

Perspective from the Netherlands **A bottom-up approach**

Towards integrated Networking and
Grids infrastructures for eScience and beyond,
The EU eInfrastructures initiative

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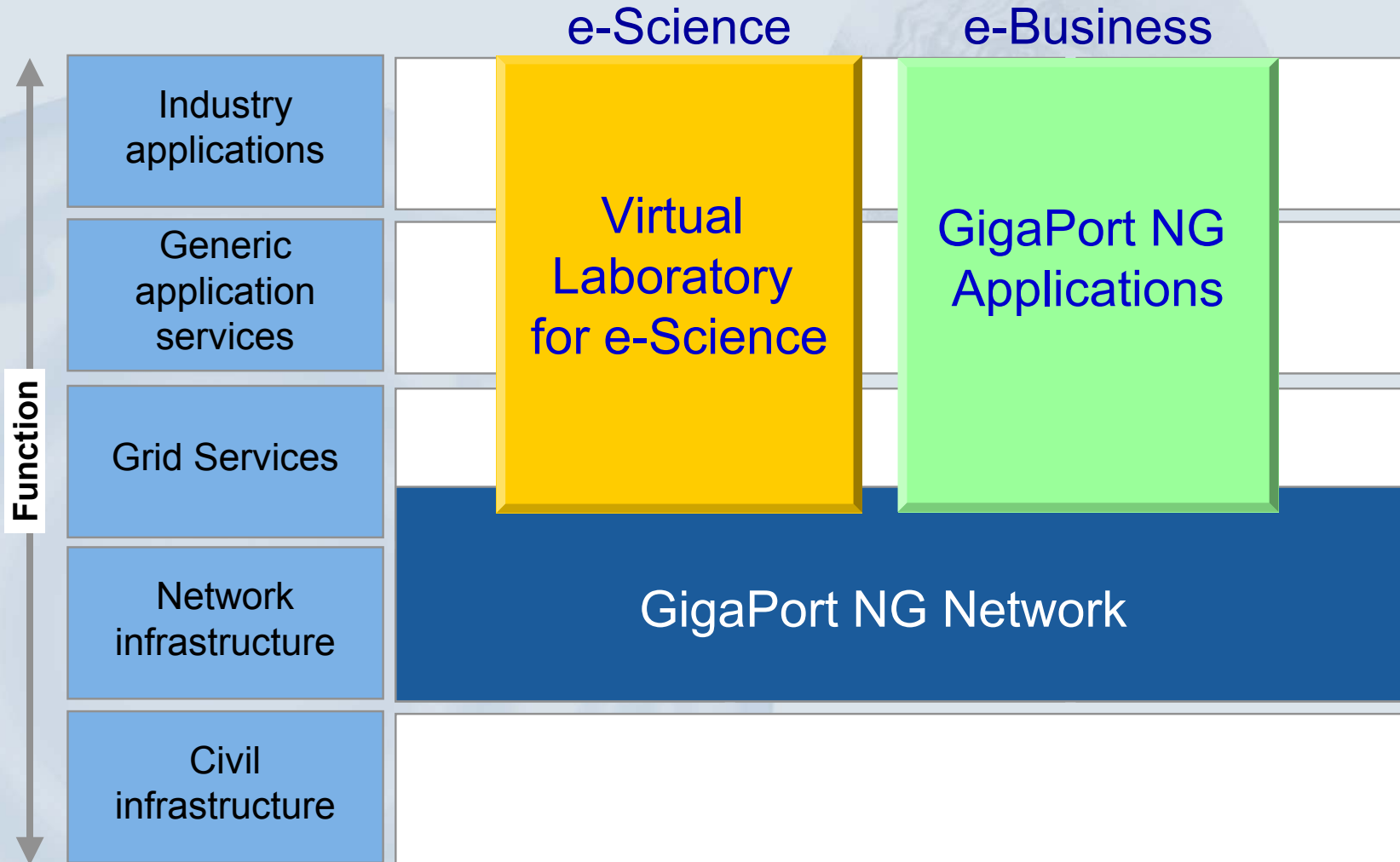
The Dutch e-science approach

- An integral approach including
 - A very high bandwidth infrastructure
 - SURFnet (Gigaport and Gigaport Next Generation projects)
 - A computer science community, interfacing the physical network and the applications
 - A number of typical e-science applications
 - Virtual Lab E-Science project
 - Extending to possible e-business developments
- E-sciencepark Amsterdam a focal point for a nation wide programme
 - Combines infrastructure (SURFnet, SARA)
 - Computer Science environment
 - Large number of (potentially) advanced users

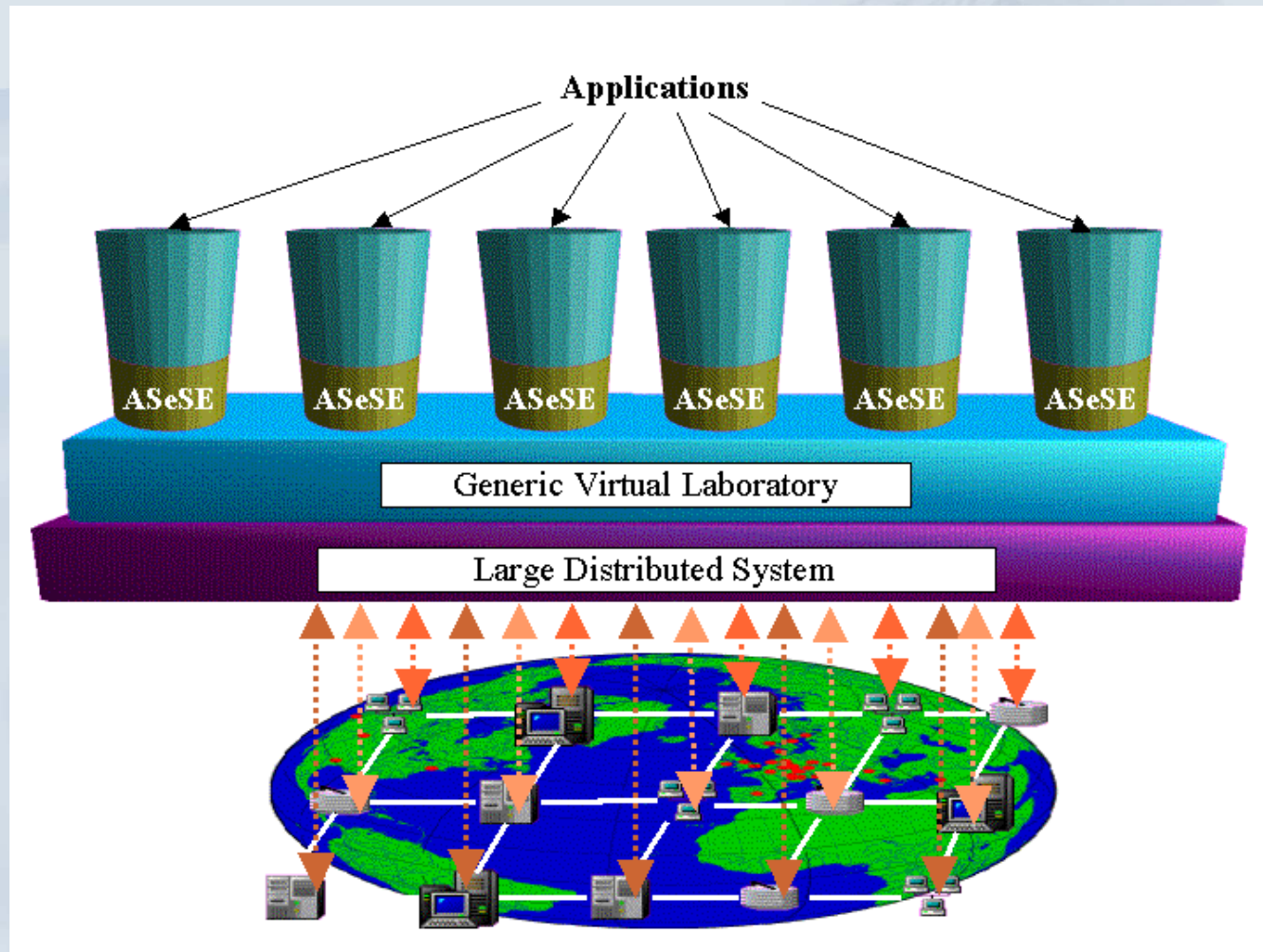
The essential ingredients

- Establish a framework in which grid producers and consumers interact
 - Understanding and educating the consumers
- Remove bandwidth as a limiting constraint by preparing for massive data transport
- Find balance between technology push and application pull
- Integrate networks and grids
- Differentiate infrastructure
 - Separate high end applications and Internet users

The Dutch route



VL-E structure



Large Distributed Systems

- High Performance Distributed Computing
 - parallel applications to run efficiently and robustly on large scale distributed systems
- Security and AAA
 - AAA models and architectures for VL-E environments
- Optical Networking
 - optical networking transport models for e-science applications

Generic Virtual Laboratory

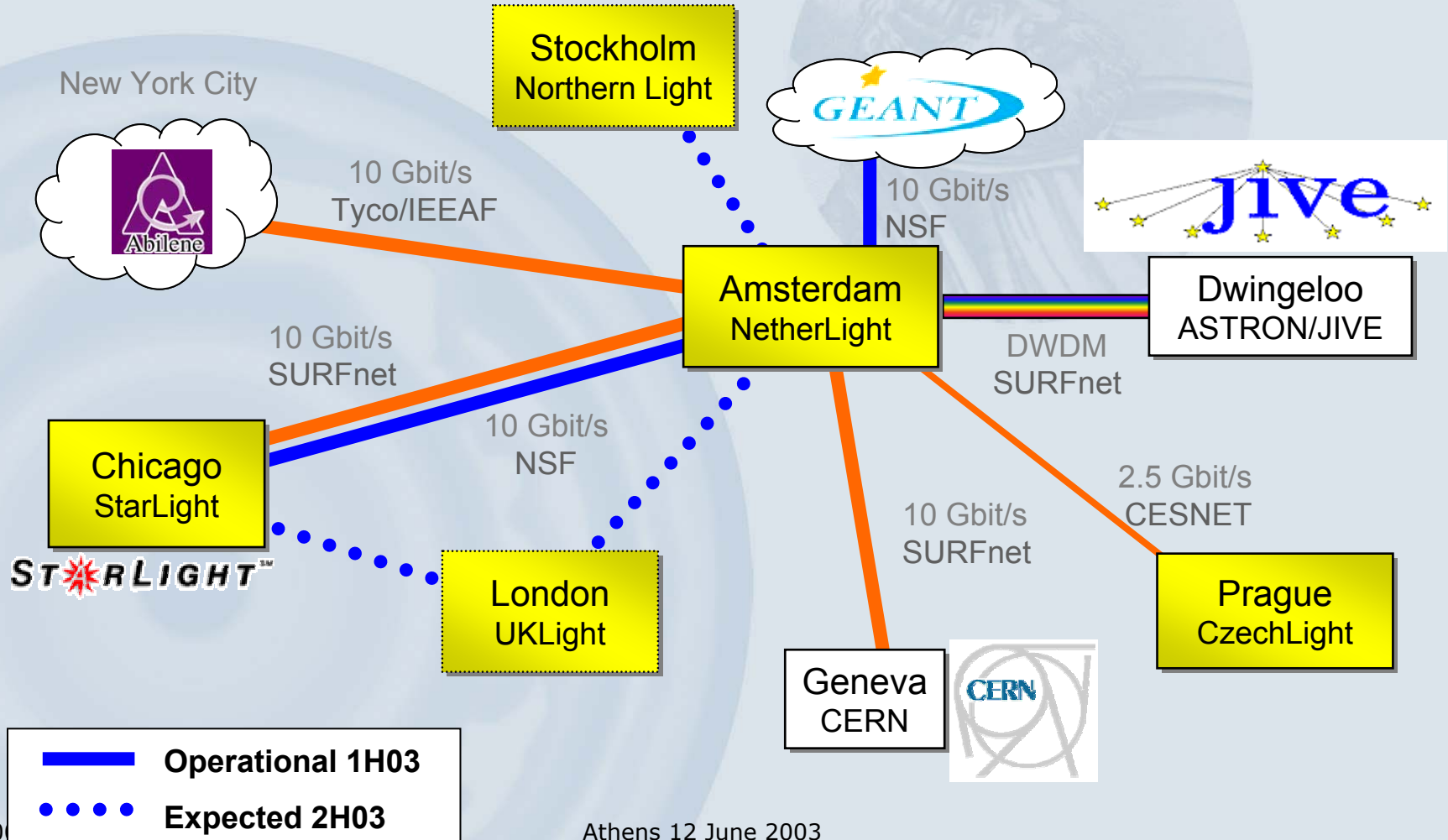
- Interactive Problem Solving Environment
 - methods and techniques for interactive HP computing
- Adaptive Information Disclosure
 - dynamic model driven information and knowledge extraction methods and techniques
- User interface and virtual reality based visualization
- Collaborative information management
 - cooperative federated information management
- Virtual Laboratory and system integration

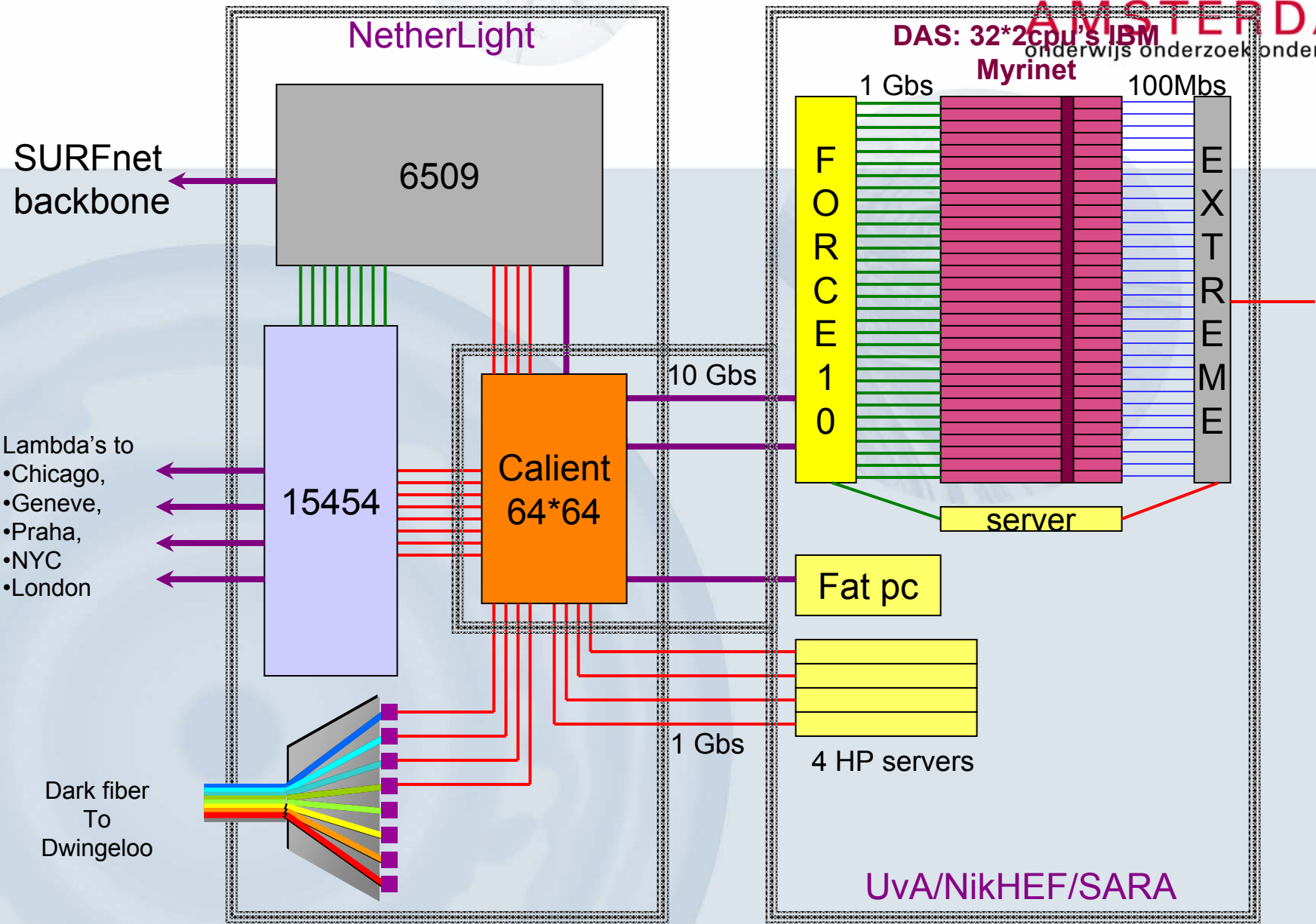
E-science applications

- Data intensive science
 - Astronomy, Earth Observation, HE Physics
- Food Informatics
- Medical diagnosis and imaging
- Biodiversity
- Bioinformatics ASP
- Dutch Telescience Laboratory

NetherLight Network: 2003

Emerging international lambda grid





UvA/NikHEF/SARA

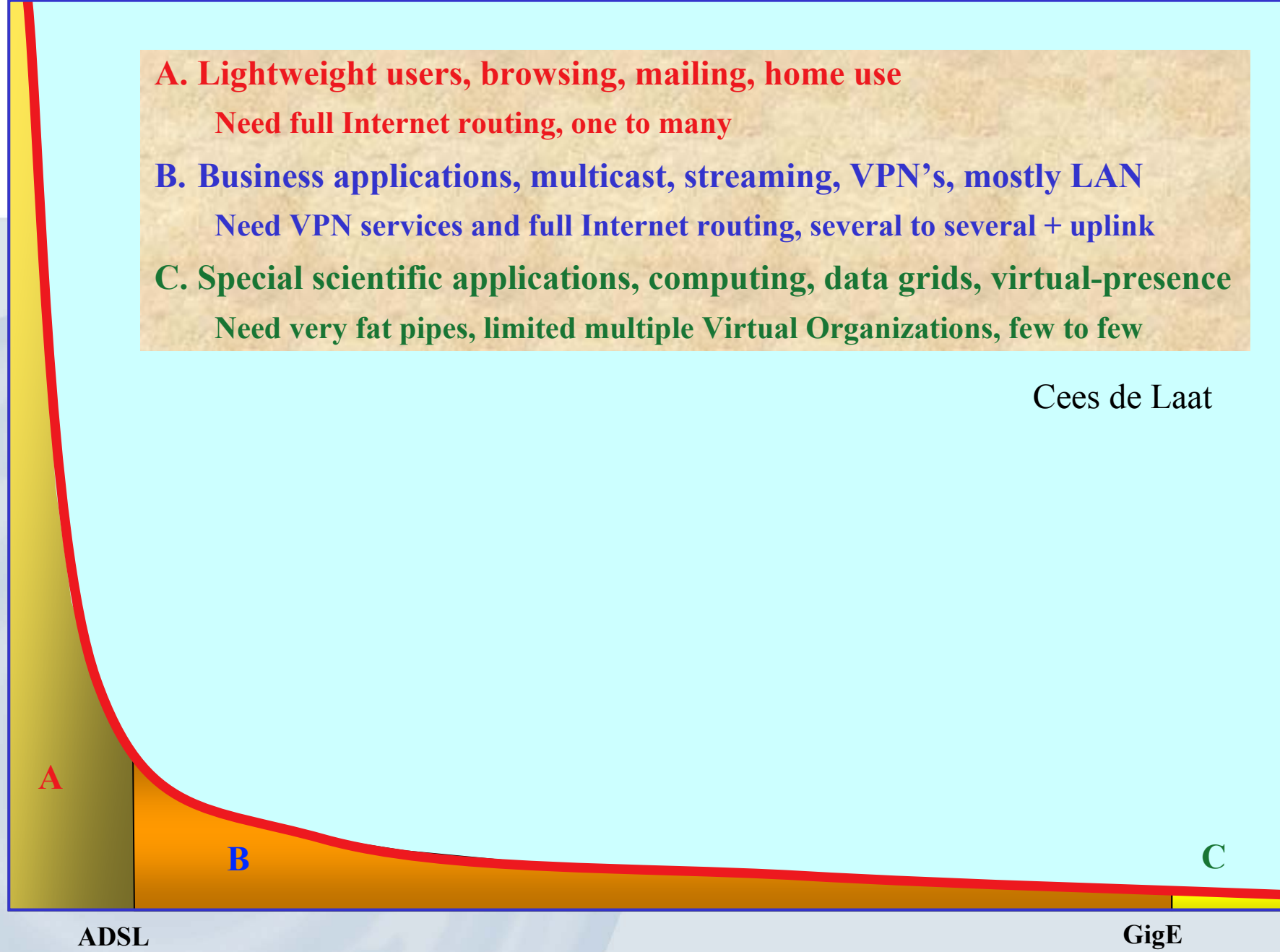
**64*64
Optical Switch @
NetherLight
Costs 1/100th of a
similar throughput
router but with
specific services!**



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- A. Lightweight users, browsing, mailing, home use**
Need full Internet routing, one to many
- B. Business applications, multicast, streaming, VPN's, mostly LAN**
Need VPN services and full Internet routing, several to several + uplink
- C. Special scientific applications, computing, data grids, virtual-presence**
Need very fat pipes, limited multiple Virtual Organizations, few to few

Cees de Laat

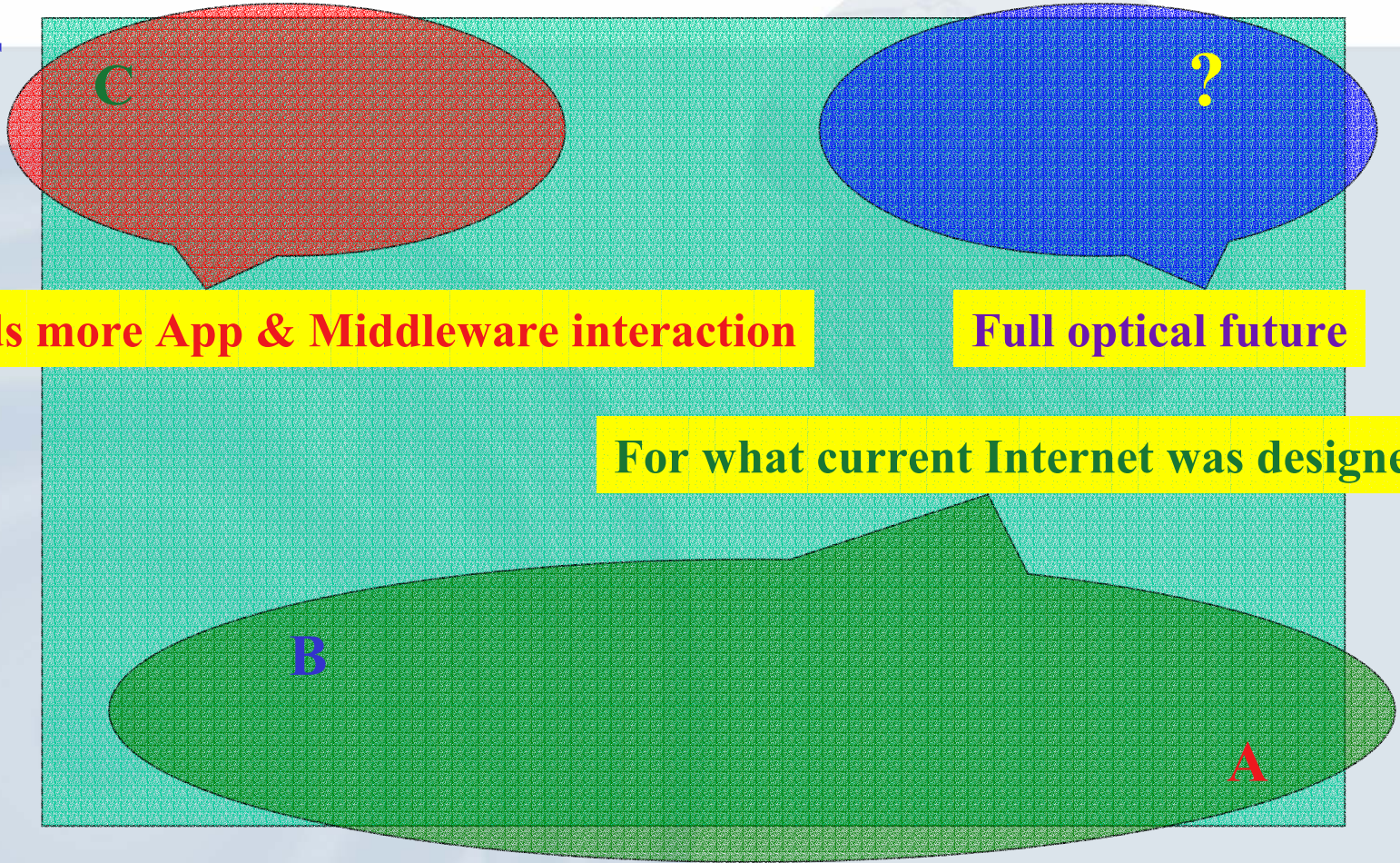


ADSL

GigE

Transport in the corners

BW*RTT



Needs more App & Middleware interaction

Full optical future

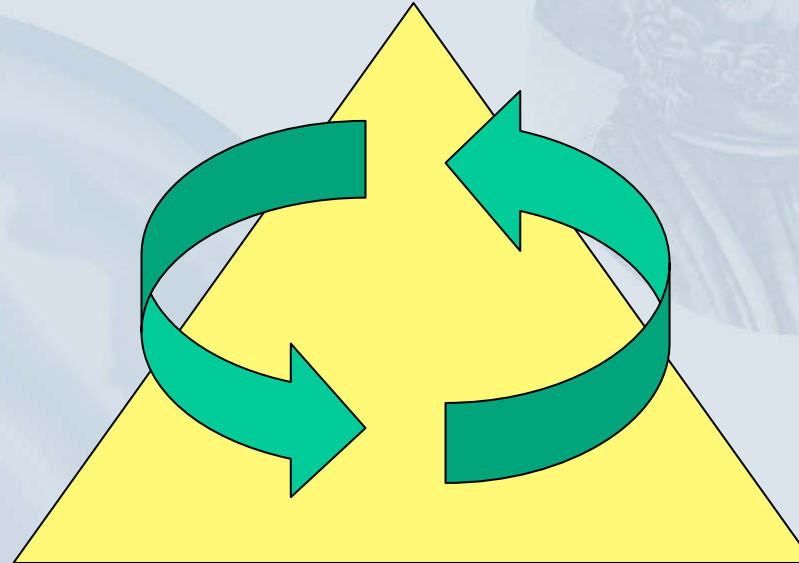
For what current Internet was designed

FLOWS

From ASP's to Grid Service Providers

Creators

e.g. universities,
some industries



Producers

e.g. Supercomputer centers,
Network exchanges,
Storage providers

Consumers

e.g. E-Sciences,
Industries

A European GRID

- The GRID long term goal should aim for integration at the level of
 - Countries
 - disciplines
 - academic and industrial users
- Requires coping with
 - Different cultures and legal systems
 - Security (industry !)
- A Pan European GRID service organisation
 - But different from the network
 - Value in the local resources, there is the ownership
 - Distributed versus centralized control

Portals, Markets, GRID economics

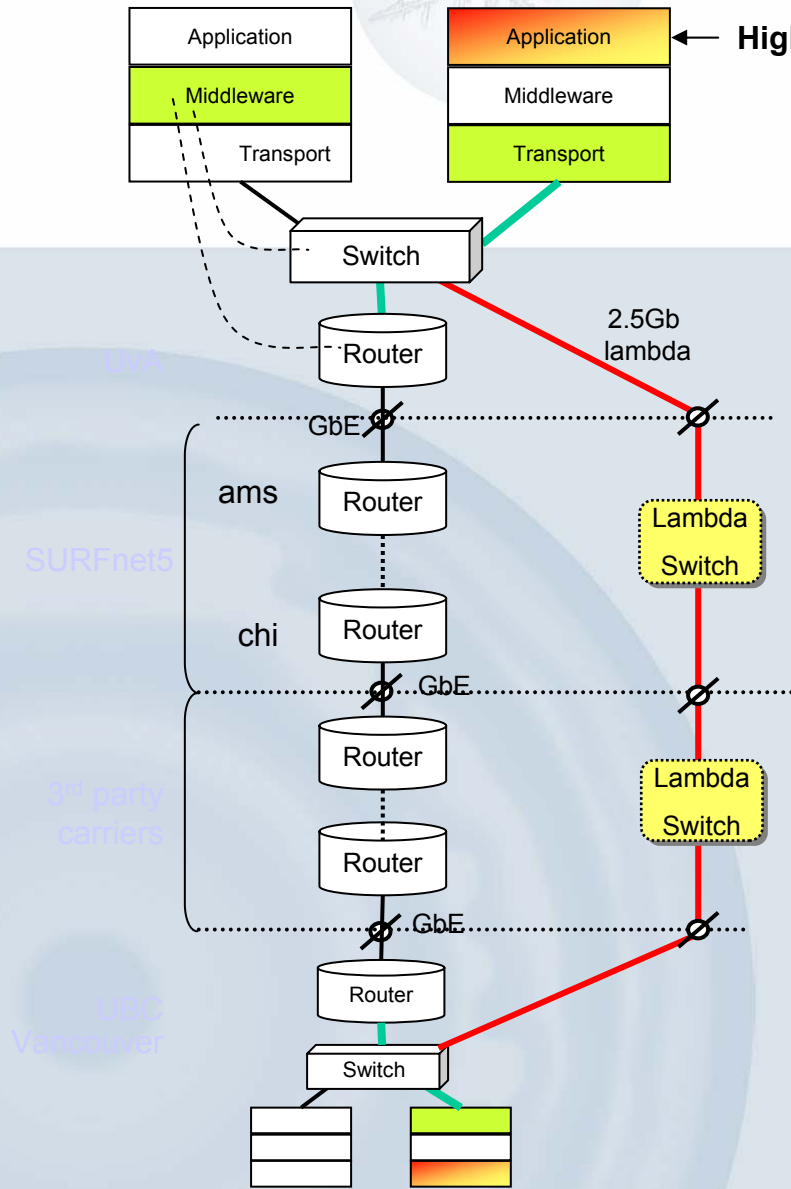
- CPU's, storage, networks represent value
- Dynamic virtual organizations require brokers
- Invest in grid portals
- Grid exchanges
- Create grid markets
- Choose decentralized models (just as the web)

Q&A

- Is it the interest of the Member and Associated States in Europe to support the creation of a Nation- and European-wide eInfrastructure in the extended ERA for e-Science?
 - I guess yes
- What are the necessary policy level decisions and actions to enable the effective cross institutional, cross border and cross scientific discipline sharing of resources? Regulatory framework?
 - brokering, security, e-banking

Q&A

- What would be the appropriate administrative and operational support schemes in this case?
 - Honor the owner rights of the resource
 - Identify the people who would be responsible
 - Observe existing (contractual, trust) relationships
- What could be the roles for National legacy schemes (e.g. the NRENs)?
 - Trusted third party roles, portals, brokers for grid, grid search engines



- lambda for high bandwidth applications
- Bypass of production network
- Middleware may request (optical) pipe
- RATIONALE:
- Lower the cost of transport per packet

QuickTime™ and a Cinepak decompressor are needed to see this picture.