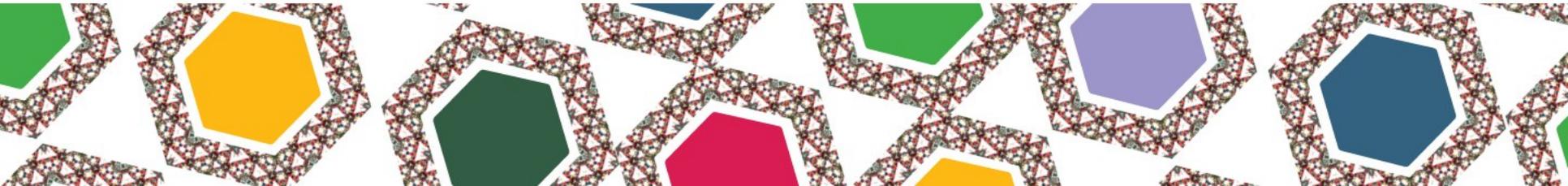


ITU Kaleidoscope 2013
Building Sustainable Communities

Achieving Sustainable Communities with ICT:
lessons from the Great East Japan Earthquake

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lessons from the Great East Japan Earthquake

- ❑ When we cannot do daily communication, we wonder what we do?
- ❑ The 3.11 occurred in reality in such a situation.
- ❑ Then functional restoration works on ICT have been carried out in a variety of ways, but it still continues two years after.
- ❑ Even the ICT function has been restored, some people cannot make communications as same before the 3.11.
- ❑ That is,
to recover the ICT functions is not equal
to recover the communications.

Lessons from the Great East Japan Earthquake

- ❑ To recover the system that has lost should be done on the plan-based procedure.
- ❑ The recovery of life-line directly connected to the everyday life of citizen must be done immediately.
- ❑ And also, to build a cyber-society in the future, role of ICT-related evacuation is an important item in the reconstruction.

Lessons from the Great East Japan Earthquake

- ❑ In order to realize a next generation healthy cyber community,
- ❑ it is important to capture the phenomenon exactly that causes the vulnerability,
- ❑ through the course of the development of ICT in the past from **institutional** aspects and **technical** aspects.

What is the technology tsunami?

- ❑ Some task of sharing the definition is necessary.

I would like try to make a definition :

- ❑ 1) Unusual large number of traffics generated by many resources (terminal, switch, transmission line, program, data, etc.),
- ❑ 2) made overload to a network function.
- ❑ 3) Then some damages has been given.

Some relations with technical tsunami.

The following acts may cause vulnerability:

- ❑ introduction of new technology,
- ❑ development of new service features,
- ❑ continuous updating of system functions,
- ❑ off-design conditions of use,
- ❑ overload, etc.

These acts cause some bugs, too.



A treasure house of complex, convergence and/or fusion

- Telecommunication is like a treasure house of complex, convergence and/or fusion tools,
- such as wireless, cable transmission, transmission equipment, phones, terminals, switches, telegraph and telephone, multimedia, digital video, ISDN, Internet, cloud, broadcasting, communications, etc.

Convergence of T and T with P

1980~1988

- MPT (Ministry of Posts and Telecommunications)
 - Postal Telephone and Telegraph
 - Post Telefon Telegraph
 - Public Telegraph and Telephone
 - Poste, Téléphone et Télécommunications
- *Nippon Telegraph and Telephone Public Corporation*
- **Nippon Telegraph and Telephone Corporation**
- *The American Telephone & Telegraph Company*
- (British Telecom) Post Office Telecommunications
- British Telecommunications plc

History of ICT improved by damages.

- By the experience of the record-breaking damages of accidents or disasters, telecommunication technology has been improved, and its function has been evolved.

This phenomenon had been observed in the following situations:

- ❑ 1) When the manual switch telephone office was eliminated, and service of fully automatic exchange network had spread.
- ❑ 2) When Digital technology and Program-controlled services had been introduced into the telephone network.
- ❑ 3) When the data communication (computer terminal-to-terminal communication) has been introduced in the telephone network.
- ❑ 4) When Telematics' services had been commercially used in the telephone network .

(Example 1)

By an earthquake of 40 years ago

- ❑ By an earthquake of 40 years ago, due to the suspension of power supply for microwave relay station, the telecommunication backbone between Honshu and Hokkaido was disrupted.
- ❑ Taking a lesson from this experience, the backbone of Japan went into multiple roots for all relay stations.
- ❑ In addition, NTT had achieved the composite technology combining coaxial cable, micro wireless line, and link of satellite communications.

(Example 2)

Due to fire accident of cables in a telephone office 35 years ago,

- ❑ All telephones in the city were unusable for two days. At the same time, the relay function to the neighboring office was disrupted.
- ❑ Taking a lesson from this experience, two relay lines between the neighboring offices were installed in each telephone switching box
- ❑ At the same time, the lines of important facilities were duplicated.

(Example 3)

There was an initial failure

- ❑ When introducing the first commercial electronic automatic exchange we developed.
- ❑ Therefore, the communication function in the city was lost for a few hours.
- ❑ The cause was missing the "bugs" during the program inspection and miss-operation during the initial configuration.
- ❑ In addition, to keep the sustainable urban functions, many measures became to be taken into account.
- ❑ With the removal of some such defects in the second system, the failure did not come out again.

(Example 4)

The convergence of telephone network with other network

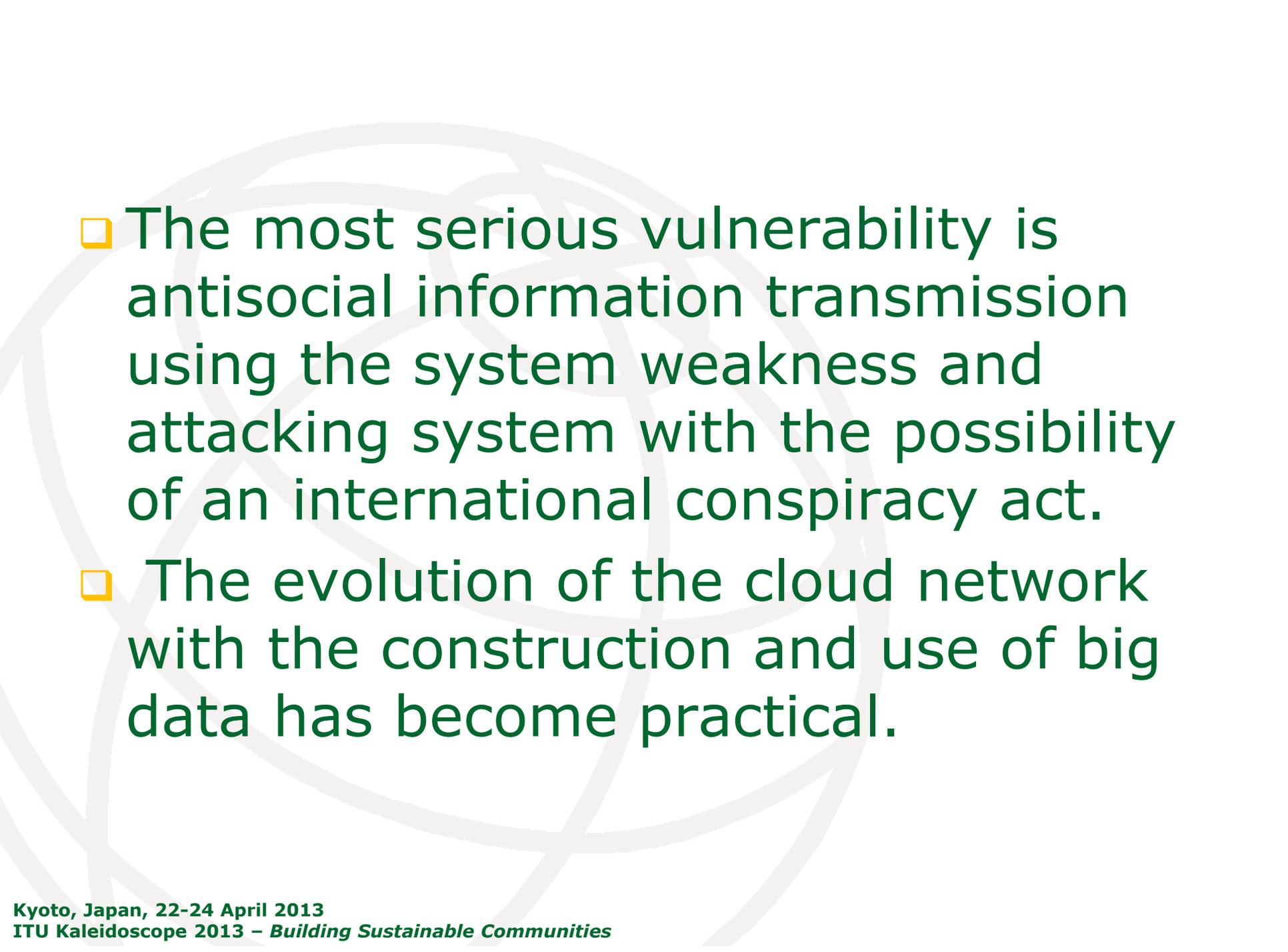
- ❑ The convergence of telephone network with facsimile network or computer data network created inconveniences, since the control functions and conditions of telephone network in the initial design was only for the voice call.
- ❑ By solving them, multimedia network control technology had been improved.
- ❑ This experience was used to design the basic data traffic in ISDN.

Convergent evolution between communication and computer.

- ❑ The convergence of computing and networking gave us the Internet. This has profoundly transformed our management, education and training, research and development, enterprise, administrative functions, entertainment, medical care, etc.
- ❑ I superintended Broadband Network Convergence Forum at GITI Waseda University in 2007.

Big data and technological Tsunami in the network society.

- ❑ When feature of system is advanced, the size of the network will be greater and the convenience of the system will be increased. Along with it, however, vulnerability is also increased.
- ❑ Cyber systems are constantly evolving, due to environmental changes, improved functionality, improved performance, and the replacement of the users.

- 
- ❑ The most serious vulnerability is antisocial information transmission using the system weakness and attacking system with the possibility of an international conspiracy act.
 - ❑ The evolution of the cloud network with the construction and use of big data has become practical.

1. Social Innovation through Utilization of Big Data

- 1.1 What is Big Data?
- 1.2 Where is Big Data?
- 1.3 Vulnerability of Communities inherent in the Big Data
- 1.4 What is Technical tsunami?

Big data

- ❑ Unstructured huge amounts of data which is explosively increasing with the development of Internet.
- ❑ By analyzing huge collection of data that occurred various aspects, it is said that there is merit on specific business trends, disease prevention, and measures of crime.
- ❑ Sensors mounted on the mobile device, remote sensing, software logs, cameras, microphones, RFID readers, and wireless sensor networks, have contributed to realize the Big Data .
- ❑ Big data is a challenge that scientists face in day-to-day field meteorology, genomics, Connect-mix, complex physical simulation, environmental biology, Internet search, economics, and management of information science.
- ❑ Depend on advances in technology ,the limit of the size of the current data is petabytes, exabytes, and zettabyte .
- ❑
- ❑ **Wikipedia(Japanese) Machine translation by Google**

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- ❑ This has profoundly transformed our management, education and training, research and development, enterprise, administrative functions, entertainment, medical care, etc.
- ❑ I superintended **Broadband Network Convergence Forum (GITI Waseda U)** in 2007.
- ❑ The meaning of convergence in the Forum had the followings.
 - ❑ 1) Convergence of **network functions,**
 - ❑ 2) Convergence of **terminal capabilities,**
 - ❑ 3) Convergence of **the media in contents transmission,**
 - ❑ 4) Convergence of **intelligence in information processing,**
 - ❑ 5) Convergence of **social functions**
(enterprise, government, service, etc.).

The subject at that time was
How to make a conversion
by next generation network:

- ❑ A. Realization of digital HDTV network services,
- ❑ B. Spreading optical cable to homes, and,
- ❑ C. Starting service of high-speed digital portable system.
- ❑ D. Convergence of terminal capabilities:
 - ❑ ⇒ the technical development and
 - ❑ ⇒ the institutional reform issue
 - ❑ to make a cellular phone becoming a wallet, a ticket of transportation, and a key of house or car.

Analogy of Mechanism of Big DATA with cross-sectional view of Earth (conceptual diagram)

- 1. Crust (Outer skin of the Earth)
- 1. Information attributable to thing, material, the facilities: surveillance video, GPS, car navigation system, passenger sensor at station, smart power meters, IC card, medical data, environmental and weather data, entertainment, content, e-books, mobile, goods, facilities, etc.

- 2. Mantle (liquidity)
- 2. Information attributable to actions by person:
- SNS, phone log, movement, learning, content reception, diagnostic chart, shopping, etc.

- 3. Core
- 3. Information attributable to functions:
- control, operation, management, and coordination:
- production management, urban functions, medical functions, administrative functions, energy management, logistics management, distribution etc.. ,

new threat by Technical tsunami

- ❑ A variety of service functions and enlarged scale of network Increase possibility to generate new threat by Technical tsunami
- ❑ When the internet began to be used in the open society, (: DoS Denial of Service) is described in the IETF document in November 1975...
- ❑
- ❑ There was a technology tsunami., making overload to servers and

a phenomenon of cyber attack: DoS Denial of Service

- ❑ It is understood as a phenomenon of cyber attack.as a Typical of the DoS:
- ❑ WEB site function become Unavailable by surging Traffics in large amount.
- ❑ Cyber-attacks DoS occur. By Power loss of the WEB device, Disconnect the LAN cable,
- ❑ Changing the configuration data of the WEB server, etc.

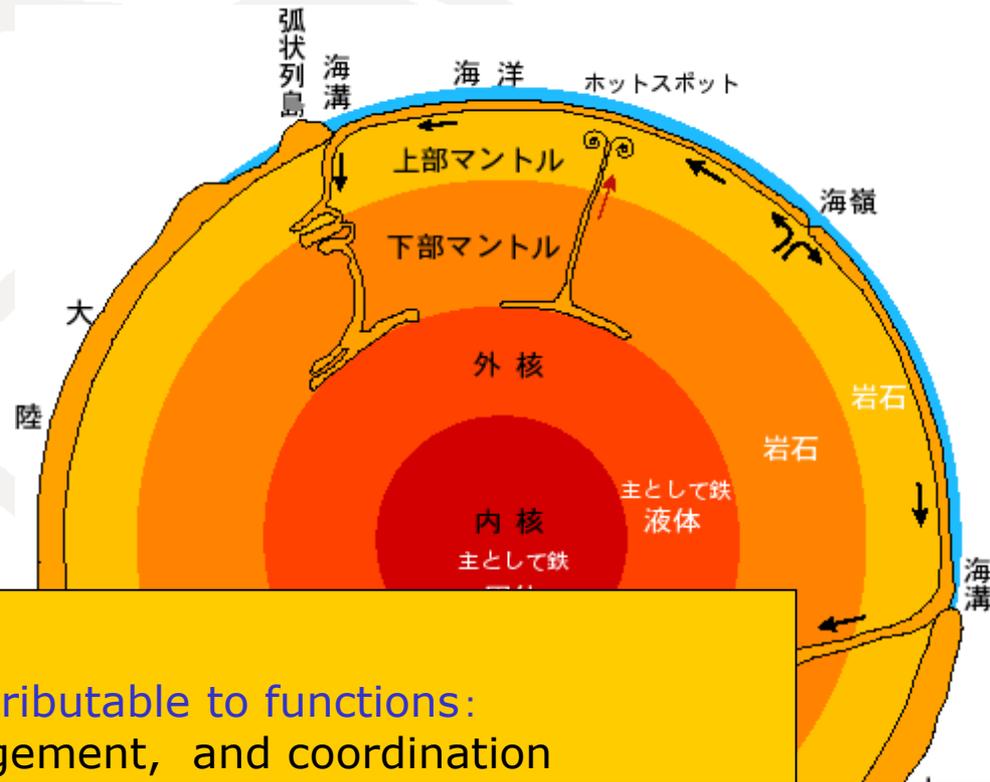
Distributed Denial of Service DDoS

- ❑ There was a technology tsunami, making overload to servers and lines, by mass communication that occur during the activity of infection-mail viruses and network worms,
- ❑ Around 2003, DDoS attacks by radical protests for a particular site has occurred. is gives a load on the target site or line,
- ❑ It is intended to be in denial of service, by generating high volumes of traffic from multiple sources.



1.1 What is Big Data?

cross-sectional view of the Earth (conceptual diagram)



3.Core

3.Information attributable to functions:
operation, management, and coordination

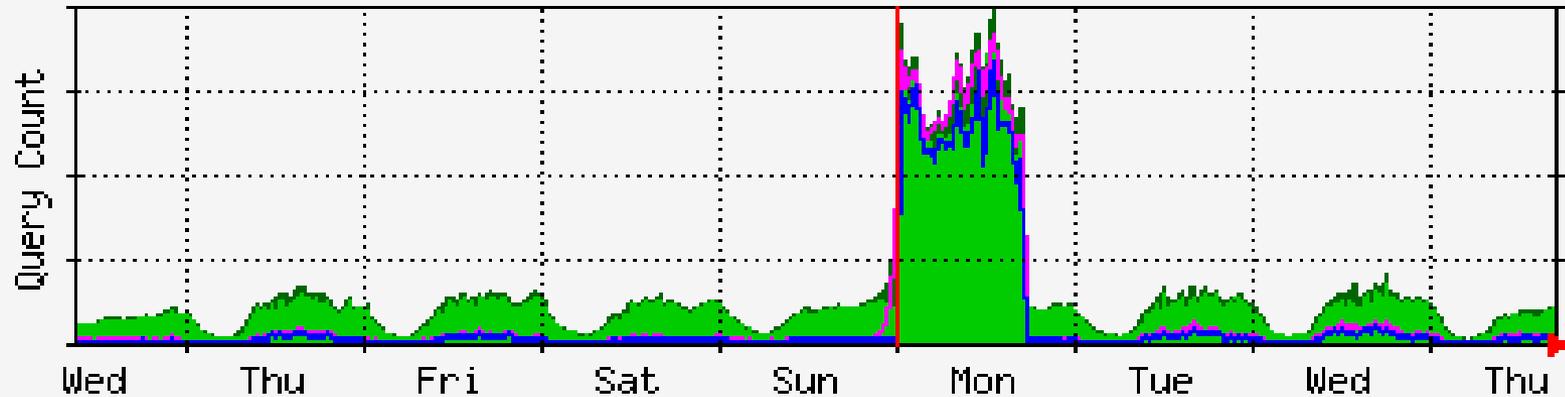
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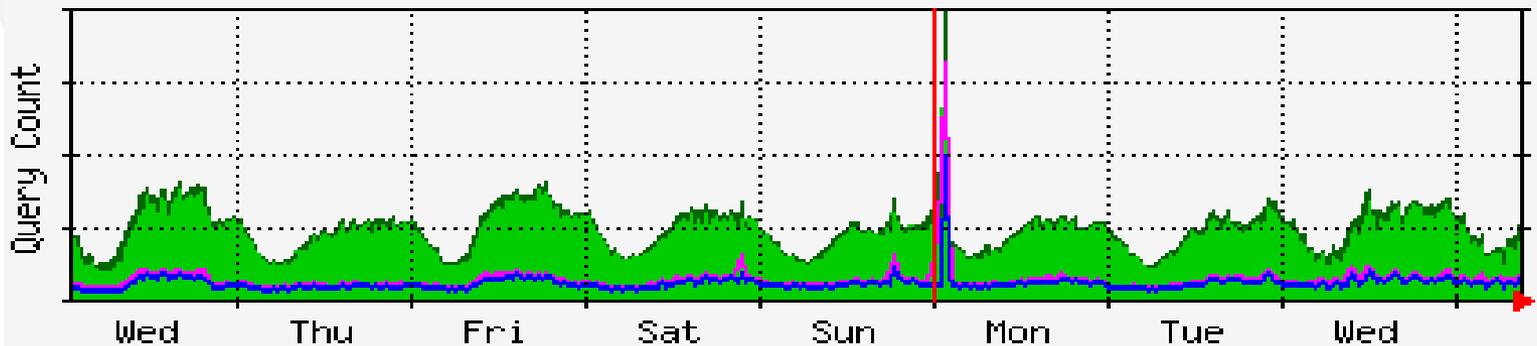
1.Crust(Outer skin of the Earth)

1.Information attributable to Thing, material, the facilities:

Distributed Denial of Service



Status of the DNS server with the 2004/04



Status of the DNS server with the 2004/06

Q?

- ❑ What kind of function was ICT carrying out to the natural disaster forecast?
- ❑ How should necessity and its investment framework have development of what kind of technology from now on again?



□ Thank you