



Globalisation of Healthcare by Virtualisation of Hospitals

G. Grasczew, T.A. Roelofs, S. Rakowsky and P.M. Schlag
SRU OP 2000, MDC/RRK, Charité, Berlin, Germany
www.OP2000.eu

*Second United Nations International UN-SPIDER Workshop
Disaster Management and Space Technology – Bridging the Gap
Bonn, 13-15 October 2008*



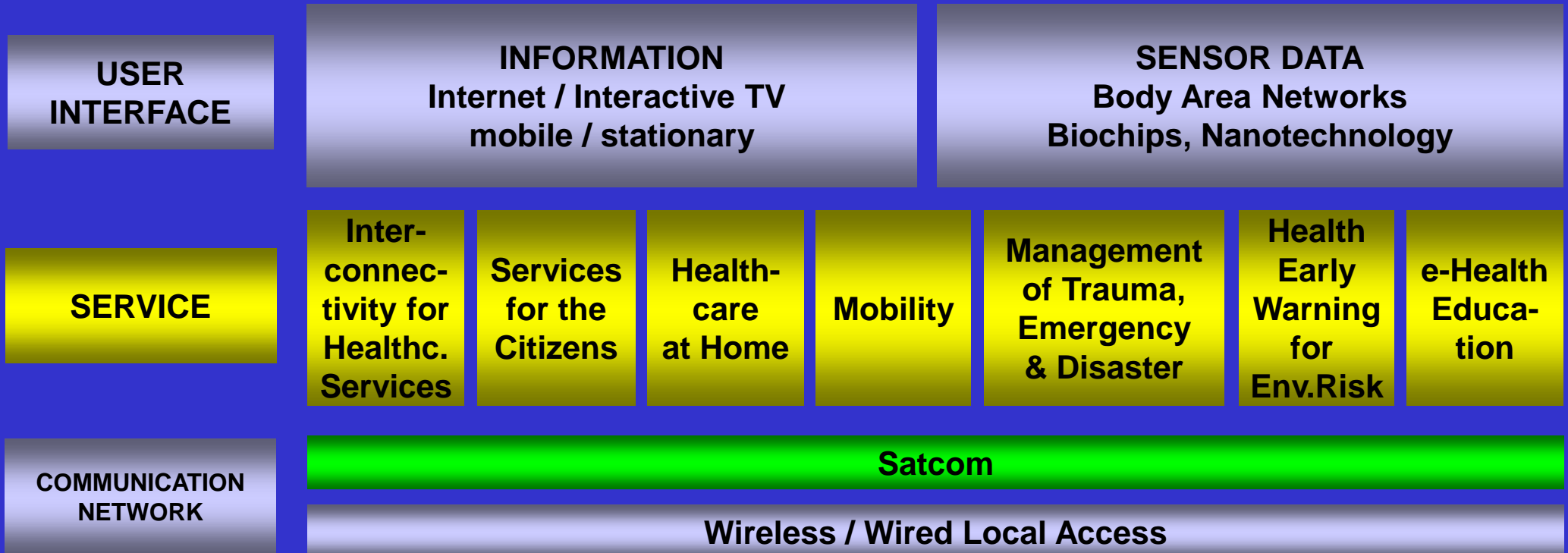
SRU OP 2000, RRK/MDC, Charité, Berlin

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

GALENOS

Generic Advanced Low-cost trans-European Network Over Satellite
 Project carried out with the support of the European Union

64 kbps to 2 Mbps
 Bi-directional exchanges

Pilot network in the field of medicine

- Tele-consultation
- Tele-diagnosis
- Tele-monitoring

Participating cities: Berlin, Paris, Toulouse, Marseille, Milan, Nice, Firenze, Sofia, Napoli, Matera, Thessaloniki, Athens, Samos, Tunis.

Logos: telespazio, MEDAT, Demokritos, ALCATEL, EUTELSAT, NORTEL DASA

DELTAASS

Disaster Emergency Logistic Telemedicine Advanced Satellites System

Satellites: Inmarsat, Global-star, GPS, Eutelsat

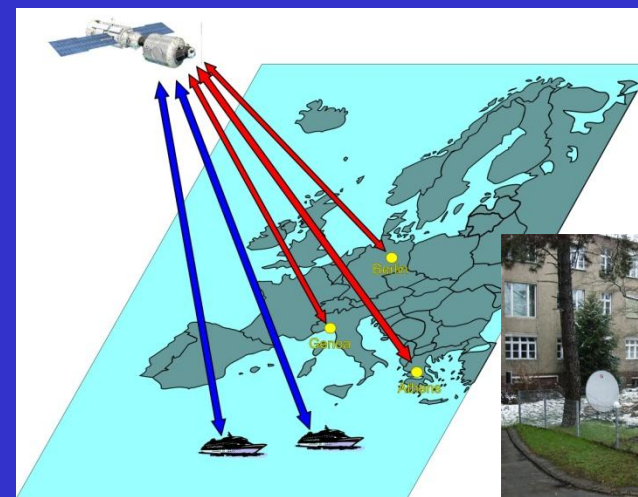
Facilities: Mobile Field Hospital, Mobile Teams, Reference Hospital, Permanent Center, Gateway

Logos: cnes, MEDI, SPACEL, ALCATEL, SPAC, EADS, EADS, cesa

NETWORK OVER SATELLITE

EMISPHER

Locations: Berlin (OP 2000/Charité), Clermont Ferrand (CICE), Istanbul (ISTEM (Univ.)), Athens (NCSR), Palermo (IsMeTT), Tunis (Fag/ Med. Tunis), Casablanca (Med. & Pharm Faculty), Alger (ANDS), Nicosia (Univ. of Cyprus), Cairo (Ain Shams Univ.).



SRU OP 2000, RRK/MDC, Charité, Berlin

Real Time Digital Medicine

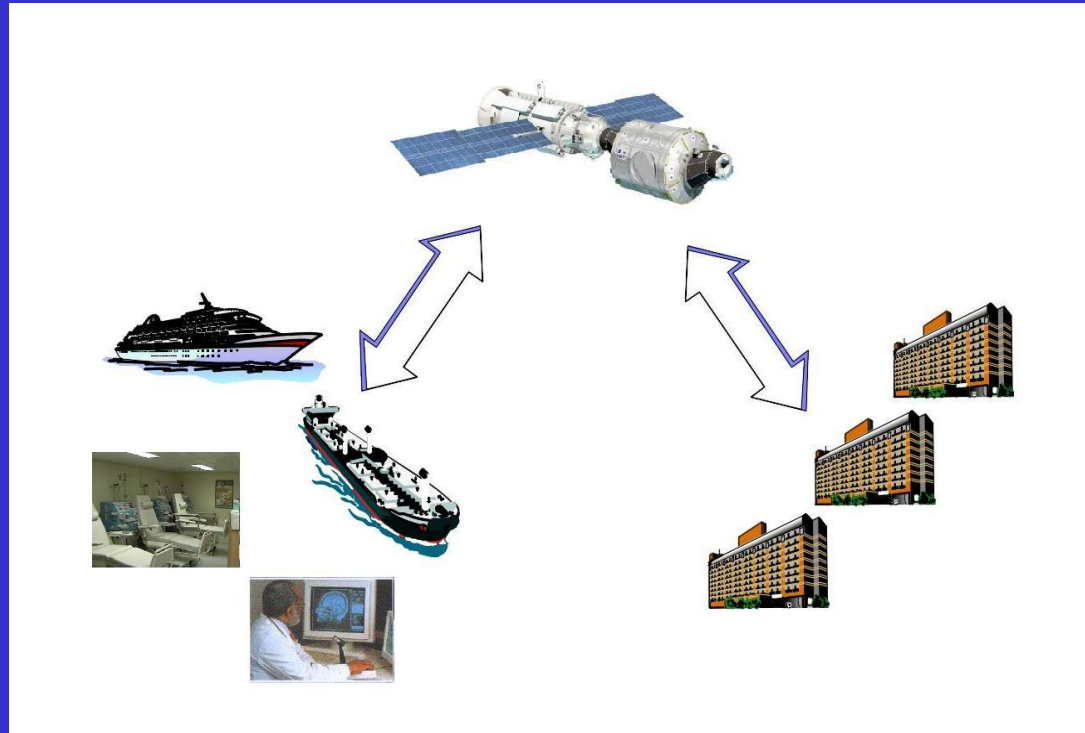
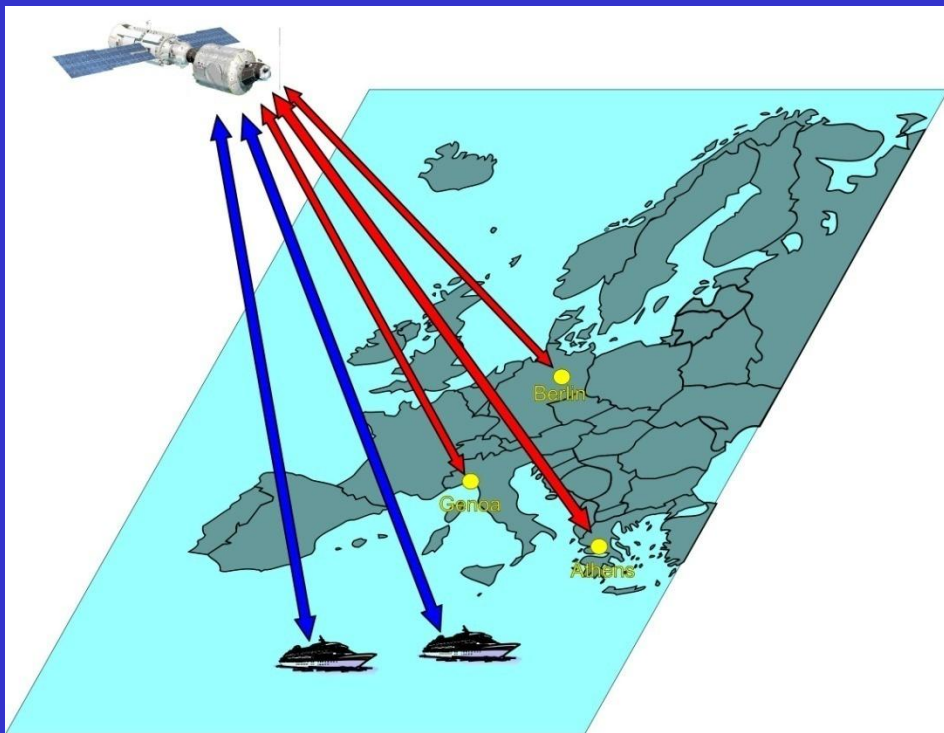


- Telesurgery (including laparoscopy)
- Pre- and post-transplant consultation

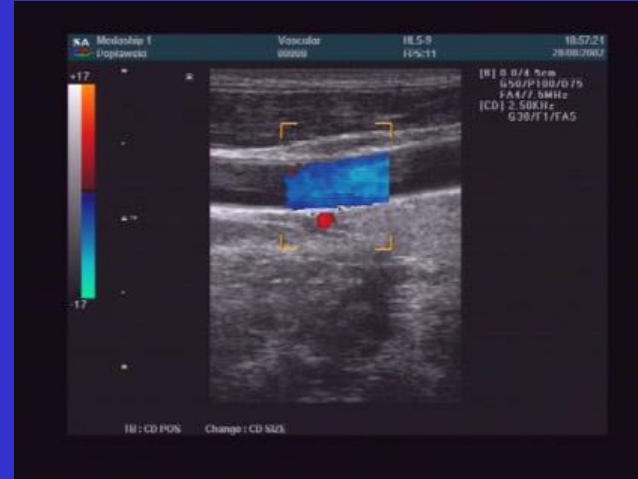
- General Teleconsultation for second opinioning
- Teleteaching, Teletraining & Tele-education



MEDASHIP Satellite Network



Telemedical Applications in MEDASHIP



The screenshot displays a complex telemedicine interface. At the top, there are window titles for 'MedaShip' and 'LTAS'. The main area is divided into several sections: a video feed of a medical professional on the left, a large ultrasound image in the center, and various data panels on the right. The data panels include 'Vital Signs' (Heart Rate, Blood Pressure, SpO2, etc.), 'System Status' (CPU usage, Memory usage, etc.), and a 'Patient Case' section. The interface is designed for real-time monitoring and communication during medical emergencies.





Teleconsultation and Telesonography during triage



SRU OP 2000, RRK am MDC, Charité,

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

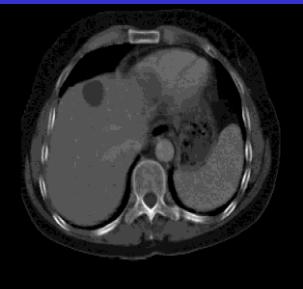
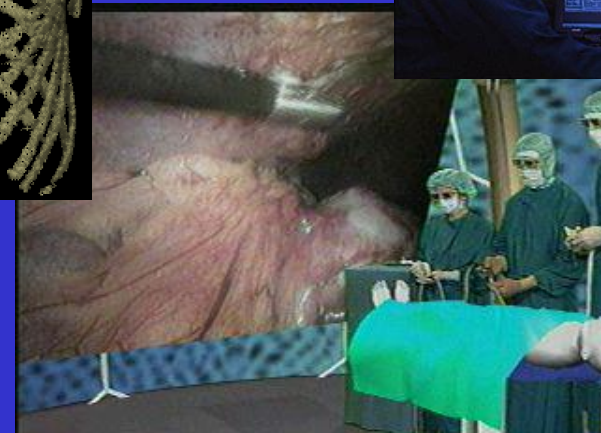
- provide the best possible patient care at any site
- optimal use of all available medical resources
- contribute towards standardised treatment protocols (disease management and evidence-based medicine)
- allow the wide use of interactive real-time telemedical services for medical e-learning
- **contribute 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

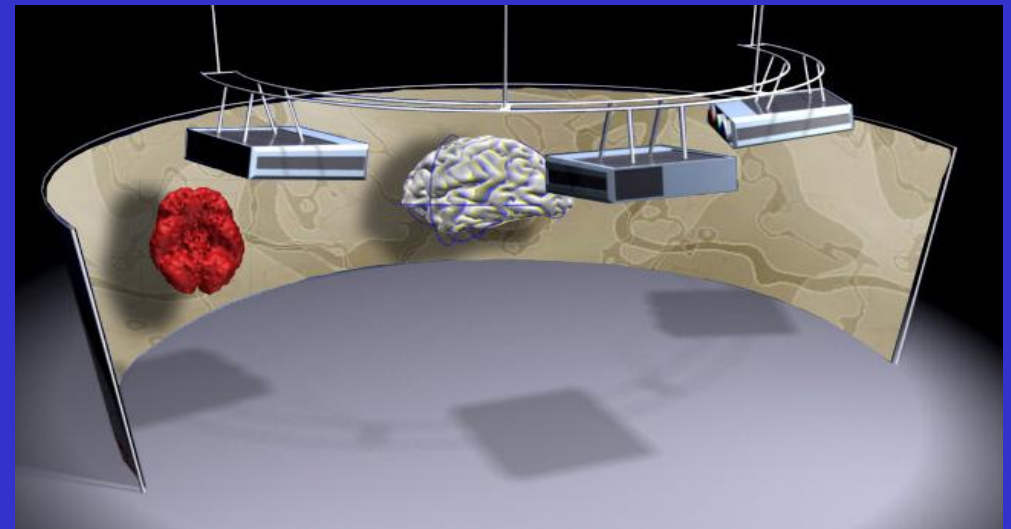
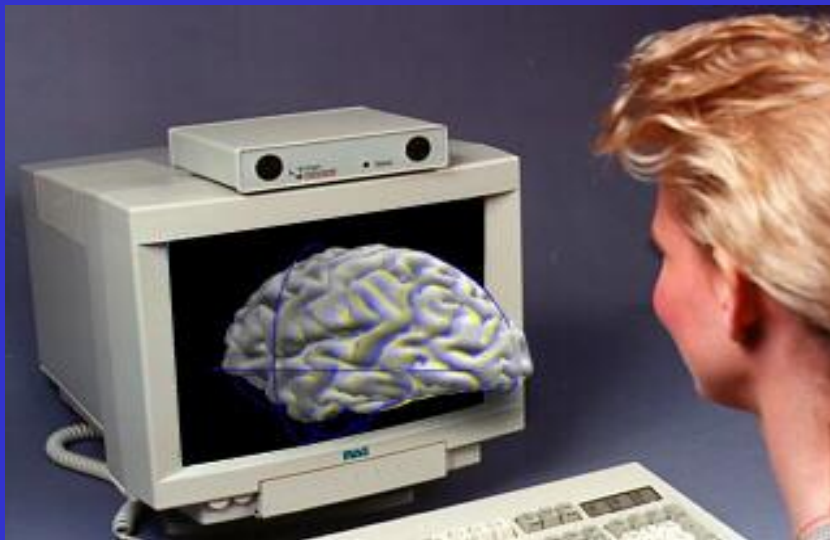
Simultaneous and synchronized access from local and remote

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



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



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



Surgical Oncological Working Place 2020



Advanced
Telecommunications

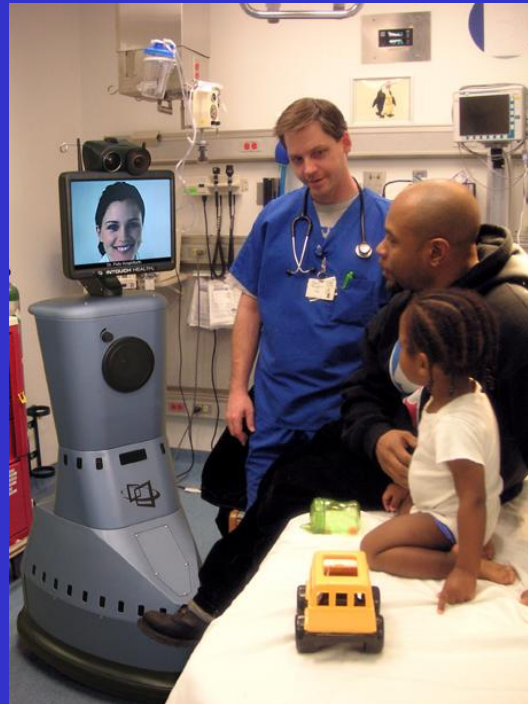


Medical Command
Centres

Source: MedSMART 2003



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: optimisation rather than maximisation !



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?

