Dynacore Networking pilots

L. Gommans*, W. Lourens, C.T.A.M. de Laat, E. van der Meer and B.U. Nideröst

Faculty of Physics and Astronomy Utrecht

*Cabletron

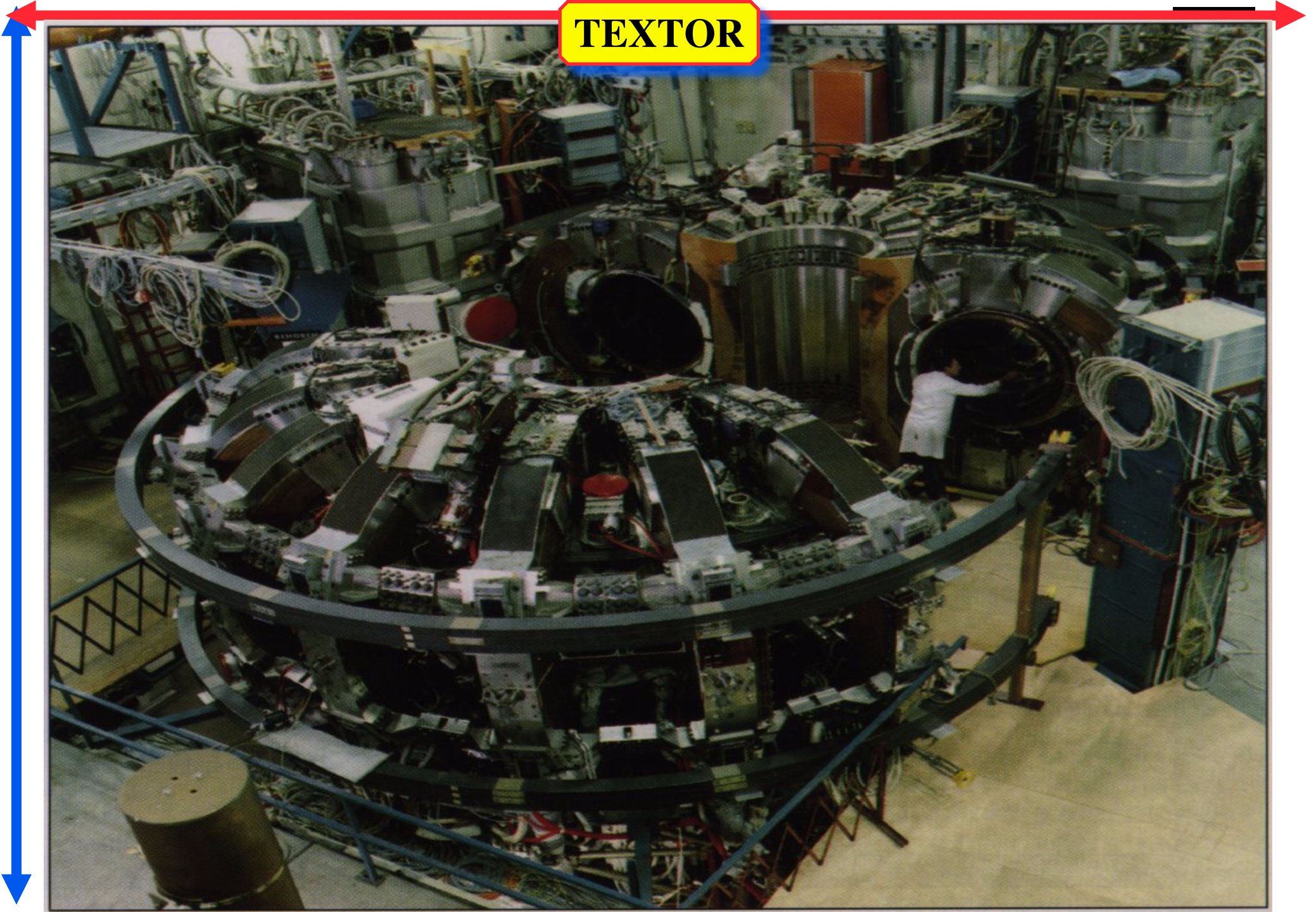
M. Korten, G. Kemmerling

Forschungs Zentrum Jülich

For the DYNACORE (REMOT++) collaboration.

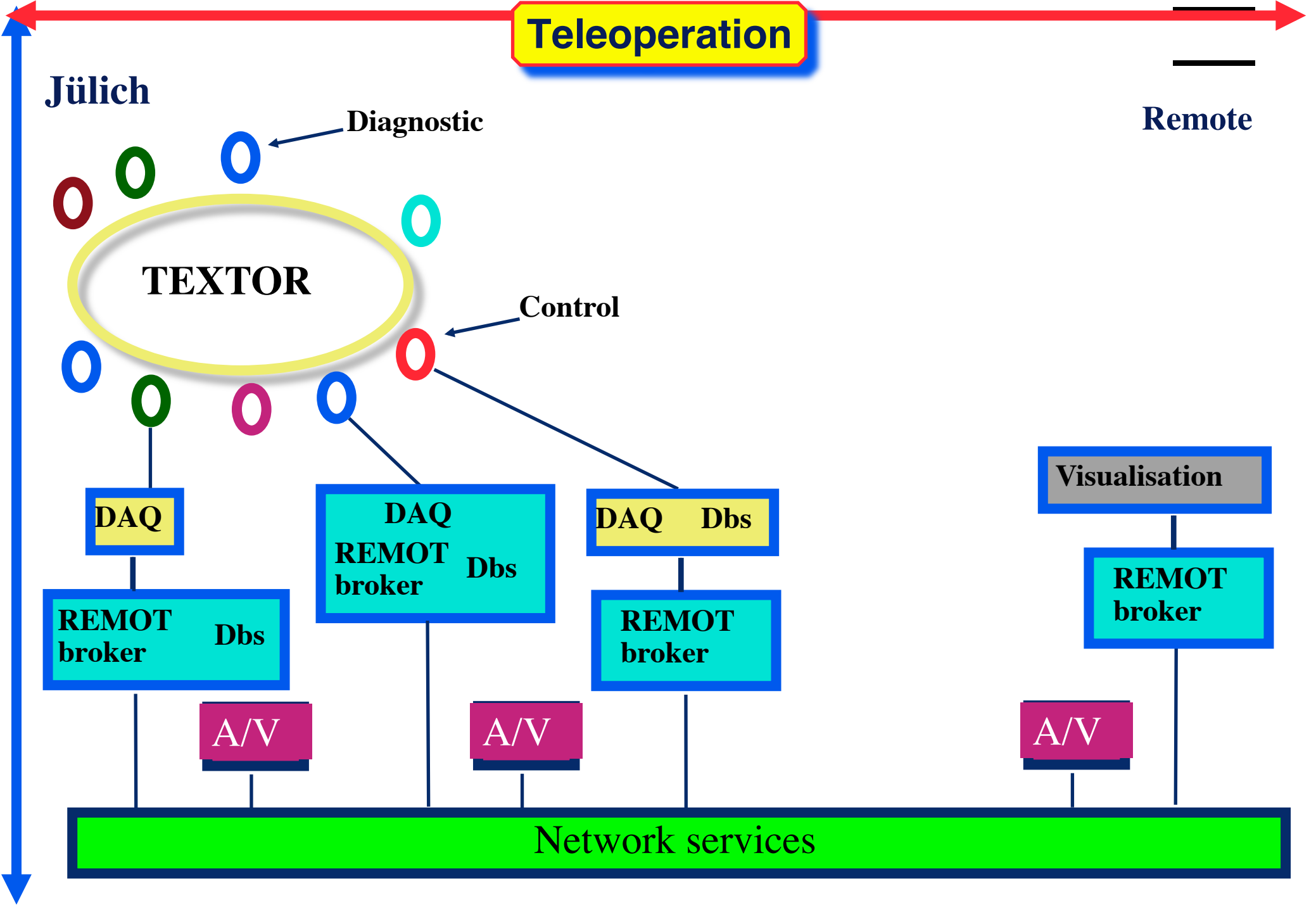
Contents

- **REMOT (RE1008)**
  - Remote Experiment MOnitoring and conTrol
  - The REMOT project objective is to develop a system architecture to allow remote control of scientific experiments and facilities that require real time operation and multimedia information feedback, and using available or deploying communications infrastructure.
- **DYNACORE (RE 4005)**
  - DYNAmically COnfigurable Remot Experiment
  - The DYNACORE monitoring & control application will allow scientists to access remote experimental facilities in order to perform scientific experiments in a similar way as if they were physically located at those facilities.


TEXTOR

Services and Requirements

- **Experiment cycle**
  - load settings in the diagnostics
  - negotiations with TEC operator on properties of next pulse
  - freeze all diagnostic and machine parameter
  - load capacitors
  - PLASMA pulse
  - data readout
  - look at data of your own diagnostic
  - correlate with data of other diagnostics
  - draw conclusions for settings on next pulse
- **Cycle takes about 5 - 10 minutes**
- **Load capacitors, pulse, data readout take 3 minutes**
- **Data size currently: 10 - 100 MByte / pulse depending on active diagnostics**


Teleoperation
Jülich
Remote
Diagnostic
TEXTOR
Control
DAQ
REMOT broker
Dbs
DAQ
REMOT broker
Dbs
DAQ
Dbs
REMOT broker
Visualisation
REMOT broker
A/V
A/V
A/V
Network services

Network requirements

- **Real Time**
  - time is limited between shots and decisions have to be made
- **Scalable**
  - there are about 20 diagnostics from several institutes
- **Multicast**
  - there are many one to one, one to many and many to many conferences going on
- **Solutions**
  - IP based QoS
  - ISDN
  - IpV6, RSVP, DiffServ/IntServ
  - Mbone
  - Netmeeting
- **Total Bandwidth Estimate: ≈ 20 Mbit/s**

Pilots

- TF-Ten, continuing in TF-TANT
- SURFnet4
  - ATM - LANE for DAQ systems
  - ATM - SVC in backbone
  - Videoconference/GroupWare survey
  - survey
  - ATM multicast in the backbone
  - ATM - ABR traffic, policing and management
  - DAS
  - IAS
  - Simulator for computer aided learning
  - Wireless LAN for computer aided learning
  - IPv6
  - RSVP

Videoconferencing

- No ISDN, no leased lines for financial and political reasons
- Mbone over QoS cirquits (see MERCI)
- native ATM based (FORE Nemesys)
- Need 4 - 6 Mbit/s for broadcast quality
- Need one to one and one to many
- We started using Nemesys boxes for meetings between University Twente and University Utrecht
- Doing MBone experiments over SURFnet
  - connection setup and teardown
  - hardware compression

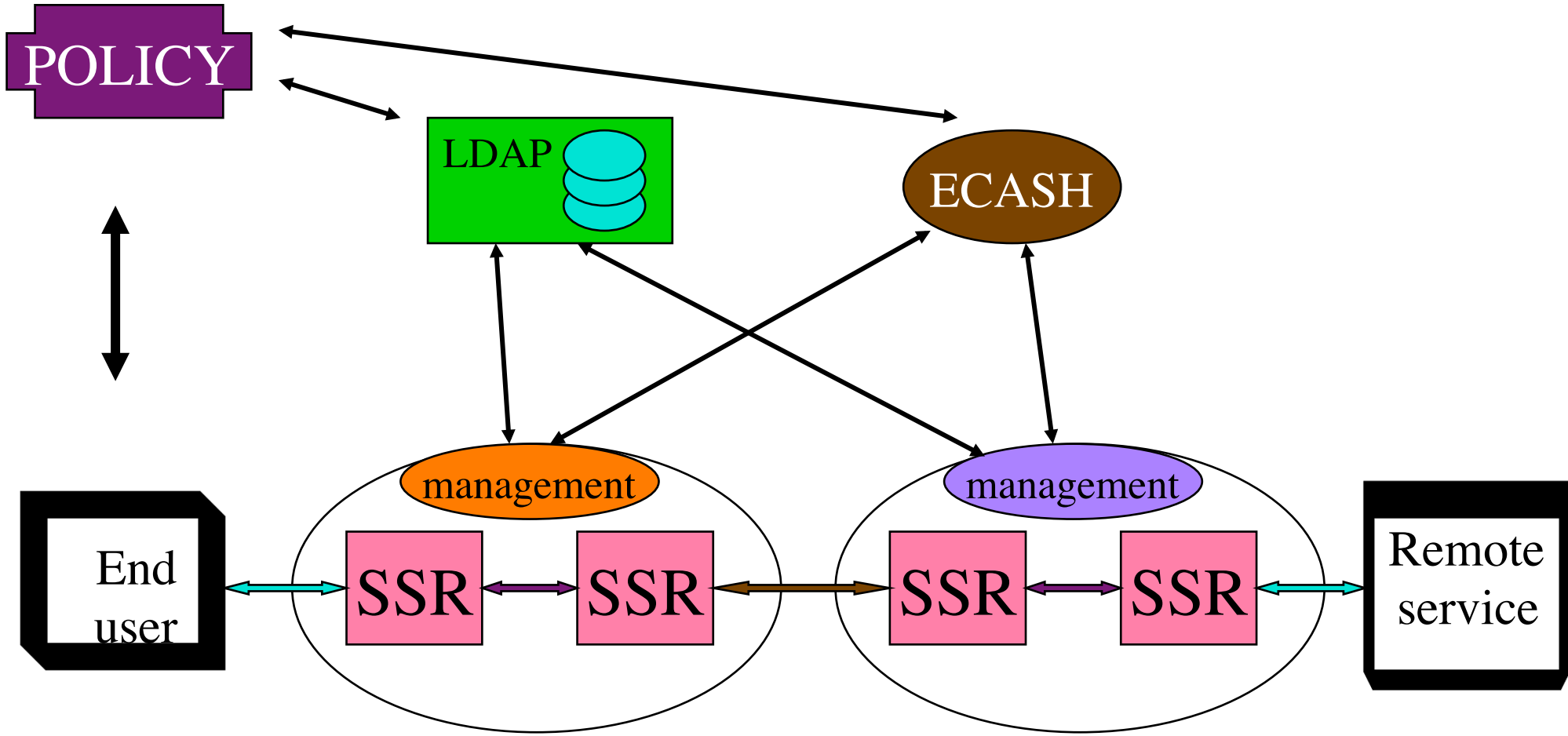
The management domains

- Physics-UU to IPP-FZJ => 8 kingdoms
  - Physics dept
  - ACCU
  - SURFnet
  - PTT
  - Deutsche Telecom
  - WINS/DFN
  - FZJ-ZAM
  - FZJ-IPP

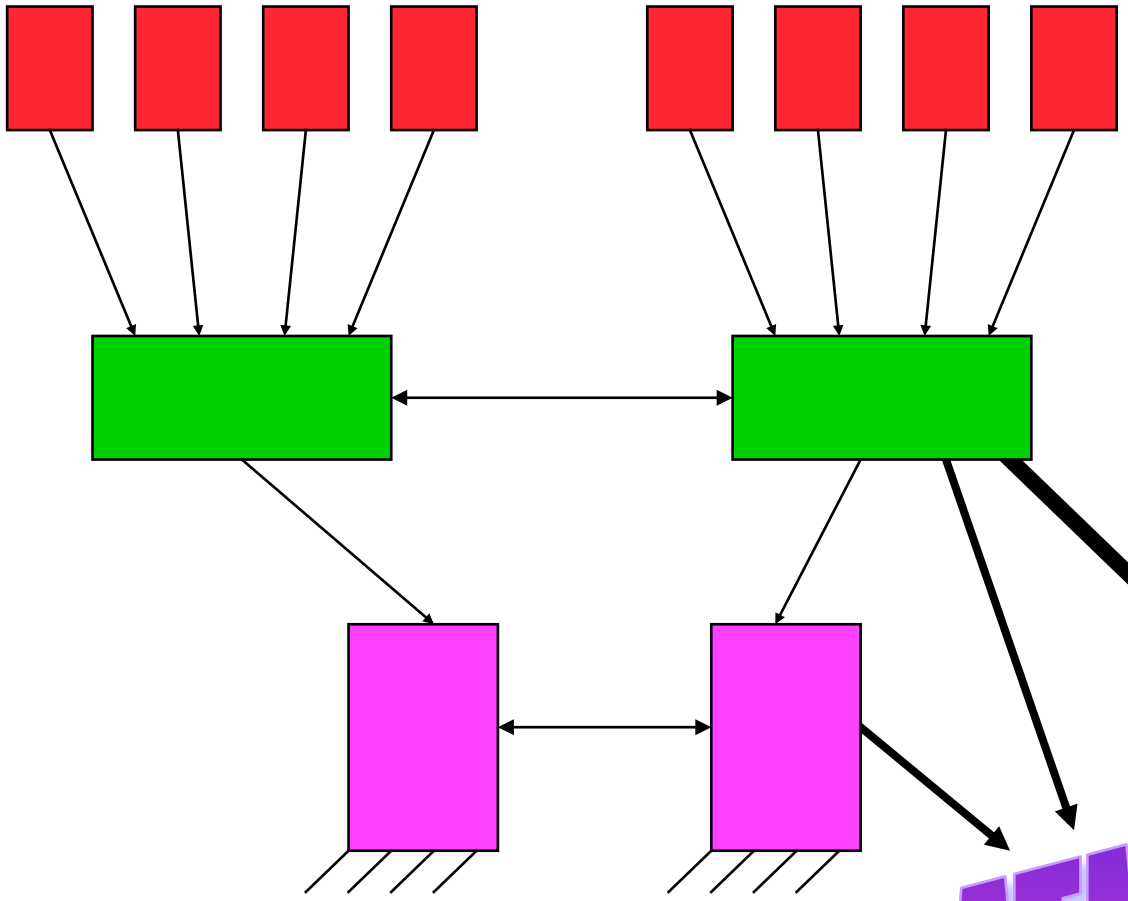
New cost model

- **Networks are expensive resources**
- **Borrow from supercomputer era**
- **New unit: megabit/s kilometer second (mks)**
  - SURFnet has: 10 * 155 * 200 * 31536000 ≈ 9.8E12 mks
  - Dynacore needs: 1 * 20 * 400 * 80*8*3600 ≈ 1.8E10 mks
  - DAS needs: 24 * 10 * 100 * 50*24*3600 ≈ 1.0E11 mks
- **Establish a program advisory commission**
- **Use ecash on virtual bank to account**
- **Use chipcards with certificates to do CAC**

Possible architecture



GIGAcluster



SUN

1Gb/s eth

SSR L4 switch

Workstations/Pc's

ATM

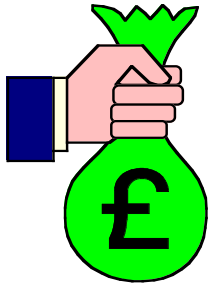
GIGAnet

GIGAcluster applications

- REMOT/DYNACORE, collaboratory
- Objectivity, distributes db's
- Corba, object and message passing
- Qbone, Quality of Service on WAN
- MCU's, scalable video distribution
- SURFnet 5, GIGAbit producer/sink
- DAS - Computing
- LLT (LFAP, CAC, COPS, IPSEC, …)

Acknowledgments

- This work is supported by
  - SURFnet bv
  - Digital Equipment
  - Cabletron
  - SUN
  - European Commission, DG XIII
    - » Telematics Applications Programme Telematics for Research
    - » RE 1008 REMOT
    - » RE 4005 DYNACORE



- More info:
  - http://www.phys.uu.nl/~delaat
  - http://www.phys.uu.nl/~wwwfi
  - http://www.phys.uu.nl/~wwwfi/das
  - http://www.phys.uu.nl/~dynacore

QUESTIONS ?