middle-range and small medical centres;
  - between various regions of the world

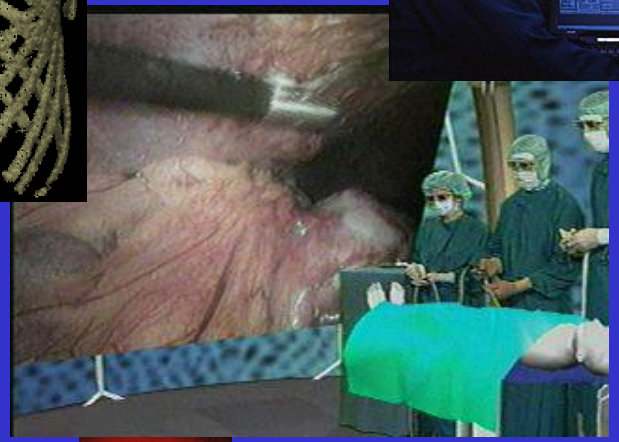
VH and Global u-Health

Simultaneous and synchronized access from local and remote

- **collaborative access of patient data**
- **collaborative manipulation**
- **collaborative control**







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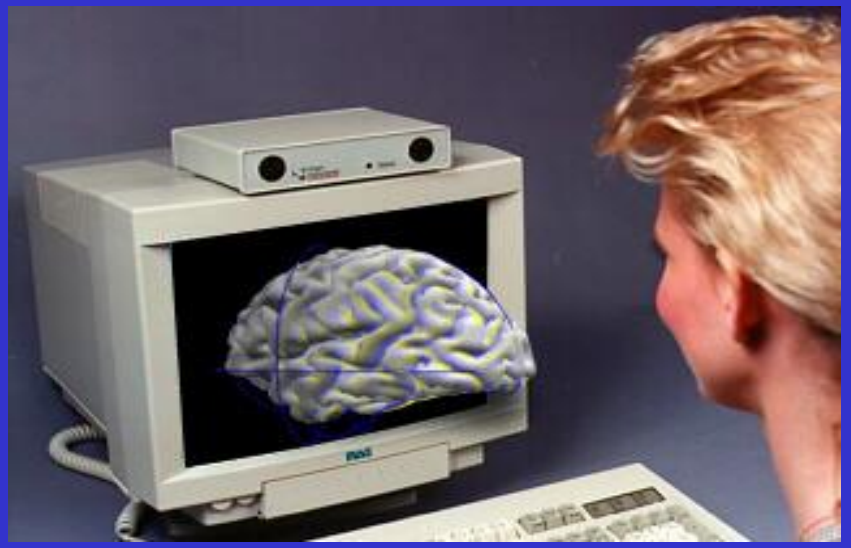
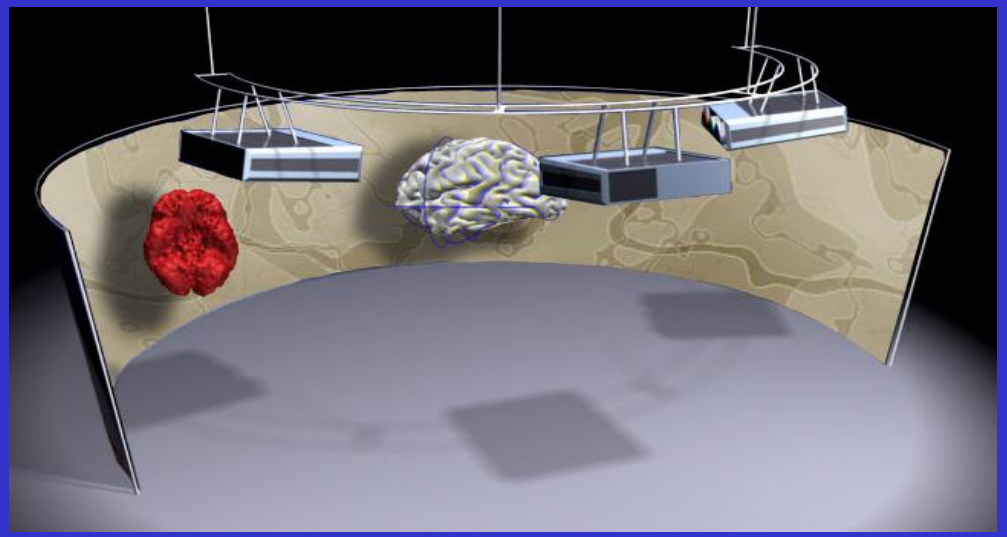
Digital Medical Education – Project 2020

- Integration of Head tracking Systems for realistic stereoscopic view
- Use PHANToM as force feedback manipulator
- Use synchronized client abilities for driving medical CAVE Systems





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VH – Project 2020: Technology of Interacting and Integration of Means

Surgical Oncological Working Place 2020

Advanced Telecommunications

Medical Command Centres

Source: MedSMART 2003

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VH – Robotic Telepresence

Source: InTouchHealth, USA

Are all possible innovations in healthcare desirable?

- **Implantable EPR-chip: 64 % say no!**
- **Nursing robots: 54 % say no!**

Source: "Future IT for Healthcare", May 2007, Fraunhofer ISI & ZEW

⇒ users' acceptance is pivotal (professionals & patients/citizens)

⇒ ICT: <u>optimisation</u> rather than <u>maximisation</u> !

Global Health – Challenges & Opportunities

- Raising awareness and consolidation of the demand
- Development of economic models for sustainable services
- To move from curative to preservative medicine
- To account for ethical and privacy aspects
  - Is health a human right or a social duty?