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

EGU General Assembly 2010 – Vienna, Austria

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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

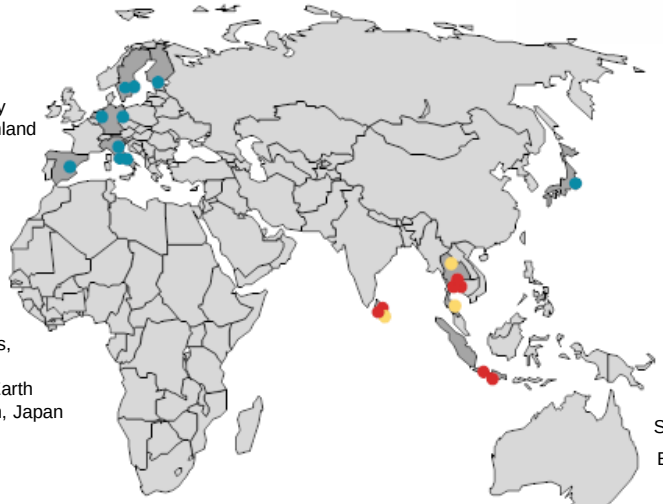
Engineering Ingegneria Informatica S.p.A., Italy

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

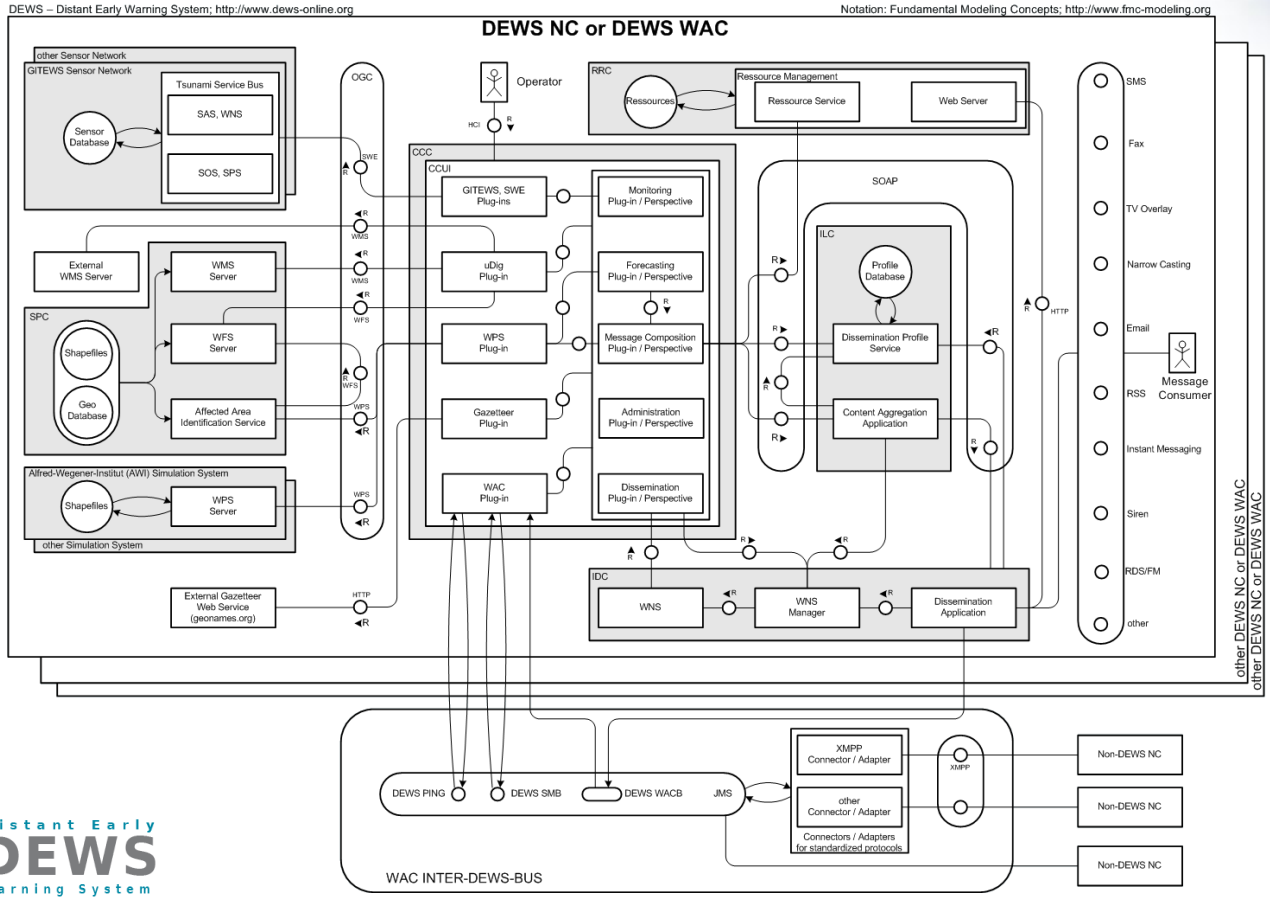
Department of Disaster Prevention and Mitigation Thailand

Project-Partner INCO-Partner (Authority) INCO-Partner (University)

Distant Early DEWS Warning System

DEWS – What is it? … contd.

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



Distant Early DEWS Warning System

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

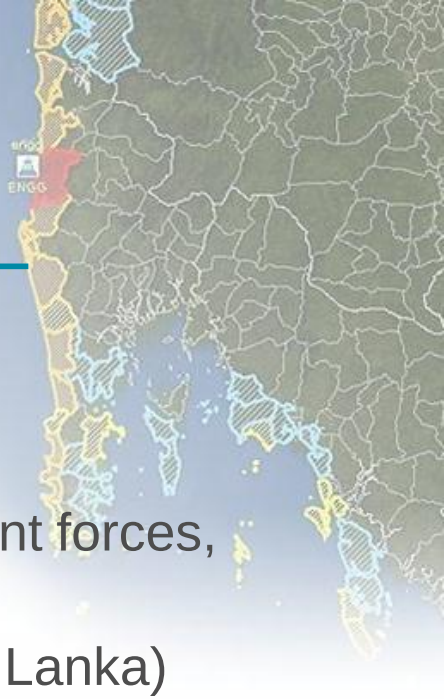
- **Free and open source software** wherever possible
- Existing open standards wherever possible

Distant Early DEWS Warning System

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

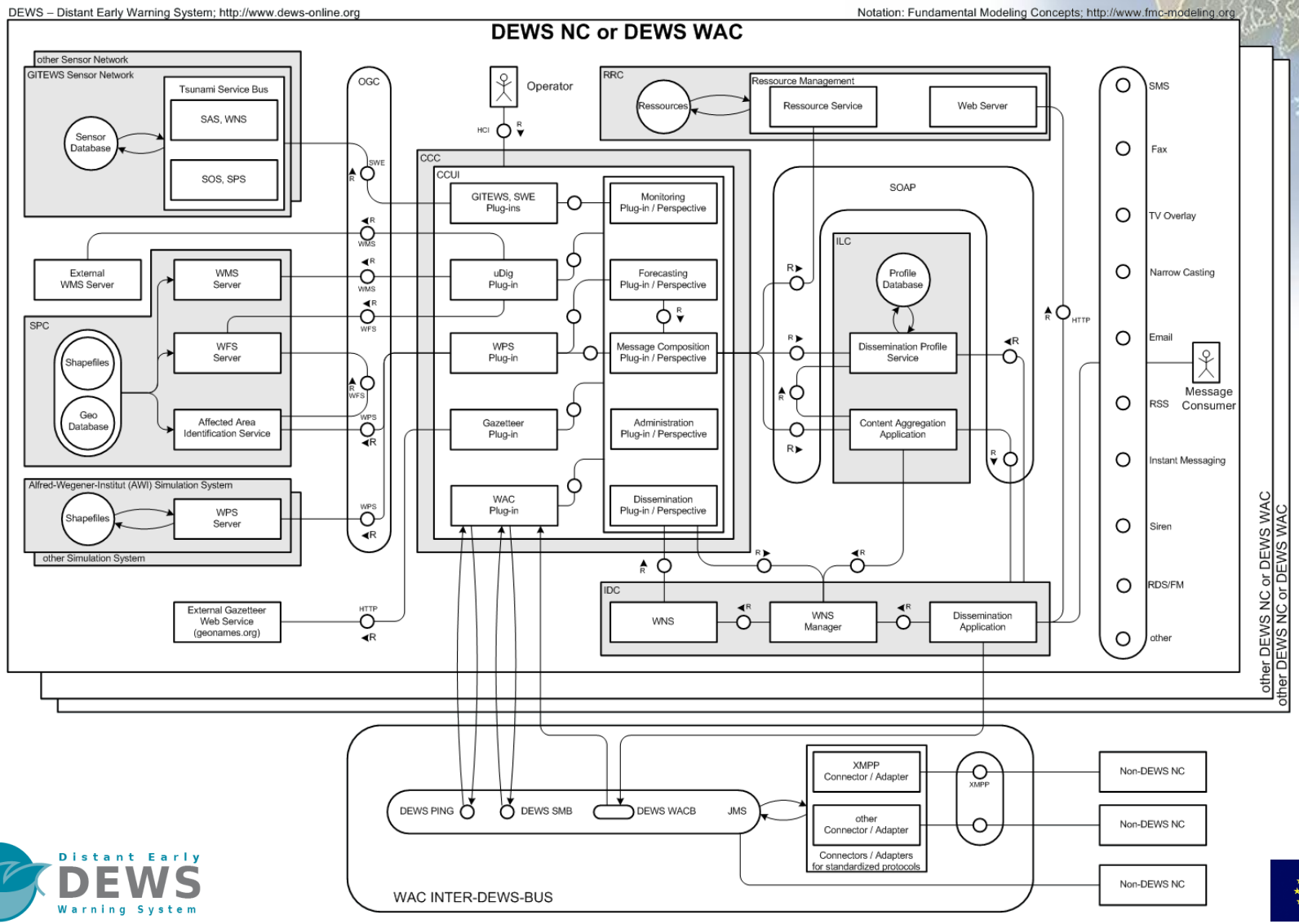
DEWS – Today and tomorrow



- 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

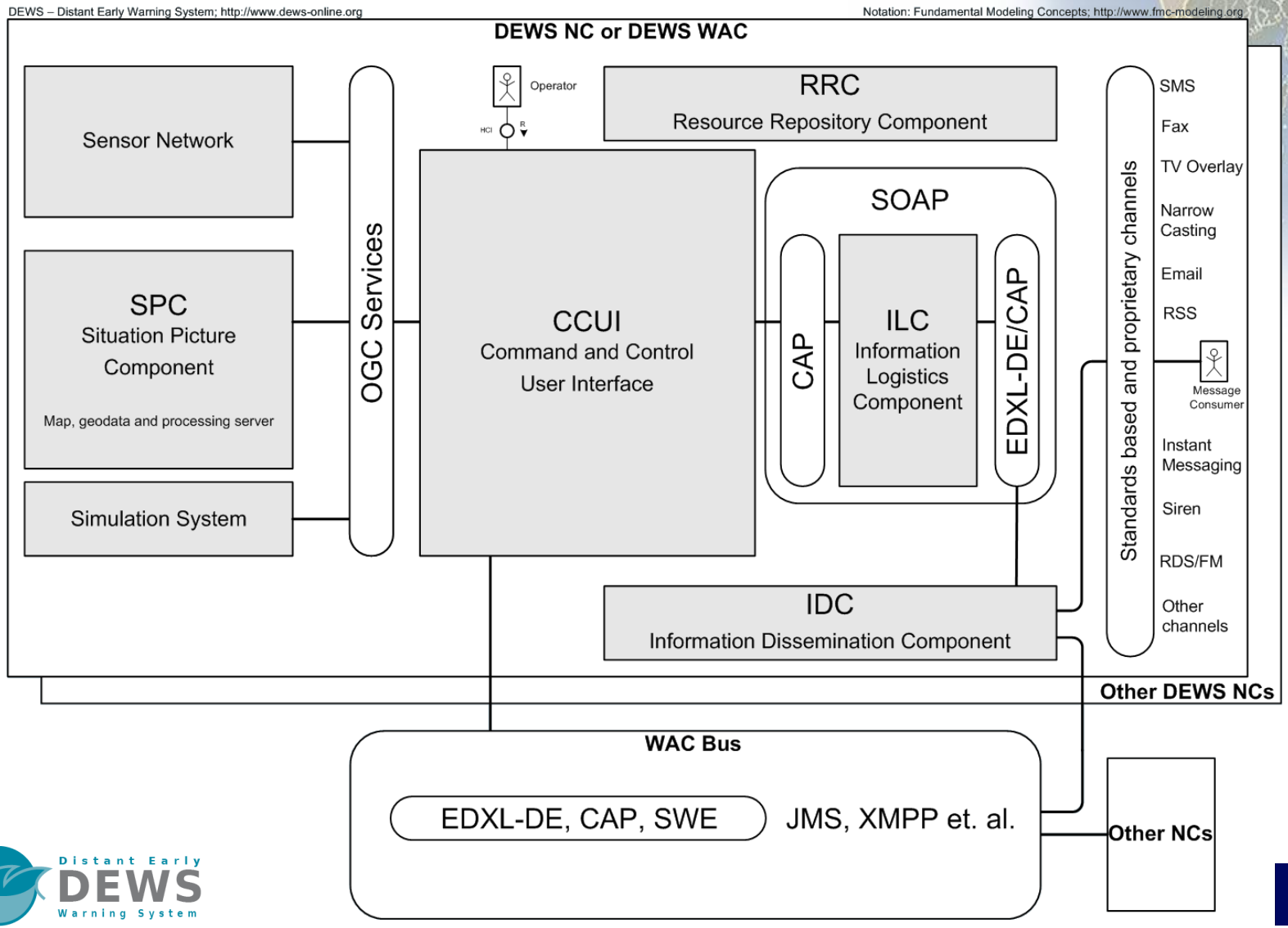
Distant Early DEWS Warning System

Architecture



Distant Early DEWS Warning System

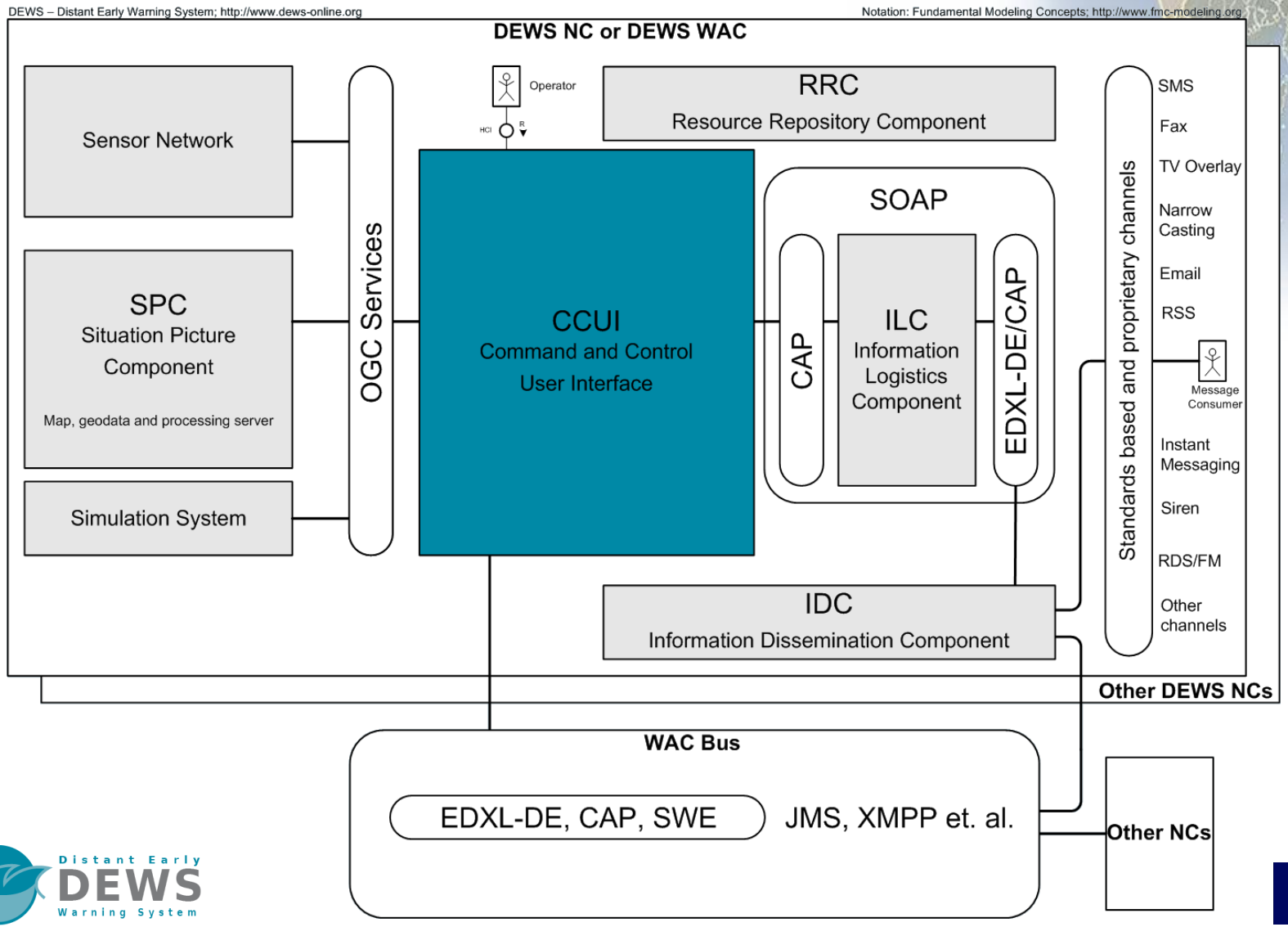
Architecture simplified



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

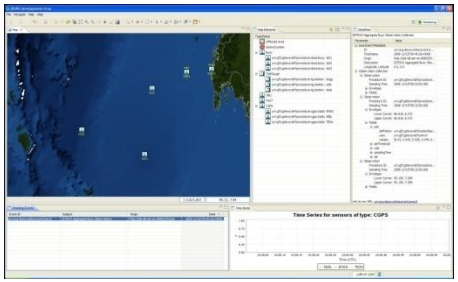
Workflow – Perspectives of CCUI

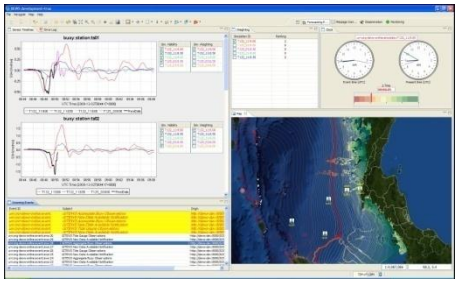
Monitoring Perspective

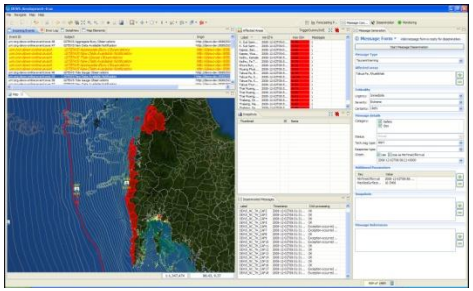
Forecasting Perspective

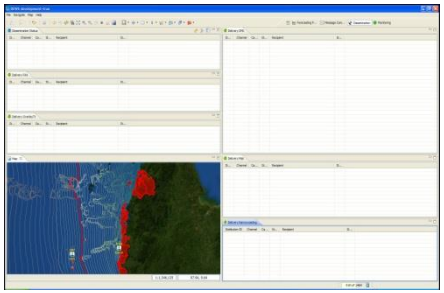
Message Composition P.

Dissemination Perspective



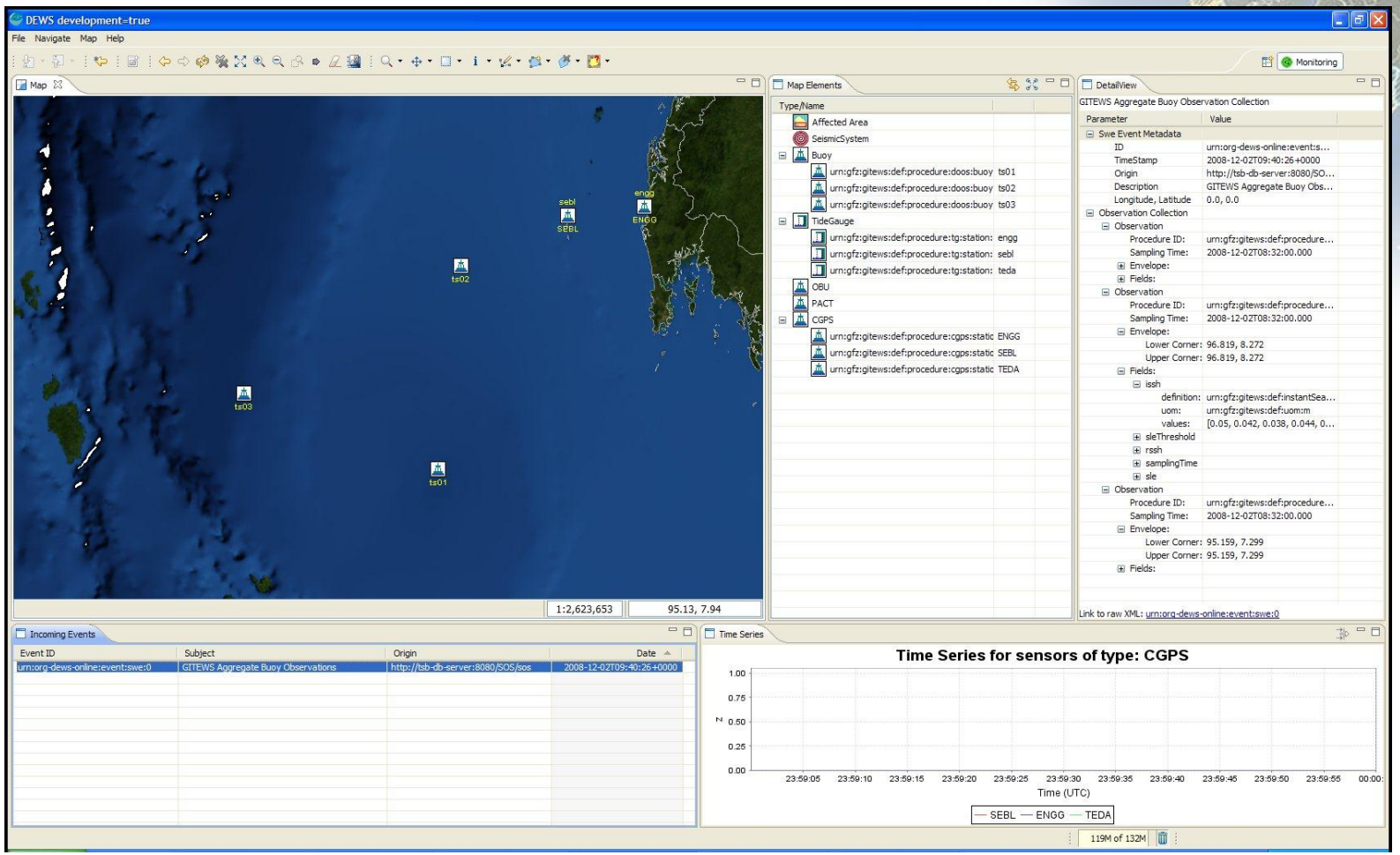






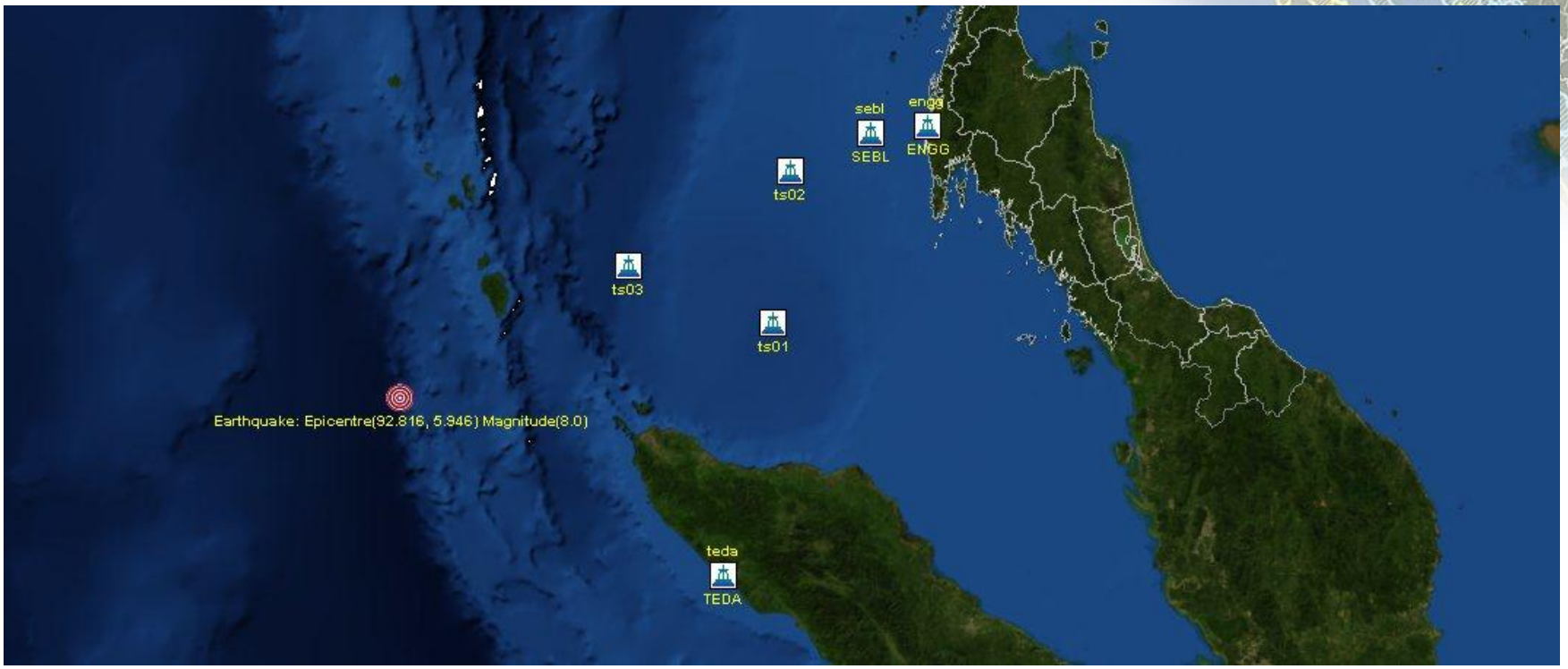
Distant Early DEWS Warning System

CCUI – Monitoring Perspective



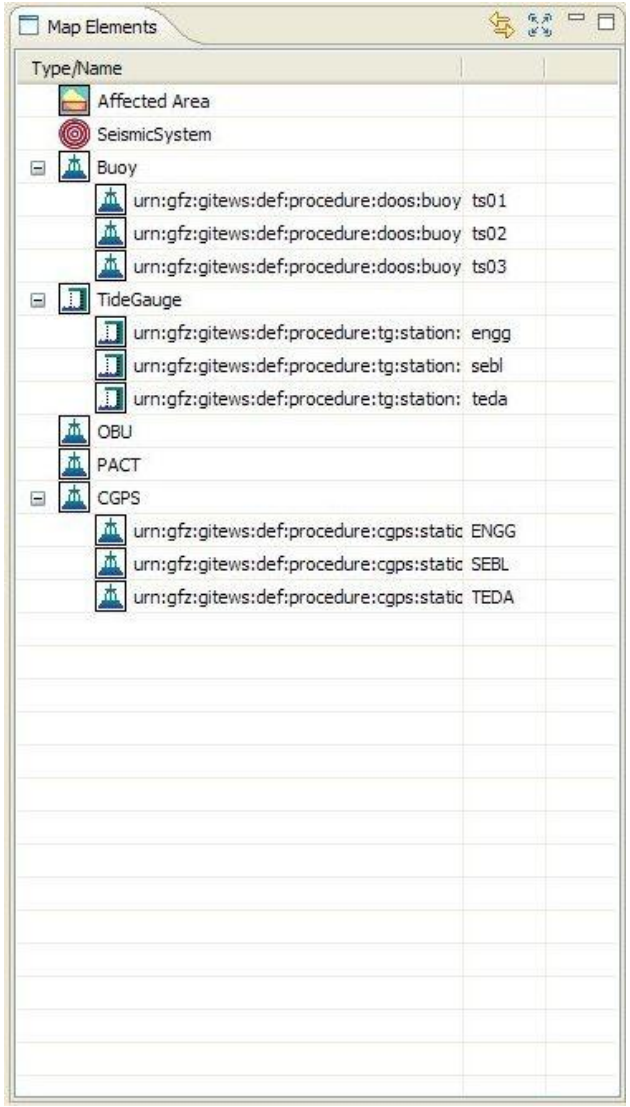
Distant Early DEWS Warning System

CCUI – Monitoring Perspective cont'd



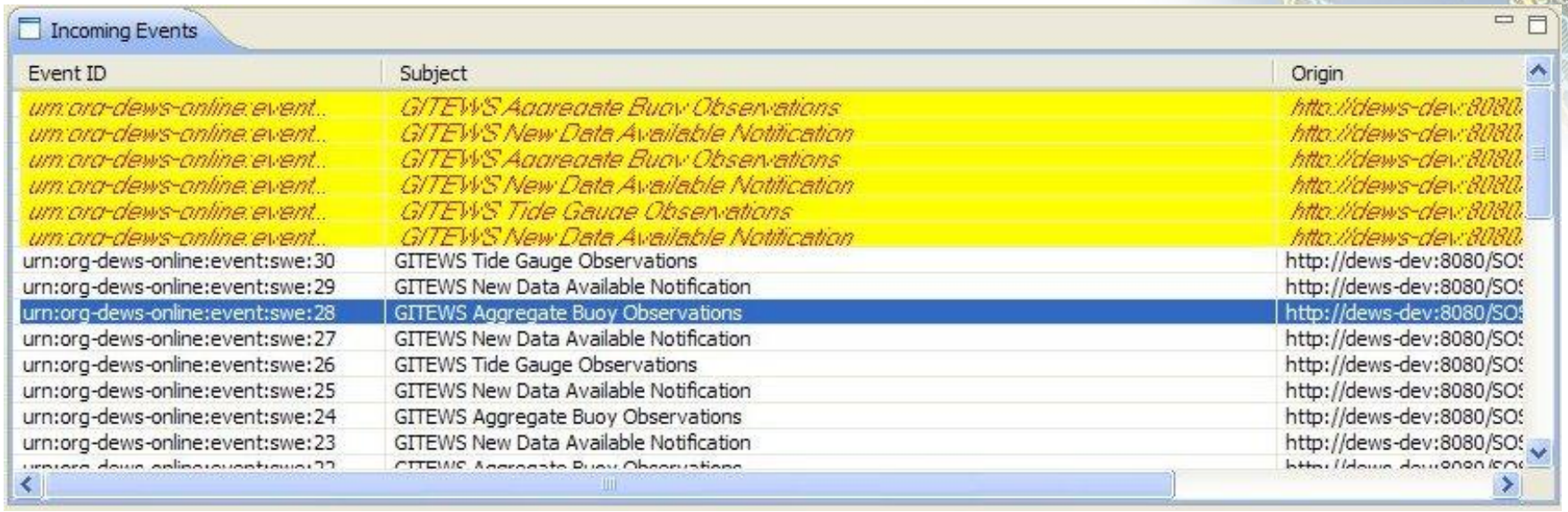
Distant Early DEWS Warning System

CCUI – Monitoring Perspective cont'd

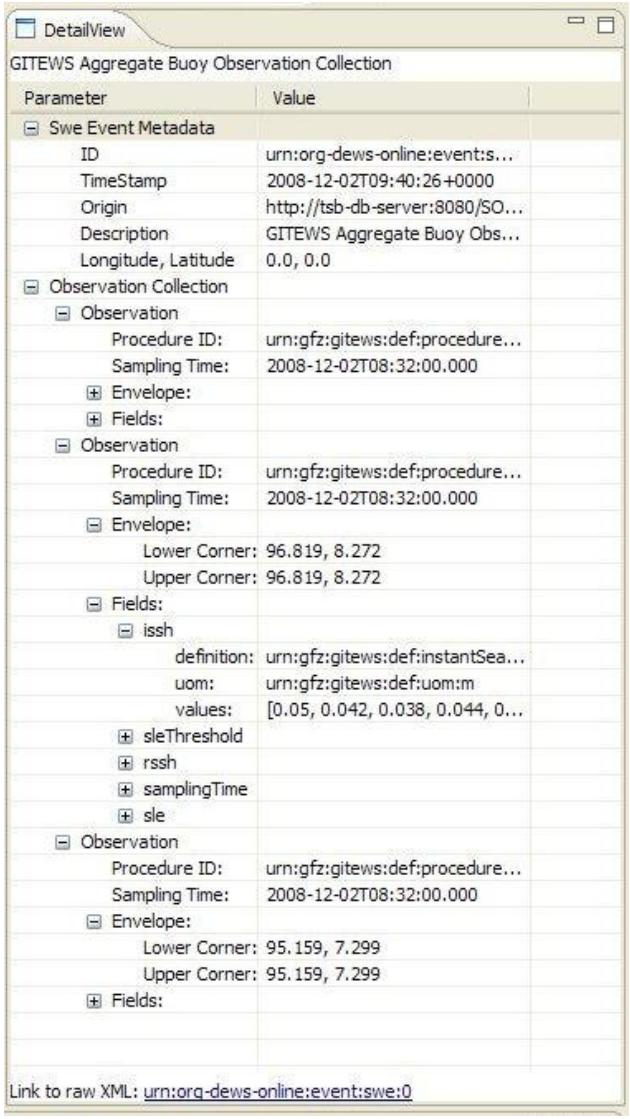


Distant Early DEWS Warning System

CCUI – Monitoring Perspective cont'd

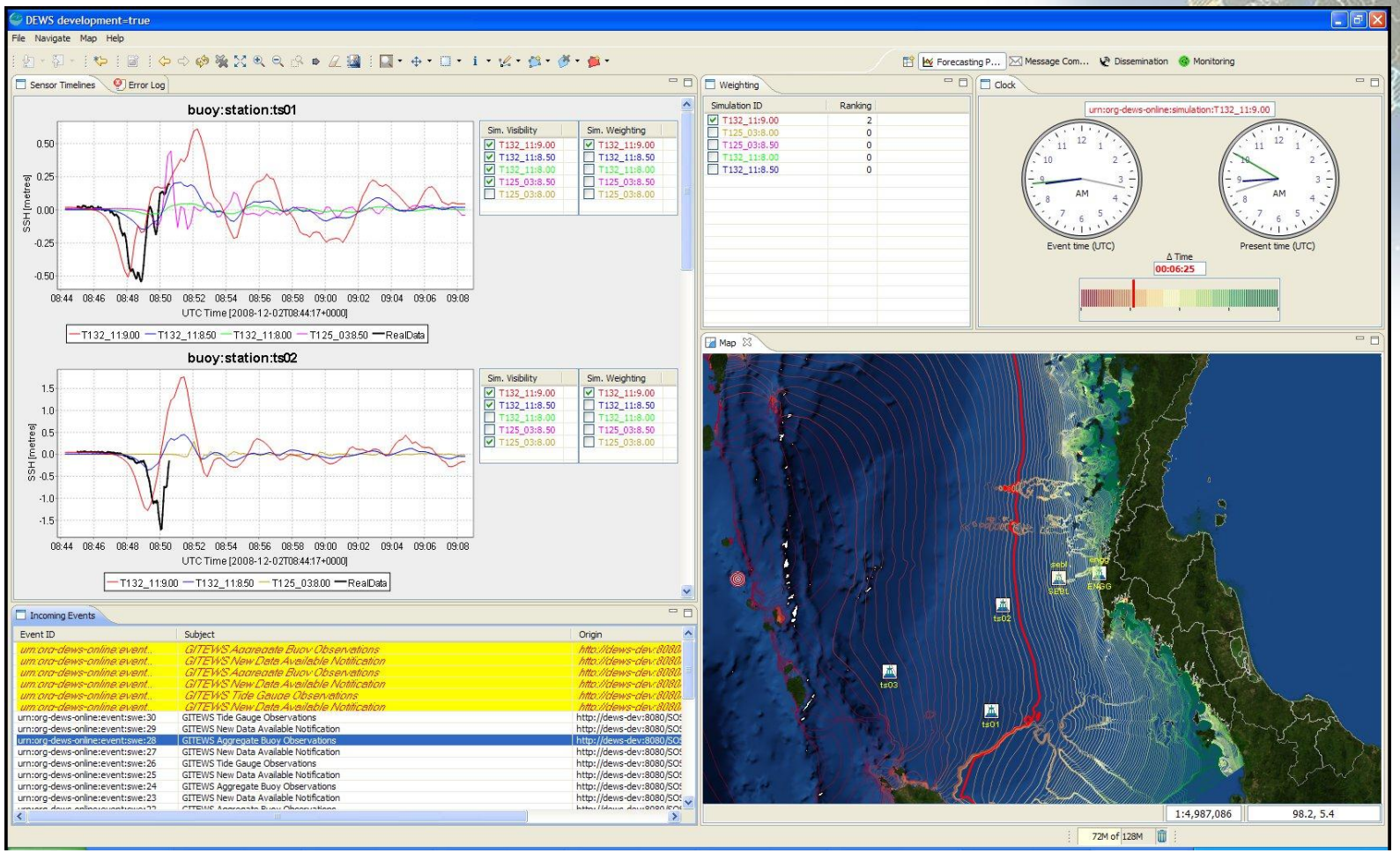


CCUI – Monitoring Perspective cont'd



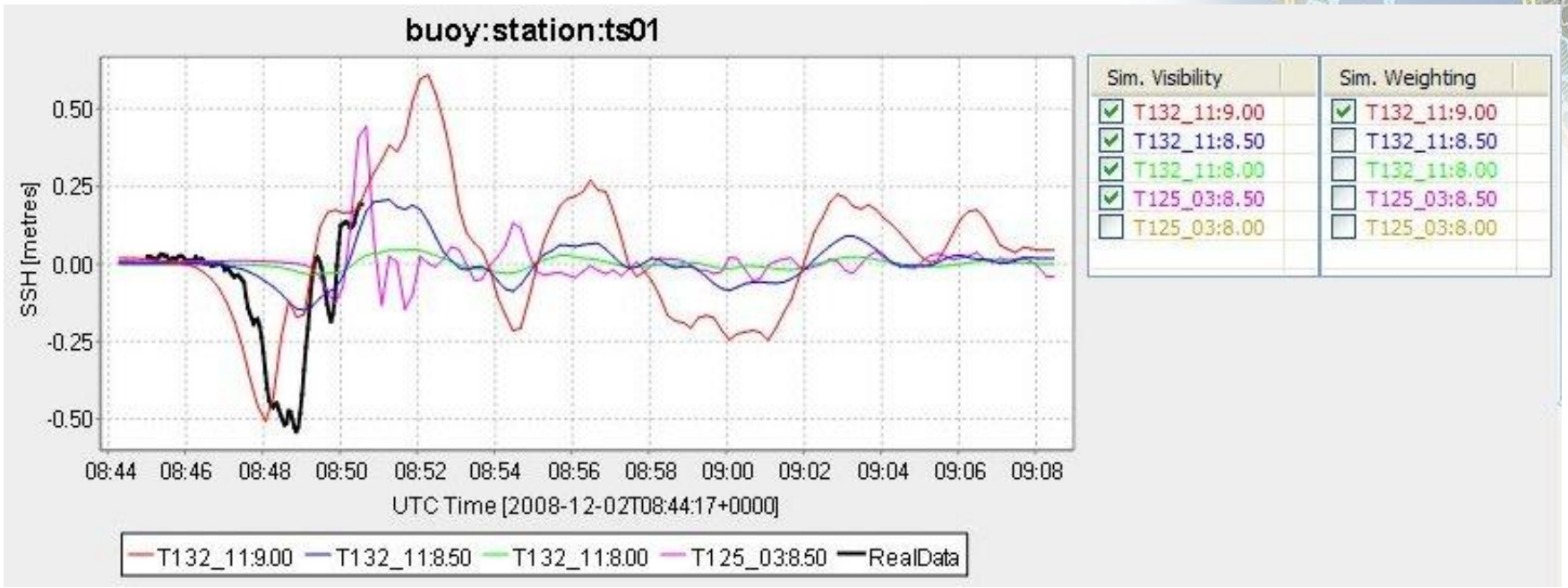
Distant Early DEWS Warning System

CCUI – Forecasting Perspective



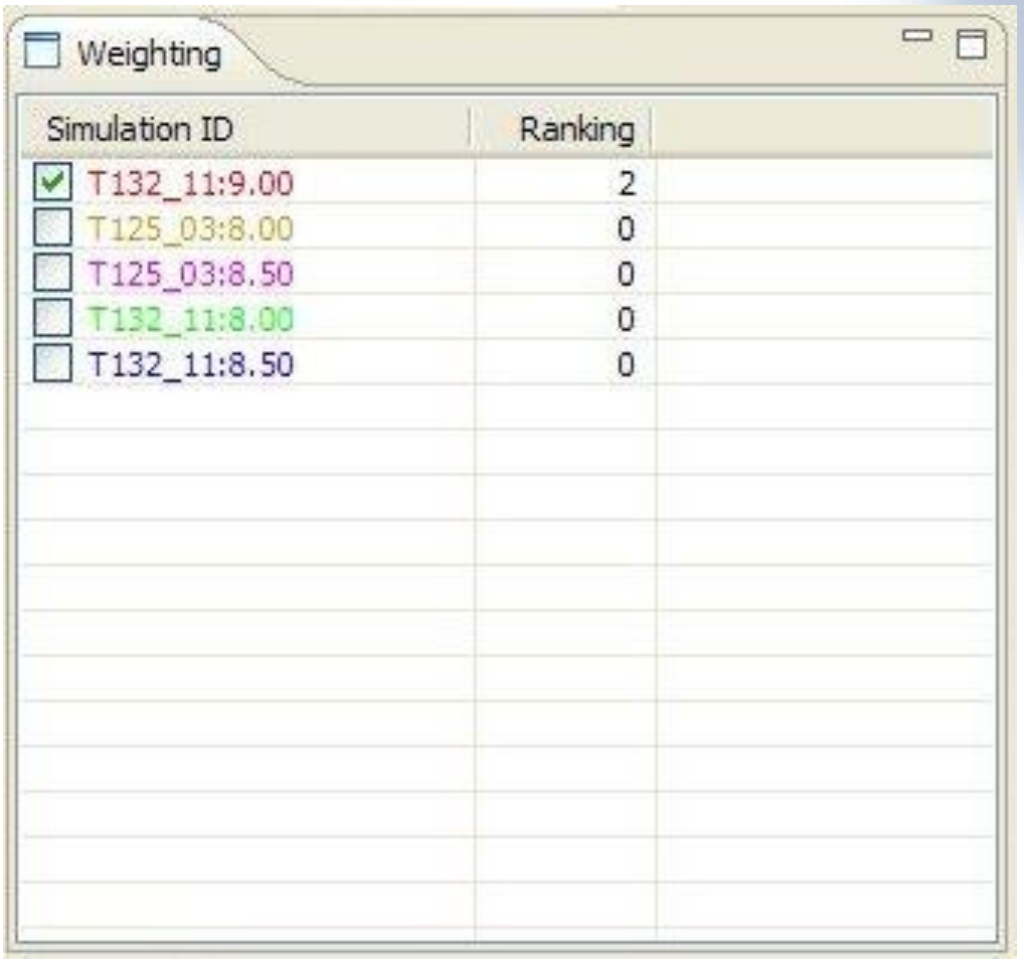
Distant Early DEWS Warning System

CCUI – Forecasting Perspective cont'd



Distant Early DEWS Warning System

CCUI – Forecasting Perspective cont'd

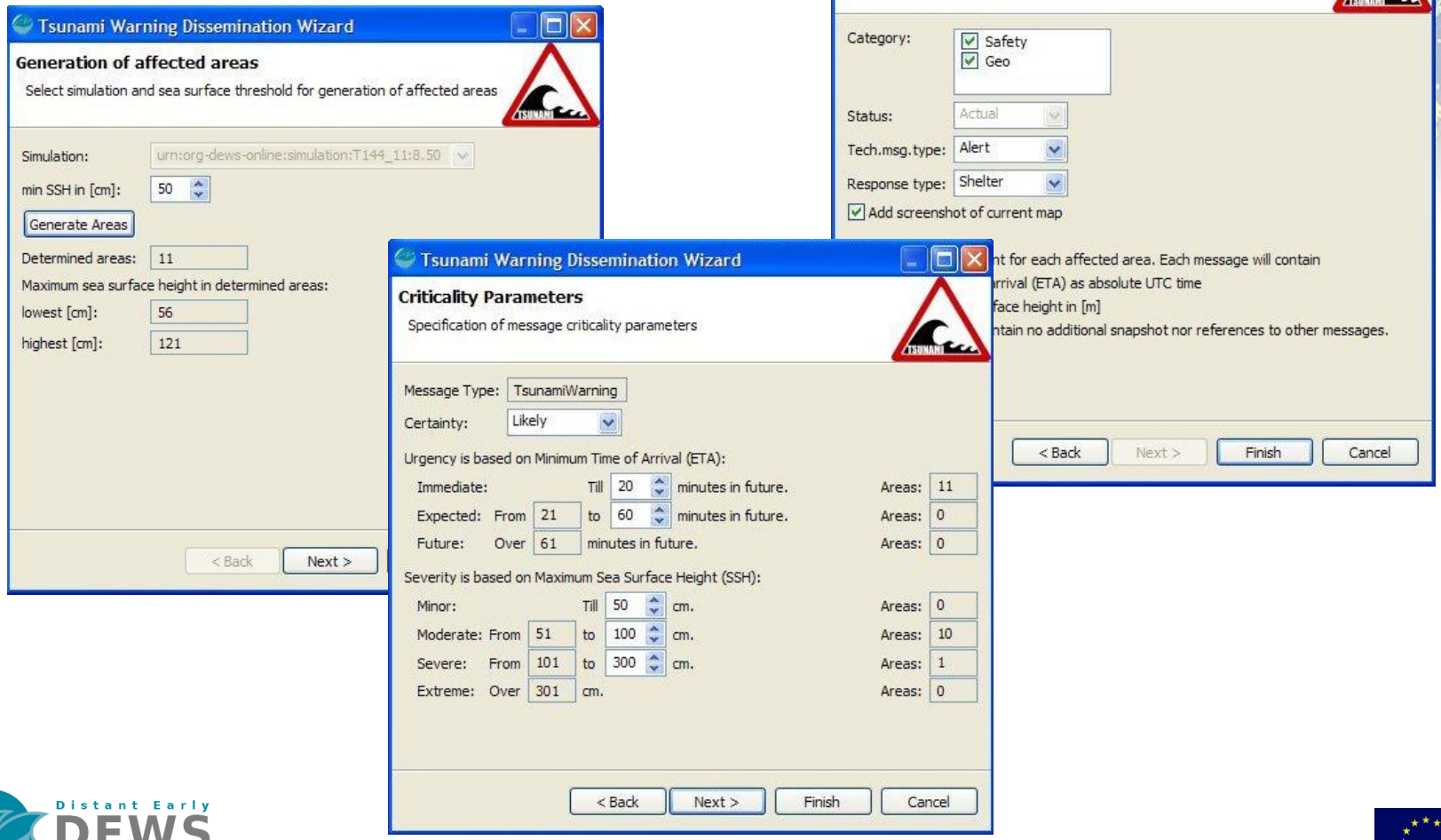


Distant Early DEWS Warning System

CCUI – Forecasting Perspective cont'd

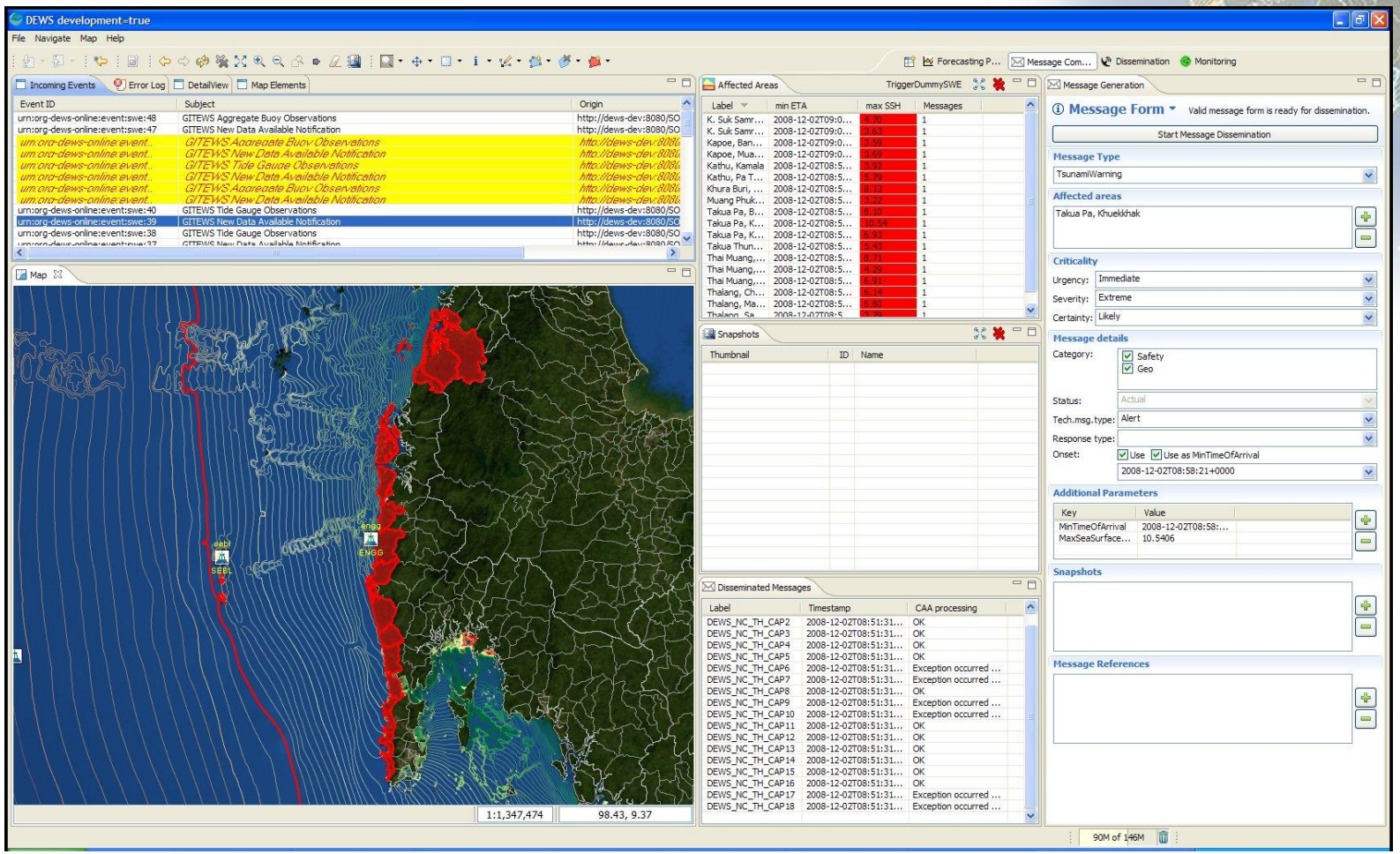
Distant Early DEWS Warning System

Tsunami Warning Dissemination Wizard



Distant Early DEWS Warning System

CCUI – Message Composition Perspective

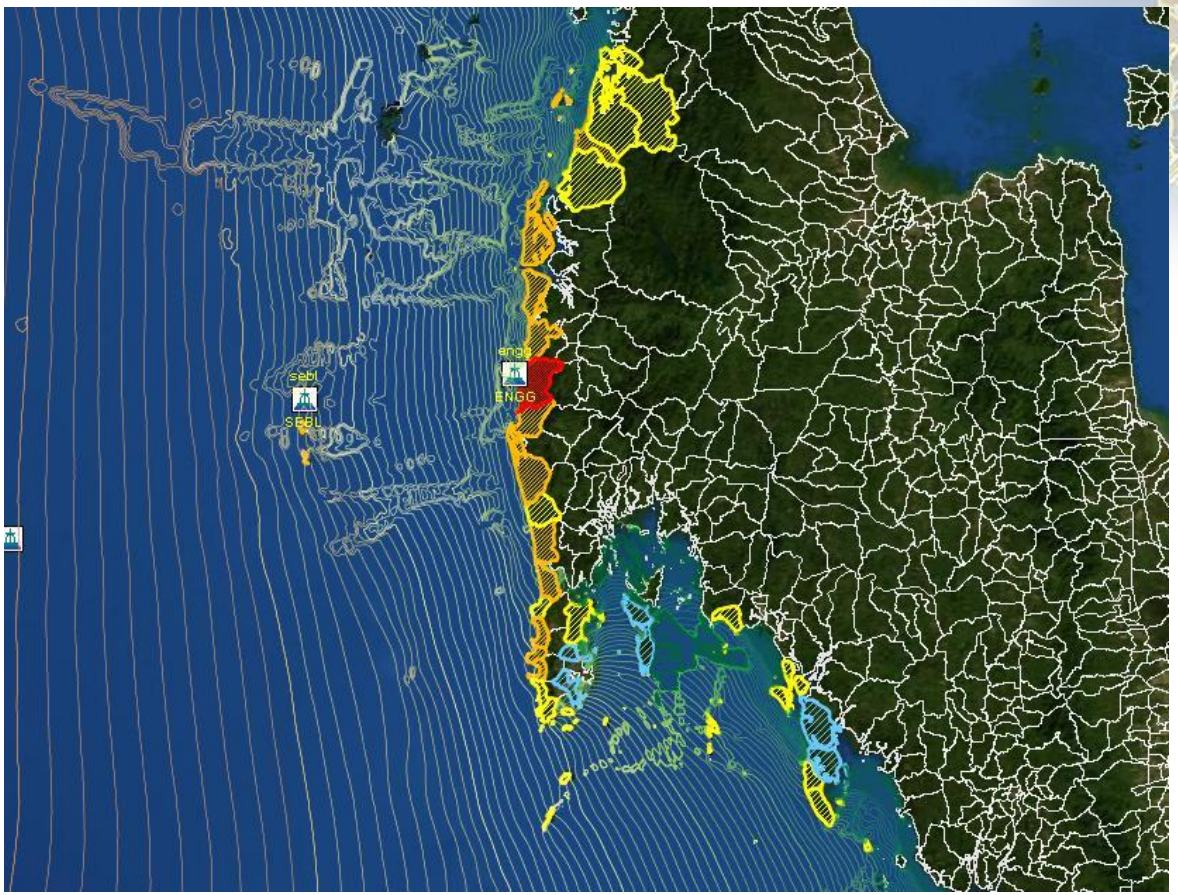


Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd

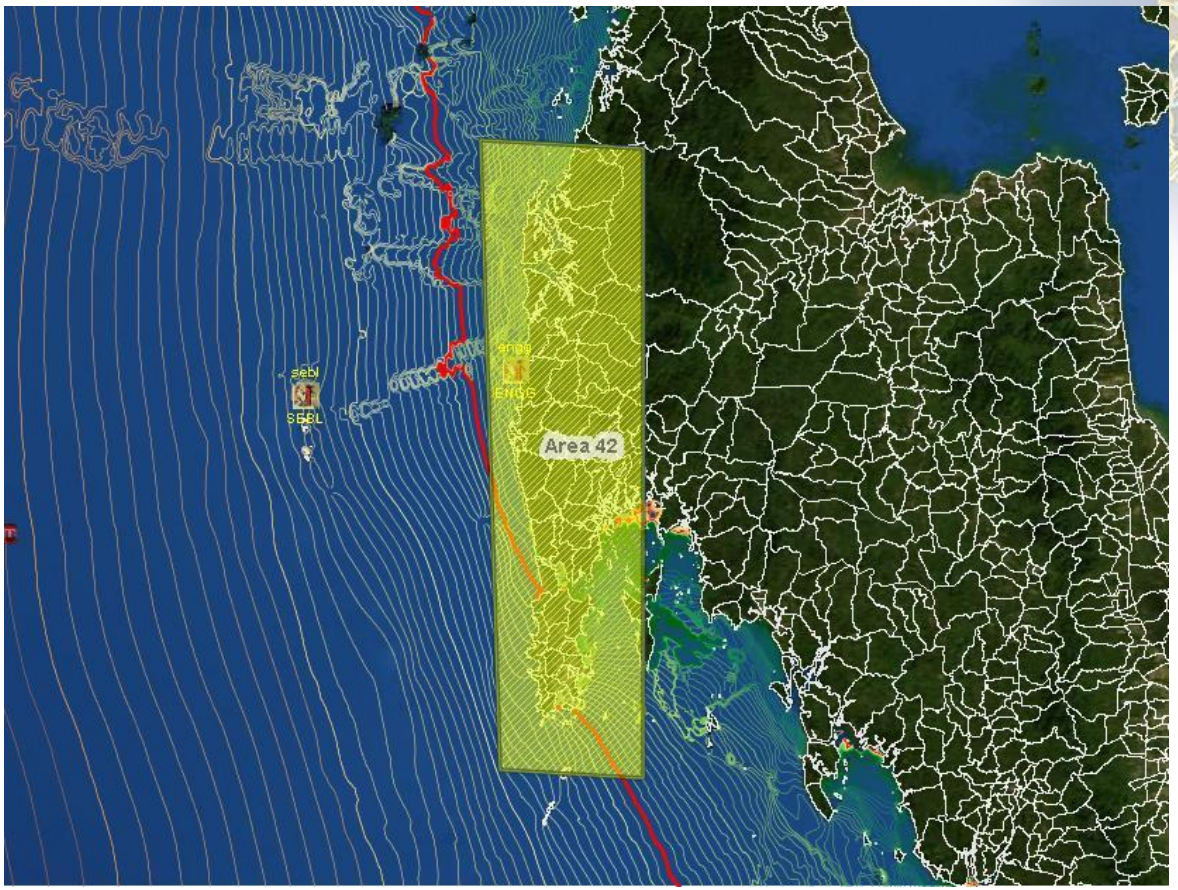
Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd



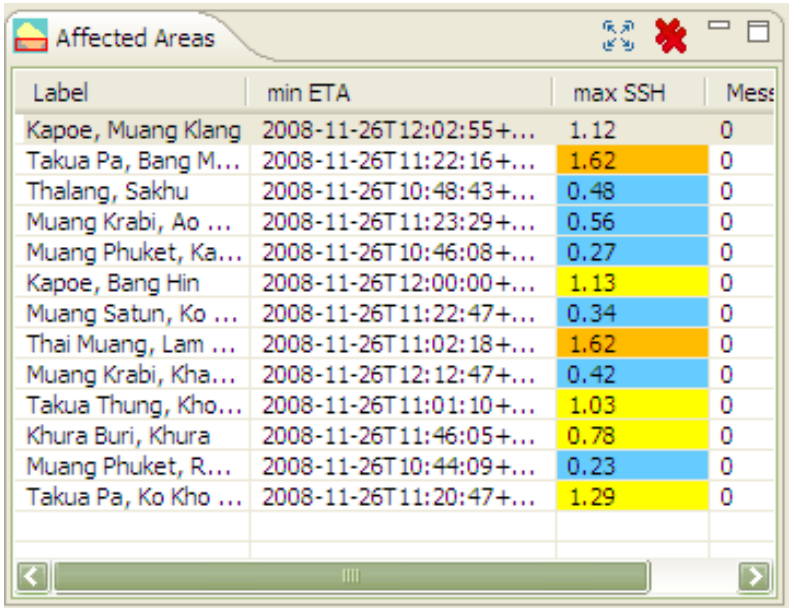
Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd



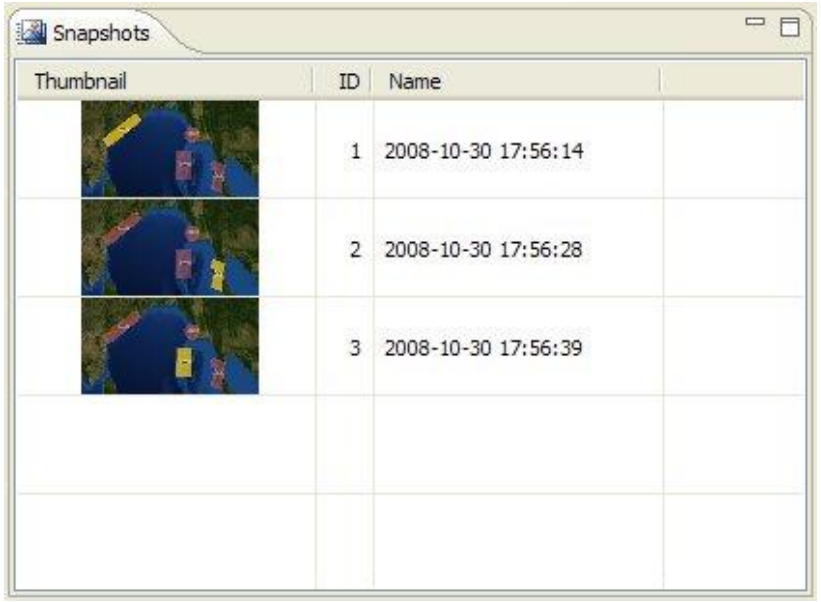
Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd



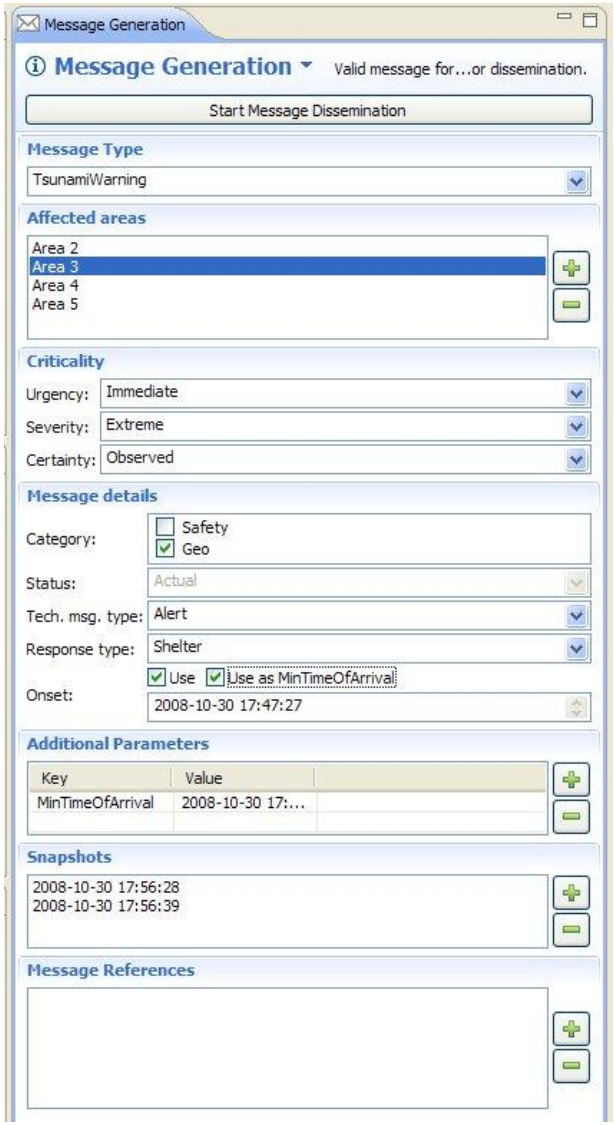
Label	min ETA	max SSH	Mess
Kapoe, Muang Klang	2008-11-26T12:02:55+...	1.12	0
Takua Pa, Bang M...	2008-11-26T11:22:16+...	1.62	0
Thalang, Sakhu	2008-11-26T10:48:43+...	0.48	0
Muang Krabi, Ao ...	2008-11-26T11:23:29+...	0.56	0
Muang Phuket, Ka...	2008-11-26T10:46:08+...	0.27	0
Kapoe, Bang Hin	2008-11-26T12:00:00+...	1.13	0
Muang Satun, Ko ...	2008-11-26T11:22:47+...	0.34	0
Thai Muang, Lam ...	2008-11-26T11:02:18+...	1.62	0
Muang Krabi, Kha...	2008-11-26T12:12:47+...	0.42	0
Takua Thung, Kho...	2008-11-26T11:01:10+...	1.03	0
Khura Buri, Khura	2008-11-26T11:46:05+...	0.78	0
Muang Phuket, R...	2008-11-26T10:44:09+...	0.23	0
Takua Pa, Ko Kho ...	2008-11-26T11:20:47+...	1.29	0

CCUI – Message Composition Persp. cont'd



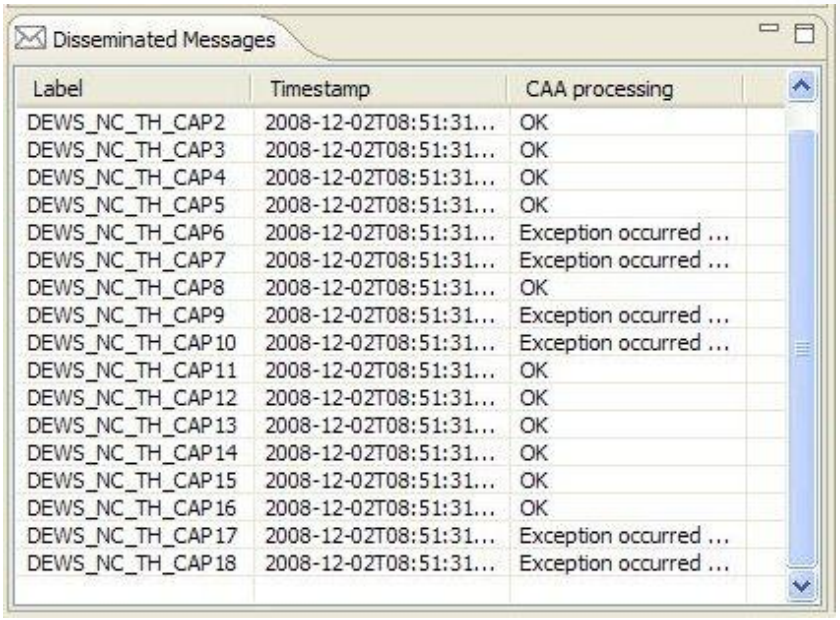
Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd



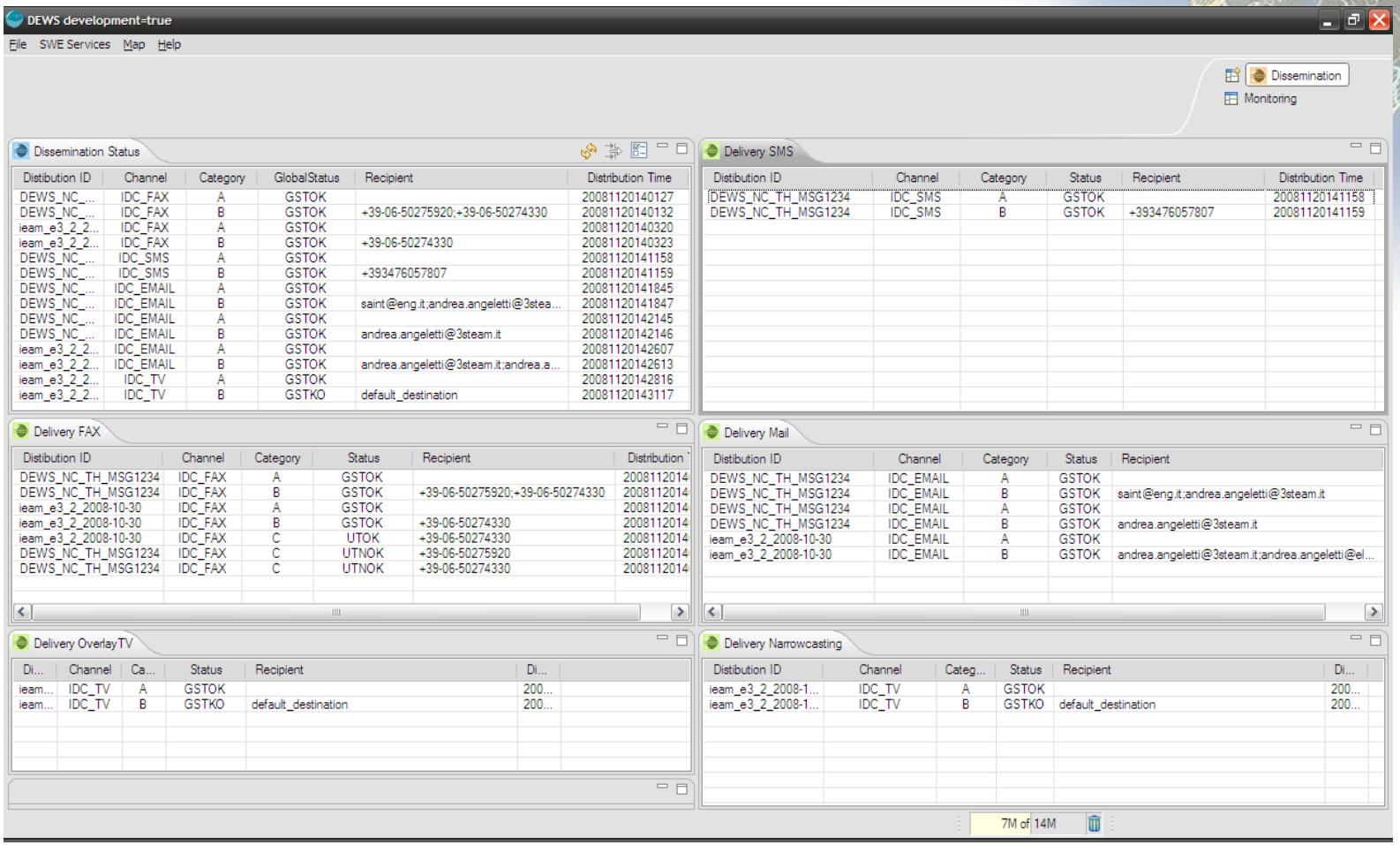
Distant Early DEWS Warning System

CCUI – Message Composition Persp. cont'd



Label	Timestamp	CAA processing
DEWS_NC_TH_CAP2	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP3	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP4	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP5	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP6	2008-12-02T08:51:31...	Exception occurred ...
DEWS_NC_TH_CAP7	2008-12-02T08:51:31...	Exception occurred ...
DEWS_NC_TH_CAP8	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP9	2008-12-02T08:51:31...	Exception occurred ...
DEWS_NC_TH_CAP10	2008-12-02T08:51:31...	Exception occurred ...
DEWS_NC_TH_CAP11	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP12	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP13	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP14	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP15	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP16	2008-12-02T08:51:31...	OK
DEWS_NC_TH_CAP17	2008-12-02T08:51:31...	Exception occurred ...
DEWS_NC_TH_CAP18	2008-12-02T08:51:31...	Exception occurred ...

CCUI – Dissemination Perspective

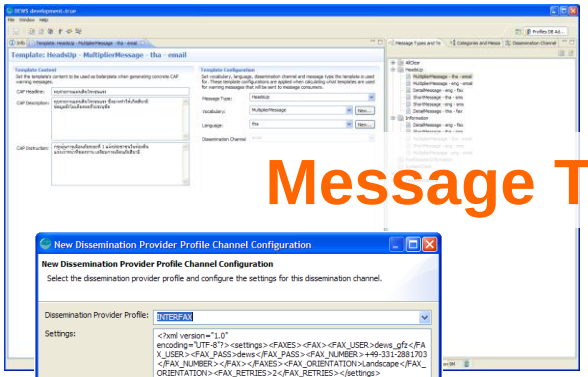


Distant Early DEWS Warning System

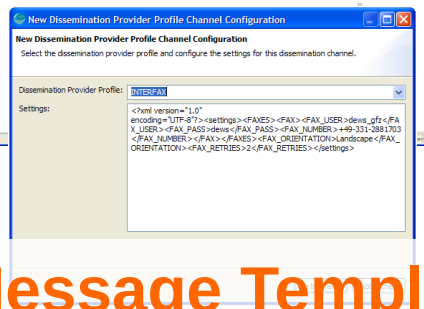
CCUI – Administration Perspective

Administration Perspective

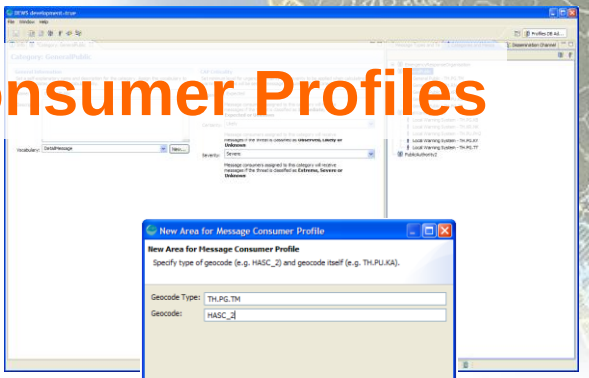
Message Types



Message Templates

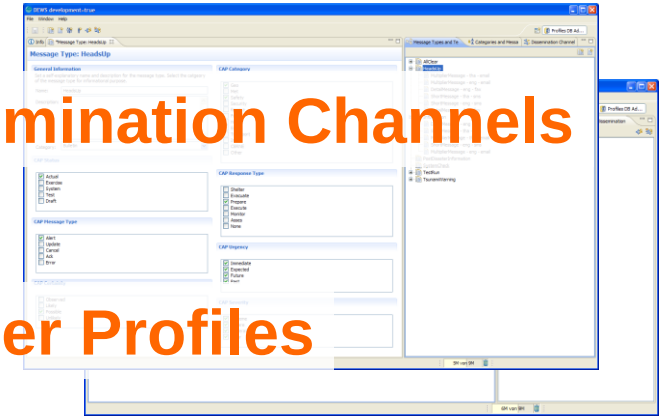


Message Consumer Profiles

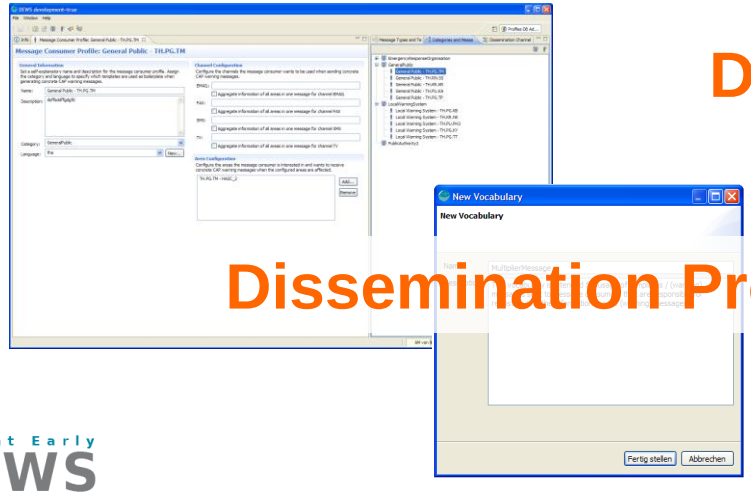


User groups

Dissemination Channels

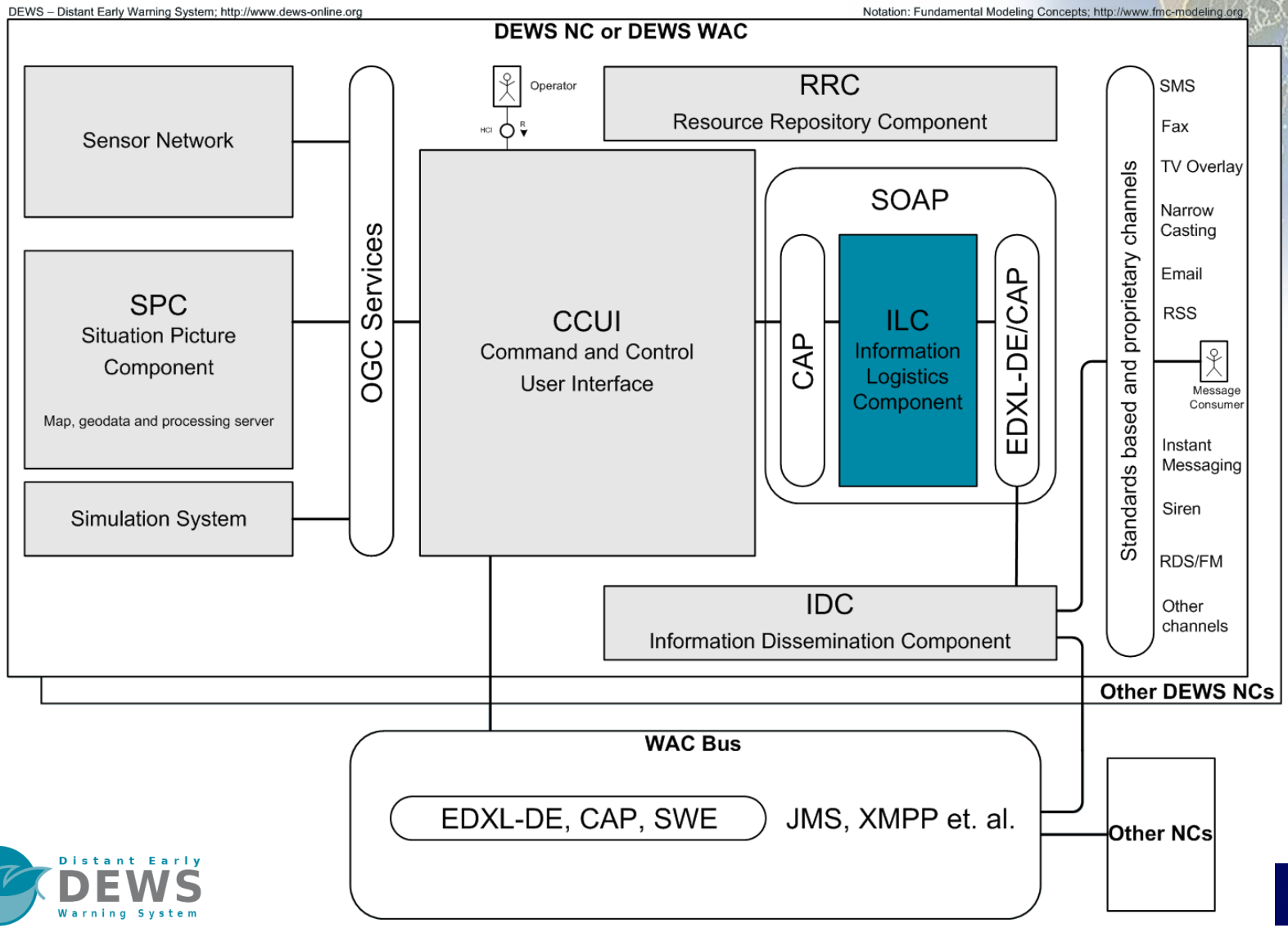


Dissemination Provider Profiles

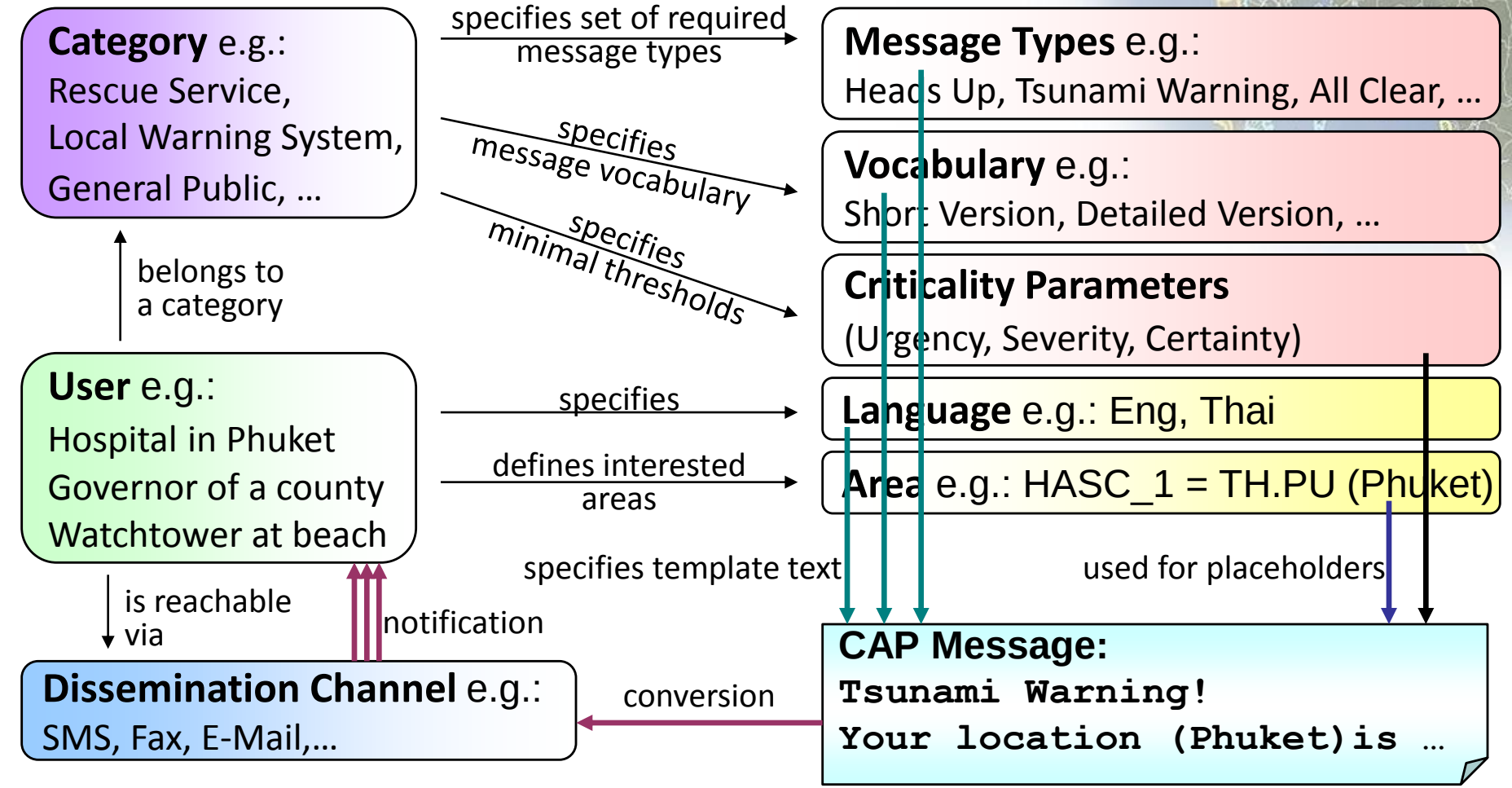


Distant Early DEWS Warning System

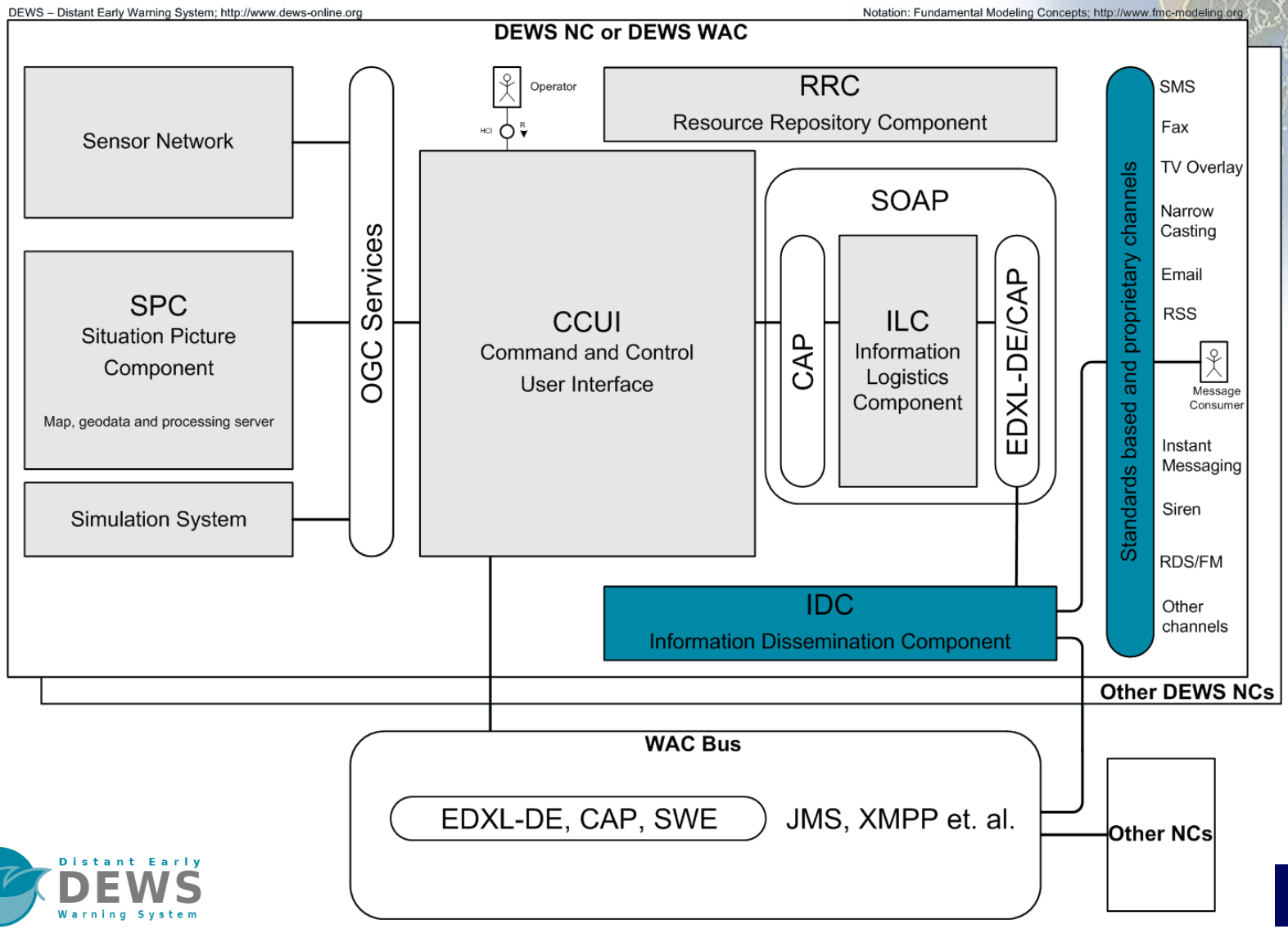
Information Logistics



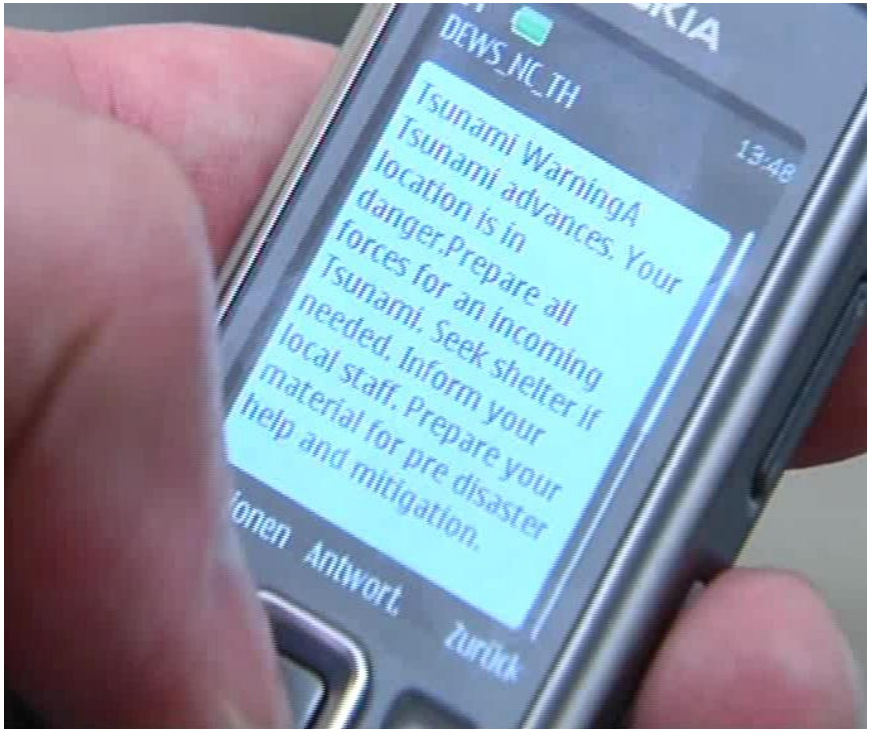
Information Logistics contd.

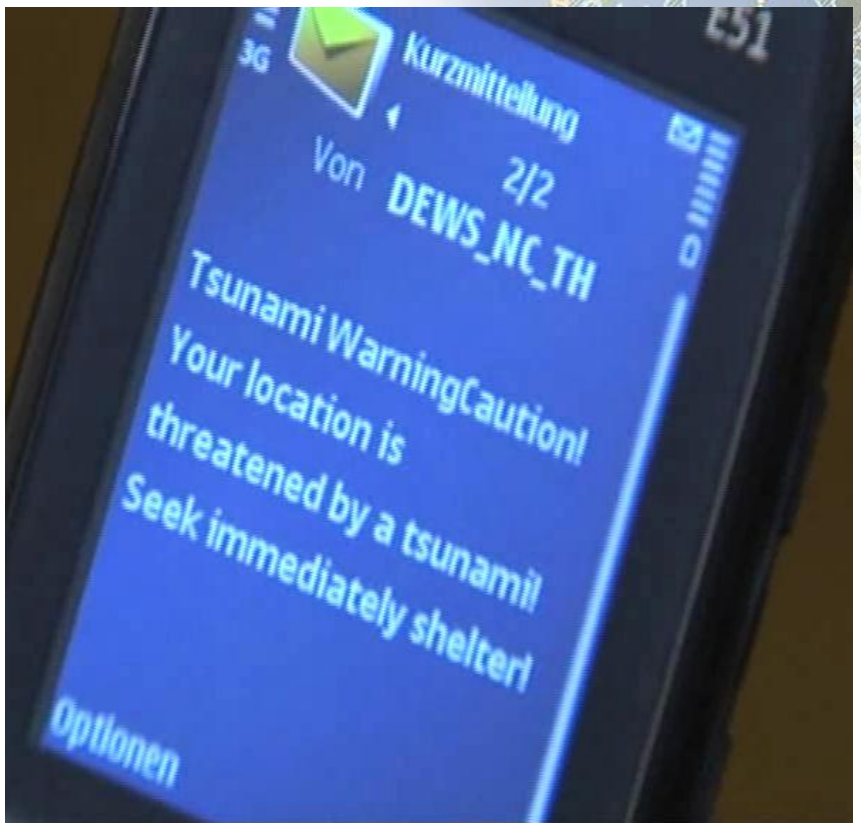


Dissemination Channels



Dissemination – SMS





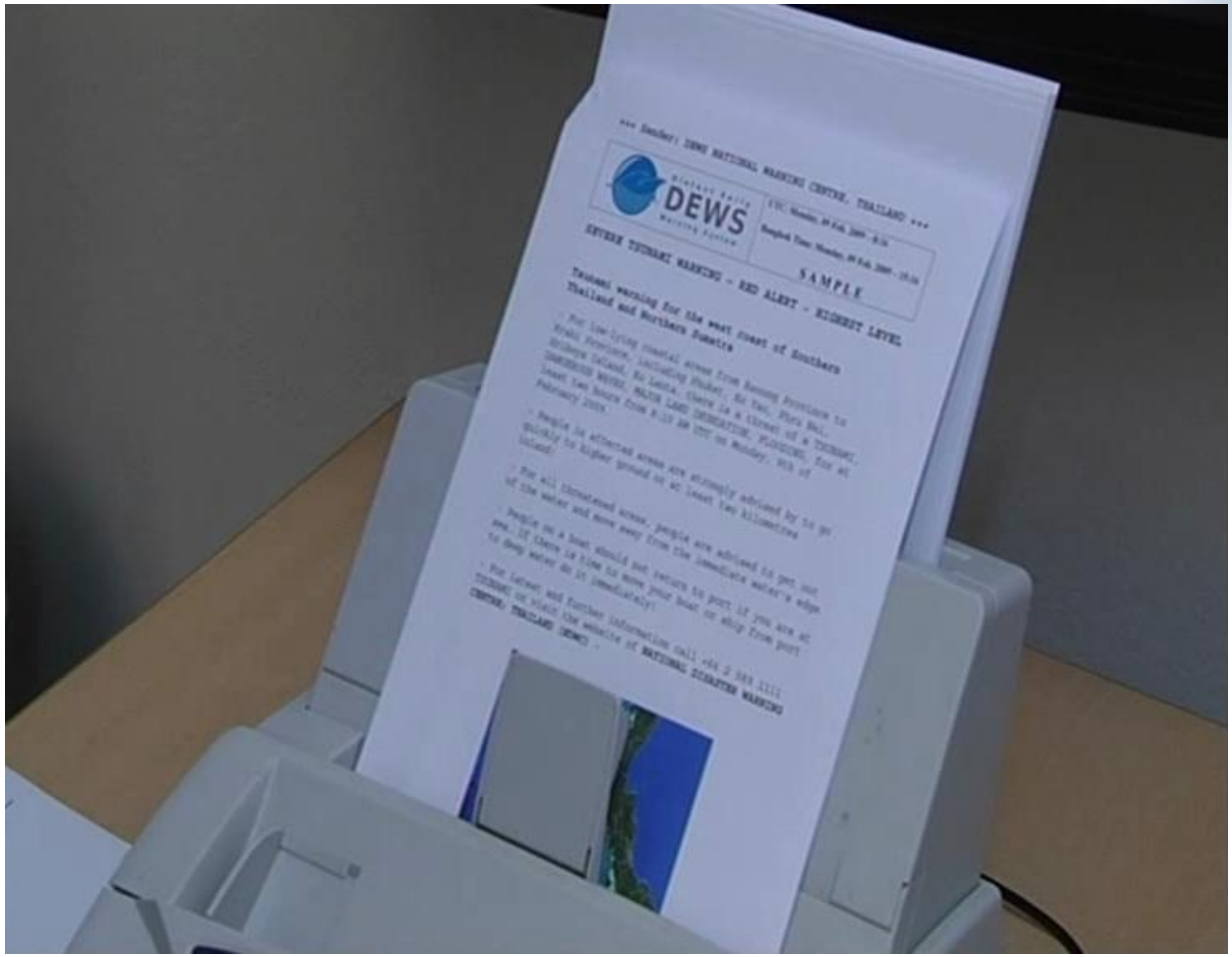
Distant Early DEWS Warning System

Dissemination – TV Overlay et. al.

TV

Narrow Casting

Dissemination – Facsimile



Distant Early DEWS Warning System

Dissemination – Email

Tsunami Warning

Peringatan tsunami Posteingang | X

Alle drucken

DEWS Consortium Details anzeigen 28. Sep. Antworten

Gelombang Tsunami tengah menjalar dan akan mengancam daerah-daerah berikut ini.
Location TH.PG.TM.Na Toei: estimated time of arrival = 2009-09-28T09:56:00+0000, max inundation height = 4.2901;
Mobilisasi semua sumber daya dan personil agar tanggap pada datangnya tsunami.
Informasikan staf lokal Anda untuk mengorganisir dan menjalankan rencana-rencana evakuasi.

Done 893

Affected Area Code

Estimated Time of Arrival

Estimated Wave Height

Bahasa Indonesia

Distant Early DEWS Warning System

Dissemination – Email contd.

All Clear Message

Keadaan Aman Posteingang | X

Alle drucken

DEWS Consortium Details anzeigen 28. Sep. Antworten

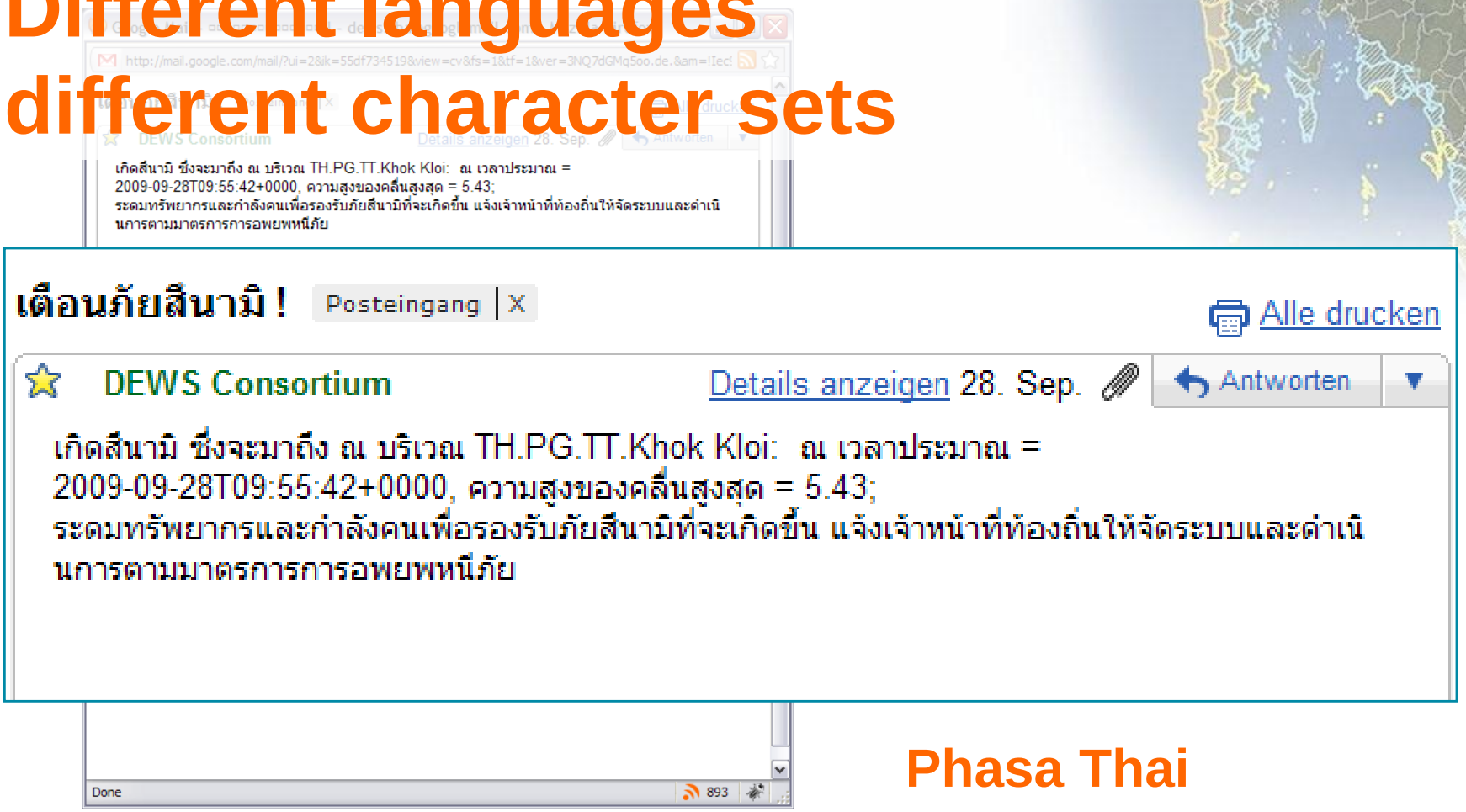
Gempa bumi ini tidak menyebabkan Tsunami. Tidak terjadi bencana
Informasikan kepada staf lokal Anda untuk kembali lakukan kegiatan normal operasional.

Done 894

Bahasa Indonesia

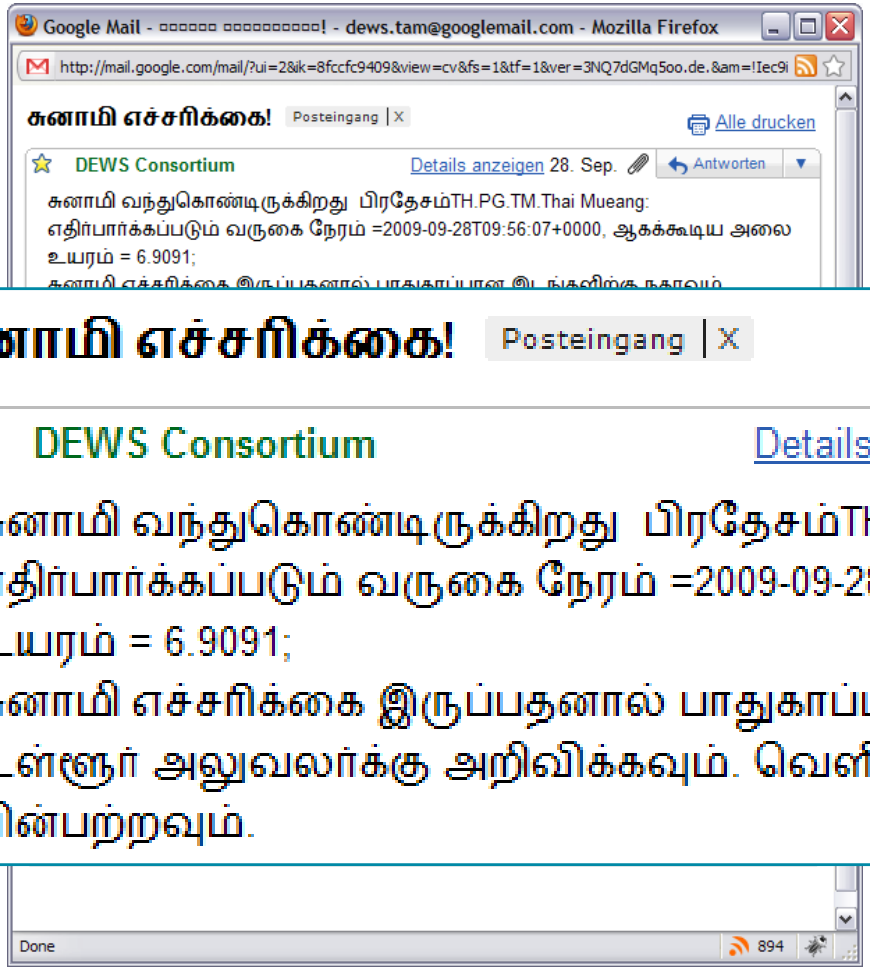
Dissemination – Email contd.

Different languages
different character sets



Phasa Thai

Dissemination – Email contd.



Tamil

Distant Early DEWS Warning System

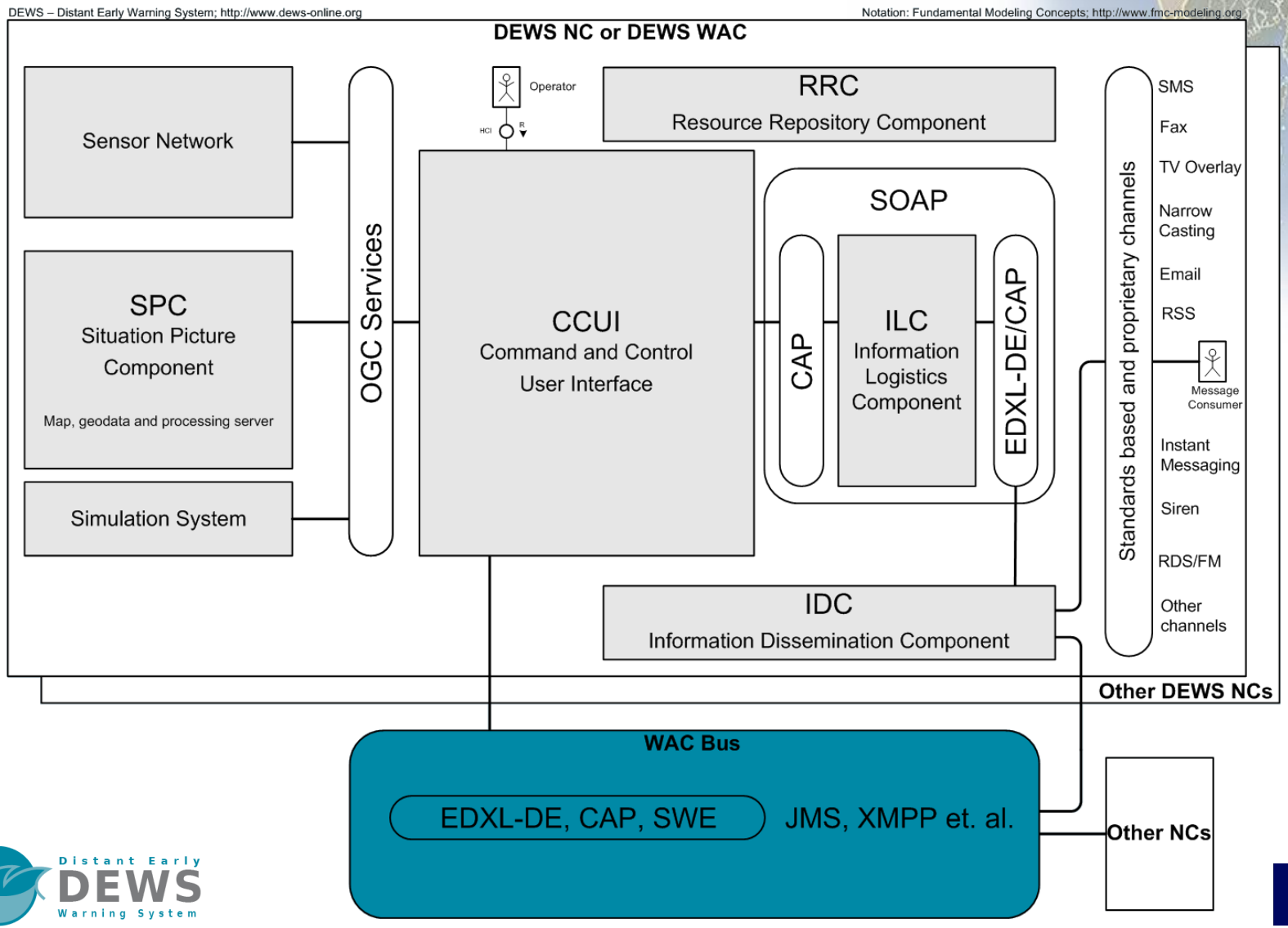
Dissemination Channels contd.

- 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

Distant Early DEWS Warning System

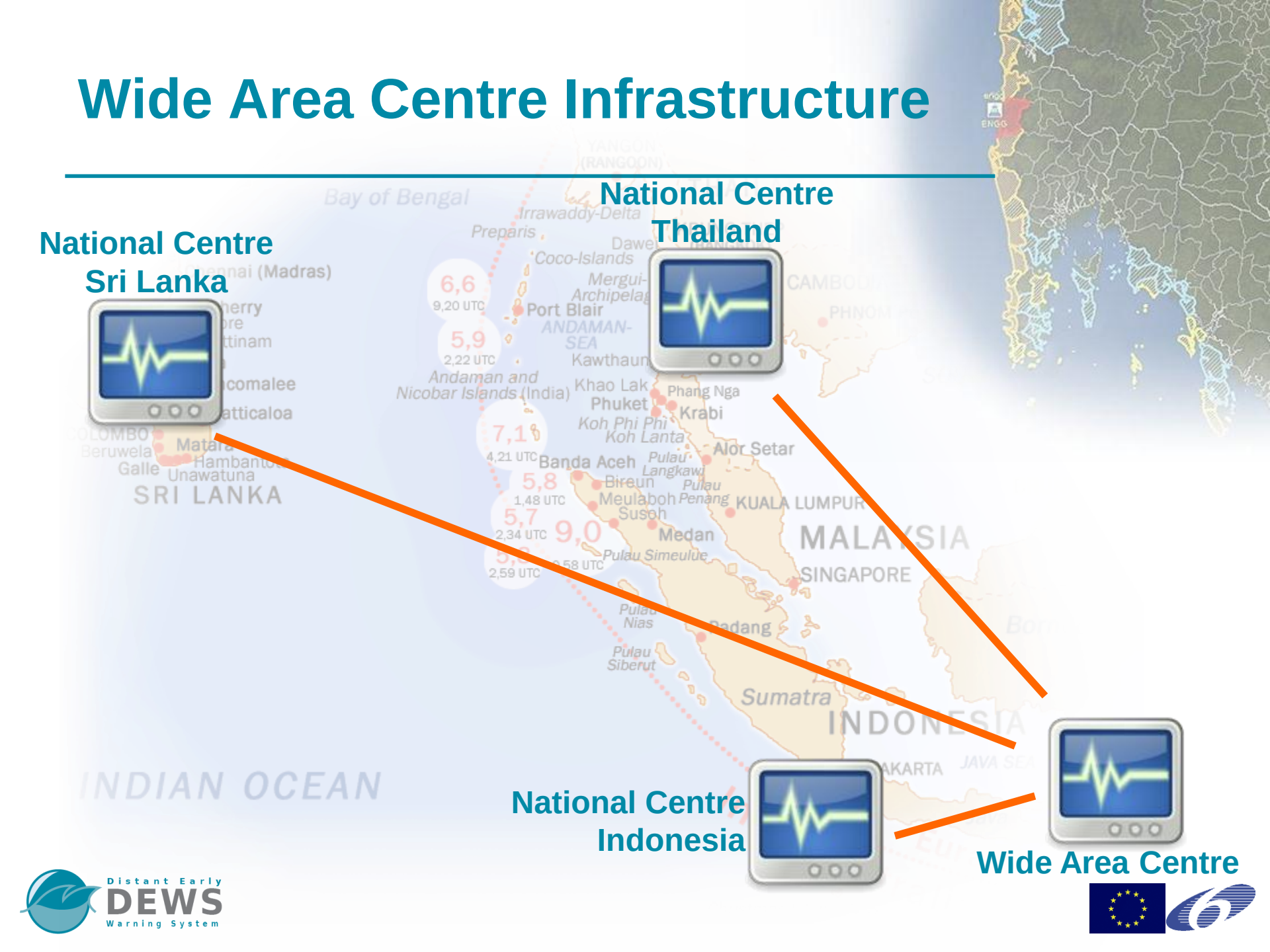
Wide Area Centre and WAC Bus



DEWS National Centres

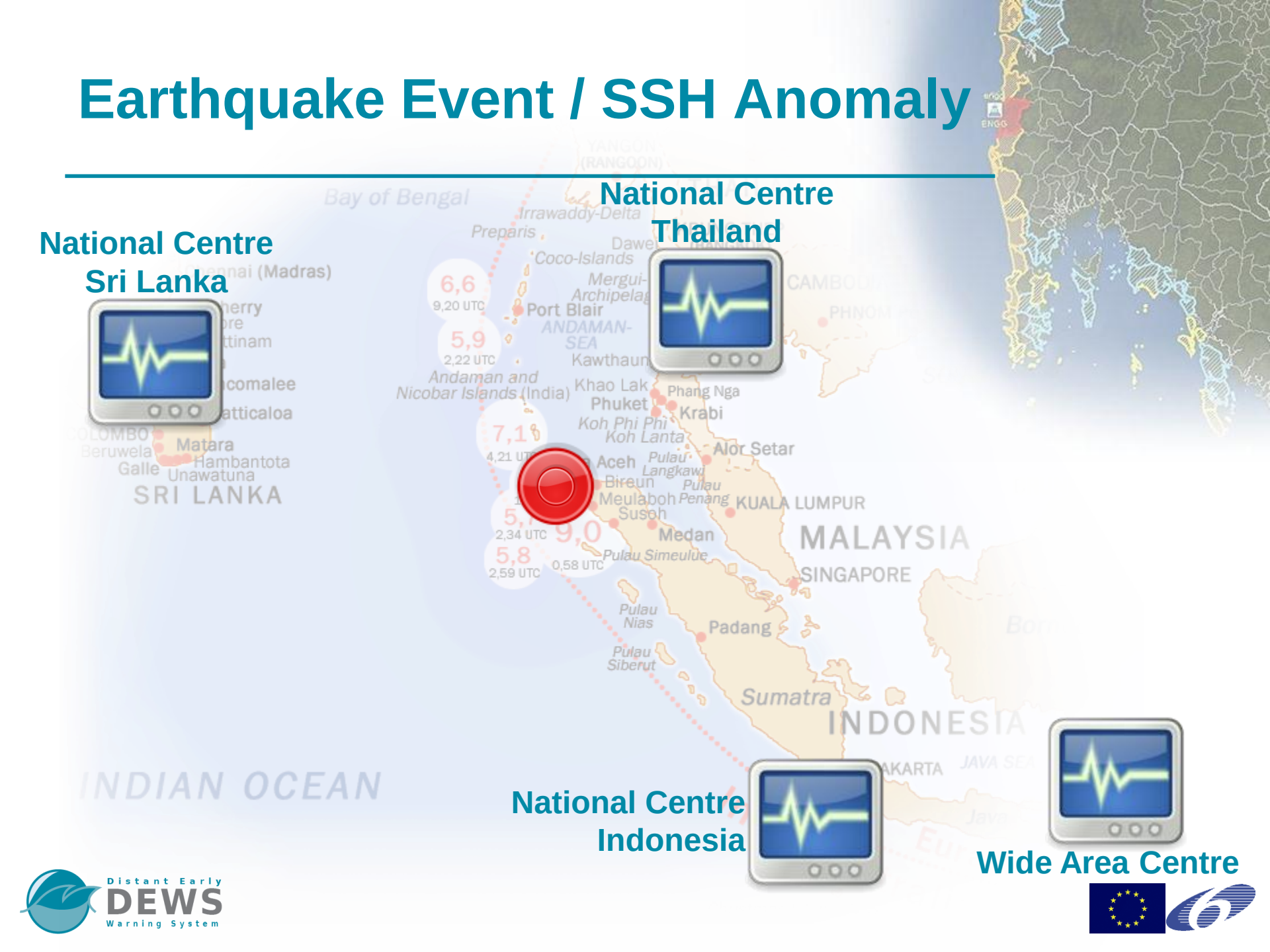
Distant Early DEWS Warning System

Wide Area Centre Infrastructure



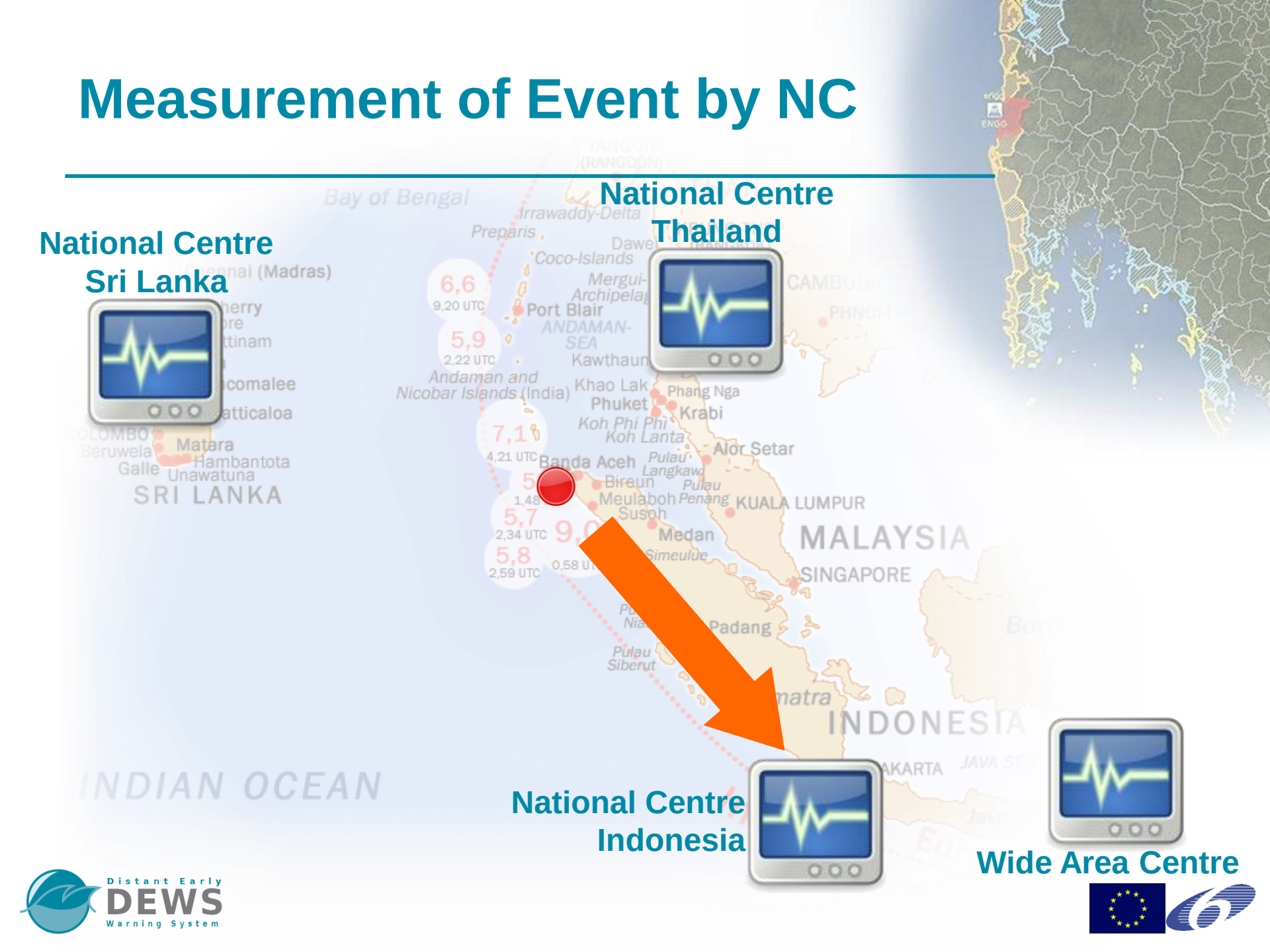
Distant Early DEWS Warning System

Earthquake Event / SSH Anomaly



Distant Early DEWS Warning System

Measurement of Event by NC

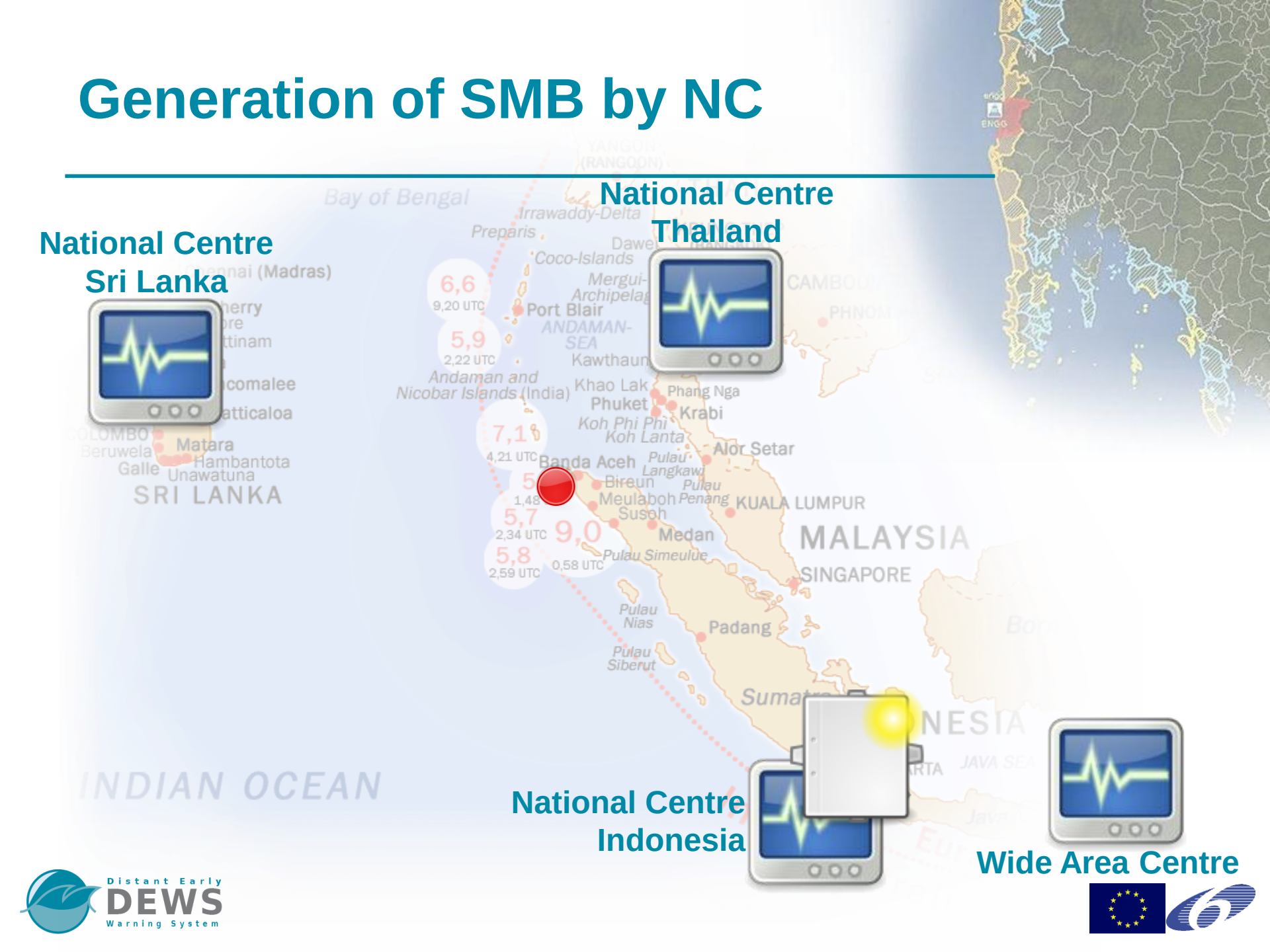


Distant Early DEWS Warning System

Dissemination on National Level

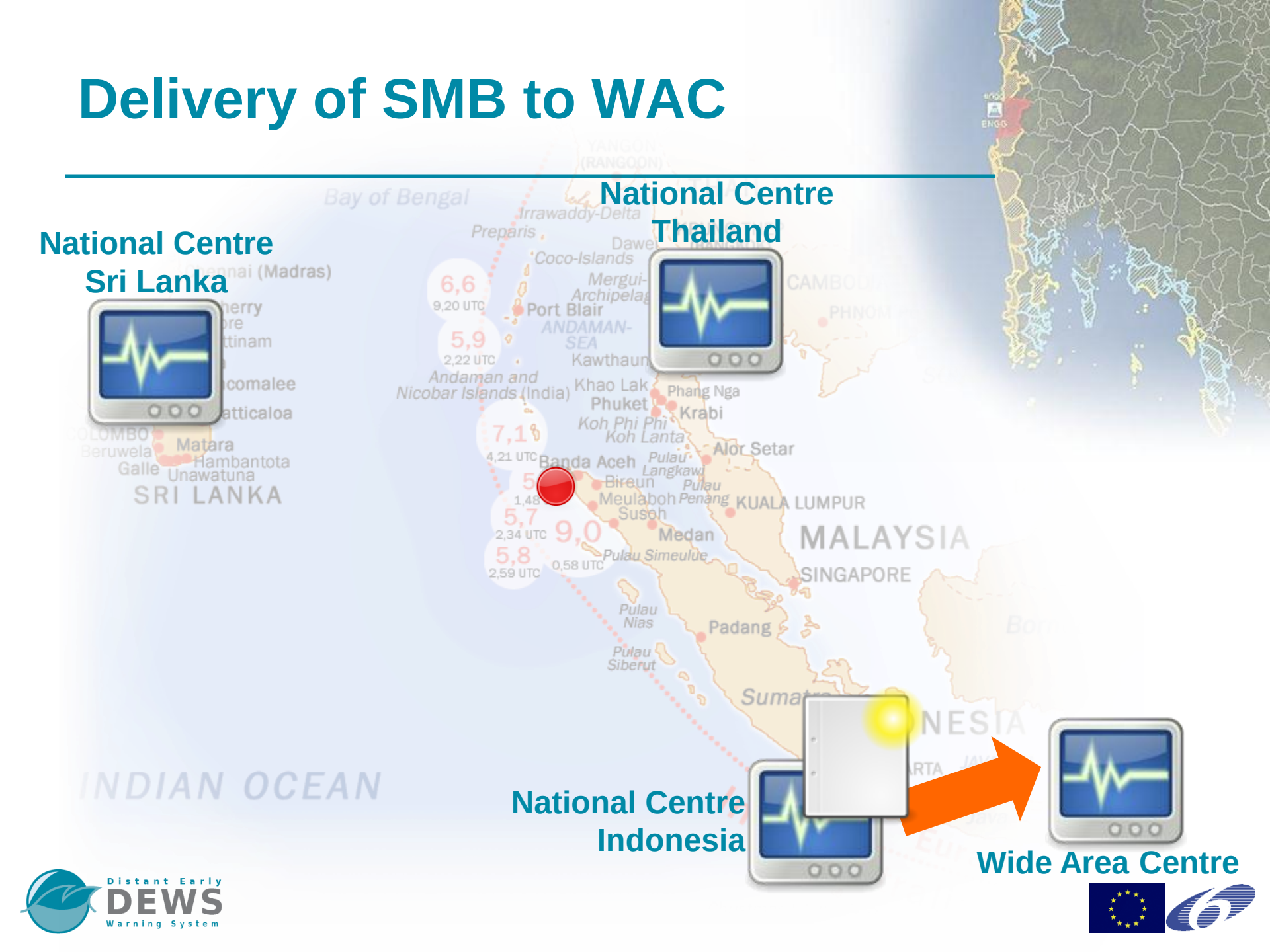
Distant Early DEWS Warning System

Generation of SMB by NC

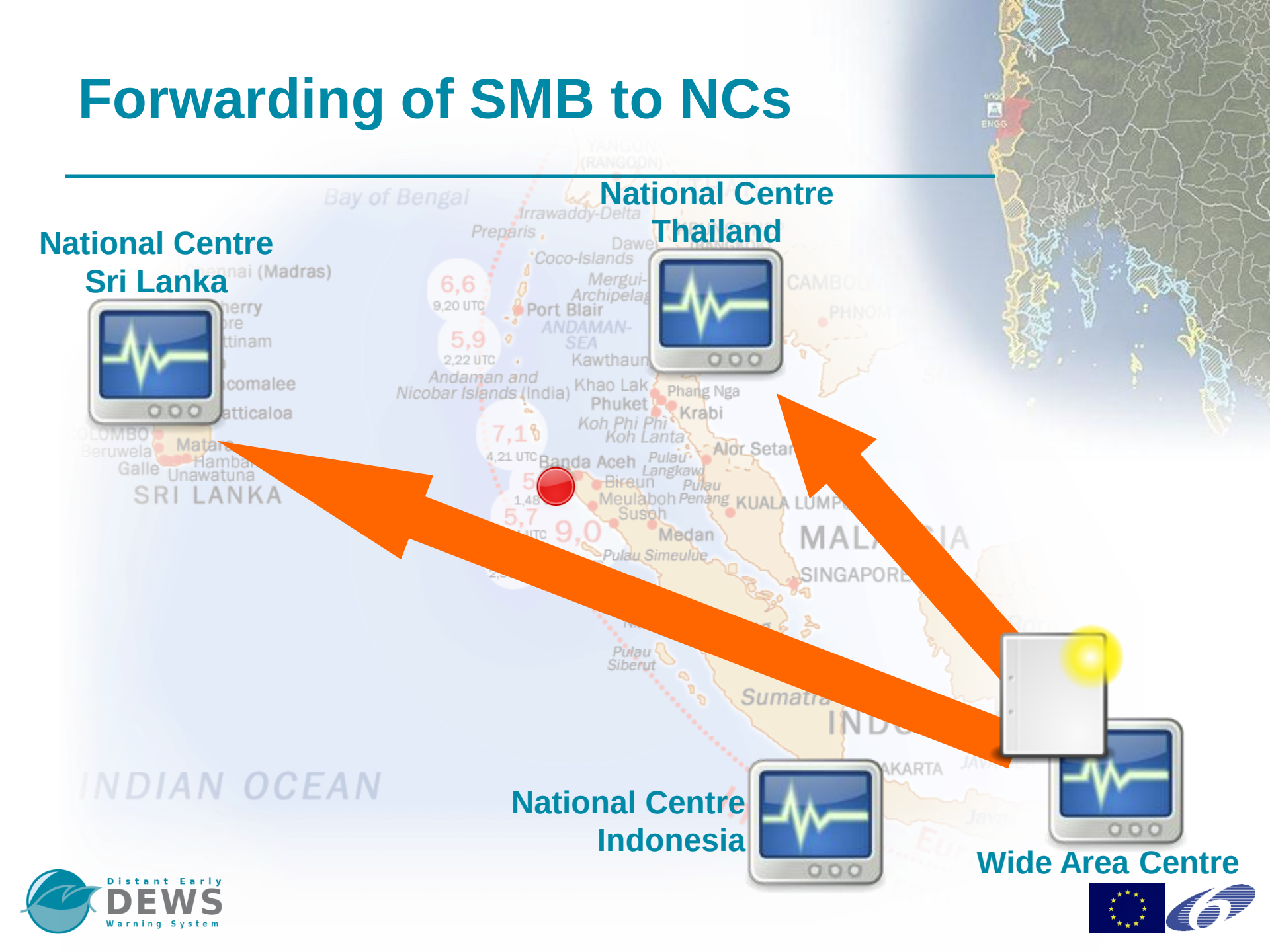


Distant Early DEWS Warning System

Delivery of SMB to WAC

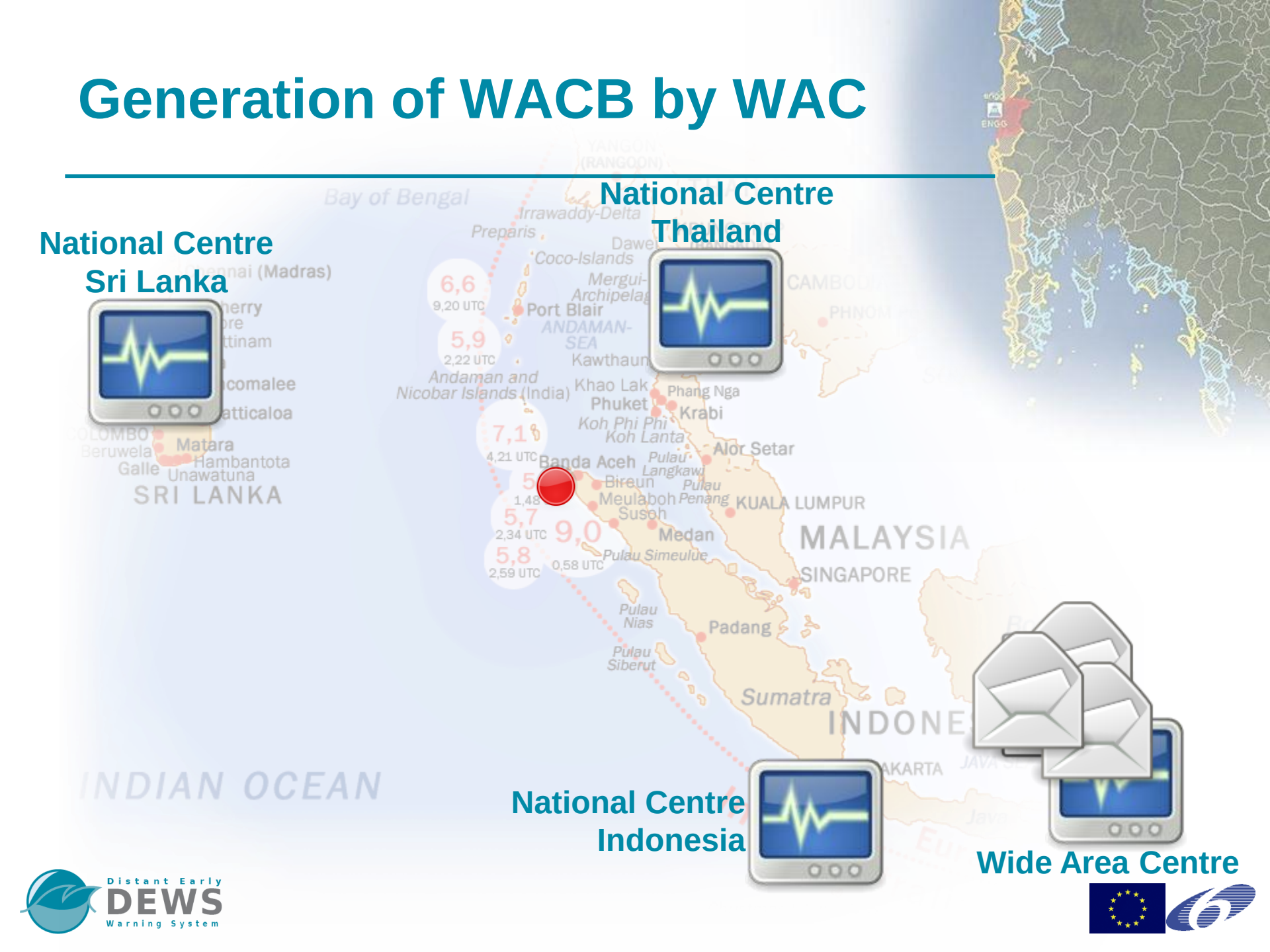


Forwarding of SMB to NCs

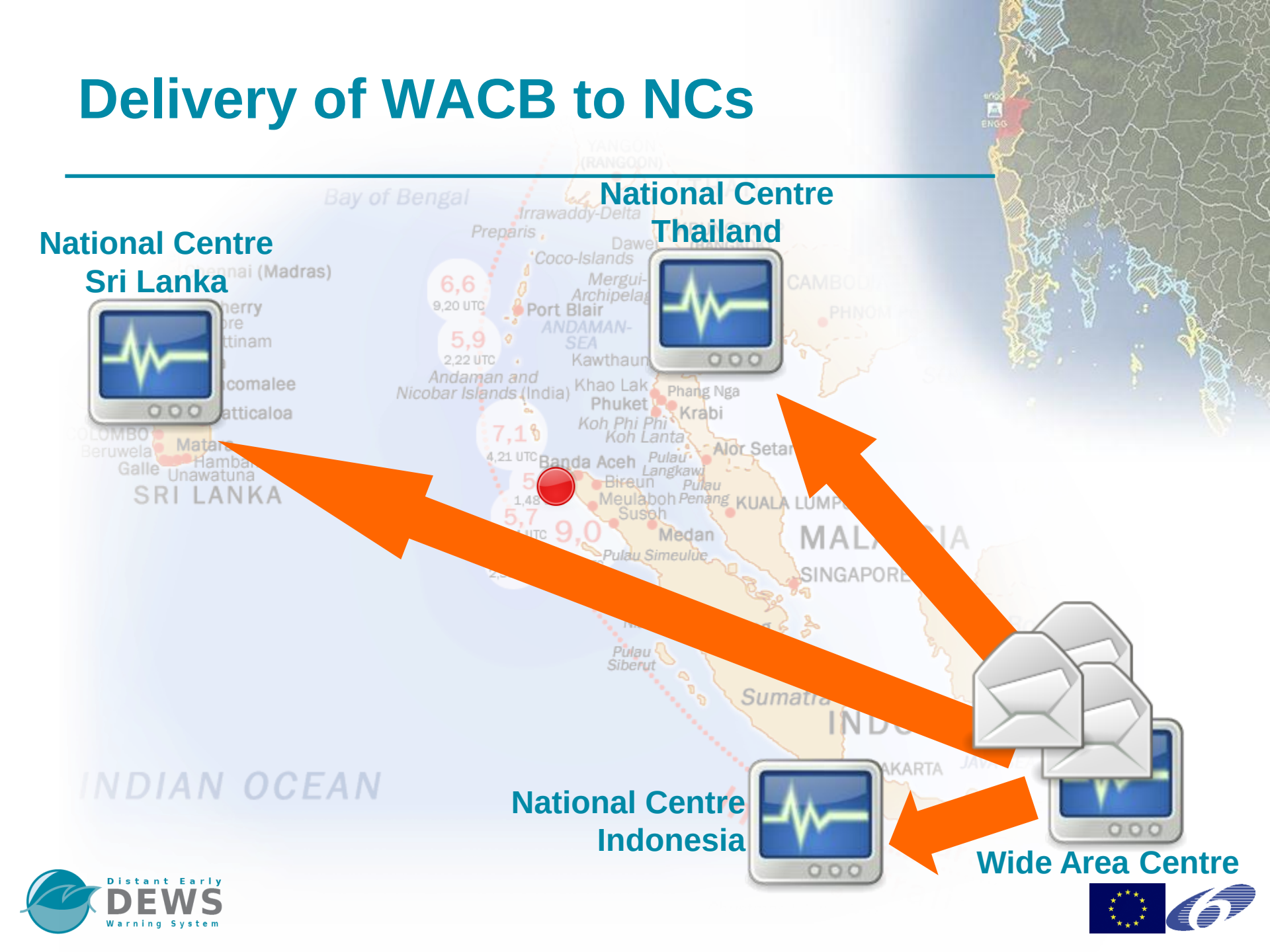


Distant Early DEWS Warning System

Generation of WACB by WAC



Delivery of WACB to NCs



Dissemination on National Level

Distant Early DEWS Warning System

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

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