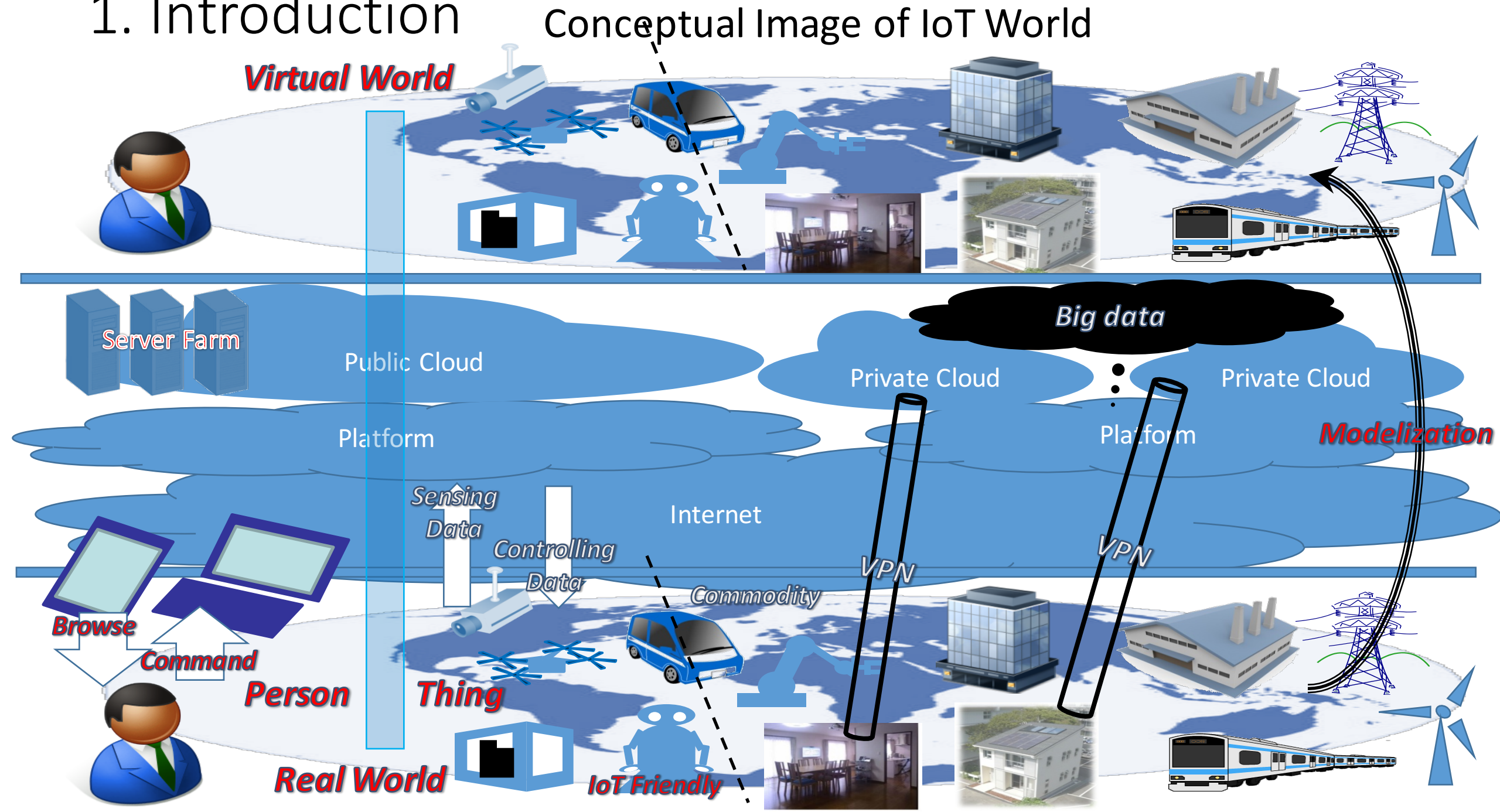
Agenda

1. Introduction
2. Objectives of activity
3. Meeting
4. Contents of I-D
5. High Lights
6. Building Up TEST BED to solve Problems

1. Introduction



1. Introduction

- Motivation for writing this I-D
  - Sharing comments from Things players about IoT
  - Clarifying the barriers for deployment of IoT
  - Prototyping an open referable document of these barriers.

2. Objectives of activity

- What are challenges for realizing IoT ?

- ICT industry players
- (ICT industry:communication carriers, ICT equipment vendors, the Internet service providers, application vendors, and software houses)

- Things industry players
- (Things industry:home and housing equipment manufacturers, infrastructure providers such as railways companies and power companies, and manufacturers of home appliances such as air conditioners and refrigerators)

3. Meeting

- Meeting with major players and asking questions
  - ✓ Telecommunications Carrier (ICT)
  - ✓ Global IC chip vender (ICT)
  - ✓ Railway Company (Things)
  - ✓ Electric Power Company (Things)
  - ✓ Home and housing equipment manufacturer (Things)
  - ✓ (Two) Home appliance manufacturer (Things)
  - ✓ Medical equipment manufacturer (Things)
  - ✓ Automobile parts manufacturer (Things)
  - ✓ Precision machinery manufacturer (Things)

4. Contents of I-D

1. Introduction
2. Technical challenges
2.1. Security and Privacy
2.1.1. Security
2.1.2. Privacy in acquiring data
2.2. Challenges posed by data acquisition, data distribution, data management and data quantity
2.2.1. Traffic patterns
2.2.2. Acquired mass data
2.2.3. Explosive increase and diversity of data
2.3. Mapping of the physical world and the virtual world
2.3.1. Physically handling acquired data
2.3.2. Data calibration
2.4. Product lifetime, generation management, and the cost of equipment updates
2.4.1. Product lifetime
2.4.2. Introducing IoT equipment into commodity equipment
2.5. Too many related standards and the speed of standardization
2.5.1. Too many related standards
2.5.2. Speed of standardization
2.6. Interoperability, fault isolation, and total quality assurance
2.6.1. Interoperability
2.6.2. Fault isolation
2.6.3. Quality assurance
2.7. Product design policy
2.7.1. Changes in design policy

4. Contents of I-D(Cont'd)

2.8. Various technology restrictions within actual usage
2.8.1. Using radio waves
2.8.2. Batteries
2.8.3. Wiring
2.8.4. Being open
3. Non-technical challenges
3.1. Changing the product paradigm
3.1.1. Ecosystems
3.1.2. Coordination and significant changes in strategy
3.1.3. Competition with existing industries
3.2. Benefits
3.2.1. Rising costs and monetization
3.3. Security and privacy of social systems
3.3.1. Classification of ownership, location, and the usage of data
3.4. Disclosure of data
3.4.1. Side effects and malicious use potentially caused by the disclosure of data
3.5. Preparing social support
3.5.1. Regulations
3.5.2. Corporate social responsibility
3.5.3. Customization for individual customers
3.5.4. IoT literacy of the users
3.5.5. Individual vs family
4. Security Considerations
5. Privacy Considerations
6. Acknowledgments

5. High Lights -1

- 2.1.1. Security

For example, there is a product available for connecting the entrance door to the network. In ICT security technology, increasing the key length of the encryption makes it much harder to break. But even if the latest security technology is used when it is installed, the security technology will become obsolete and even pose a risk about halfway through the twenty- to thirty-year lifetime of the entrance door. As has been explained in other items, the ICT sense of time is completely different from that of Things.

5. High Lights -2

- 2.1.2. Privacy in acquiring data

Another huge challenge is the ownership of data. Up until now, there has been a divided debate on whether data belonged to the company or to the users. Likewise, the relationship inside a small user group is also extremely diverse and complicated. One specific example is of a company that had obtained permission from the head of the household to use the data when it carried out an HEMS trial. Later on, the spouse of the head of the household disagreed and as a result permission to use the data was withdrawn.

5. High Lights -3

- 2.2.1. Traffic patterns

There are many challenges related to the set up and management of IoT equipment. We have heard from the construction companies that the configuration of IoT equipment with a large number of sensors involves a lot of hard work.

5. High Lights -4

- 2.5.1. Too many related standards

There are many standards related to IoT equipment and devices. There are multiple standards, technologies and services for communication technology, such as Bluetooth, Wi-Fi, NFC, and LTE, and it is difficult to choose which to apply.

The Things industry players do not always have the communication technology professionals needed for IoT. In the meeting, we learned that many companies were uncertain and hesitant about fields outside their own area of expertise. On the other hand, technological competition will improve quality as well as the level of completion, and thus will be beneficial for users.

5. High Lights -5

- 2.6.2. Fault isolation

In the IoT world, these issues become more difficult and complicated. For example, a smart home is equipped with air conditioners, kitchen supplies, and doors connected to the Internet. A problem that occurs in the smart home poses a much more serious problem to end users than an e-mail failure or problem with a PC.

If users are left to isolate the fault on their own, they may not know which manufacturer they contact for repairs if they are unable to isolate the fault on their own, or the manufacturer may refuse to perform repairs because they fall outside the scope of their responsibility. As can be seen, the issue is an important challenge that will determine whether the B2C specific IoT world can be established.

5. High Lights -6

- 2.8.4. Being open

Up until now, companies in the Things industry have developed products in a closed loop process, seeking to capture users with their company's own products. For this reason, they lack an open design concept of interoperability. Today, an entirely new design concept is needed to design products that can interconnect with the products of other companies.

5. High Lights -7

- 3.1.2. Coordination and significant changes in strategy

It will become necessary to run businesses jointly with new partners, as well as cooperate and work in coordination with other industries and competitors. This issue—even when it is fully understood—will be very difficult to address and put into practice.

We have seen instances in which only a limited amount of information was given when parties exchanged opinions. There have also been instances in which communication was difficult because of differences in terminology and culture.

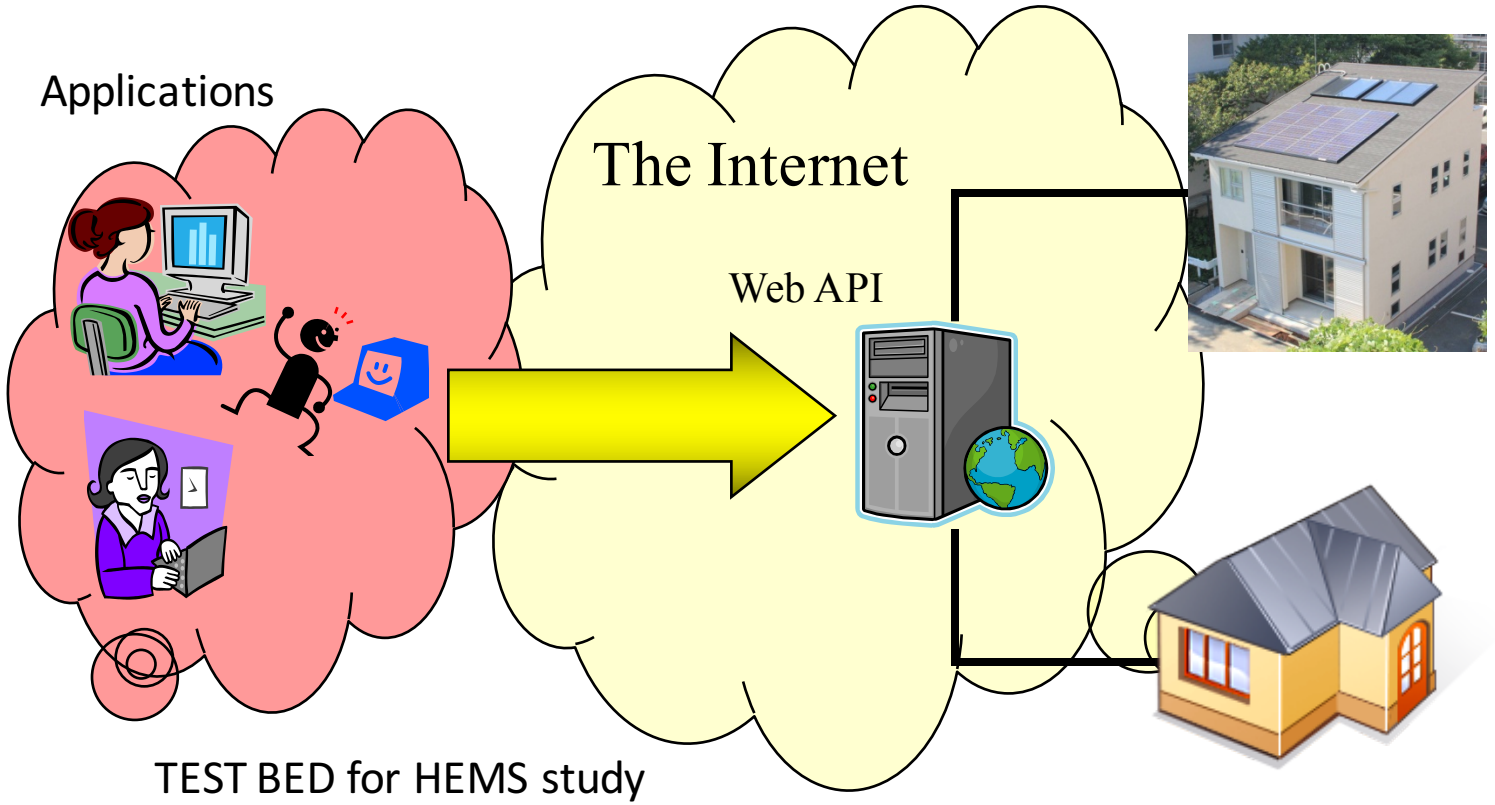
5. High Lights -8

- 3.4.1. Side effects and malicious use potentially caused by the disclosure of data

The disclosure of data can expose individuals and society to risks. For example, it has been shown that the electricity smart meter can lead to burglary because it shows when electricity is used and not used, providing an indication of the time when no one is home. This particular example demonstrates the importance of ensuring security and privacy.

6.Building Up TEST BED to solve problems

The University of Tokyo (UoT) and HEMS ALIIANCE, consortium for HEMS business study, already have a TEST BED to create fascinating HEMS Apps.
Since HEMS is one use case of IoTs, UoT is planning to build up another TEST BED for IoT study based on HEMS TEST BED knowhow.



Experimental Smart House “COMMA House” in UoT.

Other Smart Houses

Challenges in and among industries for the prompt realization of IoT

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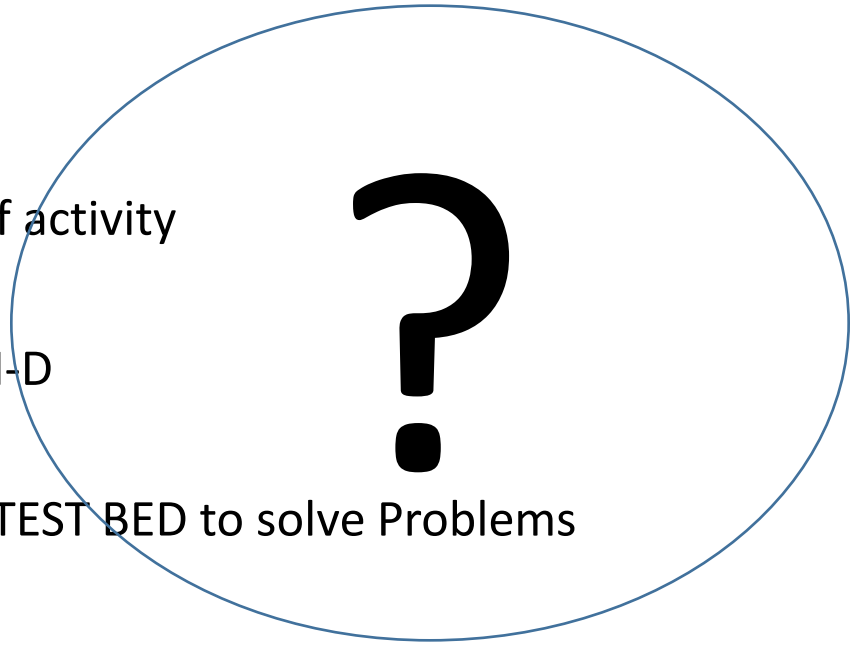

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