Recent Activities on International Grid Trust Federation

Yoshio Tanaka (yoshio.tanaka@aist.go.jp)
APGrid PMA, Chair
Grid Technology Research Center,
AIST, Japan

Grid Technology Research Center AIST

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- **Introduction of Grid**
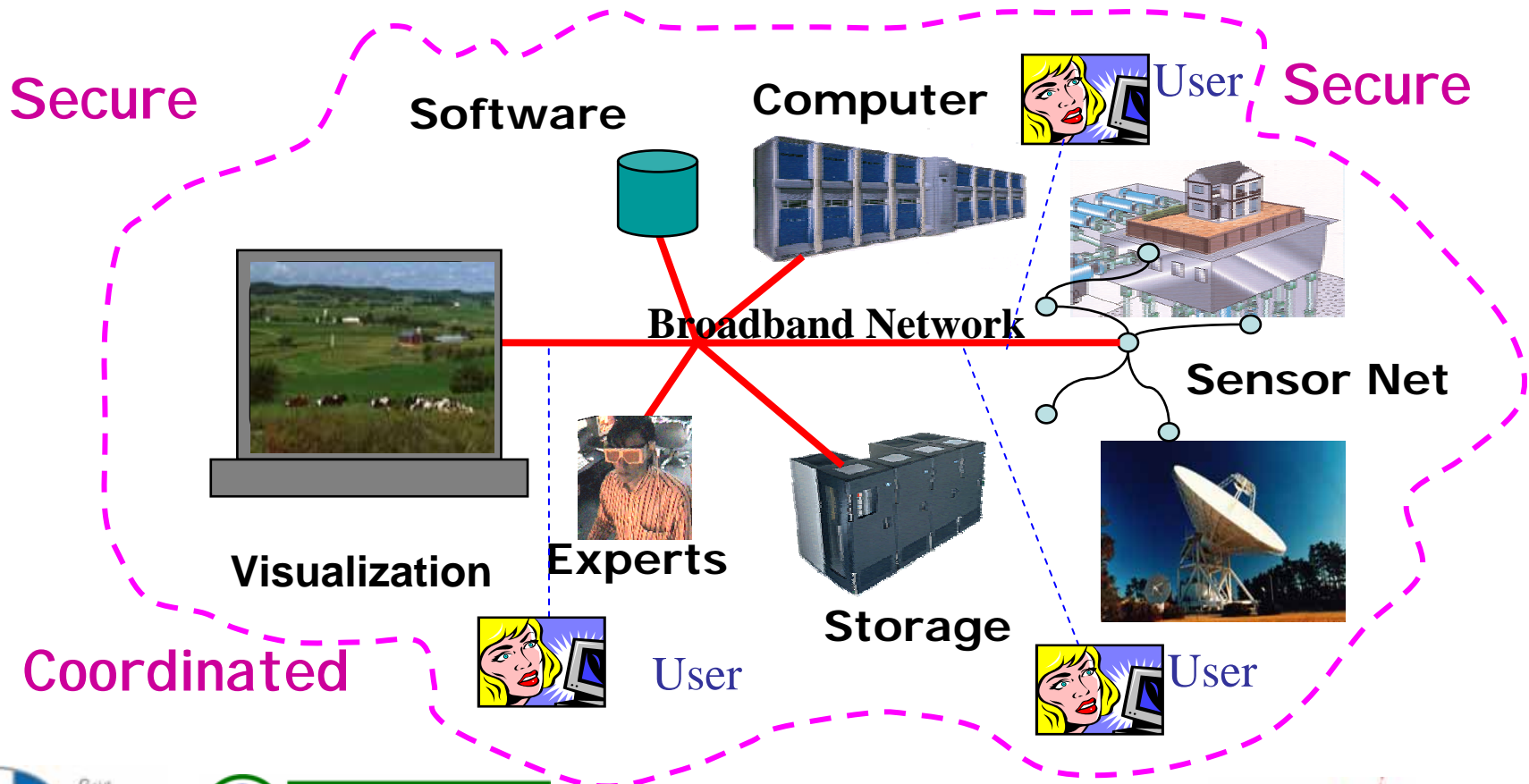- **Grid Security**
  - Status and problems
- **How to implement trust federation**
  - Policy Management Authority
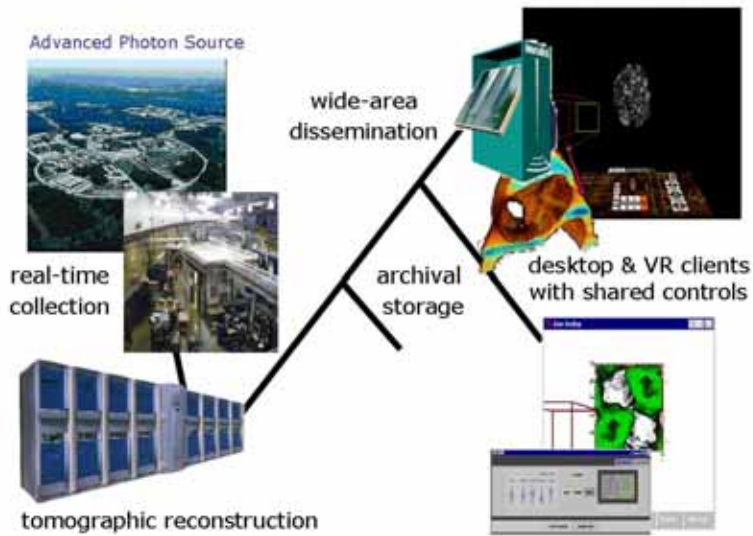 - International Grid Trust Federation
- **Summary**

What is Grid?

- **Flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources**
  - resources include not only computers but various kinds of resources such as databases, networks, sensors, etc.

Secure

Secure

Coordinated

Software

Computer

User

User

User

Broadband Network

Visualization

Experts

Storage

Sensor Net

What Grid makes it possible?

🌐 Online Access to Remote Instruments

🌐 Petabyte-scale Data Analysis
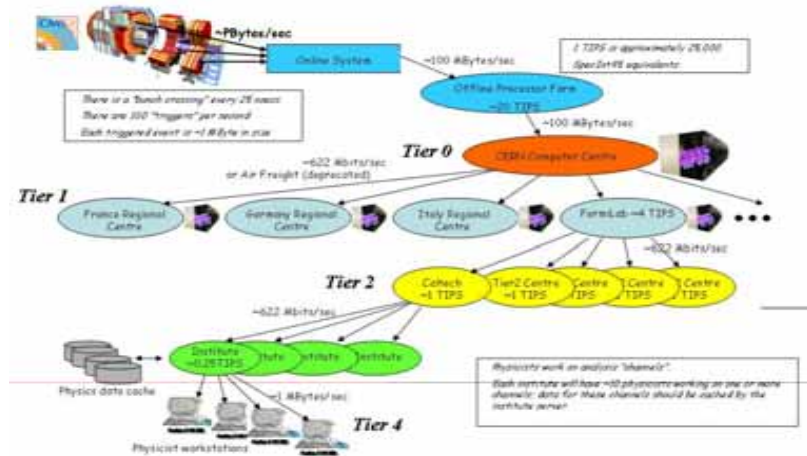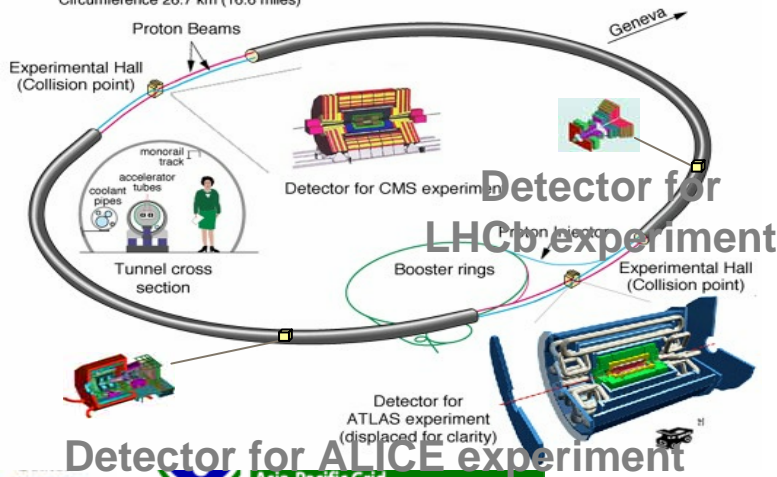
Image courtesy Harvey Newman, Caltech

Large-scale Distributed Computing
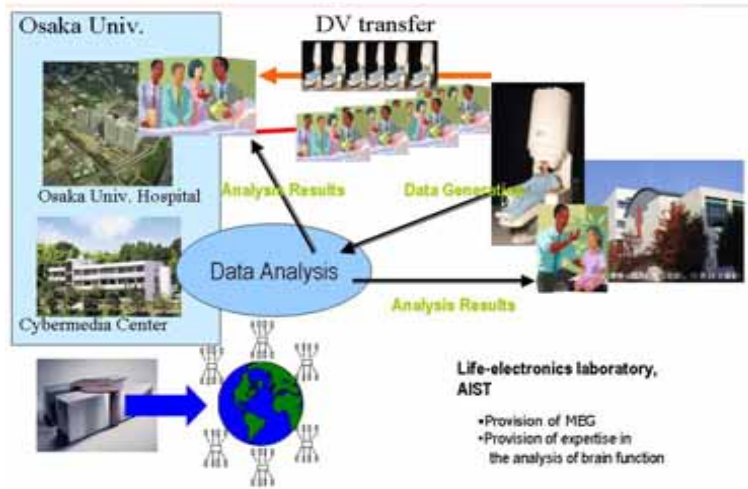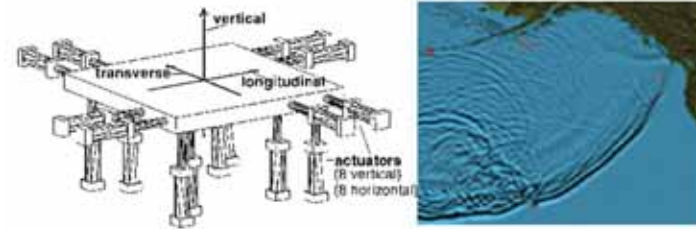
Large-scale Metacomputing

What Grid makes it possible? (cont'd)

High Throughput Computing

Mathematicians Solve NUG30

- Looking for the solution to the NUG30 quadratic assignment problem
- An informal collaboration of mathematicians and computer scientists
- Condor-G delivered 3.46E8 CPU seconds in 7 days (peak 1009 processors) in U.S. and Italy (8 sites)
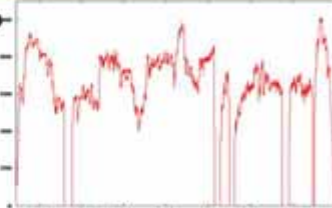
14,5,28,24,1,3,16,15,
10,9,21,2,4,29,25,22,
13,26,17,30,6,20,19,
8,18,7,27,12,11,23

MetaNEOS: Argonne, Iowa, Northwestern, Wisconsin

Climate simulation using Ninf-G

Ninf-G

Weather Portal

Client (AIST)

3D Visualization System (by NCHC)

Results on the Web

APGrid PRAGMA
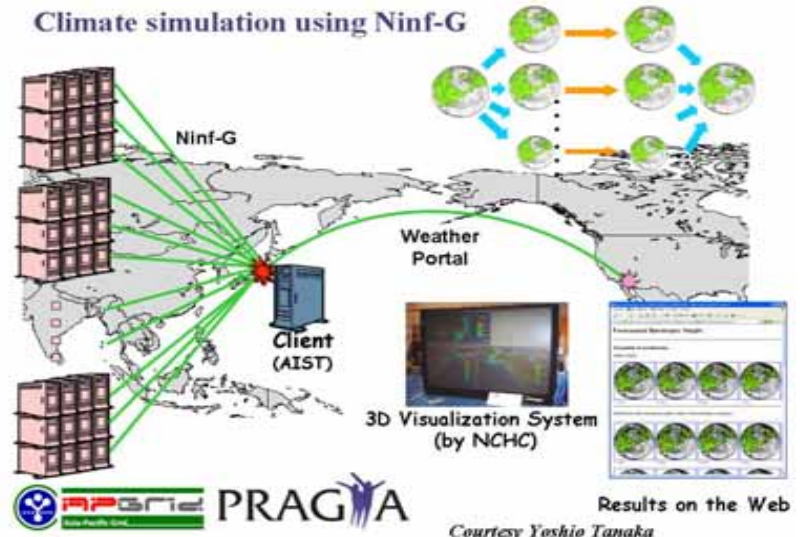
Courtesy Yoshio Tanaka

Integration of Human Resources

Asia-Pacific Grid

The Grid: A Brief History

- **Early 90s**
  - ▶ Gigabit testbeds, metacomputing
- **Mid to late 90s**
  - ▶ Early experiments, academic software projects, application experiments
- **Now**
  - ▶ Dozens of application communities & projects in scientific and technical computing
  - ▶ Major infrastructure deployments
  - ▶ De facto standard technology: Globus Toolkit™
  - ▶ Growing industrial interest
  - ▶ Global Grid Forum: ~1000 people, 30+ countries
- **Status**
  - ▶ Grid is going to be a production phase
    - ◉ High-speed network + High-performance computers
    - ◉ Grid middleware become mature

Large-scale QM/MD simulation on AIST-TeraGrid @ SC2004

P32 (512 CPU)

QM simulation
MD Simulation based on DFT

P32 (512 CPU)

TCS (512 CPU) @ PSC

F32 (256 CPU)

Run the simulation for more than 10 hours on 1793 cpus on AIST Super Cluster and TeraGrid
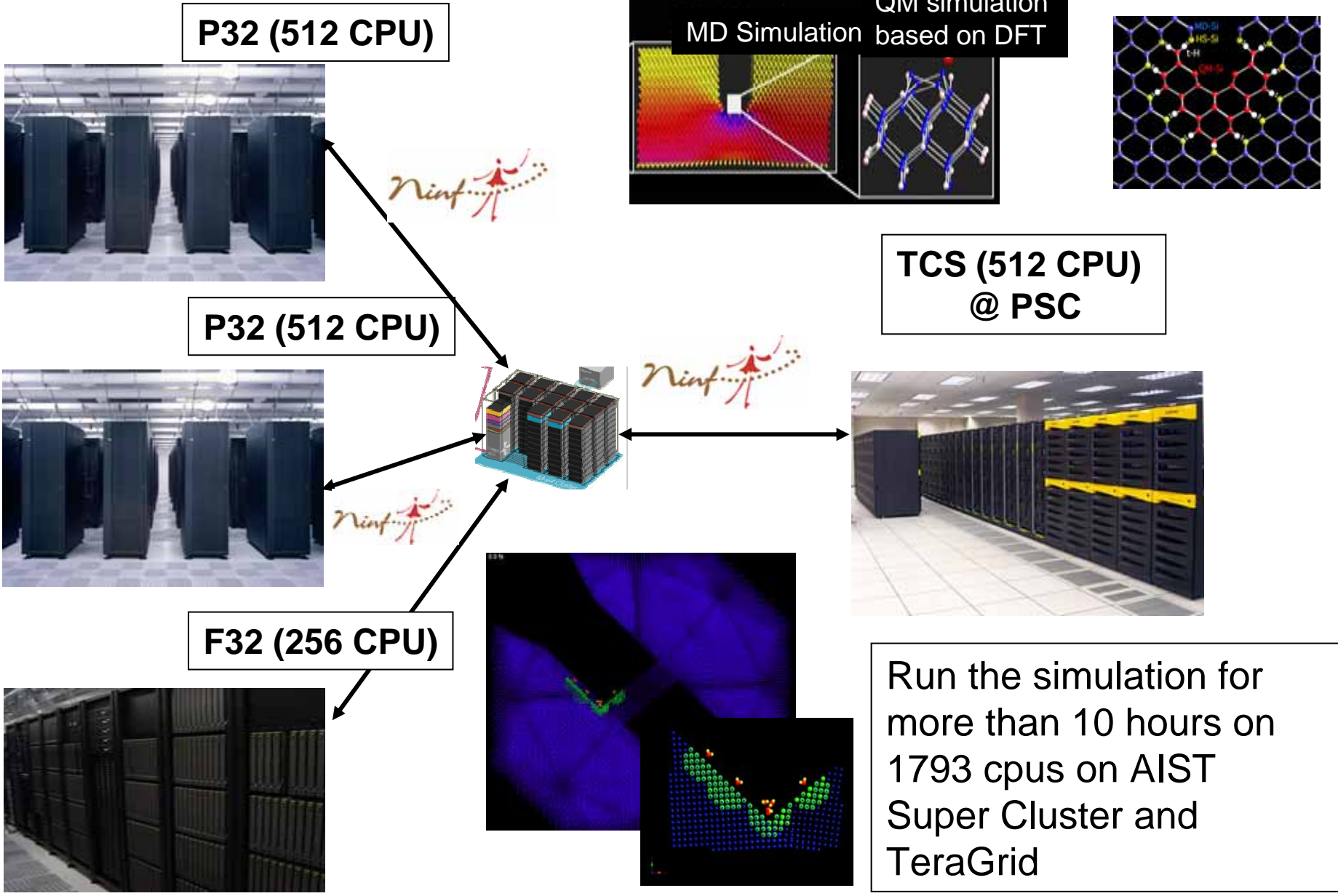
Grid Security

- **GSI is based on X.509 certificates and PKI.**
  - ► Most organizations are launching their own Certificate Authorities (CA) for issuing end-entity certificates for users, hosts, services.
  - ► Proxy Certificates (RFC3820) for single sign on and delegation
- **A Virtual Organization (VO) is implemented by federations of multiple security domains.**
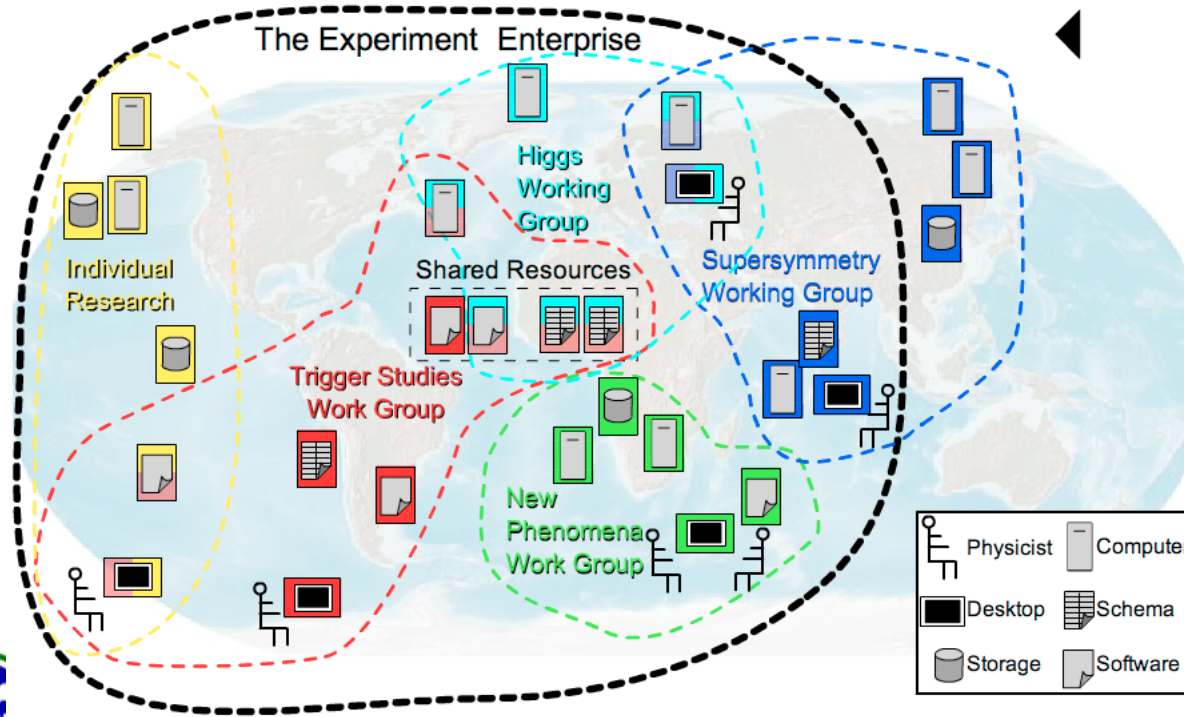
Grid Security (cont'd)
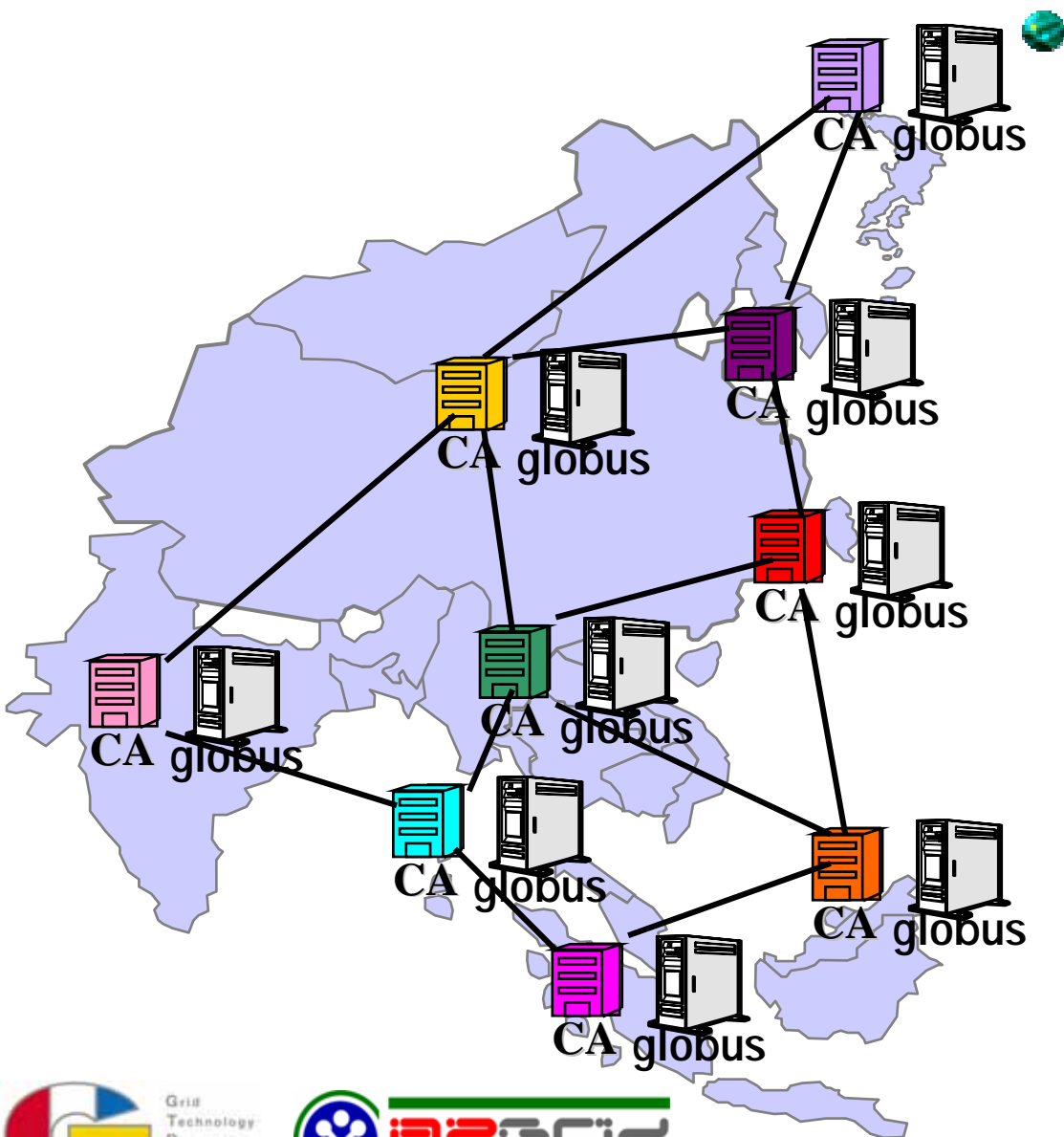
The most popular multi-domain PKI architecture (in Grid) is cross-recognition

- ▶ Independent CAs would <u>somehow be licensed or audited</u> by a mutually recognized trusted authority.
- ▶ e.g.
  - AIST trusts KISTI CA operated by KISTI, Korea.
  - KISTI trusts AIST GRID CA operated by AIST.

Grids in Asia Pacific

Architecture, technology
- Based on GT2
  - Allow multiple CAs
  - Build MDS Tree
- Grid middleware/tools from Asia Pacific
  - Ninf-G (GridRPC programming)
  - Nimrod-G (parametric modeling system)
  - SCMSWeb (resource monitoring)
  - Grid Data Farm (Grid File System), etc.

Status
- 22 organizations (10 countries)
- 23 clusters (1688 CPUs)

Problems

- **Problems of authentication federations**
  - All CAs should keep the same level of operation.
    - How the CA is securely operated?
      - Use HSM? Dedicated CA room?
    - …
  - All CAs should have no conflict in policy
    - How the CA identifies end entities?
      - Use face-to-face meeting? Telephone? etc.
    - …
- **Policy Management Authority (PMA) is a coordination body of CA policies and operations.**

APGrid PMA: Asia Pacific Grid PMA

- **General Policy Management Authority in Asia Pacific**
  - ▶ Not specific for ApGrid, Not specific for PRAGMA…
- **Launched on June 1st, 2004**
- **Defines minimum CA requirements**
- **APGrid PMA approved that we accept two levels of CA:**
  - ▶ Experimental-level CA
    - Alternative of the Globus CA
    - Can be trusted within A-P communities
  - ▶ Production-level CA
    - Strict management is necessary
    - Expected to be trusted by international communities

APGridPMA: Status (Members and CAs)

Affiliation	Name	Production CA	Experimental CA
AIST / Japan	Yoshio Tanaka	in operation	will close
ASCC / Taiwan	Eric Yen	in operation	none
KISTI / Korea	Jae-Hyuck Kwak	in operation	in operation
CAS / China	Kai Nan	in operation	in operation
IHEP / China	Gonxing Sun	in operation	none
VPAC/Australia	Damon Smith	planning	in operation
NAREGI/Japan	Shinji Shimojo	Planning	in operation
NCHC / Taiwan	Julian Yu-Chung Chen	planning	in operation
Osaka U / Japan	Susumu Date	planning	in operation
SDSC / USA	Mason Katz	no plan	planning
HKU / HongKong	Chen Lin, Elaine	no plan	in operation
U of Hyd / India	Arun Agarwal	no plan	in operation
USM / Malaysia	Boon Yaik	no plan	in operation
BII / Singapore	Kishore Sakharkar	no plan	in operation

APGridPMA: Status

- 🌐 **7 ex officio members, 7 general members**
- 🌐 **Regular (monthly) VTC.**
- 🌐 **(physical) face-to-face meeting once per year.**
- 🌐 **We have started mutual audit**
  - ▶ NAREGI PKI WG has subjectively selected criteria for auditing Grid CAs.
    - ℮ based on
      - ✚ AICPA/CICA WebTrust$^{SM/TM}$ Program for Certification Authority
      - ✚ minimum CA requirements of APGrid PMA and EUGrid PMA
  - ▶ AIST CA has audited Academia Sinica CA (Taiwan)
  - ▶ All APGrid PMA Production-level CAs will be audited by external auditors in a year.
  - ▶ Audit checklist and experiences will be documented at the GGF CAOPs WG.

Status of PMAs

- **Currently, there are three regional PMAs**
  - EUGrid PMA (established May 2004)
    - Former: EUDG WP6 CA Coordination Group (started in 2002)
  - TAG PMA (going to be established)
    - Former: DOEGrid PMA (started in 2002)
  - APGrid PMA (established June 2004)
    - Unofficially started in 2003
- **Each regional PMA is responsible for**
  - coordination of CA policy within the region
  - coordination of CA policy with the other regional PMAs
- **Three PMAs are the founders of the International Grid Trust Federation (IGTF)**

Role of PMAs (examples)

- **Can EGEE trust your CA?**
  - How is the procedure for reviewing/accrediting your CA?
  - Does your CA need to be reviewed by individual organizations in EGEE?
  - If the other CA in Asia wish to be trusted by EGEE, is separate review necessary?
  - APGridPMA will accredit your CA. EGEE does not need to review/accredit your CA.
- **Can your organization trust CAs in EGEE?**
  - How is the procedure for reviewing?
  - Do you need to review all CAs in EGEE?
  - EUGridPMA will accredit CAs. Both you and APGridPMA do not need to review/accredit CAs in EGEE.
- **If you will launch a new CA that is expected to be trusted by organizations in EGEE, how should you design policy and practices of your CA?**
  - APGrid PMA provides minimum CA requirements.

History of IGTF activities

- **GGF7@Tokyo, March 2003**
  - First meeting with EU, DOE, and AP members
  - Agreed with working on forming the Grid PMA.
    - develop minimum requirements
    - develop GridPMA charter
- **Continuous discussions between AP, EU, and TAG PMA for International Grid Trust Federation.**
  - GGF12 and EUGrid PMA meeting@Brussels, September 2004
  - GGF13@Seoul, March 2005
  - EUGridPMA meeting@Tallinn, May 2005
  - GGF14@Chicago, June 2005
  - GGF15@Boston, Oct. 2005

Status and next step of IGTF

- **Charter has been drafted by David Groep (NIKEF, EUGrid PMA Chair) and it is being reviewed by three PMAs.**
- **Start date (Dates TBD)**
  - Set up PMA@GridPMA.org
  - Repository – ESnet
  - Mailing lists - ESnet
  - First work item
    - Coordination of policies
  - Next
    - How to share CA information (CA certificates, etc.)

Some of (operational) issues to be resolved

- **How can we implement international Grid federation?**
- **Should International Grid PMA define minimum CA requirements?**
- **Should a Grid PMA audit each other's PMA?**
  - How is the contents of auditing?
- **If minimum CA requirements will be changed, that should be propagated to other PMAs.**
- **If a CA key is compromised, how revocation information should be propagated to relaying parties?**
- **…**

Summary
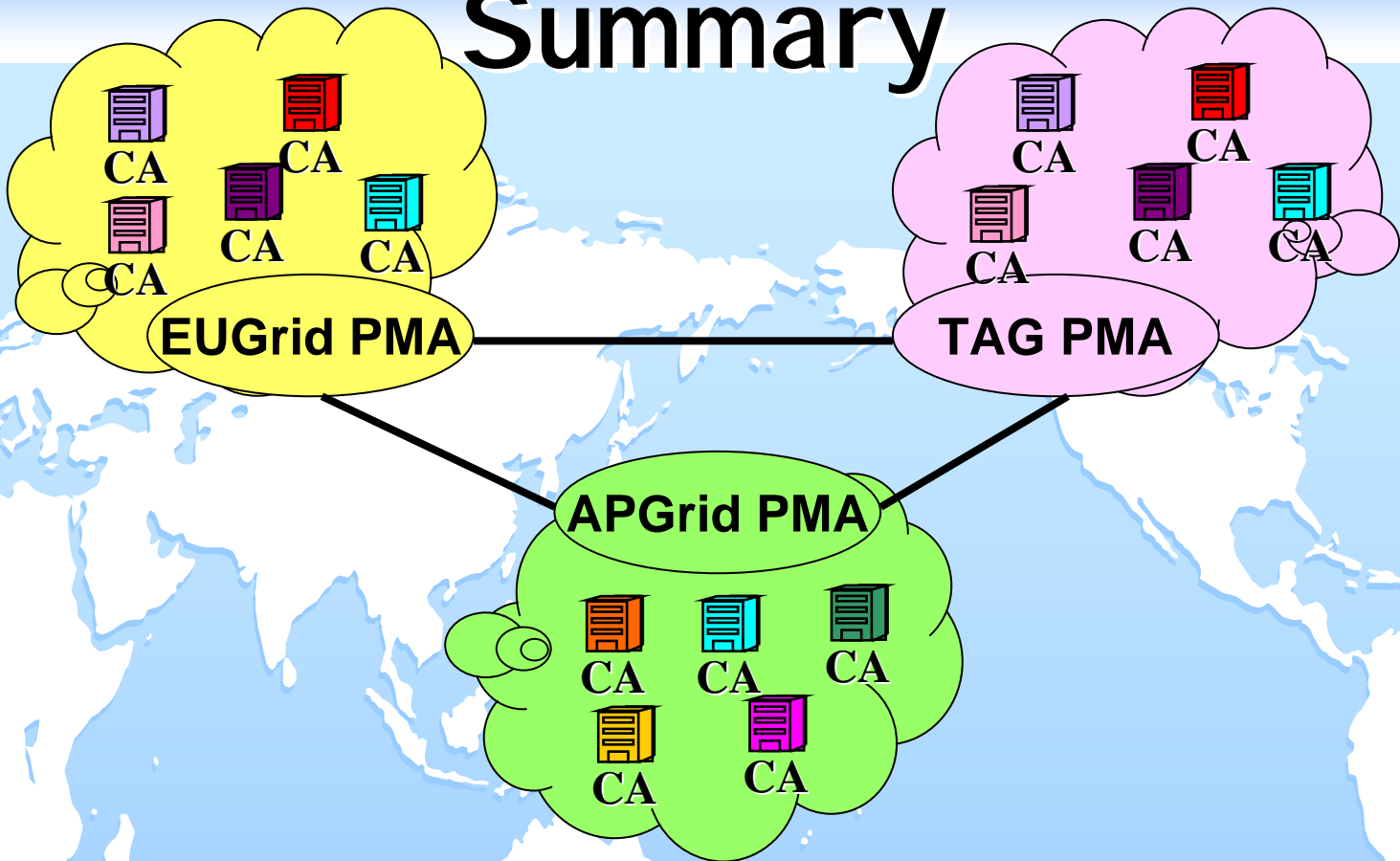
- APGridPMA is a coordination body of CA policies in Asia Pacific.
- APGridPMA is collaborating with EUGrid PMA and TAGPMA for International Grid Trust Federation.

More Information

- **APGrid PMA**
  - http://www.apgridpma.org/
- **EUGrid PMA**
  - http://www.eugridpma.org/
- **TAGPMA**
  - http://www.tagpma.org/
- **GridPMA**
  - http://www.gridpma.org/
- **ApGrid**
  - http://www.apgrid.org/
- **PRAGMA**
  - http://www.pragma-grid.net/
- **GTRC/AIST**
  - http://www.gtrc.aist.go.jp/
- **My email address**
  - yoshio.tanaka@aist.go.jp