

APRICOT-APAN
2011 HONGKONG



APAN Sensor Network WG - 3rd meeting @ Hong Kong -

2011/02/23

Susumu Takeuchi (NICT, Japan)

Introduction of APAN Sensor Network WG

- Chair
 - Eui-Nam Huh (KyungHee University, Korea)
- Co-Chairs
 - Lasse Thiem (FOKUS, Germany)
 - Susumu Takeuchi (NICT, Japan)
 - Basuki Suhardiman (ITB, Indonesia)
- Secretariat
 - Reza Khoshdelniat (MIMOS, Malaysia)

Charter of SensNet WG



- Goal
 - SensNet WG encourages the collaboration of technical experiences and knowledge regarding SNs, and will develop a scalable, sustainable, and easy-to-deploy technical environment for utilizing collected sensing data among SNs deployed in each country.
- Objectives
 - 1. Encourage SN deployment and federation
 - Exchange SN deployment cases, technical issues and experiences
 - Standardize SN description (access method/policy, specifications, protocols) and application interface (access method, query language) by utilizing external standards
 - 2. Federate for sensing data utilization
 - Develop **a federated framework** to discovery any resources in heterogeneous SNs for supporting varieties of applications
 - Ensure the scalability of a federated framework that can handle over millions of sensor nodes for realizing low-cost federation

Summary of the Past Meetings

- 1st Meeting @ APAN 29th Sydney (Feb. 2010)
 - 1 WG Meeting and 2 WS Sessions (w/ 7 speakers)
 - Introduce our researches and projects
- 1st Core Meeting @ Seoul (May 2010)
 - Discuss and establish our WG's formal charter
 - Updated charter was approved on June
- 2nd Meeting @ APAN 30th Hanoi (Aug. 2010)
 - 1 Group Meeting and 2 WS Sessions (w/ 8 speakers)
 - Share backgrounds to develop our activities

Reference: Position Paper

- Discussions of the Group Meeting of 2nd Meeting are published as the position paper
 - S. Takeuchi, "Activities of APAN Sensor Network WG: Toward a Federated Sensor Network Framework," in *Proc. of the APAN 30th Meeting*, Nov. 2010.
 - Available at: [**http://bit.ly/snpos**](http://bit.ly/snpos)

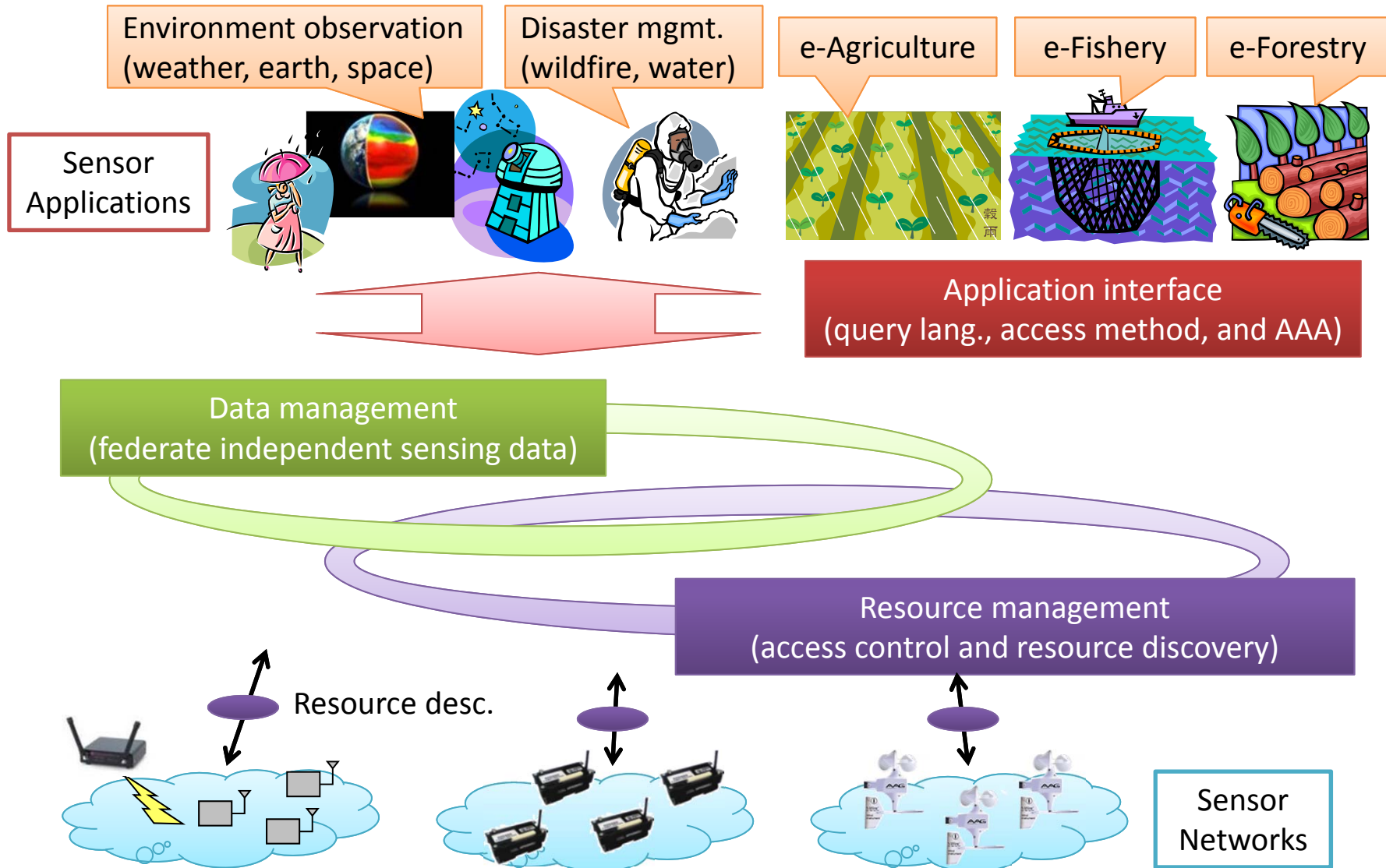
Objective of the 3rd Meeting

- Discuss a concrete approach for a part of the federated framework
 - Resource Management
 - Susumu Takeuchi
 - Data Management
 - Prof. Eui-Nam Huh
- Panel discussion at the next session (afternoon)

Goals of the Federated Framework

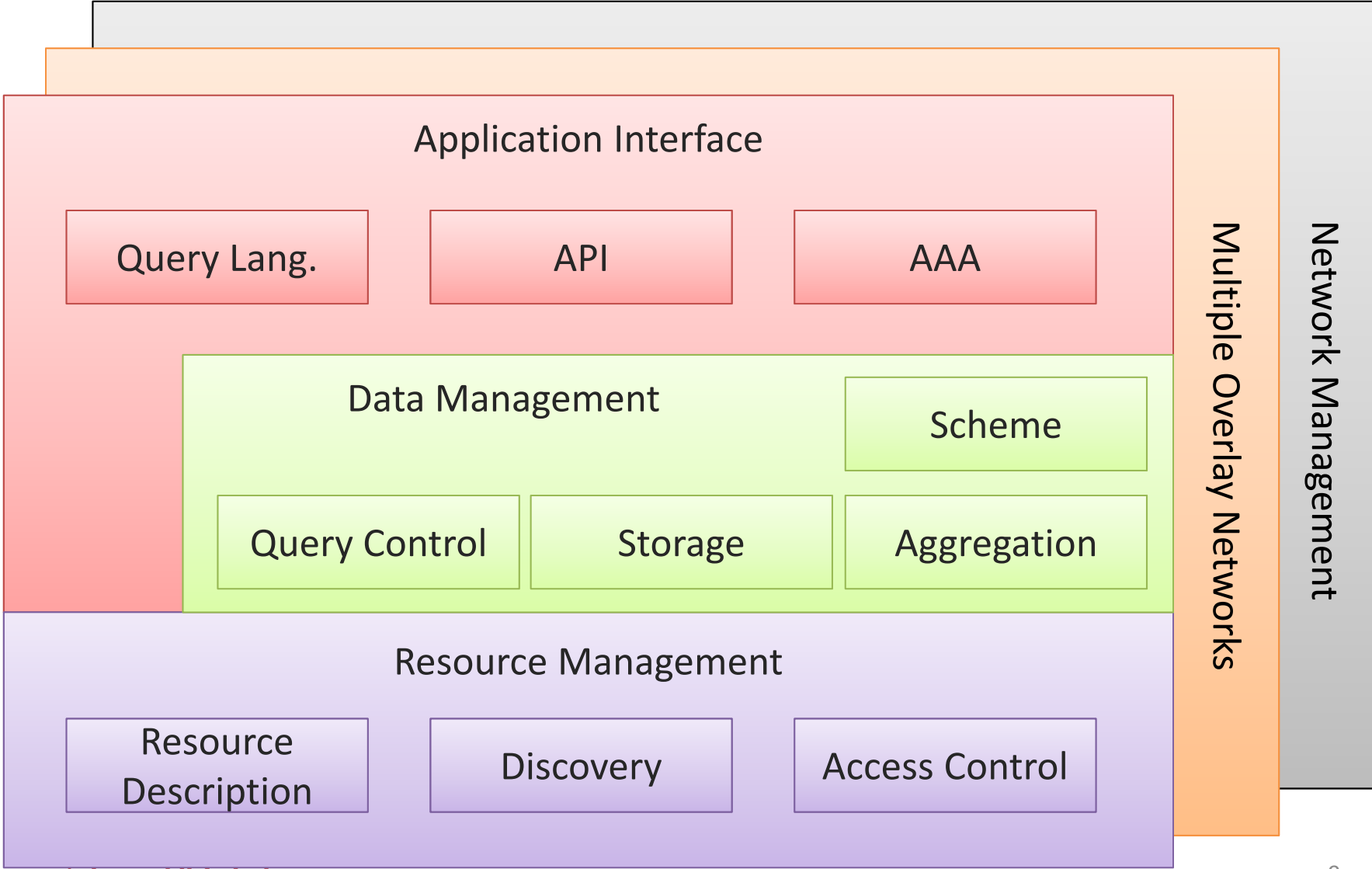
- 1. Low-cost and easy deployment and management of sensor networks for wide-area coverage**
 - Deployment cost is a barrier, but management cost is a more critical barrier to maintain sensor networks.
- 2. Support crucial sensor network applications in the Asia-Pacific region**
 - Environmental monitoring (e.g., weather, disaster, pollution, smart grid) would be essential for sustainable development in this region.

Grand Design (Conceptual Model)



Quoted: <http://bit.ly/snpos>

Function Blocks and Challenging Issues



Quoted: <http://bit.ly/snpos>

Detailed Functions (1/5)

- Resource management



- Resource Description

- Describe sensors specification that include data type, observation method and interval, access method, data management method, etc.

- Discovery

- Enable application developers to find an appropriate sensor or data node based on the given sensor ID

- Access Control

- Handle access for each resource according to its management policy

Detailed Functions (2/5)

- Data management

- Aggregation

- Collect sensing data from **sensor node**

- Storage

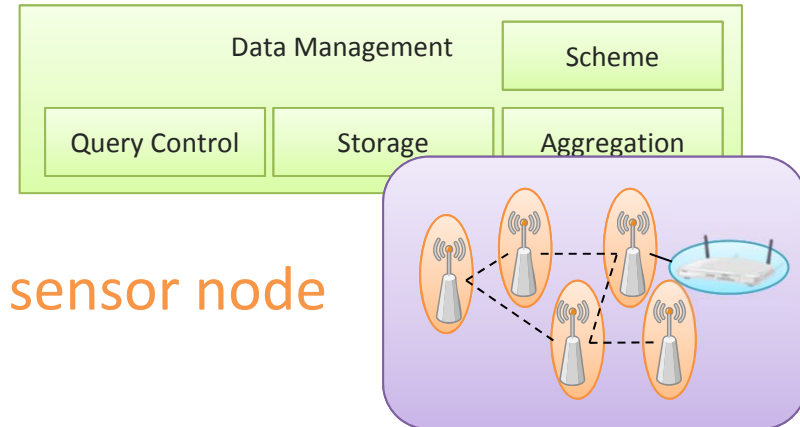
- Store raw/aggregated sensing data in each **data node**

- Query Control

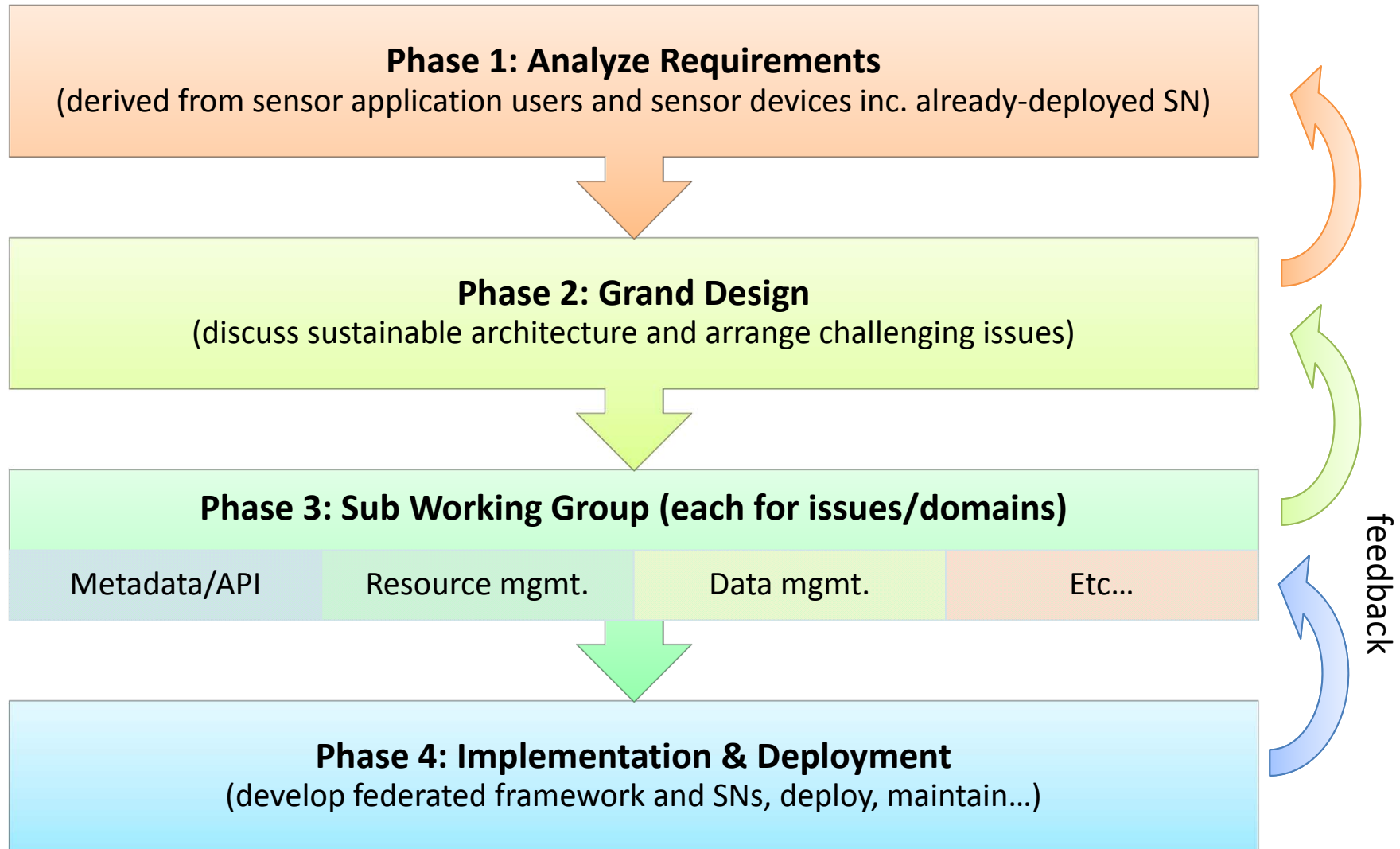
- Retrieve sensing data stored in the **data nodes**

- Scheme

- Describe the structure, attributes, relationships, etc. of the stored data



Discussion and Organization Steps



Quoted: <http://bit.ly/snpos>

* Estimated 4 years to accomplish

Goals of Today's Discussion

- Discuss issues and exchange related knowledge of the Resource Management and the Data Management field
 - Requirements each for the management
 - Related technologies and/or standards
 - Issues that we should address
 - Possible contribution for the framework each from organization

DISCUSSIONS FOR RESOURCE MANAGEMENT

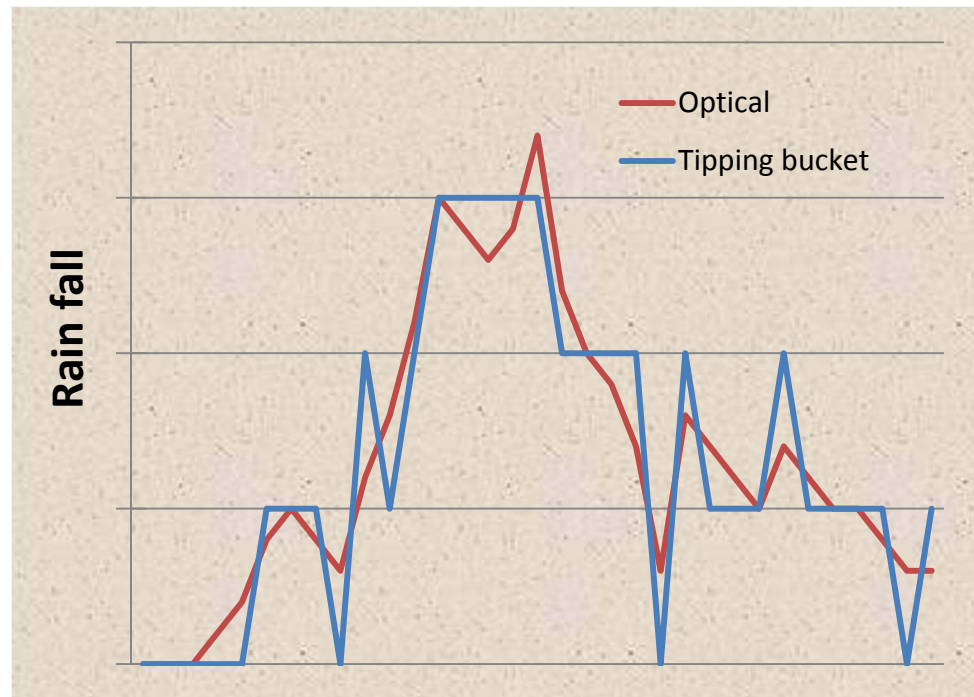
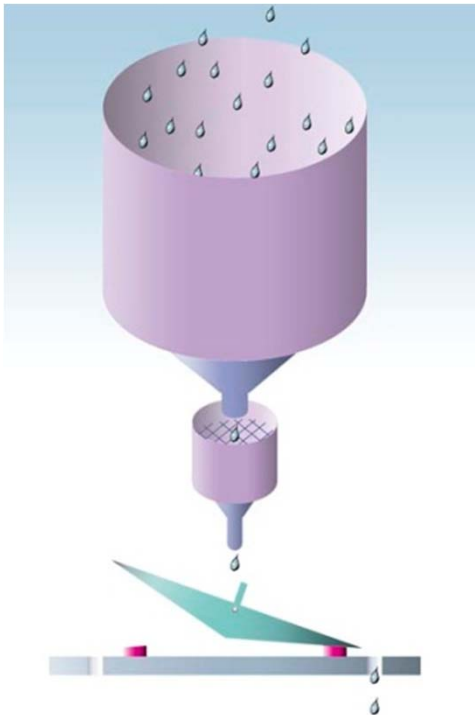
Argument of Resource Management

(1) Sensors Specification

- Data type (units)
 - Easy to be converted, but how to describe?
 - Ex) Temp. = {C, F}, humidity = {RH, AH}, pressure = {alt.}
- Observation method, interval, and accuracy
 - Accuracy = {reaction rate, error rate, etc.}
 - Different based on device specs. and requirements
 - Ex) Rain gauge <explained later>
- Access method, data management method
 - I/F and storage policy must be different by domains
 - Ex) Just collecting by 6LowPAN/ZigBee, or providing by SOAP

Ex) Rain Gauge

- Tipping bucket rain gauge
 - Observe every specified amount of rain
- Optical rain gauge
 - Observe real time rain drops by laser



Argument of Resource Management

(2) Discovery & Access Control

- Discovery of sensor/data node
 - Multiple overlay networks provide a distributed retrieval method
 - How to allocate sensor ID?
- Access control for sensor networks
 - Handle access each for resource; according to its management policy
 - How to describe a management policy?
 - **Granularity control** must be an unique requirement in sensor networks

OPEN DISCUSSION