Systems Science Laboratory

Information and Communication Technology (ICT) for the environment, by the environment, with the environment

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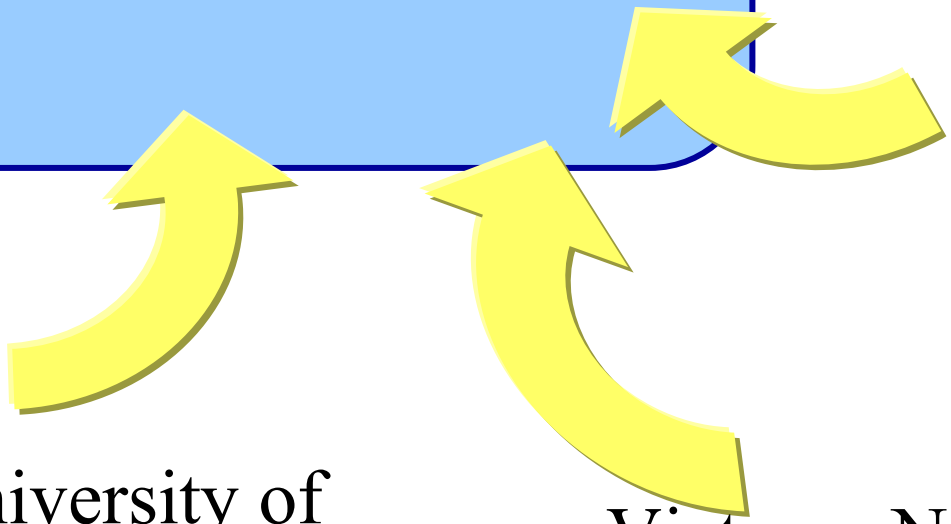
Possibilities of ICT for the environmental problems

Environmental Problems are tough

- **Environmental Problems for each country**
- **Possible solutions by ICT**



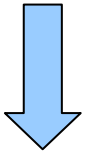
Institute of Technology Bandung (ITB)
(Indonesia)

Toyohashi University of Technology (TUT)
(Japan)

Vietnam National University, Hanoi (VNUH)
(Vietnam)

Outline

- What is ICT?
- ICT for the environment
- ICT by the environment



- ICT with the environment

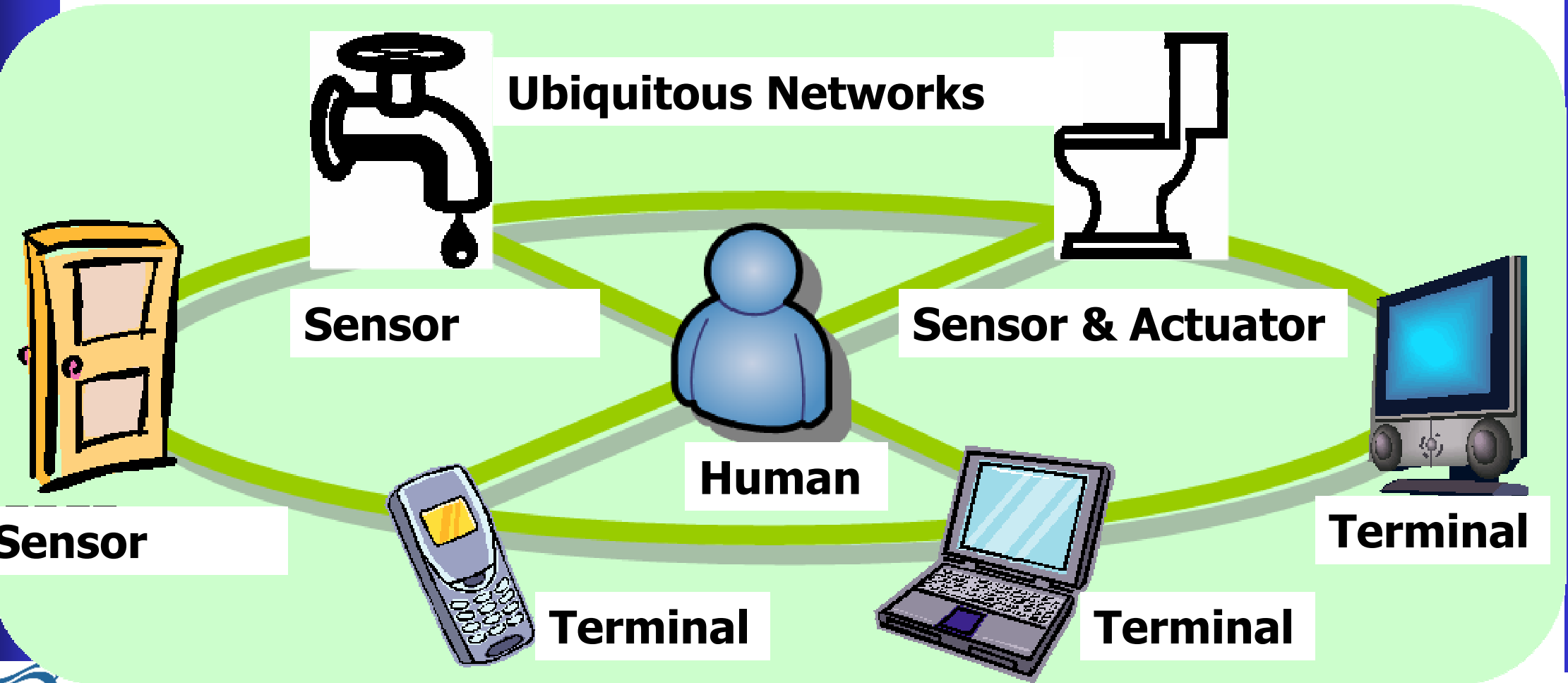
What is ICT? (definition and examples)

- Information Processing (Computations)
  - Simulation
  - Prediction
  - Learning
  - Database .....
- Information Distribution (Communications)
  - Internet
  - Cell Phone Systems
  - Sensor Networks
  - Ubiquitous Networks.....

Ubiquitous Society

Ubiquitous computing is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities.

This paradigm is also described as **pervasive computing**, **ambient intelligence**, or, more recently, **everyware**. [wikipedia]



What is ICT? (a feature of ICT)

- ICT involves many persons: inventors, designers, developers and above all, users.
- ICT requires extensive support from many people and also has a great impact on many people.

What is ICT? (ICT is environment-friendly)

- ICT contributes to save energy/material.
  - E-mail < phone < telex < letter < messenger
  - Simulations by computational models < by physical models (crash-test of cars)
- ICT has a potential of substituting energy/material with information.
- (ICT provides means to share knowledge by going beyond time and space.)

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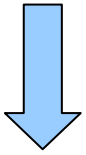

- ICT with the environment

ICT for the environment (already used)

- **Sensing technology** has been used to monitor environmental conditions;
- **Simulation and prediction** to support decision-making on environmental issues;
- **Database technology** to support the accumulation of monitored data sets.

ICT for the environment (already used)

- http://www.freiburg.de/servlet/PB/menu/1205038_l1/index.html

ICT for the environment (to be applied)

- **Ubiquitous computing** is expanding the real-world applications of ICT;
- **Intelligent information processing** with adaptive and learning capabilities would provide flexibility for decision making.

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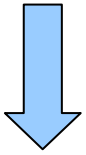
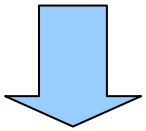


- ICT with the environment

ICT by the environment (examples for cars)

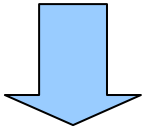
- Concerns about global warming



  - combustion control with low emission
  - hybrid cars
  - electric cars
  - engines using non-fossil fuel (e.g. hydrogen gas)

ICT by the environment (examples for energy saving)

- Concerns about saving energy



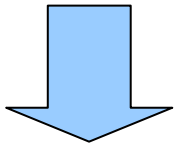
  - smart grids for supplying electric power;
  - intelligent homes, buildings, and factories that allow energy to be managed flexibly.

ICT by the environment (examples for energy saving)

- **Smart Grid utilizes ICT for flexible electricity generation, delivery and consumption [EPRI http://www.smartgrid.epri.com/]**

- **Fuel**

Battery technology

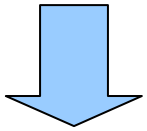


- **Japanese**

style Smart Grid (local production for local consumption)

ICT by the environment (examples of ICT itself)

- **ICT itself involves much energy consumption and load on the environment**



  - **green ICT (or "green computing"), which means ICT that considers the environment, has attracted growing attention.**

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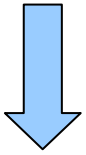
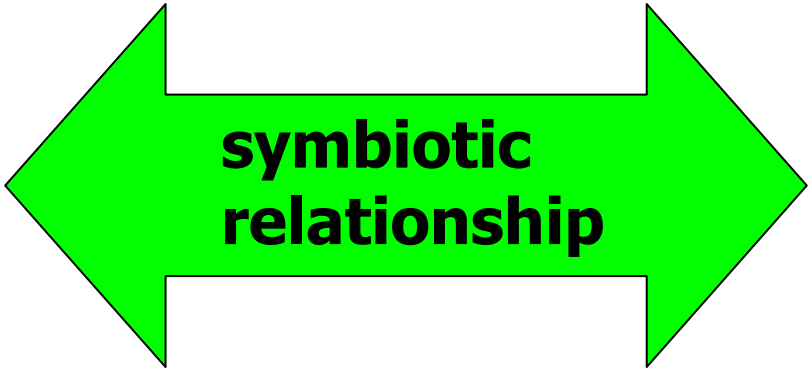


- ICT with the environment

ICT with the environment

- Humans  Environment

- Humans  Environment

ICT with the environment

- ICT could serve as global eyes that
  - monitor the environment and humans, and
  - feed back enough information about the global state of the environment to enable humans to avoid causing irreparable damage.

Summary

- ICT has a potential of substituting energy/material with information.
- ICT provides means to share knowledge by going beyond time and space.

"Mottainai" (It is so wasteful that things are not made full use of their value. [wikipedia])

- Possibilities of ICT for the environmental problems

Possibilities of ICT for the environmental problems

ICT

- Prediction
- Simulation
- Learning/Adaptation
- Database
- Internet/Web
- Cell Phone Systems
- Sensor Networks

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Environmental Problems

- Climate Change
- Energy
- Solid Waste
- Chemical Substance
- Ozone layer depletion
- Bio diversity
- Sustainable society
- Water Pollution
- Air Pollution