



**ITU Kaleidoscope 2013**  
**Building Sustainable Communities**

**Sustaining Life**  
**During the Early Stages of Disaster Relief**  
**with A Frugal Information System:**  
**Learning from**  
**the Great East Japan Earthquake**

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# Key Messages

1. Resilient, rather than robust, ICT is necessary for municipal governments to provide life saving activities immediately after devastating disasters
2. A “Frugal IS” design, which implies minimal resources, is a means of providing resilience
3. Mobile devices, with which many people are familiar, will be essential to providing emergency services

# Overview of the Earthquake

- ❑ Occurred at 14:46 (JST) on March 11, 2011
- ❑ Sliding plates → 500km rupture zone
- ❑ Richter scale of 9.0
- ❑ Deaths: 16,131, Injuries: 5,994  
Missing: 3,240 (As of Jan 2012)

Oozuchi town

>> Before the earthquake (Sep.4, 2010)

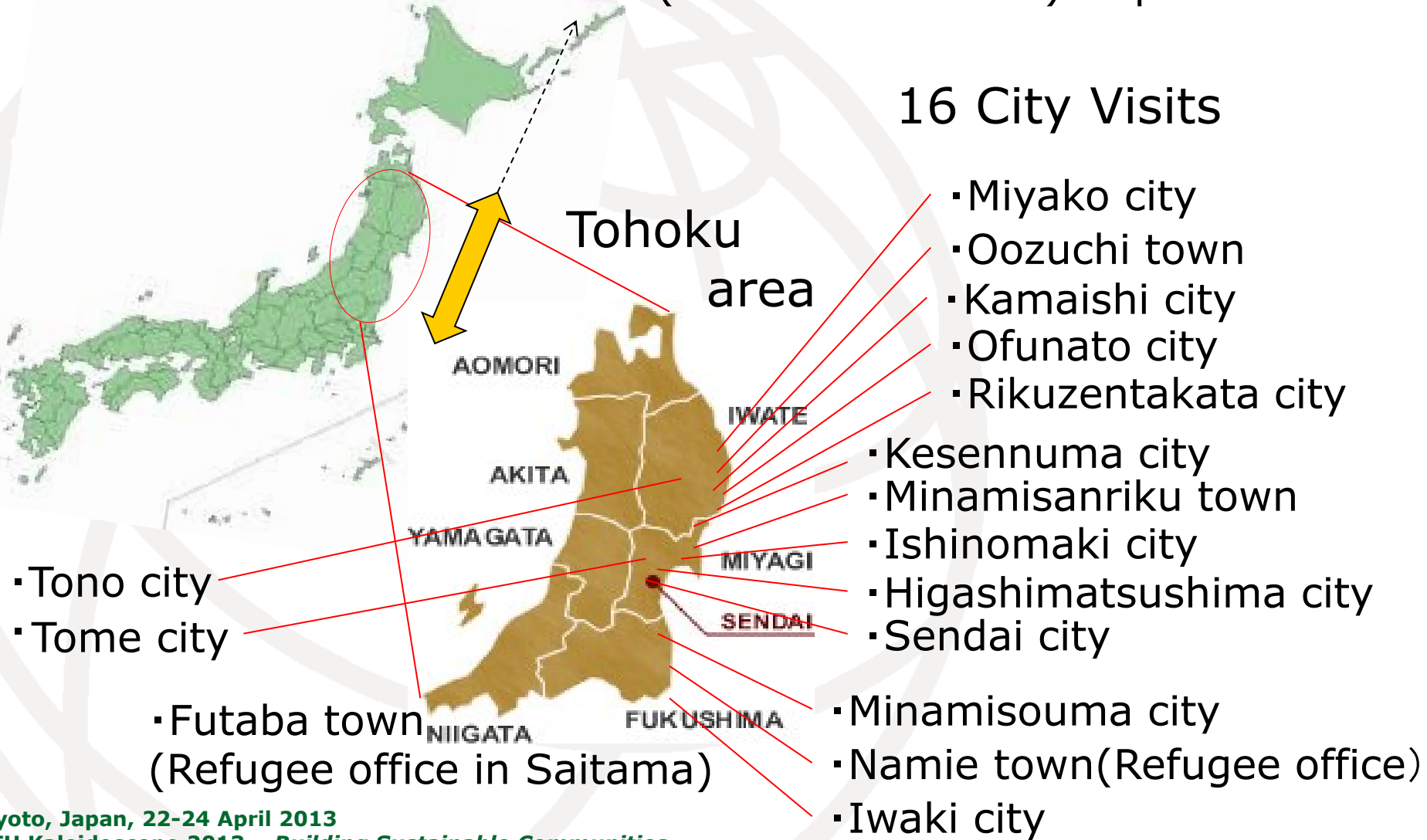


>> After the earthquake (Apr.20, 2011)



# Field Research (2011 Aug.-2012 Feb.)

500km (≒Cannes to Rome) rupture zone



## 16 City Visits

- Tono city
- Tome city

▪ Futaba town  
(Refugee office in Saitama)

- Miyako city
- Oozuchi town
- Kamaishi city
- Ofunato city
- Rikuzentakata city
- Kesennuma city
- Minamisanriku town
- Ishinomaki city
- Higashimatsushima city
- Sendai city
- Minamisouma city
- Namie town(Refugee office)
- Iwaki city



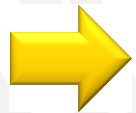
# Need Resilient (vs. Robust) Systems

- ❑ Buildings collapsed: 0 (1 washed away)
- ❑ Servers damaged (data loss): 3/16
- ❑ Power loss: 13/16
- ❑ Loss of communications: 10/16



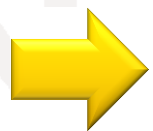
Photos by Rikuzentakata city and  
Ishinomaki city

**Buildings were robust  
but systems failed nevertheless**



# Primary Operations of Municipal Governments after a Disaster

- 1) Confirm the whereabouts and safety of residents
- 2) Establish and operate evacuation centers
- 3) Transport and manage relief goods
- 4) Support evacuees and record status
- 5) Issue disaster-victim certificates



**Needs agile and flexible  
delivery of life saving services**

# The Reality

Due to the degraded ICT conditions and a shortage of personnel,

it was not easy to...

- share information
- process data
- grasp the situation

# Requirements for Resilient Information Systems

- ❑ Minimal resources (power)
- ❑ Familiarity with tools (devices)
- ❑ Versatility (applications)



# Frugal Information System

- Defined as “...*an information system that is developed and deployed with minimal resources to meet the preeminent goal of the client*”

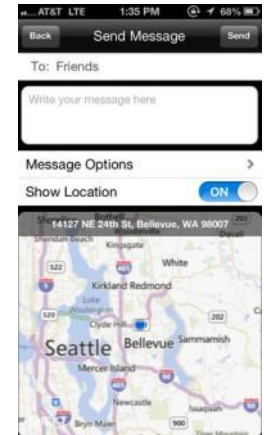
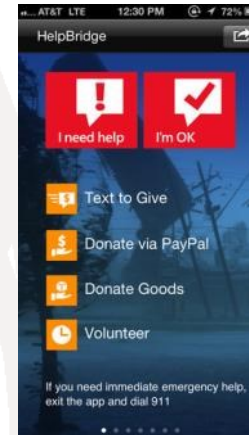
# Four U-constructs of the Frugal Information System

Drive	
Ubiquity	The drive to access information unconstrained by time and space
Universality	The drive to overcome the friction of information systems' incompatibilities
Uniqueness	The drive to know precisely the characteristics and location of a person or entity
Unison	The drive for information consistency

# Use of Cell Phone (mobile Internet) as the Standard Platform

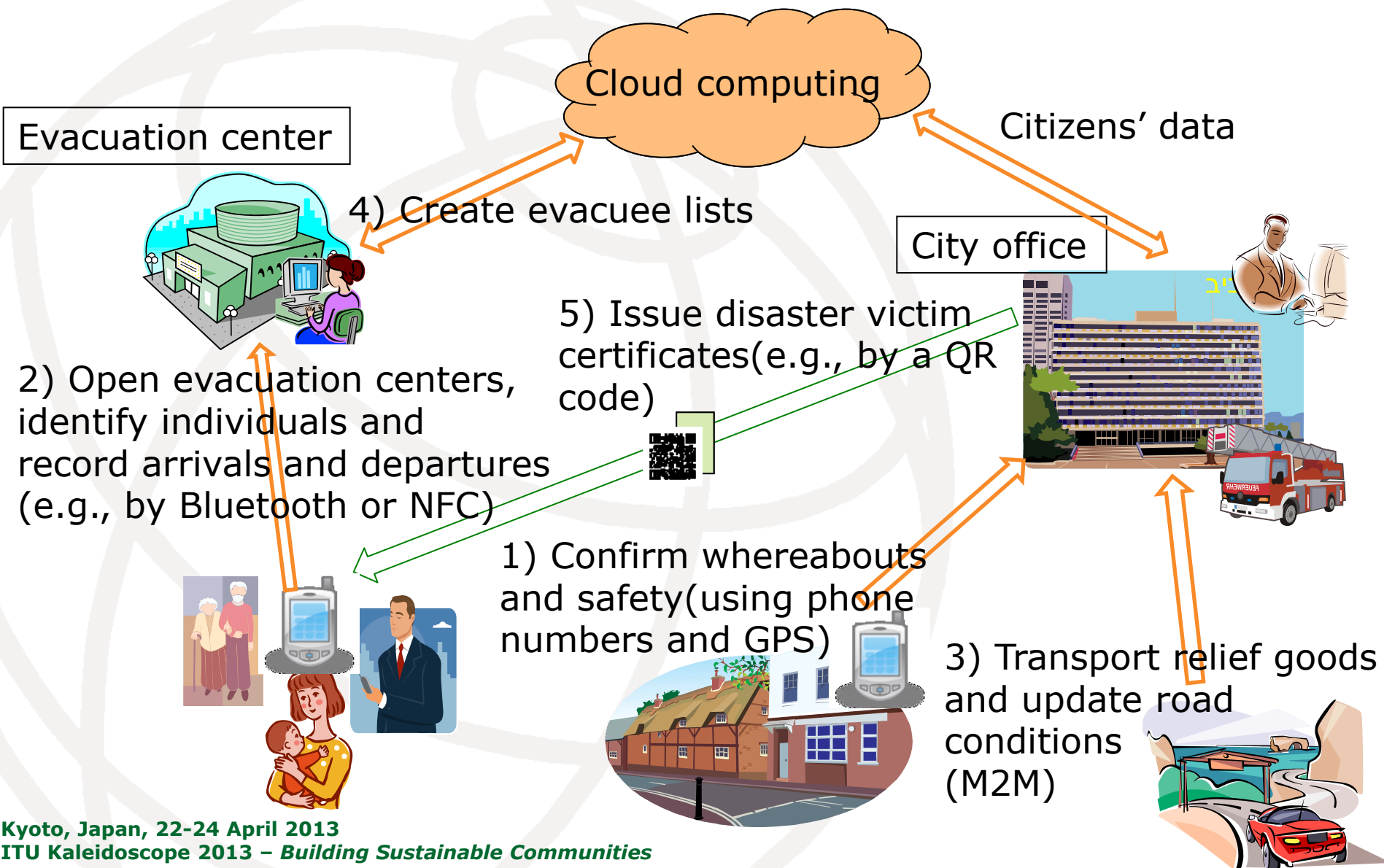
- ❑ Widely available : Ubiquity
  - Most used tool for individuals after 3.11
- ❑ Open interface (API) : Universality
  - Emergency App for smartphone [HelpBridge]

Message	Code
I need water	1
I need food	2



- ❑ SIM ID, phone # etc. : Uniqueness
- ❑ Data integration on cloud : Unison
- ❑ Easy-to-charge (minimal resources)

# Frugal IS in Disaster Relief Operations



# Issues

1. Power supply to wireless base stations
2. Destruction of aerial (over-ground) trunk cables among base stations
3. Japanese governmental structure does not assume the use of public wireless services as a backbone for security reasons



# Frugal Design for Resilient ICT

- Prepare disaster resilient and **ubiquitously** available networks as soon as possible
- Design **universal** infrastructures and applications
- Use mobile devices (that people are familiar with) to identify individuals and to secure **uniqueness**
- Promote public and private sector collaboration for data **unison**