Developing Information Systems and their HCIs for Major Disasters

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Introduction

- Two major earthquakes in Eastern Marmara region of Turkey in 1999
  - Death toll in excess of 20,000
  - Billions of dollars lost
  - Eastern Marmara is the most developed region of the country
    - Main reason for the huge death toll and financial losses → sub-standard buildings and infrastructure
    - A development problem
    - Can informatics help?
    - If yes, in what capacity?
Introduction
Introduction

- Earthquakes “travelling” eastwards on the North Anatolian Fault Line
- 17 August 1999
  - ~100 km fault line broken → South plate moved 5 m westwards in 45 seconds → 7.8 Richter scale
- Next target Istanbul?
  - 10-40 km away from the Fault Line
  - Severe earthquake damages in history of the city
  - Istanbul provided the main support in the 1999 earthquakes
    - The most developed city in Turkey
    - Proximity
    - Will have to rely on self-support in a severe earthquake
ICT4dev → ICT for emergency relief

- Emergency Communication (Information) System
- Chaos and lack of communication after the 1999 disasters
- ECS → One of the most important and meaningful applications in developing countries
  - Infrastructure and buildings are fragile → severe damage in disasters
  - Technical support → not a major problem
  - Institutional weaknesses → problem
ECS

CI, ECS \rightarrow\ Multi-disciplinary approach

- Computer Science, Cognitive Science
  - Human-Computer Interface (HCI)
    - Special case \rightarrow\ ECS

- Development studies
  - ICT for development
  - Dependency theory
Sahana: A standard in ECS?

Welcome to the Sahana FOSS Disaster Management System

Sahana is an integrated set of pluggable, web based disaster management applications that provide solutions to large-scale humanitarian problems in the aftermath of a disaster. These applications and the problems they address are as follows:

- **Missing Person Registry**
  Helping to reduce trauma by effectively finding missing persons

- **Organization Registry**
  Coordinating and balancing the distribution of relief organizations in the affected areas and connecting relief groups allowing them to operate as one

- **Request Management System**
  Registering and Tracking all incoming requests for support and relief up to fulfilment and helping donors connect to relief requirements

- **Camp Registry**
  Tracking the location and numbers of victims in the various camps and temporary shelters setup all around the affected area

- **Inventory Management System**
  Effectively and efficiently manage relief aid, enables transfer of inventory items to different inventories and notify when items required to refill.

- **Catalogue System**
  Captures information on different catalogues and measurement units. Which is used in systems such as Inventory Management System and Request Management System
Sahana: A standard in ECS?

- Developed in Sri Lanka after the tsunami disaster on 26 December 2004
- Open source system
  - MySql
  - PHP programming language
  - Apache Web Server
- Modules
  - Missing person registry
  - Situation awareness
  - Organization registry
  - Request management system
  - Volunteer management
  - Inventory management
Sahana: A standard in ECS?

- Sahana’s appeal to developing countries
  - Freely available through GPL
    - Suitable for collectivist cultures in developing countries
  - Translation to local languages possible

- Problems of DCs in disaster preparedness
  - Reactive stance
  - Fatalism
  - Hurricanes & earthquakes more common in “South”
Emergency Communication Systems

- Requirements for ECS
  - Reliability
  - Simplicity
  - Robustness
  - Security
  - Using a range of communication technologies
  - Wide user population → some in deep distress
  - Should be accessed via web

- Interface *is the system for users*
  - More so for the ECS

- Aspects of HCI
  - Ascertain the users’ needs
  - Ensuring proper reliability
  - Standardization
Emergency Communication Systems

User types for HCI

- Novice or first-time users
- Knowledgeable intermittent users
- Expert frequent users

User types for ECS

- Survivors
- Rescue workers in the disaster region
- Rescue workers at remote
- Friends and relatives at remote
- Individual aid donors at remote
TABLE 2. User types of an ECS and the attributes of HCI for each type.

<table>
<thead>
<tr>
<th></th>
<th>Survivors</th>
<th>Rescue workers in the disaster region</th>
<th>Rescue workers at remote</th>
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</tr>
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<tbody>
<tr>
<td>Skill level for using the ECS</td>
<td>Novice or first-time, possible delegation of computer usage to others</td>
<td>Novice or first-time/knowledgeable intermittent; later experts</td>
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</tr>
<tr>
<td>Workload</td>
<td>Not much</td>
<td>Extremely heavy</td>
<td>Heavy</td>
<td>Medium/Low</td>
<td>Low</td>
</tr>
<tr>
<td>Motivation</td>
<td>Very high</td>
<td>Very high</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Stress level</td>
<td>Extremely high</td>
<td>Very high</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Awareness of high cost and irrecoverability of error</td>
<td>N/A due to the victims’ confused state of mind</td>
<td>Very high</td>
<td>Very high</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Satisfaction level at the end</td>
<td>N/A due to the victims’ confused state of mind</td>
<td>Very high</td>
<td>High</td>
<td>High</td>
<td>N/A</td>
</tr>
<tr>
<td>Requirement for prioritizing items in information overload</td>
<td>N/A due to the victims’ confused state of mind</td>
<td>Very high</td>
<td>Very high</td>
<td>High</td>
<td>High</td>
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# HCI in ECS

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<td>Knowledge of the events in the immediate disaster area</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Knowledge of the events in the big picture</td>
<td>Low/Medium</td>
<td>Low/Medium</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Requirement for fast decision-making and prompt action</td>
<td>N/A due to the victims’ confused state of mind</td>
<td>Very high</td>
<td>Very high</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Requirement for trust to the others</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Requirement for high degree of concentration</td>
<td>N/A due to the victims’ confused state of mind</td>
<td>Very high</td>
<td>Very high</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Ability to perform in conflict situations</td>
<td>High</td>
<td>Very high</td>
<td>Very high</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
Thank you.