Trust Issues in Disaster Communications

Yuko Murayama

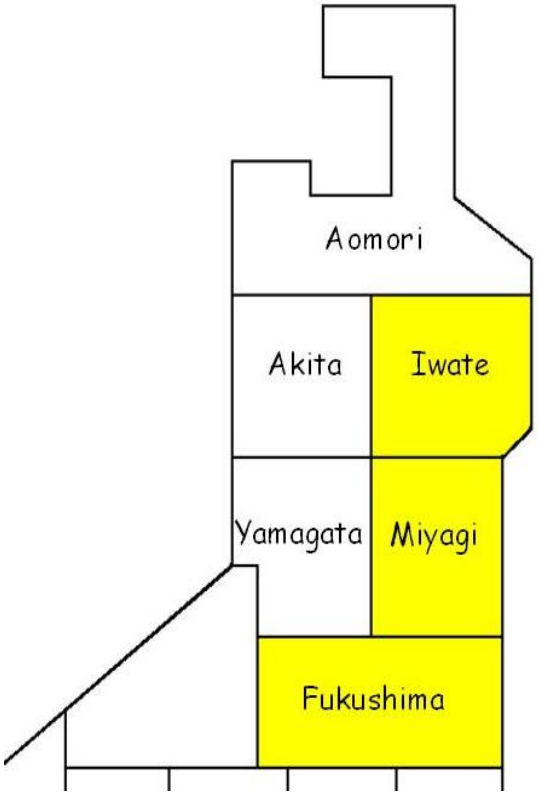
Faculty of Software and Information Science
Iwate Prefectural University

www.go-iwate.org

Outline

1. Support required at disaster
2. Support organization
3. Some results from our experience
4. Issues of disaster communications
   - trust issues
   - distrust issues
5. Disaster communications
6. Future work

Damage caused by the 3.11 disaster



Aomori: 9,644.21 km^2

Akita: 11,636.25

Miyagi: 7,285.75

Fukushima: 13,782.75

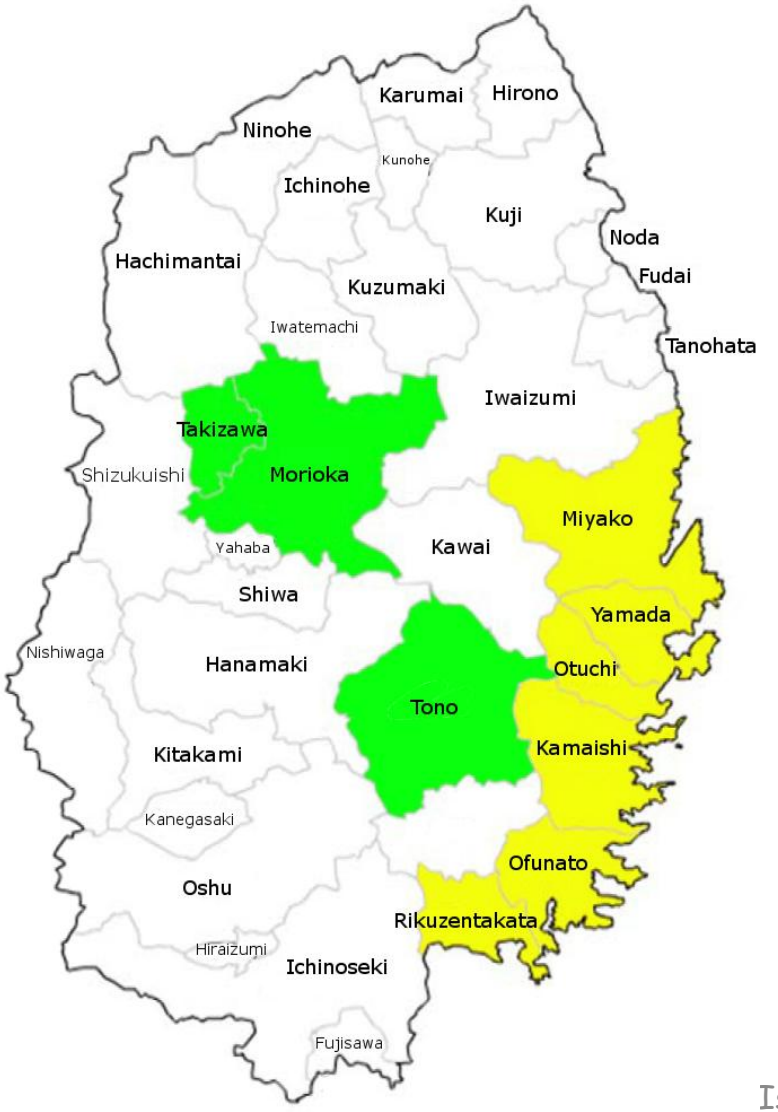
Yamagata: 9,323.46

- Tohoku Region:
  - Deaths: 15,789
  - Missing: 3,279
  - Injured: 4,604
- Iwate: 15,278.40 km^2
  - Deaths: 4,670
  - Missing: 1,315
  - Injured: 188

Reference:

1. National Police Agency
   http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf
   Feb. 14, 2012

Support for Iwate



Iwate is large:

- Iwate: 15,278.40 km² (5,899.02 sq mi) http://en.wikipedia.org/wiki/Iwate_Prefecture
- Connecticut: 14,357 km² (5,543 sq mi) http://en.wikipedia.org/wiki/Connecticut

Technical Support required at Disaster

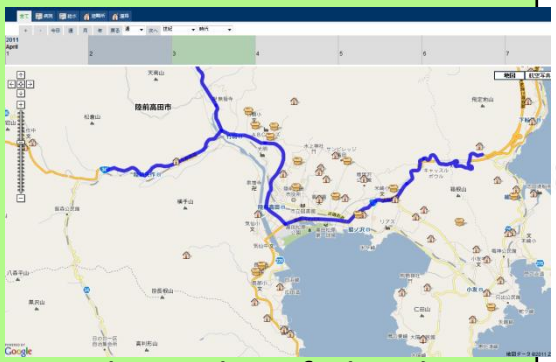
1. Information acquisition and provision:
   - People search: safety information: on-line, cell phone, off-line
   - Visualizing Lifeline information: e.g.) road condition, transport, electricity, water supply etc.
   - radioactivity, shopping and daily-life-related
   - portal sites of disaster information: www.go-iwate.org
     - No. of access: 5,892 (as of 12:30 Mar. 2, 2012)
2. Networking for information infrastructure:
   - internetworking with communication links
   - IT environment with PCs and printers
3. Shelter information management for a local government
   - List of people in a shelter: name/age/family/address
   - An information system for food and goods distribution
4. Volunteer Support
   - Tohno Volunteer Center: e.g.) local information for visitors

がんばろう！いわて
岩手震災 IT 支援プロジェクト
go-iwate.org

Our Support Activities

＜Iwate Prefectural University

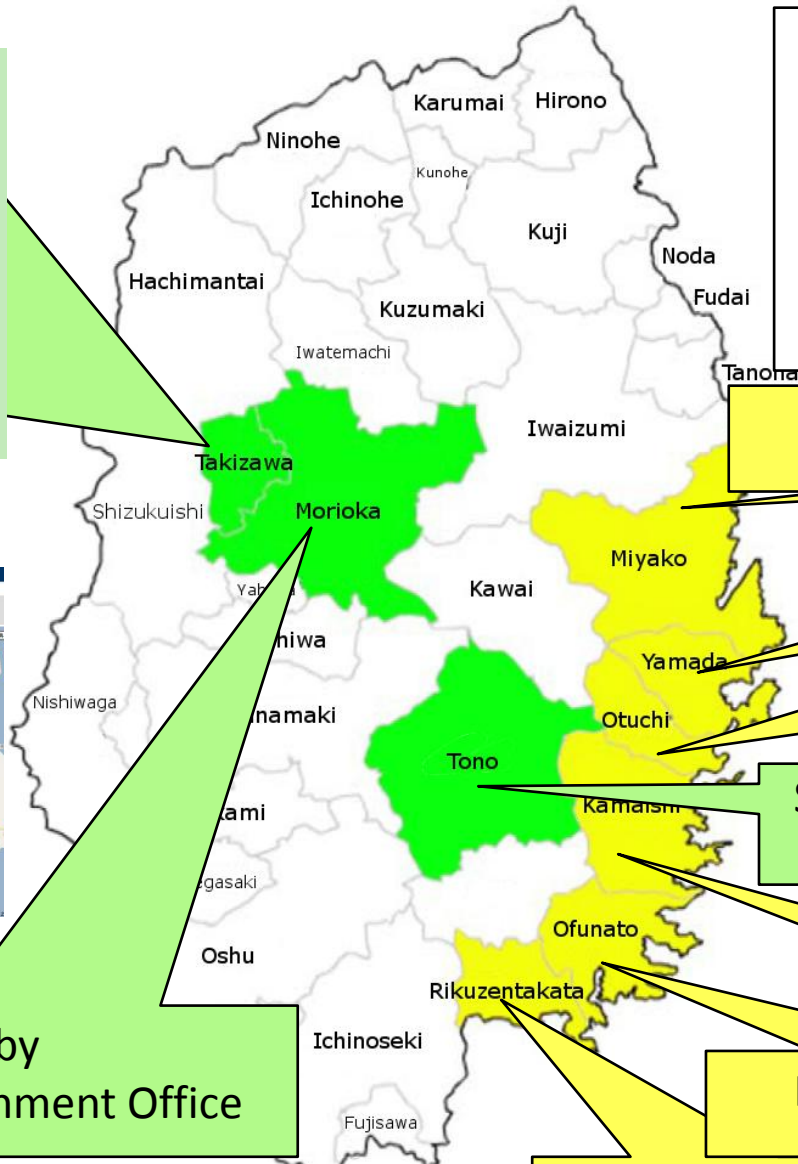
Disaster Information Portal Site



Visualizing the Life-line line

Graduate students in Tokyo

Safety Information on mobile



Internetworking and PC

Internetworking and PC

Internetworking and PC

Safety Information off-line
Tohno VC

PC and Information

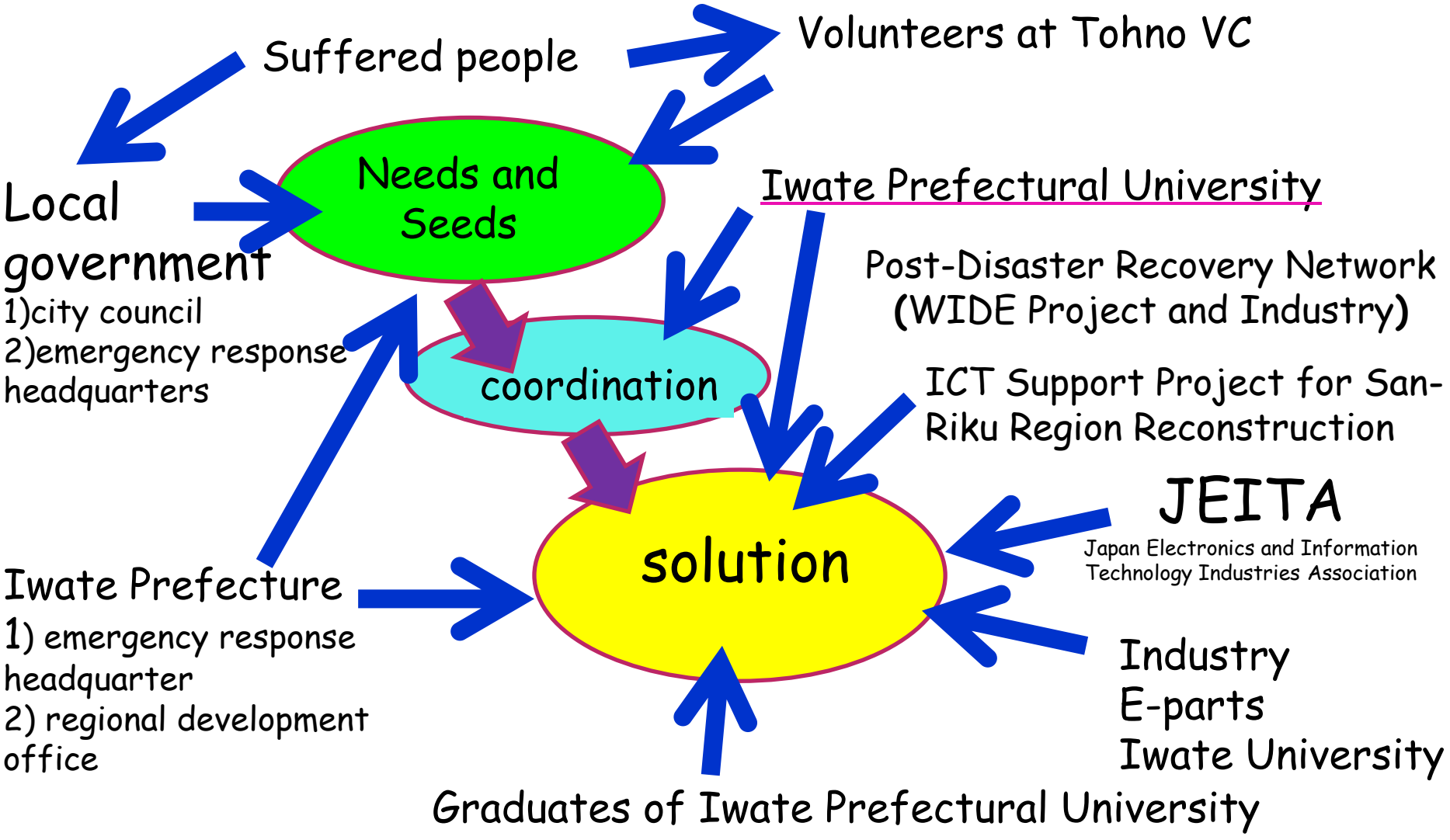
Internetworking and PC

Internetworking and PC

Support Plan by
Iwate Prefectural Government Office

■ : Supporters
■ : Suffered region

Support Organization: a loosely coupled federation



Case Study: networking at disaster

Loose Cabling: so as to remove easily later

Issues from the experience: ICT was not required so desperately

1. Providers' viewpoint:
   - ICT should be required
2. Need to understand the real need
   - Supporters and Cars, first
   - And then, ICT
3. Organizational Protocols
   - Hierarchy and independence of local governments
     - e.g.) convincing the need for networking
       - Prefectural offices: 1) emergency 2) normal
       - Local government offices: a) emergency b) normal

Disaster Communications

Risk Communications

vs.

Disaster Communications

Risk Communications

- a part of Crisis Management
- National Research Council, 1989:
  - an interactive process of exchange of information and opinion among individuals, groups, and institutions
  - risk types ,levels ,methods for managing risks

Disaster Communications

- ✓ Risk Communications (e.g. nuclear plant, disaster prevention)
  - ✓ residents
  - ✓ specialists
- ✓ Disaster Communications
  - ✓ sufferers
  - ✓ volunteers
  - ✓ Administrative offices
  - ✓ Supporters:
    - ■ organizations
    - ■ individuals

Nature of Disaster Communications

the same purpose but hard to cooperate

- ✓ Heterogeneity of people
  - Background, tired, fatigue, volunteer vs. business
- ✓ Most of us are novices
  - Need to deal with the matters without experiences
- ✓ Communications with unknown people
  - Easy to misunderstand
- ✓ Need for decision-making in changing circumstances
  - No best optimized solution
- ✓ None knows the true needs
  - ICT is a part of solution
- ✓ Don't expect appreciation
  - No time; things keep happening one after another
  - Multiple issues to deal with at the same time

Related Work: Emergency Management

- History: the Office of Emergency Preparedness (OEP) in the Executive Office of the President
  1. a prototype Delphi System (1970)
  2. Emergency Management Information System for the Wage Price Freeze (EMISARI) (1971)
     - 200 to 300 users to exercise coordinated response to crisis situations
     - the companion PREMIS system: for collaborative actions
- Crisis management:
  - a highly flexible but also structured group communication system is required

[1] Murray Turoff: Past and future emergency response information systems, Comm. of the ACM Vol. 45 No. 4, April 2002

Use of SNS for Emergency Management[2]

- Facebook:
  - Information Systems for Crisis Response and Management (ISCRAM),
  - The Humanitarian Free and Open Source Software (hFOSS) Project
  - Arkansas Tech University Department of Emergency Administration and Management
  - Emergency Awareness at the University of Maryland
- LinkedIn:
  - Emergency Management and Homeland Security Officials,
  - Professionals in Emergency Management,
  - American College of Emergency Physicians (ACEP)
  - Firefighter, Rescue & EMS Network
  - the International Association of Emergency Managers (IAEM)
  - IAEM EUROPA
  - Community Emergency Response Teams (CERT)

[2] Connie White, Linda Plotnick, Jane Kushma, Starr Roxanne Hiltz, Murray Turoff : An online social network for emergency management , International Journal of Emergency Management, Vol. 6, No. 3-4 pp. 369-382 2009

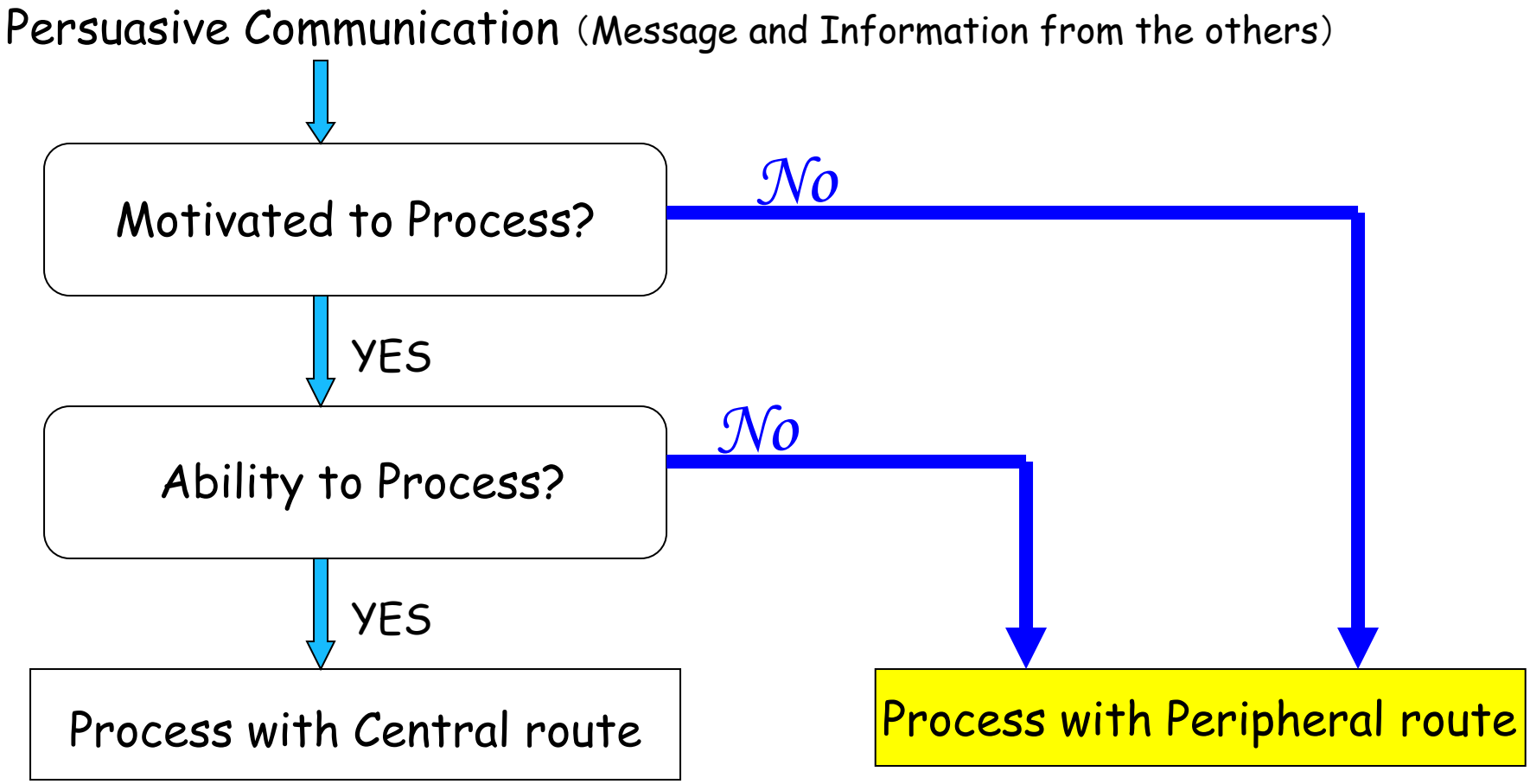
What is needed for disaster communications

speed

rhythm

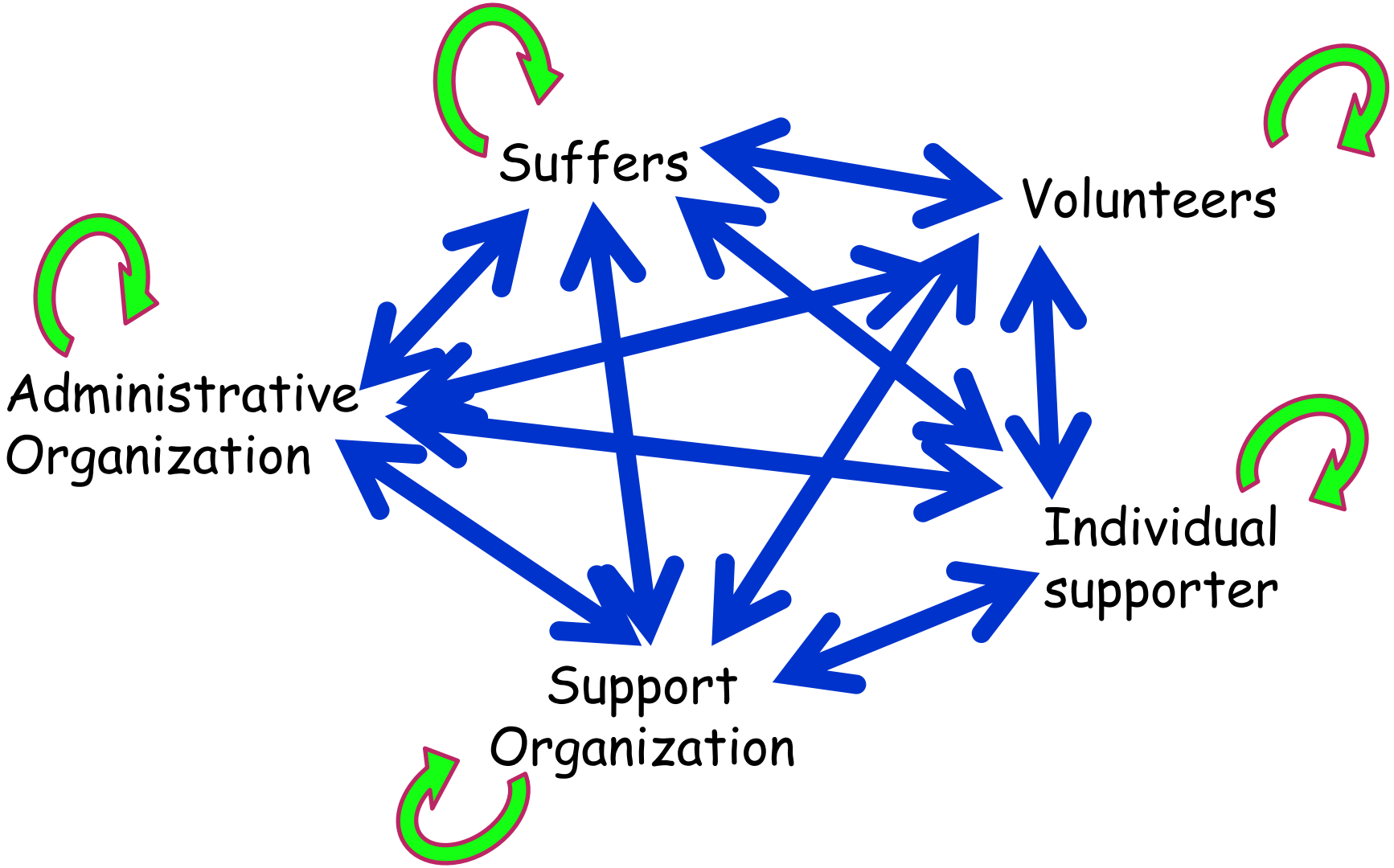
trust

Elaboration Likelihood Model (ELM)[3]



[3] Petty, R. E., & Cacioppo, J. T. :Attitudes and persuasion: Classic and contemporary approaches. Dubuque, IA: William C. Brown 1981

Trust required in Disaster Communications



Related Work: Basic Studies on Trust (multi-disciplinary concept)

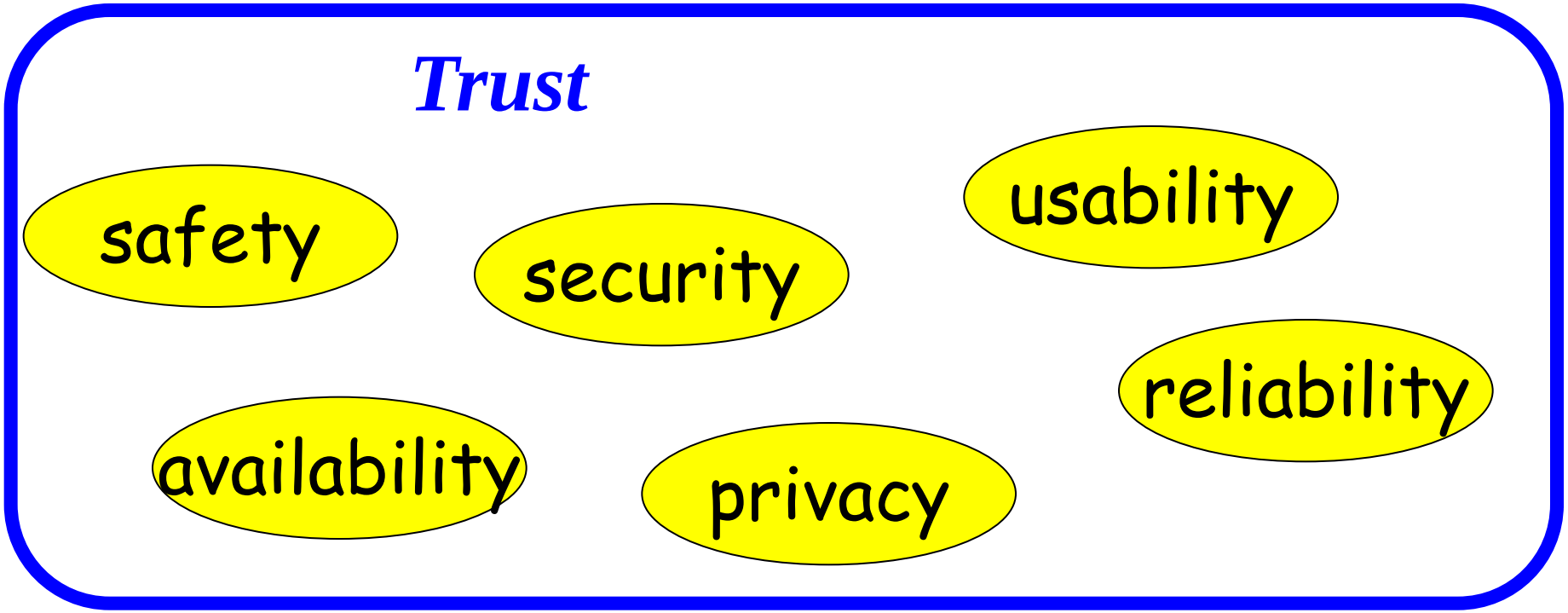
- definition of trust in an interpersonal context (Deutsch,1960)
- trust as a particular level of one's subjective probability that another's action would be favorable to oneself (Gambetta, 1988)
- the first computational trust model (Marsh, 1994)
- People trust people, not technology (Friedman, et al. 2000)

Cognitive and Emotional parts of Trust

Lewis, J. D. and Weigert, A.: Trust as a Social Reality, Social Forces, Vol. 63, No. 4, pp. 967-985 1985

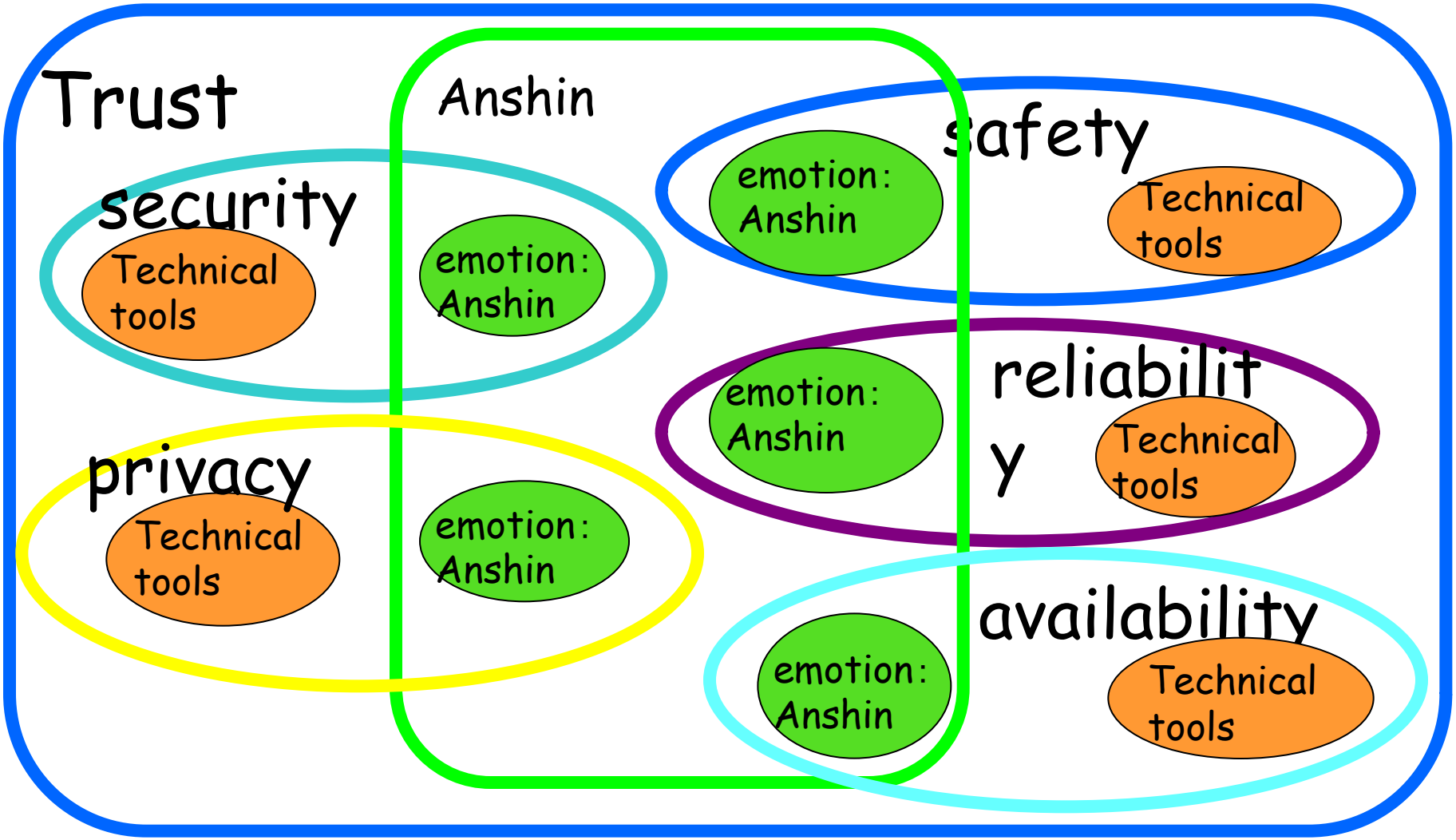
- **Cognitive Trust**
  - "good rational reasons
  - competence, benevolence, integrity
- **Emotional Trust**
  - Strong positive affect for the object of trust
  - "Feeling Secure"
    - Xiao, S. and Benbasat, I.: The formation of trust and distrust in recommendation agents in repeated interactions: a process-tracing analysis, Proc. of the 5th international conference on Electronic commerce (ICEC'03), pp. 287-293 2003.

Trust models by Camp and Hoffman



[4] Camp, L.J. "Design for Trust", Trust, Reputation and Security: Theories and Practice, ed. Rino Falcone, Springer-Verlang (Berlin) (2003).
[5] Hoffman, L. J., et al. : Trust beyond security: an expanded trust model, Communications of the ACM, Vol. 49, No.7, pp.94-101 (2006).

Anshin indicates "emotional part of …

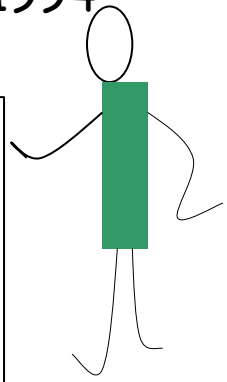


Anshin vs. Trust

[6] Yamagishi, T.& Yamagishi, M.:Trust and commitment in the United States and Japan, Motivation and Emotion 18(2), pp.129-166 1994

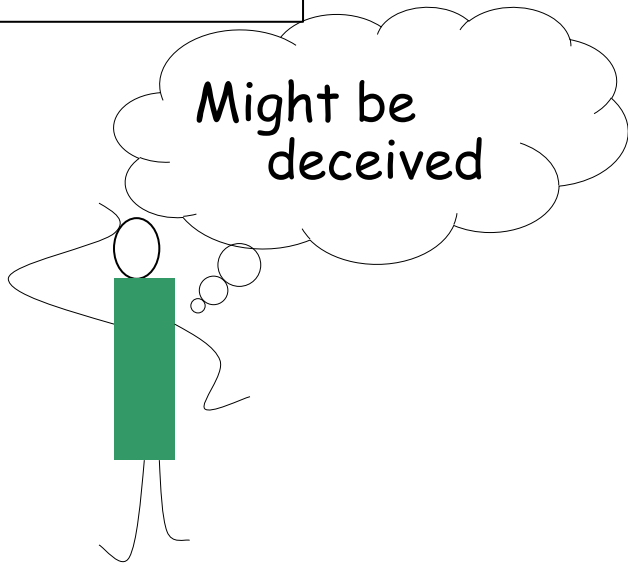
the community with Anshin:

there is no need for trust because no one is supposed to deceive the other



the community with Trust :

judge the others based on the information



What we need is Trust

Basic Factors of Cognitive Trust:

1. Competence
2. Integrity
3. Benevolence

→ Salient Value Similarity (SVS) model [1]

[7] Earle, T. C. & Cvetkovich, G.(1995). Social trust: Toward a cosmopolitan society. Westport, CT: Praeger Press.

the asymmetry principle of Trust

trust building
vs.
trust destroying

[8] Slovic, P. :Perceived risk, trust, and democracy. Risk Analysis, 13, 675-682 1993

Distrust

- ✓antonym of Trust:
  - Absence of Trust
  - Not Distrust
- ✓cognitive trust vs. emotional trust
- ✓Distrust is emotional part of trust

Distrust in Disaster Communications

- ✓Easy to get distrust
- ✓Need to have trust-processing
- ✓Collaboration with the Salient Value Similarity (SVS) model

from Short-term restoration to Long-term reconstruction

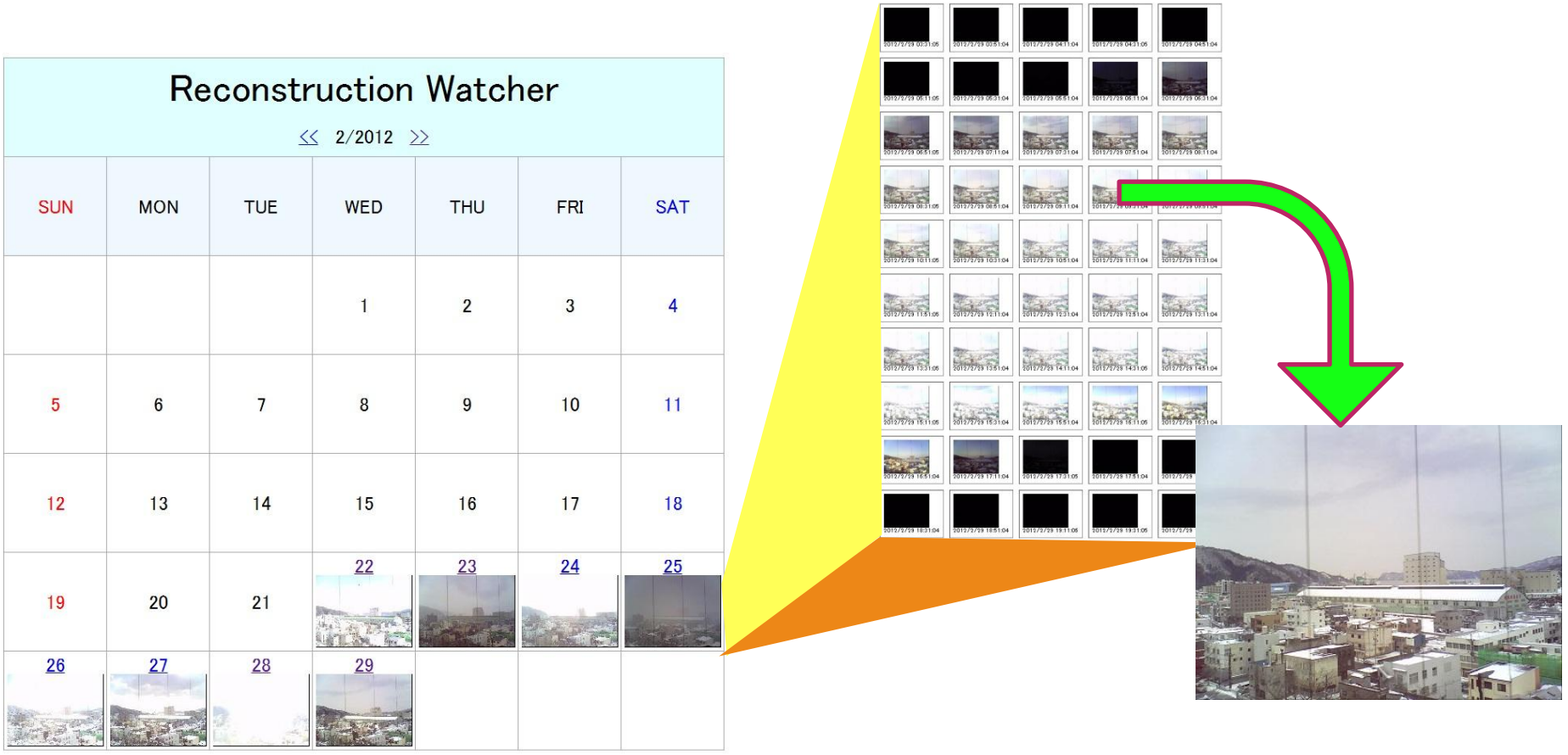
- ✓ Disaster Information System
  - Short term: safety information, lifeline, shelter, volunteer activity, goods distribution
  - Long term: care, jobs, housing, education, community, transport
  - ICT environment
    - From shelters to houses
    - Local governments
    - Public transport
- ✓ From infrastructure to applications
  - Reconstruction watcher
  - Use of Digital Signage
- ✓ Sustainable support: business models
  - Welcome to Project Fumbaro Eastern Japan
  - Amazon: *wish list*

Reconstruction Watcher (Yamada, Kamaishi)

がんばろう！いわて
岩手震災 IT 支援プロジェクト
go-iwate.org

Setting a PC and a web camera

Reconstruction Watcher version 2 with photo images without much bandwidth



Disaster Information System

Different from a normal-time use

- ✓ Need a standard format
  - Safety information
  - Information on suffers: family, shelter
  - Shelter
  - Good Distribution: never be well-planned
  - Medical information: the disaster weak
  - donation: traceability
- ✓ *Sahana*[9,10]
  - Open source
  - Community of software developers
- ✓ Need a well-known interface
- ✓ Killer Application for Cloud Computing!

[9] Paul Currion, Chamindra de Silva and Bartel Van de Walle: Open source software for disaster management, Comm. of The ACM, Vol. 50, Issue 3, pp.61-65 2007

[10] Sahana Japan: http://www.sahana.jp/

Iwate Disaster IT Support Project

www.go-iwate.org