Virtualisierung und Grid Computing, FhG Stuttgart, 27.5.2008

Enterprise Grids

Status, Vorteile, Strategien, Herausforderungen, Empfehlungen

Wolfgang Gentzsch
DEISA Distributed European Infrastructure for Supercomputing Applications
Duke University, Durham, North Carolina
RENCI Renaissance Computing Institute, University of Chapel Hill, North Carolina

IT Transition heute

Old World	New World
Static	Dynamic
Silo	Shared
Physical	Virtual
Manual	Automated
Application	Service

Transitioning from **S**ilo **O**riented **A**rchitecture

to

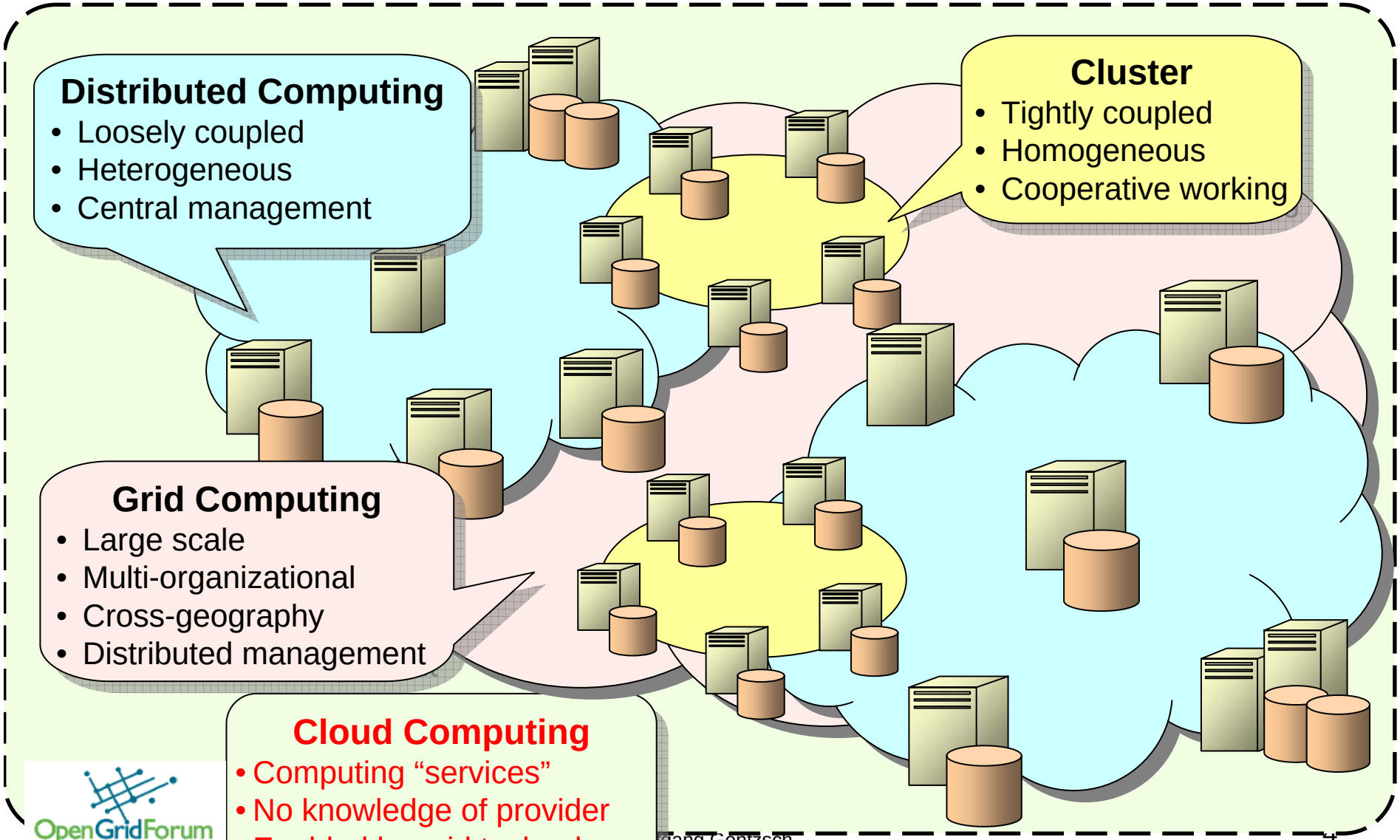
Service **O**riented **A**rchitecture

Von traditionellen IT Inseln zum IT Outsourcing

- Independent distributed IT islands, historically grown
- IT re-centralization, standard processes, virtualization, autonomic comp.
- Mixed model: central IT plus ‘cycle steeling’ (PC Grids)
- Campus & Enterprise Grids (OGSA, EGA Ref, DRMs, Globus, policy engine driven, monitoring/acctg/billing/reporting)
- Resource providers, utility model (Sun, IBM, HP, etc)
- For specific apps: Application service portals, ASPs & GSP
- Rich market for computational services, e-science, e-business
- Complete outsourcing of IT services

Whatever grid business model you choose,
this does not mean to give up IT responsibility !

Grid Szenarien . . .



OpenGridForum
OPEN FORUM | OPEN STANDARDS

. . . und ihre Vorteile

- Resource Utilization: increase from 20% to 80+%
- Productivity: more work done in shorter time
- Business Agility: flexible actions and re-actions
- On Demand: get resources, when you need them
- Easy Access: transparent, remote, secure
- Sharing: enable collaboration over the network
- Failover: migrate/restart applications automatically
- Resource Virtualization: compute services, not servers
- Heterogeneity: platforms, OSs, devices, software
- Virtual Organizations: build & dismantle on the fly

Grids in der Forschung

Grids in der Industrie

Aber Vorsicht:
Enterprise Grids ≠ e-Science Grids !

	e-Science[1]	Enterprise[2]
Goals	Scaling Compute Intensive Collaboration	Scaling Compute & Transactional Availability
Problems	Application Development Immature Technology Interoperability	Manageability Integration Cost
Solutions from:	Communities Internal Org. Vendors	Internal Org. Vendors Communities

1 – Includes e-Science users, infrastructure providers and funding agencies

2 – Includes Enterprise users and platform (hardware and software) providers (vendors)

OGF Umfrage 2008: Gründe für Grids

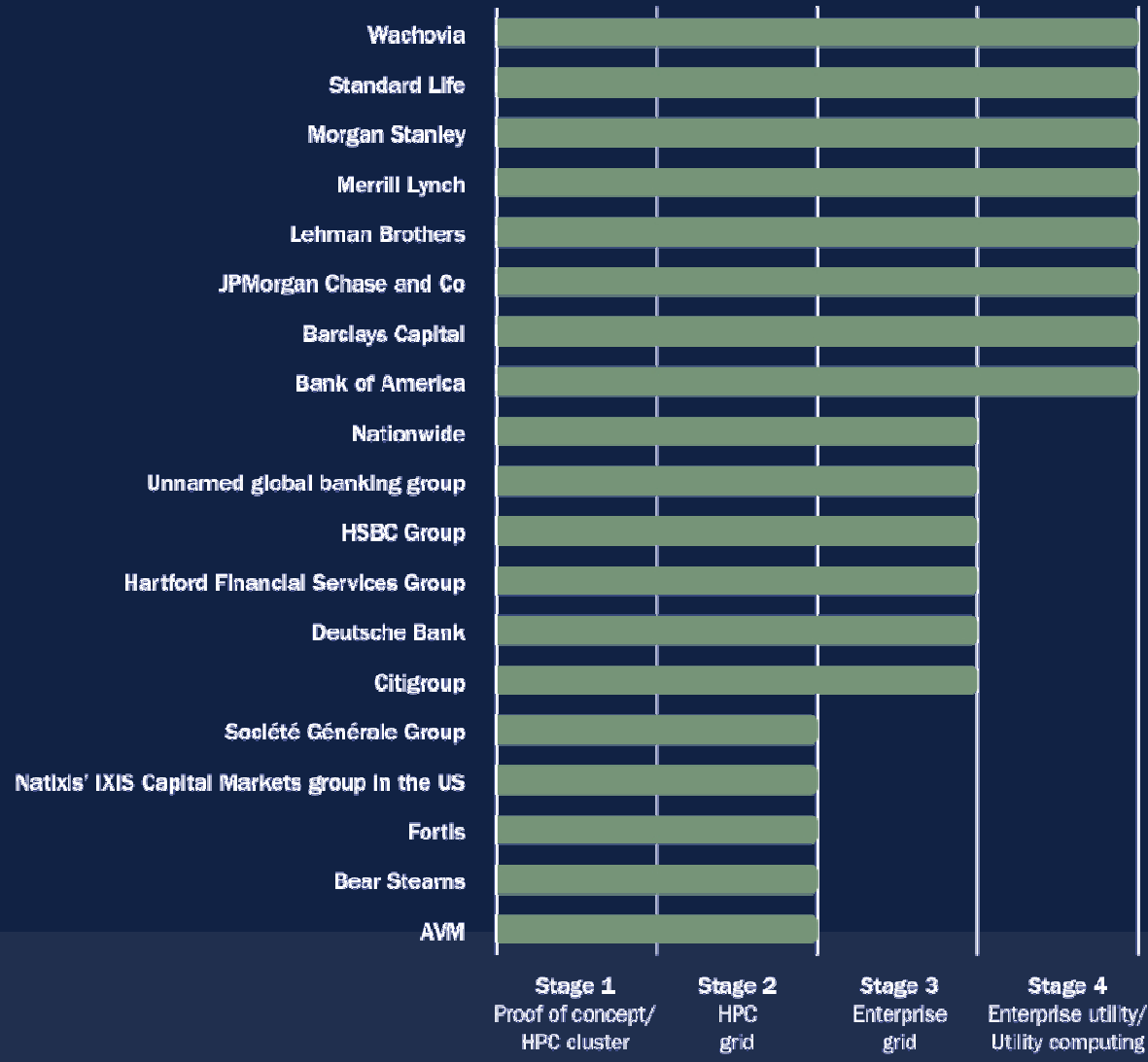
Feature	***Rank (Score)***							
	All	**e-Science**	**Platform**	**S/W**	**Infrastructure Providers**	**Enterprise**	**Funding Agencies**	**Partners**
	57	23	13	1	9	5	1	3
Scalability	1(51)	**1(43)**	**1(64)**	2(67)	2(37)	**1(73)**		3(33)
Inter Organizational Collaboration	2(29)	**2(36)**	6(15)		1(67)	7(0)		6(0)
Time to complete compute intensive job	3(27)	**3(26)**	4(18)		3(19)	5(20)		1(67)
Availability	4(23)	5(22)	**2(33)**	1(100)	5(15)	**3(33)**		6(0)
Scaling data processing	5(22)	4(23)	**3(21)**		7(11)	7(0)	1(100)	2(44)
Transactional Throughput	6(15)	8(7)	4(18)	3(33)	8(4)	**2(47)**		3(33)
Ability to complete computationally intensive job	7(14)	6(17)	8(8)		3(19)	6(7)	3(33)	5(22)
Resilience	8(9)	7(9)	7(13)		5(15)	7(0)		6(0)
Transactional latency	9(6)	9(1)	9(3)		9(0)	4(27)	2(67)	6(0)

OGF: Probleme bei Grids

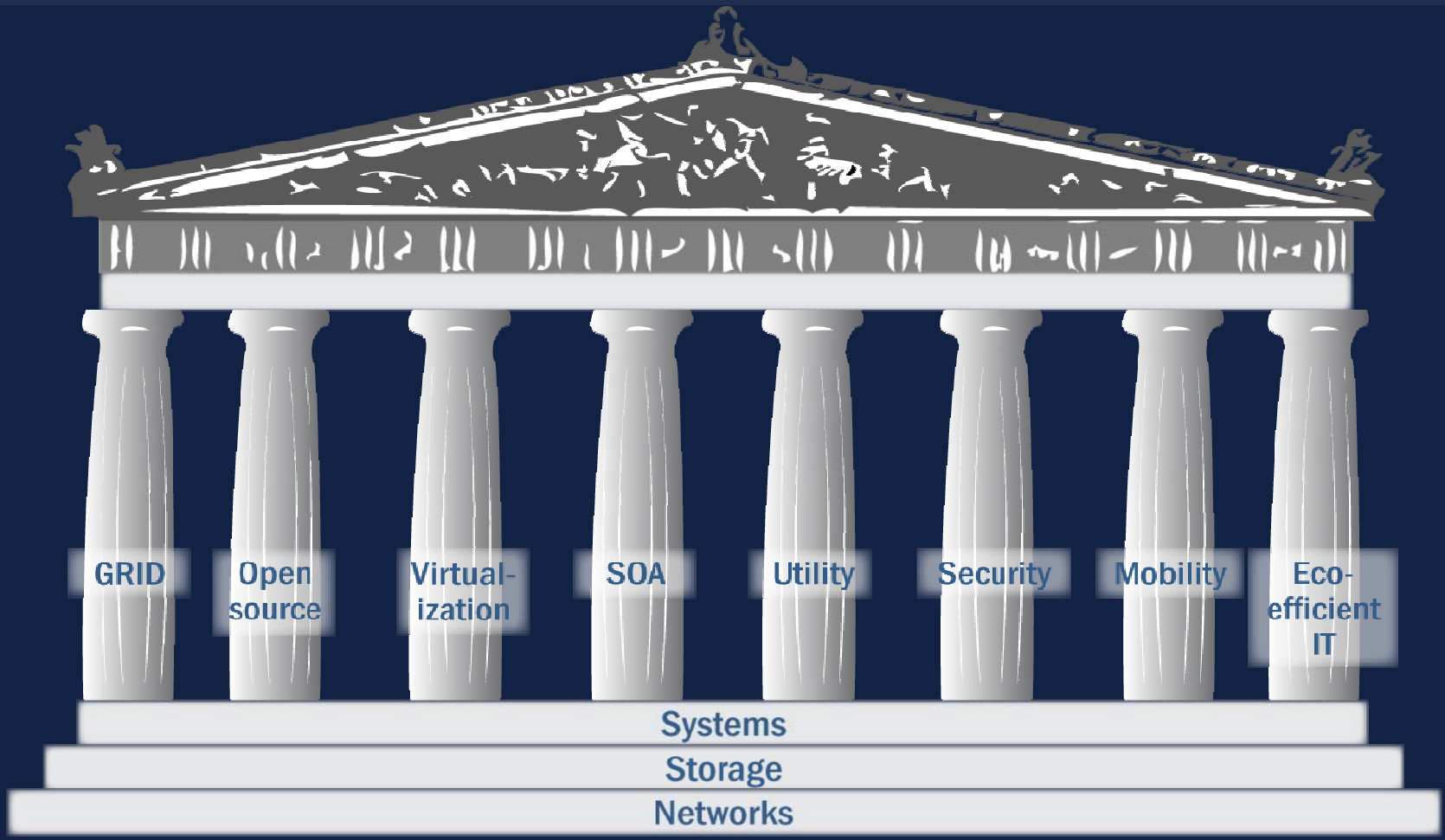
Problem	***Rank1***							
	All	e-Science	Platform	S/W	Infrastructure Providers	Enterprise	Funding Agencies	Partners
	68	23	13	1	8	5	1	3
Application development	**1(31)**	**1(36)**	6(15)	2(67)	1(38)	11(0)	2(67)	2(33)
Immature technology	**2(25)**	**2(30)**	**2(23)**	4(0)	3(29)	11(0)	4(0)	1(67)
Management complexity	**3(20)**	6(14)	4(21)	4(0)	3(29)	**1(50)**	4(0)	4(22)
Interoperability	**4(18)**	**3(23)**	4(21)	4(0)	8(8)	6(17)	4(0)	2(33)
Platform integration	**5(17)**	9(10)	**1(31)**	4(0)	6(21)	**3(25)**	4(0)	6(11)
Management	**5(17)**	11(4)	**2(23)**	1(100)	2(33)	**3(25)**	4(0)	8(0)
Organizational or Inter-organizational alignment	**7(16)**	5(19)	8(13)	4(0)	5(25)	6(17)	4(0)	4(22)
Data exchange/sharing	**8(14)**	4(20)	8(13)	3(33)	10(0)	8(8)	4(0)	8(0)
Application complexity	**9(11)**	6(14)	6(15)	4(0)	10(0)	3(25)	4(0)	8(0)
Cost	**9(11)**	9(10)	11(3)	4(0)	7(13)	**2(42)**	1(100)	6(11)
Application scalability	**11(10)**	8(12)	8(13)	4(0)	9(4)	8(8)	3(33)	8(0)
Operational Efficiency	**12(9)**	12(0)	12(0)	4(0)	10(0)	11(0)	4(0)	8(0)
Lack of a common language	**13(1)**	12(0)	12(0)	4(0)	10(0)	8(8)	4(0)	8(0)
Vendor lock-in	**14(0)**	12(0)	12(0)	4(0)	10(0)	11(0)	4(0)	8(0)

Enterprise Grid Status

Financial Services Industrie



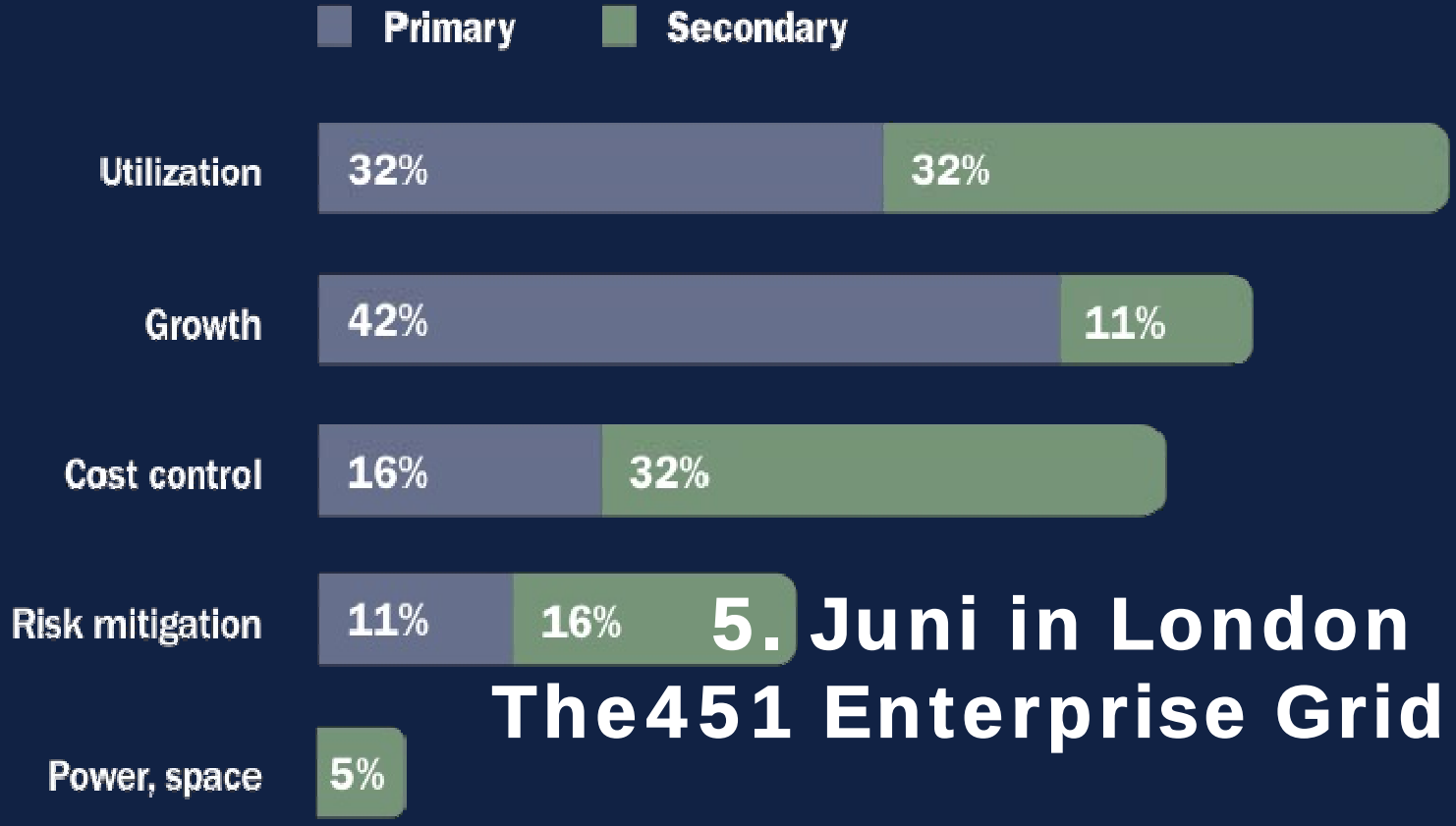
ECS Deployment Strategy



Enterprise Computing Strategy
The 451 Group

Business Trends: 2007

Financial Services Industrie



5. Juni in London

The451 Enterprise Grid Day

Haupt-Motivation für Grids
- Business getrieben -

1. **Improve Agility and Responsiveness**
   - Accelerate time-to-market (speed)
   - Better respond to changing business demands
   - Ability to introduce new competitive offerings
2. **Manage Service Levels**
   - Superior decision support and performance
   - Greater availability and uptime
3. **Reduce Costs**
   - Operating Costs (labor for ongoing development, integration, support and maintenance)
   - Capital Costs (hardware and software)

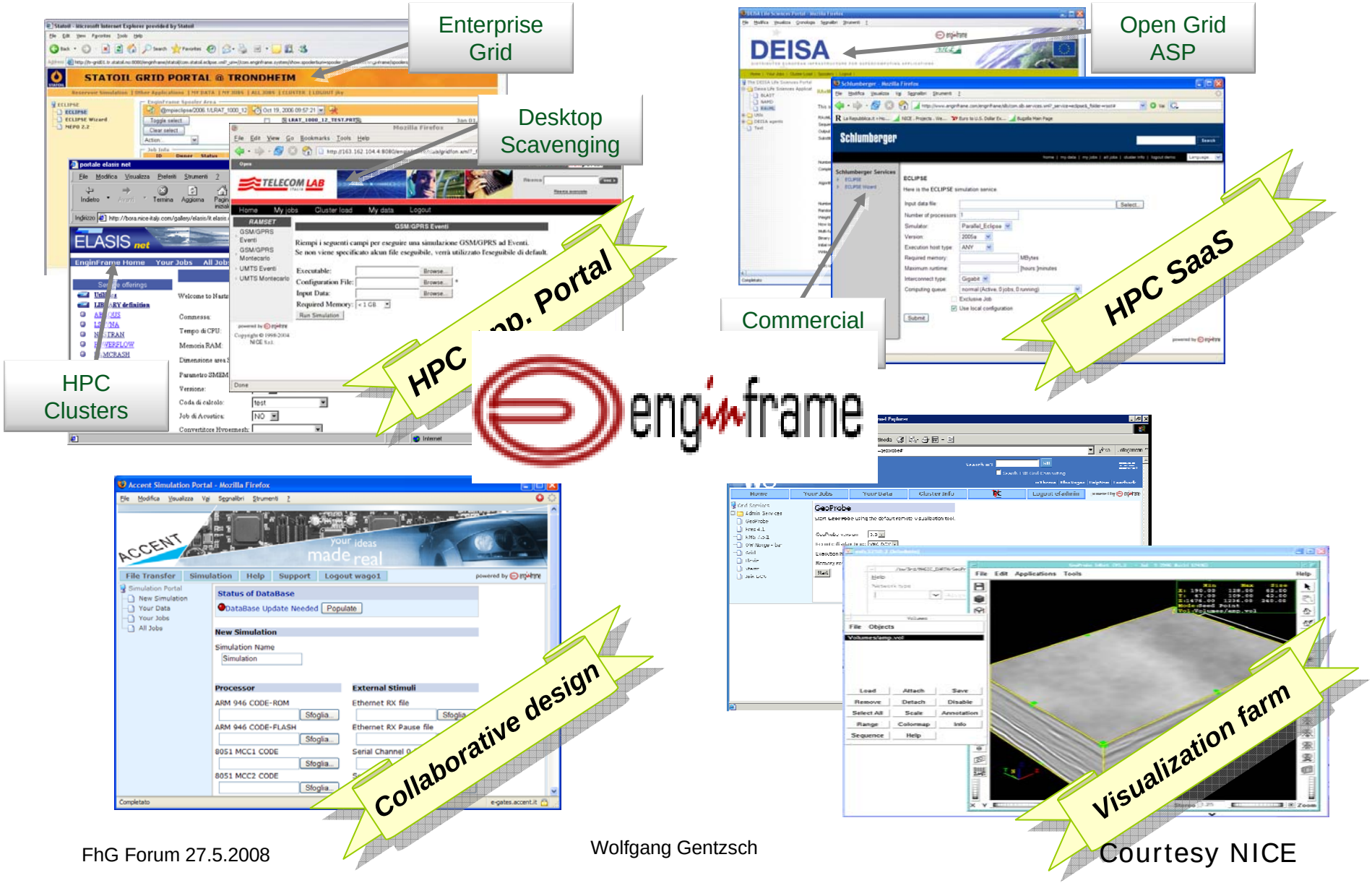
Courtesy DataSynapse

IT-Hintergrund

1. **Achieve a virtual, scalable application architecture**
   - Decouple application execution from infrastructure
   - Achieve scale without overhead and complexity
2. **Self-managed, self-healing operating environment**
   - Policy and priority-based operation
   - Increased availability and resiliency
3. **Enable commodity, shared computing**
   - Leverage existing, underutilized infrastructure
   - Migrate to lower cost infrastructure
4. **Deliver IT as an adaptive service**
   - Dynamically fulfill fluctuating performance requirements
5. **Accelerate SOA**
   - Service-enable legacy applications
   - Enable dynamic (versus static) service provisioning

Courtesy DataSynapse

Schlüssel zum Erfolg: Grid Portals



Grid Portals: transparent und nutzerfreundlich

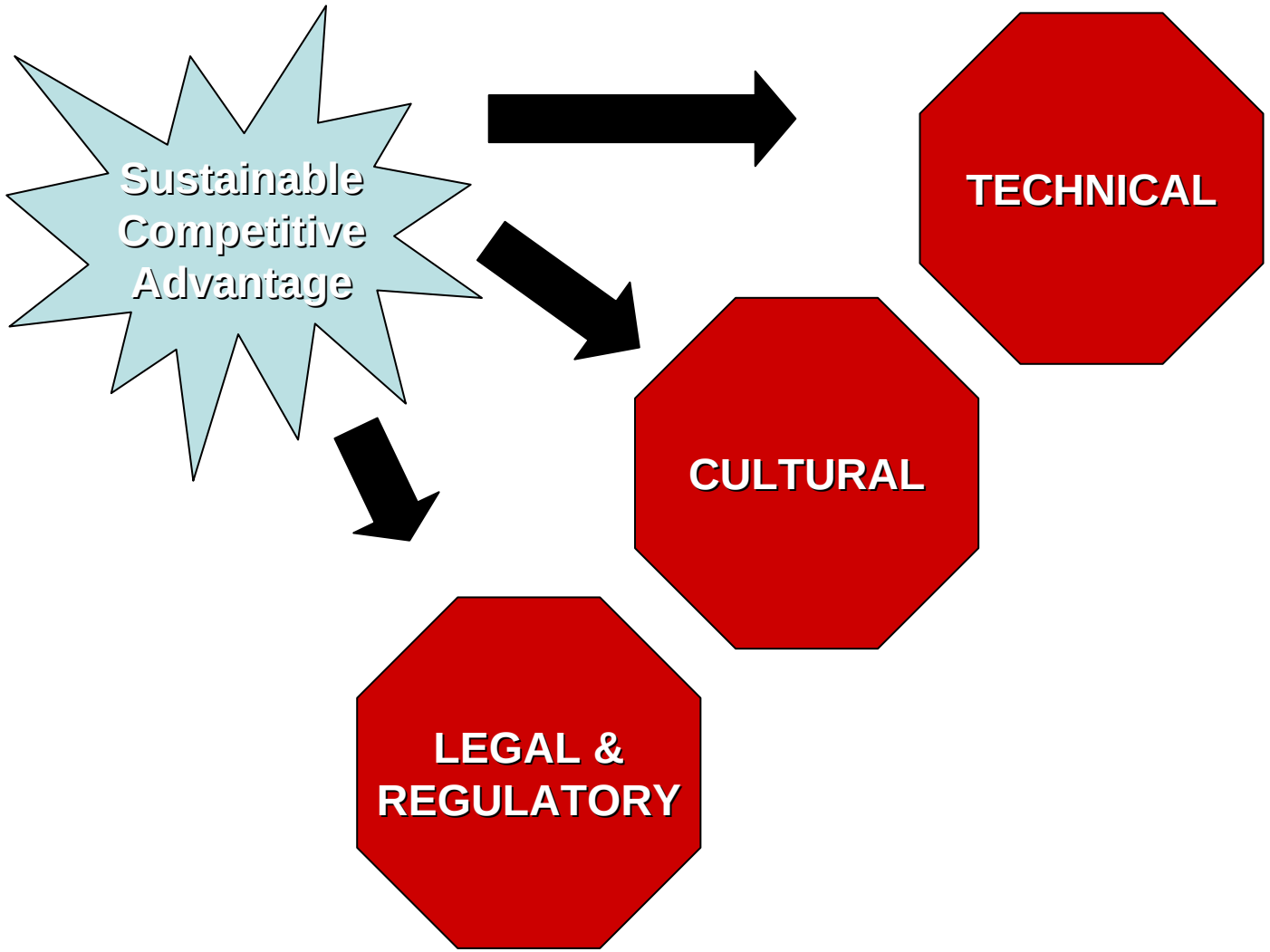
- **Complex IT infrastructure**
  - Difficult to optimally leverage resources
  - Different programs, applications, GUIs, OS, SAN, SOA
- **Data management and security**
  - Timely, consistent, transparent data access
  - Controlled access for IP protection
- **Teamworking and collaboration**
  - Complex, slow, ad-hoc collaboration
  - Identity management
- **New business opportunities**
  - ASP, compute-on-demand, HPC consolidation
  - Experience sharing and leveraging

Courtesy

Identifziere Business-Herausforderungen

- Time-to-market pressures vs. quality products
- Multiple, concurrent projects
- Projects with different schedules and milestones
- Overlapping demands for resources
- Large and growing data sets
- Larger, more complex product designs
- Not enough throughput
- Low utilization of compute resources
- Insufficient in-house IT expertise
- Increasingly complex operations management
- Heightened focus on budget/TCO/ROI

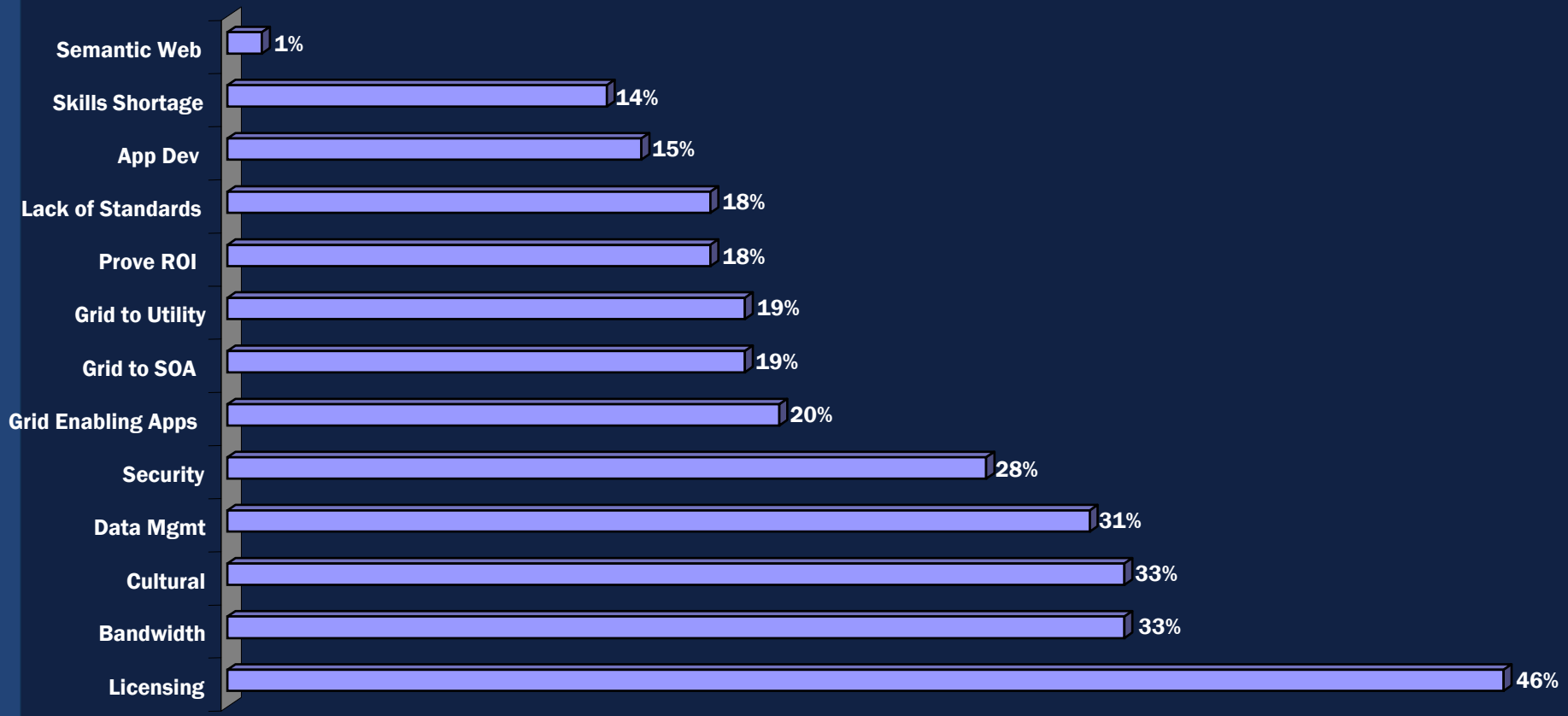
Grid-Herausforderungen



Grid-Herausforderungen

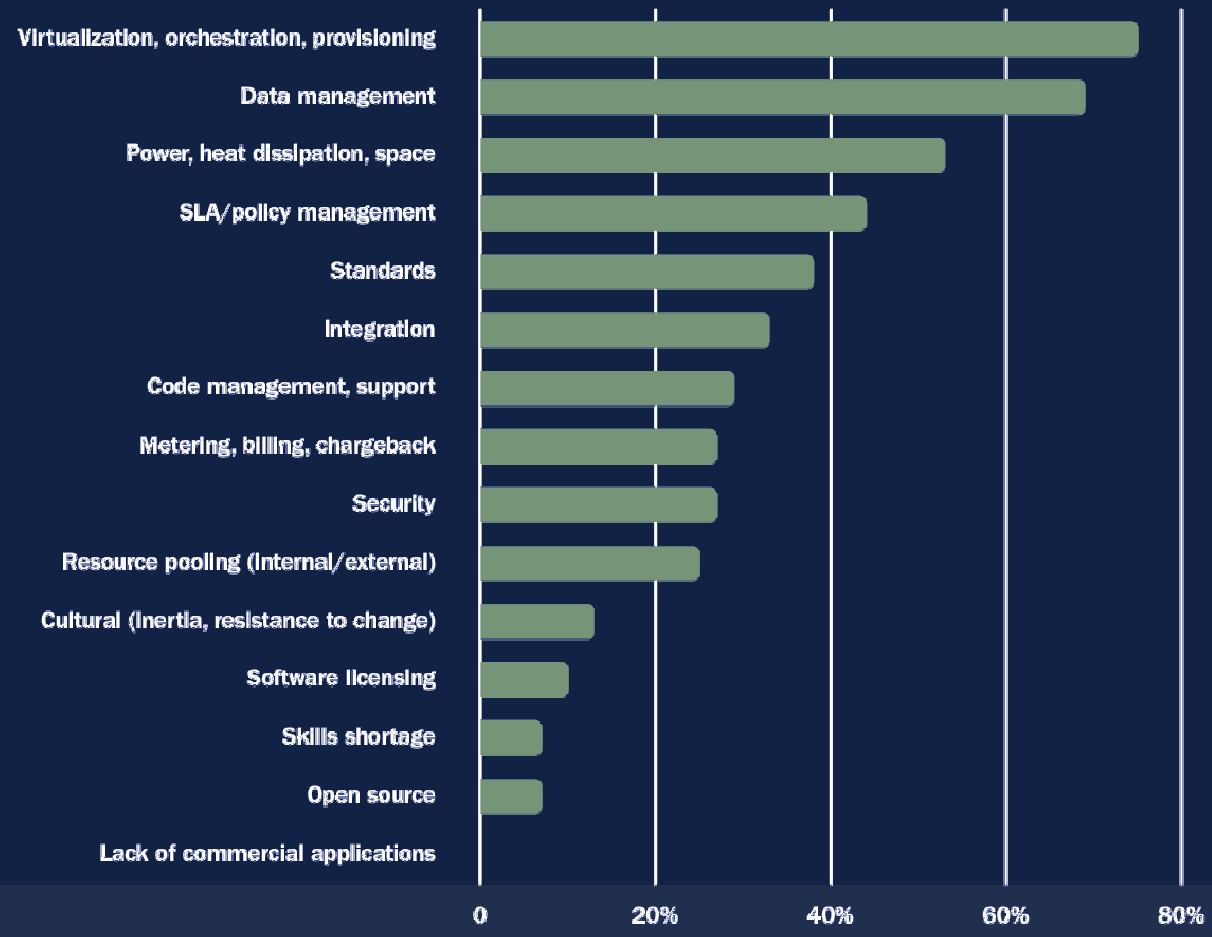
- Sensitive data, sensitive applications (medical patient records)
- Different organizations have different ROI
- Accounting, who pays for what (sharing!)
- Security policies: consistent and enforced across the grid !
- Lack of standards prevent interoperability of components
- Current IT culture is not predisposed to sharing resources
- Not all applications are grid-ready or grid-enabled
- Open source is not equal open source (read the little print)
- SLAs based on open source (liability?)
- “Static” licensing model don’t embrace grid
- Protection of intellectual property
- Legal issues (FDA, HIPAA, multi-country grids)

Herausforderungen : 2003-06 (cross-sector)



Herausforderungen : 2008

Financial Services Industrie



Fragen über Fragen

- What are my next research / business challenges ?
- Can my existing IT infrastructure still cope with these challenges ?
- Or do I need a SOA and/or Grid architecture ?
- Or should I outsource, and if so, to what extend ?
- How can I learn about **MY** SOA / Grid ????
- Are there (similar) use cases ? ➔ Can I learn from others ?
- Do I have the experts, or do I need external consultation ?
- What is the right strategy to build and operate it ?
- How will Grid change my current, proven SLAs ?
- How to / how much / who will pay for it ?

We will try to answer (part of) these questions here . . .

´Meine´ Top 10 Empfehlungen

Rule 1: Identify your specific benefits.
Rule 2: Evangelize your decision makers first.
Rule 3: Don’t re-invent wheels.
Rule 4: KISS (Keep It Simple and Stupid).
Rule 5: Evolution, not revolution.
Rule 6: Establish a governance structure.
Rule 7: Money, money, money.
Rule 8: Secure some funding for after the project.
Rule 9: Try not to grid-enable your apps in the first place.
Rule 10: Adopt a ‘human’ business model.

Details: OGF Thought Leadership Series at

http://www.ogf.org/TLS/index.php

The Grid Engine

The Combustion Engine

The Steam Engine

Danke !