Lambda-Grid & e-Science

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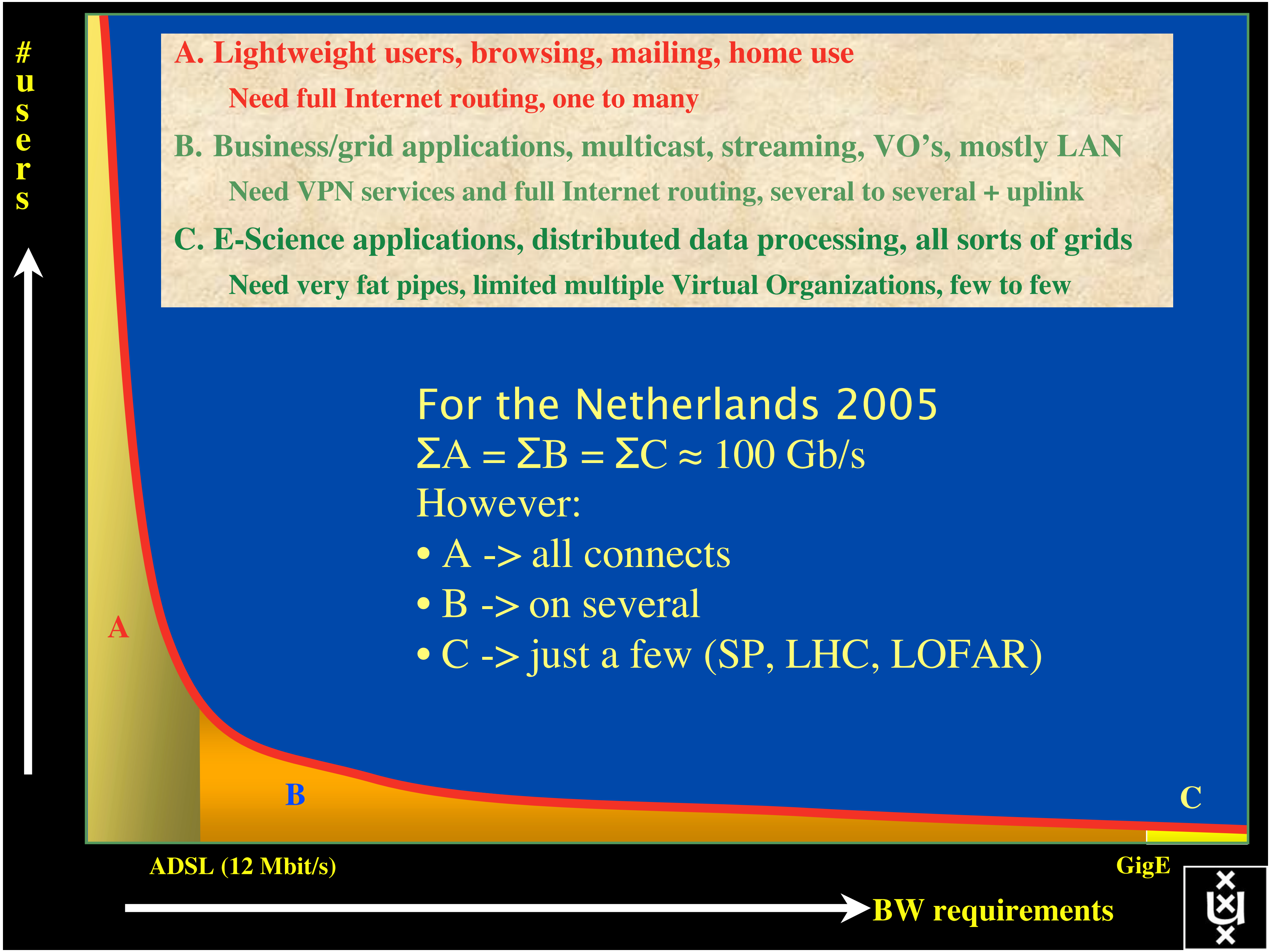
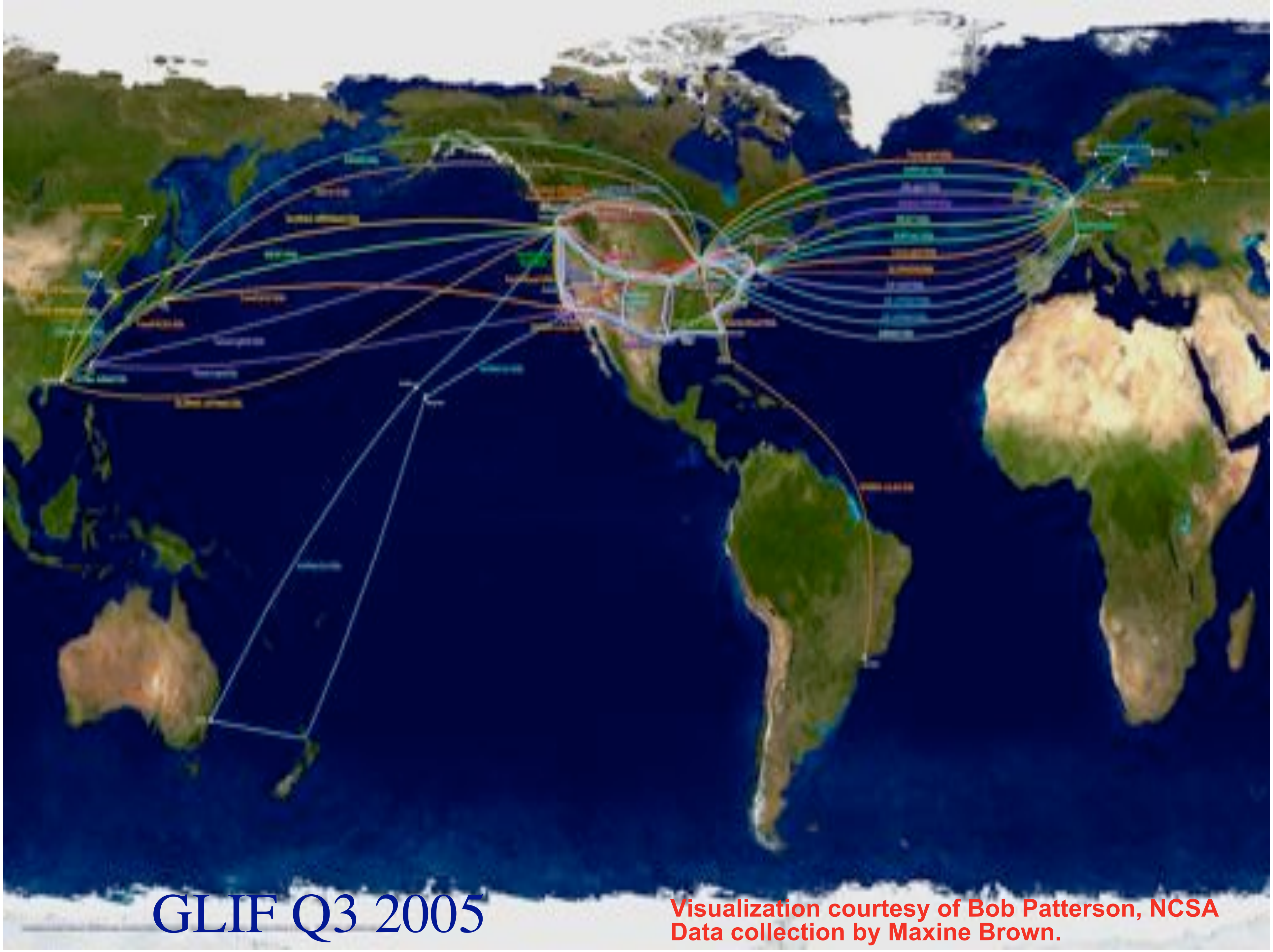
NCF



A. Lightweight users, browsing, mailing, home use
Need full Internet routing, one to many
B. Business/grid applications, multicast, streaming, VO’s, mostly LAN
Need VPN services and full Internet routing, several to several + uplink
C. E-Science applications, distributed data processing, all sorts of grids
Need very fat pipes, limited multiple Virtual Organizations, few to few
For the Netherlands 2005
ΣA = ΣB = ΣC ≈ 100 Gb/s
However:
• A -> all connects
• B -> on several
• C -> just a few (SP, LHC, LOFAR)
users
A
B
C
ADSL (12 Mbit/s)
GigE
BW requirements

What is missing in e-Infrastructure from the e-Science viewpoint?

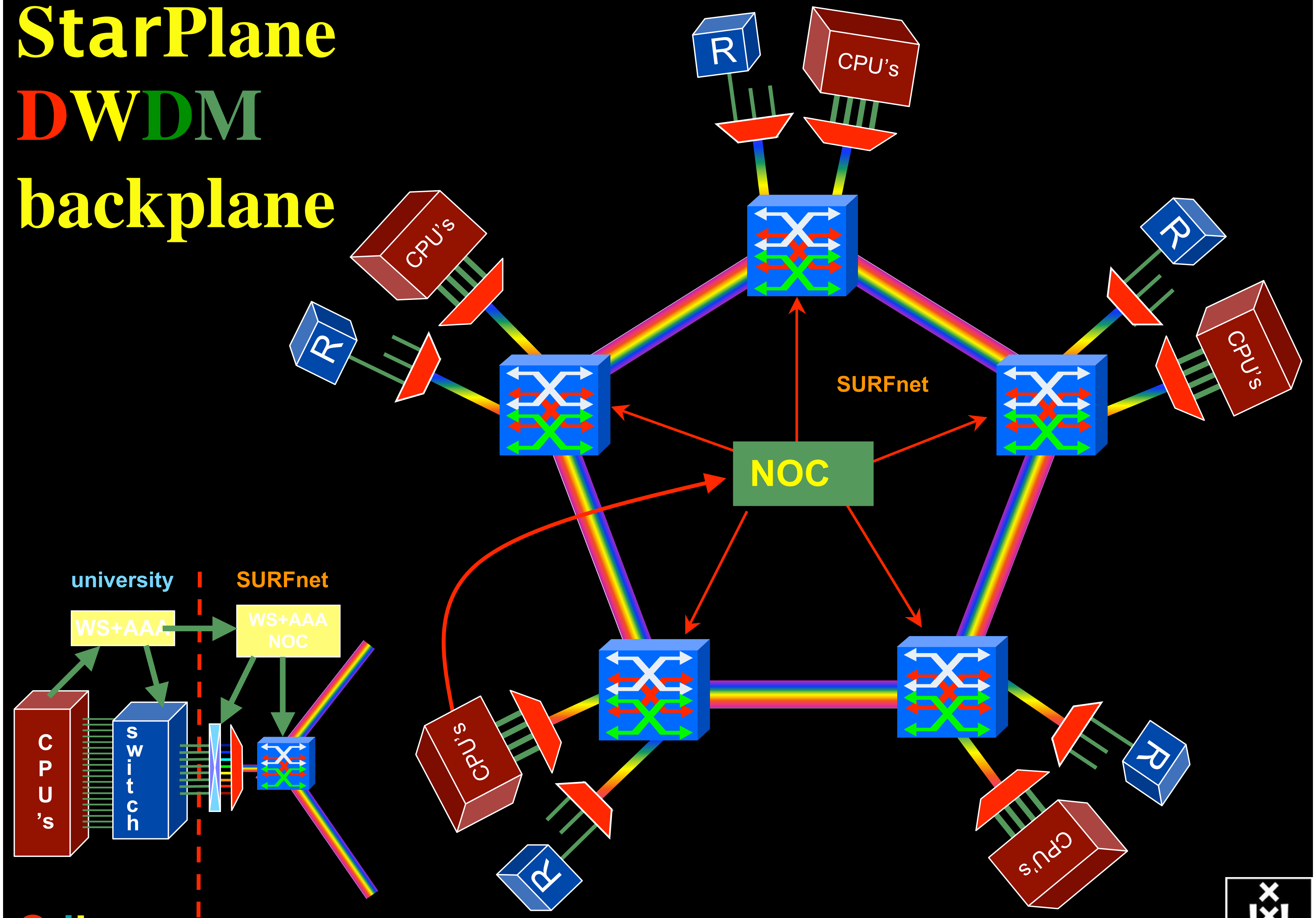
- Useful ubiquitous access to photonic networks
  - first mile problems
- Grid programming models which go beyond treating the communication as Virtual Private Networks
- Scaleable optical/photonic network resources preventing cost explosions



GLIF Q3 2005

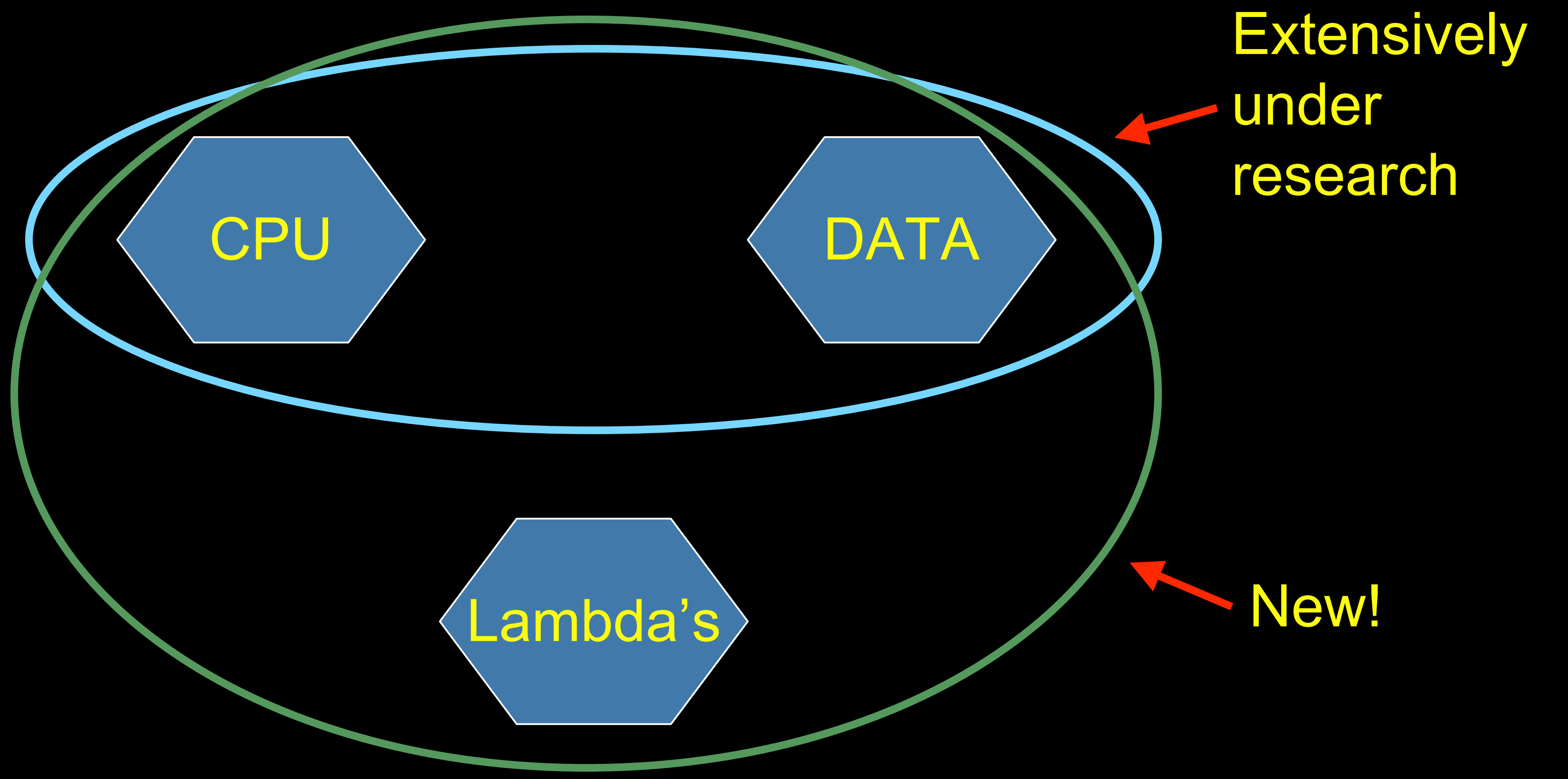
Visualization courtesy of Bob Patterson, NCSA
Data collection by Maxine Brown.

StarPlane DWDM backplane

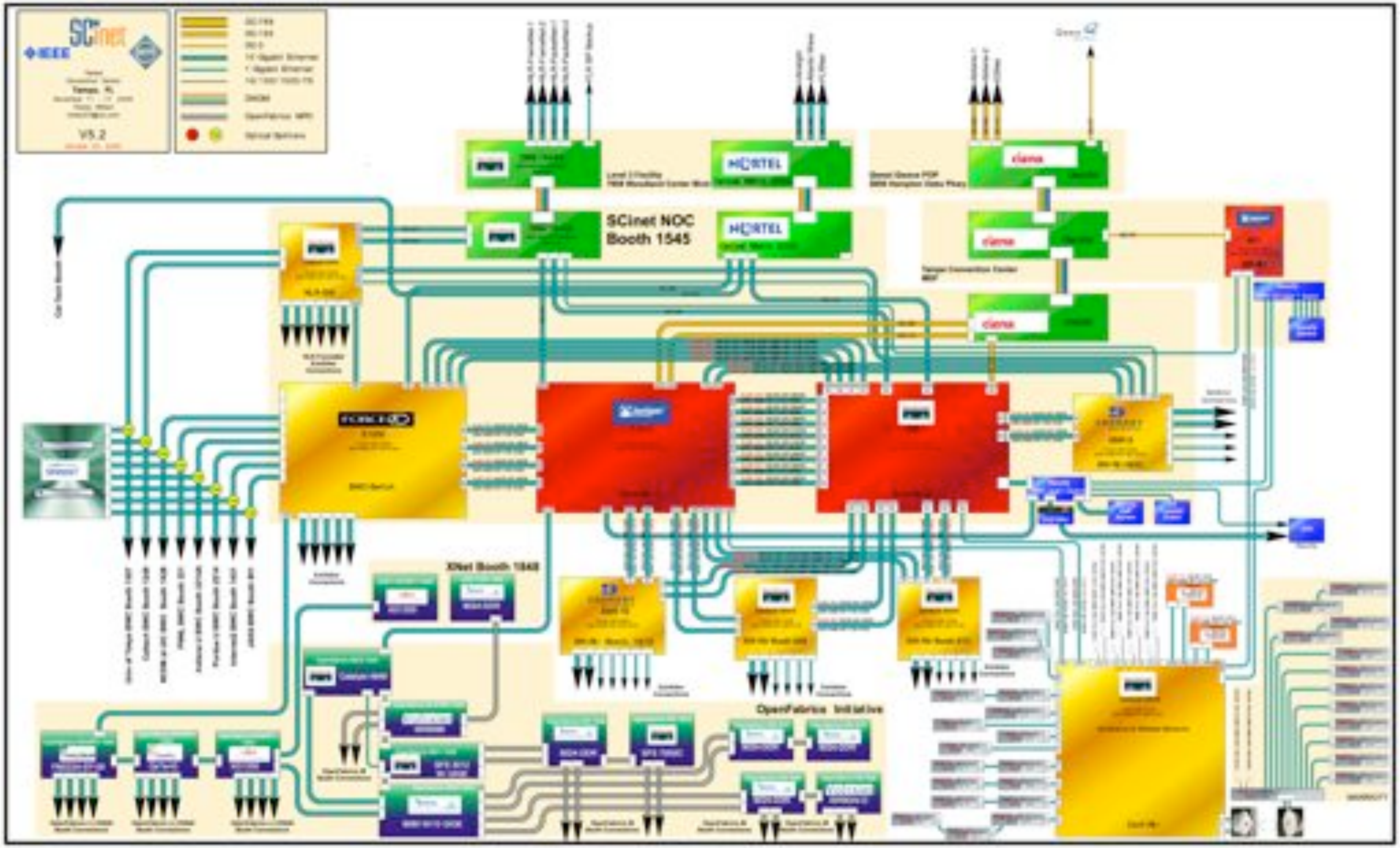


CdL

GRID-Colocation problem space



Architecture SC06



What is the next hot topic in engineering e-Infrastructures?

- Middleware is the key to unlock the tremendous capacity in dark fiber networks
  - RDF, policy, addressing & routing
  - make these networks functions in WFM systems
- Utilize the capacity
  - few Tbit/sec/fiber => few 100 times 10 Gbit/s
- reduce cost and complexity of grooming and switching
- power per bit, power per multiplication, etc.
  - 250 W/10Gbit -> few times 25 kW/fiber/side for >L0
  - costs ~ 1 kEuro per kW per year

Questions ?