Use Cases of Cyber-Physical Data Cloud Computing

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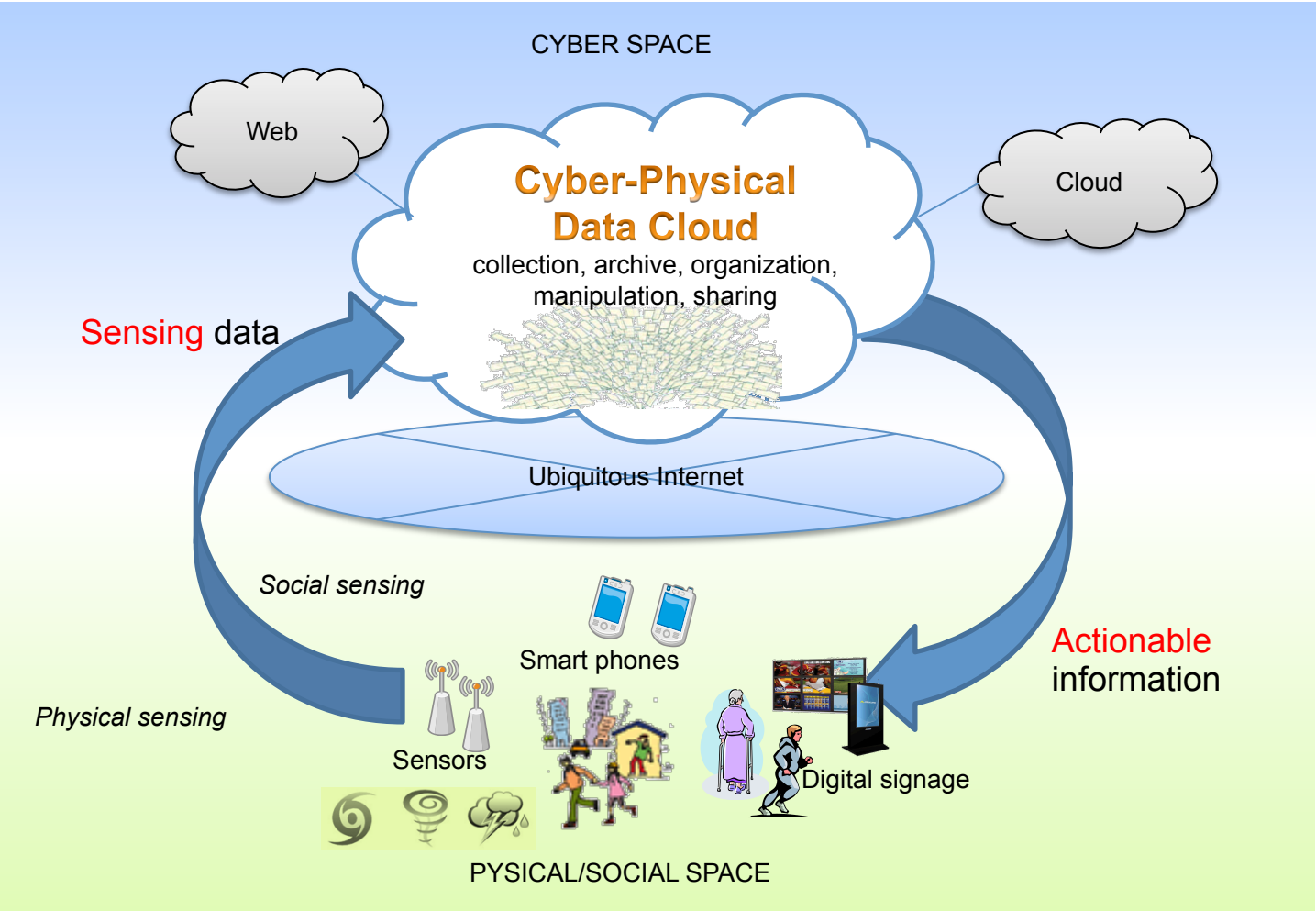
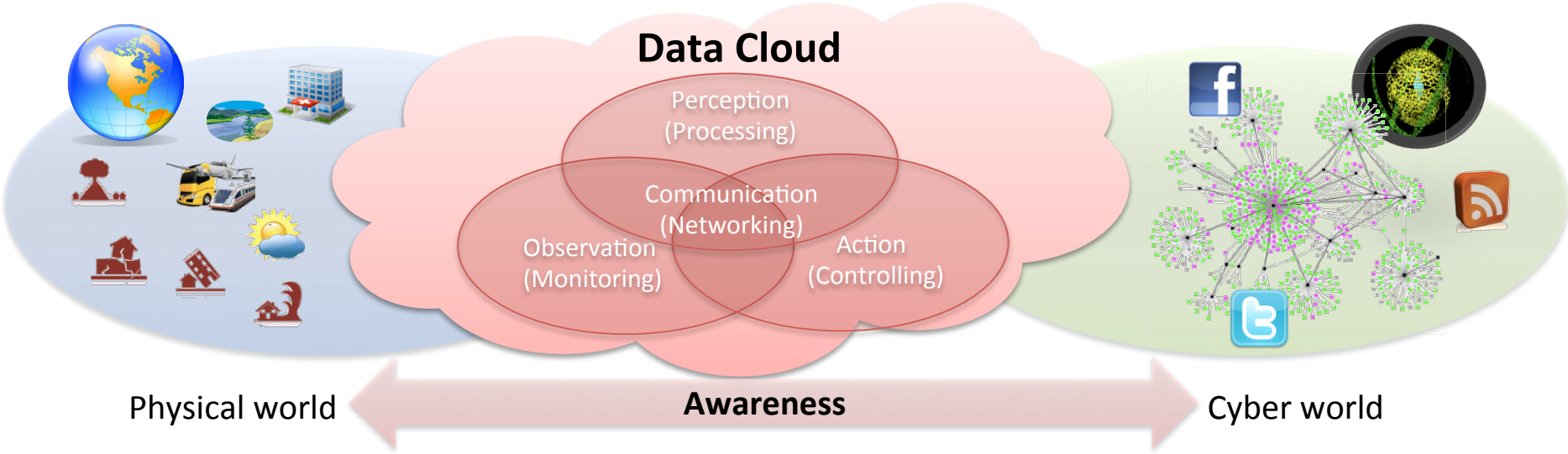
Cyber-Physical Data Cloud Computing



Goals

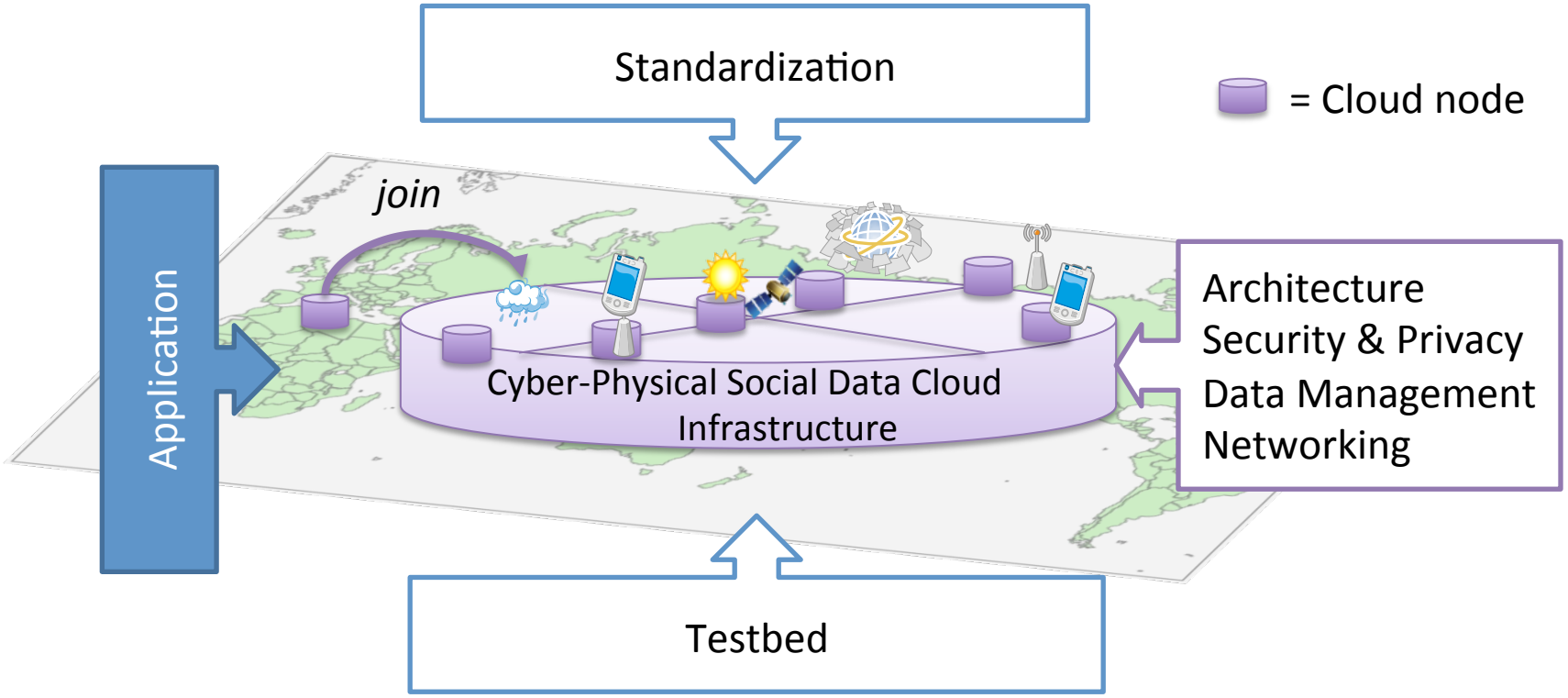


- Real-world Awareness Computing
  - Intelligent cloud computing to autonomously support useful (data/ information/knowledge) services by being aware of relationships between elements(objects, events, situations) in the real world
  - (Near) real-time interacting with the physical world
    - Observation: to monitor processes in physical world
    - Perception: to analysis information/situation
    - Communication: to share information/situation
    - Action: to control physical elements directly or indirectly

Cyber-Physical Social Data Cloud Infrastructure

- NIST & NICT Collaboration Project

  R&D of a cloud platform specialized for collecting, archiving, organizing, manipulating, and sharing very large (big) cyber-physical social data



Cyber-Physical Data Cloud Applications

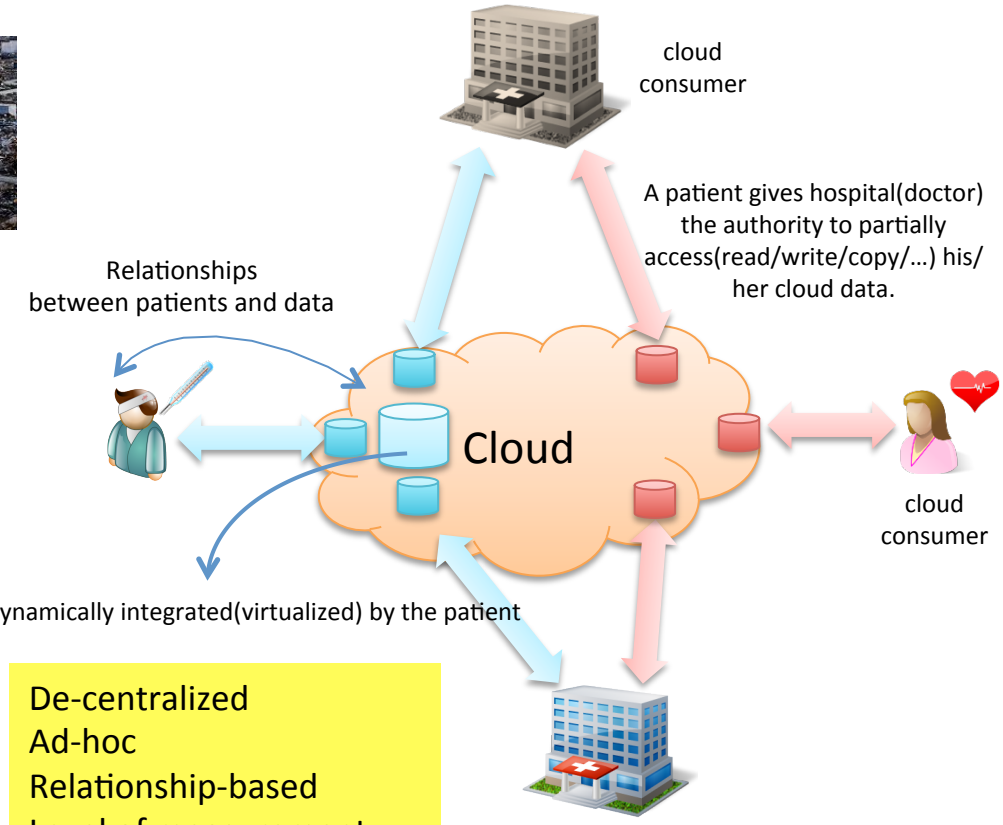
- Topics
  - Smarter Healthcare
  - Smarter Disaster Information
  - Smart City
  - Social Life Networks
- **Passim Situation-aware Applications**
  - **De-centralized**
  - **Ad-hoc**
  - **Relationship-based**
  - **Level of measurement**
  - **Autonomous**

Use Cases (1)

- Healthcare data publishing & sharing

If two hospital share their data each other, doctors can restart the treatment without overlapping examination

No health record
: cannot continue treatment quickly

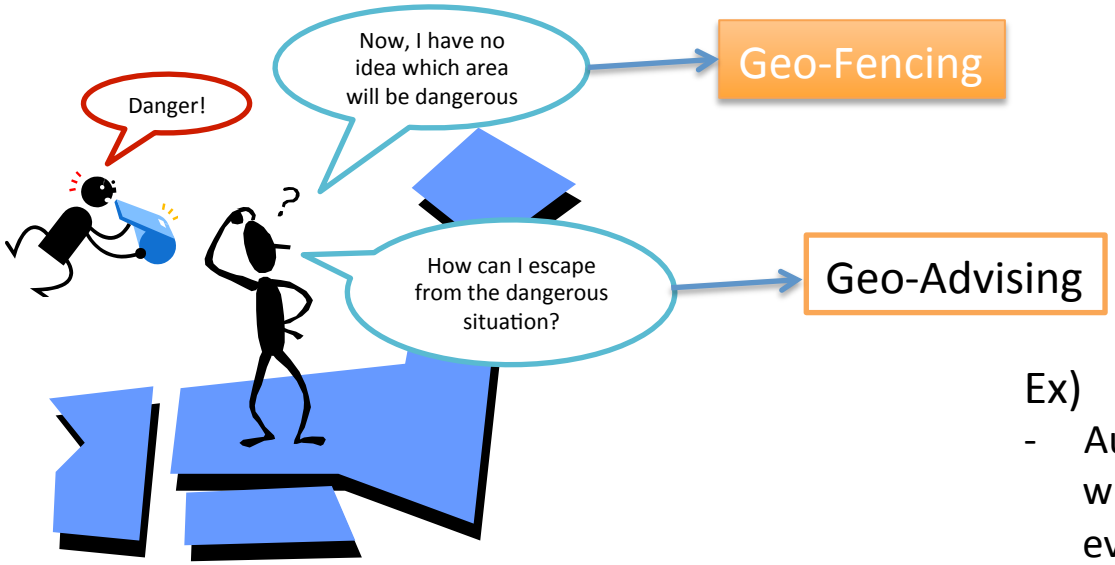


<Problems>
1) Reserved sharing
2) Global schema
3) Static systems
4) Private-Public data control

De-centralized
Ad-hoc
Relationship-based
Level of measurement
Autonomous

Use Cases (2)

- Awarable Location-based Service

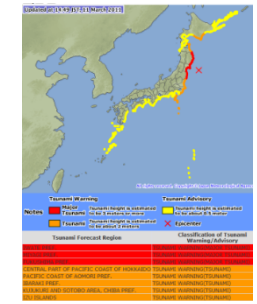


<Problems>
1) Monitoring users' location
2) Request/Response activity
3) New data(service) adaptation
4) Manually publish/share data
5) Private-Public data control

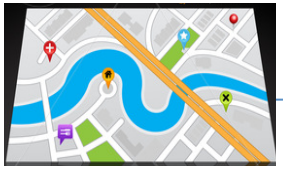
Ex)
- Automatically "check-in" subscribers when they enter a (disaster approaching/ event/favorite) place. No action outside of the place.
- Automatically and partially "share" my location
- Autonomous service discovery and composition depending on the situations

Use Cases (2)

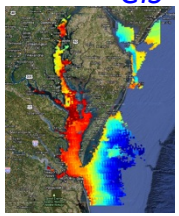
- Globally monitoring and locally fencing (safe and rapid evacuation)



advisory message



GIS



coast watch

High level of dangerous

report geolocation

Alert (broadcasting)

WarningEvent

It starts to compute risk areas using relevant data and generates "alert" event.

TsunamiAlert Event

Shelter Information (multicasting)

Alert

ShelterNavigation Event

Peer-to-peer(Ad-hoc) communication

It starts to search shelters using relevant data and generates "navigation" event.

IncreaseAlert LocationEvent

HighLevelEvent

AidSituation

PatientSituation

ShelterMonitoring Event

Social networks

Aid information

Shelter

Remote diagnosis

<Consideration>
1. Physical monitoring
2. Relationships between entities
3. Real-time data aggregation
4. Situation analysis
5. …

*Japan experience: the shelter assessment system was up and running **two weeks** after the disaster.