Distant Early Warning System for Tsunamis
A wide-area and multi-hazard approach

EGU General Assembly 2010 – Vienna, Austria

Martin Hammitzsch, Matthias Lendholt, Prof. Dr. Joachim Wächter
GFZ German Research Centre for Geosciences

www.dews-online.org
DEWS – What is it?

- European Union funded **research project**
  - EU partners (industry + research/HE institutions)
  - Partners in Indian Ocean, Pacific Region

**Atos Origin SA., Spain Coordinator**

**GFZ Potsdam, Germany**

**Citizen Alert Services BV, Netherlands**

**Helsinki University of Technology Communications Laboratory, Finland**

**Swedish Civil Contingencies Agency, Sweden**

**Engineering Ingegneria Informatica S.p.A., Italy**

**DATAMAT S.p.A., Italy**

**University of Bologna, Italy**

**Geological and Nuclear Sciences, New Zealand**

**National Research Institute for Earth Science and Disaster Prevention, Japan**

**Bandung Institute of Technology, Indonesia**

**Moratuwa University, Dept. of Engineering, Sri Lanka**

**Prince of Songkla University, Thailand**

**Chiang Mai University, Thailand**

**Geological Survey & Mines Bureau, Sri Lanka**

**Thai Meteorological Dept., Seismological Bureau, Thailand**

**Badan Meteorologi, Klimatologi dan Geofisika, Indonesia**

**Disaster Management Centre, Sri Lanka**

**National Disaster Warning Center, International Affairs, Thailand**

**Department of Disaster Prevention and Mitigation Thailand**
DEWS – What is it? … contd.

- Complex system, **software product**
  - Open Standards and Open Source
Challenges

- New generation of **open standard based** early warning systems
- Reliable hazard detection and **effective warning dissemination**

- **Multi-hazard approach**: Application potential for all types of hazards
- **Transferable** to different geographic areas

- **Modular** architecture with **standardised interfaces**
  - Upstream: Open integration platform for sensor systems
  - Downstream: Information logistics and warning dissemination components

- **Free and open source software** wherever possible
- Existing open standards wherever possible
Characteristics

• **DEWS focuses on downstream**
  – Improving information logistics and multi-channel warning dissemination
  – In a multilingual environment

• Sister project **GITEWS provides upstream**
  – Standard based distributed multi-sensor platform for tsunami detection

• Specifics
  – Rapid generation of warning messages
  – Rapid dissemination to responsible authorities and people at risk
  – Timely and in-depth information management understandable and reliable for people
  – International communication and warning exchange in the Indian Ocean region
DEWS – Today and tomorrow

• Principal focus on
  – **Tsunami**
  – **Early warning** (authorities, emergency management forces, rescue services and the public)
  – **Indian Ocean region** (Indonesia, Thailand and Sri Lanka)
  – **3 National Centres** and **1 Wide Area Centre**

• Aims to follow
  – Other geological paradigms / hazards
    • Landslides
    • Floods
    • Volcanic eruptions
  – Other areas / regions
    • Mediterranean and connected seas
Architecture simplified
Open Standards

- OGC – Open Geospatial Consortium
  - SWE (Sensor Web Enablement) Standards
    - SAS (Sensor Alert Service)
    - SOS (Sensor Observation Service)
    - WNS (Web Notification Service)
  - OWS (OpenGIS Web Service) Standards
    - WMS (Web Mapping Service)
    - WPS (Web Processing Service)
    - WFS (Web Feature Service)

- OASIS – Org. for the Advancement of Structured Info. Standards
  - EM (Emergency Management) TC
    - CAP (Common Alerting Protocol)
    - EDXL-DE (Emergency Data Exchange Language - Distribution Element)
Command and Control User Interface
CCUI contd.

- Key component of DEWS
- Application for OOD (operator on duty)
- Task oriented workflow
  - Monitoring
  - Forecasting
  - Message composition
  - Dissemination
  - Information logistics administration (user profiles, providers, preferences etc.)
- One perspective for each task
Workflow – Perspectives of CCUI

- Monitoring Perspective
- Forecasting Perspective
- Message Composition P.
- Dissemination Perspective
CCUI – Monitoring Perspective
CCUI – Monitoring Perspective cont’d
CCUI – Monitoring Perspective cont’d
### CCUI – Monitoring Perspective cont’d

#### Incoming Events

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CCUI – Monitoring Perspective cont’d
CCUI – Forecasting Perspective
CCUI – Forecasting Perspective cont’d
CCUI – Forecasting Perspective cont’d

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CCUI – Forecasting Perspective cont’d
CCUI – Message Composition Perspective
CCUI – Message Composition Persp. cont’d
CCUI – Message Composition Persp. cont’d
CCUI – Message Composition Persp. cont’d
CCUI – Message Composition Persp. cont’d

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CCUI – Message Composition Persp. cont’d

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CCUI – Message Composition Persp. cont’d
CCUI – Message Composition Persp. cont’d

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CCUI – Dissemination Perspective
CCUI – Administration Perspective

Message Templates

Message Types

Message Consumer Profiles

Dissemination Channels

Dissemination Provider Profiles

User groups

Administration Perspective
Information Logistics
Information Logistics contd.

**Category** e.g.: Rescue Service, Local Warning System, General Public, ...

**User** e.g.: Hospital in Phuket, Governor of a county, Watchtower at beach

**Dissemination Channel** e.g.: SMS, Fax, E-Mail, ...

**Message Types** e.g.: Heads Up, Tsunami Warning, All Clear, ...

**Vocabulary** e.g.: Short Version, Detailed Version, ...

**Criticality Parameters** (Urgency, Severity, Certainty)

**Language** e.g.: Eng, Thai

**Area** e.g.: HASC_1 = TH.PU (Phuket)

**CAP Message:** Tsunami Warning!
Your location (Phuket) is ...
Dissemination Channels
Dissemination – SMS

Tsunami Warning

A Tsunami advances. Your location is in danger. Prepare all forces for an incoming Tsunami. Seek shelter if needed. Inform your local staff. Prepare your help and mitigation.

Tsunami Warning Caution

Your location is threatened by a tsunami. Seek immediately shelter!
Dissemination – TV Overlay et. al.
Dissemination – Facsimile
<table>
<thead>
<tr>
<th><strong>Affected Area Code</strong></th>
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</table>

**Bahasa Indonesia**

Gelombang Tsunami tengah menjalar dan akan muncul di daerah-daerah berikut ini. Location TH.PG.TM.Na. 

**Bahasa Indonesia**

Mobilisasi semua sumber daya dan personil agar tanggap pada datangnya tsunami. Informasikan staf lokal Anda untuk mengorganisir dan menjalankan rencana-rencana evakuasi.
Dissemination – Email contd.

All Clear Message

Bahasa Indonesia

Gempa bumi ini tidak menyebabkan Tsunami. Tidak terjadi bencana. Informasikan kepada staf lokal Anda untuk kembali lakukan kegiatan normal operasional.
Dissemination – Email contd.

Different languages different character sets

Phasa Thai
Dissemination – Email contd.

Tamil

DEWS Consortium

Details anzeigen 28. Sep.

καθαρισθείσα η εγκατάσταση πρόκειται για την κατασκευή της Θ. Π. ΤΜ. Τhai Mueang:

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Dissemination Channels contd.

- Channels of many different kinds
  - SMS
  - TV Overlay and Narrow Casting
  - Facsimile
  - Email
  - RSS feeds
  - Instant Messaging
  - Sirens / siren networks
  - Voice via FM broadcast

- Other channels
Wide Area Centre and WAC Bus
Wide Area Centre Infrastructure

National Centre Thailand

National Centre Sri Lanka

National Centre Indonesia

Wide Area Centre
Earthquake Event / SSH Anomaly
Measurement of Event by NC

National Centre

Sri Lanka

National Centre

Thailand

National Centre

Indonesia

Wide Area Centre
Dissemination on National Level

National Centre
Thailand

National Centre
Sri Lanka

National Centre
Indonesia

Wide Area Centre
Generation of SMB by NC

National Centre
Sri Lanka

National Centre
Thailand

National Centre
Indonesia

Wide Area Centre
Delivery of SMB to WAC
Forwarding of SMB to NCs

National Centre
Sri Lanka

National Centre
Indonesia

National Centre
Thailand

Wide Area Centre
Generation of WACB by WAC

National Centre
Indonesia

National Centre
Sri Lanka

Wide Area Centre
Delivery of WACB to NCs

- National Centre
  - Sri Lanka
  - Indonesia
  - Thailand

Wide Area Centre
Dissemination on National Level

National Centre
Sri Lanka

National Centre
Indonesia

Wide Area Centre
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