

2020

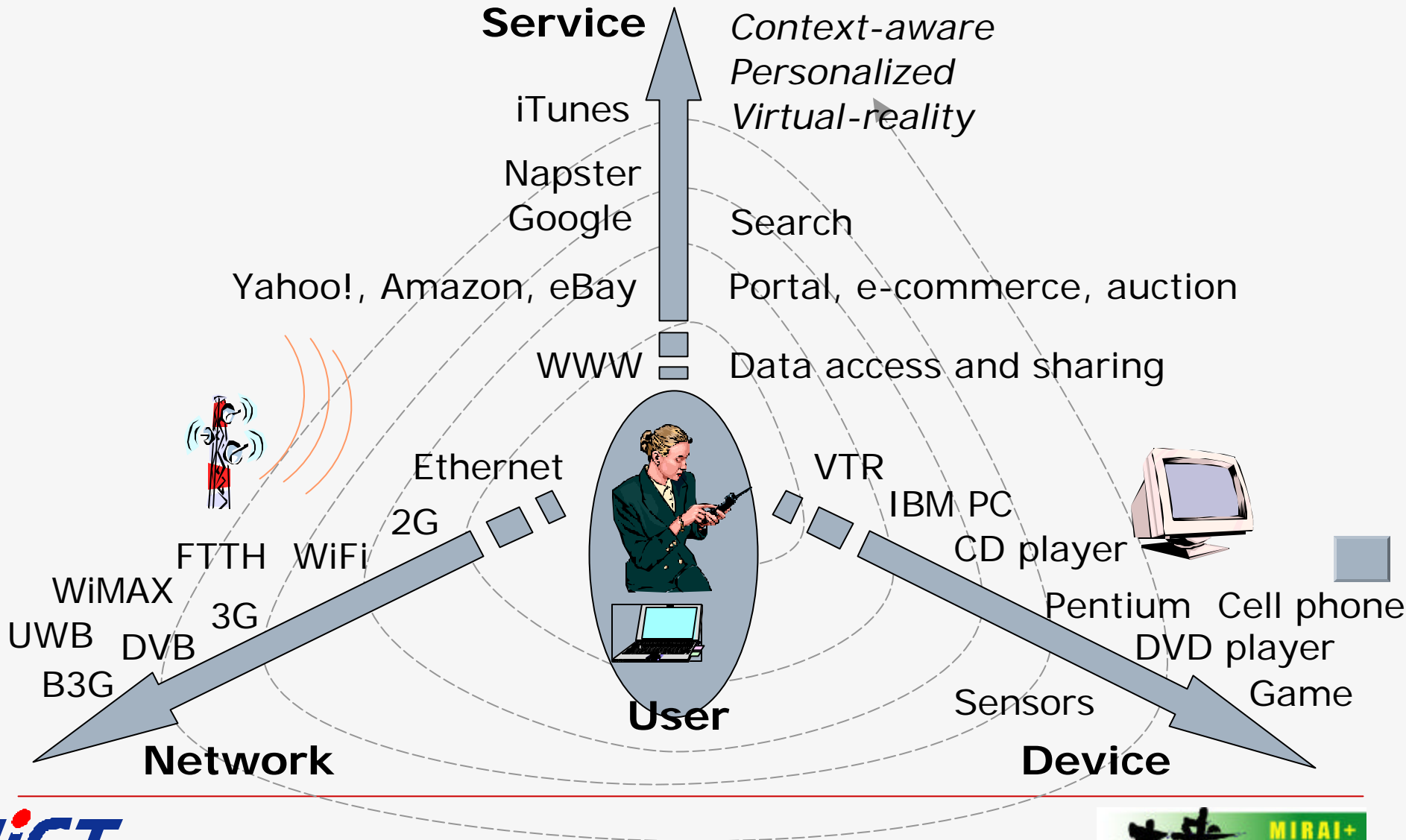
Context-Aware, Sensing, and Others

Masugi Inoue

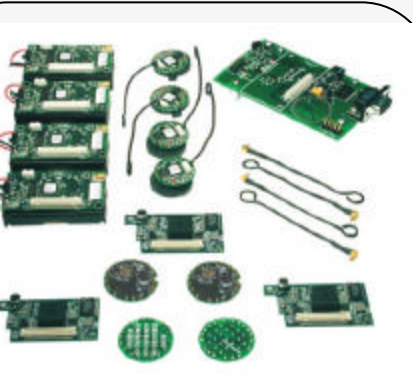


National Institute of Information and Communications Technology

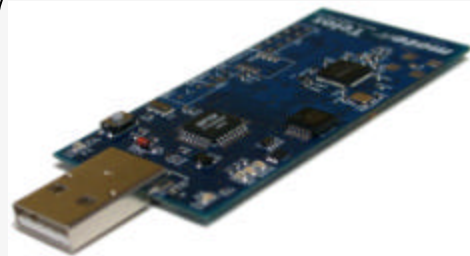
Network-Device-Service Spiral



Sensor Nodes



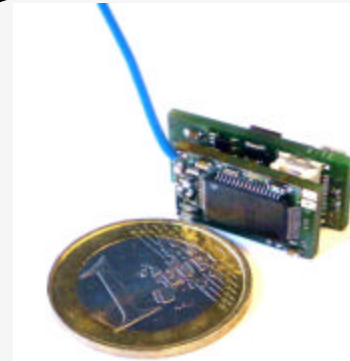
MICA2 Mote



Telos



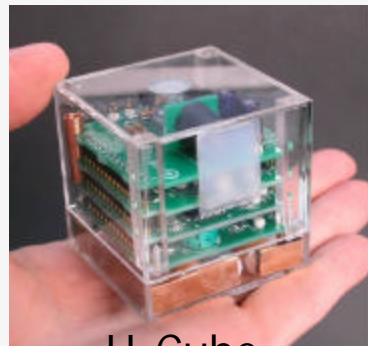
i-bean



Smart Its



Ni3



U-Cube
Univ. of Tokyo



Mitsubishi



Oki

Mobile Phone in 2010

- LSI performance
 - Reaches the level of '04 server PC (HDTV video codec possible)
- Memory
 - 40GB 1-inch HDD
- Radio speed
 - 100Mbps (DoCoMo's Super3G), 480Mbps (WUSB), 54Mbps (WLAN)
- Sensors
 - Gyrocompass, g-sensor, GPS, RFID, illuminometer?
 - Input interface, gaming, pedometer? HDD head protection, navigation
 - 2010-: holographic display, tactile interface

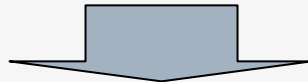


Electronics in 2010

- Many electronics ready for HDTV
 - PC, TV, HDD, game, digital camera
- Next target is still unclear.



- One Direction: Invisible Devices
 - Many invisible devices per person (to make money!)
 - Low-power and low-price



- Context-aware, personalized services and applications!



Available Electronics

- ❑ Soft display
 - Electronic paper with organic transistor
 - Organic EL (electronic luminescence)
- ❑ Large and low-price display with organic transistors
- ❑ Luminous fiber that can be knitted with other fibers

"u-City" Project: Vending Machine Networking with Sensors

Potential

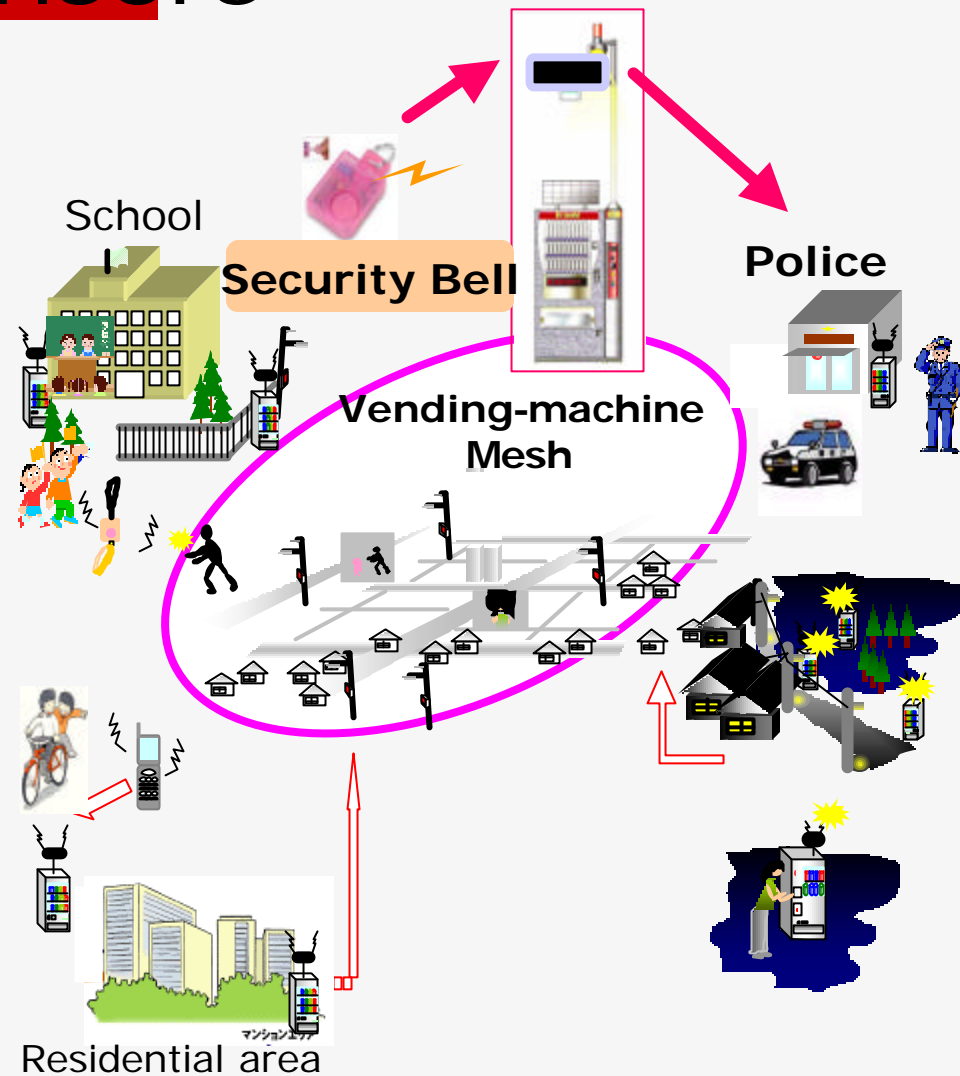
- 26million machines in Japan
- 6.9 machines / 1km²
- Power supply and various I/O

Vending machine network

- Security: Street surveillance for schooling children
- Navigation for pedestrians (shopping, sightseeing, etc)
- Adaptive advertisement

Members:

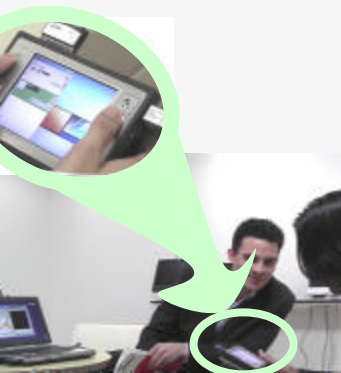
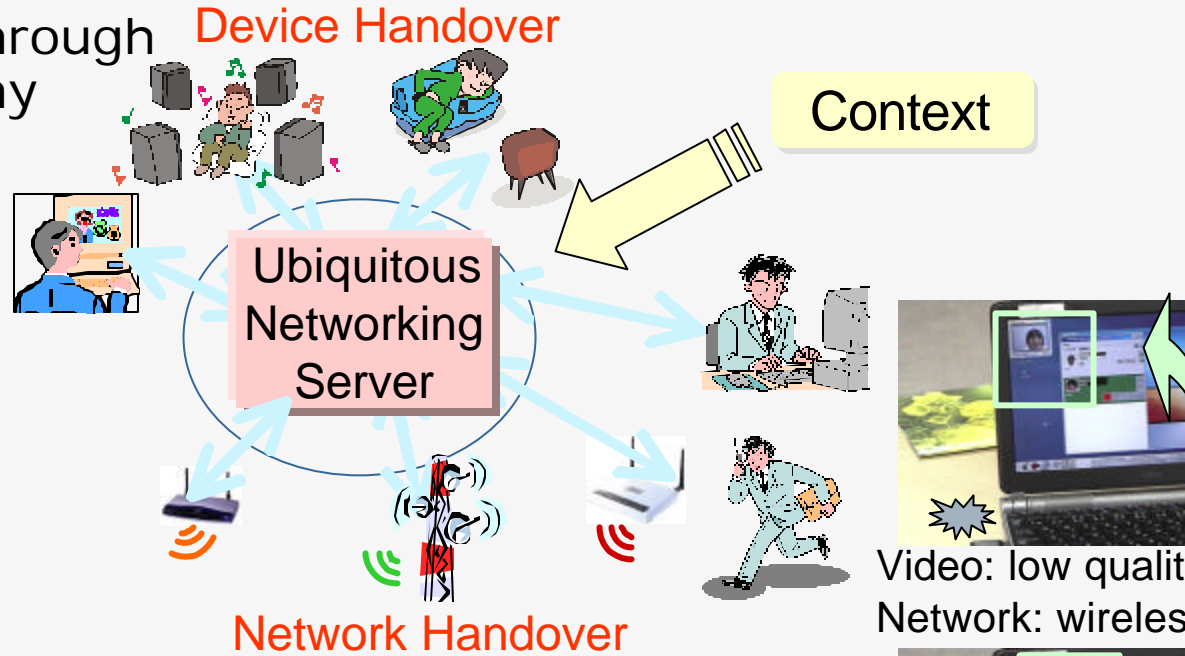
- Academia: Ritsumeikan University
- Industry: Fuji Electronic, KEPCO, CocaCola, Optex
- Government: Osaka prefecture



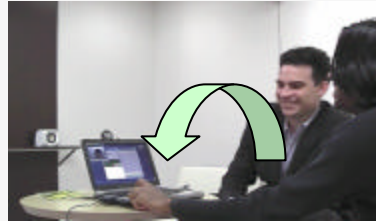
Ubiquitous Networking Server

The server aims to deliver multimedia communication through any access network and to any device.

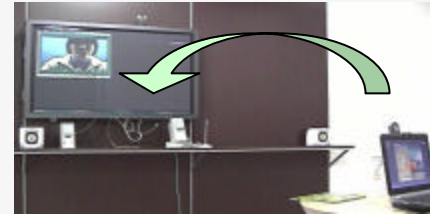
- Network handover
- Device handover
- Media adaptation
- Context-based control



Video phone on small terminal



Switch session to laptop PC

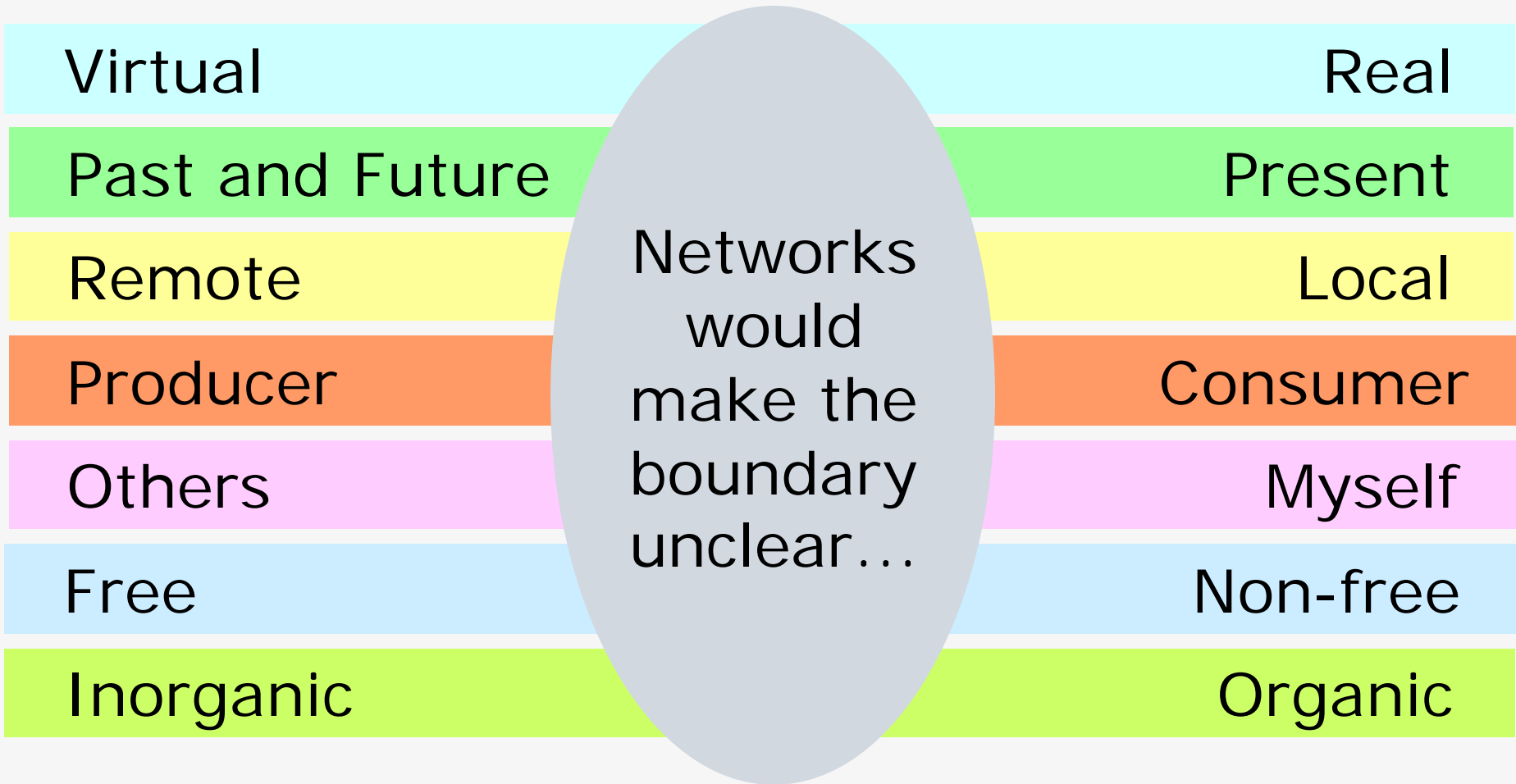


Switch session to large display



Video: high quality
Network: Ethernet

Networking Separated Worlds



Arranged from NIKKEI ELECTRONICS 2005.5.23, p1

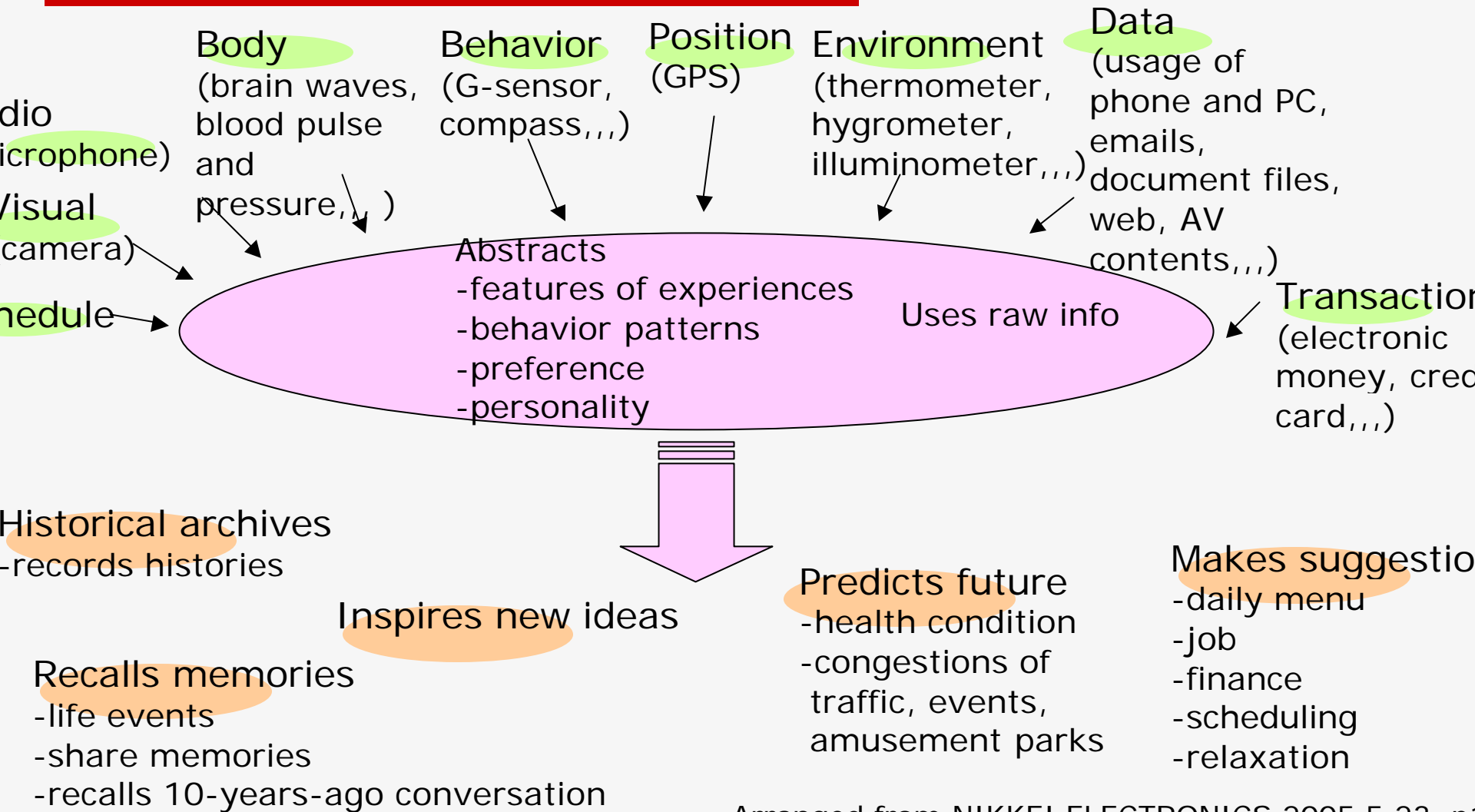
Pass-by Communication

- “nintendogs” on Nintendo DS
 - Dog breeding game on mobile game terminal
 - Ad-hoc networking with WLAN
 - Records encounters when passing-by someone having the same game working

- Unintentional, pass-by communication
 - Well-received by people who want any contact with people with similar personality, hobbies, interests,,,

- Virtual-Real, and Others-Myself

Recording All for TIME MACHINE



Arranged from NIKKEI ELECTRONICS 2005.5.23, p1

On-going Projects for TIME MACHIN

- ASSIST (DARPA)
 - Records experiences of soldiers
- Casual Capture (HP USA)
 - Takes photos with on-body cameras
- MyLifeBits (Microsoft)
 - Records all electronic data
- Lifelog (Aizawa lab, U. Of Tokyo)
 - Records AV and position info with a cap featuring camera and microphone + GPS
- Recording House (Kaoru Misaki)
 - Installed many monitors displaying recorded contents (it cost 0.2Million USD!)

Body-Machine Interface

□ RFID

- Frequent customers of a disco can have RFID implanted into the upper arm already...

□ Brain-machine interface

- Experiments using mice and monkeys: many!!
- BrainGate (already developed for human body)
 - for controlling mouse cursor and changing TV channel
- Researches are ongoing about inputting signals into monkey brain!!
- Direct connection between transistor and nerve cell

□ Eye-machine interface

- Artificial silicon retina (ASR) for recovering patient's eyesight

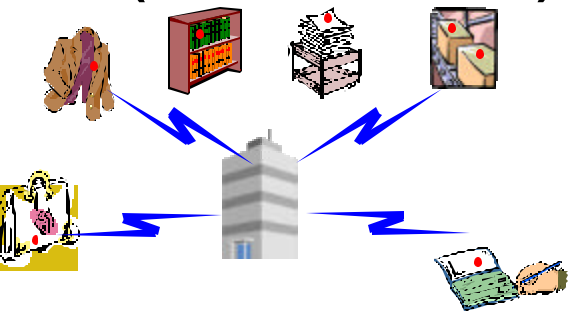
□ Ear-machine interface

Ubiquitous R&D Project by MIC in Japan

The MIC promotes the research and development project to establish the key technologies for Ubiquitous networks and contributes to the realization of a Ubiquitous network society.

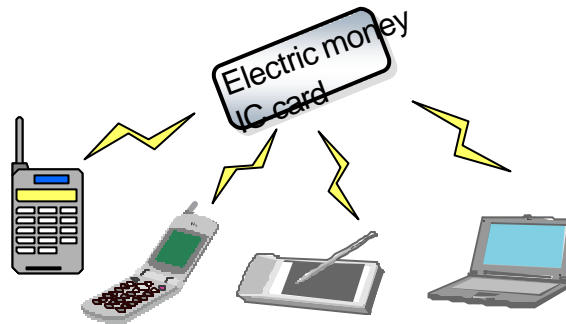
Microchip networking technology

Leaded by YRP
(Prof. Sakamura)



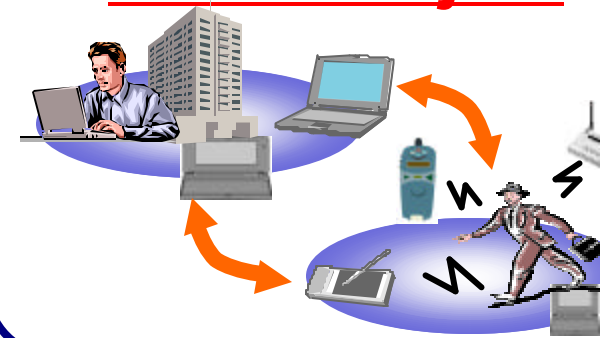
Ubiquitous network authentication and agent technology

Leaded by NTT



Ubiquitous network control and management technology

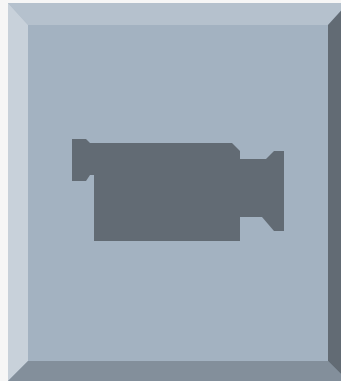
Ubila Project



MIC: Ministry of Internal Affairs and Communications

Small Stories in 2008

- Ubila Project in Japan created a vision video containing short three stories of ordinary lives with ubiquitous networking.
- Produced by
 - KDDI, Hakuodo, and Ubila



(about 2 min.)

Concluding Remarks

PAST and PRESENT

- Many infrastructure-type networks and a mobile phone

- Person-to-person communication and information access

- Revolution
 - Higher-speed, more features

FUTURE

- + Many non-infrastructure-type networks, many invisible devices and sensors
 - Mobile phone may disappear...

- + Information gathering and processing
 - Context-aware, personalized virtual-real interaction
 - Needs to develop users' needs

- Integration and evolution
 - Short-distance, low-power, small, simple, low-price

- Many nodes, distributed, embedded, invisible, implan