

# Inter-cloud computing: Use cases and requirements *lessons learned 3.11*

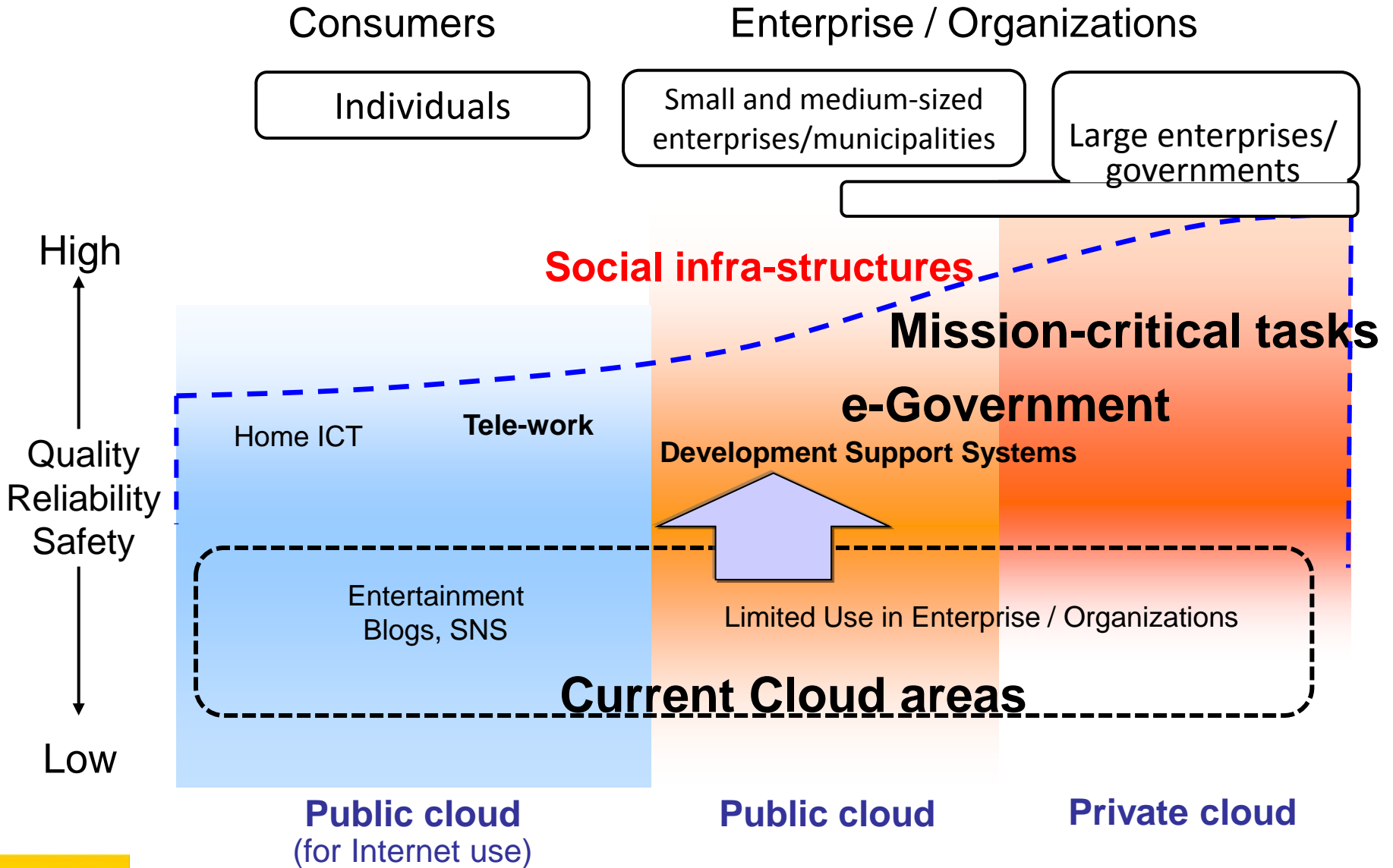
Oct 12, 2011

Global Inter-Cloud Technology Forum (GICTF)

Institute of Information Security (IISEC)

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# Secure cloud computing is promising



## Secure cloud computing for Lifeline Services

### 1. Various Quality requirements

- ✓ Availability (even in emergency situation), Latency, Bandwidth, Security, Cost, Green

### 2. Various Functional requirements

- ✓ To increase user benefits, quick delivery, etc.

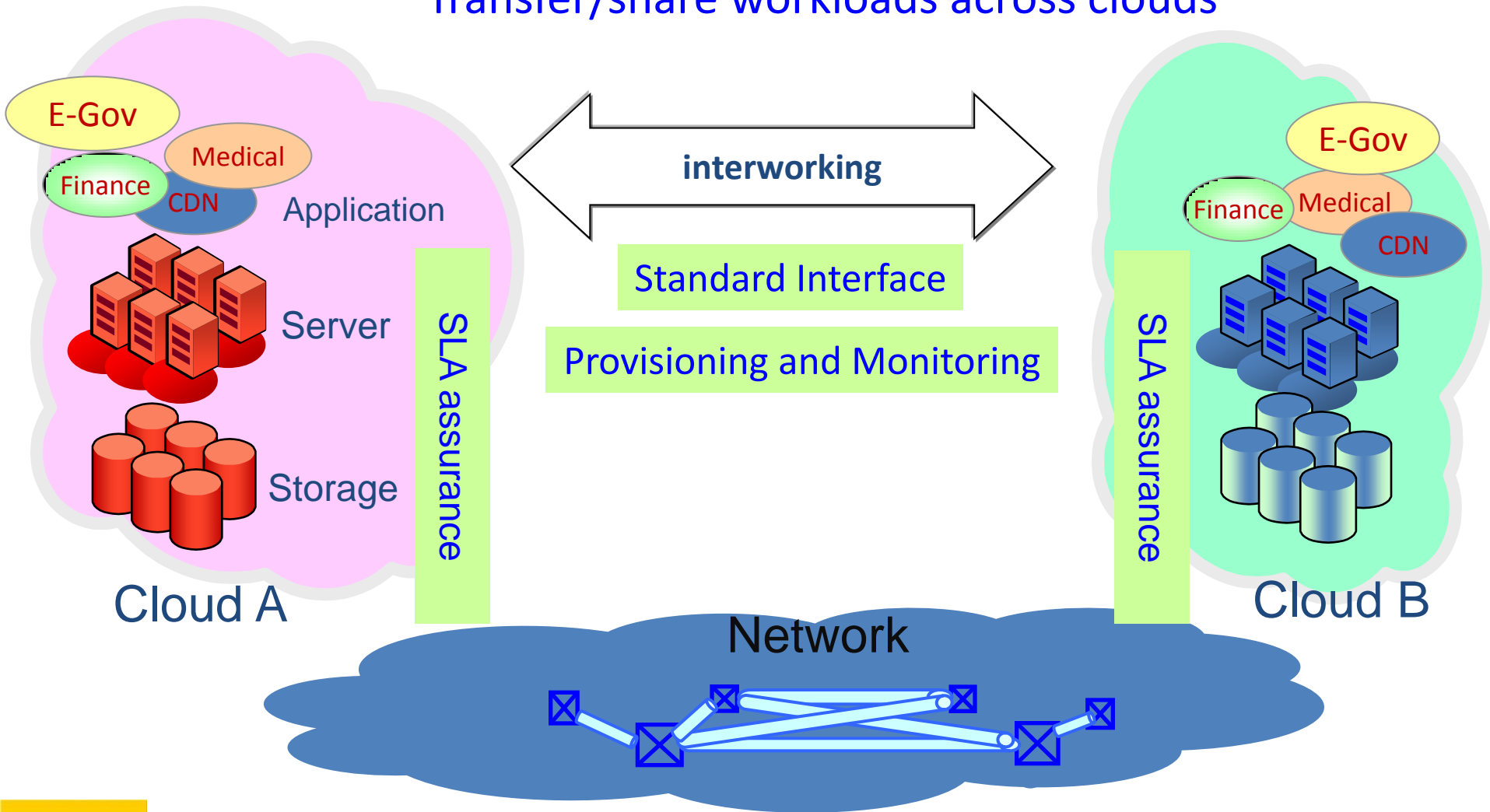


Can “single cloud” satisfy everything?

***“Inter-Cloud computing” technologies is promising.***

# Inter-cloud Computing

On-demand reassignment of cloud resources  
Transfer/share workloads across clouds



# Communication facilities were the worst affected



①基地局設備 (宮城県 松島野蒜設置)



②伝送設備 (岩手県 野田村設置)



③基地局設備 (宮城県 石巻緑町設置)



④ドコモショップ (宮城県 石巻東店)

# Communication facilities were the worst affected

- Transmission lines: 90 routes were cut off
- 18 buildings were fully destroyed, and 23 buildings were flooded
- 65000 telephone poles were destroyed by the flood



<岩手県 気仙大橋>



<宮城県 北上ビル>



<岩手県 親住居ビル>



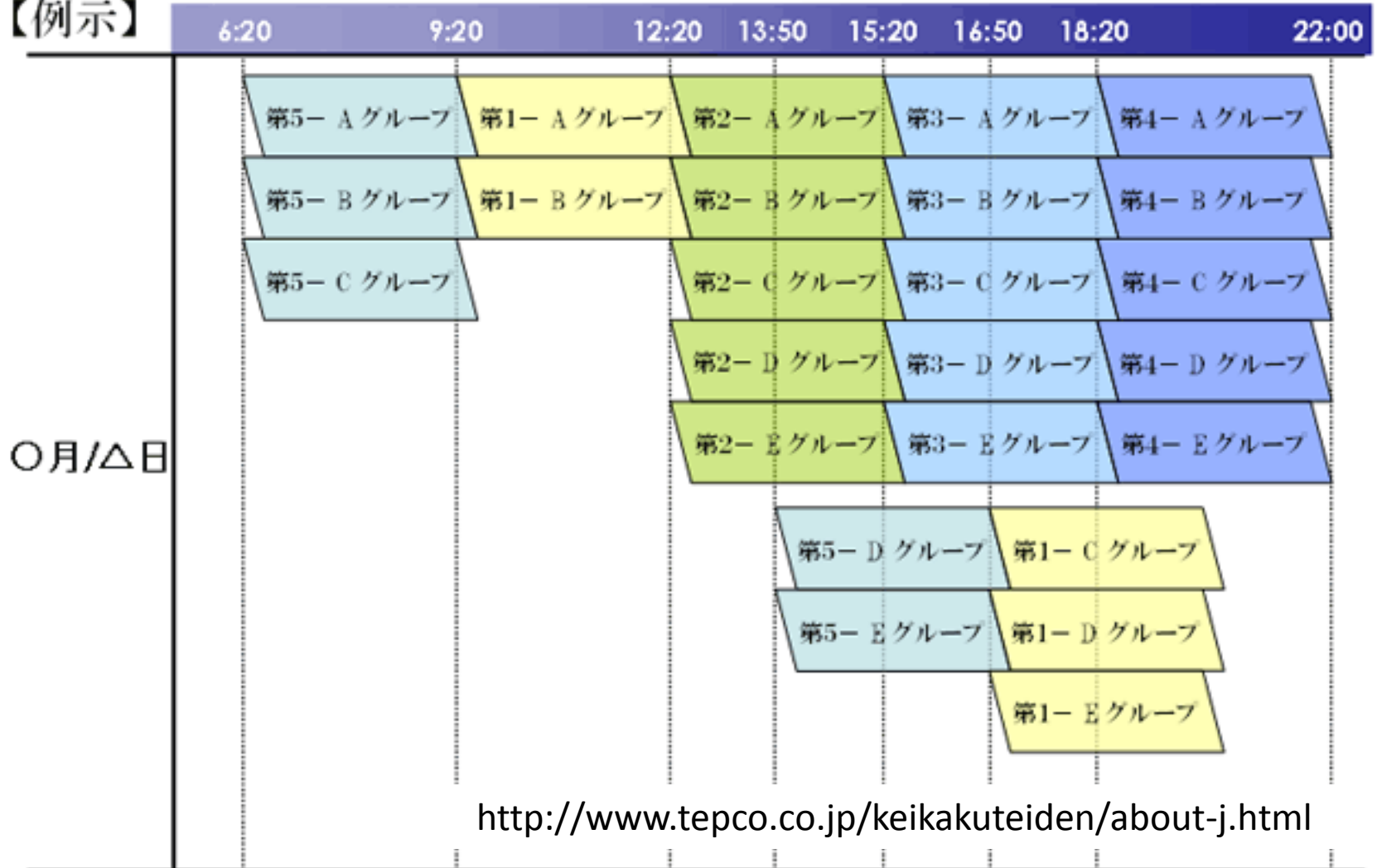
<岩手県 陸前高田エリア>



<宮城県 気仙沼エリア>

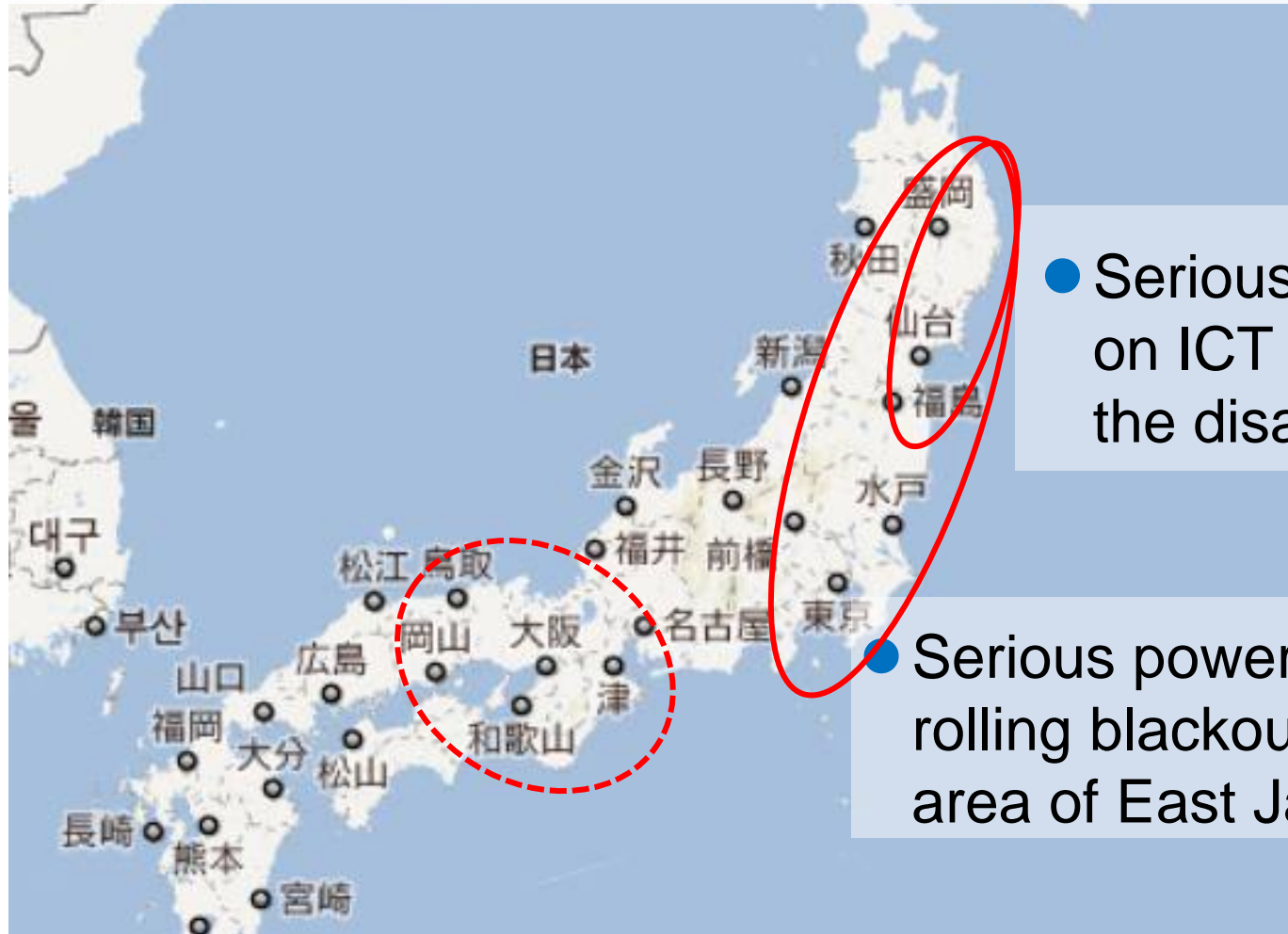
## Schedule of rolling blackout

【例示】



<http://www.tepco.co.jp/keikakuteiden/about-j.html>

## *Flexibly reassigning resources among cloud providers and network providers on a global scale*



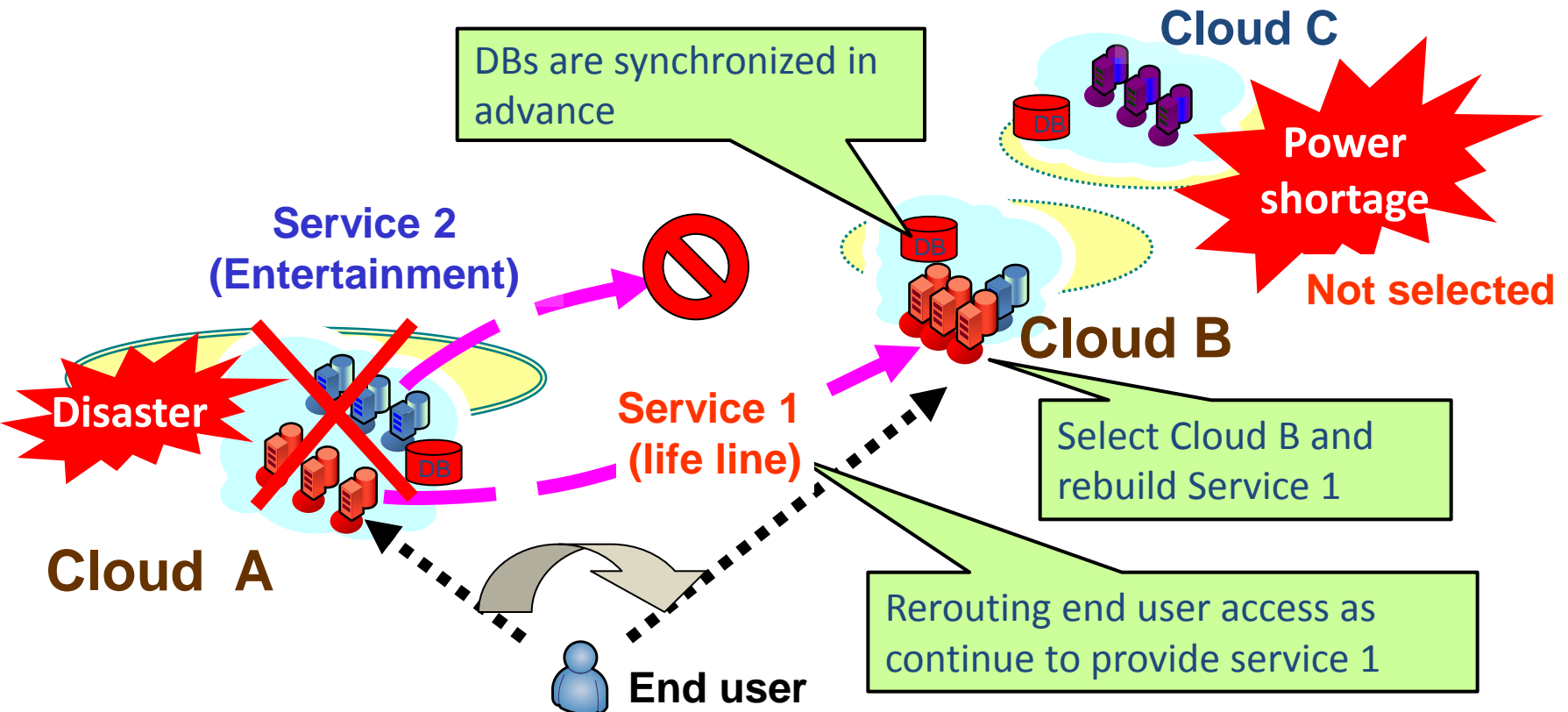
- Serious damage on ICT facilities in the disaster area

- Serious power shortage / rolling blackout in wide area of East Japan

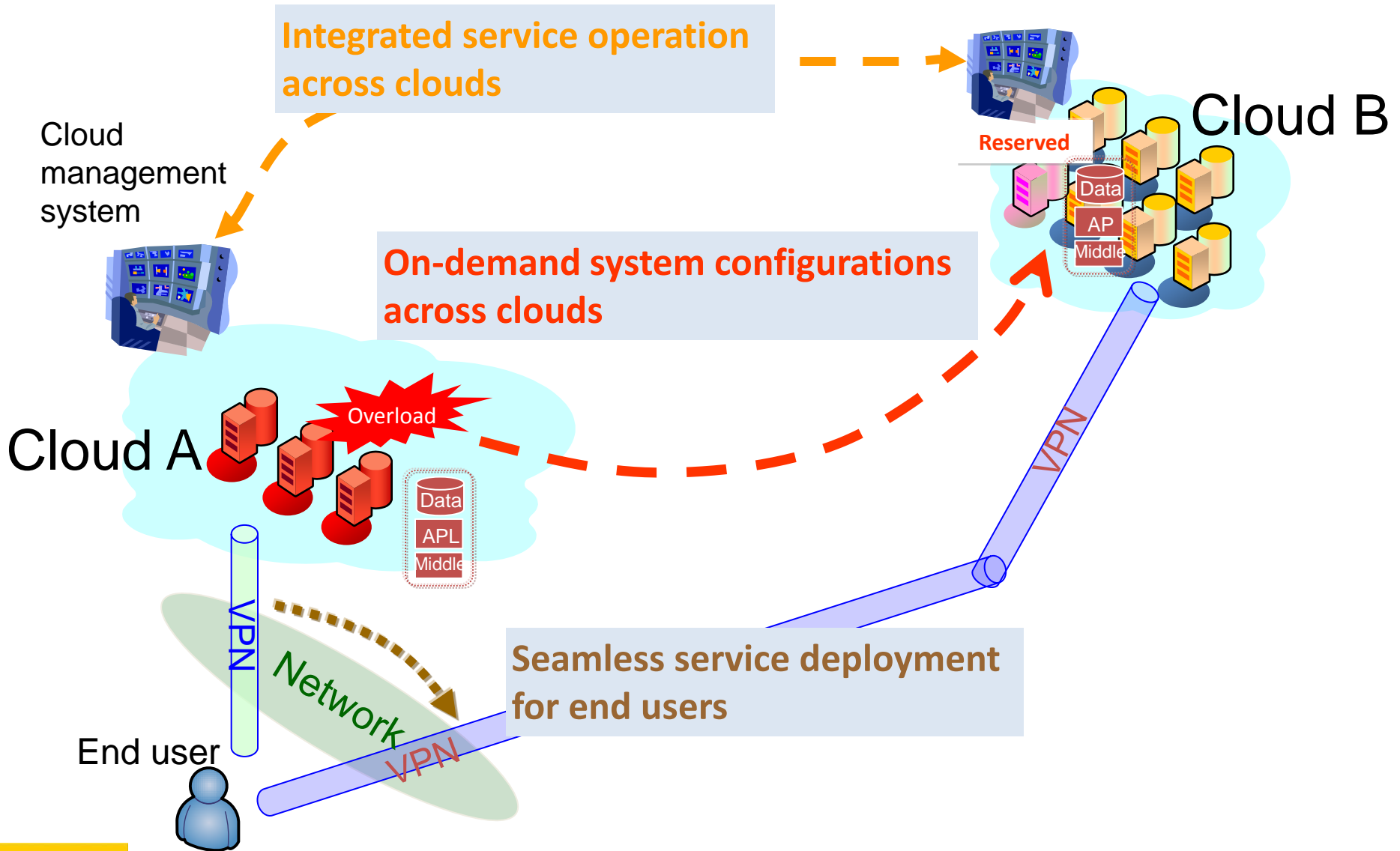


# Use case: Disaster recovery

Finding and selecting available cloud resources among clouds in other areas, then *dynamically* rebuilding cloud services in the event of a disaster or a large-scale failure



# Requirements for inter-cloud computing



## [On demand system configuration across clouds]

- Search for available resources across clouds
- Rebuild cloud services in heterogeneous environment (different machine specs, different OS and different hypervisor)
- Reconfigure networks (network within datacenter and network between datacenters) dynamically

## [Integrated service operation across clouds]

- SLA and policy negotiations among clouds
- Centralized monitoring and auditing of services across clouds

## [Seamless service deployment for end users]

- Automatic rerouting / distributing user access
- Mutually exchanging information for tenant / end-user authentication across clouds

# Global Inter-Cloud Technology Forum **GICTF**

- Promote international standardization of “inter-cloud” interface through industry-academia-government collaboration **and cooperation with standards bodies**



- Identify technical needs for secure “inter-cloud technology”
- The first white paper **“Use case and functional requirements for Inter-Cloud Computing”** Aug 2010
- **Draft interfaces for Inter-Cloud computing (2011 4Q)**
- **Requirements for network virtualization in Inter-Cloud computing(2011 4Q)**
- Raise awareness of users both in industry, government and communities

(as of September 2011)

- **78** enterprises: NTT, KDDI, NEC, Hitachi, Fujitsu, Toshiba Solution, Microsoft, IBM, Oracle, Cisco, BIGLOBE, IJ and others
- Independent administrative institution, National laboratory
- University professors, etc.
- Ministry of Internal Affairs and Communications of Japan (Observer)
- Ministry of Economy, Trade and Industry (Observer)

# Highly Reliable Inter-Cloud Systems

# R&D project

funded by Japanese government

<2009 - 2011: total 20M\$>

Application

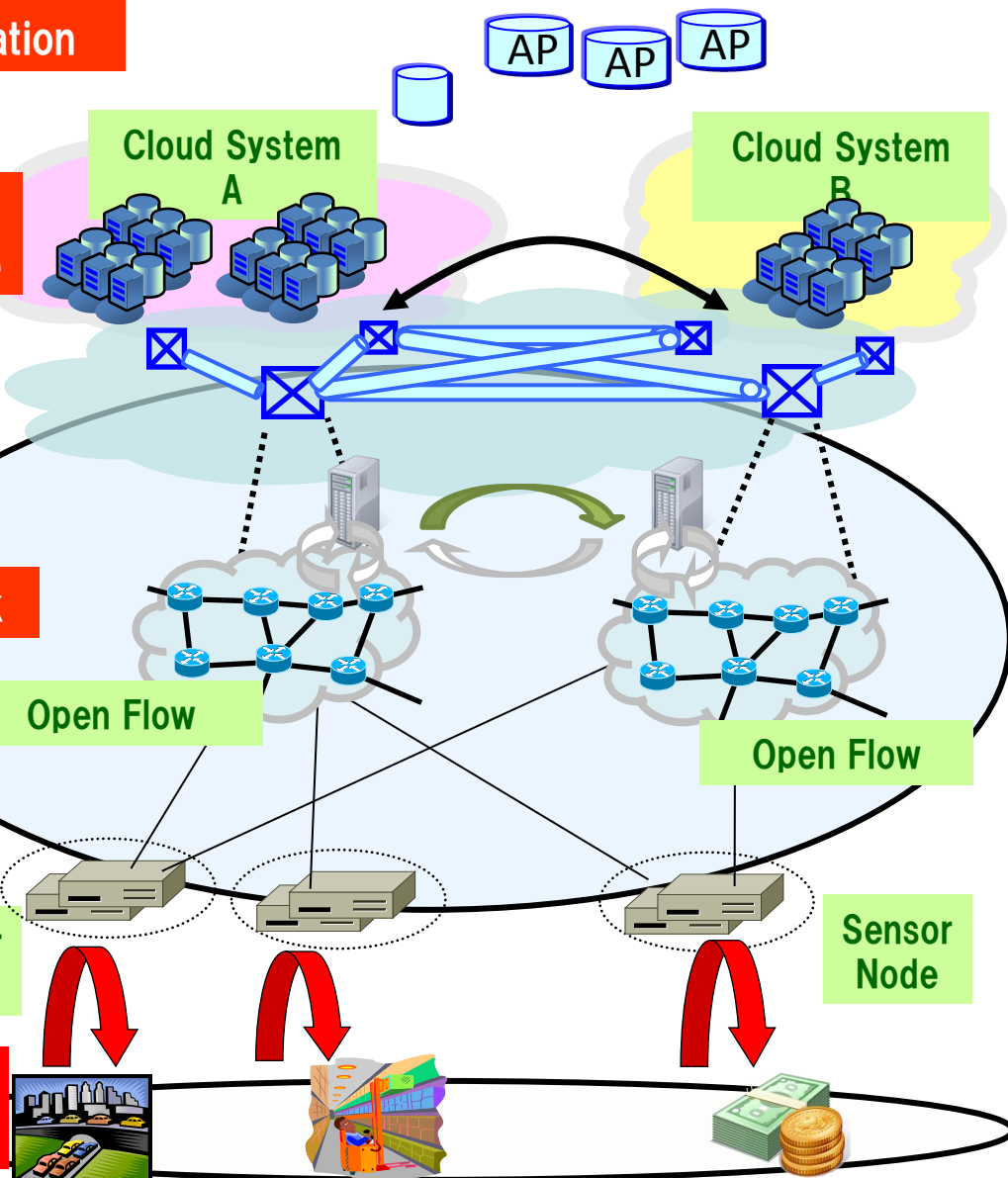
Server Storage

Network

Sensor Node

Physical World

GICTF



Cloud Resource Provisioning (Univ. Tokyo)

Cloud Resource Federation and Reconfiguration (NTT R&D, NTT Data, NTT Communications)

Dynamically Reconfigurable NW based on Open Flow (NEC, KDDI, Univ. of Tokyo)

Real-time Sensor Node (Hitachi)

# DISCUSSION TOWARDS GLOBAL COLLABORATION IS VERY IMPORTANT!