[Data D] Location Confirmation at a Large Scale Disaster with Noncontact IC Cards

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Japanese version of this document was created by Prof. Kiyoshi NAKANO, Osaka City University and was translated into English by JICA as an ODA program. If you would like to use it, e.g., in publications, please send an e-mail to the mail address in the following :

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The entire picture and the position of this announcement

- Position of this announcement
  - Recommendation and verification of idea
  - Not involving technological development
- Premises
  - Assuming that mobile phones are not available at large scale disasters
  - Key point is whether Japanese E911 (mobile phones to inform of location automatically with calling 110 and 119) operates well at large scale disasters

- Entire picture
  - Use of noncontact IC card = Only the card using noncontact IC chip (Felica produced by Sony) is currently popular.

- Entire picture (continuing)
  - A registered noncontact IC card is used as an individual identification tag. ID (identification number) is recorded by the family.
  - Using Felica reader/writer of convenience stores and vending machines
  - A person walking a long distance home holds a card over the reader/writer of a convenience store (for example, on trash cans at the store front), and the time, location of the store, and card ID are recorded.
  - His /her family inputs an ID, and then the time and location above are indicated.
  - Even if mobile phones and e-mail transmission are restricted and unavailable, this service can be used.

What is a noncontact IC card?

- The card in which a noncontact IC chip is built.
  - What is a noncontact IC chip?
    - With receiving radio waves, it generates electricity, calculates, memorizes, and transmits information.
    - RFID, Wireless IC tag, Noncontact IC tag, and Electric tag all the same thing
    - If it is in the shape of a card, it is called a card. If it is in another shape such as a baggage tag, a price tag, a nameplate, a bill (note), or one built in a machine, it is called a tag.

- Application
  - Committee on Welfare, Health and Hospital Management= Checking the state of children commuting to and from school
  - Checking medicine = Checking database of prescription with ID number obtained from a patient's ID card, and alerting if the ID of the medicine does not match it

- Application (continuing)
  - Committee on Economic and Port & Harbor = Traceability check for perishable food and others to clarify where vegetables at a store come from or go to.
  - Committee on Regional/Urban Development Coordination= Burying RFID tags in paving bricks, that are read with a white stick for blind people or a pedestrian guiding system
  - Committee on Environmental Creation/Resources Recycling = Providing packing materials and parts with noncontact IC tags to easily clarify makers and materials by automatic sorting
  - In Complement D at end, there are examples of ideas of using a card in civic education and others.

RF=Radio Frequency
ID Identification

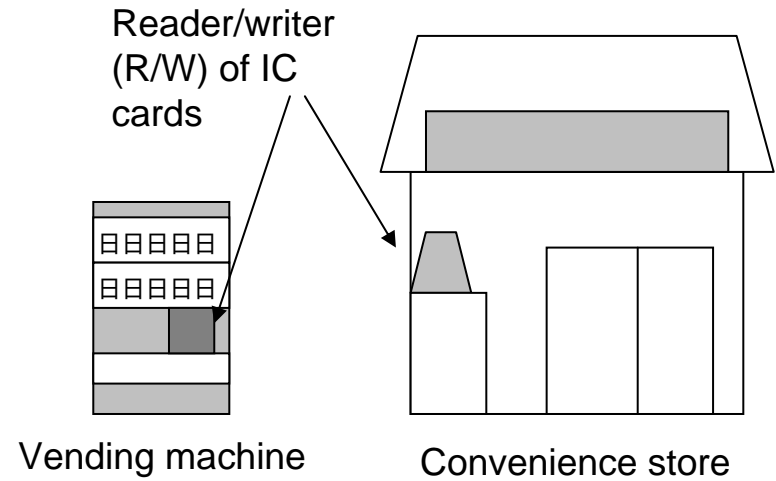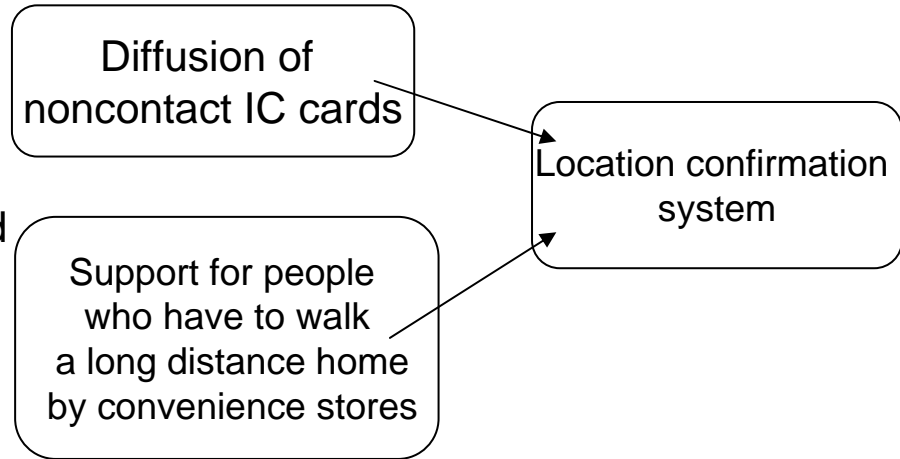# People Who Have to Walk a Long Distance Home due to Large Scale Disasters

- Definition of "people who have to walk a long distance home " and "people who have difficulty in getting home"

  - People who give up going home because their home is far away, and who start leaving for home on foot but require shelter on the way because of difficulty in getting home ("Survey report on the estimated damage from epicentral earthquakes in Tokyo" by the Tokyo Metropolitan Government in August 1997)

  - Assuming that those people start giving up 10% by 10%, exceeding 10 km, and all people require shelter at a point over 20 km (Definition by Central Disaster Prevention Conference).

  - This study is conducted from the viewpoint of people who have to walk a long distance home.

- Estimated number of people who have to walk a long distance home

  - Tokyo epicentral earthquake Approx. 4.14 million (estimation in this study. See Complement A at the end)

  - Nagoya/Tokai earthquakes Approx. 200,000 (estimation in the article of Shizuoka Shimbun)

  - Tokai/Tonankai earthquakes (Aichi Pref.)   Approx. 980,000 (Study by Aichi Pref. and others)

  - Kansai Area: Kyoto=Approx. 390,000, Osaka =Approx. 2.03 million, Kobe=Approx. 310,000 (including tourists) (Kansai Council)

Summary of Guideline for implementation of supporting measures for people who have difficulty to go home in Aichi Pref.
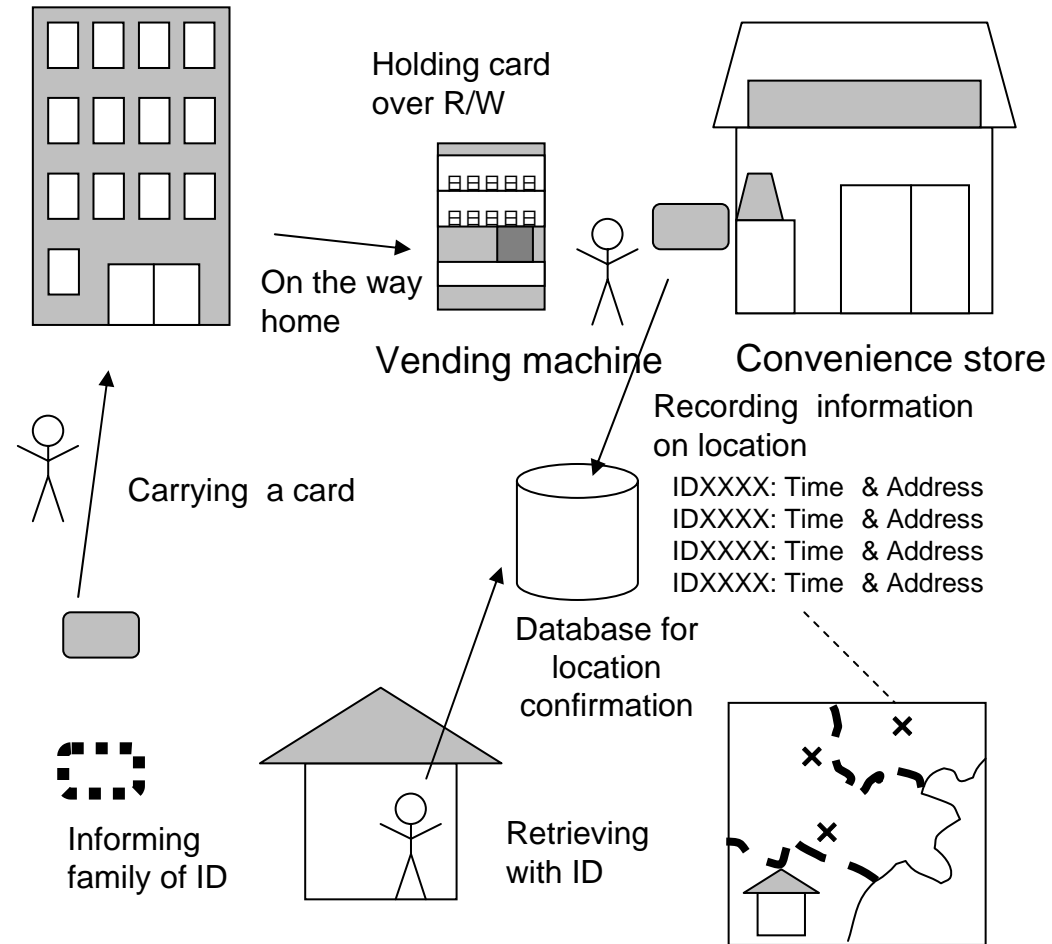http://www.pref.aichi.jp/bousai/kitakukonnan/kitakukonnan_gaiyou.html

Location confirmation with versatile use of noncontact IC card = Flow of processing [I]

- Diffusion of noncontact IC cards and support for people who have to walk a long distance home by convenience stores   Location confirmation system using both of them
- Family records ID of noncontact IC cards and IC chips.
- Using the reader/writer (R/W) of noncontact IC cards in convenience stores and vending machines
  - Using R/W of Electronic Money Edy
  - It is necessary to consider deployment with official budget in preparation for emergencies. R/W for PC = Pasori RC-S320 ¥3,129 (tax included)
  - It is possible to use vending machines corresponding to mobile phones with functions of Edy and electronic money.

Diffusion of noncontact IC cards

Support for people who have to walk a long distance home by convenience stores

Location confirmation system

Reader/writer (R/W) of IC cards

Vending machine

Convenience store

Location confirmation with versatile use of noncontact IC card = Flow of processing [II]

- Recording Time, Location, and ID

  - Recording the location of R/W (for example, latitude and longitude), time, and ID of a card

  - Family records ID of noncontact IC cards

  - In times of emergency, the list of data on location and time is indicated by gaining access to a specific website and inputting an ID.

  - This should be avoided in favor of retrieval by name.

Holding card over R/W

On the way home

Vending machine

Convenience store

Carrying a card

Recording information on location

IDXXXX: Time & Address
IDXXXX: Time & Address
IDXXXX: Time & Address
IDXXXX: Time & Address

Database for location confirmation

Informing family of ID

Retrieving with ID

Diffusion of Noncontact IC Card

- Accumulative shipment of FeliCa chips exceeded 100 million in October 2005, including foreign countries . (FeliCa chip = RFID chips built in Suica and Edy)
- Felica Card type = 90 million, Felica built-in mobile phones = 10 million
- Japan=71 million, Hong Kong=16 million, Singapore=10 million, China (Shenzhen)=1.5 million, India(Delhi)=1 million, Thai (Bangkok) =0.5 million

Type (Issuer) (Commencement date of service)	As of	No. of issues	For mobile wallet	Note
Suica (JR East) (Nov. 2001)	End of June, 2007	21.21 million	0.54 million	*1
ICOCA (JR West) (Nov. 2003)	June 11, 2007	2.99 million	None	*1
Edy (Bit Wallet)+2	End of June, 2007	31 million	6 million	*1
PiTaPa (Surutto Kansai) (Aug. 2004),	Apr.13, 2007	0.67 million		*2
TOICA (JR Tokai) (Nov. 2006)	Apr. 13, 2007	0.23 million		*2
PASMO (Private railway in Kanto) (Mar. 2007)	End of June 2007	4.26 million	None	*1
Card identifying adults (TIOJ) (In 2008)	Although a FeliCa card was used in the demonstration experiment of card identifying adults, it was determined to become a card of Type A (Not using FeliCa). However, about 700,000 tobacco vending machines will become hybrid machines which can read both Type A cards and FeliCa cards.			
nanaco (Seven Eleven) (Apr. 2007)	July 11, 2007	4 million	0.4 million	*1
WAON (AEON) (Apr. 2007)	June 20, 2007	0.3 million	None	*1

*1 Figures in "As of," "No. of issues," and "For mobile wallet" are based on "Business Media Makoto" (http://bizmakoto.jp/makoto/articles/0707/18/news026.html)
*2 Figures in "As of" and "No. of issues" are based on "Asahi Com"(http://www.asahi.com/edu/nie/jiyuu/TKY200707190557.html)

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Support of convenience stores, etc., for people who have to walk a long distance home

- Making arrangements with convenience stores, etc.
  - Kansai Area: Signing on Feb. 17, 2005
    - Autonomous bodies   7 prefectures and 3 government-designated cities
    - Companies   11 convenience store companies, 1 fast food company
  - Chukyo Area: Signing on June 9, 2005
    - Autonomous body = Aichi Pref.
    - Companies   11 convenience store companies, Aichi Petroleum Business Association, and the Tokai Brunch of Japan Post
  - Metropolitan Area: Signing on Aug. 31, 2005
    - Autonomous bodies   4 prefectures 4 government-designated cities
    - Companies   8 convenience store companies, 1 fast food company

- Contents of support
  - In Kansai, Chukyo, and Metropolitan area
    - Providing tap water and bathrooms
    - Providing road information obtained with maps and radios
- Advantages of convenience stores
  - Open 24 hours a day
  - Provided with back-up power supply
  - Provided with back-up communications line

Osaka Prefectural Office, etc.
http://www.pref.osaka.jp/fumin/html/05957.html
Aichi Pref.
http://www.pref.aichi.jp/bousai/
webpress_kitakukonnan_20050602.html
Tokyo Metropolitan, etc.
http://www.metro.tokyo.jp/INET/OSHIRASE/
2005/08/20f8n200.htm

Location confirmation with versatile use of noncontact IC card -- Social and legal validity

- Possibility of identity theft
  - In large scale disasters, the possibility of losing cards and others' picking them up increases.
  - As nothing is written on a card, there is hardly any advantage to identity theft.
  - There are very few criminals committing identity theft for pleasure in the event of emergencies.

- Private Information Protection Law
  - There is no possibility of violating the Private Information Protection Law without using a name.

- Agreement with business operators
  - Anyway, it is considered to be more smooth and realistic to confirm the previous agreement to use noncontact IC cards for location confirmation service among traffic business operators, electronic money operators, and users starting use of noncontact IC cards.

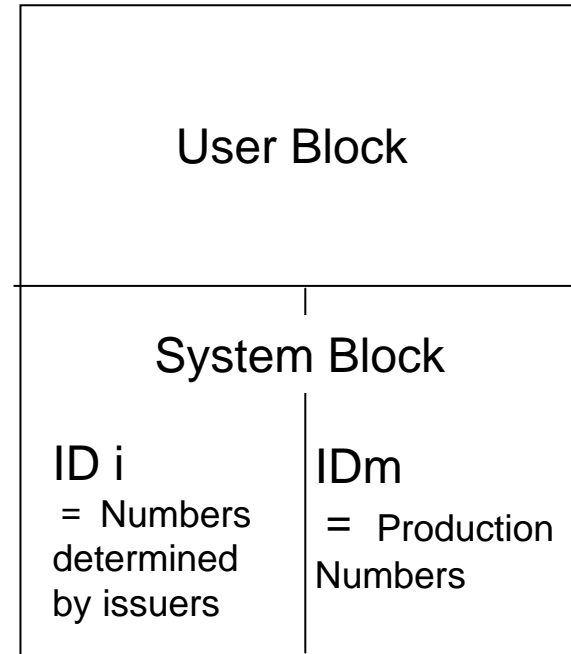# Location confirmation with versatile use of noncontact IC card -- Legal validity

- Is personal information used for purposes other than the original intent?
  - As for the use of noncontact IC cards in the system stated in this paper, it cannot be said that there is no possibility that personal data will be used for purposes other than the original intent. However, as the table of names corresponding to ID on a noncontact IC card is not used, there is less of a possibility.
  - When a family wants to retrieve with a name, the individuals' agreement in advance may be required. However, it is not considered to be a sensible way in terms of security. (For example, kidnapping in a time of emergency without enough police force)

- Does statistical use violate the Private Information Protection Law?
  - Usable as data to estimate the distribution of people who walk a long distance home
  - It is not considered to be against the Private Information Protection Law, as the data on an IC card is used just to count the number without specifying individual names.

- Anyway, it is considered to be more smooth and realistic to execute a contract for use of location confirmation service when starting the use of noncontact IC cards.

Problems in terms of social implementation and their solutions

- Vending Machines
  - Aiming to depart from "being treated as a nuisance"
  - Made strict to some extent
  - Increasingly ensuring communication lines for remote control step by step
  - Accessible with wireless LAN hopping among vending machines, if a part of the communication line is available
  - Interaction with noncontact IC cards and mobile phones corresponding to electronic money can be used for marketing in peace time.

- Convenience Stores
  - They are conscious of being socially expected to play their roles in times of emergency.
  - Having ensured communication methods including back-up means to a great extent, for example satellite communications and satellite mobile phones
  - Increasingly ensuring power supply
  - It is easy to ensure places to install the reader/writer, such as on trash boxes in front of a store, but it is necessary to consider countermeasures against garbage overflow.

Structure of ID of FeliCa

- ID of FeliCa
  - User Block
    - It is used by each operator flexibly in totally different ways. It is impossible to share and use them for the same purpose.
  - System Block
    - ID i　Numbers determined by issuers　Operators assign numbers based on their own standards. Details have not been open to the public.
    - IDm　Production NOs.　Each chip has its own number. The way to determine numbers is common in FeliCa.

User Block	
System Block	
ID i Numbers determined by issuers	IDm Production Numbers

C　Feasibility of location confirmation with noncontact IC card at large scale disasters

Conclusion and future issues

- It is logically possible to use a noncontact IC card that has been diffusing at a level of 10 - 20 million as an identification card for location confirmation of people who have to walk a long distance home in large scale disasters.

- By holding noncontact IC cards over the reader/writer in front of a store, the time, location, and ID are recorded. When family input the ID at home, etc., the time and location are indicated.

- Installing a reader/writer in front of a convenience store and in a vending machine (built-in) may be considered.

- In terms of reading time, this is possible.

- Although the possibility of violation of the Private Information Protection Law is not high, it is desirable to obtain users' agreement when issuing a card.

- It is necessary to start considering appeals to autonomous bodies and industries on the first basis of cooperation among convenience stores and autonomous bodies for supporting people walking home

- The financial and personal burden of costs has not been examined carefully. It is necessary to consider this in the future.