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Survivor Confirmation at Higher Educational Institutions as A Socio-Technical Testbed for Large-Scale Emergency Response

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Abstract. This position paper proposes a Large Scale Message Notification and Confirmation Service in a daily-emergent continuum and its system architecture for survivor confirmation at higher educational institutions. It is derived from experiences and lessons learned using Nagoya University's home-grown Survivor Confirmation System in annual disaster drills since 2006 and the real usage at the Sendai Earthquake (what we call Great East Japan Earthquake). Higher educational institutions consist of diverse communities like faculty, staff, students, administrators. Also, they have further outside stakeholders like parents, alumni, detonators. This diversity of higher educational institutions can provide a small set of human society. In the sense, we think that survivor confirmation at higher educational institutions is a very good socio-technical testbed to seek an effective way for large-scale emergency response.

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Background

Nagoya University Survivor Confirmation System

Recently in Japan, a lot of commercial-based solutions for Survivor Confirmation Systems have been offered from ICT service providers, and some of them have been adopted at higher educational institutions. In the United States, this trend is also shown in the result of Campus Computing 2011 Survey that more than 60% in average have an operational campus-wide emergency notification system[1].

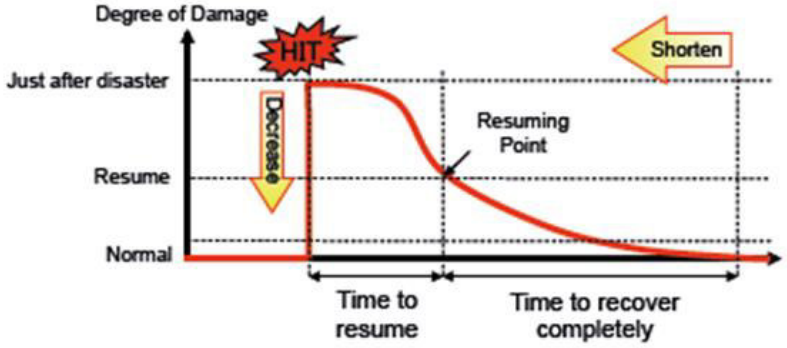

Figure 1: Recovering process after disaster.

However, most of them are dedicated to use only in crisis situations that rarely happen, and it is difficult for higher educational institutions to let constituencies teach how to use such a rarely used Survivor Confirmation System, because the constituency is transient, in special, almost quarter of students are constantly joining and leaving. In addition to it, the high procurement and maintenance costs are also preventing the introduction of Survivor Confirmation System.

Due to these reasons, in 2006, Nagoya University decided to develop a home-grown and really-operational system that satisfies the following conditions [2]:

1. Survivor Confirmation System must be embed on to commonly and daily used system at Nagoya University and must be accessible anytime and anywhere,

2. Basic personal information such as full name and affiliation must be regularly maintained as a daily business,

3. Security and privacy concerns for personal information must be fully assured.

After disaster, firstly, it is mandate for institutions to recover required lifelines such as electricity, water and communication lines to resume normal activities as soon as possible. Besides, top-level administrators must have dependable and

concrete information on how many constituencies are able to come to campus, in order to make a decision on the resume of teaching and learning as fast as possible (See Figure 1).

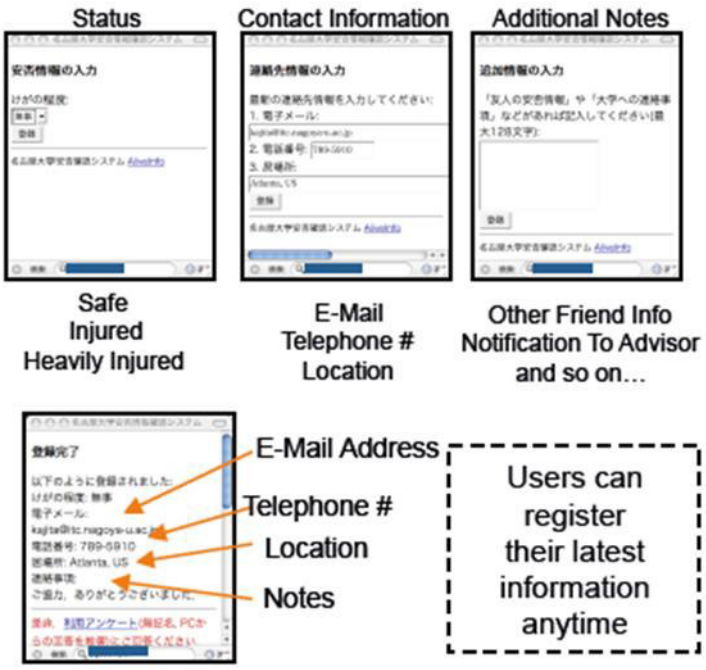

Figure 2: Screen shots to input survivor confirmation information.

As the result, Nagoya University Survivor Confirmation Sys- tem had been step-wisely developed to implement the following functionality on top of Nagoya University Portal, target- ting on the resume of normal acitivities rather than search and rescue mission just after disaster:[2, 3, 4, 5]

- User authentication is required to input survivor in- formation by using University-wide ID, e-Mail address registered in advance, or birthday,

- A sub-system of Nagoya University Portal is implemented at Academic Center for Computing and Media Studies, Kyoto University, in order to realize the robustness for service delivery using a Service Delivery Network (SDN) inter-connected by a VPN connection,

- Users can access by using not only Web browser but also cellar phone,

- Personalized view is provided through “Disaster” tab for general users and “Disaster Management Office” tab for Survivor Confirmation System administrators,

- Users can input survivor information, contact information and additional information such as other's in- formation, and these can be input anytime and any number of times (See Figure 2),

- Users can search registered survivor information but the number of query results is restricted to only three due to privacy,

- The system can transmit messages to call for inputting the survivor information by using registered e-Mail addresses for PC and cellar phone.

Usages in drills and Sendai Earthquake

Since 2006, Nagoya University has been conducting annual earthquake disaster drill with survivor confirmation registration drill. In addition to it, a solo drill for survivor confirmation registration has been conducted the beginning of spring semester. Through these drills, we have reached the level where about 8,000 constituencies[1] out of 24,000 register their information in 2010 drill.

The Great East Japan Earthquake (Sendai Earthquake) happened at 14:46 on March 11th in 2011. The level 4 in Japanese earthquake intensity scale was measured even at Nagoya where the main campus of Nagoya University is located and over 600km away from the seismic center. Although there was no severe damage on campus fortunately, Nagoya University had started announcing the request for survivor confirmation information as the damages in Great East Japan were broadcasted on televisions. After call for input, the number of input was turned to increase, and attained about 13,000 after a month at last. Since the number of call has reached to the plateau, other methods like telephone contacting through student affair offices at each department were concurrently performed, and 100% confirmation for students attained[2] by the middle of May 2011[6].

Lessons learned and research issues in crisis situation

Through these experiences on the system development and its usages, we have learned the following points:

- Gathering and maintaining reachable e-Mail addresses within a daily activity is mandate,

[1] At the latest drill held on October 2011, the number increased to 10,371.

[2] Three undergraduate students of Kyoto University were died during their graduation trip to Sendai.

- Survivor Confirmation System should be integrated with daily used system like Institutional Web Portal, not as a separated system rarely used,
- Low-tech and expensive methods like telephone and post-card should be prepared because the system-based survivor confirmation is not able to confirm all of con- stituency perfectly,
- The robustness of Survivor Confirmation System un- der crisis situation must be attained.

To improve these lessons learned, the following research issues must be addressed:

1. How we can reach a large-scale but transient constituency and maintain the connectivity,
2. How we can incorporate a rarely used information sys- tem within daily used information system,
3. How we can passively and automatically gather constituency's status in an inexpensive way.

To tackle these issues, we would like to propose a Large Scale Message Notification and Confirmation Service in a daily-emergent continuum and its system architecture for survivor confirmation at higher educational institutions as shown in Figures 3 and 4. In special, activity information from social media and logging information from institutional information systems could address effectively to know the latest status of constituency automatically. And also, we are planning to implement it as an open source software to share and cooperate the instances among multiple institutions for the robustness under crisis situations.

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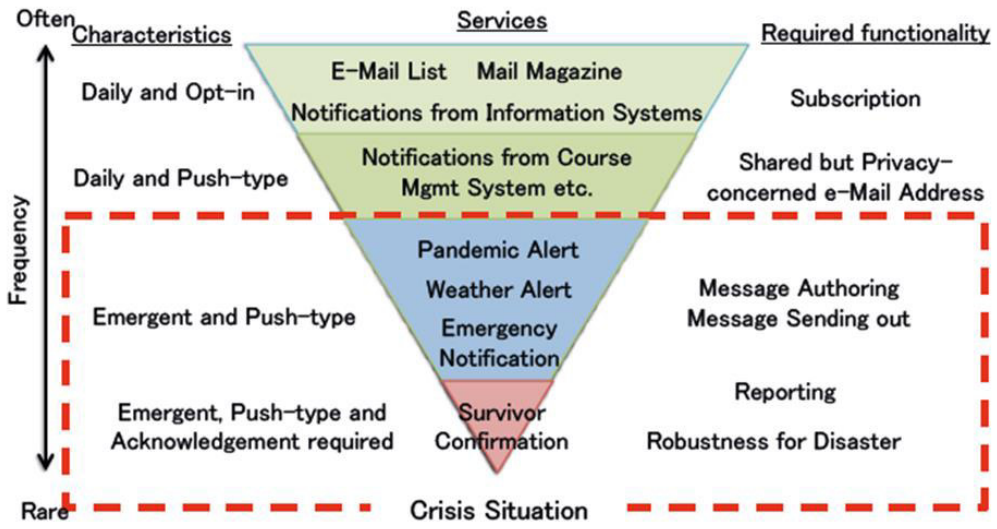

Figure 3: A Large Scale Message Notification and Confirmation Service.

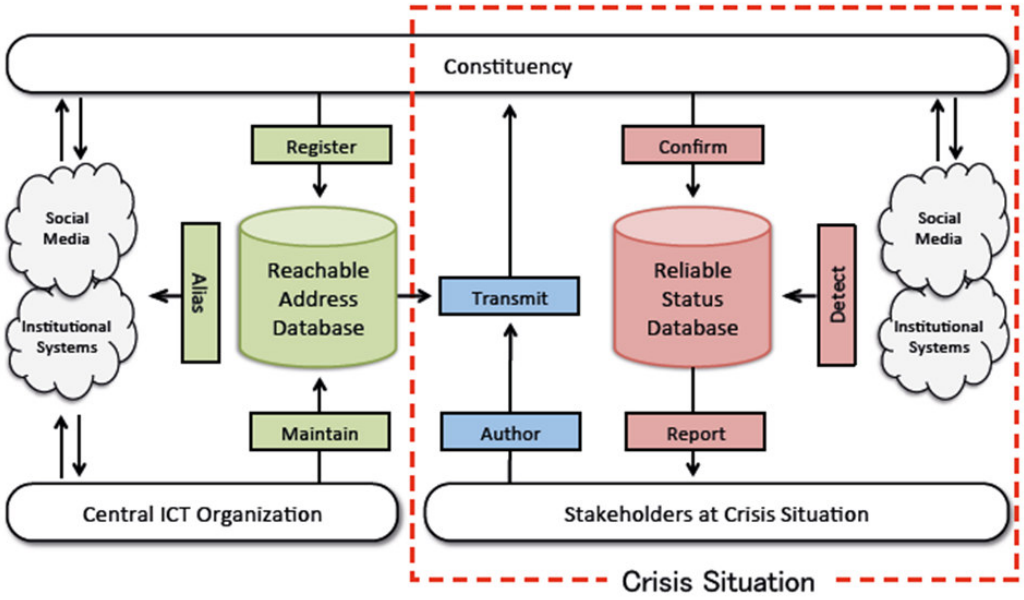

Figure 4: A system architecture for Large Scale Message Notification and Confirmation Service.