



**C**ollaborative, **C**omplex and **C**ritical  
Decision-Support in **E**volving **C**risis

## **TRIDEC Tsunami Early Warning System in international tsunami warning and communication exercise**

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Collaborative, Complex, and Critical Decision-Support in Evolving Crises

TRIDEC

- Focuses on new technologies for real-time intelligent information management in collaborative, complex critical decision processes
- Important application field of the technology developed is management of natural crises, i.e. tsunamis
- Based on the development of and experiences in the German Indonesian Tsunami Early Warning System (GITEWS) and the Distant Early Warning System (DEWS)
- In TRIDEC new developments extend the existing platform for both, sensor integration and warning dissemination
- Building distributed tsunami warning systems for transnational deployment based on a component-based technology framework

**Collaborative, Complex and Critical Decision Support in Evolving Crises**

**Acronym:** TRIDEC

**Reference:** 258723

**Start Date:** 01.09.2010

**End Date:** 31.08.2013

**Duration:** 36 months

**Costs:** 8.9 million €

**EU Funding Contribution:** 6.79 million €

**Contract Type:** Collaborative Project - IP

**Coordinator:**

*Prof. Joachim Wächter, Centre for GeoInformation Technology, Helmholtz Centre Potsdam GFZ - German Research Centre for Geosciences (Germany)*

**Partners:**

*University of Southampton, IT Innovation Centre (United Kingdom)*

*Queen Mary and Westfield College, University of London - Department of Electronic Engineering (United Kingdom)*

*Joanneum Research Forschungsgesellschaft GmbH - DIGITAL - Institute of Information and Communication Technologies (Austria)*

*IOSB - Fraunhofer-Institute of Optronics, System Technologies and Image Exploitation (Germany)*

*TDE Thonhauser Data Engineering GmbH (Austria)*

*Q-Sphere Limited (United Kingdom)*

*Instituto Portuguese do Mar e Atmosfera – IPMA (Portugal)*

*Alma Mater Studiorum- Universita di Bologna - Department of Physics (Italy)*

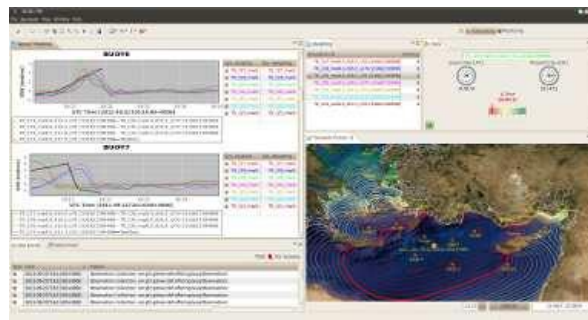
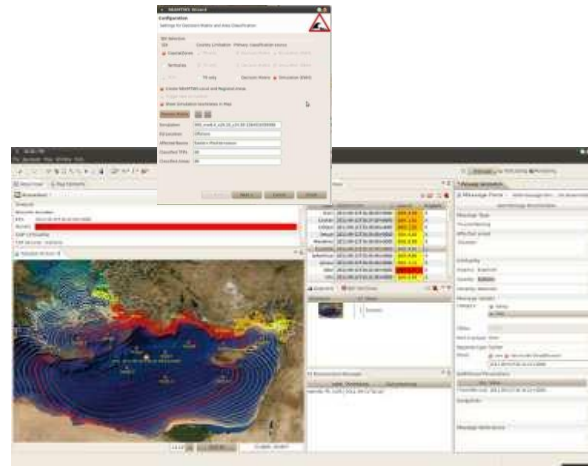
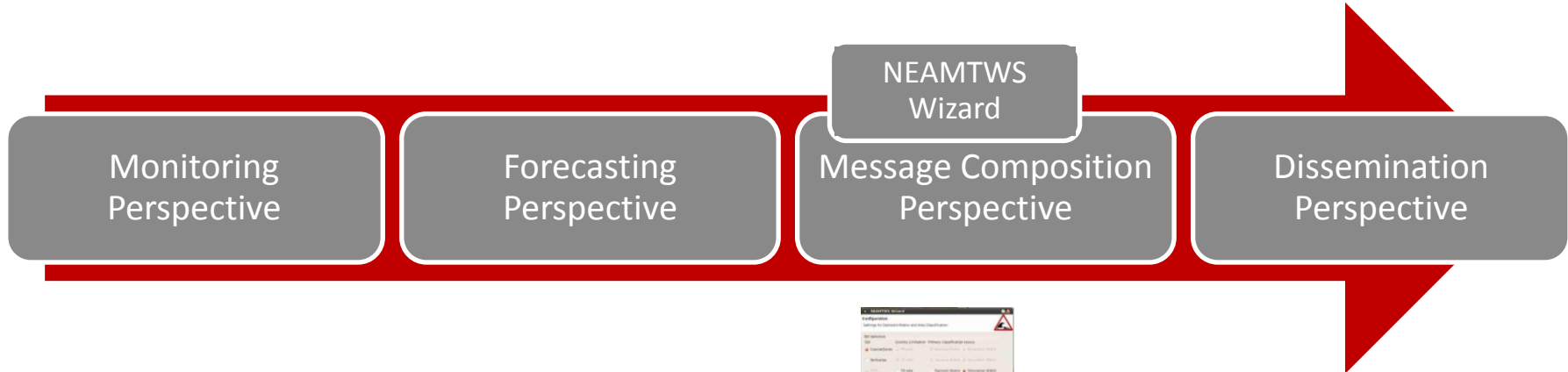
*Bogazici Universitesi - Kandilli Observatory and Earthquake Research Institute (Turkey)*



Command and Control User Interface

CCUI

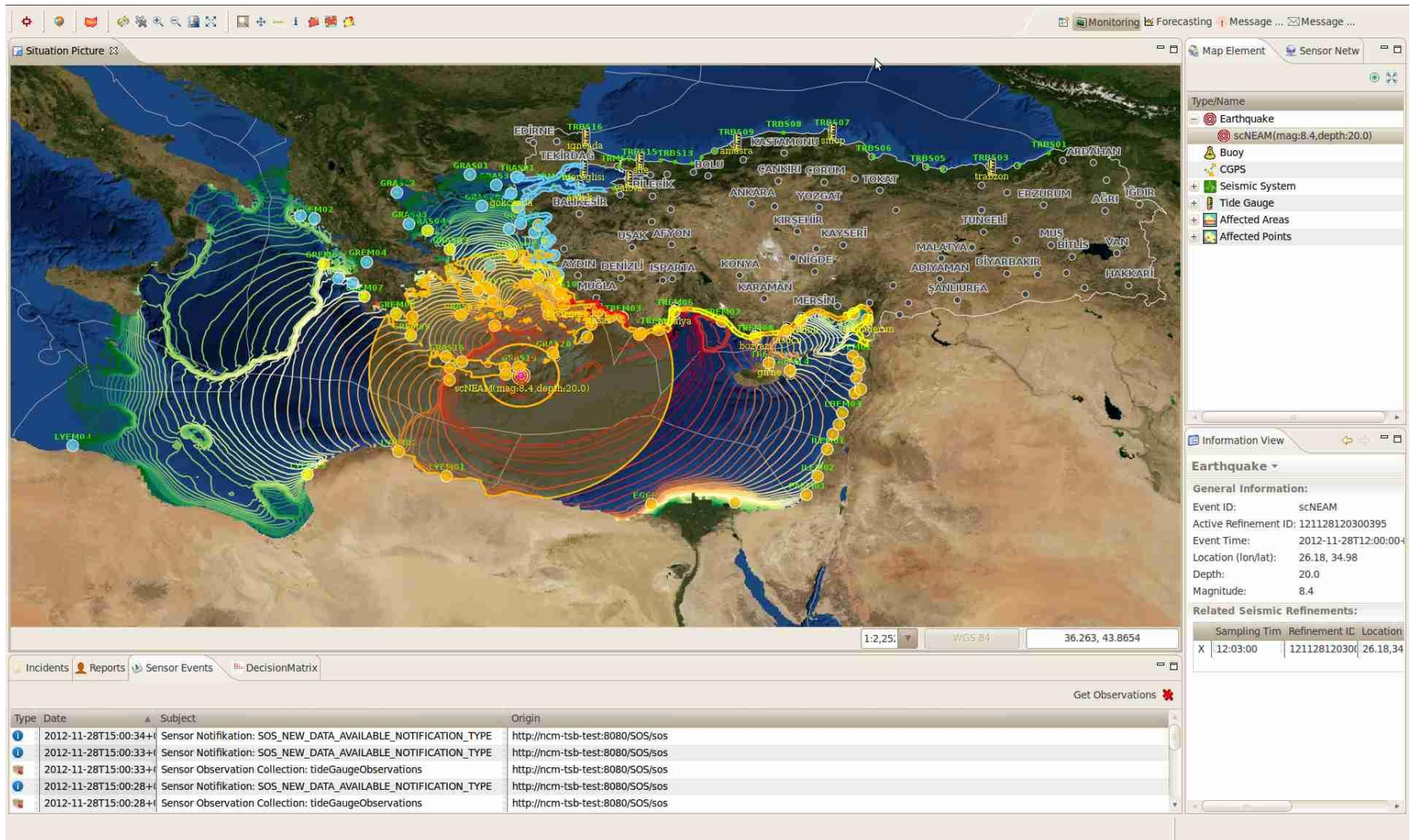
# CCUI Workflow



# CCUI Workflow cont'd

- “Perspectives” provide functionality associated with one task of the workflow
  - Monitoring Perspective is used to track running events
  - Forecasting Perspective is used to analyse simulations
  - Message Composition Perspective is used to prepare and send warning messages
  - Dissemination Perspective is used to observe all generated and sent warning messages
- Perspectives are supported by wizards
  - NEAMTWS Wizard accelerates the operator’s work with automatic and relevant operations to
    - Asses estimated impact based on pre-computed simulations,
    - Identify and classify affected areas and points of interest, and
    - Generate and release warning messages

# CCUI - Monitoring Perspective



# CCUI - NEAMTWS Wizard

The screenshot displays the NEAMTWS Wizard configuration window over a map of the Eastern Mediterranean. The map shows simulation isochrones for an earthquake event. The configuration dialog box is open, showing the following settings:

- Configuration:** Settings for Decision Matrix and Area Classification.
- SDI Selection:** SDI (Country Limitation: Primary classification source).
- CoastalZones:**  TR only,  Decision Matrix,  Simulation (EWH).
- Territories:**  TR only,  Decision Matrix,  Simulation (EWH).
- TFPs:**  TR only,  Decision Matrix,  Simulation (EWH).
- Create NEAMTWS Local and Regional Areas:**
- Trigger new simulation:**
- Show Simulation Isochrones in Map:**
- Process Matrix:**
- Simulation:** 999\_mw8.4\_x26.18\_y34.98:1364916599998
- EQ Location:** Offshore
- Affected Basins:** Eastern Mediterranean
- Classified TFPs:** 88
- Classified Areas:** 86

Below the map, the Decision Matrix is displayed for a Depth of 20.0 and Magnitude of 8.4:

Depth	Location	Magnitude	Tsunami Potential	Local	Regional	Ocean-Wide
<100km	Offshore or D<100km	$5.5 \leq M < 6.5$	Weak local	Advisory	Information	Information
		$6.5 \leq M < 7.0$	Destructive Local	Advisory	Information	Information
	Offshore or D<100km	$7.0 \leq M < 7.5$	Destructive Local	Watch	Advisory	Information
		$7.5 \leq M < 7.9$	Destructive Regional	Watch	Watch	Advisory
$\geq 100km$	-	$7.9 \leq M$	Destructive Oceanwide	Watch	Watch	Watch
		$5.5 \leq M$	No	Information	Information	Information
-	-	-	No	None	None	None

Affected Basins:

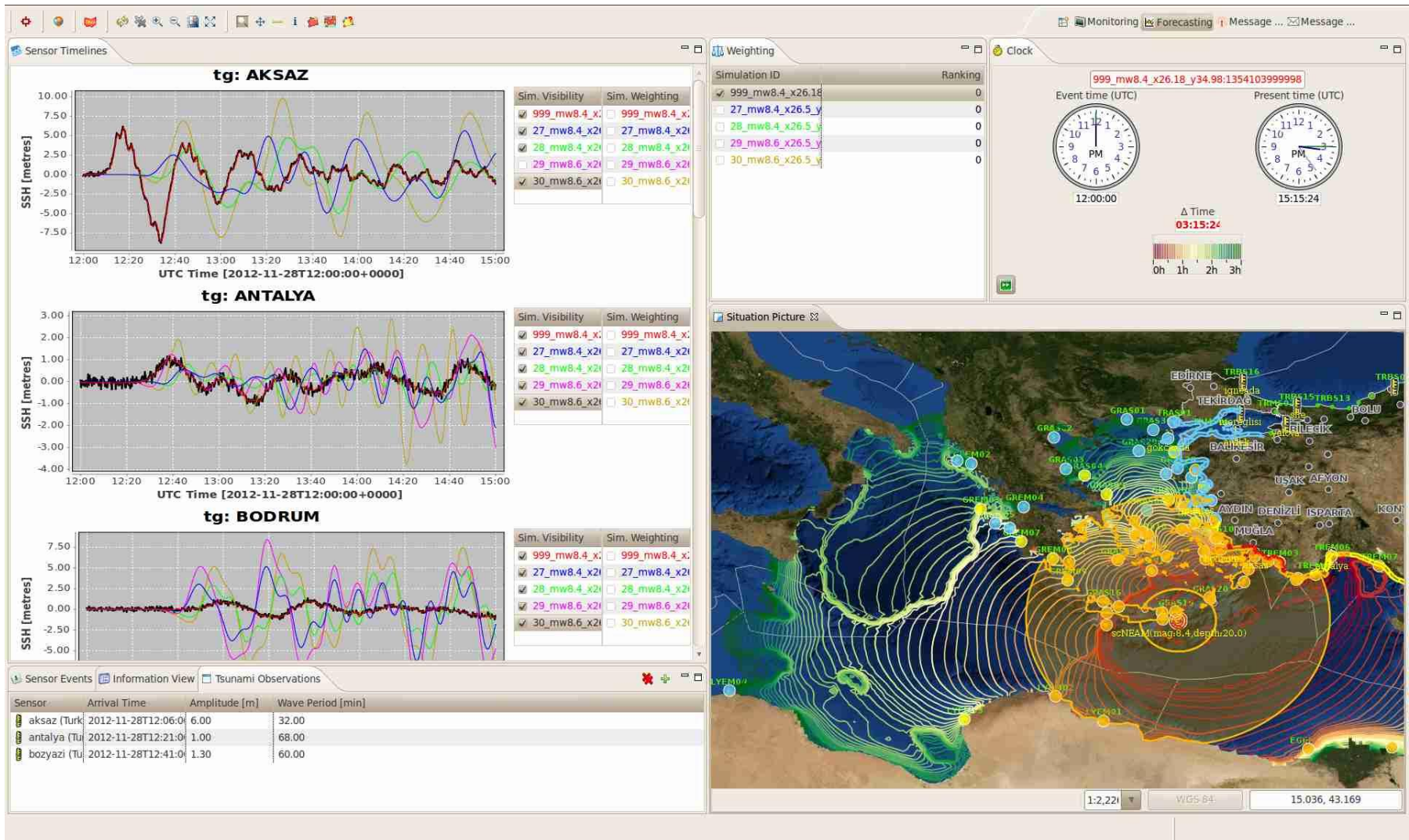
Basin Name	EQ Distance
Eastern Mediterranean	EQ within basin

Tsunami Forecast Prints (TFP):

Retrieving geo codes f...ected area.



# CCUI - Forecasting Perspective



# CCUI - Dissemination Perspective

The screenshot displays the CCUI interface for disseminating a tsunami exercise message. The main window shows the message content, which includes a review section, address information, a headline, and a detailed description of the tsunami exercise. The description mentions a tsunami exercise message number 004, issued as advice to government agencies, and provides preliminary parameters for an earthquake that occurred on November 28, 2012, at 12:02Z. The earthquake's origin time, coordinates, depth, and location in the Eastern Mediterranean Sea are listed. The magnitude is 8.4. The message also includes an evaluation of the tsunami watch, stating that sea level readings indicate a tsunami was generated, but no major waves are expected. It advises that if no major waves are observed for two hours after the estimated time of arrival, local authorities can assume the threat is passed.

The interface also shows a list of dissemination channels on the left, including various email addresses, phone numbers, and social media handles. The right side of the interface displays global dissemination statistics and a table of disseminated messages. The global statistics show 129 successful messages, 1 failed message, and 0 pending messages, for a total of 130 messages. The TWITTER channel statistics show 17 successful messages, 1 failed message, and 0 pending messages, for a total of 18 messages. A table of disseminated messages is also visible, listing UTM IDs, DSM IDs, dissemination times, and explicit addresses.

Channel Type	UTM ID	DSM ID	Dissemination Time	Explicit Ad
EMAIL	MRM2012-11-28T1	DSM0	2012-11-28T12:10:51	
	MRM2012-11-28T1	DSM0	2012-11-28T12:10:54	
	MRM2012-11-28T1	DSM0	2012-11-28T12:11:04	
	MRM2012-11-28T1	DSM0	2012-11-28T12:11:00	
	MRM2012-11-28T1	DSM0	2012-11-28T12:10:57	
	UTM13541042496	DSM0	2012-11-28T12:04:10	
	UTM13541042510	DSM0	2012-11-28T12:04:11	
	UTM13541052384	DSM0	2012-11-28T12:20:38	
	MRM2012-11-28T1	DSM0	2012-11-28T12:25:50	
	MRM2012-11-28T1	DSM0	2012-11-28T12:25:59	

UTM ID	DSM ID	Dissemination Time	Explicit Address
UTM135410424265	DSM0	2012-11-28T12:04:03	
UTM135410424266	DSM0	2012-11-28T12:04:03	
MRM2012-11-28T1	DSM0	2012-11-28T12:10:21	
UTM135410424953	DSM0	2012-11-28T12:04:09	
UTM135410424954	DSM0	2012-11-28T12:04:09	
MRM2012-11-28T1	DSM0	2012-11-28T12:25:30	
UTM135410524556	DSM0	2012-11-28T12:20:48	
UTM135410524695	DSM0	2012-11-28T12:20:49	
UTM135410745245	DSM0	2012-11-28T12:57:32	
MRM2012-11-28T1	DSM0	2012-11-28T13:02:25	

# CCUI - Message Composition Perspective

**Information View**

**Köycegiz**

General

Name/ID: Köycegiz  
ETA: 2012-11-28T12:00:01+0000  
Hazard: **SSH: 7.29**

CAP Criticality

CAP Severity: Severe  
CAP Urgency: Immediate  
CAP Certainty: Likely

**Situation Picture**

**Affected Areas**

Label	ETA (UTC)	Severity	Hazard
Dalaman	2012-11-28	Extreme	SSH: 4.75
Mugla Merkez	2012-11-28	Extreme	SSH: 4.63
Bodrum	2012-11-28	Extreme	SSH: 4.05
Marmaris	2012-11-28	Extreme	SSH: 5.79
Ortaca	2012-11-28	Extreme	SSH: 4.27
Fethiye	2012-11-28	Extreme	SSH: 3.37
Köycegiz	2012-11-28	Extreme	SSH: 7.29
Ula	2012-11-28	Extreme	SSH: 5.47
Gömeç	2012-11-28	Minor	SSH: 0.12
Ayvalik	2012-11-28	Minor	SSH: 0.20
Knak	2012-11-28	Minor	SSH: 0.02

**Message Generation**

Message Form - Valid message form ... for dissemination.

Start Message Dissemination

Message Type

NEAMTWS-TR-End

Affected areas and points

ADANA YUMURTALIK  
AGIOS NIKOLAOS  
ALEXANDRIA  
AMORGOS KATAPOLA  
ANDROS

Additional Parameters

Key	Value

Snapshots

2012-11-28T14:58:13+0000

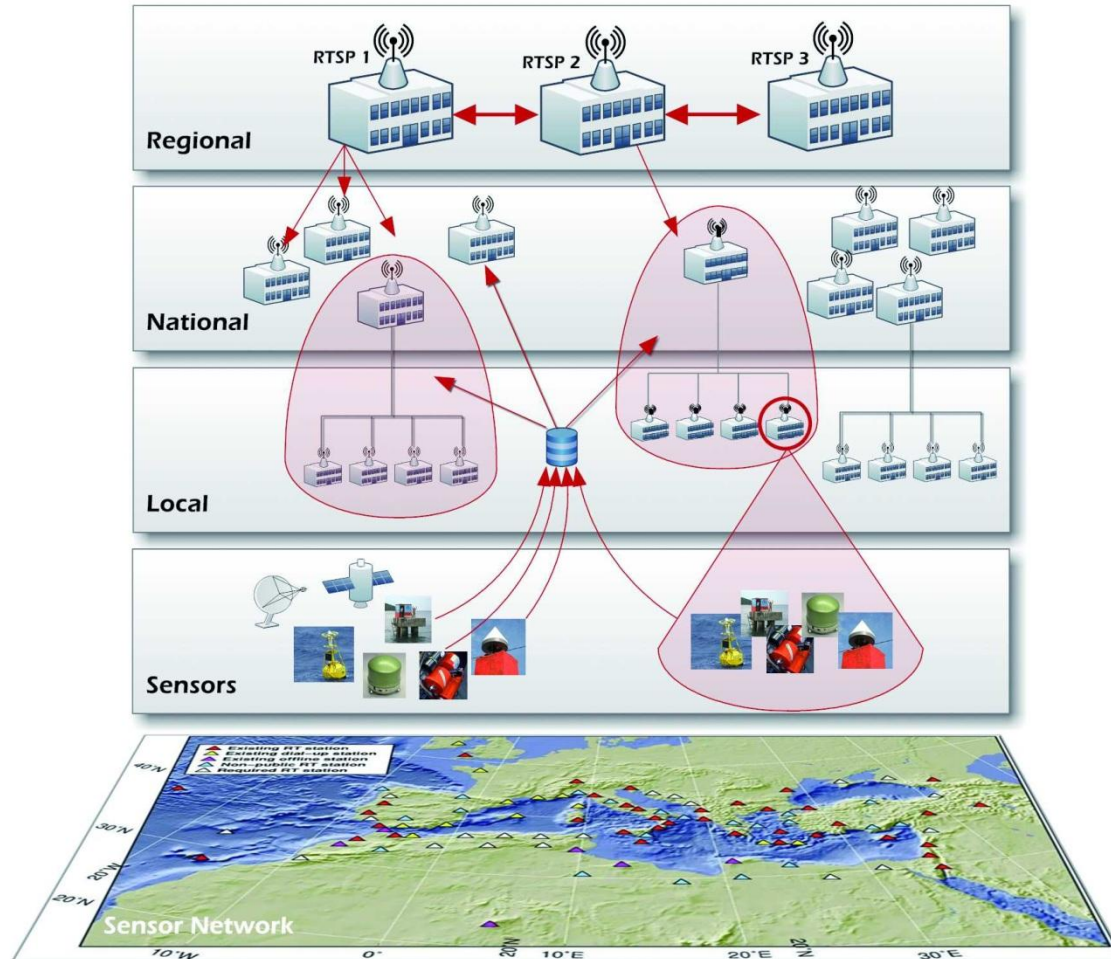
Message References

urn:org:fossilab:centre:NC:TR:KOERI\_CAP1  
urn:org:fossilab:centre:NC:TR:KOERI\_CAP2  
urn:org:fossilab:centre:NC:TR:KOERI\_CAP3

**Generated CCUI Messages**

Thumbnail	ID	Name
	1	2012-11-28T12:03:30+0000
	2	2012-11-28T12:20:10+0000
	3	2012-11-28T12:57:04+0000
	4	2012-11-28T14:58:13+0000

# Centre-to-centre communication



# CCUI - Centre-to-centre communication

The screenshot displays the CCUI (Centre-to-centre communication) software interface. The main window is divided into several panels:

- Information View / Map Elements:** A panel at the top left, currently empty.
- Affected Areas / Affected Points:** A table listing affected areas and points. The visible data is as follows:

Label	ETA (UTC)	Severity	Hazard
a;Moita;Aveiro		Severe	
EAMTWS-Local		Severe	
- Situation Picture:** A map of Europe showing seismic hazard contours in various colors (red, orange, yellow, green). A specific area is highlighted with a yellow circle and labeled "scNEAM (mag:8.6, d:1hr35,0)".
- SDI: CoastalZones / SDI: Territories / SDI: TFPs:** A table listing SDI data. The visible data is as follows:

Name	Geocode
Turkey	TR
- Message Generation:** A panel on the right side, showing a "Message Form" with "3 warnings detected". It includes fields for "Message Type", "Affected areas and points", "Additional Parameters", "Snapshots", and "Message References".
- Generated CCUI Message / Snapshots / WAC Bulletins:** A table at the bottom right showing generated messages. The visible data is as follows:

Label	Timestamp	Are
centre:NC:PT:WACB@2012-11-27T08:19:52+0000	2012-11-27T08:19:52+0000	77
centre:NC:PT:WACB@2012-11-27T08:36:38+0000	2012-11-27T08:36:38+0000	77
centre:NC:PT:WACB@2012-11-27T08:53:43+0000	2012-11-27T08:53:43+0000	77
centre:NC:PT:WACB@2012-11-27T09:15:39+0000	2012-11-27T09:15:39+0000	77
centre:NC:PT:WACB@2012-11-27T10:17:47+0000	2012-11-27T10:17:47+0000	77
centre:NC:PT:WACB@2012-11-27T11:13:41+0000	2012-11-27T11:13:41+0000	77
centre:NC:PT:WACB@2012-11-27T11:15:28+0000	2012-11-27T11:15:28+0000	76

The interface also shows a scale of 1:9,600, a coordinate system of WGS 84, and a location of -36.8971, 14.5432. A status bar at the bottom right indicates "NCM Interlink PT".

→ Received at KOERI from IPMA

# CCUI - Centre-to-centre communication

The screenshot displays the CCUI (Centre-to-centre communication) interface. The main window is divided into several sections:

- Information View:** Shows the sender information: `um.org:fossilab:centre:NC:TR:WACB@2012-11-28T12:21:22+0000`. It also displays the dispatch time (2012-11-28T12:21:22+0000) and the affected areas (90).
- Affected Areas:** A table listing various locations with their respective hazard levels, severity, urgency, and certainty. The table includes columns for Name, ETA (At in [HH:MM]), Hazard, Severity, Urgency, Certainty, and ID.
- Situation Picture:** A satellite map of the Mediterranean region showing the affected areas as yellow and blue circles. A central point is marked with a red circle and labeled "so:HEAM:magnitude:20.0".
- Affected Areas List:** A detailed list of affected areas with columns for Label, ETA (At in [HH:MM]), Severity, and Hazard. The list includes locations such as IERAPETRA, AYDIN DIDIM, ANTALYA ALANYA, TYRE, ANTALYA (M), MIXOS CHORA, GAZIMAGUSA (M), IKARIA AGIOS KIRIKOS, CHANIA, JABLEH, SIDON, SIROS ERMOLPOLI, BANIYAS, LATAKIA, TARTUS, TRIPOLI, GIRNE (M), GAYDOS KARAVE, MONEMVASIA, CHORA SFAKION, TINOS, BEIRUT, ANDROS, AYDIN KUSADASI, MILOS ADAMAS, EYIA KIMI, GITHIEON, KITHERA KAPSALI, CHIOS VOLLISIOS, CEPHALONNIA ARGOSTOLI, KIPARISSIA, CANAKKALE BOZCAADA, SKIATHOS, BENGHAZI, SAMOS KARLOWASI, IZMIR ALLAGA, KALOSGEROI, KATAKOLLO, VOLOS, LESVOS SIGRI, and I PSEWS MITTI INI.
- Message Generation:** A panel for creating and sending messages. It includes a "Message Form" section with a "Start Message Dissemination" button, a "Message Type" dropdown, and a "Message References" section.
- Additional Parameters:** A table for defining key-value pairs for the message.
- Snapshots:** A section for capturing and managing snapshots of the current situation.
- Generated CCUI Messages:** A table showing the generated messages, including their labels, timestamps, and areas.

→ Received at IPMA from KOERI

A Tsunami Warning and Communication Exercise for the North-eastern Atlantic, the Mediterranean, and Connected Seas Region

**NEAMWAVE12**

# NEAMWave12

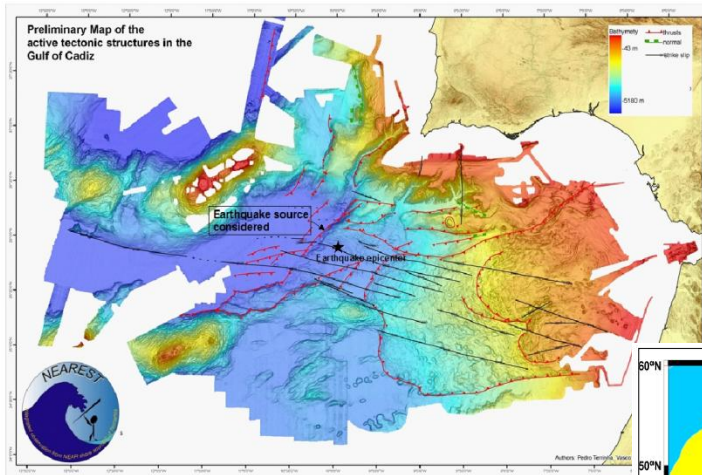
- International tsunami response exercise
  - UNESCO-IOC ICG/NEAMTWS
  - On November 27-28, 2012
  - Participants have been countries in the North-eastern Atlantic, the Mediterranean and Connected Seas (NEAM) region
    - Kandilli Observatory and Earthquake Research Institute (KOERI), Istanbul, Turkey
    - Portuguese Institute for the Sea and Atmosphere (IPMA), Lisbon, Portugal
- Simulated widespread Tsunami Watch situations throughout the NEAM region
- Tsunami warning chain tested to a full scale for the first time with different systems
  - TRIDEC system validated in this exercise among others by KOERI and IPMA



# TRIDEC in NEAMWave12

- Participating in 2 of the 4 scenarios
  - Morning of November 27, 2012, first scenario initiated and played by the Portuguese Institute for the Sea and Atmosphere (IPMA)
    - Based on the devastating 1755 Lisbon event with the assumption that the event represents the worst-case tsunami scenario impacting the NE Atlantic region
  - Afternoon of November 28, 2012, fourth scenario was performed by Kandilli Observatory and Earthquake Research Institute (KOERI)
    - Based on a Mw=8.4 worst-case interpretation of the 8 August 1303 Crete and Dodecanese Islands earthquake resulting in destructive inundation in the Eastern Mediterranean

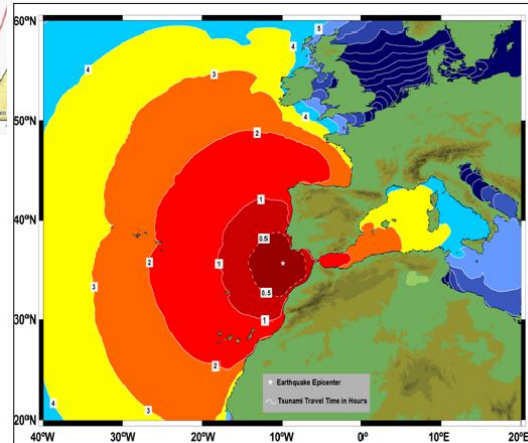
# NEAMWave12 – IPMA Scenario



### Earthquake Fault Parameters

Epicerter Location (Fault center)	Longitude : -9.890 Latitude : 35.574
Dimensions	Length : 170 km Width : 90 km
Slip	10 m
Strike	42.1°
Dip	35°
Rake	90°
Depth to the top of the fault	5 km
Shear modulus	6.5 e+10Pa
Moment magnitude	8.6

Simulated tsunami travel time to some coasts of NE Atlantic Region:



- 24 min to southwestern coasts of Portugal;
- 54 min to southwestern coasts of Spain;
- About 48 min to Atlantic coasts of Morocco;
- About 1h to the coast of Madeira, Portugal;
- About 1.5h to Alboran sea coasts (North of Morocco and South of Spain)
- About 2.25h to the coast of Azores, Portugal;
- About 2.6h to the Atlantic coast of France;
- About 3.5h to southern coast of Ireland;
- More than 4h to United Kingdom coasts;

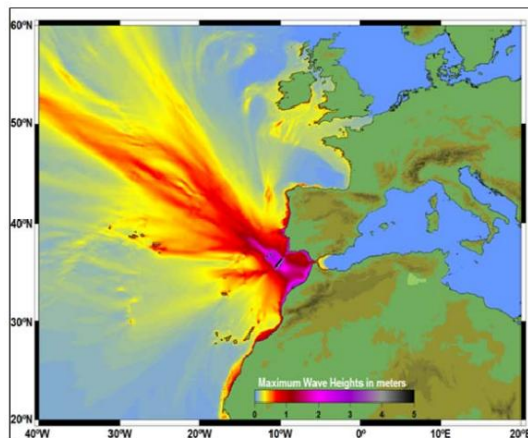


Figure 4: Maximum wave height distribution

Coast	Maximum wave heights at 50m depth, from numerical modeling	Wave heights at coast (1m depth) from Green's law
Sagres, Portugal	3.561m	9.469m
Madeira, Portugal	1.036m	2.754m
Azores, Portugal	1.763m	4.688m
Cadiz, Spain	2.119m	5.634m
Alboran coasts	South of Spain	0.423m
	North of Morocco	0.542
Canary Island	0.319m	0.848m
Casablanca, Morocco	3.070m	8.163m
La Rochelle, France	0.230m	0.611m
Saundersfoot, United Kingdom	0.476m	1.265m

Table 2: Maximum wave heights computed at the selected locations.

# NEAMWave12 – KOERI Scenario

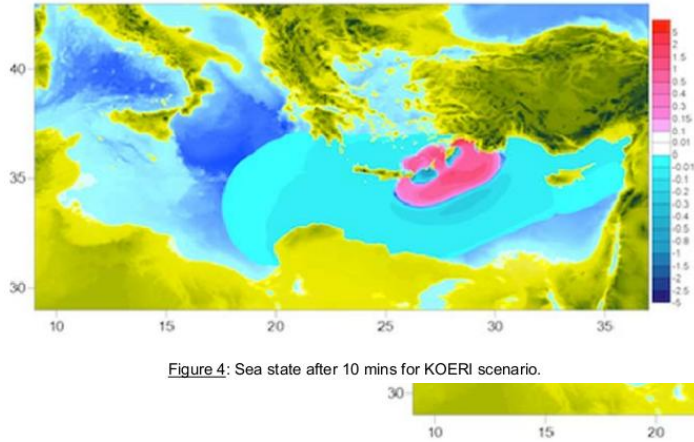


Figure 4: Sea state after 10 mins for KOERI scenario.

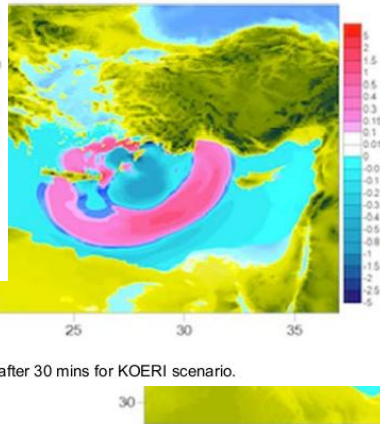


Figure 5: Sea states after 30 mins for KOERI scenario.

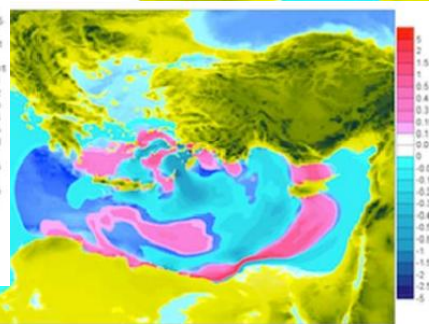


Figure 6: Sea state after 60 mins for KOERI scenario.

r 90 mins for KOERI scenario.

Lat	Lon	Mw	Depth	Displacement	Strike	Dip	Rake
34.98°N	26.18°E	8.4	20 km	8 m	55°	30°	110°

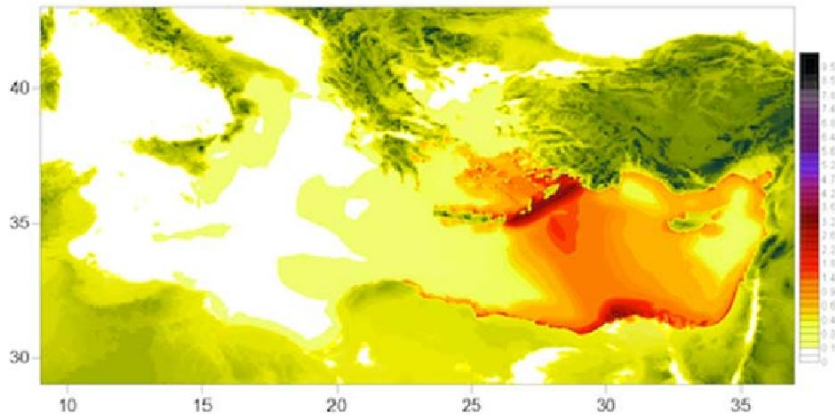


Figure 2: Maximum wave height distribution for KOERI Scenario

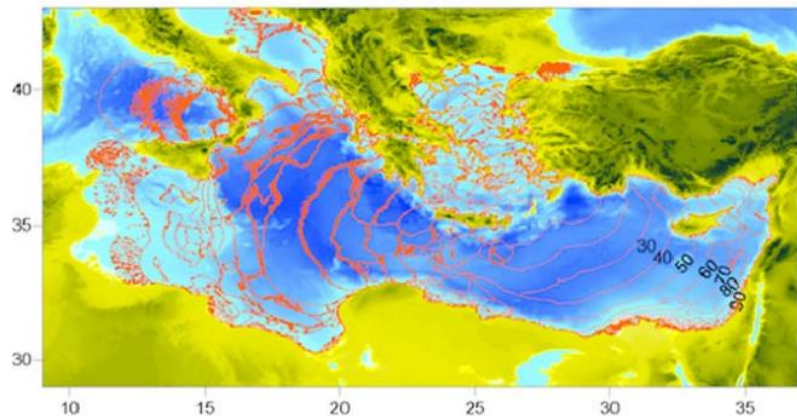


Figure 3: Travel time isochrones for KOERI Scenario

# Portuguese Phase A

- Sense the initial virtual earthquake and sea level data successively
- Assess and verify the occurrence of a tsunami based on the virtual data sensed
- Generate pre-defined warning messages with customization
  - Based on event's specific parameters and analysis results
- Disseminate generated messages to
  - ICG/NEAMTWS community via GTS, and Email
  - Portuguese CPA via email, and
  - Other registered message recipients via Fax, Email, and SMS
- Exercise direct center-to-center communication with TRIDEDEC system deployed at KOERI

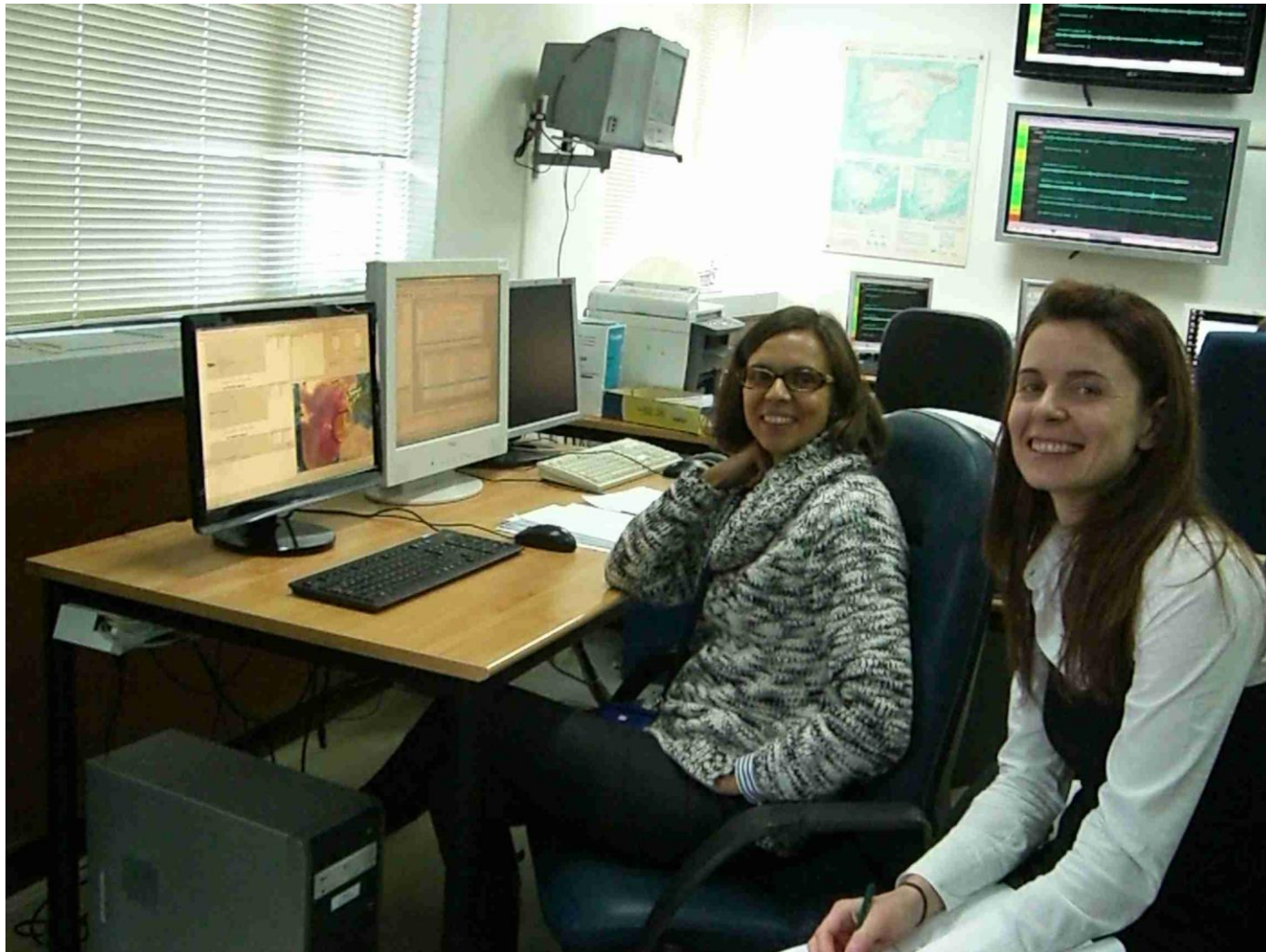
# Turkish Extended Phase A

- Sense the initial virtual earthquake and sea level data successively
- Assess and verify the occurrence of a tsunami based on the virtual data sensed
- Make use of unconventional, human sensors by integrating artificial eye-witness reports
  - Sent and geographically referenced by Android app Geohazard, and
  - Collected and managed by the crowd-mapping platform Ushahidi
- Generate user-tailored warning messages with customization
  - Based on recipients' vocabulary, language, subscribed region, criticality, and channel
  - Based on event's specific parameters and analysis results
- Disseminate generated messages to
  - Turkish CPA via email, and
  - Other registered message recipients via FTP (imitating GTS), Fax, Email SMS, twitter clone StatusNet, WordPress blog
- Exercise direct center-to-center communication with TRIDEDEC system deployed at IPMA

Master Schedule of Events  
Portuguese Phase A, NEAMWave12

# PORTUGUESE MSEL

# MSEL PT

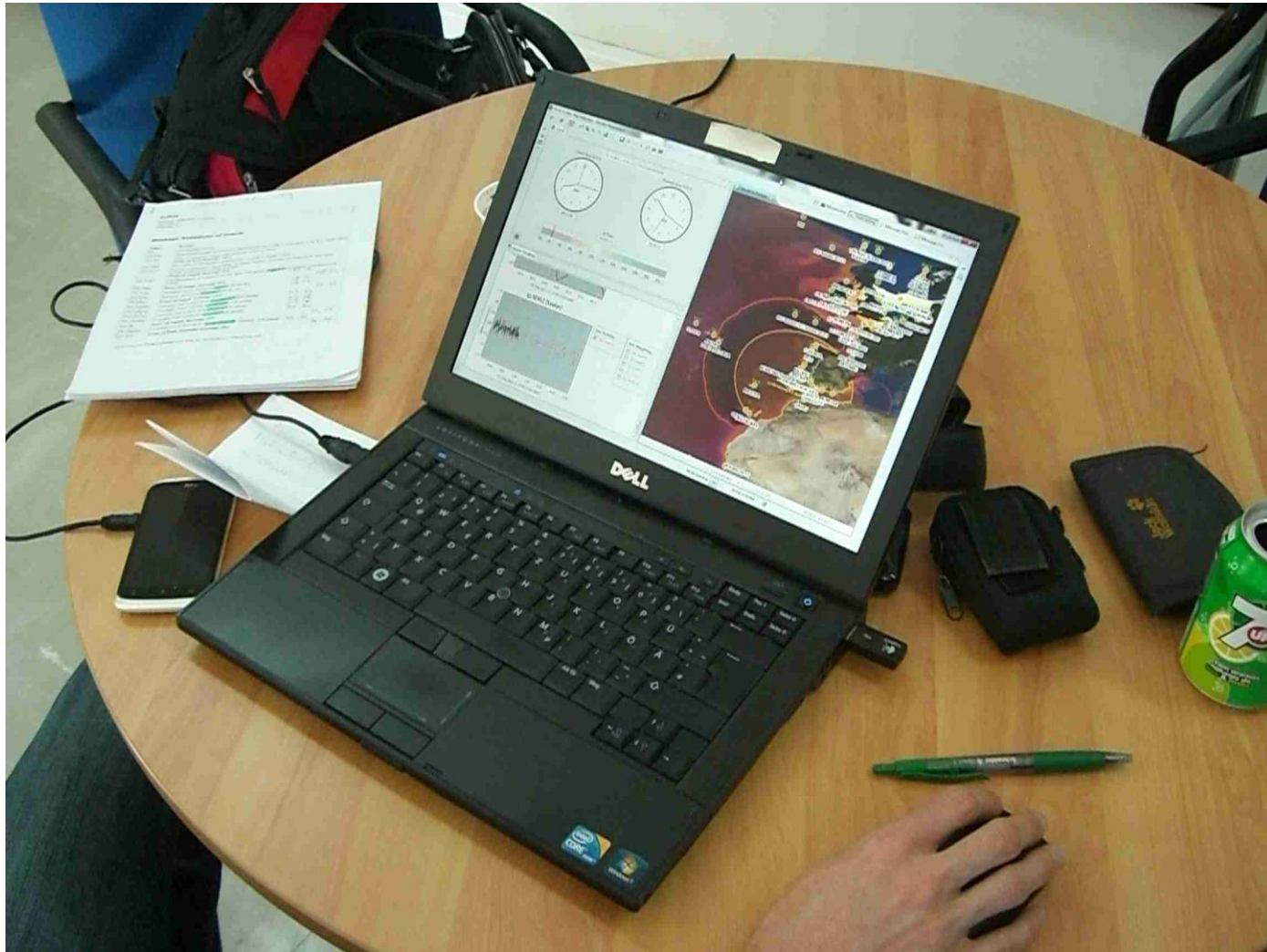


# MSEL PT cont'd

	Time *	Event
<b>EQ</b> →	T0	Earthquake occurs
	T3min	Initial earthquake parameters (hypocenter and MW) computed with magnitude 8.1 and depth 28km
<b>msg#1</b> →	T4min	First evaluation of possible tsunami impact (DM); Issue of first message (#1)
<b>EQ refinement</b> →	T20min	Revision of earthquake parameters with magnitude 8.6 and depth 35km
<b>msg#2</b> →	T21min	Second evaluation of possible tsunami impact; Increase in magnitude but same levels of alert (according to decision matrix); Issue of supplement Message (#2)
<b>Sea level</b> →	T33min	Confirmation of tsunami on the first tide-gauge, Lagos, Portuguese mainland SW coast
<b>msg#3</b> →	T38min	Issue of supplement message (#3)
	T41min	Tsunami wave arrival to <u>Sines</u> tide-gauge
<b>Sea level</b> →	T43min	Tsunami arrival to <u>Cascais</u> tide-gauge
<b>msg#4</b> →	T1h	Issue of supplement message (#4)
	T1h04min	Tsunami wave arrival to Casablanca tide-gauge
	T1h07min	Tsunami wave arrival to Gibraltar tide-gauge
	T1h11min	Tsunami wave arrival to Huelva tide-gauge
<b>Sea level</b> →	T1h49min	Tsunami wave arrival to Ferrol tide-gauge
<b>msg#5</b> →	T2h	Issue of supplement message (#5)
<b>Sea level</b> →	T2h05min	Tsunami wave arrival to Ponta Delgada, Azores, tide-gauge
<b>msg#6</b> →	T3h	Issue of End Tsunami message (#6)



# MSEL PT - Centre-to-centre communication



# MSEL PT - C2C cont'd

**Share all sensor measurements** →

**WAC bulletin#1** →

**WAC bulletin#2** →

**WAC bulletin#3** →

**WAC bulletin#4** →

**WAC bulletin#5** →

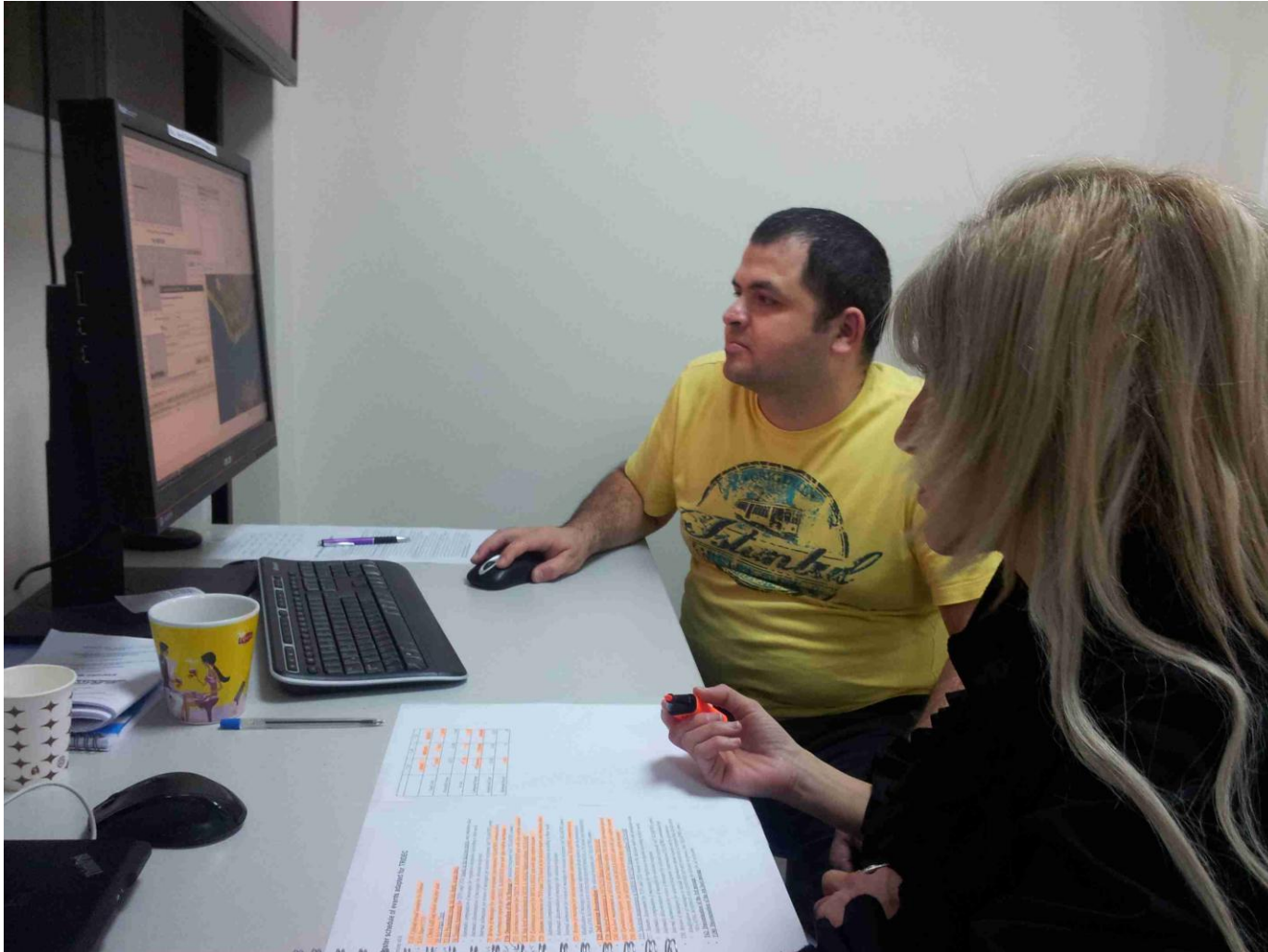
**WAC bulletin#6** →

Time *	Event **
T0	Earthquake occurs
T3min	Initial earthquake parameters (hypocenter and Mw) computed with magnitude 8.1 and depth 28km <i>including automatic dissemination of sensor measurement bulletin with earthquake parameters</i>
T4min	First evaluation of possible tsunami impact (DM); Issue of first message (#1) <i>including automatic dissemination of the 1st WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>
T20min	Revision of earthquake parameters with magnitude 8.6 and depth 35km <i>including automatic dissemination of sensor measurement bulletin with updated earthquake parameters</i>
T21min	Second evaluation of possible tsunami impact; Increase in magnitude but same levels of alert (according to decision matrix); Issue of supplement Message (#2) <i>including automatic dissemination of the 2nd WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>
T38min	Issue of supplement message (#3) <i>including automatic dissemination of the 3rd WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>
T1h	Issue of supplement message (#4) <i>including automatic dissemination of the 4th WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>
T2h	Issue of supplement message (#5) <i>including automatic dissemination of the 5th WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>
T3h	Issue of End Tsunami message (#6) <i>including automatic dissemination of the 6th WAC bulletin while tsunami assessment for TFPs based on the decision matrix</i>

Master Schedule of Events  
Turkish Extended Phase A, NEAMWave12

## TURKISH MSEL

# MSEL TR cont'd



# MSEL TR - 1<sup>st</sup> message

**EQ** →

**msg#1-A** →

**Review msg#1-M** →

**Release msg#1-M** →

Time *	Event **
T0	Earthquake origin time
T3min	Earthquake parameters (magnitude, latitude, longitude, depth, origin time)
T4min	<p><i>Tsunami Assessment for Tsunami Forecast Points (TFP) and Coastal Forecast Zones (CFZ) based on the decision matrix and simulation data including:</i></p> <ul style="list-style-type: none"> <li>- <i>Automatic computation of messages for registered recipients according to their needs</i></li> <li>- <i>Automatic dissemination of messages for selected recipients</i></li> <li>- <i>Internal submission for review of messages for selected recipients (for simulated international NEAMTWS Phase A communication)</i></li> </ul>
T5min	<i>Review of messages for selected recipients (for simulated international NEAMTWS Phase A communication)</i>
T8min	<i>Eyewitnesses reports for CRETE, KARPATOS sent with App confirm earthquake</i>
T10min	<i>Dissemination of the 1st Message for selected recipients (for simulated international NEAMTWS Phase A communication)</i>

# MSEL TR - 2<sup>nd</sup> message

	<i>T11min</i>	<i>Eyewitnesses reports for CRETE, KARPATOS, RHODES sent with App confirm tsunami</i>
<b>Sea level</b> →	<i>T18min</i>	<i>Sea-level measurement at MUGLA AKSAZ Station confirms tsunami</i>
<b>Eyewitness report</b> →	<i>T19min</i>	<i>Eyewitnesses reports for MUGLA AKSAZ sent with App confirm tsunami</i>
<b>msg#2-A</b> →	<i>T20min</i>	<i>Tsunami Assessment for TFPs and CFZs based on the decision matrix and simulation data including: - Automatic computation of messages for registered recipients according to their needs - Automatic dissemination of messages for selected recipients - Internal submission for review of messages for selected recipients (for simulated international NEAMTWS Phase A communication)</i>
<b>Review &amp; modify msg#2-M</b> →	<i>T21min</i>	<i>Review of messages for selected recipients (for simulated international NEAMTWS Phase A communication) including: - Modification of messages to include information about reports sent by eyewitnesses "SEA LEVEL READINGS AND EYEWITNESS REPORTS INDICATE A TSUNAMI WAS GENERATED."</i>
<b>Release msg#2-M</b> →	<i>T25min</i>	<i>2nd message dissemination for selected recipients (for simulated international NEAMTWS Phase A communication)</i>

# MSEL TR – 3<sup>rd</sup> message

Sea level



T39min	Sea-level measurement at ANTALYA station re-confirms tsunami
T40min	<i>Sea-level measurement at MUGLA AKSAZ station refines TSUNAMI information (i.e. wave period)</i>
T45min	<i>Eyewitnesses reports for ANTALYA and MUGLA AKSAZ sent with App confirm tsunami</i>
T50min	<i>Eyewitnesses reports for MERSIN BOZYAZI sent with App confirm tsunami</i>
T55min	Sea-level measurement at MERSIN BOZYAZI station re-confirms tsunami
T57min	<i>Tsunami Assessment for TFPs and CFZs based on the decision matrix and simulation data including: - Automatic computation of messages for registered recipients according to their needs - Automatic dissemination of messages for selected recipients - Internal submission for review of messages for selected recipients (for simulated international NEAMTWS Phase A communication)</i>
T58min	<i>Review of messages for selected recipients (for simulated international NEAMTWS Phase A communication) including: - Modification of messages to include information about reports sent by eyewitnesses "SEA LEVEL READINGS AND EYEWITNESS REPORTS INDICATE A TSUNAMI WAS GENERATED."</i>
T62min	Dissemination of the 3 <sup>rd</sup> message for selected recipients (for simulated international NEAMTWS Phase A communication)

msg#3-A



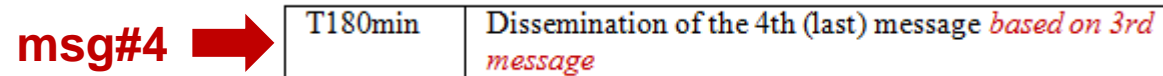
Review & modify msg#3-M



Release msg#3-M

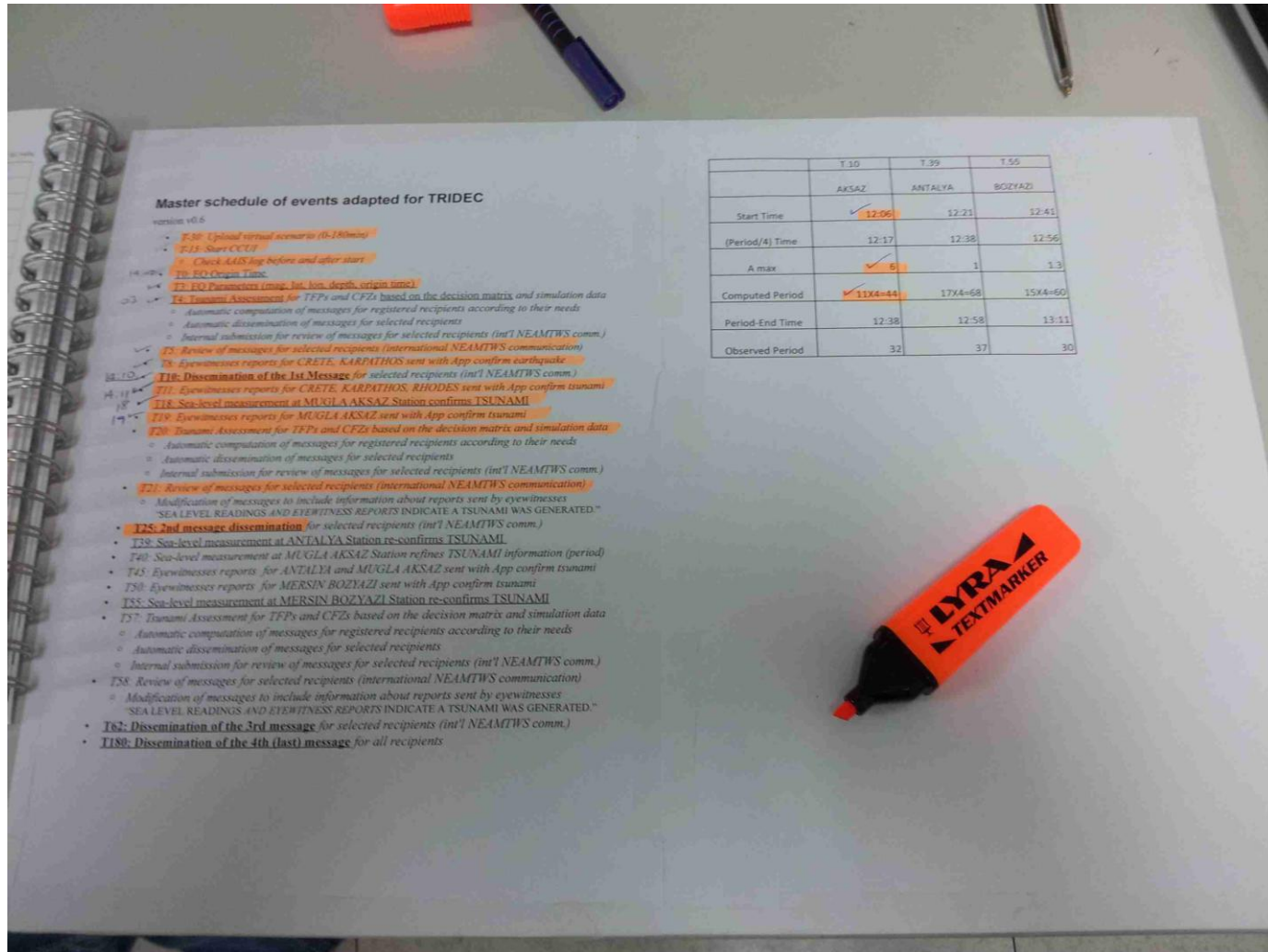


# MSEL TR - 4<sup>th</sup> message





# MSEL TR cont'd



# MSEL TR – Centre-to-centre communication

**Share all sensor measurements** →

**WAC bulletin#1** →

**WAC bulletin#2** →

**WAC bulletin#3** →

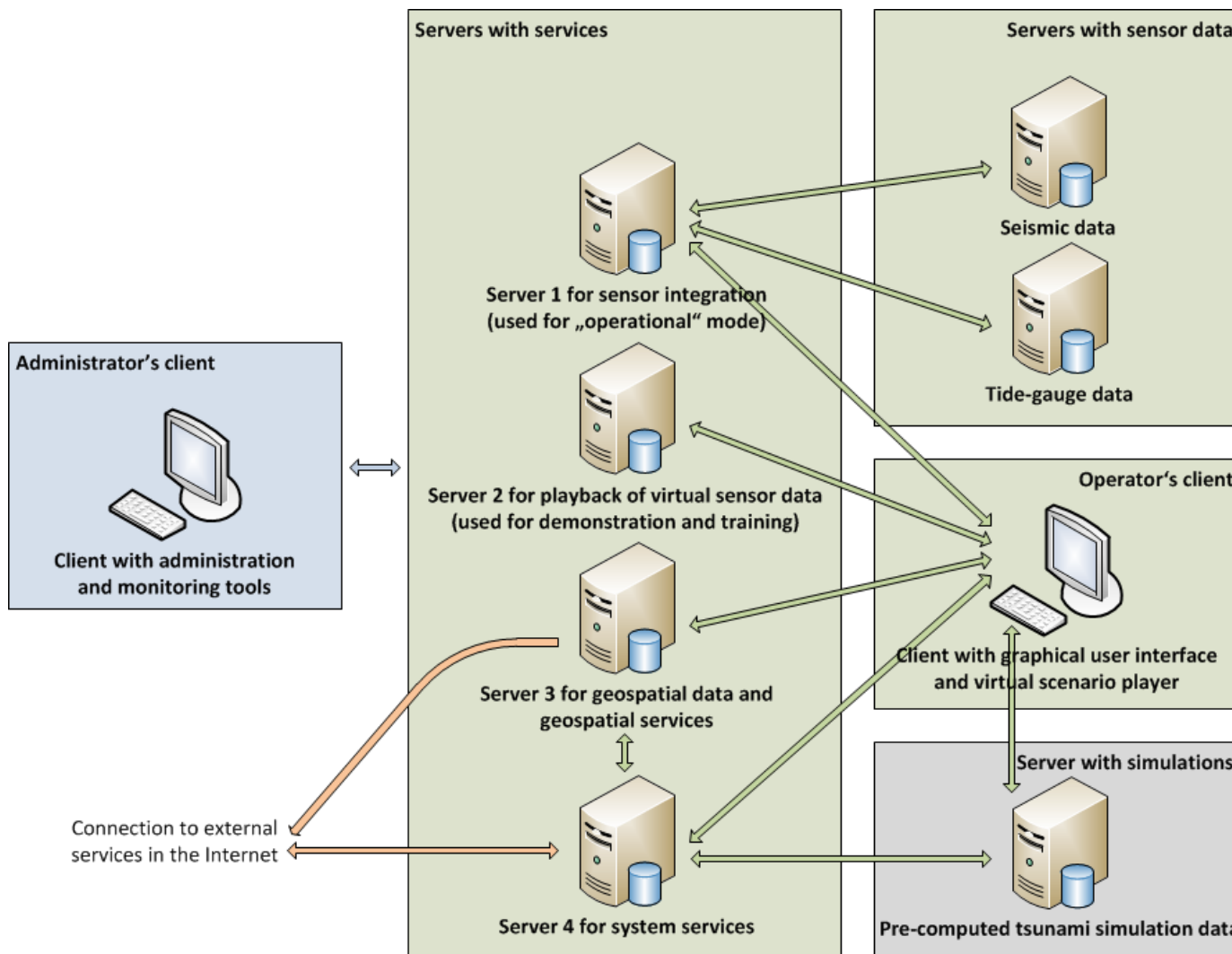
**WAC bulletin#4** →

Time *	Event **
T0	Earthquake origin time
T3min	Earthquake parameters (magnitude, latitude, longitude, depth, origin time) <i>including automatic dissemination of sensor measurement bulletin with earthquake parameters</i>
T4min	Tsunami Assessment for TFPs and CFZs based on the decision matrix <i>and simulation data resulting in automatic dissemination of the 1st WAC bulletin (before T10: Dissemination of the 1st message)</i>
T20min	Tsunami Assessment for TFPs and CFZs based on the decision matrix <i>and simulation data resulting in automatic dissemination of the 2nd WAC bulletin (before T25: 2nd message dissemination)</i>
T57min	Tsunami Assessment for TFPs and CFZs based on the decision matrix <i>and simulation data resulting in automatic dissemination of the 3rd WAC bulletin (before T62: Dissemination of the 3rd message)</i>
T180min	Dissemination of the 4th (last) message <i>based on 3rd message</i>

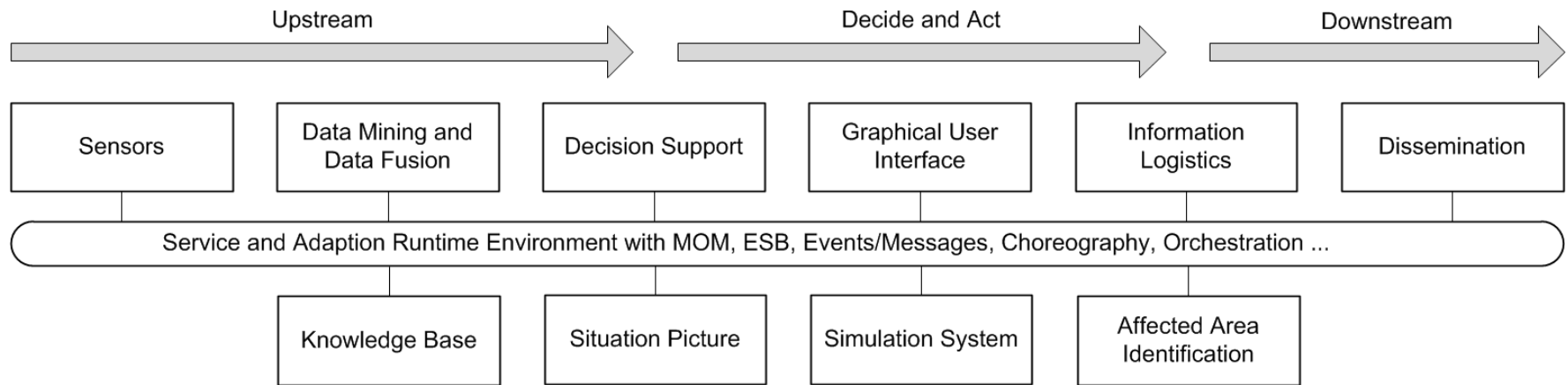
Turkish Extended Phase A, NEAMWave12

# TRIDEC SYSTEM ARCHITECTURE

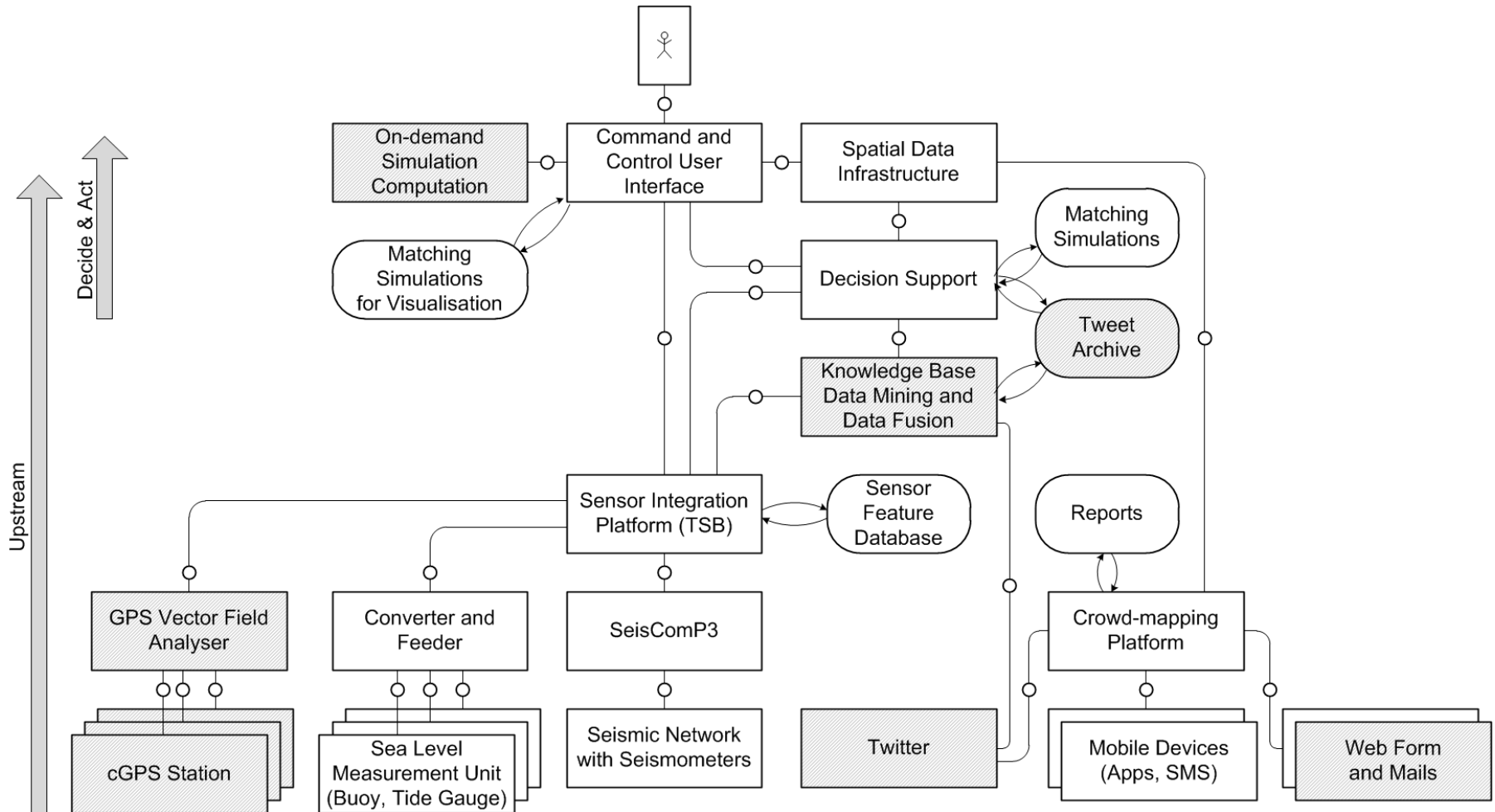
# System Environment



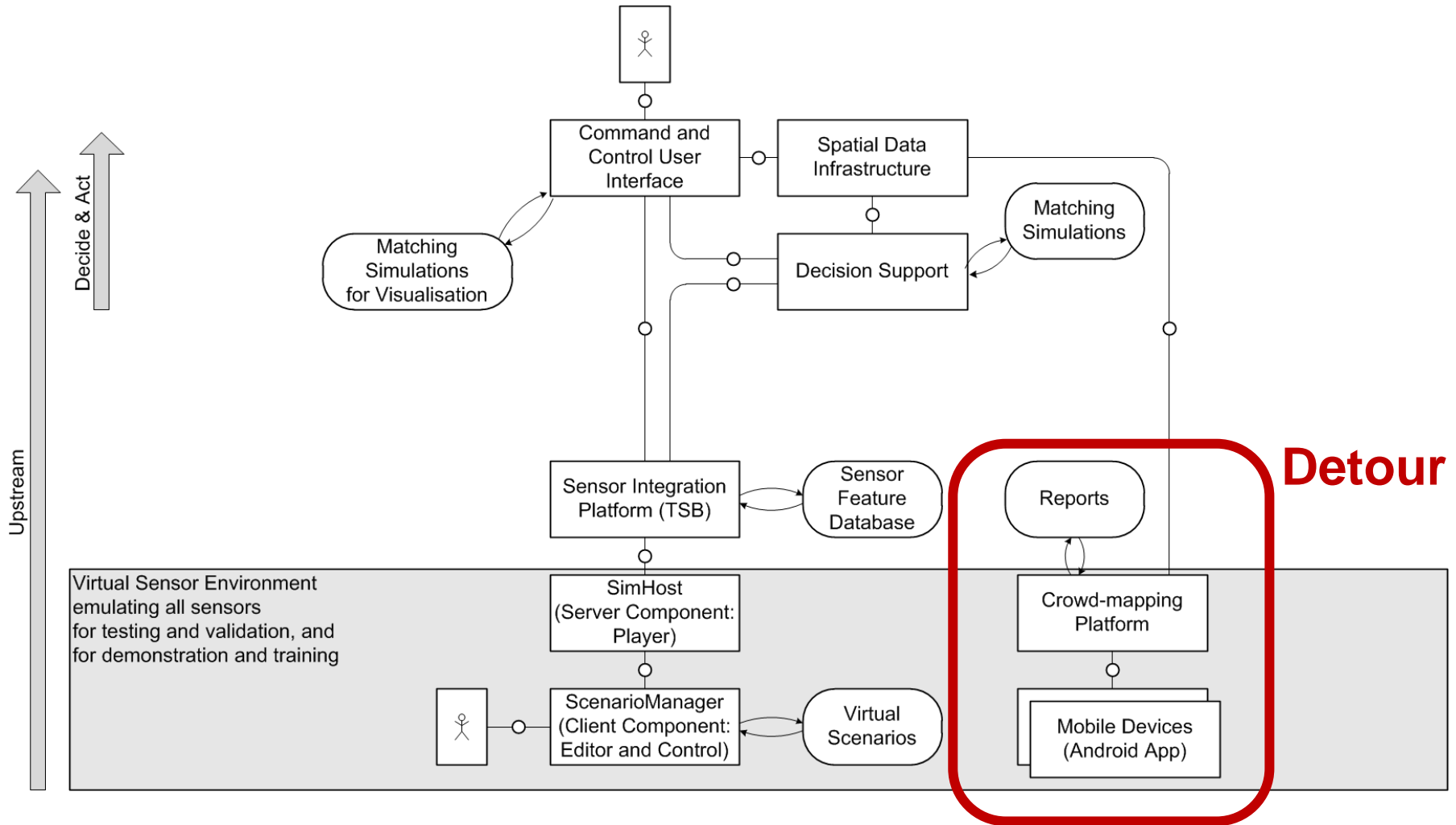
# System Architecture - Concept



# System Architecture - Upstream

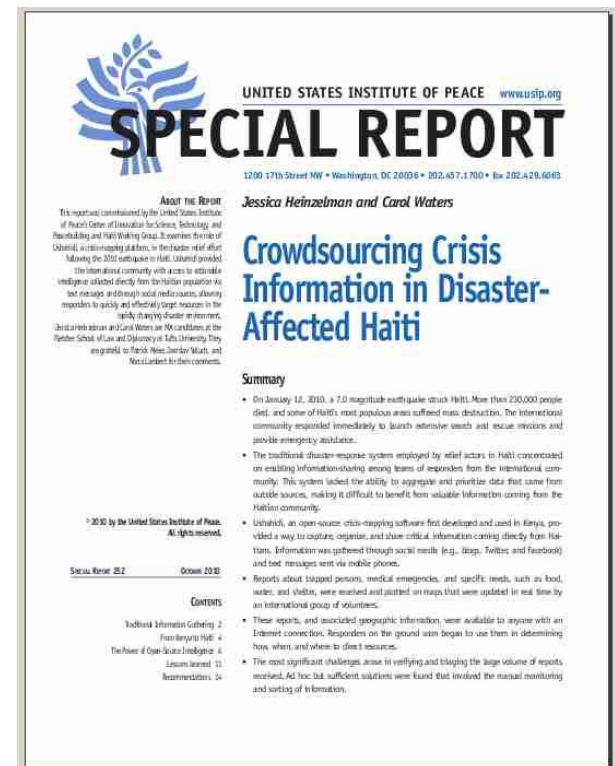


# System Architecture - Upstream NEAMWave12



# Detour – Android App Geohazard & Ushahidi

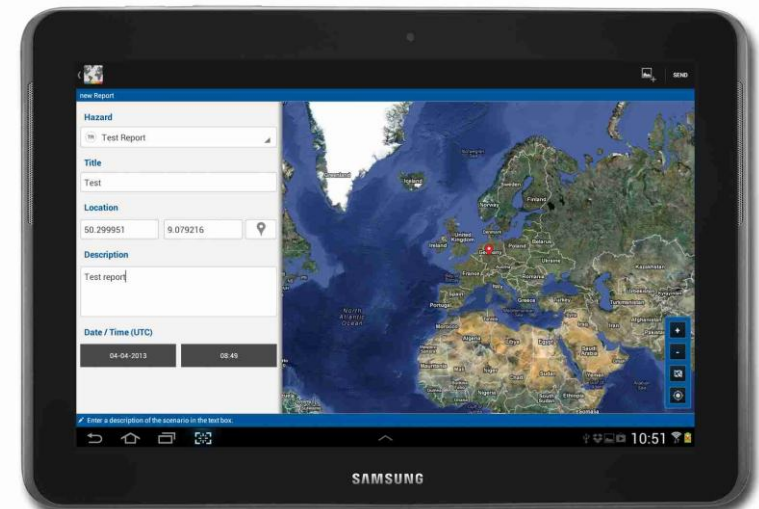
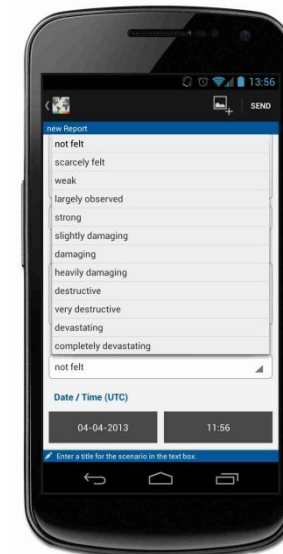
- Extending conventional sensors, i.e. seismic system, tide gauges, buoys, and GPS, with unconventional sensors, e.g. eyewitness reports
- In 2010 United States Institute of Peace (USIP) examined role of Ushahidi in the disaster relief effort following the 2010 earthquake in Haiti
- Ushahidi, an open-source crisis-mapping platform, provided a way to capture, organize, and share critical information coming directly from Haitians
- Application and Validation
  - 2010 Chile earthquake
  - 2010 BP's Deepwater Horizon oil spill in the Gulf of Mexico
  - 2011 Christchurch earthquake and tsunami in New Zealand
  - 2011 Japan earthquake, tsunami, and nuclear emergency
  - ...





# Detour cont'd

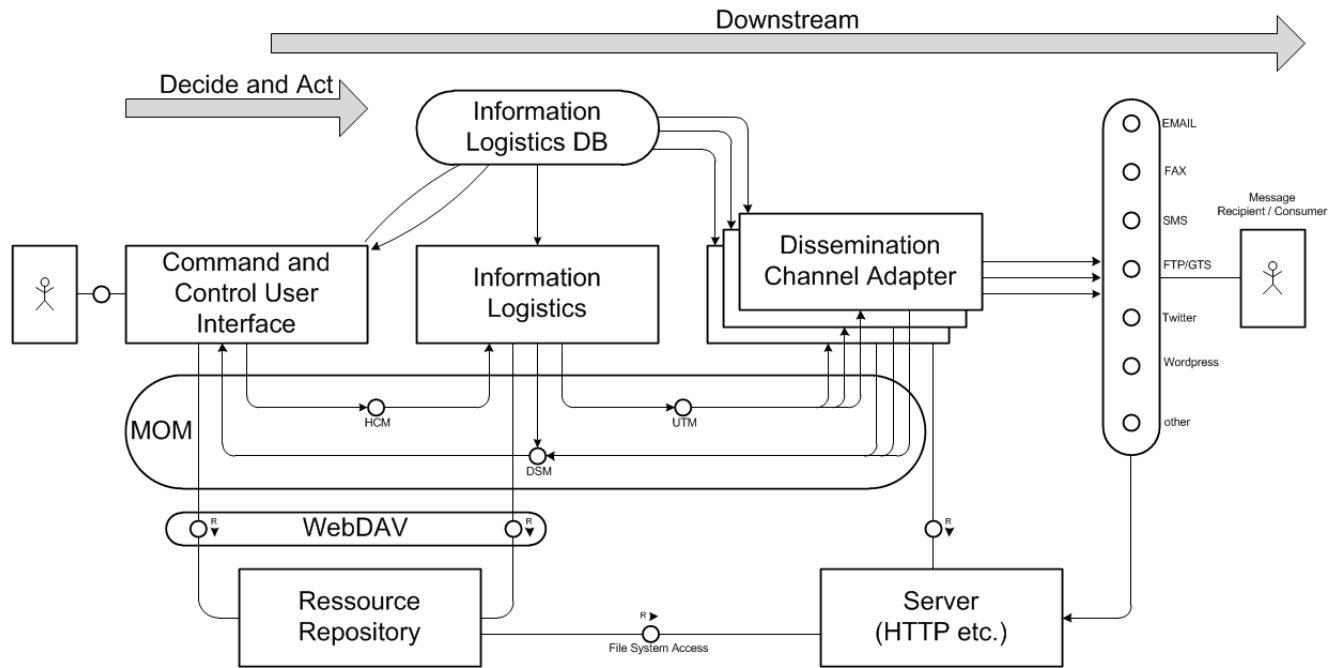
- For this purpose an Ushahidi instance has been set-up for the Turkish Extended Phase A scenario together with Android App Geohazard
  - To validate and demonstrate the feasibility of integrating and using Ushahidi
  - Serving eyewitness reports to the TRIDEDEC system
  - Making them available via the CCUI to the operators in case of tsunamigenic earthquake and tsunami events
- Thus Ushahidi provides rapid in-situ crowd-sourced measurement by people actually experiencing the crisis event



# Detour cont'd

- Primary purpose
  - Extending conventional sensors, i.e. seismic system, tide gauges, buoys, and GPS, with unconventional sensors, e.g. eyewitness reports
  - Decentralized collection of local reports using smartphone technology
  - Rapid in-situ crowd-sourced measurement by people actually experiencing the crisis event
- Increase attractiveness for users – potential eyewitnesses
  - Ability to access freely available public information from providers around the world, e.g.
    - Earthquake information services of KOERI, IPMA, USGS, GFZ, and many more, but also
    - Tsunami information services from NOAA
    - Volcano information services from USGS, and GNS
    - Cyclone and flood information services from GDACS
  - Services are chosen by the user according to specific needs

# System Architecture - Downstream



Turkish Extended Phase A, NEAMWave12

# MESSAGES & CUSTOMIZED CONTENT

# Dissemination & Set-up

- Automatic dissemination to recipients registered for CFZs
- Reviewed and manual dissemination to recipients registered for TFPs
- User-tailored warning messages with customization based on recipients'
  - Vocabulary, Language, Subscribed region, Criticality, and Channel
- Channels
  - FTP (imitating GTS; KOERI FTP server)
  - FAX (Internet fax service)
  - Email (KOERI mail server)
  - SMS (Internet SMS service)
  - twitter clone StatusNet (internal instance at KOERI)
  - WordPress Blog (internal instance at KOERI)

# Message 3 - EMAIL

TSUNAMI EXERCISE MESSAGE NUMBER 003  
NEAR MISS CANDIDATE TSUNAMI WATCH PROVIDER  
CREATED AT 120712 28 NOV 2012

... THIS IS AN EXERCISE ...

... TSUNAMI WATCH ONGOING ...

THIS ALERT APPLIES TO EGYPT ... GAZA ... GREECE ... ISRAEL ... LEBANON ... LIBYA ... SYRIA ... TURKEY

... TSUNAMI ADVISORY ONGOING ...

THIS ALERT APPLIES TO GREECE ... LIBYA ... TURKEY

THIS MESSAGE IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME : 12062 28 NOV 2012  
COORDINATES : 34.58 NORTH 02.58 EAST  
DEPTH : 20 KM  
LOCATION : EASTERN MEDITERRANEAN SEA  
MAGNITUDE : 8.4

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAGE LOCATION	LAT	LONG	TIME APPL. PER
TURKEY - AKSAZ	36.84N 26.08E	12062 6.00M	30 NORTH
TURKEY - ANTALYA	36.83N 30.61E	12212 1.00M	68.00MIN
TURKEY - BOZCAZI	36.19N 32.94E	12412 1.30M	60.00MIN

LAT - LATITUDE (N NORTH, S SOUTH)  
LONG - LONGITUDE (E EAST, W WEST)  
TIME - TIME OF THE MEASUREMENT (Z IS UTC TIME)  
APPL. - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.  
ET IS - AMPL. - CREST TO TROUGH WAVE HEIGHT.  
VALUES ARE GIVEN IN METERS (M).  
PER - PERIOD OF TIME IN MINUTES (MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION OF TSUNAMI WATCH  
SEA LEVEL READINGS AND EYEWITNESS REPORTS INDICATE A TSUNAMI WAS GENERATED. THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT GREATER THAN 0.5M AND/OR CAUSE A TSUNAMI RUN-UP GREATER THAN 3M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES NEAREST THE REGION AND REPORT IF ANY ADDITIONAL TSUNAMI WAVE ACTIVITY IS OBSERVED. AUTHORIZED PERSONNEL SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

EVALUATION OF TSUNAMI ADVISORY  
SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT LESS THAN 0.5M AND/OR CAUSE A TSUNAMI RUN-UP LESS THAN 3M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES NEAREST THE REGION AND REPORT IF ANY ADDITIONAL TSUNAMI WAVE ACTIVITY IS OBSERVED. AUTHORIZED PERSONNEL SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

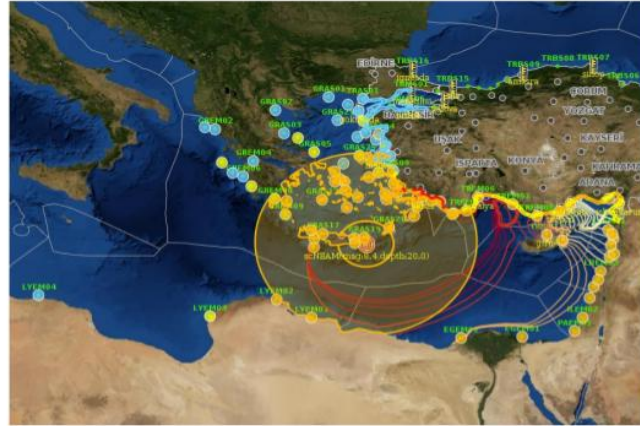
ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WATCH AREA AND ADVISORY AREA GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION-FORECAST POINT	COORDINATES	ARRIVAL TIME LEVEL
GREECE-AGIOS NIKOLAOS	35.23N 25.72E	12062 28 NOV WATCH
GREECE-DESMOTHA	35.62N 26.74E	12062 28 NOV WATCH
GREECE-KAPATHOS PEDIACHORI	35.44N 27.18E	12062 28 NOV WATCH
GREECE-KASTELORIZOS PEDIACHI	36.12N 28.20E	12062 28 NOV WATCH
GREECE-KIKOS LIMENAS	36.59N 28.09E	12062 28 NOV WATCH
GREECE-KIKOS PORT	36.59N 28.23E	12062 28 NOV WATCH
GREECE-STRETA	35.23N 26.11E	12062 28 NOV WATCH
GREECE-GARDI KHANJE	34.69N 24.12E	12062 28 NOV WATCH
GREECE-HEATHORON	35.38N 24.47E	12062 28 NOV WATCH
GREECE-CHAFI KARAKON	35.20N 24.13E	12062 28 NOV WATCH
GREECE-SANTORINI EPANOM FTERO	36.42N 25.42E	12112 28 NOV WATCH
GREECE-KOS METALOP	36.74N 26.38E	12162 28 NOV WATCH
GREECE-KALIMNOS PARAPORTO	36.57N 26.98E	12202 28 NOV WATCH
GREECE-CHANIA	35.52N 24.62E	12412 28 NOV WATCH
GREECE-SPINOS KATAPOLA	36.83N 26.96E	12412 28 NOV WATCH
GREECE-DIMAS AGIOS KIRIAKOS	37.63N 28.45E	12562 28 NOV WATCH
GREECE-PANORVALA	36.62N 25.04E	12862 28 NOV WATCH
GREECE-ERODOS CHOKA	37.13N 25.37E	13062 28 NOV WATCH
GREECE-ERODOS EPANAPOLI	37.44N 24.95E	13122 28 NOV WATCH
GREECE-ERODOS CHAFI	37.84N 24.94E	13152 28 NOV WATCH
GREECE-TZIZI	37.53N 25.19E	13152 28 NOV WATCH
TURKEY-ANTALYA HAI	36.29N 29.64E	13062 28 NOV WATCH
TURKEY-NEGLA OLUBURU	36.69N 28.78E	13062 28 NOV WATCH
TURKEY-NEGLA ANSAZ (N)	36.84N 28.40E	13062 28 NOV WATCH
TURKEY-ANTALYA (N)	36.84N 30.61E	12212 28 NOV WATCH
TURKEY-ANTALYA ALANBA	36.50N 31.98E	12312 28 NOV WATCH
TURKEY-NEGLA PETRETE	36.86N 29.18E	13132 28 NOV WATCH
TURKEY-ANTALYA FIKIRDE	36.29N 30.15E	13132 28 NOV WATCH
TURKEY-NEGLA BOZCAZI (N)	36.19N 32.94E	12412 28 NOV WATCH
TURKEY-ANTALYA BOZKAYI (N)	37.02N 27.42E	12312 28 NOV WATCH
TURKEY-GZENE (N)	35.34N 26.38E	12352 28 NOV WATCH
TURKEY-NEGLA YASACU (N)	36.28N 33.84E	12562 28 NOV WATCH
TURKEY-GAZIMUSLAMA (N)	35.12N 31.95E	13012 28 NOV WATCH
TURKEY-AYDIN GZEDIN	37.15N 27.29E	13062 28 NOV WATCH
TURKEY-NEGLA ENOPLI (N)	36.50N 34.26E	13072 28 NOV WATCH
TURKEY-TZEMER ALCAZIT	36.47N 35.92E	13202 28 NOV WATCH
TURKEY-AYDIN KUSADASI	37.67N 27.26E	13302 28 NOV WATCH
TURKEY-ADANA KURBANLIK	36.77N 38.98E	13352 28 NOV WATCH
TURKEY-HATAY ISKENDERUN (N)	36.59N 36.18E	14312 28 NOV WATCH
TURKEY-SALDAKULU AYVALIK	39.13N 32.69E	14000M WATCH
LIBYA-TURBO	32.68N 24.03E	12262 28 NOV WATCH
EGYPT-ALOKARIFA	31.27N 29.94E	12462 28 NOV WATCH
EGYPT-PORT SAID	31.13N 29.36E	13362 28 NOV WATCH
LEBANON-BEIRUT	33.57N 35.36E	12562 28 NOV WATCH
LEBANON-TYRE	33.29N 35.18E	12572 28 NOV WATCH
LEBANON-TREPLI	34.67N 35.01E	13062 28 NOV WATCH
LEBANON-ALAJAZAT	34.50N 35.98E	13122 28 NOV WATCH
ISRAEL-NETIVA	32.67N 34.74E	13062 28 NOV WATCH
ISRAEL-TEL AVIV	34.97N 34.96E	13062 28 NOV WATCH
SYRIA-BAHDAD	35.19N 35.95E	13302 28 NOV WATCH
SYRIA-DAMASK	36.07N 35.92E	13352 28 NOV WATCH
SYRIA-LATAKIA	35.54N 35.75E	13312 28 NOV WATCH
GAZA-GENA	31.84N 34.42E	13152 28 NOV WATCH
GREECE-KITHORIA KAPALIS	36.14N 23.09E	12312 28 NOV ADVISORY
GREECE-GZETHOR	36.77N 22.57E	13012 28 NOV ADVISORY
GREECE-SANOS KORINAKOS	37.68N 26.08E	13072 28 NOV ADVISORY
GREECE-KITHORASIA	37.20N 21.66E	13142 28 NOV ADVISORY
GREECE-CHIOS HOLLISO	38.47N 26.62E	13212 28 NOV ADVISORY
GREECE-CEPHALONIA ARDOSTOLI	38.19N 26.40E	13312 28 NOV ADVISORY
GREECE-EXIA KOFI	37.02N 24.13E	13672 28 NOV ADVISORY
GREECE-ELATON	39.14N 21.46E	14062 28 NOV ADVISORY
LIBYA-BENGHAZI	32.13N 26.02E	13372 28 NOV ADVISORY
TURKEY-TZEMER ALIAGA	38.83N 26.94E	14162 28 NOV ADVISORY
TURKEY-CANAKKALE BOZCAADA	39.84N 26.08E	14362 28 NOV ADVISORY

SUPPLEMENT MESSAGES WILL BE ISSUED AS SOON AS NEW DATA AND EVALUATION ALLOWS. THE TSUNAMI ALERT WILL REMAIN IN EFFECT UNTIL AN END OF ALERT IS BROADCAST.

... THIS IS AN EXERCISE ...

END OF TSUNAMI EXERCISE MESSAGE NUMBER 003  
MESSAGE PRODUCED BY TRIDEC NON DEMONSTRATOR



Attachments:

1354107424761.jpg	121 KB
urn:org.fossilab:centre.NC:TR:KOERI_CAP3-1354107455619.xml	32.1 KB

```

ADVISORY LIBYA-BENGHAZI 32.13N 26.02E 13372 28 NOV ADVISORY TURKEY-TZEMER ALIAGA 38.83N 26.94E 14162 28 NOV ADVISORY TURKEY-CANAKKALE BOZCAADA 39.84N 26.08E 14362 28 NOV ADVISORY SUPPLEMENT MESSAGES WILL BE ISSUED AS SOON AS NEW DATA AND EVALUATION ALLOWS. THE TSUNAMI ALERT WILL REMAIN IN EFFECT UNTIL AN END OF ALERT IS BROADCAST. ... THIS IS AN EXERCISE ... END OF TSUNAMI EXERCISE MESSAGE NUMBER 003 MESSAGE PRODUCED BY TRIDEC NON DEMONSTRATOR
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  <value=LBM05~/value>
</valueName=CODE~/valueName>
  </area>

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# Message 3 - FAX

**TRIDEC<sup>3</sup>** Collaborative, Complex and Critical  
Decision-Support in Evolving Crises

**FAX** | **TRIDEC NCM**  
<http://www.tridec-online.eu>

To: MCP 212  
Fax: +493312881  
Date (UTC): 2012-11-28T

**Warning Information:**

Categories: [Safety]  
Response Type: Shelter  
Message Type: NEAMTWS-TH  
Severity: Severe

This fax cover consists of 4

**Message Content**

TSUNAMI EXERCISE MESSAGE NUMBER 003  
NEAM KORI CANDIDATE TSUNAMI WATCH PROVIDER  
CREATED AT 1257Z 28 NOV 2012

... THIS IS AN EXERCISE ...

... TSUNAMI WATCH ONGOING ...  
THIS ALERT APPLIES TO EGYPT ... GAZA ... GREECE ... ISRAEL ... LEBANON  
SYRIA ... TURKEY

... TSUNAMI ADVISORY ONGOING ...  
THIS ALERT APPLIES TO GREECE ... LIBYA ... TURKEY

THIS MESSAGE IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL  
GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE  
OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS  
ORIGIN TIME - 1200Z 28 NOV 2012  
COORDINATES - 34.98 NORTH 26.18 EAST  
DEPTH - 20 KM  
LOCATION - EASTERN MEDITERRANEAN SEA  
MAGNITUDE - 8.4

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY					
Gauge Location	LAT	LOn	TIME	AMPL	PER
TURKEY - AKSAZ	36.84N	28.40E	1206Z	6.00M	32.00MIN
TURKEY - ANTALYA	36.83N	30.61E	1212Z	1.00M	68.00MIN
TURKEY - BOZYAZI	36.10N	32.94E	1241Z	1.30M	60.00MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)  
LOn - LONGITUDE (E-EAST, W-WEST)  
TIME - TIME OF THE MEASUREMENT (Z IS UTC TIME)  
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.  
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.  
VALUES ARE GIVEN IN METERS (M).  
PER - PERIOD OF TIME IN MINUTES (MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION OF TSUNAMI WATCH  
SEA LEVEL READINGS AND EYEWITNESS REPORTS INDICATE A TSUNAMI WAS GENERATED.  
THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT GREATER THAN 0.5M AND/OR CAUSE A  
TSUNAMI RUN-UP GREATER THAN 1M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES  
NEAREST THE REGION AND REPORT IF ANY ADDITIONAL TSUNAMI WAVE ACTIVITY IS OBSERVED.  
AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. A TSUNAMI  
IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS  
CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE  
TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT

CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

EVALUATION OF TSUNAMI ADVISORY  
SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED.  
THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT LESS THAN 0.5M AND/OR CAUSE A  
TSUNAMI RUN-UP LESS THAN 1M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES  
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CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

SUPPLEMENT MESSAGES WILL BE ISSUED  
TSUNAMI ALERT WILL REMAIN IN EFFECT

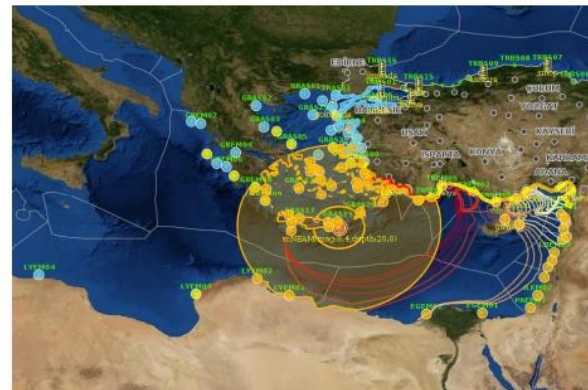
... THIS IS AN EXERCISE ...

END OF TSUNAMI EXERCISE MESSAGE NUMBER 003

MESSAGE PRODUCED BY TRIDEC NCM DEMO

**Attachment #1**

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url: <http://rc:8724/1354107424761.jpg>



# Message 3 – FTP (imitating GTS)

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WEME40 LTAA YYGggg
TSUNAMI EXERCISE MESSAGE NUMBER 003
NEAM KOERI CANDIDATE TSUNAMI WATCH PROVIDER
CREATED AT 1257Z 28 NOV 2012

... THIS IS AN EXERCISE ...

... TSUNAMI WATCH ONGOING ...
THIS ALERT APPLIES TO EGYPT ... GAZA ... GREECE ... ISRAEL ... LEBANON ... LIBYA ... SYRIA ... TURKEY

... TSUNAMI ADVISORY ONGOING ...
THIS ALERT APPLIES TO GREECE ... LIBYA ... TURKEY

THIS MESSAGE IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES
HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS
TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 1200Z 28 NOV 2012
COORDINATES - 34.98 NORTH 26.18 EAST
DEPTH - 20 NM
LOCATION - EASTERN MEDITERRANEAN SEA
MAGNITUDE - 8.4

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY
GAUGE LOCATION      LAT      LON      TIME  AMPL  PER
-----
TURKEY - AKSAZ      36.84N  28.40E  1206Z  6.00M 32.00MIN
TURKEY - ANTALYA    36.83N  30.61E  1221Z  1.00M 68.00MIN
TURKEY - BOZYAZI    36.10N  32.94E  1241Z  1.30M 60.00MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN METERS (M).
PER - PERIOD OF TIME IN MINUTES (MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION OF TSUNAMI WATCH
SEA LEVEL READINGS AND EYEWITNESS REPORTS INDICATE A TSUNAMI WAS GENERATED.
THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT GREATER THAN 0.5M AND/OR CAUSE A TSUNAMI RUN-UP
GREATER THAN 1M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES NEAREST THE REGION AND REPORT IF
ANY ADDITIONAL TSUNAMI WAVE ACTIVITY IS OBSERVED. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE
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HOURS AS MULTIPLE WAVES ARRIVE.

EVALUATION OF TSUNAMI ADVISORY
SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED.
THIS TSUNAMI CAN STRIKE COASTLINES WITH A WAVE HEIGHT LESS THAN 0.5M AND/OR CAUSE A TSUNAMI RUN-UP LESS
THAN 1M. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES NEAREST THE REGION AND REPORT IF ANY
ADDITIONAL TSUNAMI WAVE ACTIVITY IS OBSERVED. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO
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FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY
HOURS AS MULTIPLE WAVES ARRIVE.

SUPPLEMENT MESSAGES WILL BE ISSUED AS SOON AS NEW DATA AND EVALUATION ALLOWS. THE TSUNAMI ALERT WILL
REMAIN IN EFFECT UNTIL AN END OF ALERT IS BROADCAST.

... THIS IS AN EXERCISE ...

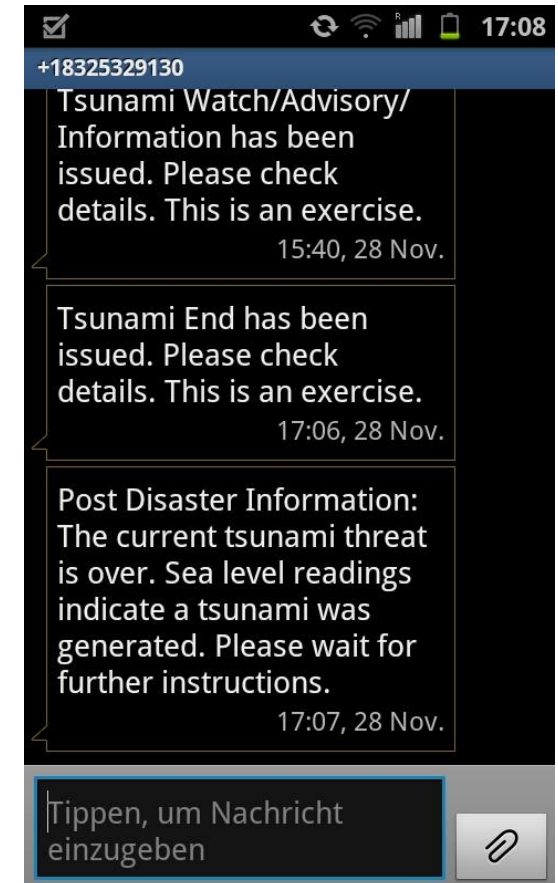
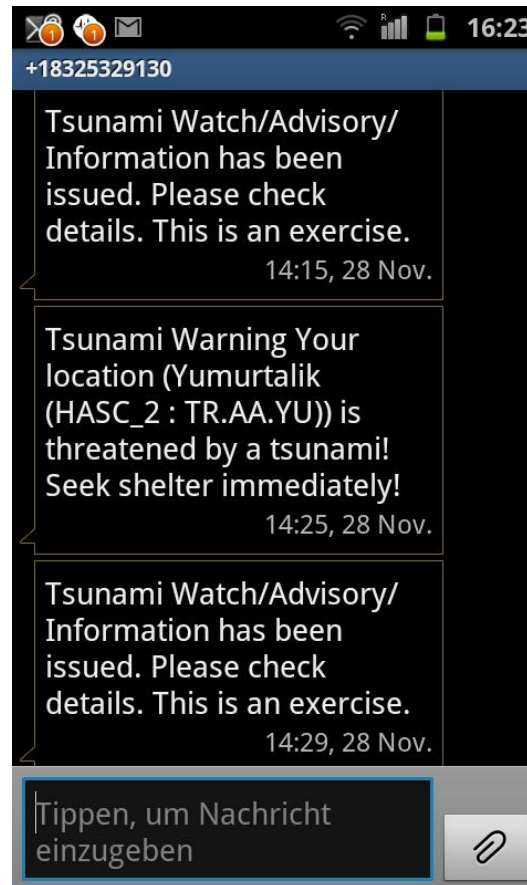
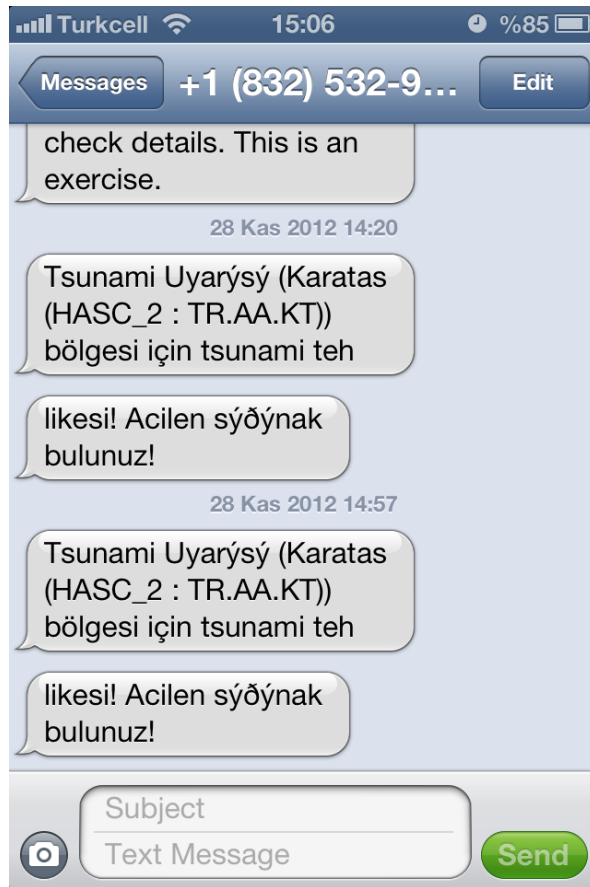
END OF TSUNAMI EXERCISE MESSAGE NUMBER 003

MESSAGE PRODUCED BY TRIDECC NCM DEMONSTRATOR

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# Messages – SMS



# STANDARDS AND FOSS

# Standards

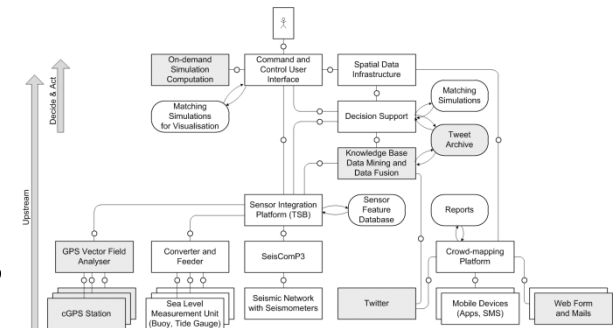
- Upstream: OGC (Open Geospatial Consortium)

- SWE (Sensor Web Enablement) Standards

- SAS (Sensor Alert Service)
    - SOS (Sensor Observation Service)
    - WNS (Web Notification Service)

- OWS (OpenGIS Web Service) Standards

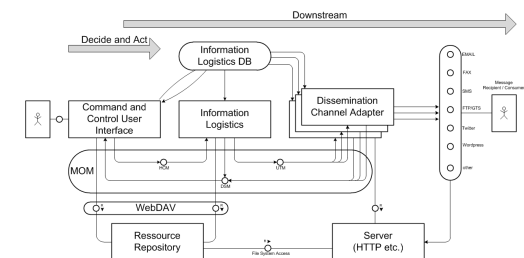
- WMS (Web Mapping Service)
    - WPS (Web Processing Service)
    - WFS (Web Feature Service)



- Downstream: OASIS (Organization for the Advancement of Structured Information Standards)

- EM (Emergency Management), TC (Technical Committee)

- CAP (Common Alerting Protocol)
    - EDXL-DE (Emergency Data Exchange Language - Distribution Element)



# Free and Open Source Software (FOSS)

- Developments of the system are based to the largest extent on FOSS components and industry standards.
- Emphasis has been and will be made on leveraging open source technologies that support mature system architecture models wherever appropriate.
- All open source software produced is foreseen to be published on a publicly available software repository
  - Thus allowing others to reuse results achieved,
  - Enabling further development, and
  - Collaboration with a wide community including scientists, developers, users and stakeholders

# CONCLUSIONS

# Conclusions

- Evaluation of TRIDE<sup>3</sup>DEC systems in full from the initial virtual earthquake sensed, to the analysis of virtual sea level sensor data, the use of simulations, and finally to the dissemination of warning messages in 2 of 4 NEAMWave12 scenarios
  - At IPMA demonstrating the conformance to international agreements in IPMA's Phase A
  - At KOERI demonstrating functionality beyond international agreements in KOERI's Extended Phase A to demonstrate unique features
- Use of conventional sensors and sensor systems and unconventional sensors
  - Use of seismic system and tide gauges
  - Use of an App to immediately sent eyewitness reports, and
  - Integration of the crowd mapping platform Ushahidi to collect eyewitness reports
- Communication
  - Centre-to-Centre software system communication between Turkey and Portugal
  - Conventional delivery of warning messages via email, fax, SMS and GTS
  - Delivery of user-tailored warning messages with customization based on recipients' vocabulary, language, subscribed region, criticality, and channel
  - Social media channels have been used in order to demonstrate new opportunities



**C**ollaborative, **C**omplex and **C**ritical  
Decision-Support in **E**volving **C**risis

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## **TRIDEC Tsunami Early Warning System in international tsunami warning and communication exercise**

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Jana Schulz (1), Rachid Omira (2), Mustafa Comoglu (3), Nurcan Meral Ozel (3), and Joachim Wächter (1)  
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