Grid ASIA and CCGrid 2006 in Singapore

"AIST SOA for building Service Oriented e-Infrastructure"

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Advanced Industrial Science and Technology, Japan

Grid World

グリッドの旬

Grid World 2006

2006年

5月11日(木) → 12日(金)

東京国際フォーラム

Tokyo International Forum

【主　催】 グリッド協議会 Grid Consortium Japan グリッド協議会
株式会社 IDGジャパン IDG JAPAN

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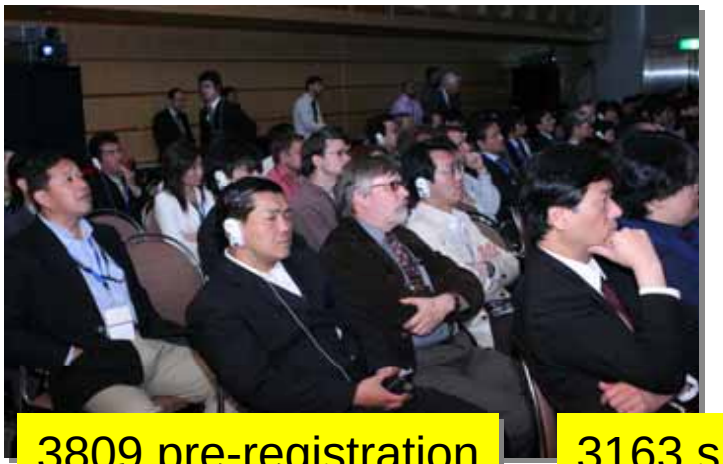
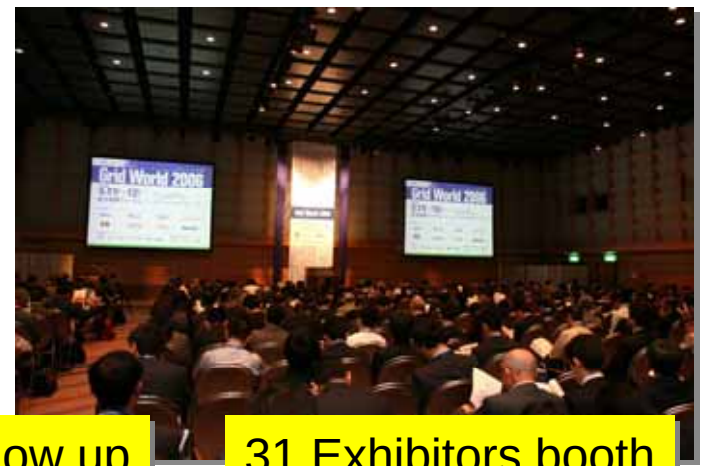
Grid World

グリッドの旬

Grid World 2006





3809 pre-registration

3163 show up

31 Exhibitors booth

AIST SOA in a nutshell

- Is a
  - part of “AIST Industrial Transformation Initiative”
    - FY2005-07, 650M JPY (~6M USD)
  - R & D Project to develop software prototype for
    - Service Oriented Infrastructure for utility computing
    - Accelerate knowledge circulation for micro services
  - pilot project to initiate another national scale program
    - led by both private and public sectors
    - Expect to reach the marketplace by 2010
- Is *NOT*
  - targeting a full production level of an SOA package within the project term
  - attempt to develop software from scratch
    - Thanking for many existing grid works

Grid Technology Research Center

GridMPI™

16hrs

60min

AKIBA Office

Grid Technology Research Center (Nov 1, 05)	
Number of Employees	69
Tenured Researchers	20
Fix-term Researchers	8
Administrative Staff	11
Contractors	30

Collaboration with industries

“AIST Industrial Transformation Initiative”

■ Background and its concept：

Project-driven enhancement of industry-academia-government collaboration (Best utilization of advantage of leaving our status as government official)

■ Objectives：

- **“Fusion”:**

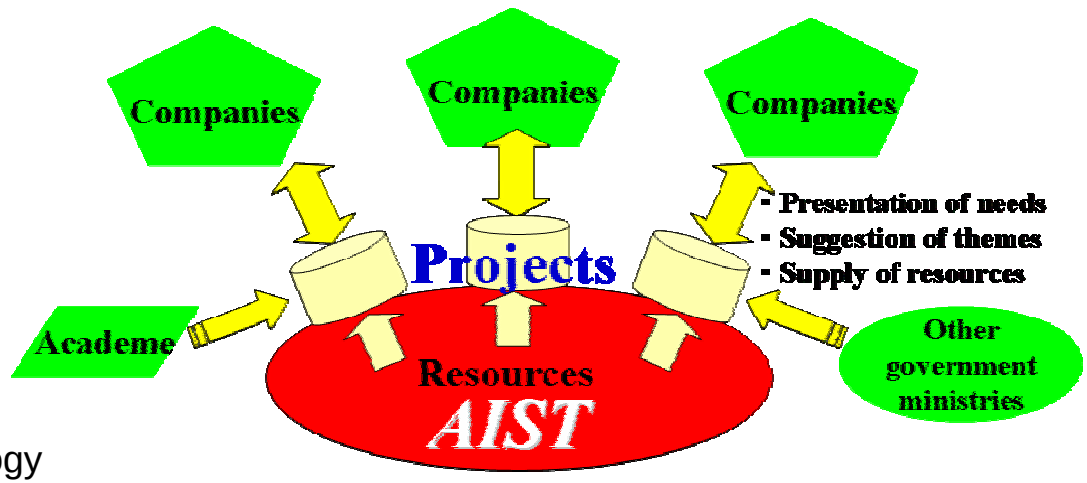
Showing AIST’s overall capacity

- **“Coordination”:**

Enhancement of industrial competitiveness

- **“Creation”:**

New fields in industry and technology



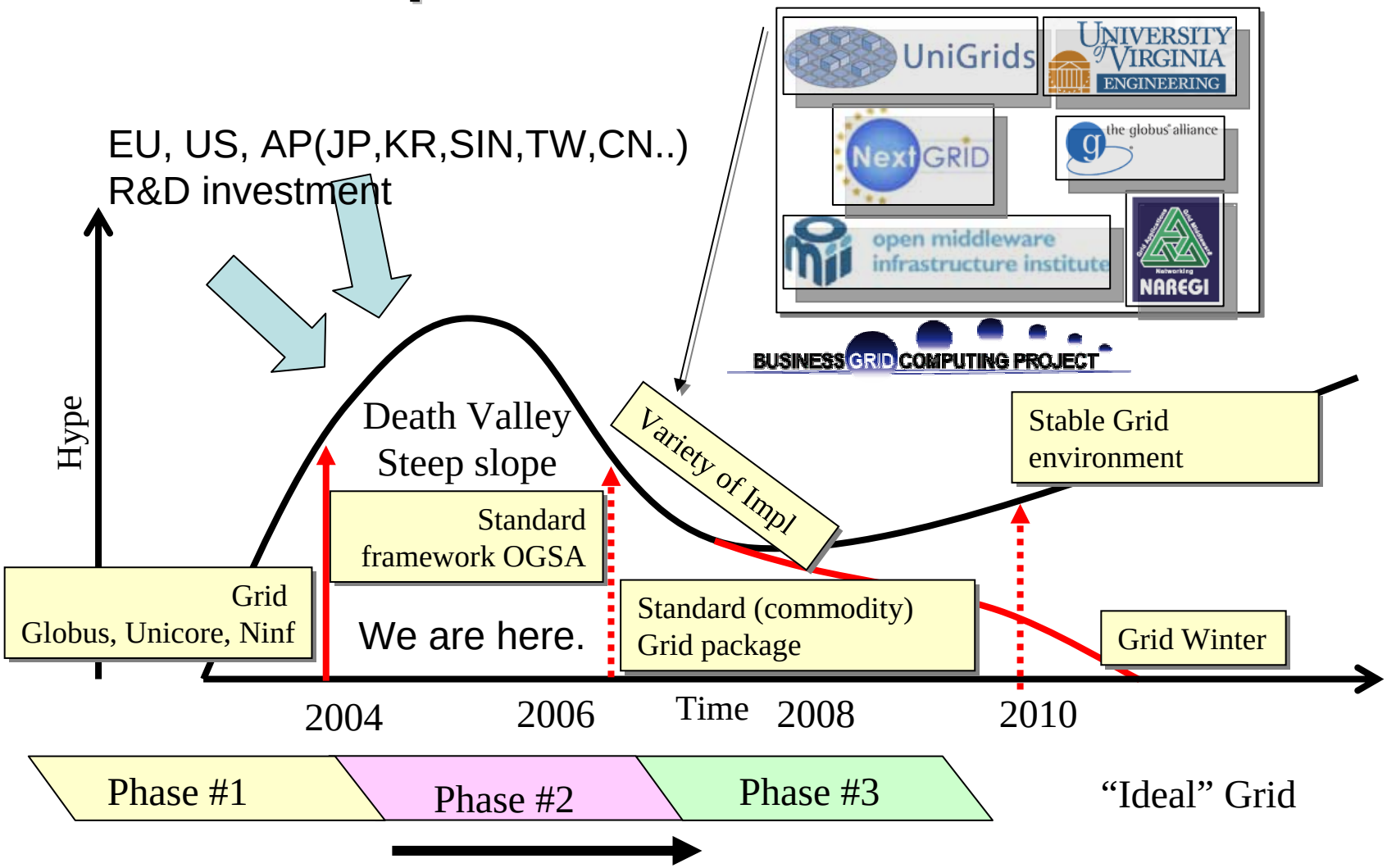
■ Research Projects (2005)：

1. The development of transgenic plant factory for the production of pharmaceuticals
2. AIST Service Oriented Architecture (AIST SOA)

■ 2006

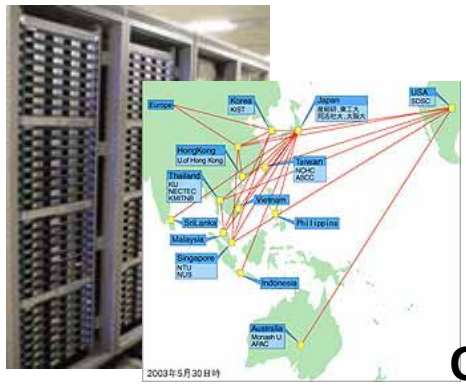
1. Robot Middleware

Grid Roadmap



Technology Life Cycle (Grid/Electricity)

Globus, Unicore
Ninf, SETI@home

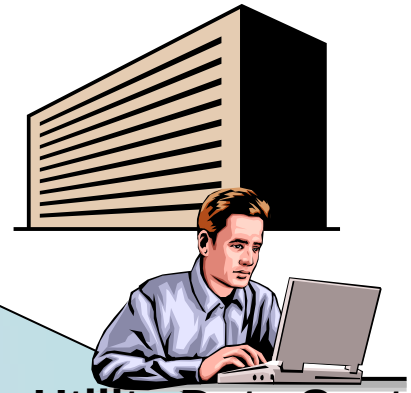


Grid Testbed

Soft PKG
Grid XX

Grid software
Product

Today



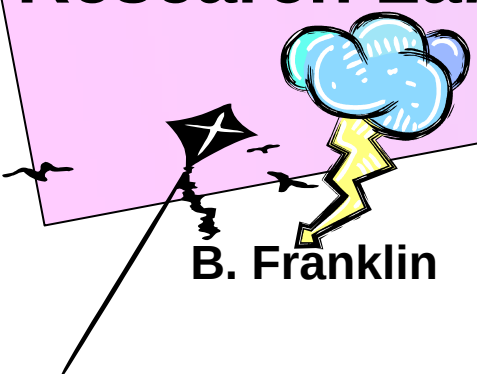
Utility Data Center

Business

Pilot user

Technology

Research Lab



B. Franklin

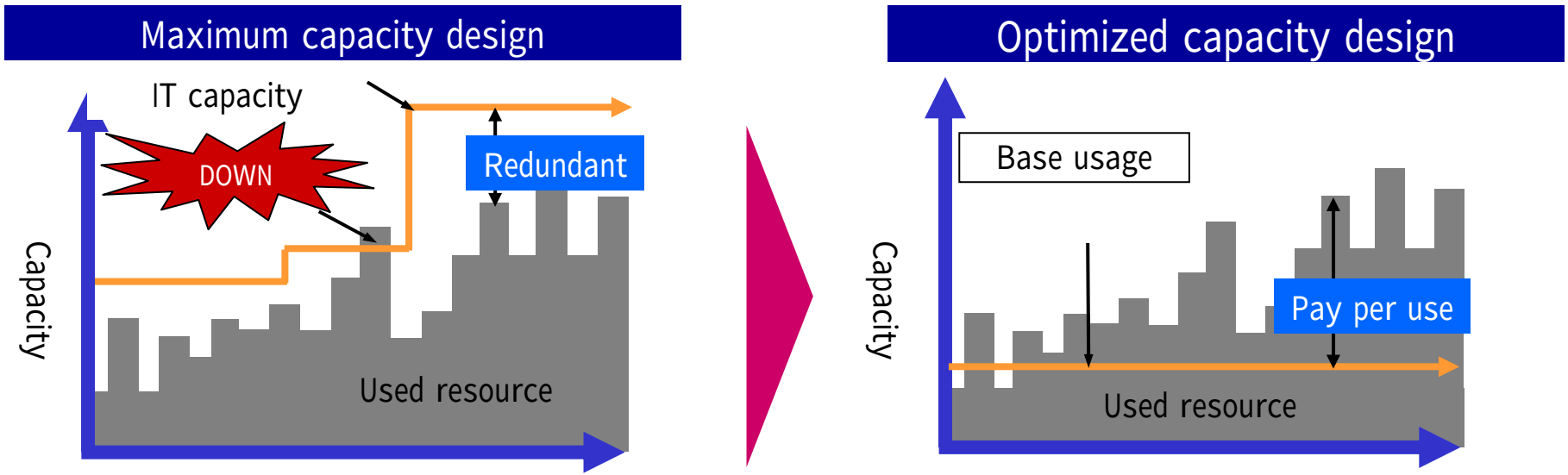
Volta's Battery

Lamp

Power Plant

IT resource Utility as gas, water, electricity

- IT resource usage varies at every moment
- IT Utility model as pay-per-use for optimizing capacity



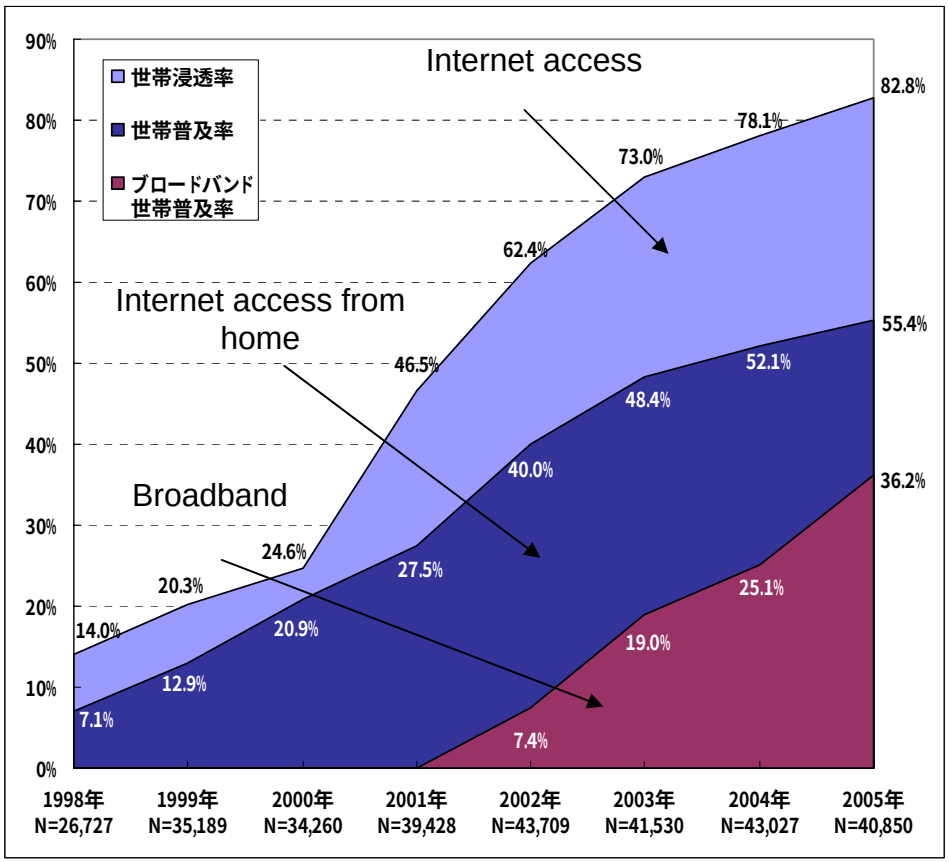
Business model

1st generation	2nd generation		3rd generation
RENTAL	SELL		UTILITY
rental, Rental fee, user, vendor, Maintenance/service	Buy/Pay, user, vendor, resaler, Maintenance/ service	ASP, Hosting	service, Service, User, Vendor, Utility, resource, Maintenance/ service
Main Frame '70	*Client/Server '90*	*New Choice '00*	***Platform/Service separation***

Changes in our life – INTERNET accessibility

- The Internet populates for personal and business use
- Resulting changes in personal life and business environment

Internet Population



Changes

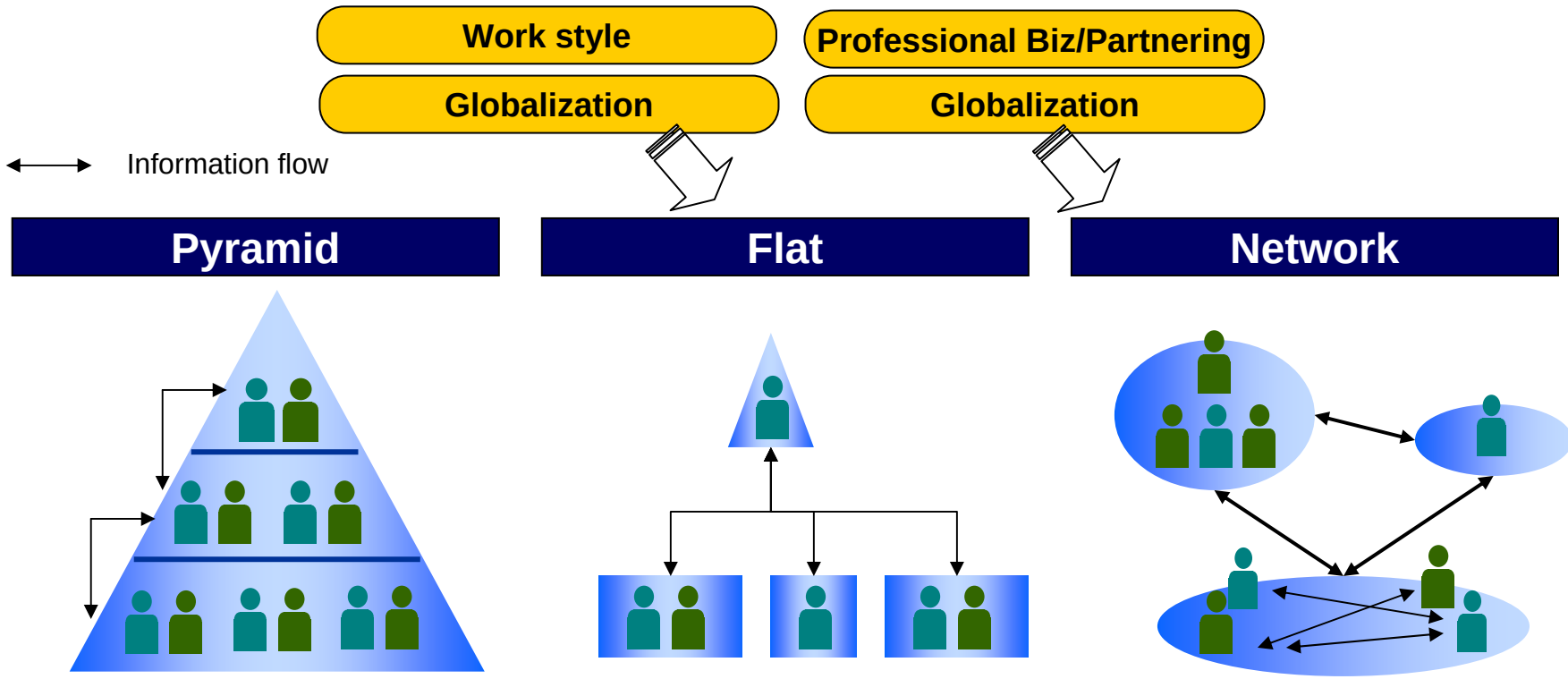
- **Work style**
- **Accelerate business speed**
- **Globalization**
- **Professional Biz/Partnering**
- **Security awareness**
- ⋮

More …
- Blog
- IT & Media collaboration
- ・・・

出典：INTERNET WHITE BOOK 2005

Changes in our life – Business structure

- From Pyramid to Flat for increasing business agility
- Towards Network model in organization and business structure



- Vertical integration
- Top down

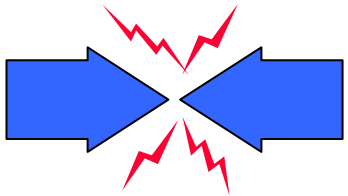
- Horizontal segmentation
- Small Governance
- Mutual dependence, autonomic group
- Coordination oriented

- Advanced
- Mutual dependence
- Best mix of Pyramid & Flat

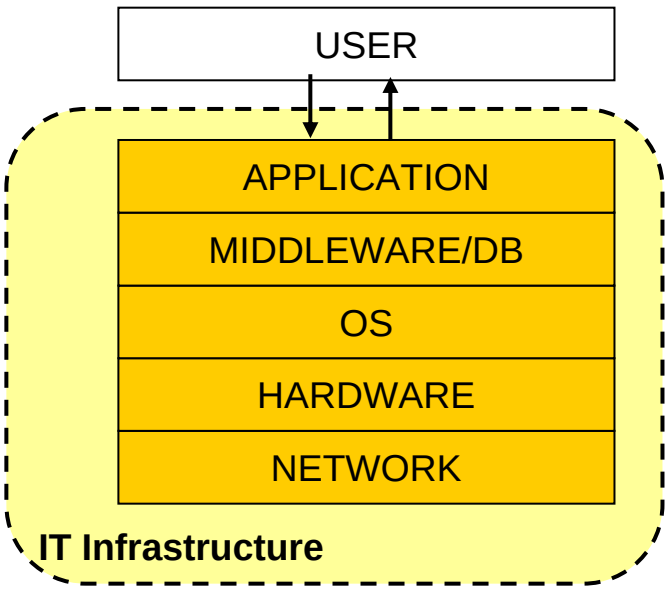
Today, IT does NOT solve any problems

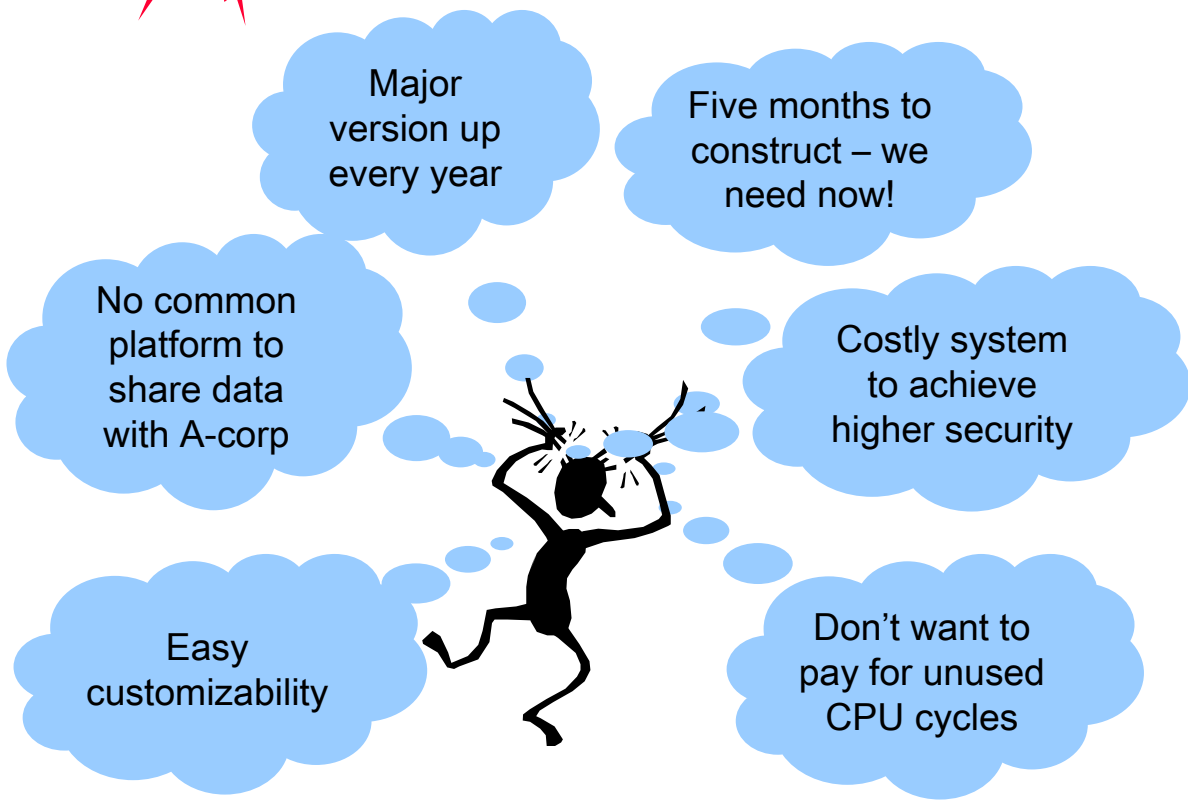
High agility of IT infrastructure for adapting to business opportunities and environment

Desired IT infrastructure



Current problems





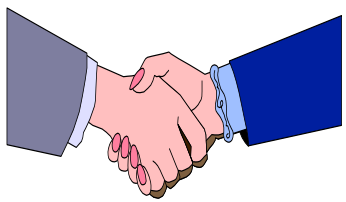
Monolithic IT Infra lacks flexibility

SOA: Emerging new IT concept

- SOA in the spotlight as an agile IT architecture with changes
- IT utility model of pay-per-use to save TCO

Key concept to provide IT infrastructure in “NETWORK” based society

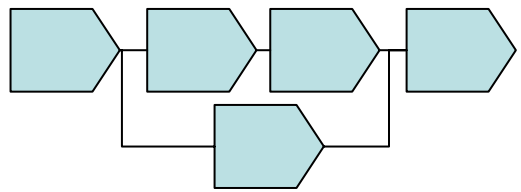
Desired IT infrastructure



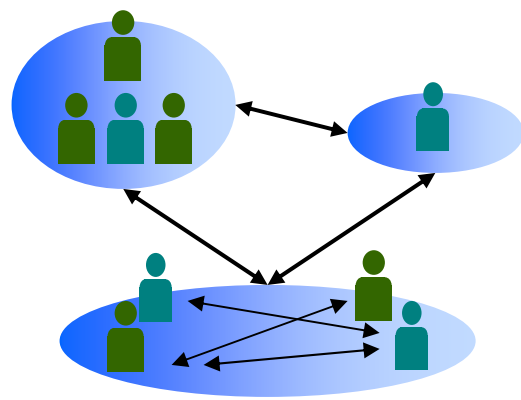
1. SOA concept

2. IT as utility

SOA (Service Oriented Architecture)



- Defined as a design methodology of building a large system as a collection of “SERVICE”
- A “SERVICE” is a set of software for a user to receive service with standard interface and protocol
- SOA concerns common message communication interface without caring language of development and platform to run
- Web service is a one of promising standard technologies to enable SOA



OK, I know SOA, then

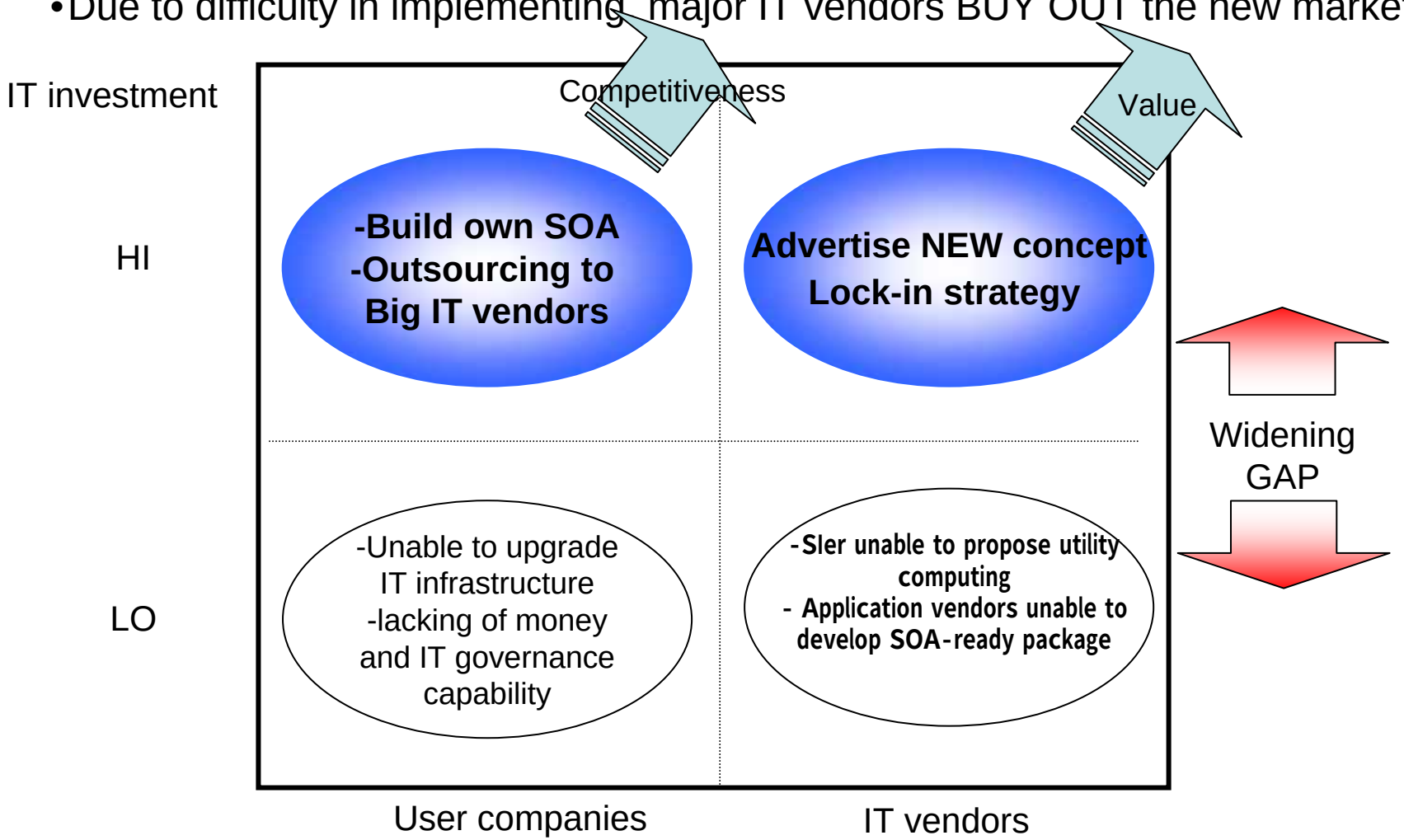
What can the SOA do for us ?

SOA won't solve these problems

WHY ?

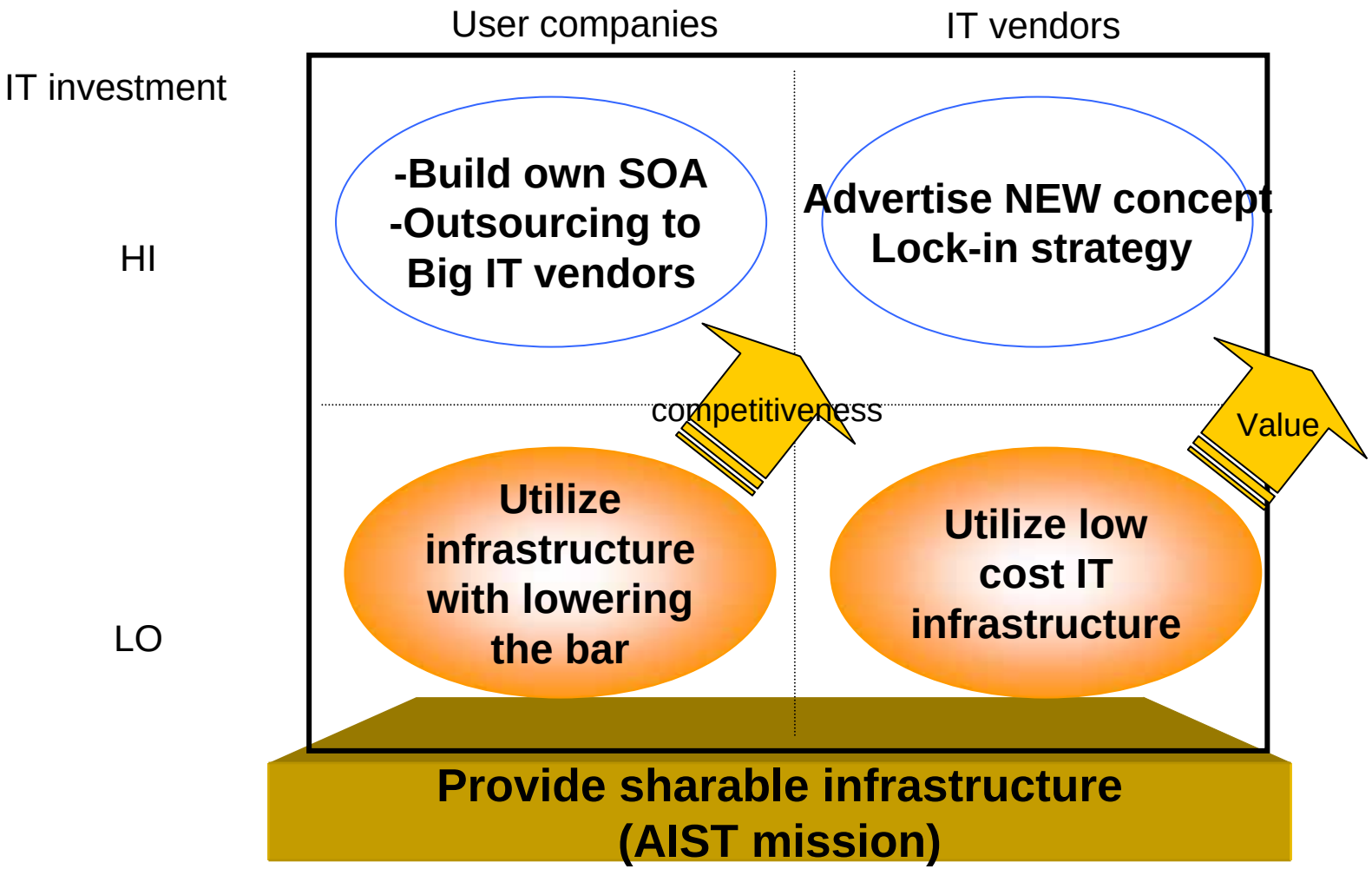
A Dark side in the future

- Today, SOA is a marketing buzzword strategically used by major IT infrastructure vendors
- Due to difficulty in implementing, major IT vendors BUY OUT the new market



Distinguish our target from others

- Demanding for IT infrastructure for a small org or individuals to strengthen competitiveness
- Public support needs – major vendors retain monopoly



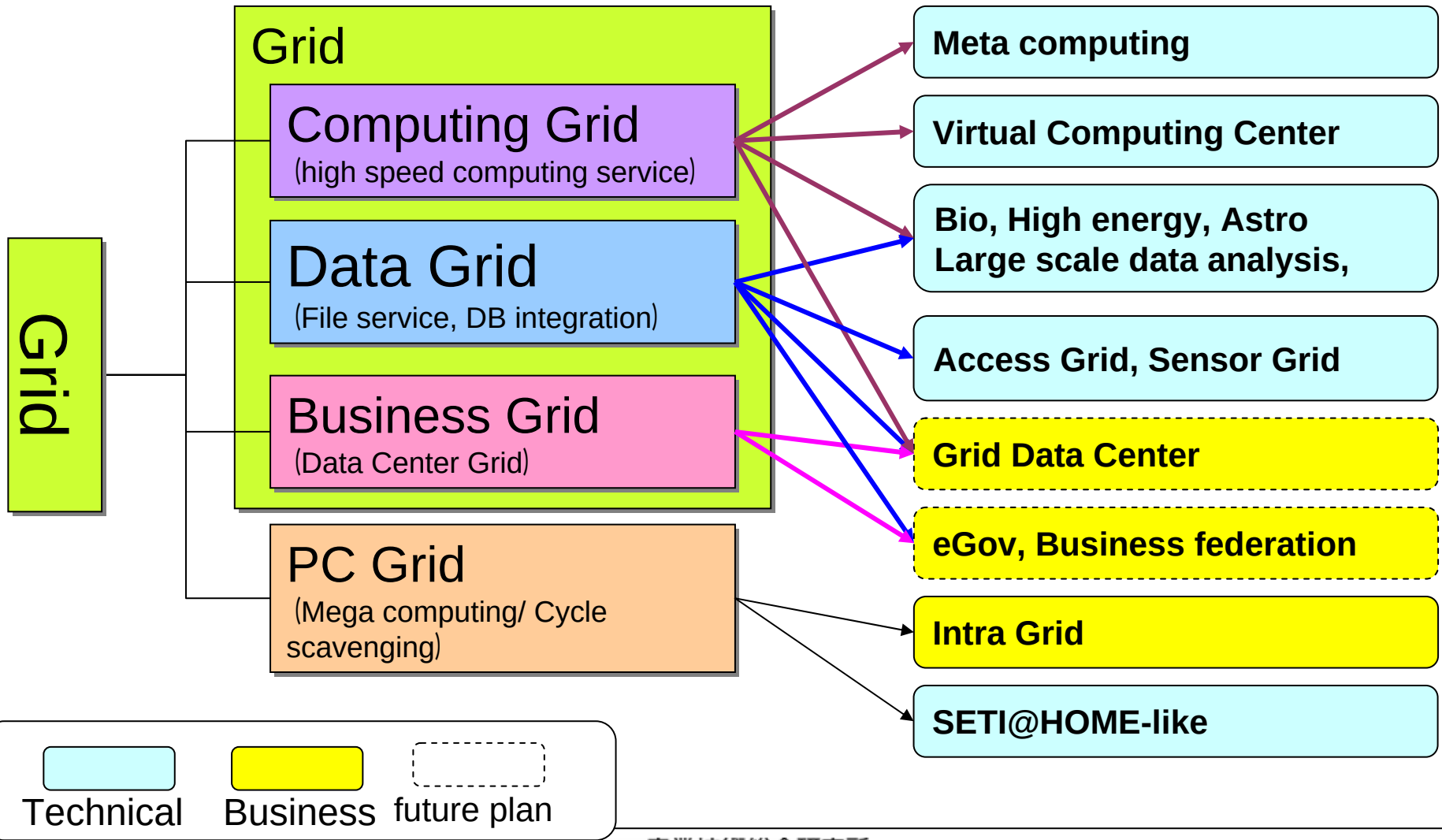
Oh!, I see.
What is the technology enabler ?

Humm… MUST BE THE GRID

☺

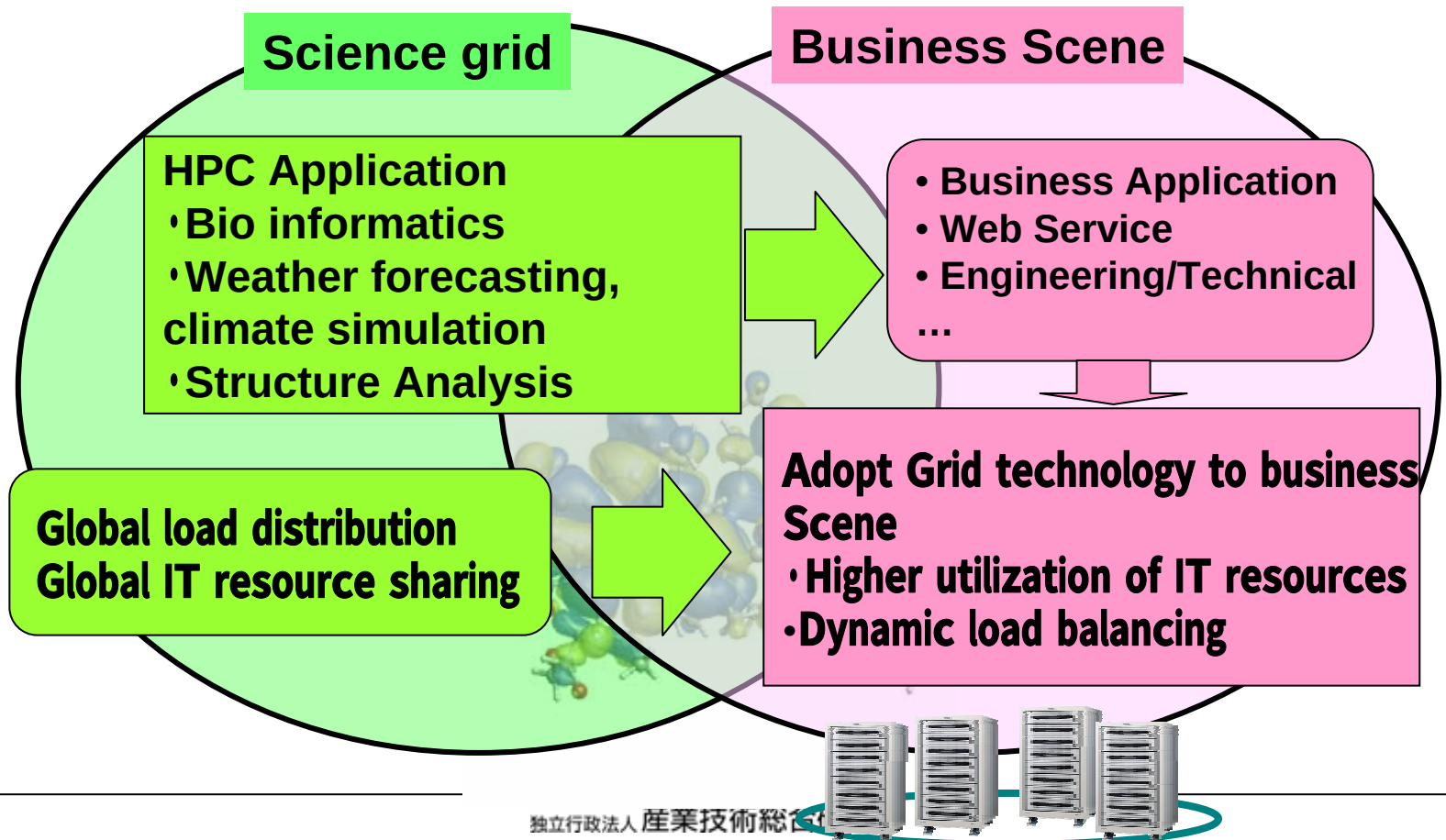
Grid – a quick look

- No clear definition, changes day by day



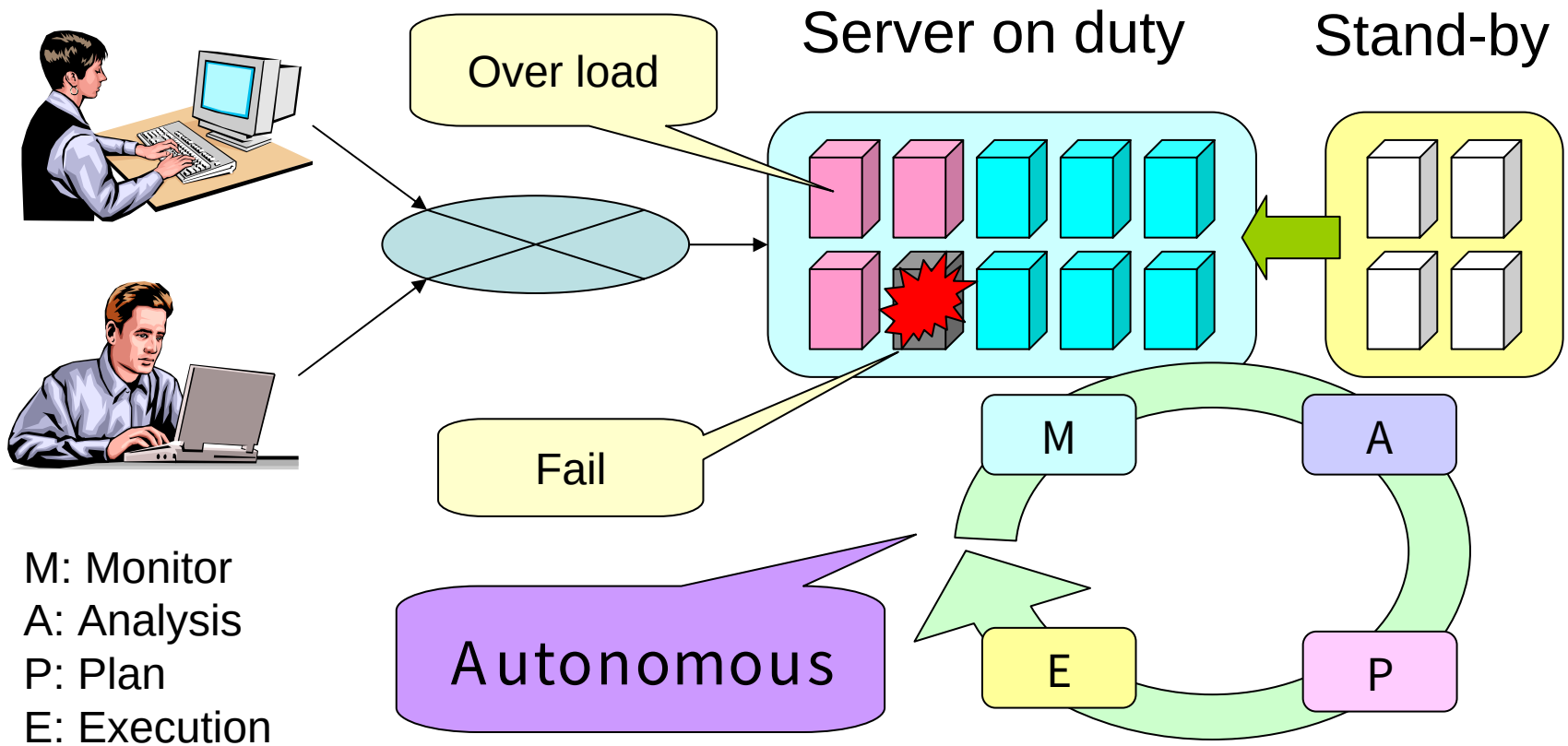
Adopt Grid Technology to Business Scene

- IT resource Virtualization/ provisioning/Integration of Web services
- Higher resource utilization usage for saving TCO
- Automate IT resource management in Data centers
- Business Continuity, Business opportunity

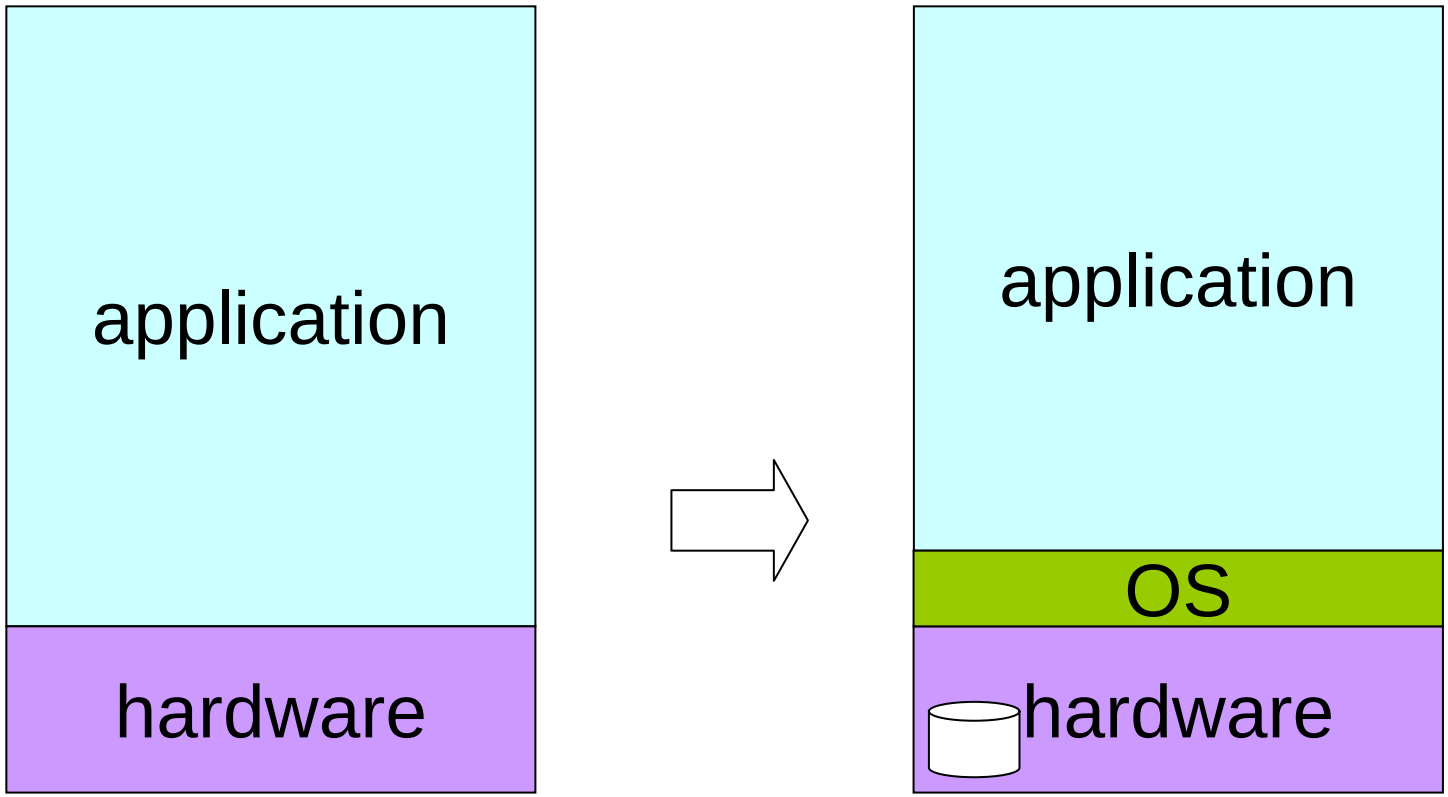


Autonomous IT Infrastructure (by BizGrid)

- Dynamic provisioning according to the demand for the resources in case for access spike, system fail.
- Virtualizes computing heterogeneity

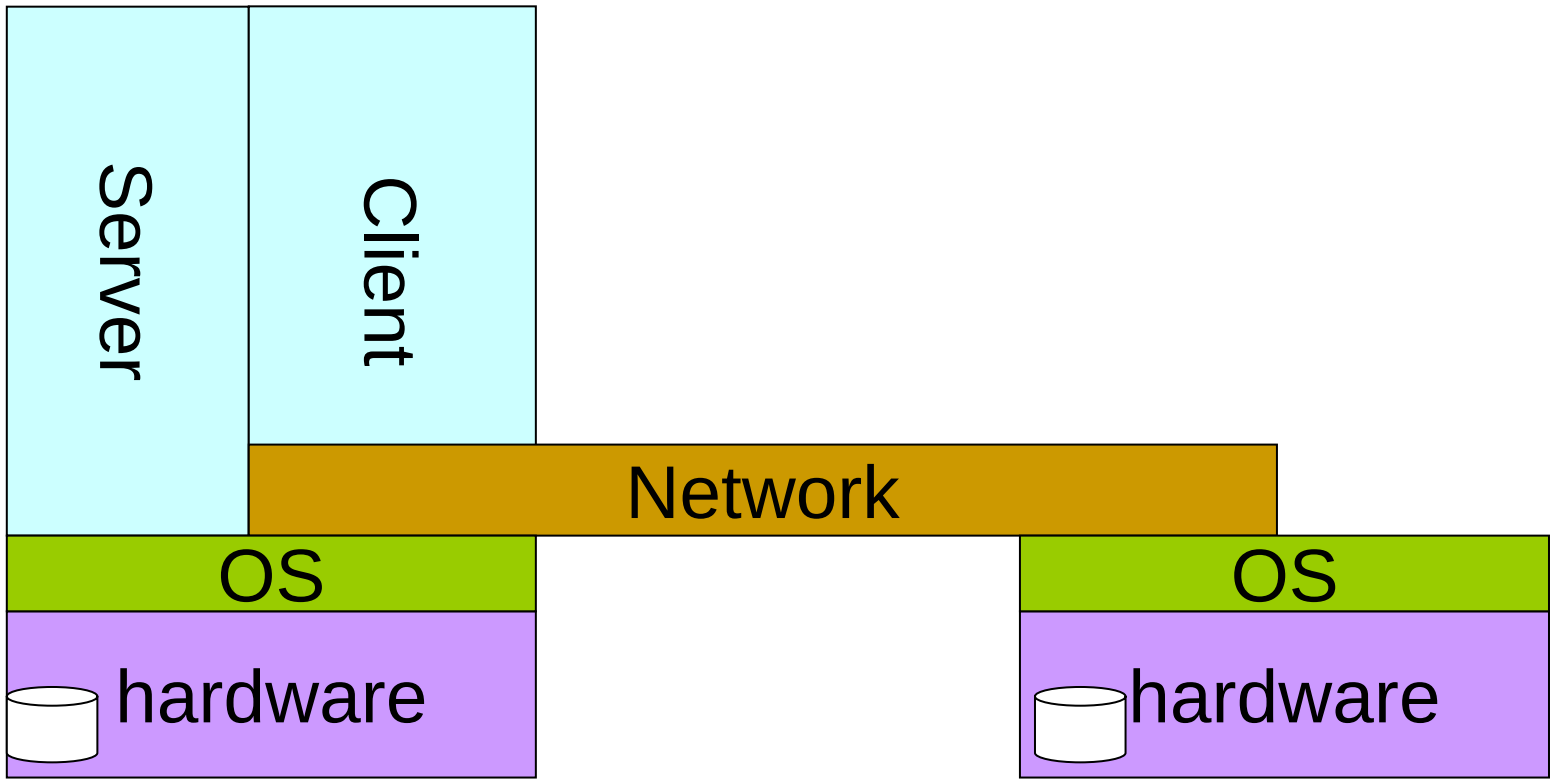


Long long time ago



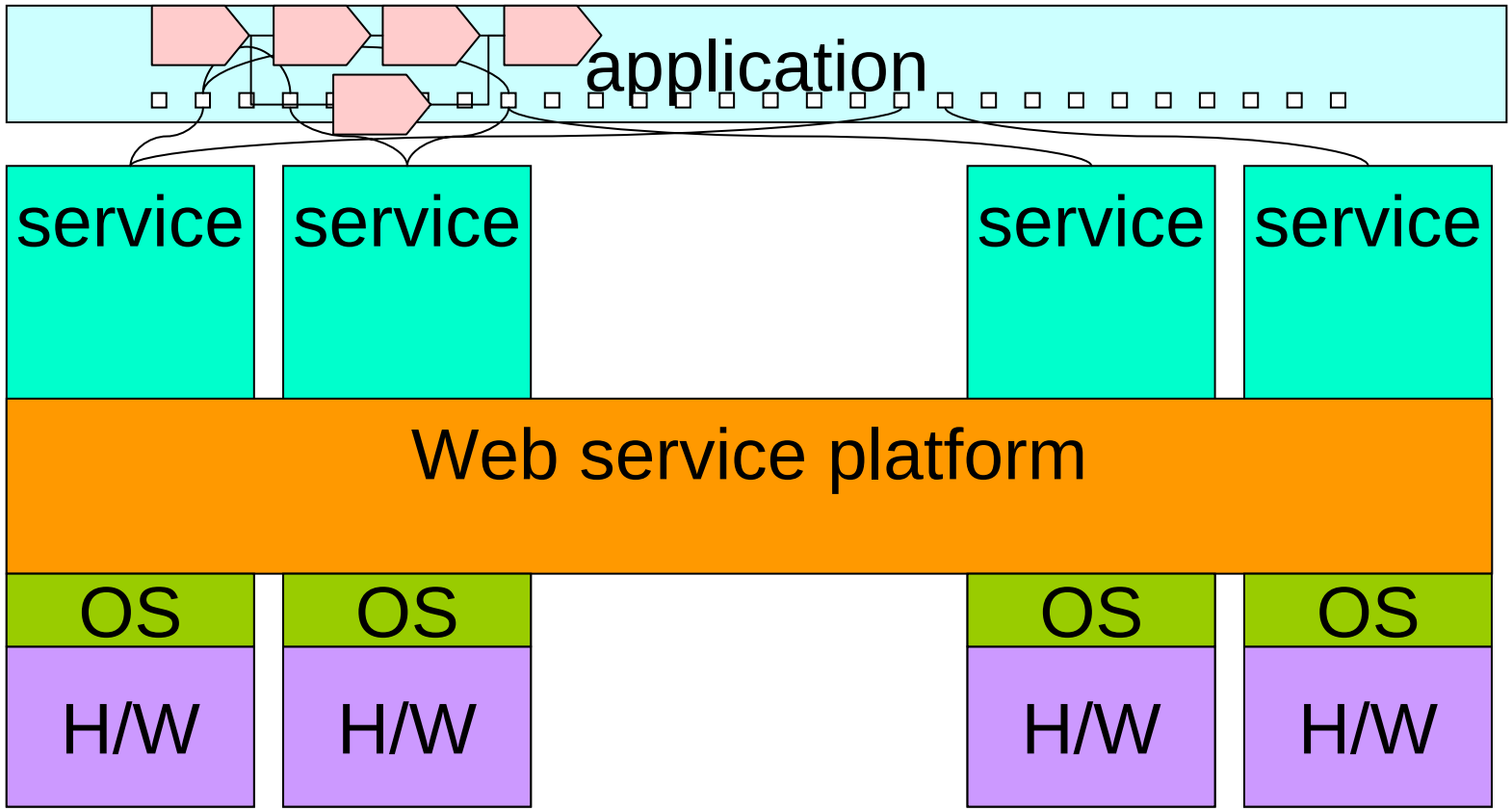
- An application program took care of h/w device
- too much complicated in programming
- Less reusability for different configuration (device, memory, etc) OS

Client – Server era (simple logic and workflow)



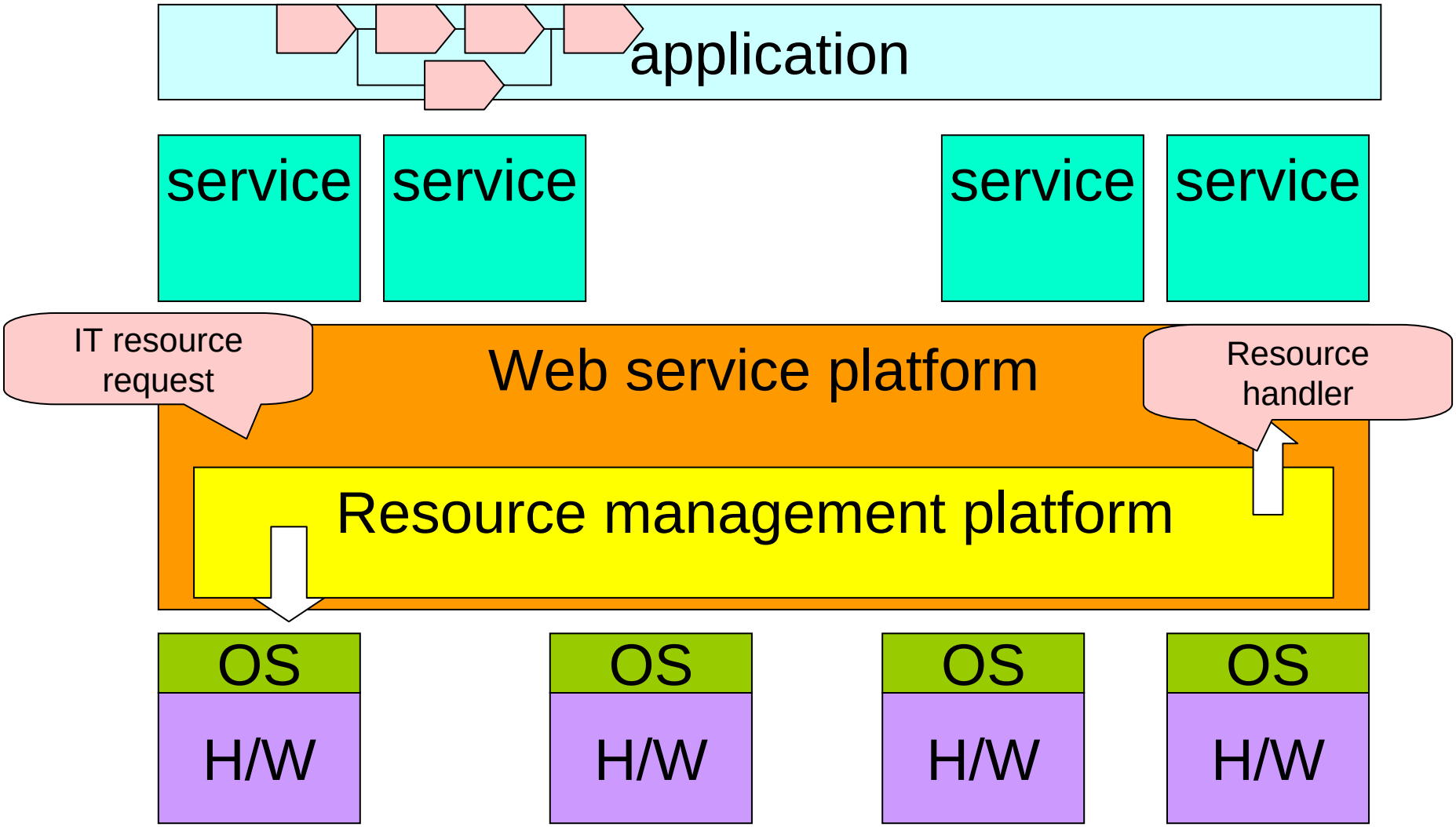
- Split an application into client and server part
- Each runs on separate but networked machines
- Apart logic from the program, servers may be shared

Introducing Web service



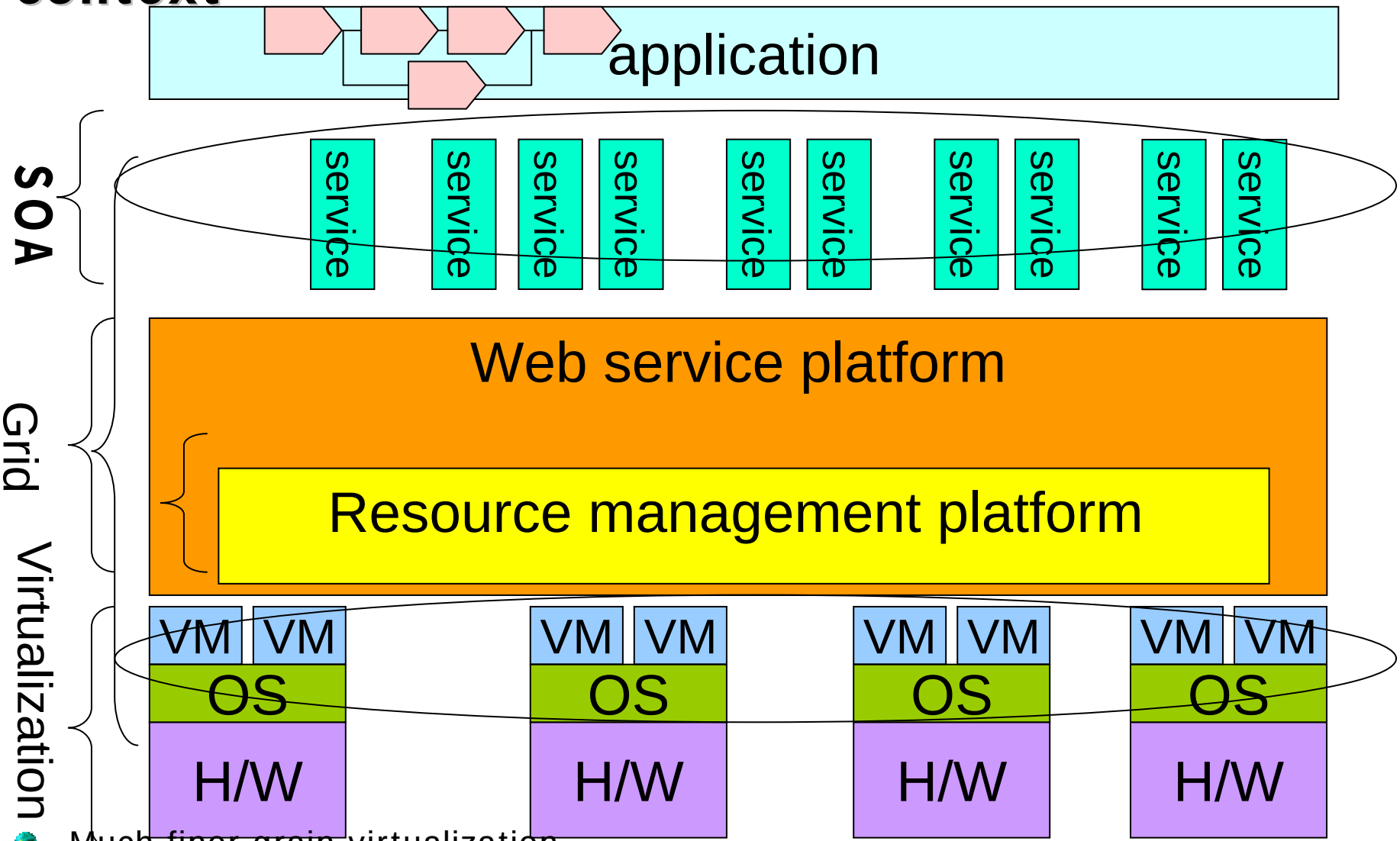
- Apart application logic from service component
- An Application consists of a set of services
- But every service sticks on a system (server)

Grid -



- Apart logical resources from physical hardware
- Resource consist of a set of logical resources

Many “Grid” definitions according to a different context



- Much finer grain virtualization
- Multiple services run on a same h/w

OK, now entering the AIST-SOA

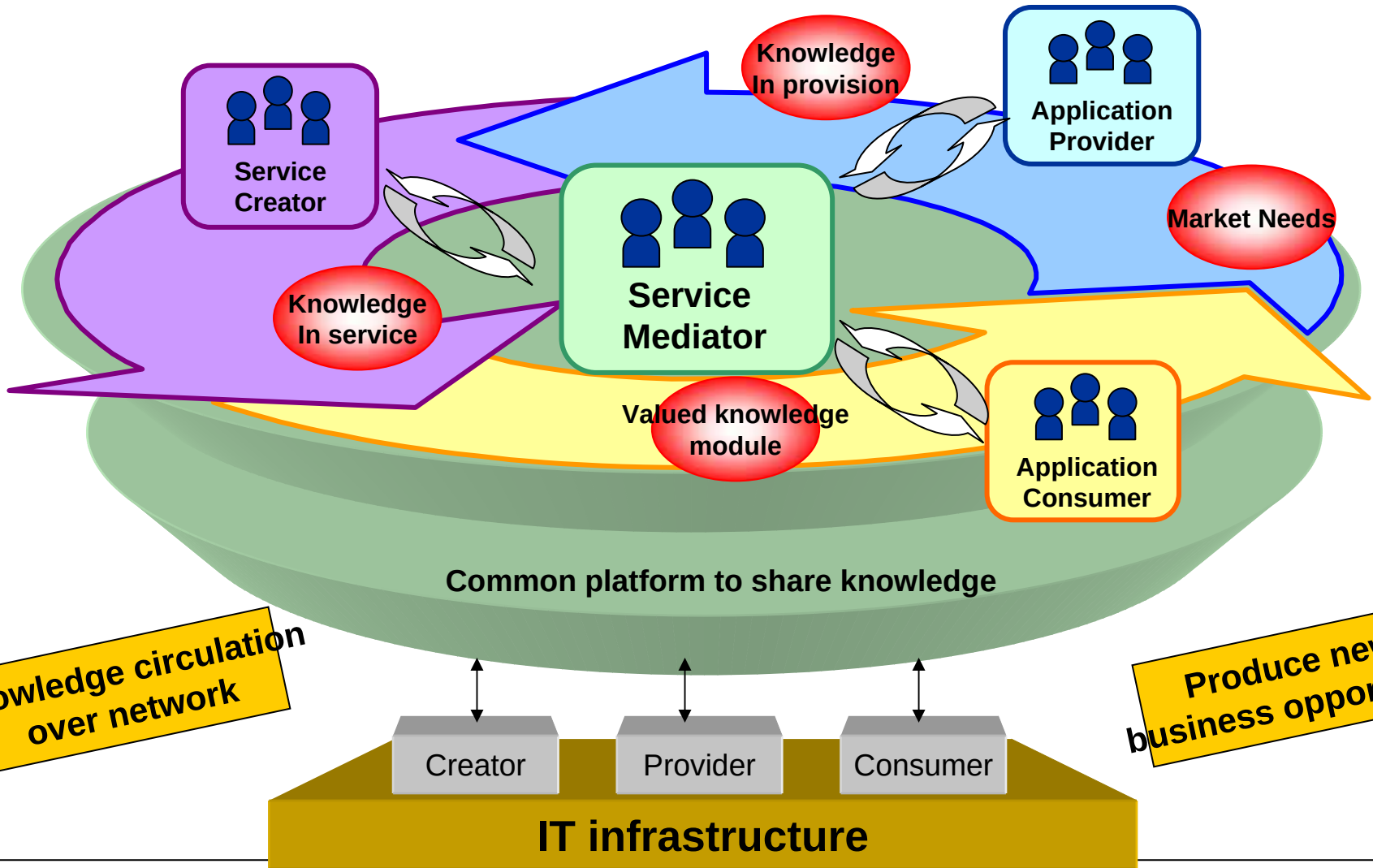
Perfect Match between
Grid and Semantic technology
(GTRC & ITRI, AIST)

AIST SOA project goal

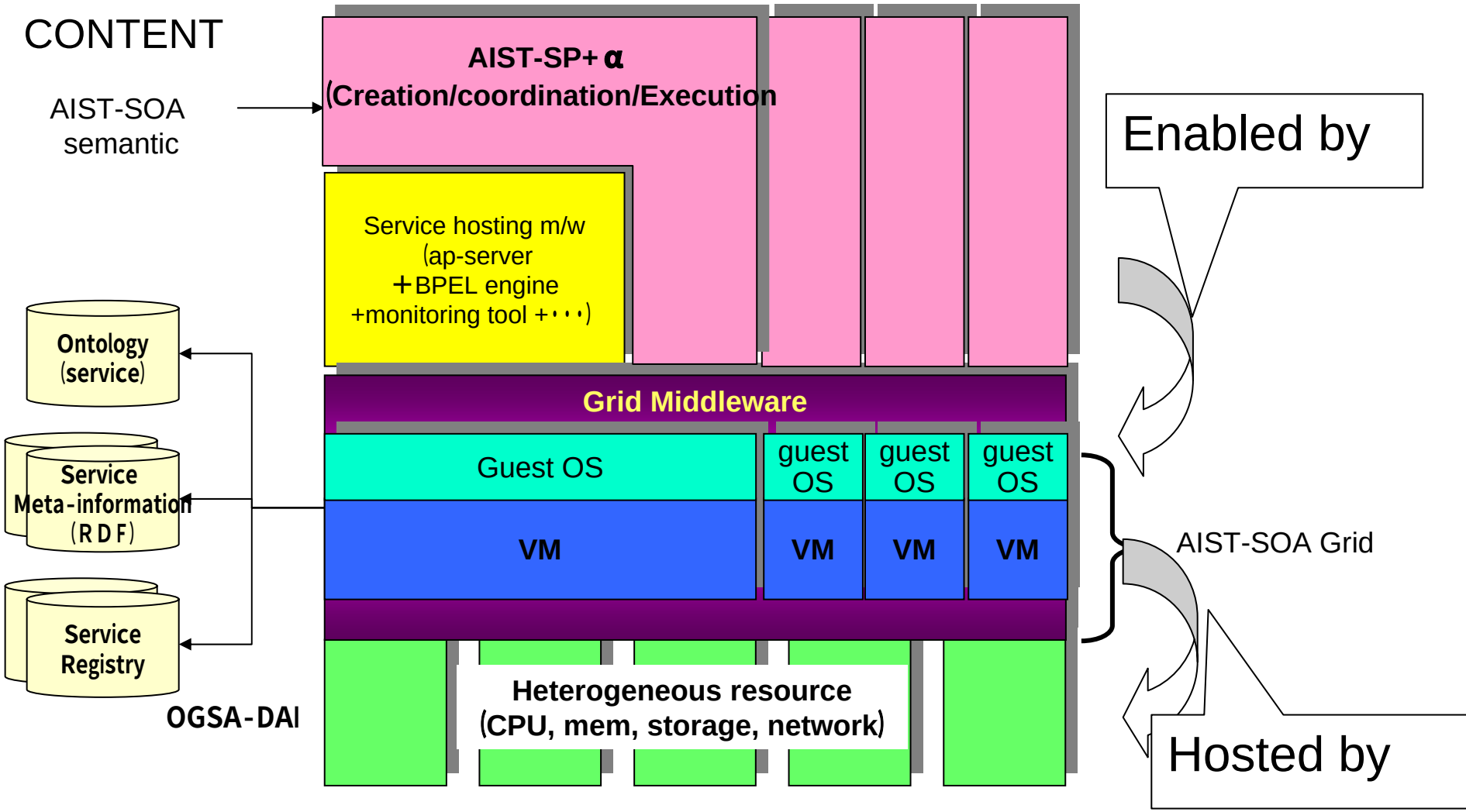
- Considerations:
  - Premium QoS for Disaster Recovery Center network
    - Not be affected by hot spots of general traffic
  - Availability of not fully used Data center
    - e.g. Okinawa's data centers are designed for disaster recovery backup
  - As research, unnecessary to consider legacy applications
    - Put a new wine in old bottles ☺
  - Sets of Blade servers are core resource in data centers
    - Well matured in local management system

AIST-SOA: a big picture

AIST-SOA intend to share knowledge and drives new business opportunity

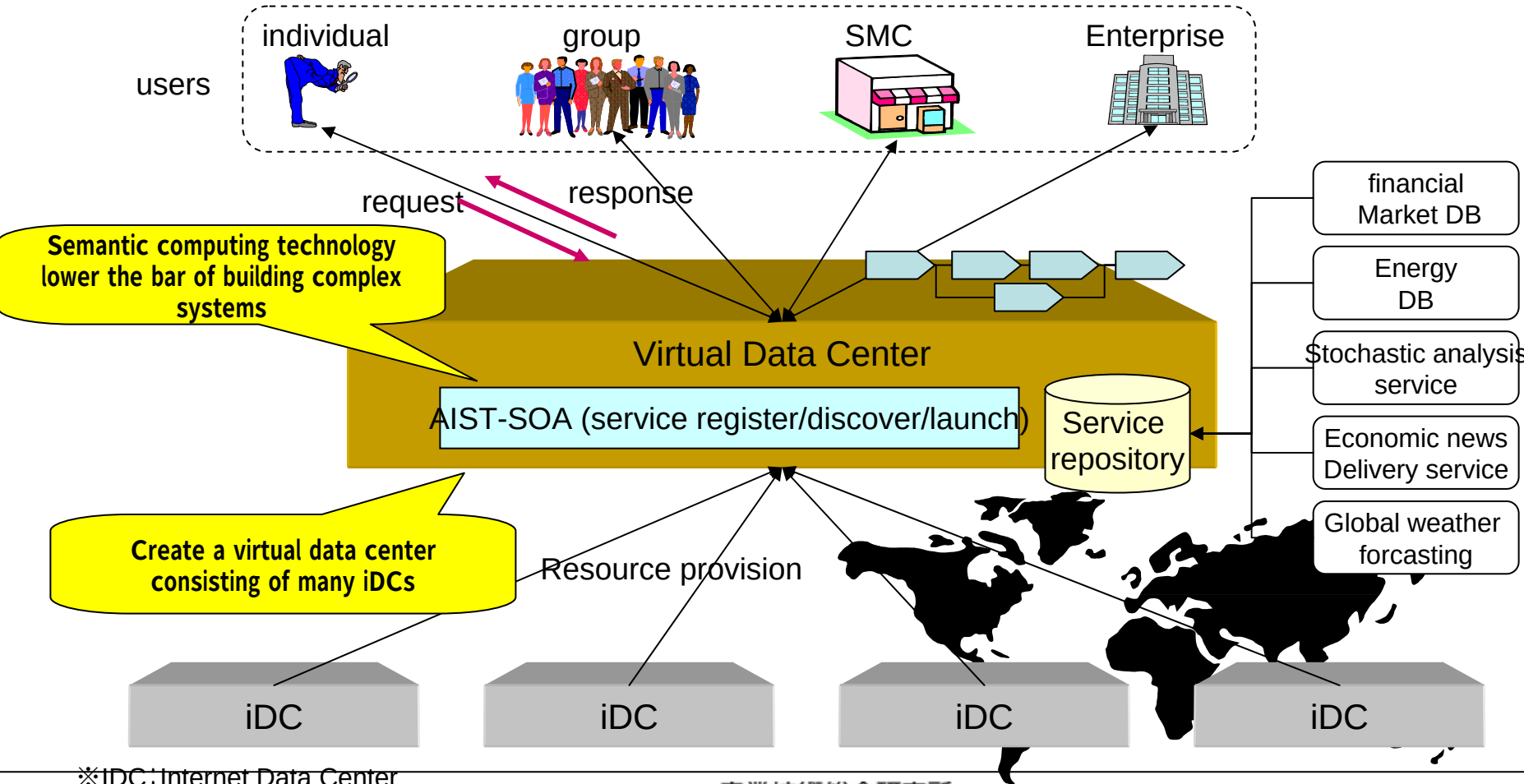


AIST-SOA internal architecture (bottom view)



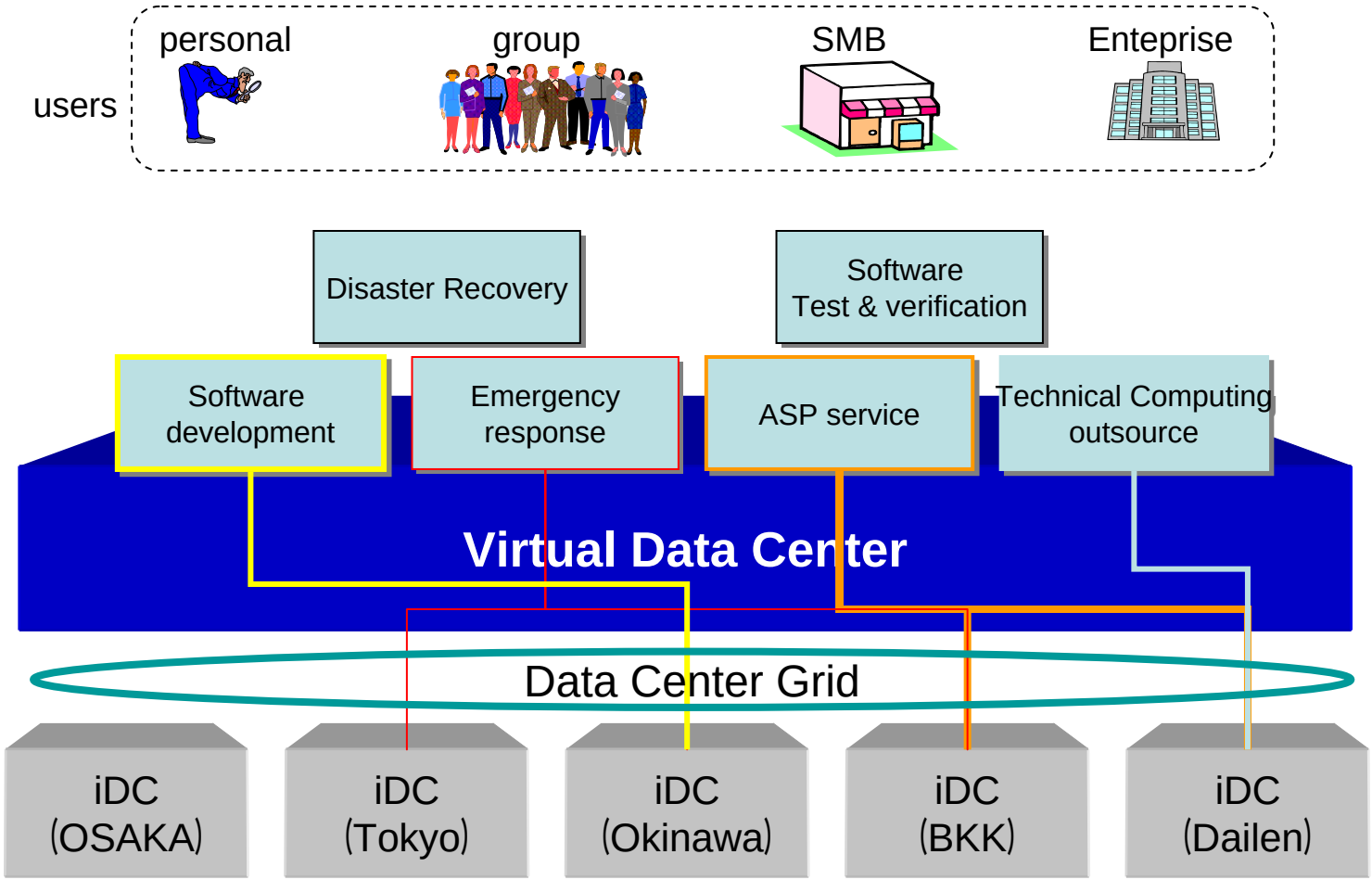
AIST-SOA enables virtual data center (VDC)

- Virtual Data Center provides a single resource service interface infrastructure as if it is a BIG and SCALABLE data center to perform services
- AIST-SOA includes a middleware package to produce a virtual data center based on SOA concept
- AIST-SOA does NOT intend to develop a competitive software with major IT venders so called “SOA”



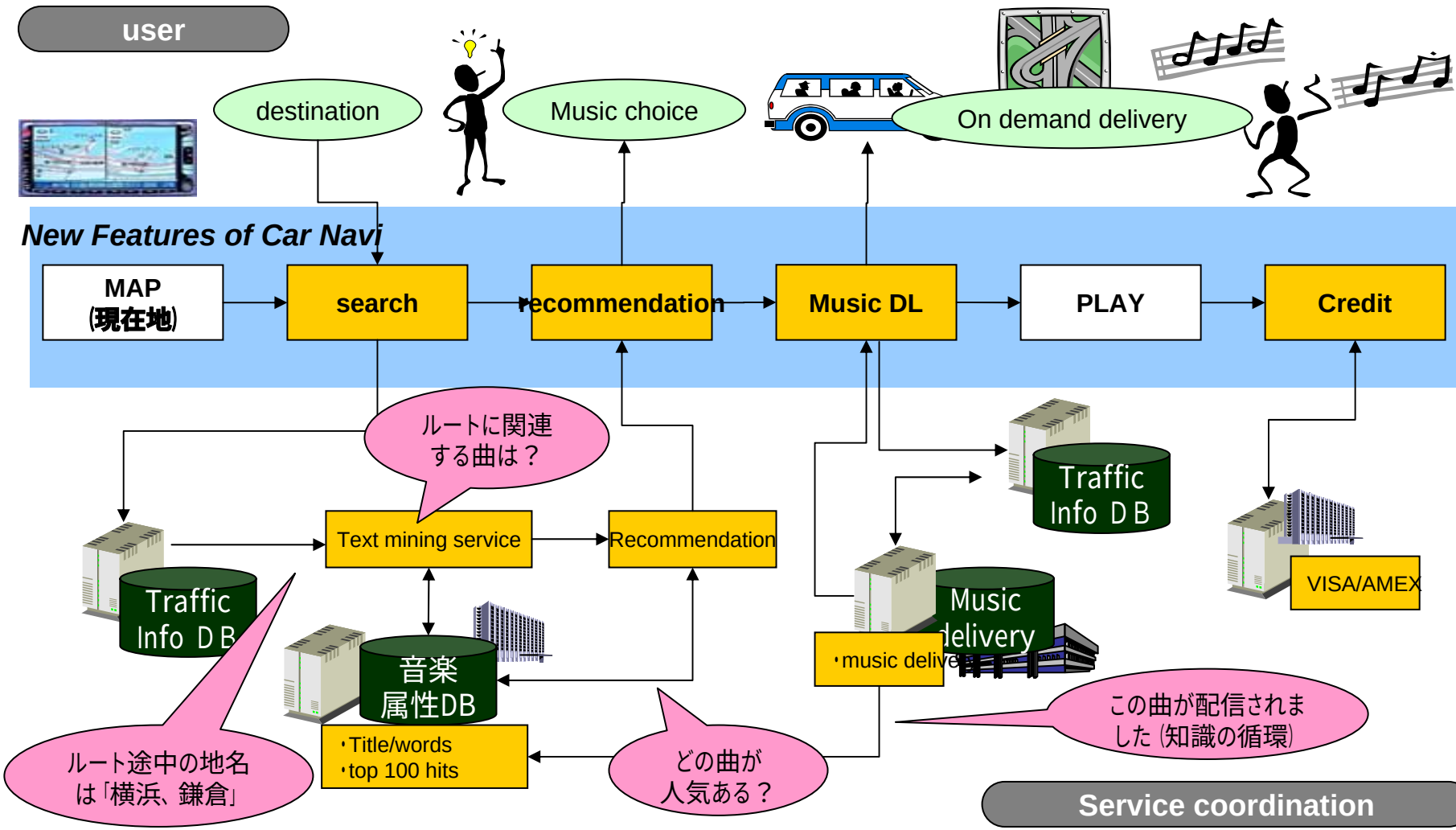
※IDC：Internet Data Center

Grid evolution: Virtual Data Center



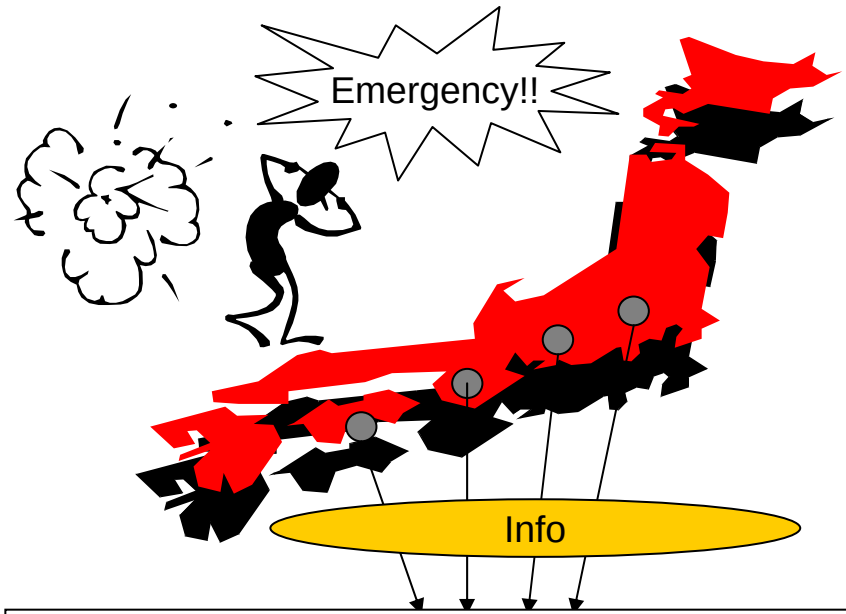
※IDC：Internet Data center

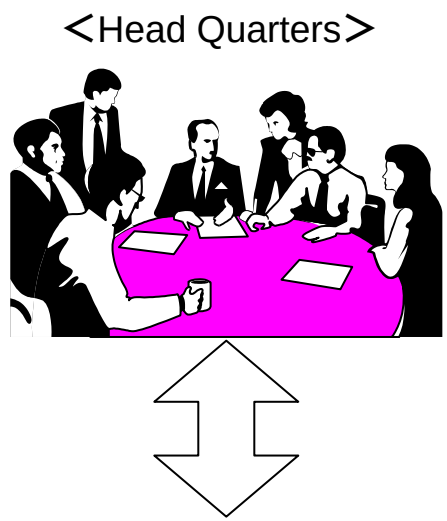
Use case scenario・・・①Car Navi／Music Delivery

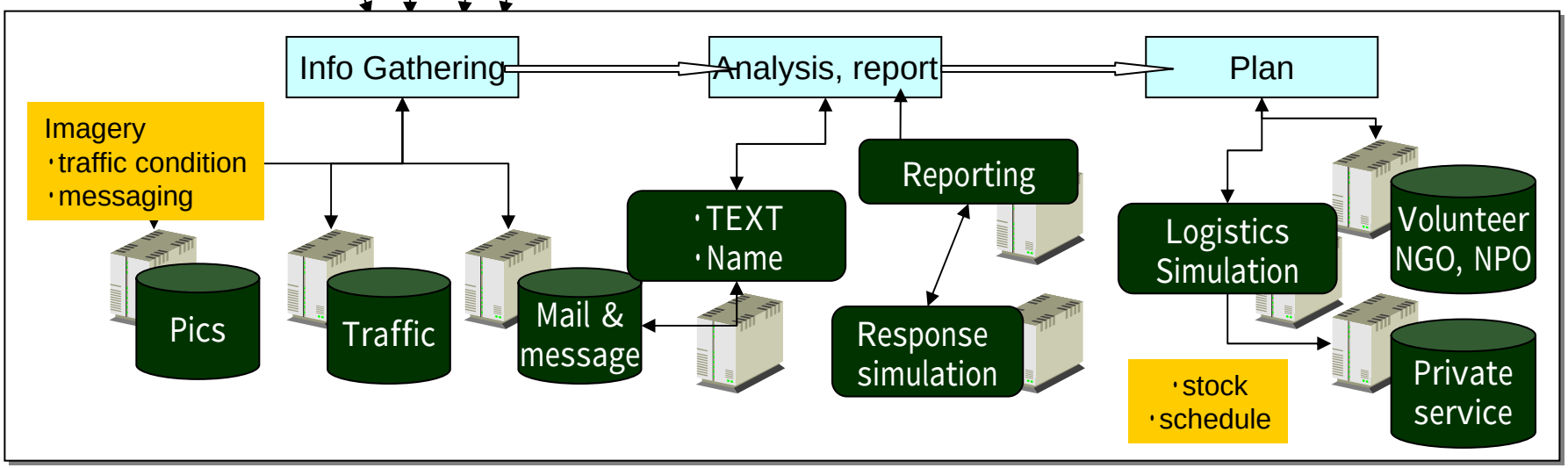


既存の膨大なデータベースを活用して、新たなアプリケーションを作ることが可能

use case scenario・・・② Emergency response team



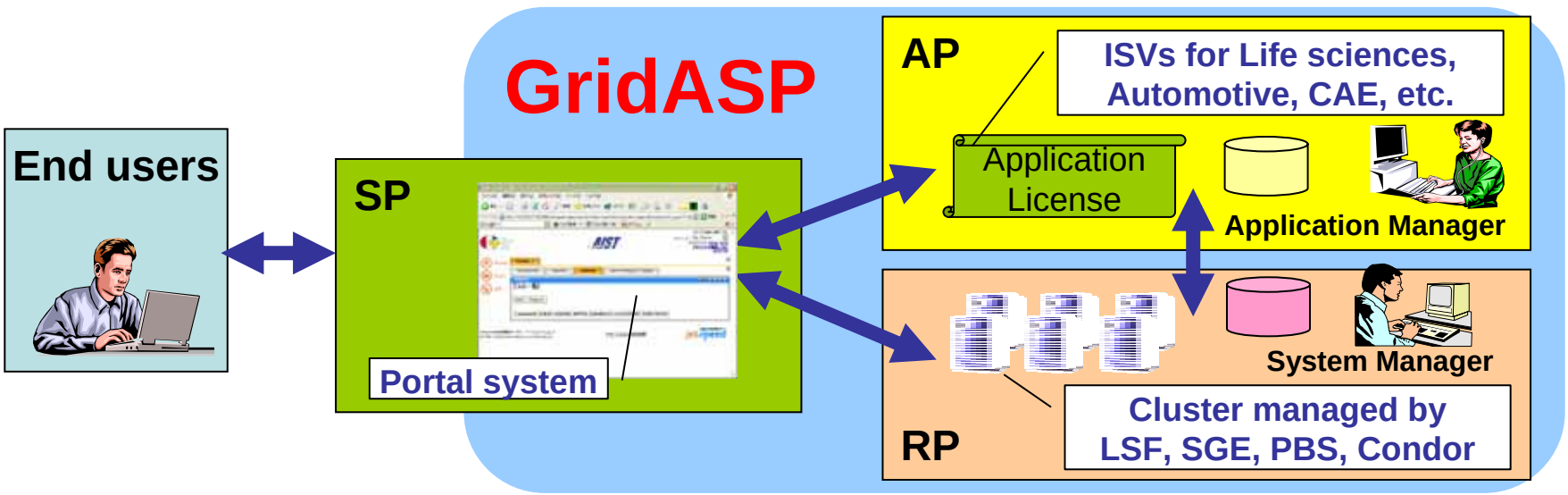




緊急時に必要な体制を、既存の知識を活用して短時間に確保

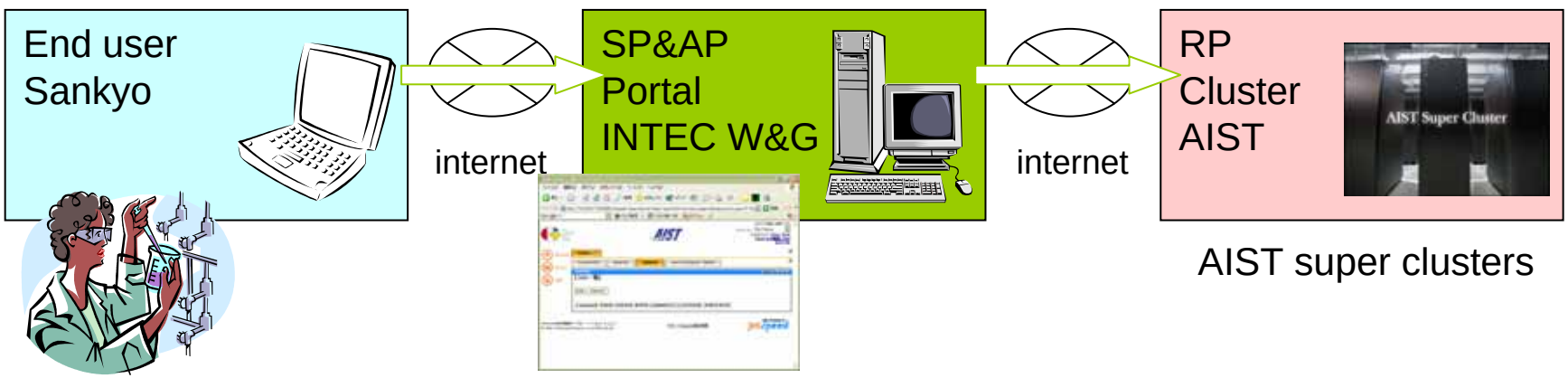
Use case scenario・・・ ③ GridASP™

- The GridASP is a utility framework for grid-enabled Application Service Providers (ASP) that supports technical enterprise applications
- Three independent organizations federate as the ASP
  - AP (Application Provider)
    - Application packages and license management
  - RP (Resource Provider)
    - Resource management and job execution
  - SP (Service Provider)
    - Web portal and mediation between users and RP



Not just a PAPER WORK !

- Verification of functionality (2005/10 – 2006/2)
  - Application: computational quantum chemistry
  - Evaluation of the GridASP with different points of view, system integration, operation, and use
  - Collaboration with private Companies
    - End user: SANKYO CO., LTD. (pharmaceuticals industry)
    - Portal operation: INTEC web and Genome Informatics Corporation
    - System Integration: Business Search Technologies Corporation
- Feasibility study in realistic situation (2005/11-)
  - **4** Commercial applications, CAE, CFD, etc. and **3** free applications, Chemistry, CG, Bio-, etc.
  - Resources in the **2** commercial Data Centers and AIST Super Cluster
  - **4** Portals by private companies
  - **2** System integrators
- Evaluation items
  - Use by actual users
  - Long period operation
  - Accounting information



Summary

- E-Infrastructure is NOT just for e-Science
- From local grid to coordinated (!= global/open) grid
- E-Infrastructure enabled by utility computing
- Opens potential new business market for SMBs
- AIST SOA is a pilot project that people use IT like electricity

The Project is OPEN to everyone
You, experts here, are always welcome

Thank You!