Grids, GGF, and the Network

Franco Travostino

travos@nortel.com

Director, Advanced Technology, Nortel Networks
Co-chair of the Hi-Perf Networking Group, Global Grid Forum

Outline

1. What's a Grid?
2. What's the GGF?
3. Three defining projects underway at GGF
4. The network in GGF's thoughts
5. GGF's new Telecom Focus Group

Outline

1. **What's a Grid?**
2. What's the GGF?
3. Three defining projects underway at GGF
4. The network in GGF's thoughts
5. GGF's new Telecom Focus Group

*[The slides in Unit #1 reflect my own views,
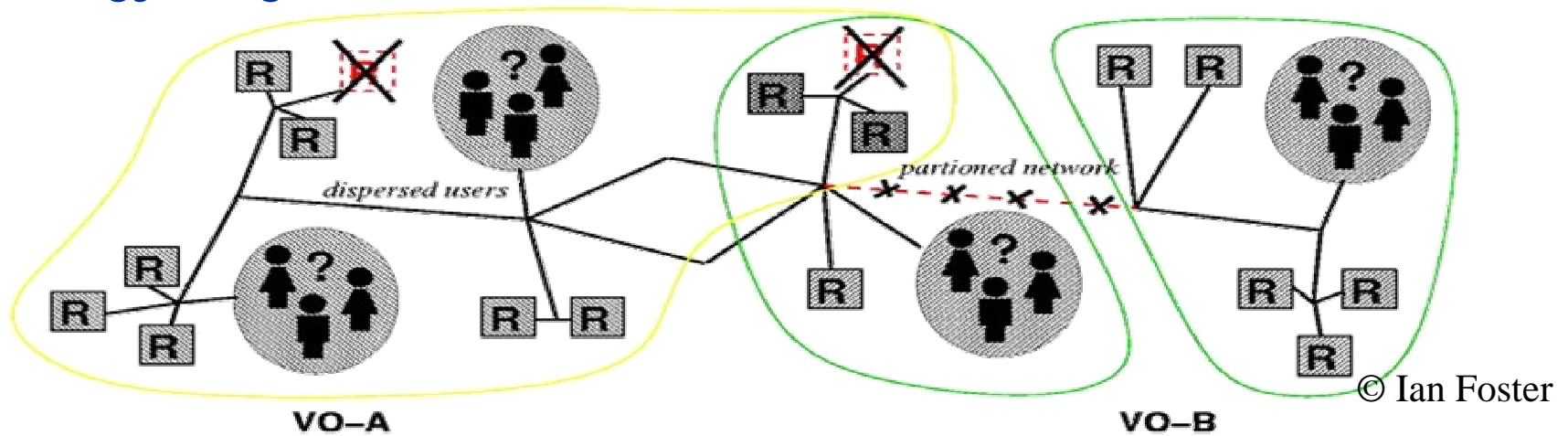with ext. sources shown whenever possible]*

(© Franco Travostino)

Grid \'grid\ *n*: a new turn of the crank
in distributed systems

Grids

Opportunity: "**Resource sharing & coordinated problem solving in dynamic, multi-institutional Virtual Organizations**" (Ian Foster)

Technology: **A grid is the common foundation for a VO**

© Ian Foster

"*When the network is as fast as the computer's internal links, the machine disintegrates across the net into a set of special purpose appliances*" (George Gilder)

Defining a Grid

Three paramount and inseparable aspects :

1. it coordinates on-demand, secure access to distributed and heterogeneous resources (cpu, storage, bandwidth ...)

2. it uses standard, open, general-purpose protocols and interfaces

3. to deliver non-trivial qualities of service

© Franco Travostino

What's special about Grids

Distributed System ca. 1985	Grid ca. 2000
User knows of and is known at each and every node forming a DS. Node's resources are known a priori	User knows of a resource pool; the pool knows about the user. No a priori knowledge
It is primarily about grouping computation units; data are seamed together with file granularity	A resource pool includes: CPU, storage, sensors, … can gang-schedule subsets thereof
It is contained within a unique administration and trust cloud	It typically straddles over administrative boundaries, trust boundaries, and large distances
OS schedules individual tasks based on task priority and system considerations	Dynamic matchmaking in time and space between "virtual organizations" and resource pools

Inspired and derived from Nemeth, Sunderam, "Characterizing Grids", JGC, vol.1 no.1, 2003

Motivations for Grids

- Scale up on computing and/or data sets
- Reduce costs via capex/opex efficiencies
- Reduce time-to-results
- Provide reliability, availability
- Support heterogeneous systems & realities
- Enable collaborations

© Franco Travostino

Which Grid? Grids a la Carte

Style of operation
- Work-flow Grid
- Peer-to-peer Grid
- Autonomic Grid
- Collaborative Grid

(pick at least one)

Resource weight
- Computing Grid
- Information Grid
- Sensor Grid
- Desktop Grid

(pick at least one)

Resource hosting
- At VO constituents
- Utility style
  (w/ or w/o Provider)

(pick at least one)

Extent
- Intra Grid
- Extra Grid
- Inter Grid

(pick one)

Grids straddle across disciplines

- A company working on the placement of a new factory needs financial forecasting combined with mining of proprietary historical data

- An industrial consortium work on the feasibility study for a new airliner

- A crisis management team reacts to a chemical spill using soil and weather models, demographic information, and productivity tools for emergency teams
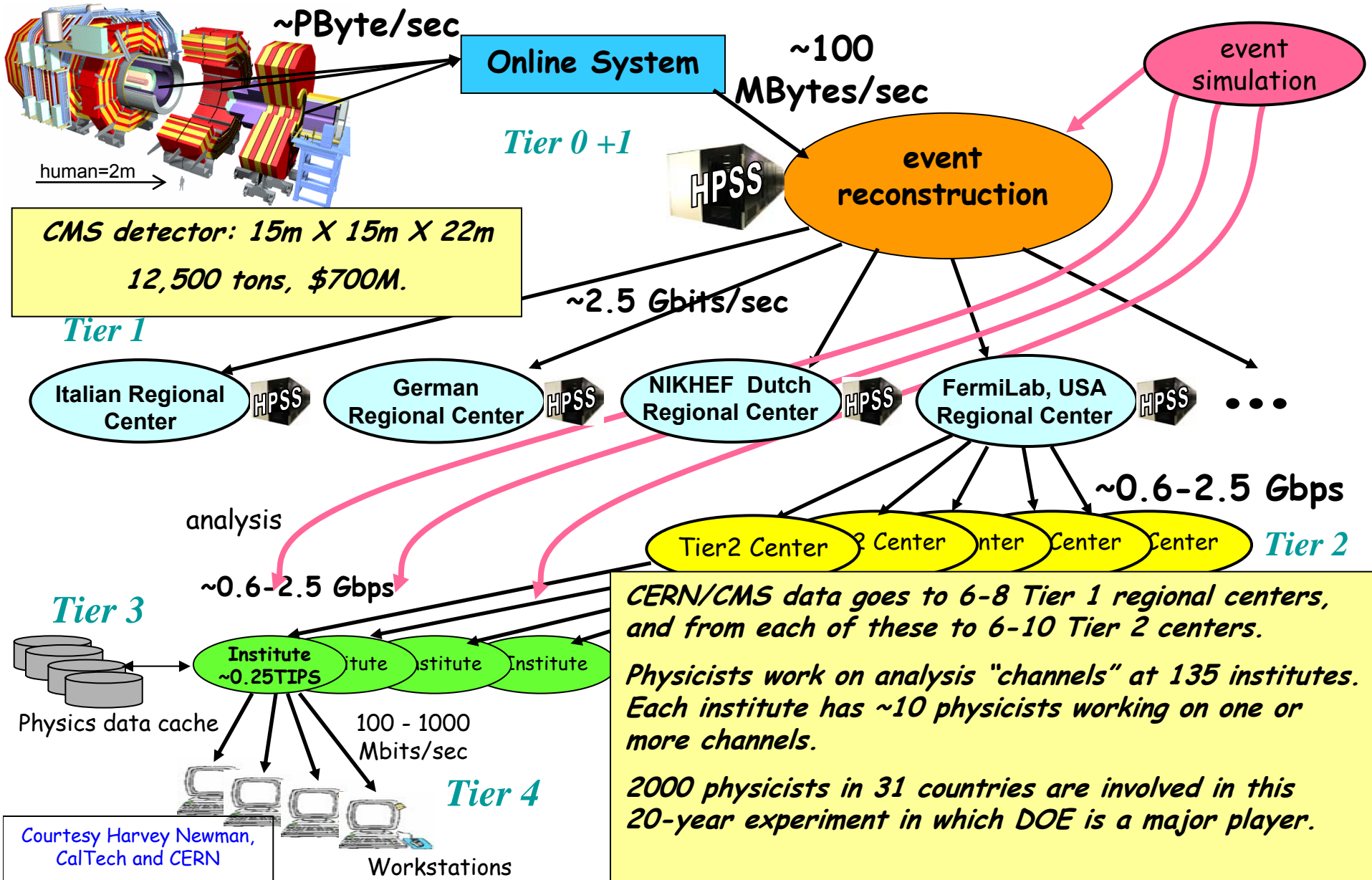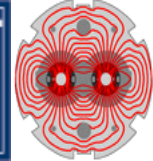
Sources: Anatomy of the Grid, Foster et al.

Grid ecosystems today: .edu,.gov

- Grids crossed a non-return point in Science
  - Grids integral part of research equipment planning cycle
    - Large equipments with large cycles, e.g. CERN's LHC
  - The distributed, lively, and mutually-trusting communities of e-Scientists best embody the notion of Virtual Organization for collaborative work
    - Still without any business-dependability requirement

- R&E testbed networks for Grids started as a barn-building practice …
  - … they are now growing to planet-scale reach

© Franco Travostino

LHC Data Grid Hierarchy
CMS as example, Atlas is similar

~PByte/sec

Online System

~100 MBytes/sec

event simulation

Tier 0 +1

HPSS

event reconstruction

CMS detector: 15m X 15m X 22m
12,500 tons, $700M.

human=2m

Tier 1

~2.5 Gbits/sec

Italian Regional Center   HPSS

German Regional Center   HPSS

NIKHEF Dutch Regional Center   HPSS

FermiLab, USA Regional Center   HPSS   • • •

~0.6-2.5 Gbps

analysis

Tier2 Center   Center   nter   Center   Center   *Tier 2*

~0.6-2.5 Gbps

Tier 3

Physics data cache

Institute ~0.25TIPS   itute   stitute   Institute

100 - 1000 Mbits/sec

CERN/CMS data goes to 6-8 Tier 1 regional centers, and from each of these to 6-10 Tier 2 centers.

Physicists work on analysis "channels" at 135 institutes. Each institute has ~10 physicists working on one or more channels.

2000 physicists in 31 countries are involved in this 20-year experiment in which DOE is a major player.

Tier 4

Courtesy Harvey Newman, CalTech and CERN
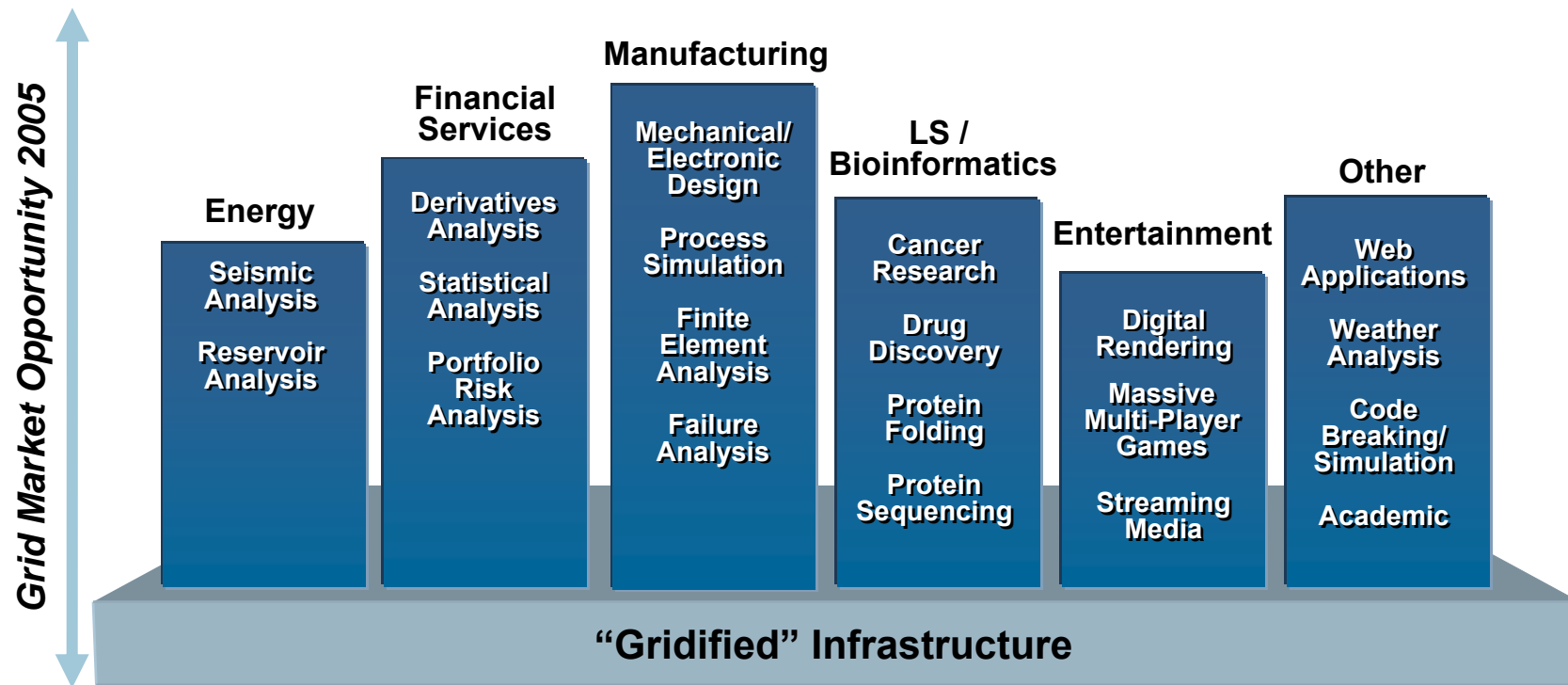
Workstations

Grid ecosystems today: .com

- Grids find fertile grounds in Enterprises, which are caught in a "decompose-and-distribute" mode:
  - decompose to pursue efficiencies (content caching, reuse)
  - distribute to reflect new biz models (partners, outsourcing)
  - for many, web-hosting was the 1st step towards d-&-d
- Further expectations built around sector-specific catalysts
  - Basle II regulations in finance
  - Seamless accommodation of flash crowds
  - Digital movie post-processing in entertainment

Grid ecosystems today: .com (cont'd)

- Proof-points (sampler):
  - Intra-Grids for non-biz-critical Grid Computing, e.g., back-office operations
  - Enterprise-Provider peer-wise agreements Utility style
  - Data Grids in the form of national data archives

- IBM, H-P, SUN, Oracle,… fully engaged in competitive visions

- Grid global spending to hit $ 4.8B by 2008*
  - Breakdown: Intra-grids $ 2.2B, extra-grids $ 1.3B, inter-grids $ 1.3B
  - Healthcare with 167.2 CAGR over 03-08. Finance top spender.

_____

* The Insight Report by the Insight Corp Inc., June 2003

Leading Grid Application Domains

Grid Market Opportunity 2005

Energy
- Seismic Analysis
- Reservoir Analysis

Financial Services
- Derivatives Analysis
- Statistical Analysis
- Portfolio Risk Analysis

Manufacturing
- Mechanical/Electronic Design
- Process Simulation
- Finite Element Analysis
- Failure Analysis

LS / Bioinformatics
- Cancer Research
- Drug Discovery
- Protein Folding
- Protein Sequencing

Entertainment
- Digital Rendering
- Massive Multi-Player Games
- Streaming Media

Other
- Web Applications
- Weather Analysis
- Code Breaking/Simulation
- Academic

"Gridified" Infrastructure

Sources: IDC

Outline

1. What's a Grid?

2. What's the GGF?

3. Three defining projects underway at GGF

4. The network in GGF's thoughts

5. GGF's new Telecom Focus Group

GGF mission

Leading the pervasive adoption of grid computing
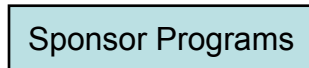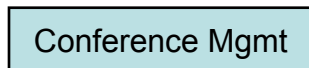for research and industry

What Does GGF Do?

- **An Open Process for Development of Agreements and Specifications**
  - Grid "Recommendations" process (GFD.1)
    - modeled after Internet Standards Process (IETF, RFC 2026)
  - Persistent, Reviewed Document Series
    - similar to RFC series; initiated October 2002
  - Intellectual Property policies (RAND) modeled after IETF policies
- **A Forum for Information Exchange and Collaboration**
  - Comparing notes on experiences, approaches
  - Spanning vertical layers, including people who are
    - Doing Grid Research
    - Designing and Building Grid software
    - Deploying Grids
    - Using Grids
  - Spanning technology areas- from directory services to scheduling to data handling to security to collaboration environments to...
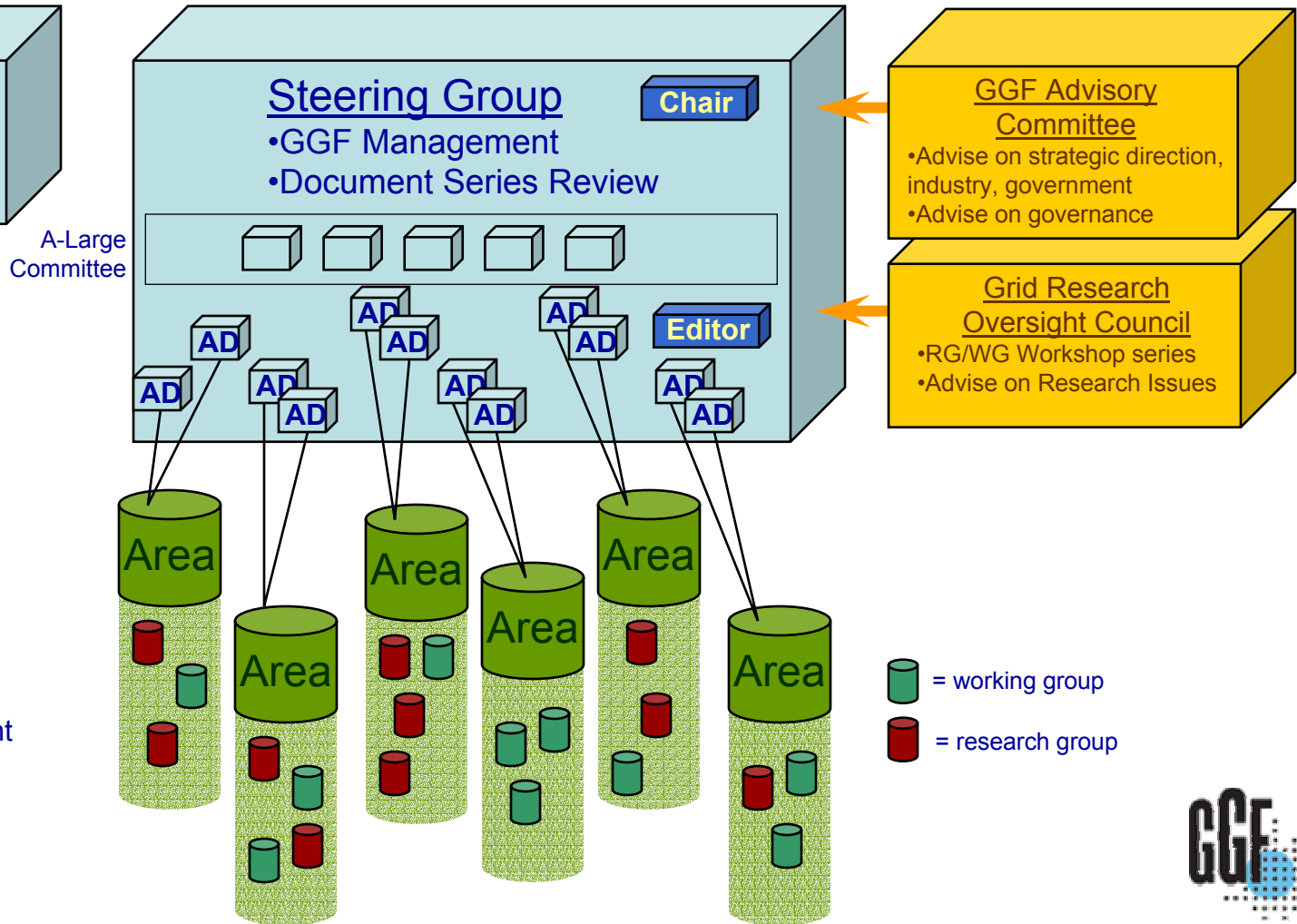
GGF Structure

GGF Corp.
Secretariat: Operations

Board of Directors
•Financial, Legal Responsibility

Conference Mgmt

Sponsor Programs

Finance/Legal

IT (Website, etc.)

Staffing & Services
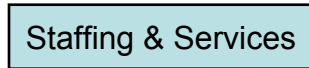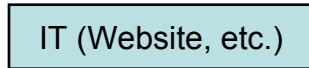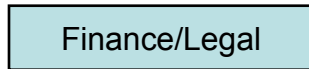
Holds *non-exclusive* copyright for document series

GGF
Document and Standards Work

Steering Group
| Chair |

•GGF Management
•Document Series Review

A-Large Committee

AD AD AD AD AD AD AD AD AD AD AD AD

| Editor |

Area Area Area Area Area Area

GGF Advisory Committee
•Advise on strategic direction, industry, government
•Advise on governance

Grid Research Oversight Council
•RG/WG Workshop series
•Advise on Research Issues

= working group

= research group

Organized into Seven Areas

- ## Applications and Programming Environments
  - Satoshi Matsuoka, Craig Lee

- ## Architecture
  - Andrew Grimshaw, David Snelling

- ## Data
  - Malcolm Atkinson, David Martin

- ## Information Systems and Performance
  - Geoffrey Fox, John Tollefsrud

- ## Peer-to-Peer: Desktop Grids
  - Cees DeLaat, David DeRoure

- ## Scheduling and Resource Management
  - Bill Nitzberg, Stephen Pickles

- ## Security
  - Olle Mulmo, Dane Skow

Key GGF Strategies: Groups

- ## Working Groups (WG)
  - Crisp focus on development of a specification, guideline, etc.
  - Clear milestones based on delivery of drafts

- ## Research Groups (RG)
  - Focus can be broader than WG, but must be clear
  - Milestones based on delivery of drafts, organization of workshops, and workshop reports
  - Application Focus Groups (kind of RG)

57 GGF Groups

Applications and Programming Models Environments (APME) - Grid Checkpoint Recovery (GridCPR-WG) • Grid Remote Procedure Call (GridRPC-WG)• Advanced Collaborative Environments (ACE-RG)• Applications and Test Beds (APPS-RG) Astronomical Grid Community (Astro-RG) • Grid Computing Environments (GCE-RG)• Grid User Services (GUS-RG)• Life Sciences Grid (LSG-RG) Particle and Nuclear Physics Applications (PNPA-RG) Preservation Environments (PE-RG) • Production Grid Management (PGM-RG) Simple API for Grid Applications (SAGA-RG)• User Program Development Tools for the Grid (UPDT-RG)

Architecture (ARCH) - New Productivity Initiative (NPI-WG)• Open Grid Service Common Management Model (CMM-WG)• Open Grid Services Architecture (OGSA-WG) • Open Grid Services Infrastructure (OGSI-WG)• Grid Policy Architecture (Policy-RG)• Grid Protocol Architecture (GPA-RG)• Semantic Grid (SEM-RG)• Service Management Frameworks (SMF-RG)

•**Data (DATA)** - Data Access and Integration Services (DAIS-WG)• Data Format Description Language (DFDL-WG) • GridFTP-WG • IPv6 (IPv6-WG) • Grid File System (GFS-WG) • Grid Storage Management (GSM-WG) • Information Dissemination (INFOD-WG) • OGSA Data Replication Services (OREP-WG) • Data Transport (DT-RG)• Grid High-Performance Networking (GHPN-RG)• Persistent Archives (PA-RG) • Transaction Management (TM-RG)

Grid Security (GRID SEC) - Authorization Frameworks and Mechanisms (AuthZ-WG)• CA Ops (CAOPs-WG)• Grid Security Infrastructure (GSI-WG)• Open Grid Service Architecture Authorization (OGSA AUTHZ-WG)• Open Grid Service Architecture Security (OGSA-SEC-WG)• Authority Recognition (ARRG-RG)• Site Authentication, Authorization, and Accounting Requirements (SAAA-RG)

Information Systems and Performance (ISP) - CIM based Grid Schema (CGS-WG)• Discovery and Monitoring Event Description (DAMED-WG)• Network Measurement (NM-WG)• Grid Information Retrieval (GIR-WG)• Grid Benchmarking (GB-RG)• Network Measurements for Applications (NMA-RG) Relational Grid Information Services (RGIS-RG)

Peer-to-Peer (P2P) - Appliance Aggregation (APPAGG-RG)• OGSA-P2P-Security (OGSAP2P-RG)

Scheduling and Resource Management (SRM) – Configuration Description, Deployment, and Lifestyle Management (CDDLM-WG) Distributed Resource Management Application API (DRMAA-WG)• Grid Economic Services Architecture (GESA-WG)• Grid Resource Allocation Agreement Protocol (GRAAP-WG)• Job Submission Description Language (JSDL-WG)• OGSA Resource Usage Service (RUS-WG)• Usage Record (UR-WG) Grid Scheduling Architecture (GSA-RG) Workflow Management (WFM-RG)

Working Groups: Developing specifications, API's, frameworks
Research Groups: Developing Use Cases, Surveys, Technical reports…

Key GGF Strategies: Documents

- ## GWD (Grid Working Draft)
    - Stable document for general community review
    - Any IP issues are noted
    - Consistent format and naming

- ## GFD (Global Grid Forum Document)
    - Passed through the relevant (to document type) process including public comment and Editor review
    - Assigned a document number (GFD.1)

GGF Document Series

- Modeled after RFC Series (Internet Standards Process)
  - Minor differences from RFC 2026, with benefit of excellent advice from IETF participants (Bradner, Carpenter, etc.)

- Types of Documents
  - Informational
    - Workshop reports, general technical information
  - Experimental
    - Rapid prototype of specifications, API's
  - Community Practice
    - Generally accepted practice (process or technical)
  - Recommendations Track
    - Technical specifications, API's

Key GGF Strategies: Events

- **Open Standards Process**
  - All participants have an equal voice
  - All meetings announced
  - Major document revisions and decisions announced to mailing list
  - Meeting minutes available
- **3 Events a year: Spring, Summer, Fall**
  - Traditionally Summer meeting WG only
  - Fall meeting full Plenary program
  - Experimenting with "tracks" starting GGF14
- **Several types of sessions:**
  - Workshops: in-depth session on particular topic
  - Tutorials: sessions to present training information
  - Plenary: Cross-group sessions
  - Group: Face to face sessions to advance working group activity
- **Events self-funded**
- **Try to spread roughly equally by region**
  - Driven be attendance and host offers

GGF

Next GGF Events

- GGF 14
  - Chicago IL, 26-29 June 2005
- GGF 15
  - Boston MA, 3-6 October 2005

Key GGF Strategies: Liaisons

- **Internet Engineering Task Force (IETF)**
  - IETF: Brian Carpenter (IBM)
  - GGF: Cees de Laat (Univ Amsterdam), David Martin (IBM)
- **Distributed Management Task Force (DMTF)**
  - DMTF: Winston Bumpus (Dell, DMTF President)
  - GGF: Tom Roney (NCSA)
- **OASIS**
  - OASIS: Karl Best (OASIS VP), James Bryce Clark (Mgr, Tech Stds)
  - GGF: Dave Snelling (Fujitsu), John Tollefsrud (Sun)
- **WS/I**
  - WS/I: Michael Weiner (IBM, WS/I President)
  - GGF: Olle Mulmo (U of Stockholm)
- **W3C**
  - WC3: Steve Bratt (COO)
  - GGF: David DeRoure (U of Southhampton)
- **EGA**
  - EGA: Don Deutsch (Oracle, EGA President
  - GGF: John Tollefsrud (Sun)

Key GGF Strategies: Management

- ## Individual Groups
  - Working Group and Research Group Chairs work with Area Directors to track progress based on charter.

- ## Area Directors (Part of GFSG)
  - Responsible for assisting chairs
  - Review drafts prior to submission to editor
  - Promote communication
  - As a group, AD's approve charters and advance CP and R documents

- ## GFSG At-Large Subcommittee
  - Responsible for implementing "appeals" process for group charter approval and document advancement decisions
  - Oversee liaison activities with other groups
  - Advise on long-term strategies

Key GGF Strategies: Advice

- **GGF Advisory Committee (GFAC)**
  - Advises GGF Chair and GFSG on long-term institutional strategies
  - Evaluates performance of GGF overall and of GGF Chair
  - Singular governing role: approves nomination, by GFSG, of GGF Chair

- **Grid Research Oversight Council (GROC)**
  - Facilitates the involvement of research community in GGF
  - Responsible for reviewing and approving workshop proposals
  - Advises GFSG on the formation of new research groups

- **Grid Marketing Advisory Council (GMAC)**
  - "Anti-Hype" Working Group
  - Advises GGF Chair and GFSG on marketing strategies for Grid Computing
  - Identifies and publicizes usage of Grid in industry, research, and academia

GGF Governance

- **Initial Establishment of GGF**
  - GGF Chair, initial GFSG appointed by plenary vote
    - October 1999
  - GFAC members appointed by GFSG
  - Expansions of GFSG and GFAC in 2000, 2001, 2002, 2004
    - New members selected by general consensus of existing GFAC, GFSG
  - Nomcom process initiated 2003 for GFSG
  - Working Group and Research Group Chairs
    - Appointed by GFSG in conjunction with proposed group charter
- **Current GGF Governance Process**
  - GGF Chair, Mark Linesch
    - Three year term, renewable, nominated by GFSG
  - GFSG: ADs and Executive Committee
    - Three year term, renewable, nominated by (RFC3777) Nominating Committee
  - GFAC and GROC members
    - Nominated by GFSG, GFAC and invited by Board of Directors, GGF, Inc.
  - STATUS
    - Nominating committee formed in March 2005 to select "Class of 2005" GFSG members. Chair Dietmar Erwin (FZ Juelich).

Intellectual Property Scenario

GFD.n technical spec using 3 patented ideas

Implementation of GFD.n spec

Contributor

GFD.n

GGF policy requires disclosure of IP by contributors to spec or participants with knowledge of claim. WG Chairs push for this as early in the process as possible. Due diligence built into 2-week GFSG review, 60d public comment. Contributors agree that *terms* will be RAND. Working group has opportunity to weigh terms against benefits of including the patent in the spec.

Software

GGF (Web) Page of IPR Disclosures

(company, patent info, terms)

(company, patent info, terms)

(company, patent info, terms)

Concepts

Copyright – Documents
(e.g. describing specifications)

Patent – Ideas/Concepts
(e.g. an algorithm or idea used in a specification)

License – Implementations
(e.g. software implementing a specification)

GGF

How to participate in GGF

- **Attend Meetings**
  - We all start as tourists
- **Join Group**
  - Mail Lists
    - Join list off WG webpage
    - Archives available there too
  - GridForge (http://forge.ggf.org)
- **Write Documents**
  - Drafts can be submitted by anyone to the GGF Editor
- **Volunteer**
  - Group volunteer
  - Sponsor
  - NOMCOM
- **Lead**
  - Group Chair
  - Area Director

GridForge Community Portal

Established July 2003

Over 100 project workspaces (for all GGF groups, committees, etc.)

Nearly 2000 active users as of April 2005. (open to any interested party at no cost)

Valuable Contacts

- Questions about Working Groups/Research Groups
  - Area Directors (http://www.ggf.org/L_Contact/contact.htm)
- Questions about Process, Sponsorship, Finance
  - Steve Crumb, scrumb@ggf.org
- Questions about this event or future events
  - Ann Collins, collins@ggf.org
- All other questions
  - office@ggf.org

Outline

1. What's a Grid?

2. What's the GGF?

3. Three defining projects underway at GGF

4. The network in GGF's thoughts

5. GGF's new Telecom Focus Group

1. OGSA

- Open Grid Service Architecture—the blueprint for Grid Computing
- Defines a service-oriented ensemble of cooperating services built upon Web Services specifications

  - Infrastructure Services enable communication between disparate resources (computer, storage, applications, etc.), removing barriers associated with shared utilization.
  - Resource Management Services enable the monitoring, reservation, deployment, and configuration of grid resources based on quality of service requirements
  - Data Services enable the movement of data where it is needed – managing replicated copies, query execution and updates, and transforming data into new formats if required.
  - Context Services describe the required resources and usage policies for each customer that utilizes the grid – enabling resource optimization based on service requirements.
  - Information Services provide efficient production of, and access to, information about the grid and its resources, including status and availability of a particular resource.
  - Self-Management Services support the attainment of stated levels of service with as much automation as possible, to reduce the costs and complexity of managing the system.
  - Security Services enforce security policies within a virtual organization, promoting safe resource-sharing and appropriate authentication and authorization of users.
  - Execution Management Services enable both simple and more complex workflow actions to be executed, including placement, provisioning, and management of the task lifecycle.
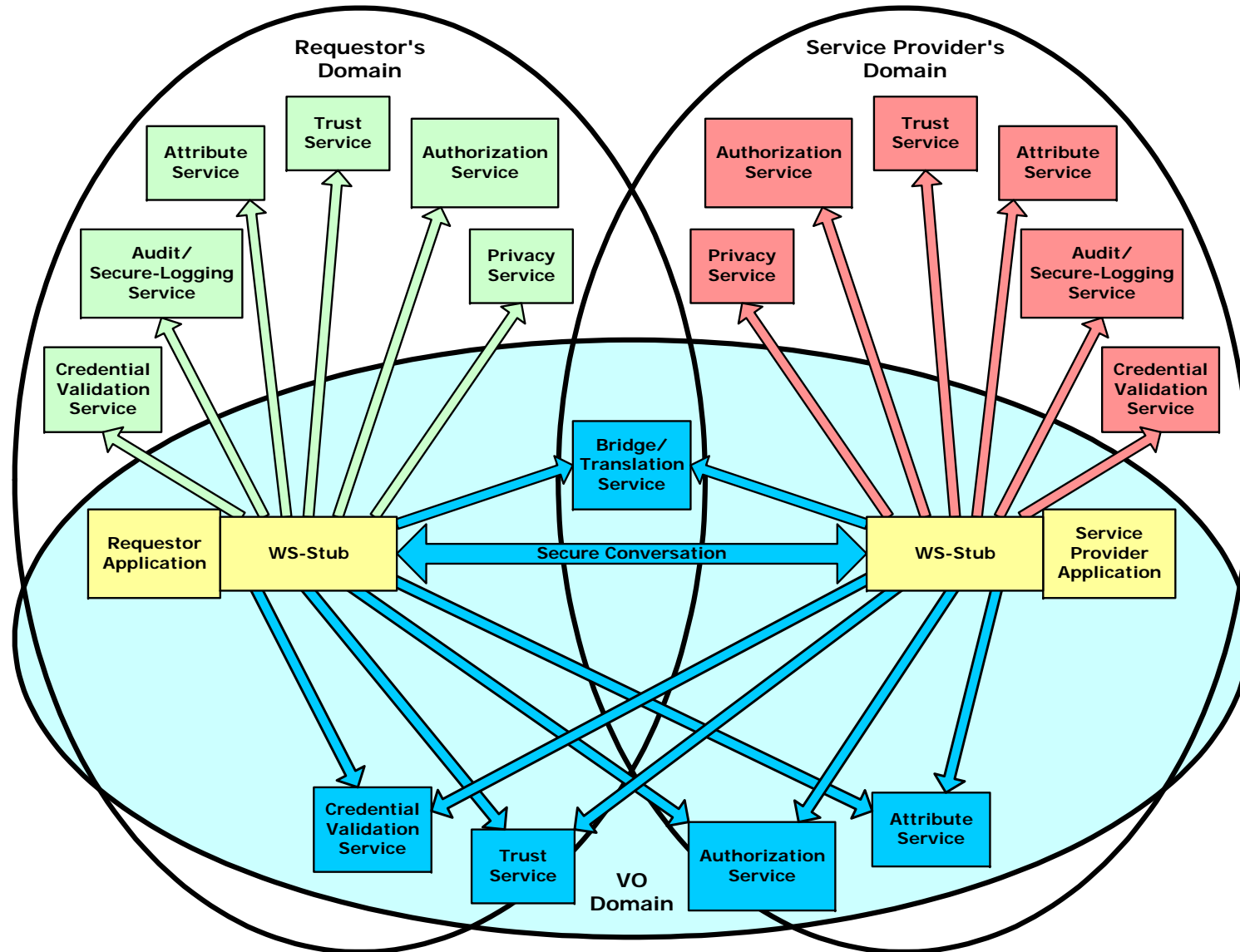
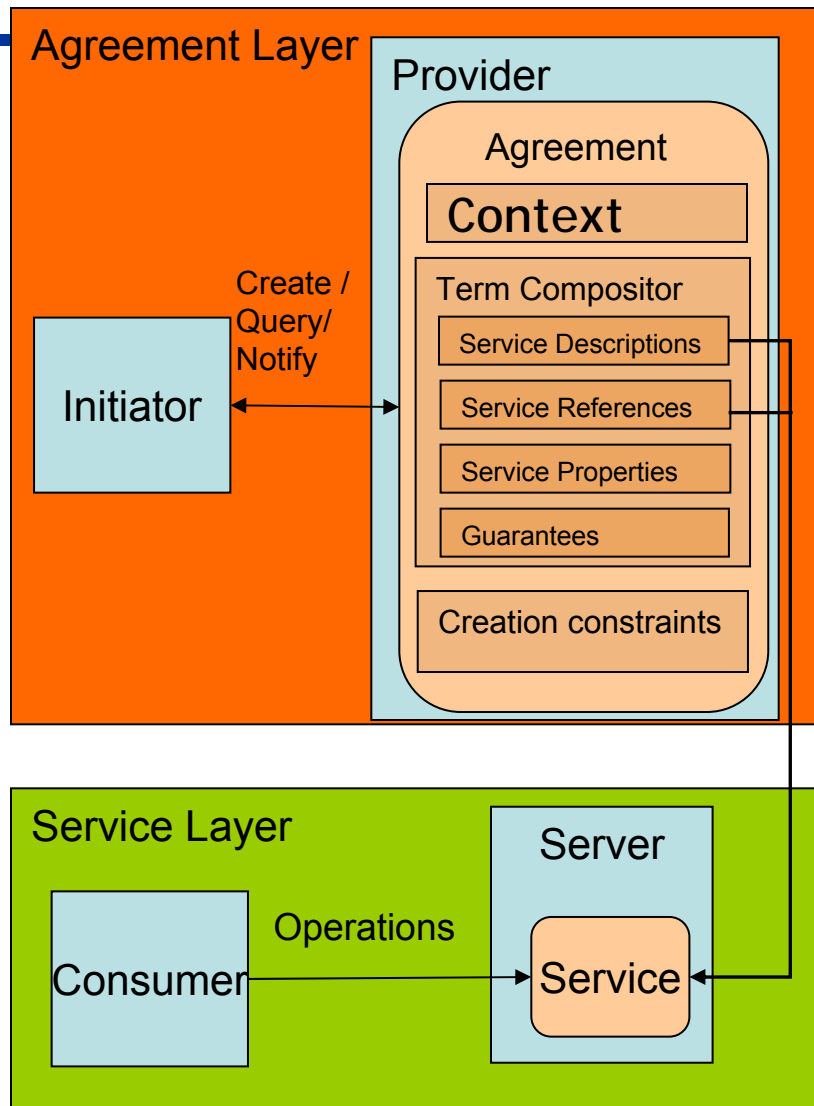# 1. OGSA layered view
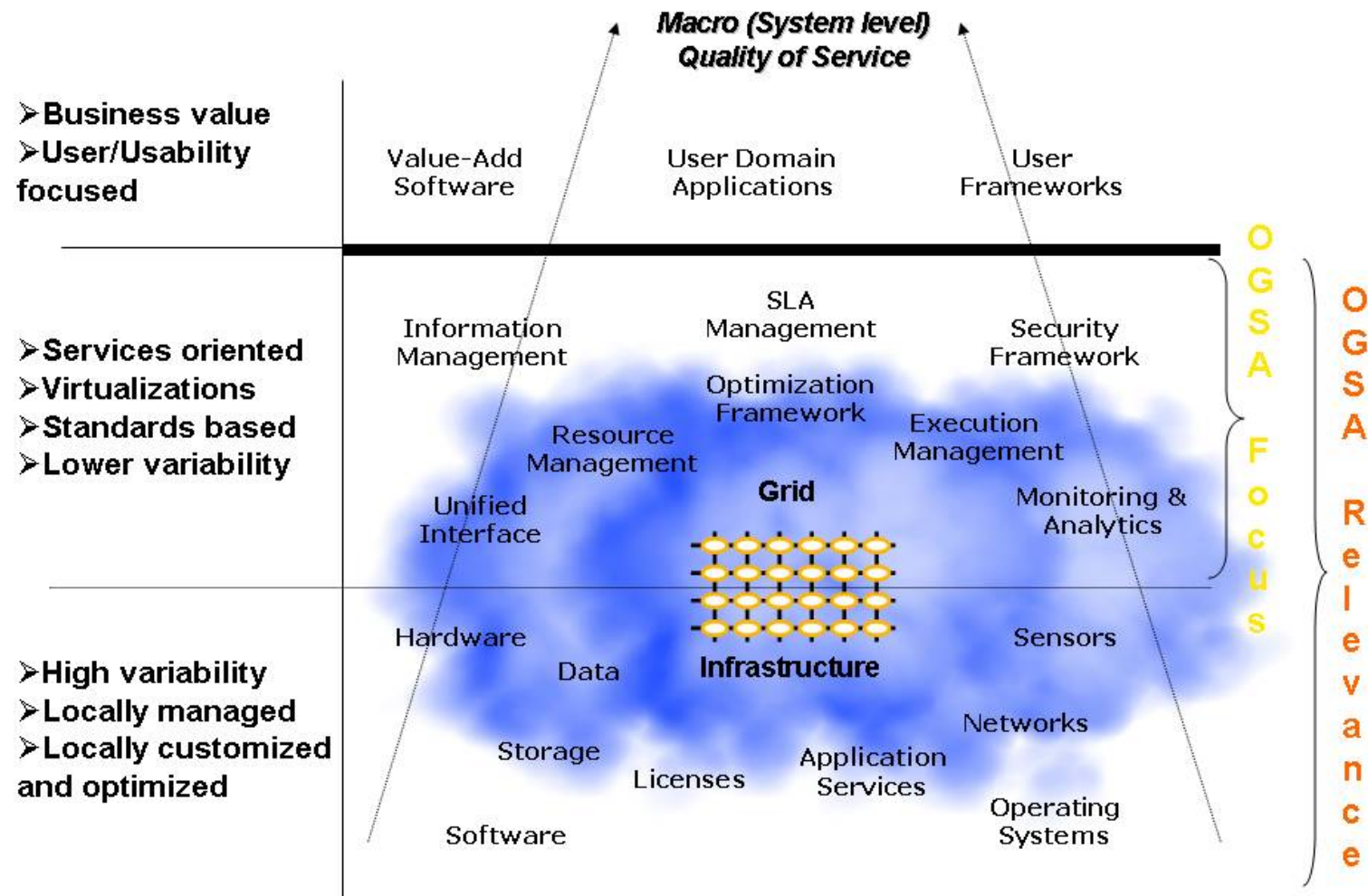
2. Security
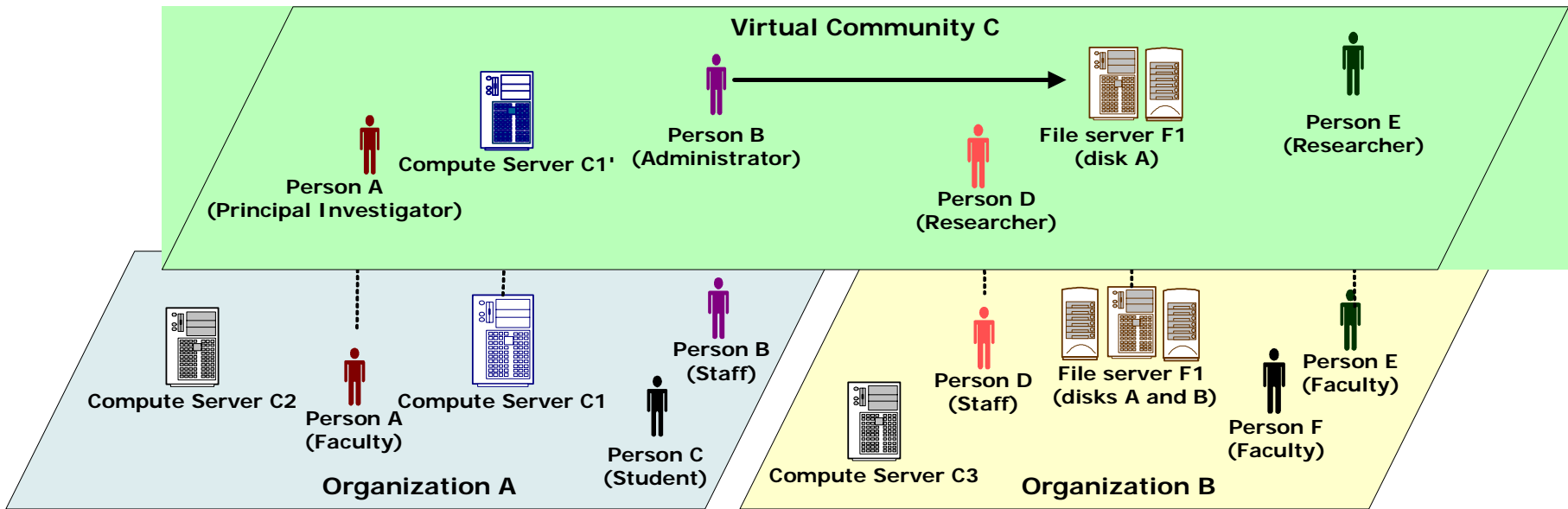
- Theme: Concurrent enforcement of multiple policies
  - At the Native and Overlay levels

2. Supporting security services

3. WS-Agreement

- **Main points**
  - Protocol for dynamic agreement management
  - WS-Agreement is domain-agnostic
  - An agreement can involve four conceptual parties: agreement initiator and provider and service consumer and provider
  - State can be published and monitored via agreement properties allowing notification of updates
  - Can be chained or nested to represent complex relationships
- Specification entered public comment period in late Aug. 2004
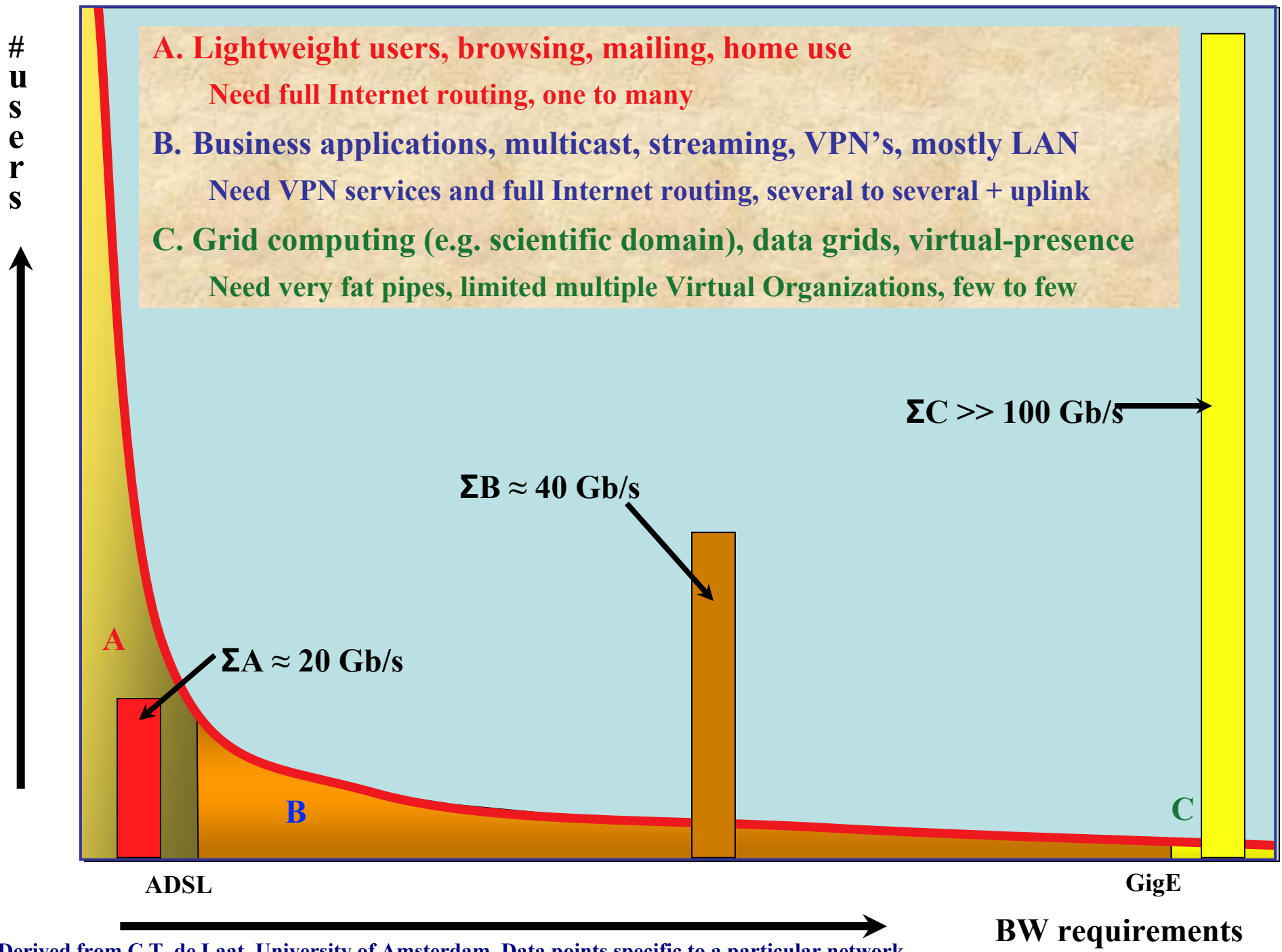 - http://forge.gridforum.org/projects/graap-wg

3. WS-Agreement Layered Model
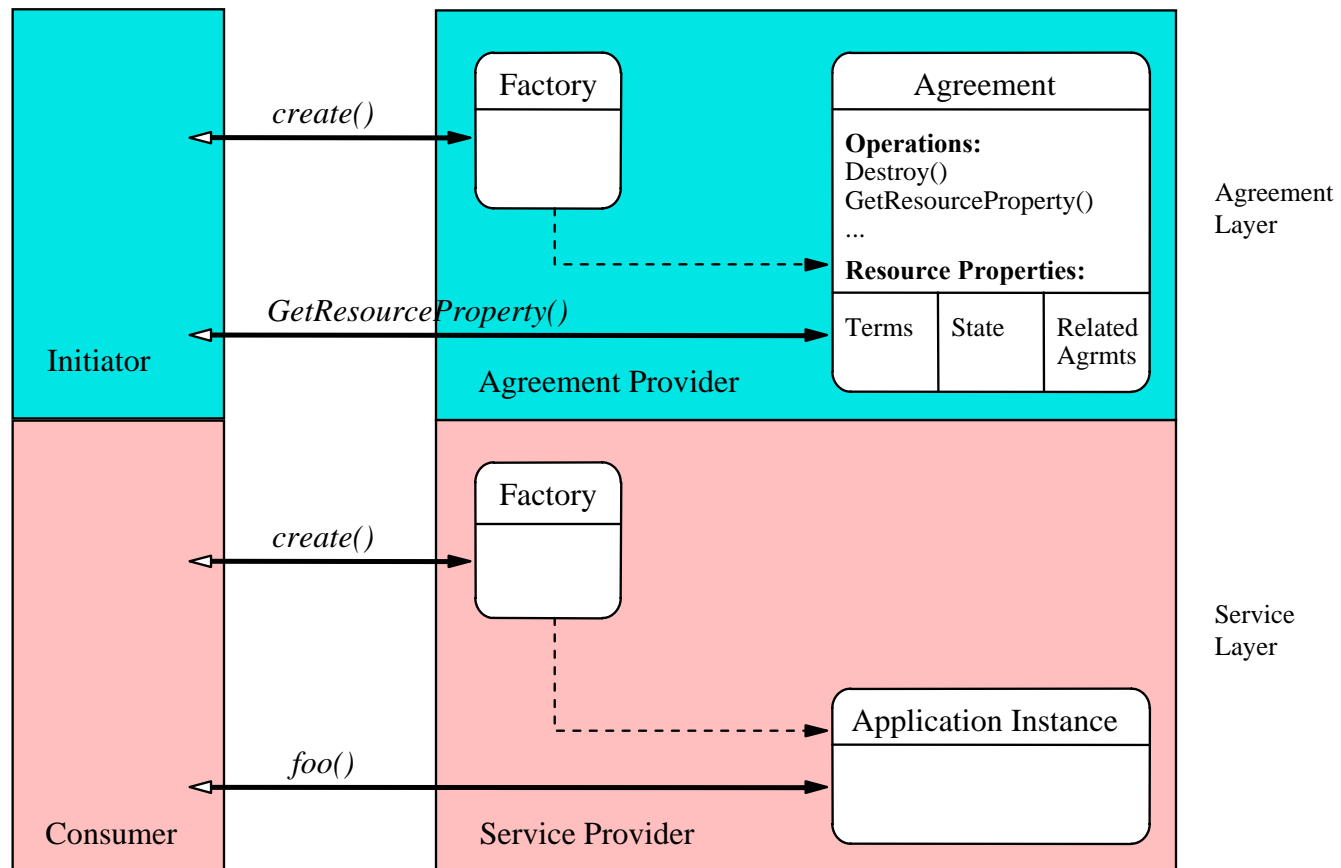
Outline

1. What's a Grid?

2. What's the GGF?

3. Three defining projects underway at GGF

4. **The network in GGF's thoughts**

5. GGF's new Telecom Focus Group

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. Grid computing (e.g. scientific domain), data grids, virtual-presence
    Need very fat pipes, limited multiple Virtual Organizations, few to few

$\Sigma C \gg 100$ Gb/s

$\Sigma B \approx 40$ Gb/s

$\Sigma A \approx 20$ Gb/s

u s e r s

A

B

C

ADSL

GigE

BW requirements

Derived from C.T. de Laat, University of Amsterdam. Data points specific to a particular network.

Recurring traits of Grid Networks

- "Herd of elephants" moving across relatively few locations
  - must fit gracefully with mice and individual elephants

- Workflow oriented rather than periodic
  - we know what's due to happen before and after the herd's migration

- Decentralized control
  - many parties SLAs, multi-resource orchestration

- Geographically-significant extents
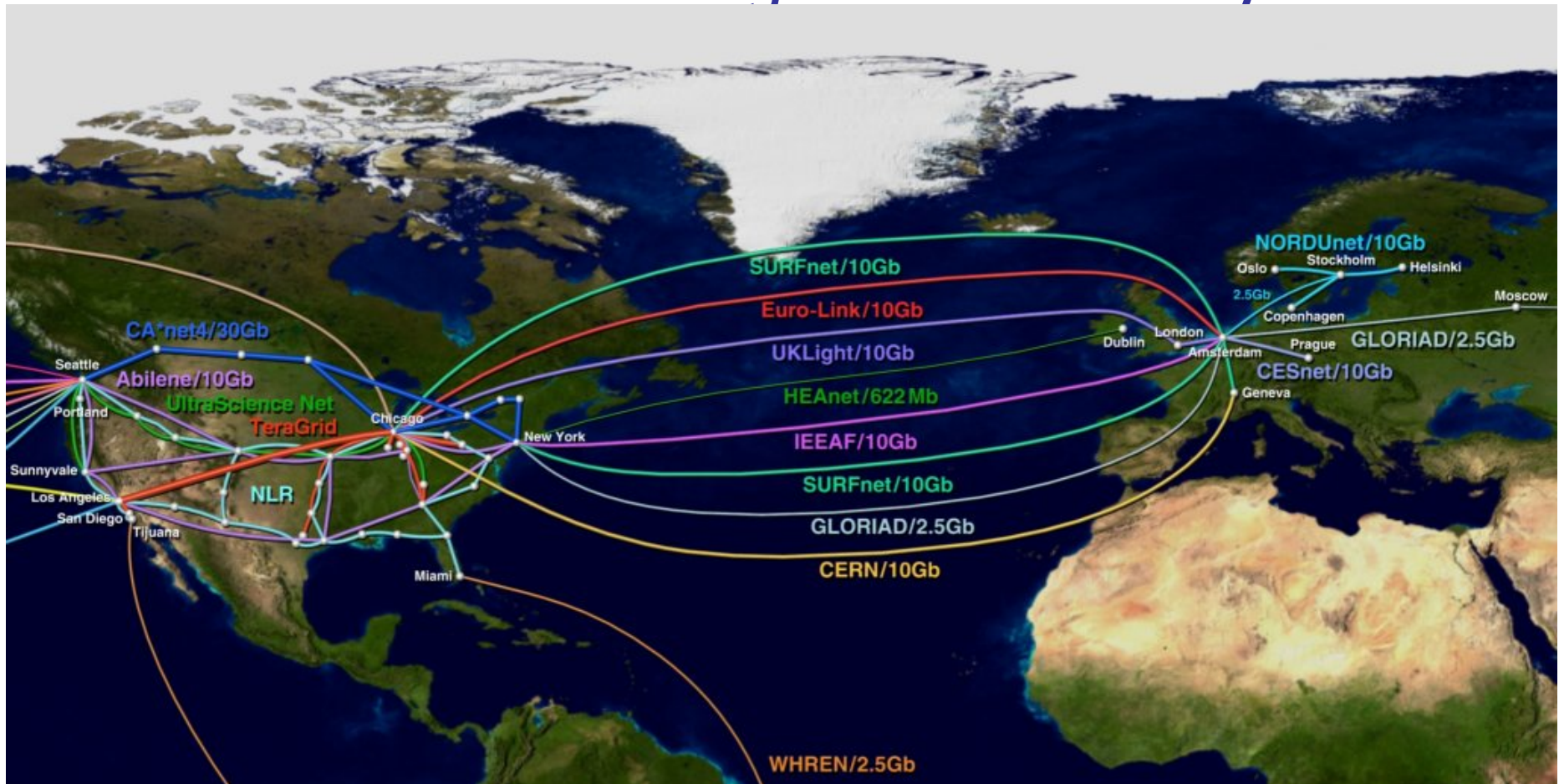 - from intranets quickly onto extranets all the way to global scale

© Franco Travostino

Ingredients for Grid Networks

- ## Bit blasting
  - the more bits thru the merrier

- ## Finesse
  - granularity of control

- ## Virtualization
  - isomorphic "knobs and dials"

- ## Resource bundling
  - network AND …

- ## Workflow reasoning
  - appreciate the "flight plan"

- ## Collision-free addressing
  - hitless VO joins

- ## Security
  - AAA, non-interference

- ## Multicast, anycast
  - Efficient data displacement, lazy binding

- ## Automated control
  - no GUIs, no Operators

- ## Feedback loops
  - between network and software

Solution domains

- ## Packet routed, virtual circuits
  - Mitigations to TCP shortcomings when large data sets need to go across large bandwidth delay product networks (GridFTP, FAST TCP, HSTCP,..)
  - QoS and routing efficiencies (DiffServ, MPLS, TE, next-gen BGP)
  - Various VPN formulations

- ## Circuit based
  - Circuits yield desirable throughput and security properties
  - Grab an optical circuit to best accommodate a herd of elephants
    - Users have IRUs to dark fiber and control the network
    - Users access OVPN/L1VPN services from providers that run commercial DWDM systems
  - Different control plane techniques
    - A fixed optical mesh between users with slow "automated patch panel" switching
    - A shared optical "cloud" with rapid λ switching between users (GMPLS, ASTN, OBS)
  - 1GE or 10GE framing to/from the user

- ## Hybrid packet circuit infrastructures
  - Middleware software seamlessly directs traffic to packet/optical paths

© Franco Travostino

Example:
Global Lambda Integrated Facility 3Q2004

Example: Session Control
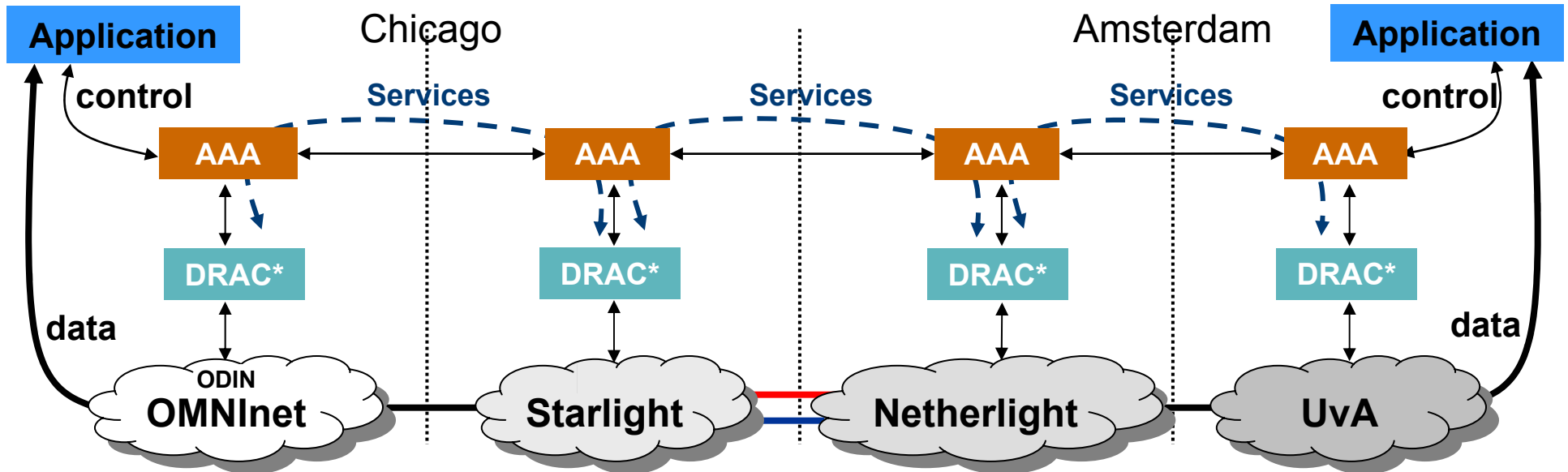
*Dynamic Resource Allocation Controller

- **finesse the control of bandwidth across multiple domains**
- **while exploiting scalability and intra- , inter-domain fault recovery**
- **thru layering of a novel SOA upon legacy control planes and NEs**

From the Grid trenches...

- **Inter-provider QoS, please**
  - under-developed policy aspects, poor policy/mechanisms split
- **How to live with firewalls and NATs**
  - skype has found a way to deploy a highly successful overlay...
- **Customer-owned infrastructures on the rise**
  - dark fiber, a popular choice
- **SDOs' control planes seen implying high OpEx**
  - a feat for carriers only, but not for owned infrastructure
- **10GE LAN/WAN dualism often cumbersome**
  - hi-capacity users stumble on buffering requirements the hard way
- **Expectations on GFP roll-out**
  - must weed out proprietary ways to map 1GE onto OC-xx

© Franco Travostino

GGF's posture

- Do not recommend any specific protocol suite
- Think of net media and control planes as Legacy

- Work on the seam between Grid and Network
  - Grid Network Services "middleware"
  - It elevates the Network to Grid-managed Resource
  - Cross-pollination: Bring SOA to the Net; take CIM from the Net
- Incubate new communities of interest
  - e.g., Grids + Service Providers = ?, Grids + OBS = ?
- Liaise with Networking SDOs
  - Grid advocacy

Groups with primary Net focus

- Grid High Perf Networking RG
  - level set on Grid/Net pain points; grids on Optical Nets and R&E networks; network service architecture(s)

- Data Transport RG
  - transport protocols: evolutions and new ideas

- IPv6 WG
  - to weed out gratuitous IPv4 dependencies from GGF specs

- Network Monitoring WG
  - standardizes ways to publish network metrics to the Grid

- GridFTP WG
  - standardizes extensions to FTP

- Liaison functions into IETF, DMTF, …
  - cross RG/WG scope; liaisons are reciprocated

GGF

Having close encounters with the Net

- ## CIM-based Grid Schema WG
  - defines CIM-schemas not yet tackled by DMTF
- ## OGSA WG
  - the network is one of many resource types
- ## Grid Resource Allocation Agreement WG
  - standardizes a common resource management protocol. With domain-specific derivations, it can describe a Network SLA lifecycle
- ## Firewalls and NAT RG
  - how can Grid infrastructures and VOs get by. Feedback onto IETF
- ## Appliance Aggregation Architecture RG
  - aggregation of client-side resources (appliances), and their interfacing to the Grid

GGF

Net-savvy GFDs

- GridFTP: Protocol Extensions to FTP for the Grid
  http://www.ggf.org/documents/GWD-R/GFD-R.020.pdf

- The "Hierarchy for Network Monitoring Characteristics" document describes which network metrics are relevant to Grid applications. It introduces standard terminology and a classification hierarchy for such metrics.
  http://www.ggf.org/documents/GWD-R/GFD-R.023.pdf

- Optical Network Infrastructure for Grid. This document charts the convergence of optical networks (present and future) with Grids
  http://www.ggf.org/documents/GWD-I-E/GFD-I.036.pdf

- Networking Issues for Grid Infrastructure. What are the pain-points in attaching Grids to Networks?   Which tidbits can the "net-heads" pass along to the "grid-heads"?
  http://www.ggf.org/documents/GWD-I-E/GFD-I.037.pdf

Sampler of Net-savvy G<u>W</u>Ds

- Survey of L4 variants on IETF-sanctioned TCP
  - what Grid and non Grid "fat" apps do to work around AIMD

- Net Services Use Cases
  - need more field experts narrating their stories

- Grid Network Services Architecture
  - network resources join CPU, storage, sensors, visual.

- New: Survey of existing standards for agile circuit-based networking
  - make the most out of VCAT, LCAS, GFP, L1VPN, etc.

- New: Grid and OBS
  - driven by strong academic interest

GGF

Outline

1. What's a Grid?

2. What's the GGF?

3. Three defining projects underway at GGF

4. The network in GGF's thoughts

5. GGF's new Telecom Focus Group

GGF has hosted a series of Telecom events

- Acknowledging the role of Network Providers in Grid's coming of age and scaling

- Network providers and equipment manufacturers invited
    - GGF 10 Berlin
    - Meeting @Supercomm 2004
    - GGF 11 Hawaii
    - GGF 12 Brussels (providers only)
    - Meeting @SC04

3 Distinct interest foci emerged

1. Providers feeding Grid Communities new enablers at the network level
   - E.g., bigger pipes, BoD, L1VPN, etc.

2. Providers using Grid within their confines
   - Yet Another Large Enterprise
   - Billing procedure, Finance, Models for antenna/power distribution, etc.

3. Providers offering Grid Managed Services
   - One stop shop to customers, utility style
   - In turn, they may broker to sub-contractors

Each one of them begs interesting questions
   - What's a sustainable Biz model? Which technologies?

Yielding a N-dimensional Matrix

NETWORK TYPES

FIXED
(CIRCUIT SWITCHED)

PURE IP

MOBILE
& FIXED

TELCO ROLES

ENABLER
TO GRID
PROVIDERS

| A | D | G |

USER OF GRID
INTERNALLY

| B | E | H |

PROVIDER OF
MANAGED
GRID SERVICES

| C | F | I |

NOTE: Only 2 Dimensions and 3 Columns shown

GGF

Chartering the Telco-RG in GGF

Motion to form a Telco-RG to:

- Survey customers' urgency
- Assess BOTH Technical & Business Enablers enhancing selected nodes (e.g., out of [A...I]) in the Matrix
- Capture distinguishing Use Cases & develop a Roadmap
- Formulate recommendations to GGF groups. Liaise with SDOs. Outreach

The Telco-RG is due to debut at GGF14 in Chicago, 26-29 June

Interim Telco-RG meeting at Supercomm '05

Chicago, Monday, June 6, 2005, 1pm

Introduction

Session 1: Progress made in Seoul at GGF 13 Meeting: Establishment of Research Group in GGF on telecoms and grids. Issues to be addressed

Session 2: Update on Interaction between GGF and other standardization bodies on grids and telecom network standards

Session 3: Progress in Examining Possible Business Models for Telcos based on Acting as Grid Brokers

Session 4: Future Requirements for Networks to Handle Grid Traffic – Challenges for Vendors and Progress at the Equipment Vendor Level

Session 5: Grid Networks to Support Service Creation and Service Development: Middleware Vendors' Role

Session 6: Tasks for the Next Two GGF Meetings

You're invited!