Development of

A Disaster Information System
&
An Earthquake Loss Estimation Tool for

Istanbul

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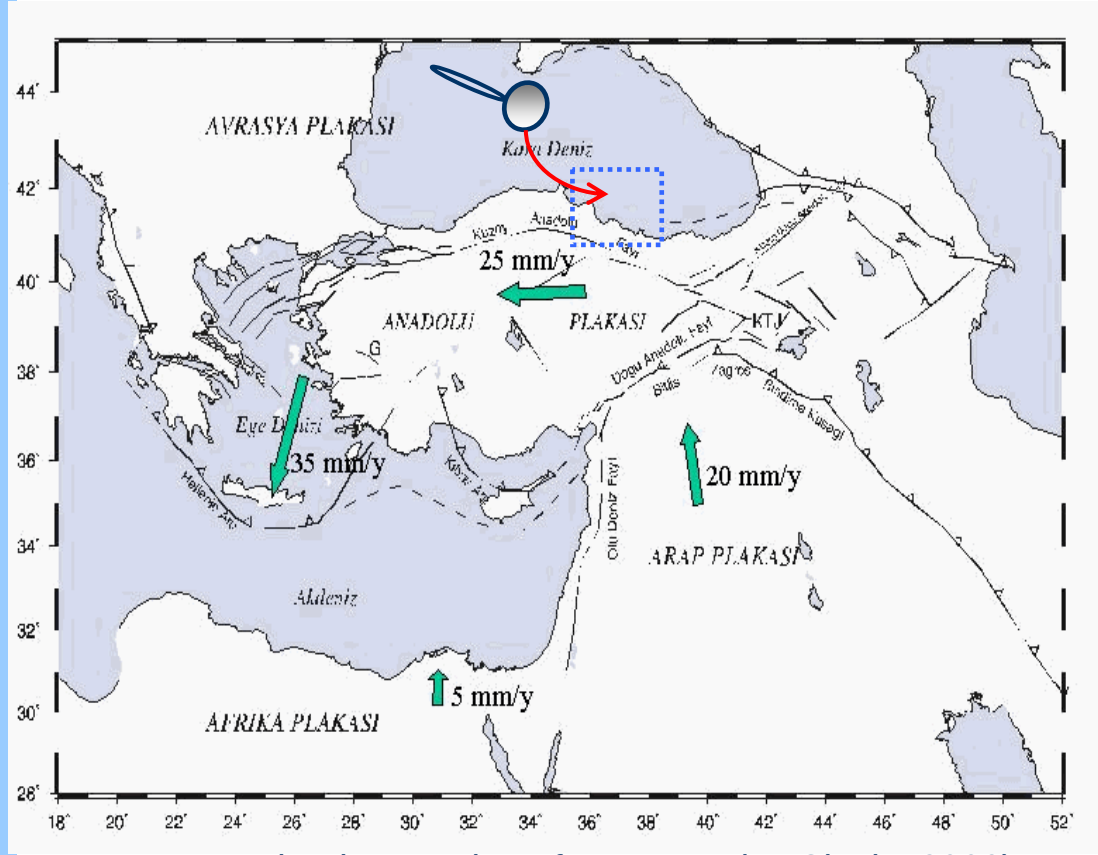
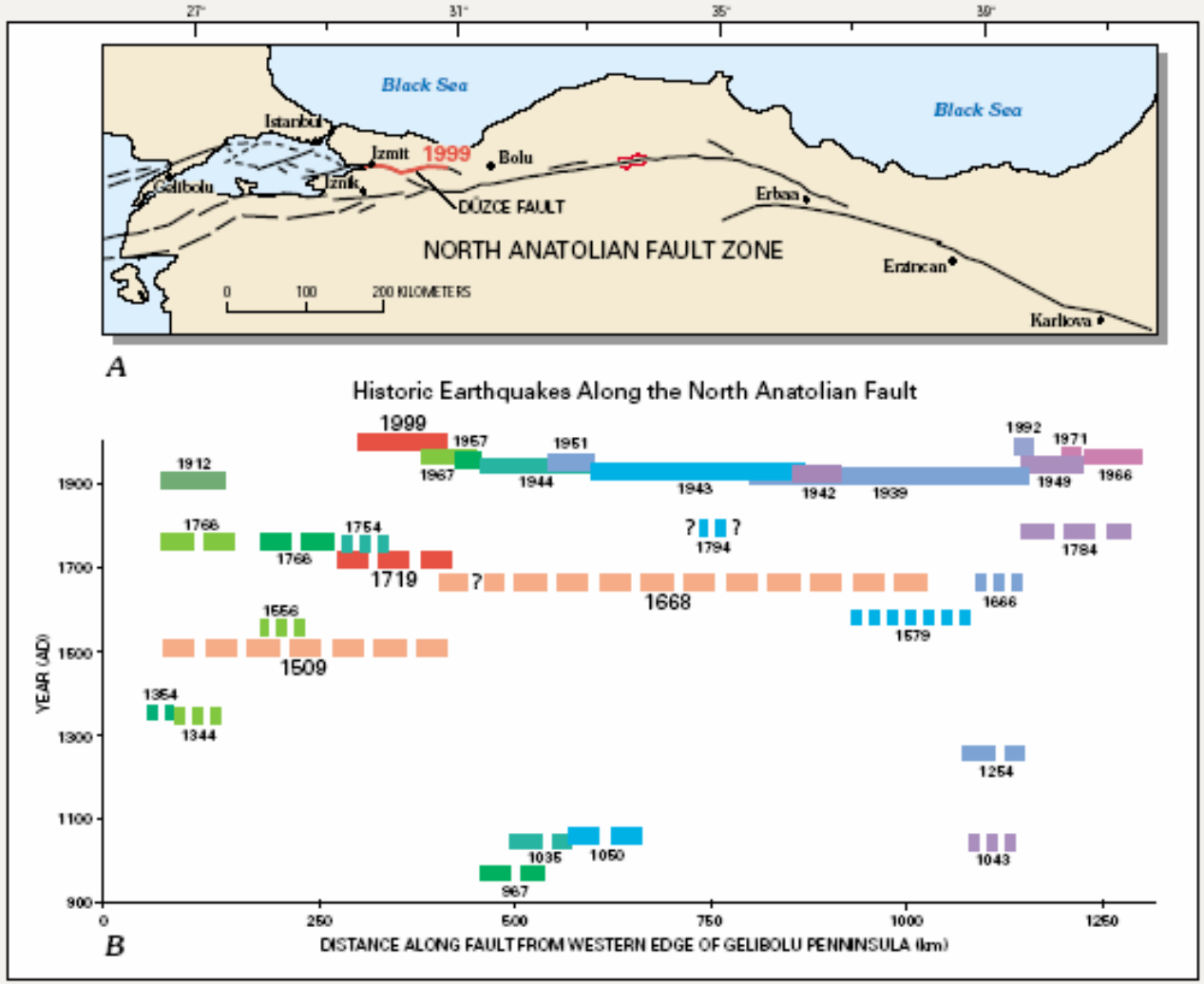
Geological Features of TURKEY



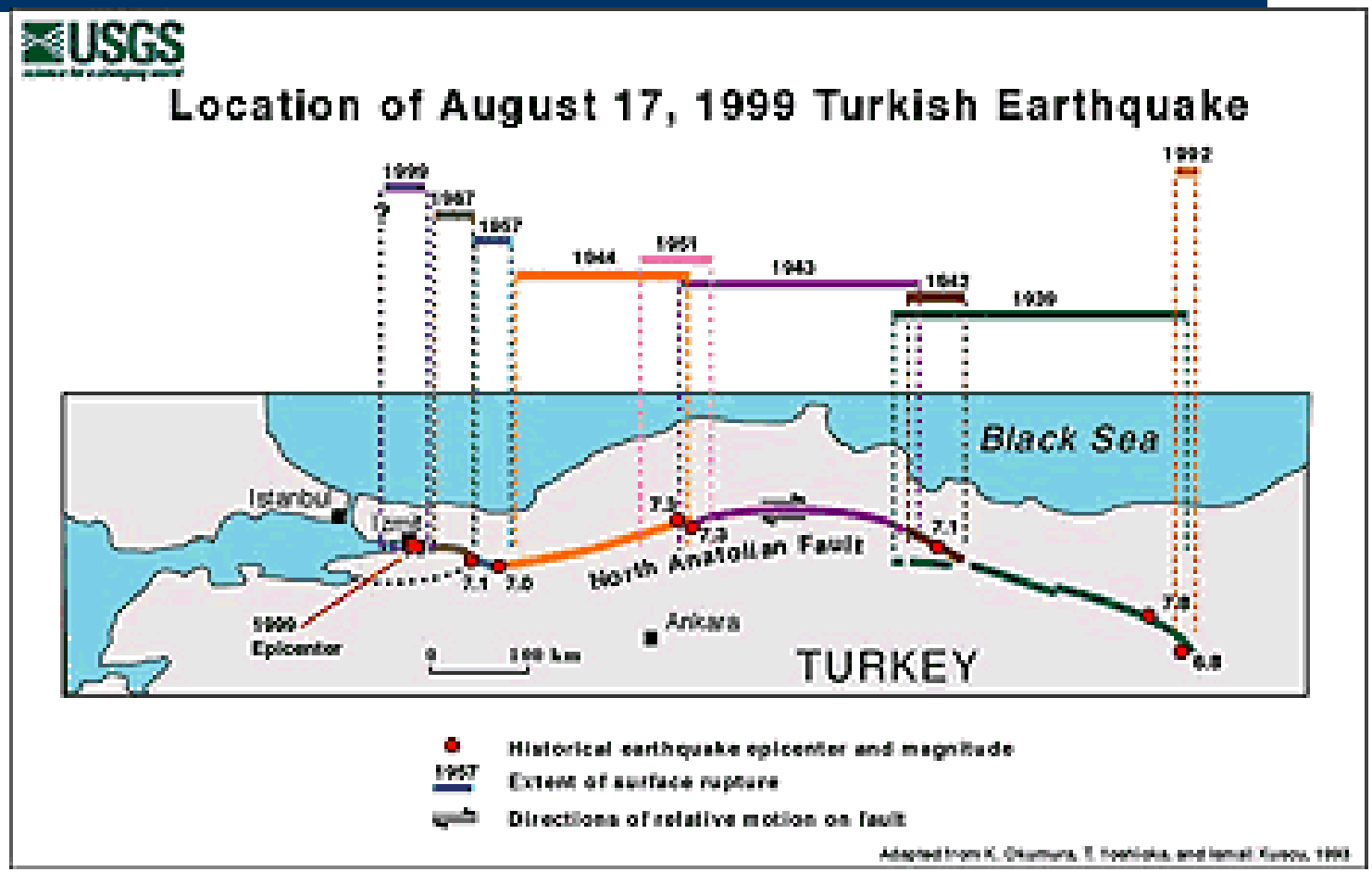
Tectonic Plate Motion of TURKEY (McClusky 2000)

GPS studies initiated in the Eastern Mediterranean region in early 1980's and provide valuable data for the slip vectors, velocities and rotational movements. By analyzing this data it is clearer now that the Anatolian plate squeezed by the Arabian plate is escaping towards the west along the North and Eastern Anatolian Faults and is expanding and rotating anticlockwise in the west forming the Aegean Graben System.

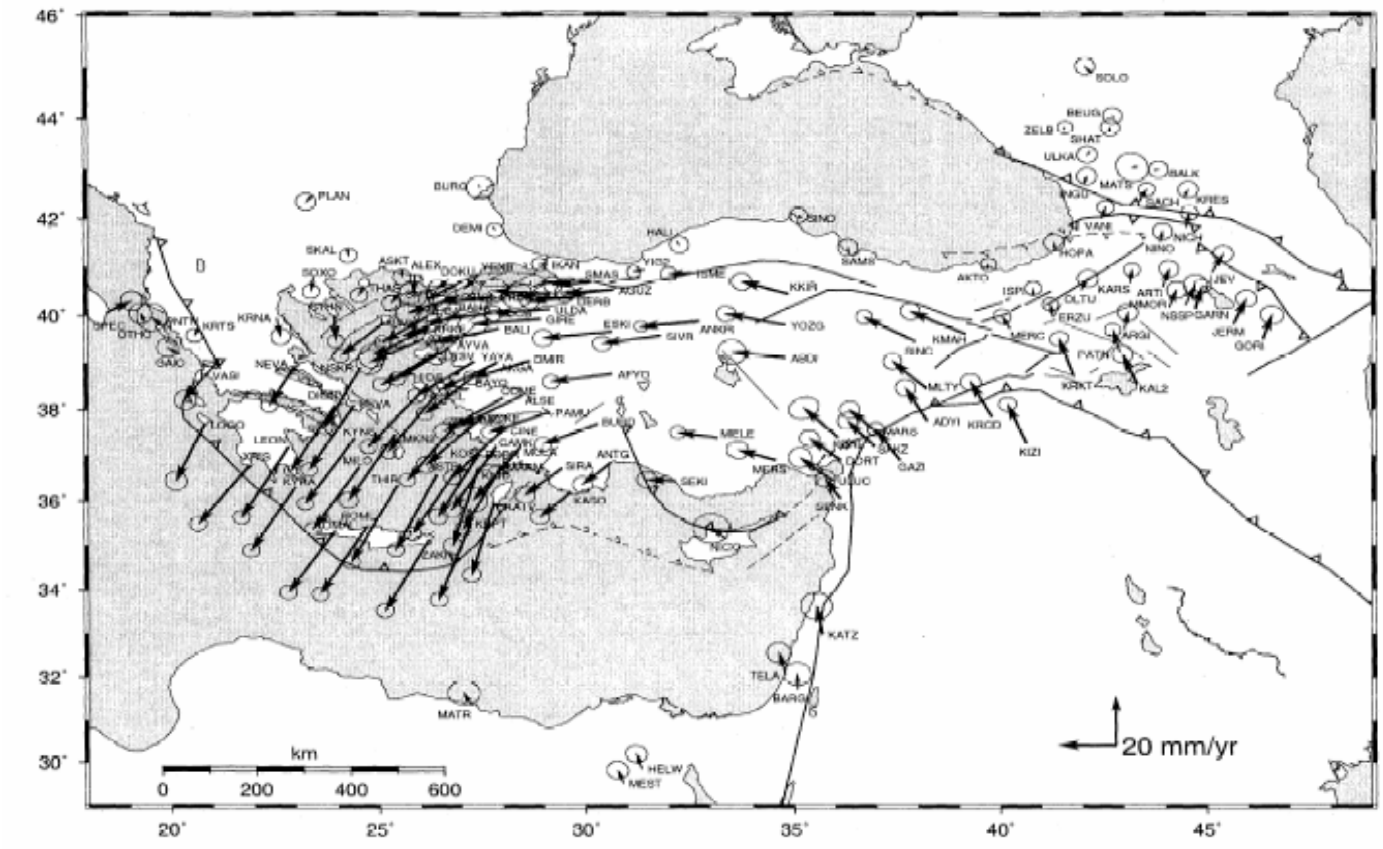
Historical earthquakes along the North Anatolian Fault



Historical earthquakes along the North Anatolian Fault



GPS VECTORS


46°
44°
42°
40°
38°
36°
34°
32°
30°
20°
25°
30°
35°
40°
45°
km
0
200
400
600
20 mm/yr
PLAN
BURG
DEMI
SKAL
SOKO
AGKT
ALEK
KAN
SMAS
YOZG
ISME
KKIR
ANKR
SIVR
ESKI
BALI
GIRE
ULDA
AFYO
ASKI
SINO
SAMS
AKTO
HALI
SOLO
ZELB
SHAT
ULKA
MATS
BALK
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ARTI
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JERM
GORI
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KRKT
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KIZI
ADYI
KRDD
MELE
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ANTG
SIRA
KASO
KATZ
TELA
BARG
MATR
HELW
MEST
NICO
SIRN
GAZI

17 August & 12 November 1999 Earthquakes

17 August (M=7.4) and 12 November (M=7.2) 1999 earthquakes killed more than 20 000 people and ruptured about 160 km of the northern branch of the NAF

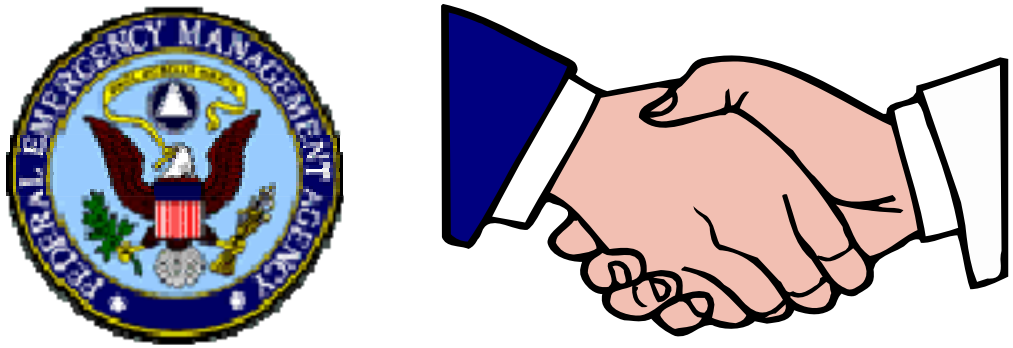
These earthquakes have also located the Marmara segments of the fault and major (M=7.6) event is expected in the next half century with and about 50% probability on this segment

1999 Earthquakes

1999 Earthquakes

Just after 1999

Agreement between FEMA (USA) and ITU 2000



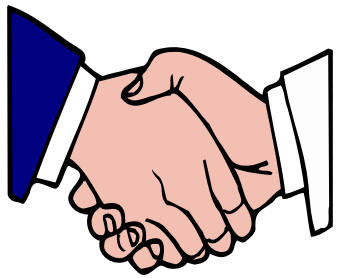
"**A** Cooperative **H**azard **I**mpact-reduction **E**ffort **V**ia **E**ducation – ACHIEVE"

14 FEMA BOOKS TRANSLATED INTO TURKISH

Next agrement between

ITU & Ministry of Interior of Turkey

2001



1. Training on Emergency Management
2. Development of Turkish Fire Brigades
3. Development of Emergency Management System
4. GIS standards based on Emergency Management (TABIS)

PROJECT GOAL of GIS STANDARDS

To develop GIS standards for

- emergency planning & administration
- disaster management & damage estimation, and
- as a decision support system for central & local authorities (ministries and local administrative units) at other times.

PROJECT OUTPUTS

1. Workshop with local authorities in Turkey, April 2002

2. Workshop with private sector in Turkey, June 2002

3. International Symposium on GIS, September 2002

Final Report was submitted to the Ministry in November 2002.

Istanbul Disaster Information System

Sponsored by the

State Planning Department of Turkey

for a period of 3 years

Istanbul Disaster Information System

The project is supported by

Istanbul Governor

Istanbul Metropolitan Municipality

Turkish Emergency Management Agency

Istanbul Disaster Information System

The Status of the Project

- The System has already been designed.
- We have just bought the hardware infrastructure & software soon.
- We will collect the data soon from the Municipality offices, and from the field if necessary.

Development of An Earthquake Loss Estimation Tool

Sponsored by

- Istanbul Metropolitan Municipality
- Scientific & Technical Research Council of Turkey

Development of An Earthquake Loss Estimation Tool

Objectives

To reduce loss of life and property, and protect people and institutions from natural hazards by providing a tool for comprehensive, risk-based loss analysis to support the nation's programs in emergency management, mitigation, planning, preparedness, response, and recovery.

The key objectives

- Develop an earthquake hazard characterization model for Turkey
- Develop vulnerability functions for infrastructure at risk
- Develop parameters for casualties, shelter needs and economic loss that reflect conditions in Turkey.

The key objectives

- Provide improved near real time loss assessment capability based on Turkish information resources.
- Provide software that takes full advantage of state-of-the-art GIS platforms.
- Provide user-friendly computer interface and support materials suitable for a wide variety of users in Turkey including emergency managers, scientific investigators and decision makers.

1st International Workshop

Organising Committee

Ahmet Emre BASMACI, Disaster Coordination Center, Istanbul Metropolitan Municipality
Ahmet SAYGUN, Director of Structure & Earthquake Research Center, ITU
Beyza TAŞKIN, Structure & Earthquake Research Center, ITU
Bekir TÜZEL, General Directorate of Disaster Affairs, Ministry of Public Works & Settlement, Turkey
Bülent ÖZMEN, General Directorate of Disaster Affairs, Ministry of Public Works & Settlement, Turkey
Gökay Atila BOSTAN, Director of Disaster Management Center, Istanbul Governorship
Hasan BODUROĞLU, President of Earthquake Foundation of Turkey, ITU
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Himmet KARAMAN, Department of Geodesy & Photogrammetry, ITU
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Turan ERDEN, Department of Geodesy & Photogrammetry, ITU

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Turgut UZEL, Head of Civil Engineering Department, Kültür University, Turkey
Vilas MUJUMDAR, NSF, USA
Yunus KALKAN, Department of Geodesy & Photogrammetry, ITU

REGISTRATION FEE : No registration fee is required.

REGISTRATION DEADLINE : November 28, 2005.
ITU Faculty of Civil Engineering, 34469 Maslak Istanbul
e-mail: sahin@itu.edu.tr - Tel & Fax: +90 212 2853782

WORKSHOP VENUE : ITU Suleyman Demirel Cultural Center, Maslak, Istanbul, Turkey

1st International Workshop

Background

Two devastating earthquakes occurred in Turkey, (August 17 and November 12) in 1999. The magnitudes were 7.4 and 7.2 respectively. The epicenters of the earthquakes were 110 km and 150 km from Istanbul, respectively. The first earthquake was a catastrophe for the entire country, which affected 10 cities including İstanbul and caused 15000 casualties. The affected area from the two earthquakes has a population of 20 million, which is one third of the population of the country, and nearly half of the Turkish economical infrastructure is located in this region. In addition, scientists expect Istanbul to have a large earthquake (magnitudes between 6.5 and 7.7) in the next 25 to 30 years.

These events have demonstrated the low resistance of Turkish infrastructure to severe ground shaking, the need for high level of planning for earthquake events. In response to these events and the need for improved disaster planning and response, Istanbul Technical University (ITU) established the Center of Excellence for Disaster Management (CEDM) in 2001 in cooperation with the US Federal Emergency Management Agency (FEMA) with funding from the US Agency for International Development. CEDM also has developed tools for supporting emergency planning, for example, a national database using GIS and remote sensing. ITU has a mission to prepare the nation for the next earthquake, and has acknowledged the need for a comprehensive tool for estimating losses to support emergency planning, response, recovery and mitigation. Following meetings of the Association of Turkish American Scientists held in March of 2001 and 2002 at the George Washington University, representatives of ITU, IAHS and NIBS initiated discussions on developing earthquake loss estimation methodology and software for the nation of Turkey based on HAZUS, a state-of-the-art, nationally applicable, standardized methodology and software program for estimating potential losses from earthquakes in the US.

Objectives of the Workshop

The objectives of the workshop are to discuss the development of an earthquake loss estimation program to support reduction of loss from earthquake hazards affecting millions of people and billions of dollars of infrastructure in Turkey, and to study the means for creating HAZTURK, a Turkish version of HAZUS. The key objectives for a new Turkish version of HAZUS are to:

- Develop an earthquake hazard characterization model for Turkey based on HAZUS.
- Create a comprehensive Turkish inventory database for loss estimation.
- Develop vulnerability functions for infrastructure at risk to supplement those in HAZUS.
- Develop parameters for casualties, shelter needs and economic loss that reflect conditions in Turkey.
- Provide improved near real time loss assessment capability based on Turkish information resources.
- Provide software that takes full advantage of state-of-the-art GIS platforms and internet capability.
- Provide user-friendly computer interface and support materials suitable for a wide variety of users in Turkey including emergency managers, scientific investigators and decision makers.

PROGRAM

December 1, 2005

09:00 - 09:30 **Registration**

09:30 – 10:30 **Opening Session**
Muhammed ŞAHİN, Chair of Workshop, ITU
Faruk KARADOĞAN, President of ITU
Gülsün SAĞLAMER, Former President of ITU
Hasan CANPOLAT, Governor of Sivas
Hasan BODUROĞLU, Turkish Earthqauke Foundation and ITU
Derin URAL, Center of Excellence for Emergency Management of ITU
Mesut PEKTAŞ, Secretary of Istanbul Metropolitan Municipiality
Mustafa TAYMAZ, Director of Disaster Affairs, Ministry of Public Works & Settlement
Hasan İPEK, Director of Emergency Management Agency, Turkey
Louis ELISA, Former Head of NATO Civil Emergency Planning Staff
K. Harald Drager, President of The International Emergency Management Society
Oğuz HAKSEVER, NTV News Coordinator, Turkey

10:30 – 11:00 **Break**

11:00 – 11.50 HAZUS Technology and Applications: Overview, *Philip SCHNEIDER / Barbara SCHAUR, NIBS, USA*
11:50 – 12:15 Turkish Experience, *Mustafa ERDİK, KOERİ – BU, Turkey*
12:15 – 12:35 Mid-America Earthquake (MAE) Center Program in Seismic Risk Management, *Amr ELNASHAI / Jerry HAJJAR, MAE Center-University of Illinois(UI), Urbana, USA*

12:35 – 14:00 **Lunch Break**

14:00 – 14:20 Management of Earthquake Risks using Condition Indicators (MERCI): Switzerland, *Alessandro DAZIO, ETH-Zurich, Switzerland*
14:20 – 14:40 MAEviz/NEESgrid and Applications Overview, *Bill SPENCER / Jim MYERS, MAE Center-IU, USA*
14:40 – 15:00 Data Management and Damage Functions, *Jawhar BOUABID, Durham Techn., USA*
15:00 – 15:20 Software Architecture, *Pushpendra JOHARI, Post, Buckley, Schuh & Jernigan, Inc., USA*
15:20 – 15:40 Vulnerability and Network Modeling in the MAE Center, *Jerry HAJJAR / Amr ELNASHAI, MAE Center-UI, USA*

15:40 – 16:00 **Break**

16:00 – 16:20 Cyberinfrastructure in Support of Earthquake Loss Assessment
Jim MYERS / Bill SPENCER, MAE-Center- IU, USA
16:20 – 16:40 An Overview of Developments for Risk Assessments and Generation of Loss Scenarios, *Antoni ROCA, ICC, Spain*
16:40 – 17:00 Role of technology in disaster situations, *Paul Geerders, The Netherlands.*
17:00 – 17:20 Vulnerability Science: Challenges and Opportunities in the GIS Environment, *Deborah Thomas, University of Colorado, Boulder, USA*
17:20 – 17:40 Multi-Hazard Mitigation: A Case Study for the Los Angeles Water System, *Leval Lund/ Curtis Edwards, American Society for Civil Engineers, Technical Committee on Lifeline and Earthquake Engineering, USA*
17:40 – 18:00 Discussions

December 2, 2005

9:30 Risk Assessment Tools Development, *Philip Schneider, NIBS, USA*

The purpose of the second day is to open a dialogue between the Turkish and U.S. representatives concerning the kind of risk assessment tool desired and its characteristics, how some of the methodology issues that affect tool development will be approached, what kind of project will be needed to realize tools development and how we can work together to achieve this objective. The following agenda seeks to answer these questions.

Approaches to Turkish Risk Assessment Tool Development
- Uses of the model/Intended users, Availability of data
- Range of capability: earthquake hazard characterization to indirect economic loss
- Supporting capabilities: rapid loss assessment, third-party model integration, mitigation module, network analysis, etc, Disaster management modules, Distribution
- Post development follow-up: training, technical support, releases, Software development

Specific Technical Development for a Turkish Risk Assessment Tool
- Data management system, Earthquake hazard characterization
- Building damage, Lifeline damage, Casualties, shelter, economic loss
- Induced physical damage, Decision making tools

Approaches to Project Management for Developing a Turkish Risk Assessment Tool
- Full development, Staged development, Demonstration project followed by full or staged development

Logistics
- Teaming arrangements, Time line, Funding issues

Next steps

Workshop Program

- **Day 1 (09:00-18:00)**
  - **Presentations**
- **Day 2 (09:00-12:30)**
  - Discussions on Risk Assesment Tools Development

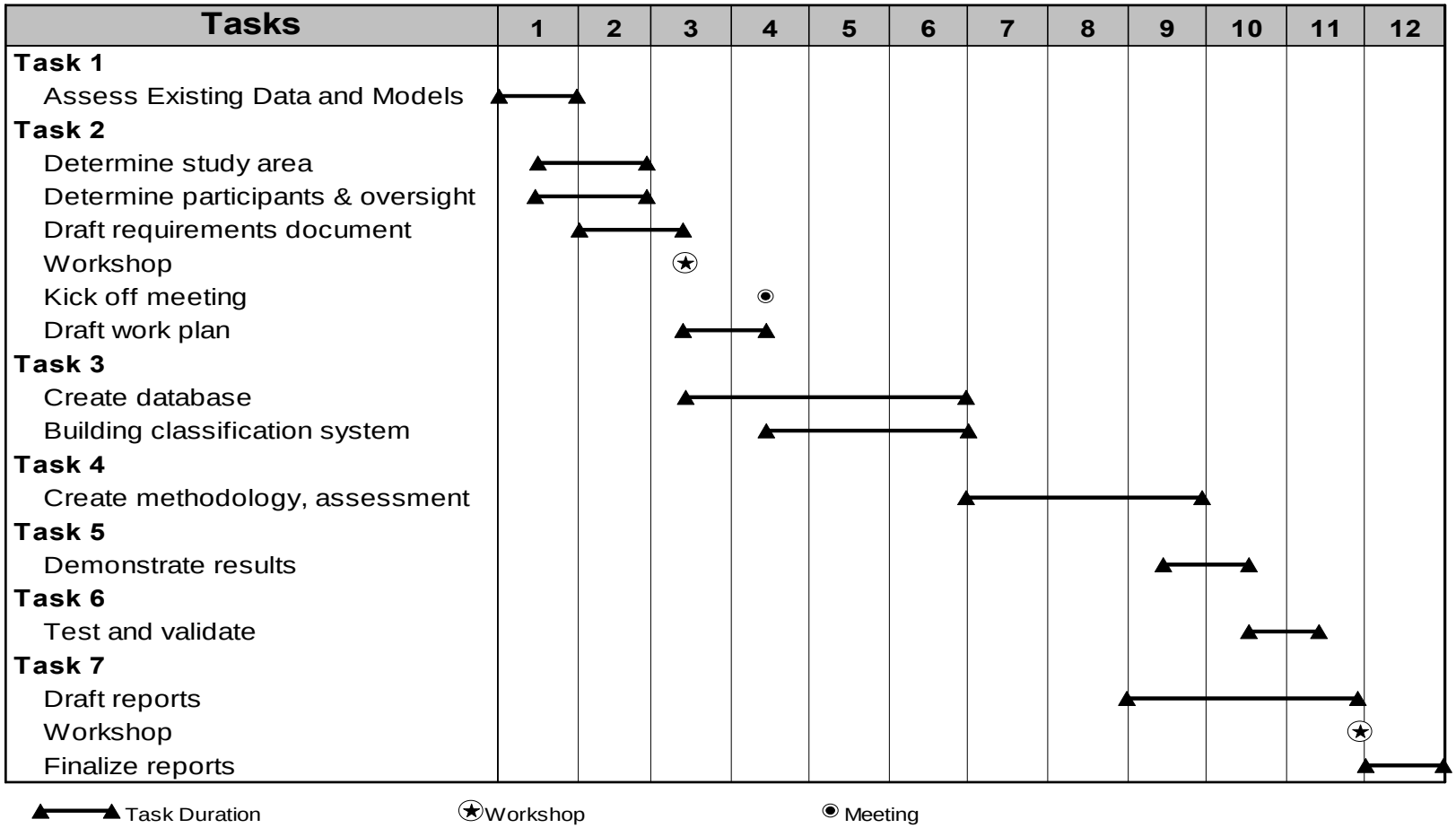
Workshop Program (Day 2)

The purpose of the second day was to open a dialogue between the Turkish and US representatives concerning the kind of risk assessment tool desired and its characteristics,

How some of the methodology issues that affect tool development wiil be approached,

What kind of project will be needed to realize tools development and how we can work together to achieve this objective.

Demonstration Project Schedule



Status of the Project

Joint agreement between

Division of Surveying Techniques,
Istanbul Technical University
&
Mid-America Earthquake Research Center,
University of Illinois, Urbana Champaign

Status of the Project

Establishing a consortium between

Division of Surveying Techniques,
Istanbul Technical University
&
Mid-America Earthquake Research Center,
University of Illinois, Urbana Champaign

Istanbul Seismic Risk Mitigation & Emergency Preparedness Project (ISMEP)

PROJECT OBJECTIVE

The proposed project will initiate a process that aims at transforming Istanbul in the next 10-20 years into a city resilient to major earthquake. The overall goal of the proposed project is to save lives and reduce the social, economic and financial impacts in the event of future earthquakes.

Istanbul Seismic Risk Mitigation & Emergency Preparedness Project (ISMEP)

PROJECT OBJECTIVE

The specific objective of the project is to improve the city of Istanbul's preparedness for a potential earthquake through enhancing the institutional and technical capacity for disaster management and emergency response, strengthening critical public facilities for earthquake resistance, and supporting measures for better enforcement of building codes and land use plans.

ISMEP Components

Component A: Enhancing Emergency Preparedness.

This component will enhance the effectiveness and capacity of the provincial and municipal public safety organizations in Istanbul to prepare for, respond to and recover from significant emergencies, especially those arising from earthquakes.

ISMEP Components

Component B: Seismic Risk Mitigation for Public Facilities.

This component will reduce the risk of future earthquake damage to critical facilities in order to save lives and ensure their continued functioning in the event of an earthquake, through retrofitting of hospitals, schools and other priority public facilities.

ISMEP Components

Component C: Enforcement of Building Codes.

This component will support innovative approaches to better enforcement of building code and compliance with land use plans.

ISMEP Components

Component D: Project Management

This component will support the Istanbul Provincial Administration to implement the project in efficient and transparent manner, and build the institutional capacity to sustain the implementation of Seismic Risk Mitigation and Preparedness program beyond the life of the project.

ISMEP Status

Feasibility studies were initiated last year.

- Emergency Communication systems
- Disaster Management Information Systems
- Improvement of Emergency Response Capability
- Pilot Project for Strengthening Public Buildings (39 schools, 12 University Hospitals, 1 Student Dormitory, 2 Search & Rescue Buildings)
- Bakırköy Province Pilot Project for Strengthening Residences (350 buildings)
- Social Tendency Survey for Residence Strengthening

ISMEP Status

By the end of this year, we hope that will have the application projects of the ISMEP.

With the hope that

Disasters do not turn into Catastrophes