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

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- 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

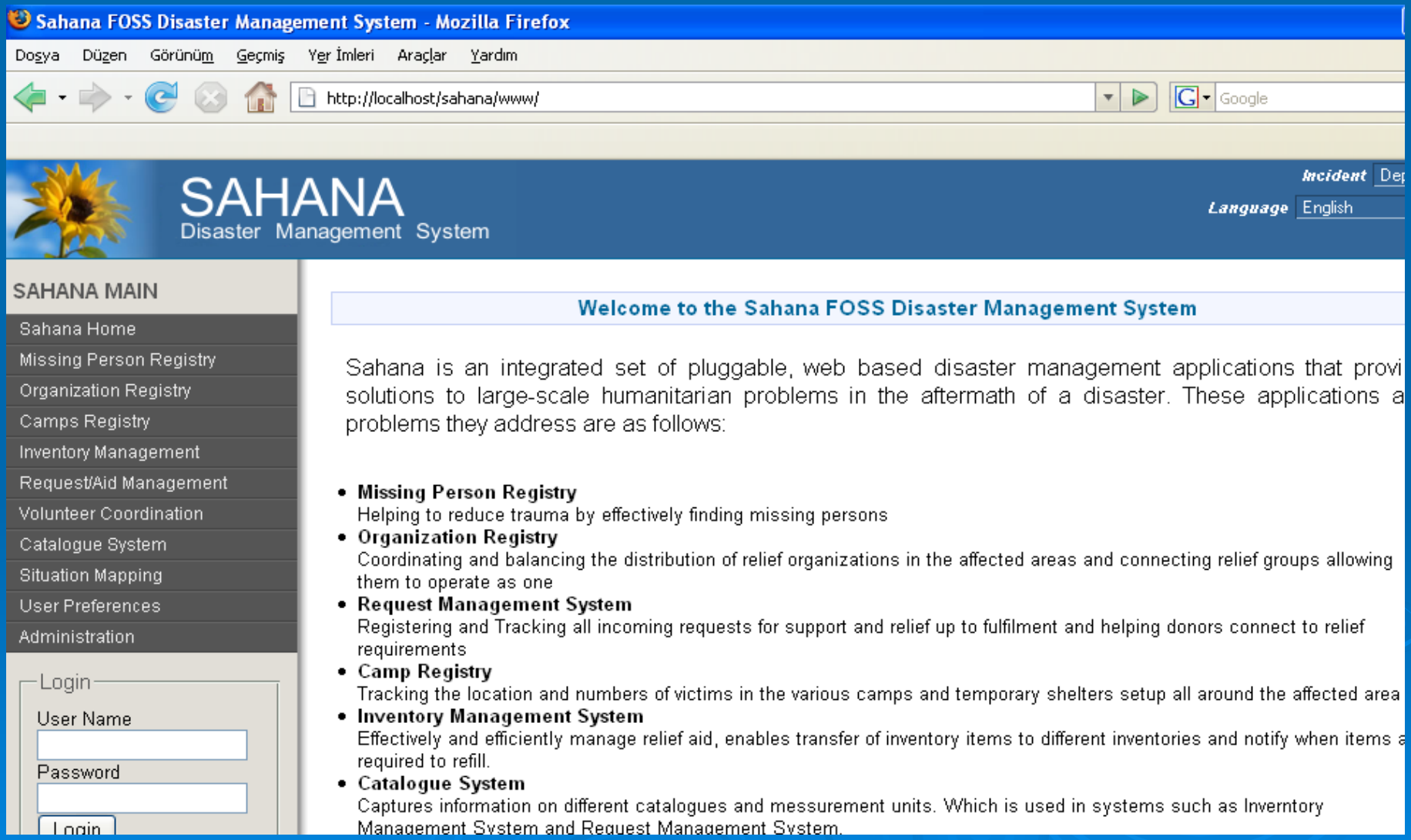
ECS

- 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 → Multi-disciplinary approach
  - Computer Science,Cognitive Science
    - Human-Computer Interface (HCI)
      - Special case → ECS
  - Development studies
    - ICT for development
    - Dependency theory

Sahana: A standard in ECS?



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

HCI in ECS

TABLE 2. User types of an ECS and the attributes of HCI for each type.

	Survivors	**Rescue workers in the disaster region**	**Rescue workers at remote**	**Friends and relatives at remote**	**Individual aid donors at remote**
Skill level for using the ECS	*Novice or first-time*, possible delegation of computer usage to others	*Novice or first-time/knowledgeable intermittent*; later *experts*	*Novice or first-time/knowledgeable intermittent*; later *experts*	*Novice or first-time*; later *experts*	*Novice or first-time*
Workload	Not much	Extremely heavy	Heavy	Medium/Low	Low
Motivation	Very high	Very high	High	High	Low
Stress level	Extremely high	Very high	High	High	Low
Awareness of high cost and irrecoverability of error	N/A due to the victims' confused state of mind	Very high	Very high	N/A	N/A
Satisfaction level at the end	N/A due to the victims' confused state of mind	Very high	High	High	N/A
Requirement for prioritizing items in information overload	N/A due to the victims' confused state of mind	Very high	Very high	High	High

HCI in ECS

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	Survivors	**Rescue workers in the disaster region**	**Rescue workers at remote**	**Friends and relatives at remote**	**Individual aid donors at remote**
Knowledge of the events in the immediate disaster area	Excellent	Excellent	Low	Low	Low
Knowledge of the events in the big picture	Low/Medium	Low/Medium	High	High	Low
Requirement for fast decision-making and prompt action	N/A due to the victims' confused state of mind	Very high	Very high	Medium	Low
Requirement for trust to the others	Very high	Very high	Very high	High	Medium
Requirement for high degree of concentration	N/A due to the victims' confused state of mind	Very high	Very high	Medium	Low
Ability to perform in conflict situations	High	Very high	Very high	Medium	Low

Thank you.