ENSURE - INTEGRATION OF VOLUNTEERS IN DISASTER MANAGEMENT

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AGENDA

1. Motivation
2. Conceptual architecture for mobile crowdtasking systems
3. ENSURE system concept
4. ENSURE system architecture
5. ENSURE implementation and evaluation
6. Summary and outlook
Current state of communication

- Social Media (Facebook, Twitter, etc.)
- Group organisation (Facebook-groups, Whatsapp, email-lists, Google maps)
- Bevölkerungsaufrufe über Radio/TV
Example of the flood disaster 2013

- Establishment of support locations
- First aid
- Direct support of response forces
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- Establishment of support locations
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=> More potentials through individual capabilities
  - access to buildings (caretaker)
  - local knowledge
  - technical/medical capabilities
Challenges

• To many or not enough volunteers
• Ineffective support
Challenges

• To many or not enough volunteers
• Ineffective support

=>

• Missing tools of coordination
• Best practices (organisational and technical)
Main functional requirements

- Registration of volunteers
- Profiling of volunteers
- Notification of volunteers
- Activation/guidance of volunteers
FUNCTIONALITY OF ENSURE
REGISTRATION AND PROFILING OF VOLUNTEERS

1) Profile information
   - Age
   - Relevant roles
   - Capabilities
   - Psychological aspects (through indirect questionnaire)

2) Context information
   - Location
   - Topic
FUNCTIONALITY OF ENSURE
NOTIFICATION OF VOLUNTEERS
FUNCTIONALITY OF ENSURE
ACTIVATION OF VOLUNTEERS

Topic-based

Location-based
FUNCTIONALITY OF ENSURE
ACTIVATION OF VOLUNTEERS
FUNCTIONALITY OF ENSURE
ACTIVATION OF VOLUNTEERS
FUNCTIONALITY OF ENSURE
ACTIVATION AND GUIDANCE OF VOLUNTEERS
Main non-functional requirements

• Mass applicability (performance/robustness)

• Adaptability to target groups

• Usability for action support

• Adaptability to disaster situations

• Compliance to regulations and privacy
ENSURE – SYSTEM CONCEPT

App

Control client

Backend system
ENSURE-BACKEND – SYSTEM ARCHITECTURE
ENSURE-BACKEND – SYSTEM ARCHITECTURE
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Control system (alerting, requests, activation)
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Event distribution

Control system
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Event distribution

- External components
- Storage and communication
- Active components
- Interfaces
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Event distribution

Notification service

Control system
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Notification service
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Device and profile management

Event distribution

Notification service

Control system

Device and profile management

Event distribution

Notification service

Control system
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Device and profile management
ENSURE-BACKEND – SYSTEM ARCHITECTURE

Content service

- Mobile Client
  - Content Endpoint
  - Incident Content
  - KV Cache
  - External components
  - Storage and communication
  - Active components
  - Interfaces

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ENSURE-BACKEND – SYSTEM ARCHITECTURE

- Device and profile management
- Feedback processing
- Content service
- System monitoring
- Event distribution
- Control system
- Notification service
- System monitoring
- Control system
- Notification service
- Event distribution
- Content service
- Feedback processing
- Device and profile management
Scalability
Performance
Robustness
Flexibility
IMPLEMENTATION

- Java script
- Event-driven architecture
- Micro services
- NoSQL-Database
- Model view view model pattern
EVALUATION: 6 MONTH TEST PHASE WITH BERLIN FIRE DPT.
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One test case example in summer 2016

- Test activation from 17.09.2016
  - 10:16:28 Alerting initiated
  - 10:16:30 **921** Test persons alerted

- **22 Responses** after 20 s
- **135 Antworten** in einer Minute
- **355 Antworten** nach 5 Minuten
- participate: **200**
- with delay: **34**
- denial: **146**
EVALUATION: 6 MONTH TEST PHASE WITH BERLIN FIRE DPT.

Observations during test phase

- Blue line: Alerted
- Purple line: Response
- Green line: Accepts
- Orange line: Delays
- Red line: Denials
EVALUATION: 6 MONTH TEST PHASE WITH BERLIN FIRE DPT.

Scalability and performance

The shows that these 95,000 activations were sent out within 1 minute and 42 seconds. The testing environment consisted of 2 servers (CX40, 2Vcores, 8GB Ram).

Full 24/7 during 6 months with no failure or downtime
Thank you!

www.ensure-projekt.de
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