Computer Science and Medicine

"a glance in the future"

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Introductory remarks

- Who am I?

- A computer scientist who has spent 30 years at CERN (and in other scientific laboratories) developing HPC systems for physics and other sciences

- Started in real-time, data acquisition and networking

- Pioneered ES, AI, MPP systems, cluster computing and in the last 7 years, Grid computing

- Initiator of EU-DataGrid, EGEE and more than 10 other HPC and Grid projects (mostly within the EU IST programmes)

- Co-founder of the Global Grid Forum (started in Amsterdam in 2001 together with EU-DataGrid)

- See my article on IEEE Spectrum Magazine (July 2006)

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Introductory remarks

- Joined Microsoft on 1/November/2005

- My mission: **Promoting Microsoft Computing into Science and Science into Microsoft Computing**

    by exploring and building important collaborations with leading scientists in Europe, Middle East, Africa and Latin America

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Medicine and Computer Science: Current status

- Computing is everywhere in medicine: patient records, instruments, visualisation, telemedicine, genetic and proteomic research, drug modelling, etc…

- But:
  - Hard to access basic clinical / patient data in homogeneous and distributed ways
  - Data are not "mobile" with the patient
  - No single patient record standards

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# Medicine and Computer Science: Current status

- Lack of preventive and early healthcare

- Lack of personalised health care

- Impediments are more policy based than technology issues
  - standards, regulatory, privacy-personal data protection etc…

- Research is still too slow in moving from the lab to the clinic, still too expensive and fails to harness healthcare data

An example:
By-pass surgery
Current Situation

Diagnosis & Planning

**Treatment**
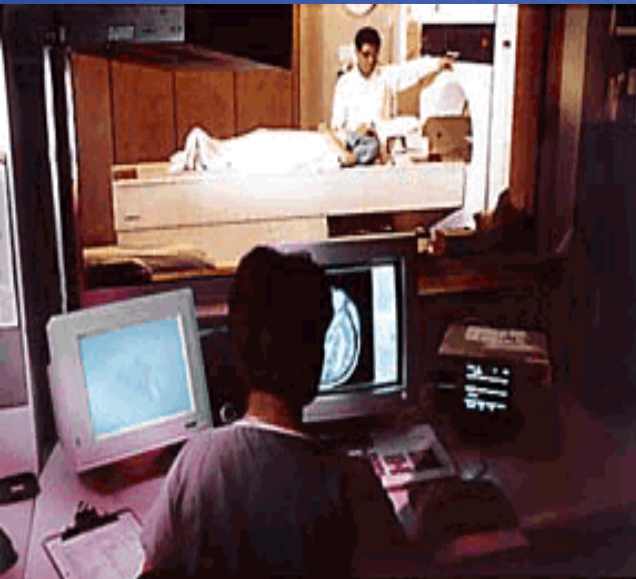
Observation

Computing supported by-pass surgery Current status

- Currently in use as training environment at Amsterdam Medical Centre
- Newly developed Personal Virtual Reality System for office use

  - VR bypass placement (30 seconds)

See for instance: P.M.A. Sloot and A.G. Hoekstra: *Virtual Vascular Surgery on the Grid*, ERCIM news, October 2004.

http://www.science.uva.nl/research/pscs/papers/archive/Sloot2004b.pdf

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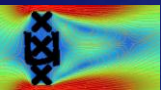
A glance to the future…

- Quickly assemble persuasive information
  - ..from multiple sources
  - ..tailored to the individual
  - ..empowering to make them healthy choices
  - ..anywhere

- Integrated communication, storage, processing, and visualisation frameworks among patient, care manager, clinical research coordinator, doctor

Microsoft vision video

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Health Future Vision
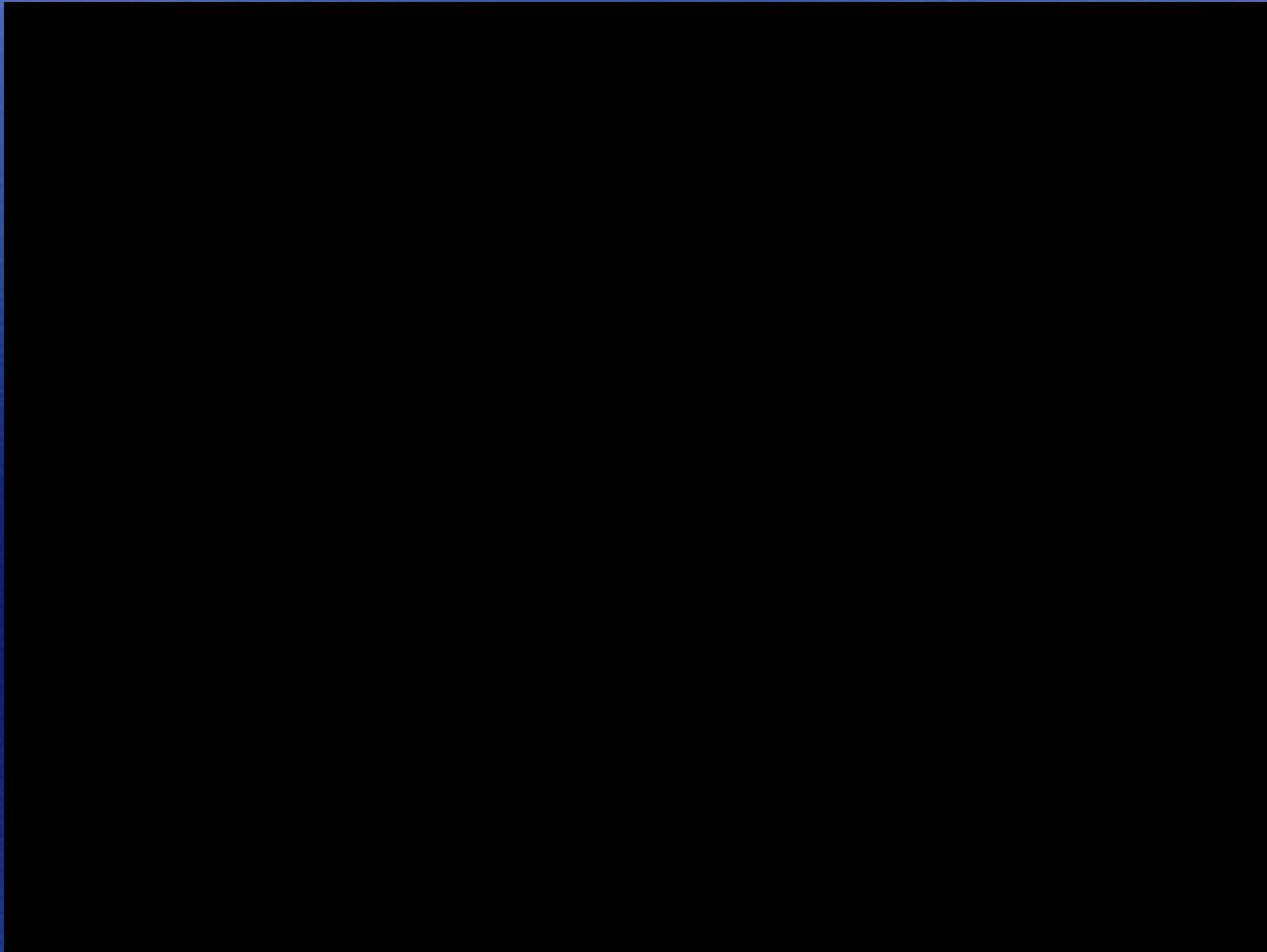
Remote Monitoring

Virtual Visit with Care Manager

Hospital Rounding

Medication Management

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Locating Equipment

In-Patient Visit

Virtual Consultation

Retail Clinic Services

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Conclusions

- Computing technology is basically there to enable new ways to provide patients with more powerful, more proactive and cost effective medicine

- Is up to the MDs to tell us if we are on the right track and define ways to accelerate the technology transfer from the research labs to the clinics

- Microsoft is investigating solutions in collaboration with leading scientists around the world to facilitate this process

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Thanks!

- This event is a good occasion to exchange ideas between computer and medical experts
- I welcome your opinion and input
- Many thanks for your time and attention

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