APAN Asia-Pacific Advanced Network

Activities of APAN Sensor Network WG

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What is APAN?

- APAN (Asia-Pacific Advanced Network)
  - Non-profit international consortium since 1997
  - R&D&E community to exchange network technologies and network-based applications, and to encourage global cooperation in the Asia-Pacific region
    - Please refer: http://www.apan.net/
  - Meetings are held 2 times a year
    - Next: APRICOT-APAN 2011 (Feb. 2011) at Hong Kong
    - Please refer: http://www.apricot-apan.asia/

APAN Sensor Network WG

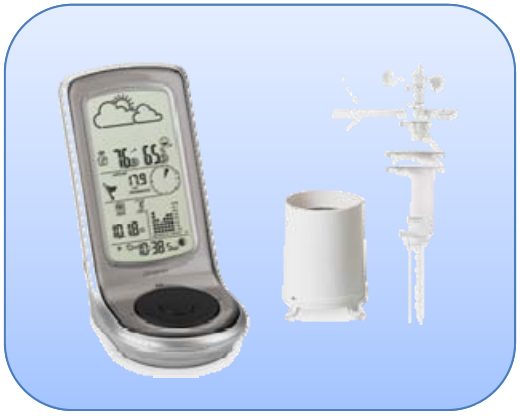
- Established on July 2009 with partners from 11 countries in the Asia-Pacific region
  - Please refer: http://www.apan.net/wg/sensor.php
- Core Members
  - Chair
    - Eui-Nam Huh (KyungHee University, Korea)
  - Co-chairs
    - Lasse Thiem (FOKUS, Germany)
    - Susumu Takeuchi (NICT, Japan)
    - Basuki Suhardiman (ITB, Indonesia)
  - Secretariat
    - Reza Khoshdelniat (MIMOS, Malaysia)

Agenda

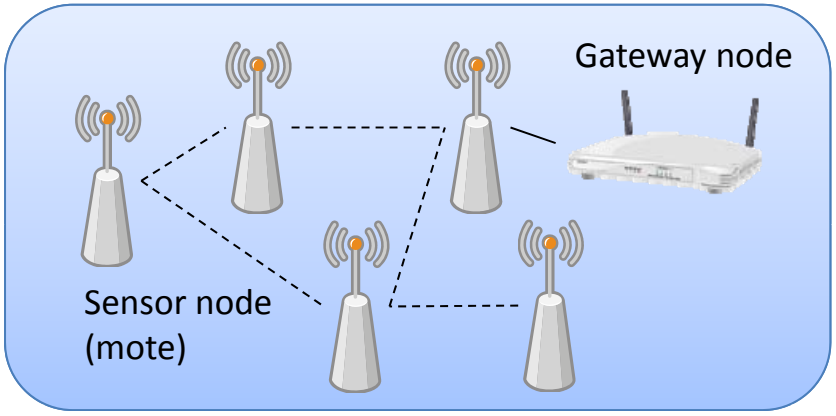
- Introduction of APAN Sensor Network Working Group (SensNet WG) and its activities
  - Background
  - Sensor network testbed federation
  - Establishment of SensNet WG
  - Goals, challenging issues, and activity policies of SensNet WG
  - Conclusion & Call for Participation

Background

- IP-based sensors are popularized
  - Weather station, wireless sensor network that includes tiny sensor nodes etc. is available
    - Wired sensors tend to have many functions,
    - whereas wireless sensors tend to be simple and a wired gateway node collects sensing data from them.



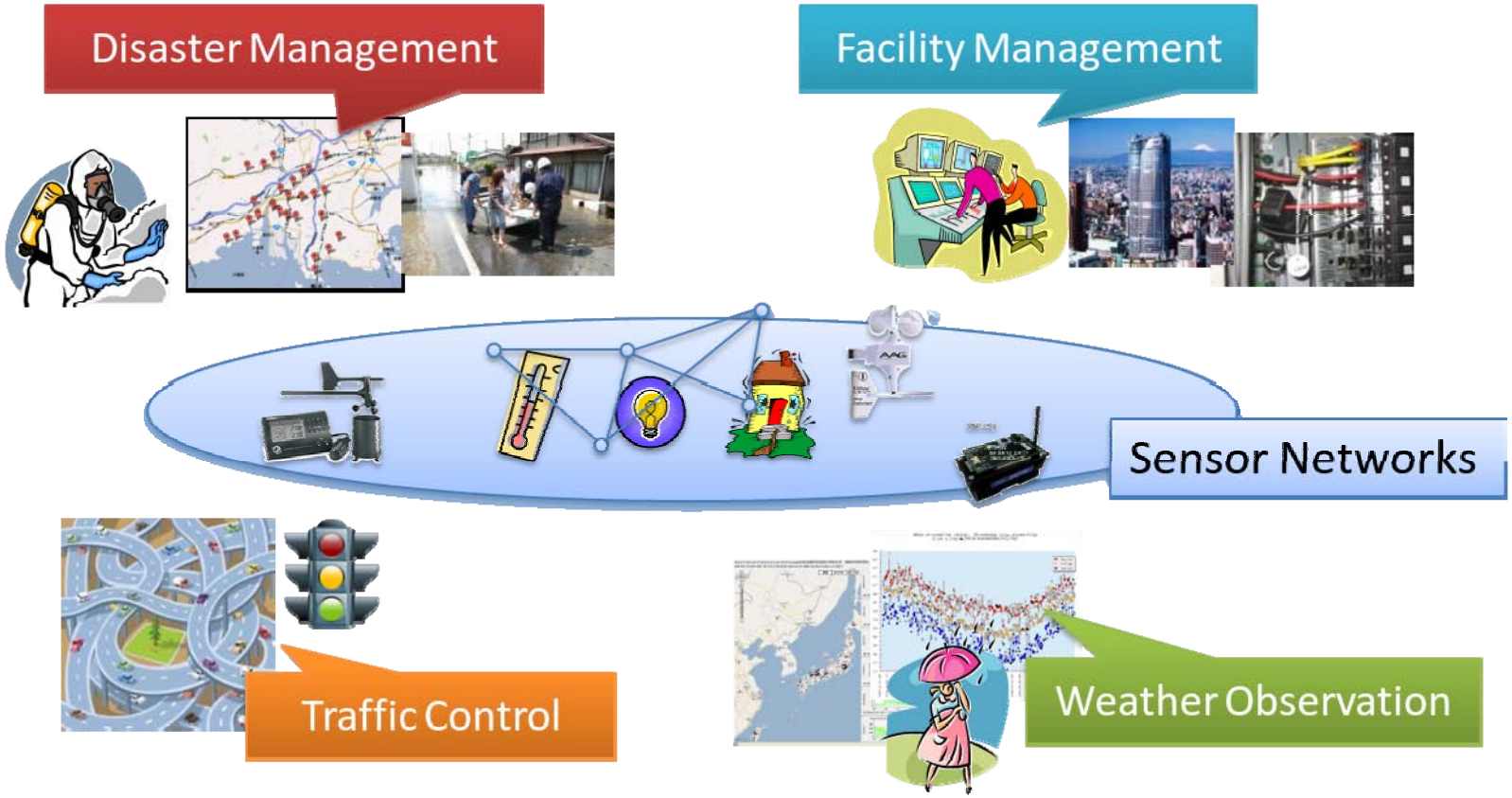
Weather station



Wireless Sensor Network (WSN)

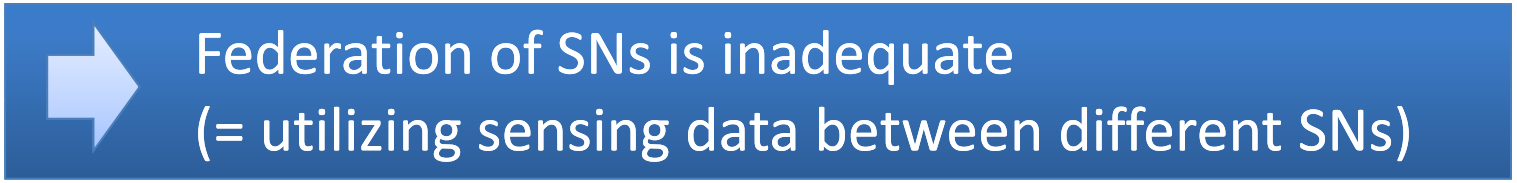
Sensor Networks as Infrastructure

- Sensor Networks (SNs) are an essential infrastructure in the ubiquitous/pervasive environment



Sensor Network Testbed Federation

- Ubiquitous/pervasive services require sensing data as much as possible
  - Various kinds of many sensors will enable the services to estimate users' context through these sensing data
  - Observing over wide-area and for a long period will enable to analyze world-scale phenomenon
- Each country has deployed SN testbeds for researching on such services, but deploying and managing SNs requires an enormous cost



Establishment of SensNet WG

- Origin
  - Federated IP-USN (Ubiquitous Sensor Network Project in Korea) Testbed BoF meetings are dissolved and reorganized into APAN SensNet WG.
    - Federation requires tight collaboration beyond the projects and application needs from several practical use cases.
- Positioning of APAN SensNet WG
  - Many SN projects are performed in the World, but there is no community to focus on:
    - Federation of sensor network testbeds, and
    - Practical applications in the Asia-Pacific region.

Goals of SensNet WG

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.

Goal 1: Deployment and Management

- The key notion is a “Federation of SNs”
  - Scalable, sustainable, and easy-to-deploy SN and its federation framework will enable tiny SN testbeds to cover wide-area
    - w/o deploying the massive number of equivalent and/or expensive sensors.

➔ SensNet WG will focus on resource/data management and deployment of SNs in the federated framework.

- P2P overlay network technologies will be required.

Goal 2: Sensor Network Applications

- The key application in Asia is “Agriculture”
  - Environmental monitoring (e.g., weather, disaster, pollution) would be essential for sustainable development in Asian countries, but agriculture must be the eventual application of them.
    - Collaboration between APAN Agriculture WG and SensNet WG must be important
- Then, what will be the characteristics of Asian agriculture?
  - Must affect on our collaboration approach


Rice Terraces
Small-scale but tolerant farming methods
http://kyuu-net.com/dantai_data/D163/

Common Concepts and Collaboration

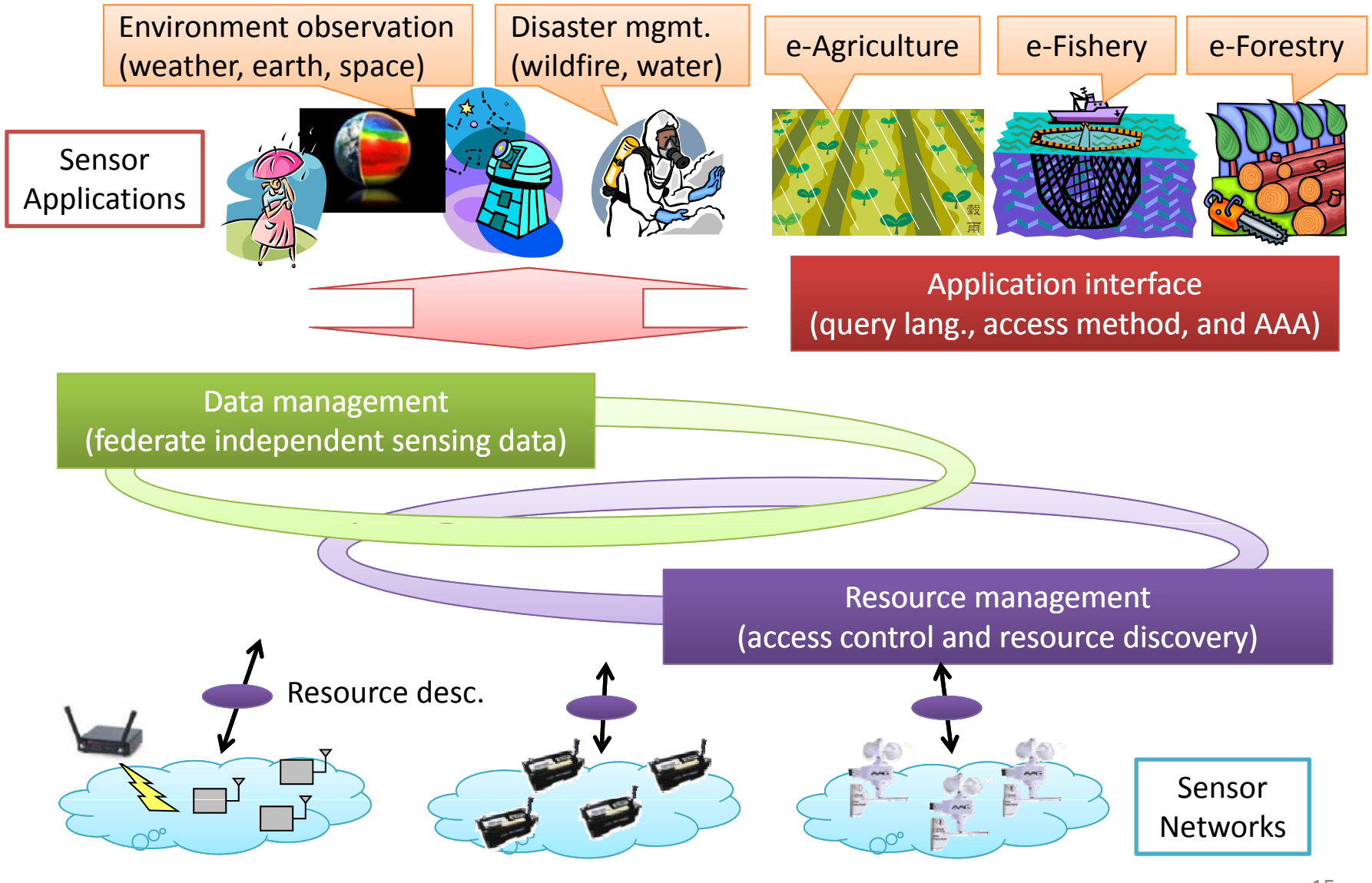
- "Distributed" and should be "Federated"
  - Sensor Network
    - Deploy tiny SNs and federate them to cover wide-area
  - Agriculture in Asia
    - Develop small farms and federate them to increase productivity
- What can SN community do for Agriculture?
  - SNs encourage a lot of small farms to maintain easily by monitoring without manpower

➔ APAN SensNet WG and Agriculture WG should collaborate tightly to extract requirements for SNs and develop a federated framework

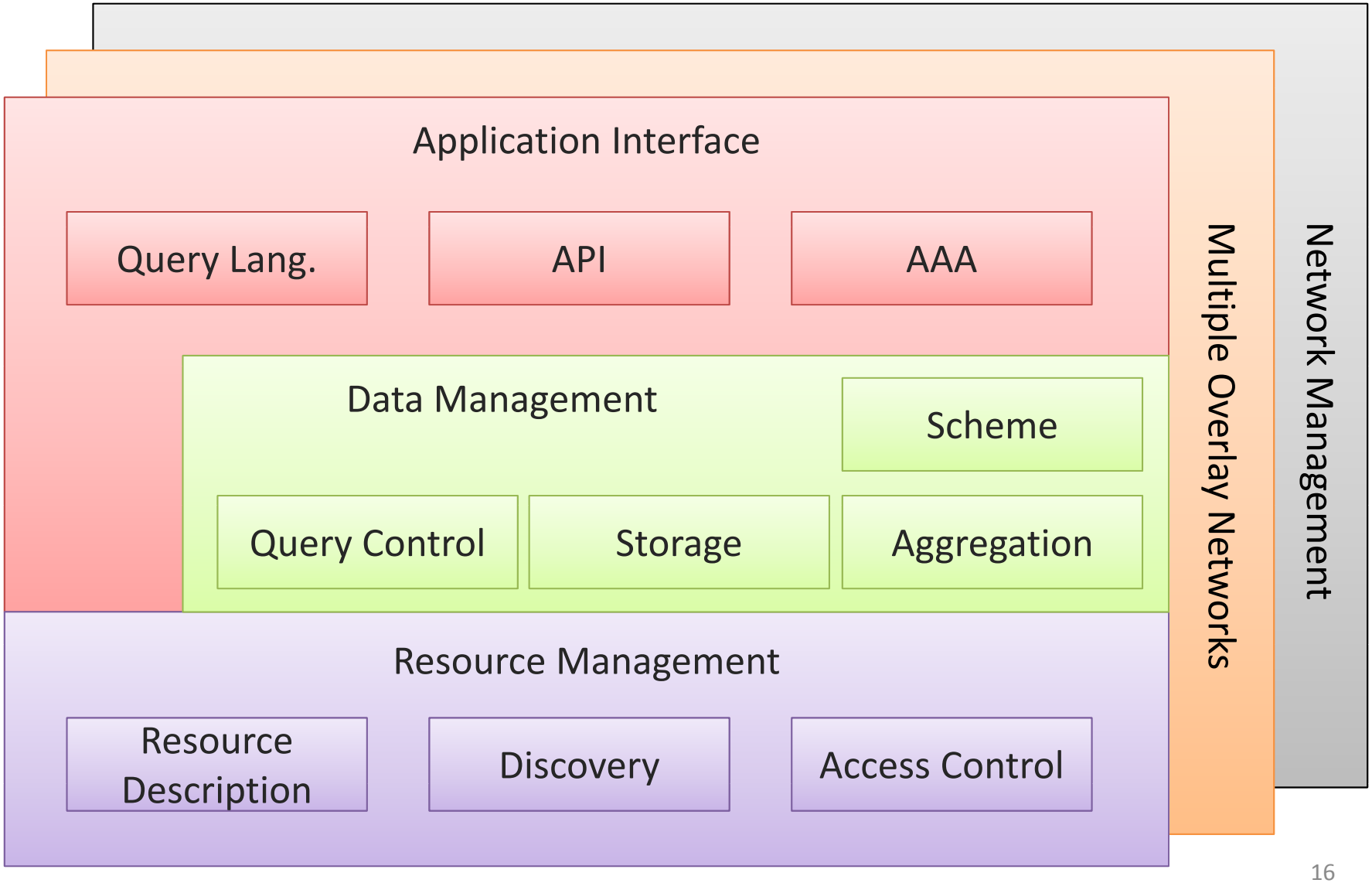
SensNet WG Charter (approved in June)

- 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

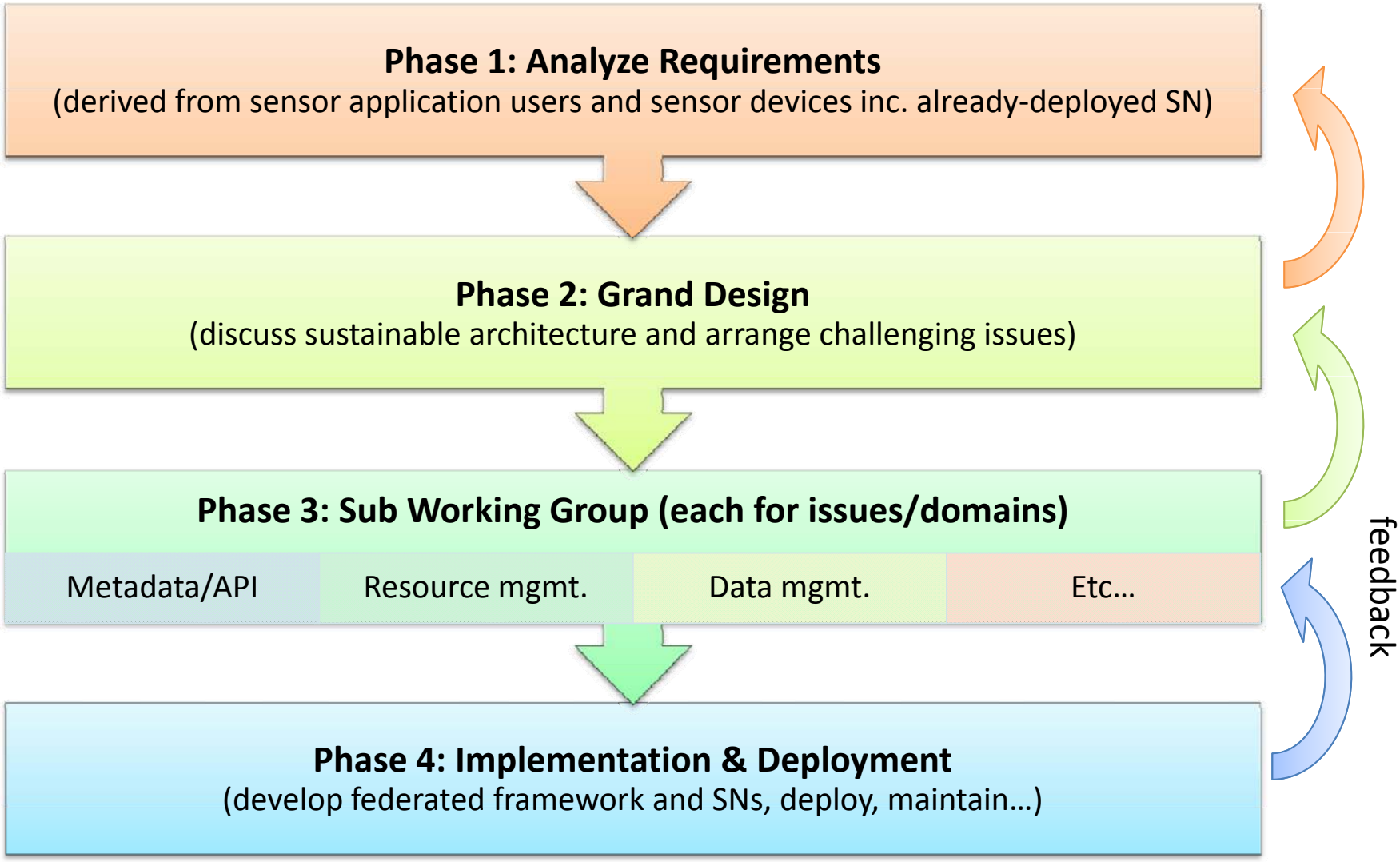
Grand Design (Conceptual Model)



Function Blocks and Challenging Issues



Discussion and Organization Steps



* Estimated 4 years to accomplish

Conclusion

- SensNet WG will focus on:
  - Resource/data management, and deployment to realize low-cost federation of tiny SNs
  - Extract requirements for SNs from agriculture field to support crucial SN applications in the Asia-Pacific region
- Call for Participation
  - APAN SensNet WG 3rd meeting will be held at APRICOT-APAN 2011 in Hong Kong on Feb. 23, 2011.
    - 2 Group Meeting Sessions
      - Discuss the issues by dividing discussions into small
    - 1 Workshop Session
      - To share the latest sensor network activities with about 4 speakers from several countries

Reference

- If you get interested in our activities, please contact to the nearest person.
  - 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)
- Please join SensNet ML from the following URL.
  - http://www.apan.net/wg/sensor.php