

**MOVE Workshop & Changes Meeting**  
**Katowice, Poland**  
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## Research and Policy on Vulnerability Assessment in Turkey

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### EARTHQUAKES IN TURKEY

- Turkey is on the world's longest faults Alp-Himalayans.
- Greatest loss of lives and damages from earthquakes:
  - Since 1900s: nearly 100.000 loss of lives and 600.000 heavily damaged buildings
- Uncontrollable and rapid urbanization since 1980s
  - in high hazard zones
  - with vulnerable building stock

**Earthquake Hazard Map of Turkey**

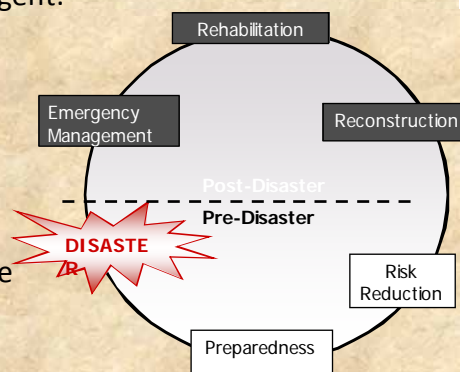
## Conventional Disaster Management

### Cyclic Model of Disaster Management

- Empowered and capable agent:
  - central authority
- Emphasis on post-disaster activities

### Limits of Ex-Post Measures

- Political Exploitation
- Discouraging Self-Insurance and Risk Mitigation
- Financial Burden on State
- Delay of Development



## BEFORE 1999:

### EMPHASIS ON CONVENTIONAL DISASTER POLICIES

- **the Disasters Law (No. 7269)**
  - Major responsibilities of government at both central and local levels
    - **Central:** Ministry of Public Works and Settlement (MPWS)
    - **Local:** Provinces and Municipalities
  - Tasks before and after disasters
    - Emphasis on the post-disaster process
    - Emergency, rescue, rehabilitation



## BEFORE 1999: EMPHASIS ON CONVENTIONAL DISASTER POLICIES

- **the Development Law (No. 3194)**
  - Focuses on new development areas
  - But, we need urban planning tools to intervene in already developed urban areas
    - Uncontrolled & rapid urbanization
    - Lack of inspection mechanisms
      - Urban planning process
      - Construction practices
    - Authorized & un-authorized building stock under risk
  - No tools for risk reduction & risk identification & mitigation



## International Disaster Policy: Shift toward Disaster Risk Reduction

- 1) **1990-2000:** United Nations (UN) – International Decade Disaster Reduction (IDNDR);
- 2) **1994:** Strategy and Plan of Action for a Safer World;
- 3) **2000:** UN- Millennium Declaration- International Strategy for Disaster Reduction (ISDR);
- 4) **2002:** Johannesburg Action Plan;
- 5) **2005:** UN-World Conference on Disaster Reduction in Kobe and Hyogo Declaration;
- 6) **2005-2015: Hyogo Framework for Action - Building the Resilience of Nations and Communities to Disasters;**
- 7) **2009:** UN- Incheon Declaration - Building a local governance alliance for disaster risk reduction;
- 8) **2010-2011:** The UN- ISDR- World Disaster Reduction Campaign: Making Cities Resilient.



## Shift toward Disaster Risk Reduction

### Creation of a Resilient Society through priority areas:

- 1) Political commitment and institutional development
- 2) **Risk identification and assessment**
- 3) Knowledge management
- 4) **Risk management applications and instruments**
- 5) Disaster preparedness, emergency management and contingency planning



## Shift toward Disaster Risk Reduction

'**risk**' and '**risk factors**' instead of '**disaster**'

**Risk** as Product of Probability (p) and Loss (L):  $R=p \times L$

**Natural disaster risk = Hazard x Vulnerability**

'**risk management**' and '**vulnerability**' reduction

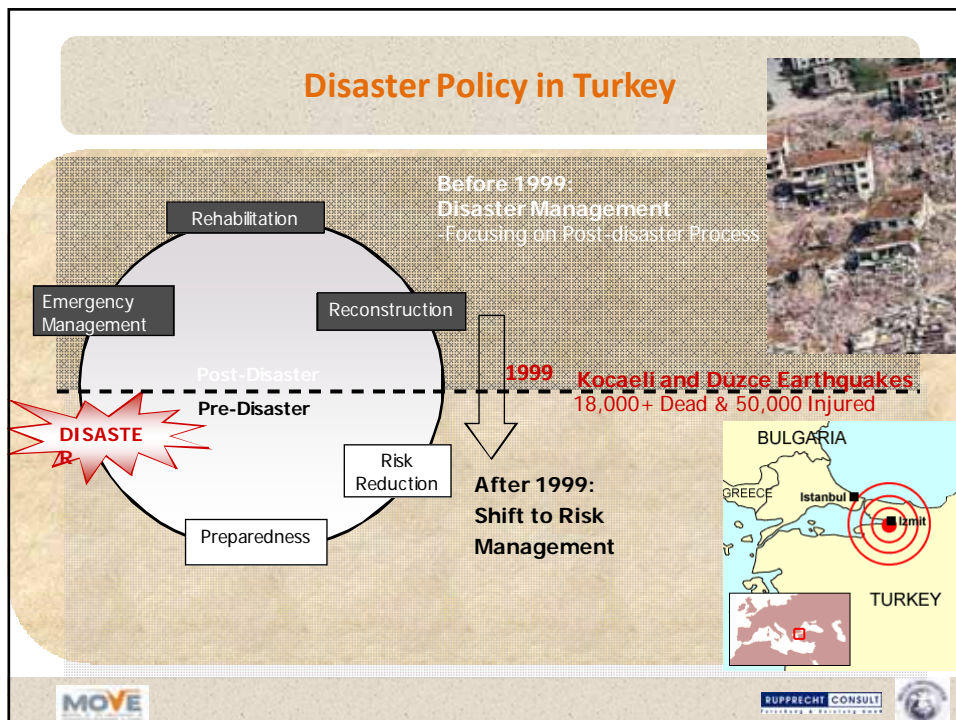
Risk management = Risk Reduction in life and property (and the environment)

Acceptance of unmanageable risks

Integration of **risk reduction** into **sustainable development**

"**mitigation**" instead of "*prevention*"





## AFTER 1999: CHANGES IN THE DISASTER POLICY

### Provisions for better construction practices

- **Compulsory Earthquake Insurance & Turkish Catastrophe Insurance Pool**
  - The Decree of the Board of Ministers (No. 587; 27.12.1999)
  - To lessen the financial burden of the State
  - To promote better construction in terms of insurance techniques
- **Building Supervision**
  - The Building Supervision Decree (No. 595; 10.04.2000)
  - Building Supervision Law (No: 4708; in 2001)
- **Proficiency in the Construction Professions**
  - A Decree (No. 601; 28.06.2000)



## AFTER 1999: CHANGES IN THE DISASTER POLICY

### Increasing Awareness in the Academia, NGOs and Institutions

- National Earthquake Council (2002-2007)
  - National Earthquake Strategy Report (2002)
- 4th Economics Conference of Turkey, State Planning Organization (2004)
  - Earthquake Management Study Group's Report
- 'Earthquake Convention', the Ministry of Public Works and Resettlement (2004)
  - Several Reports



## CHANGES toward COORDINATED RESEARCH & POLICY

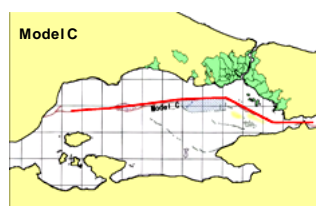
### Earthquake Risk Mitigation Projects

- the Metropolitan Municipality of Istanbul
  - the Japanese JICA (and later the Red-Cross study)
  - the Earthquake Master Plan for Istanbul (EMPI)
    - Identification of 'risk sectors', all possible lines of action for mitigation (regeneration & community participation)
    - Zeytinburnu Urban Regeneration Project
  - Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP)
  - Istanbul Megacity Project

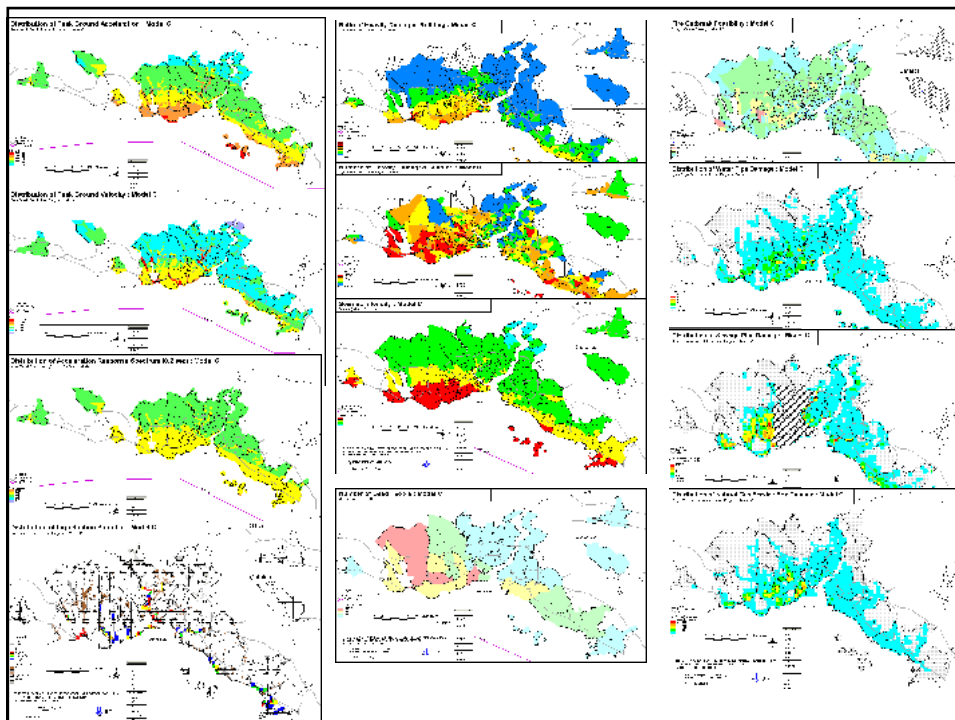


## The Japanese JICA Study (later the Red-Cross study)

- **Urban Conditions for Earthquake Disaster Management**
- **Earthquake Analysis:**
  - **Scenario Earthquakes: Model A, B, C, D**
    - Acc. to fault length and magnitude
  - Ground motion; Liquefaction; Slope Stability Risk
- **Estimation of Damages and Casualties**
  - Buildings & Human Casualties
- **Evaluation of Urban Vulnerability**
  - Buildings, Major Public Facilities, Fire, Lifelines, Bridge, Road and Traffics, etc.



- **Preparedness measures to strengthen vulnerable buildings and urban structures**
  - **Vulnerability Analysis of buildings and urban structures**
    - Estimation of Damage to Infrastructure (Water Pipe, Sewage Pipe, Natural Gas Service, Electricity Cable, Telecommunication, Roads, etc.); Availability of Parks, Open Spaces, etc.
  - **Recommended Measures to**
    - Strengthen Vulnerable buildings and urban structures: Urban Conservation Areas; Land Availability for Improvements; Recommended Strategic Improvement Areas- Mahalles
    - for Urban Land-use plan and Zoning; to promote seismic resistant buildings; frameworks for emergency response and rehabilitation; emergency road system; crises management centres;
  - **Recommended Measures for earthquake disaster mitigation**



## Earthquake Master Plan in Istanbul




- **Istanbul Metropolitan Municipality & 4 Universities:**
  - Middle East Technical University (METU) & Istanbul Technical University (ITU)
  - Bosphorus University & Yildiz Technical University
- **A road-map for action (2003)**
- **METU-ITU approach:**
  - **Urban Risk Analysis Methodology**
    - Mitigation Plans: guidelines based on **urban risk sectors**
    - Action Plans: local / pilot risk mitigation projects

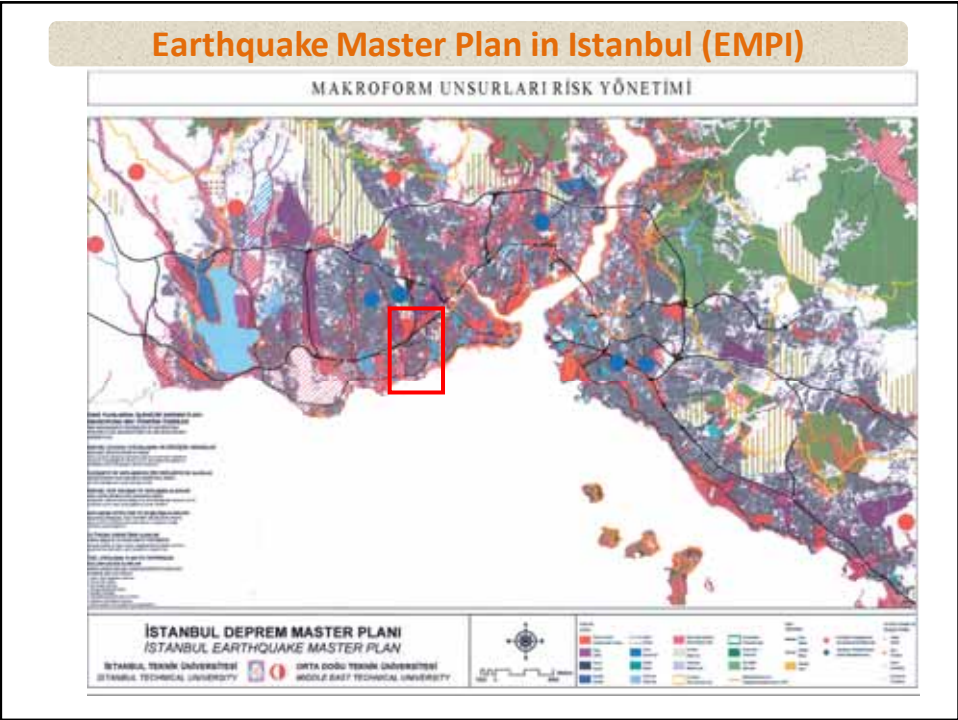


### Earthquake Master Plan in Istanbul (EMPI) Urban Risk Sectors

- *Macro-Form Risks,*
- *Urban Texture/Uses,*
- *Risks In Life-Lines,*
- *Risks In Building Stock,*
- *Hazardous Uses,*
- *Emergency Facilities,*
- *Special Risk Areas,*
- *Open Space Scarcity Risks,*
- *Risks Related To Hazardous Materials,*

- *Vulnerabilities Of Historical And Cultural Heritage,*
- *Risks In Lifelines,*
- *Risks In Building Stock,*
- *Risks Related To Emergency Facilities,*
- *External Risks,*
- *Risks Of Incapacitated Management*
- (Balimir 2004b).



### Local Action Plan – EMPI

**Zeytinburnu Urban Regeneration Plan – Integration of Risk Mitigation into Strategic Planning**

### A Local Action Plan Example: Zeytinburnu Project of METU

## CHANGES IN THE REGULATIONS & ORGANIZATION

### Changes involved with Local Authorities

- **Istanbul** : 2 new institutions (1999)
  - Disaster Management Center (AYM) - Province
  - Disaster Coordination Center (AKOM) – Metropolitan Municipality
- **New regulations**
  - Metropolitan Municipal Governments Law (5216; 10.07.2004)
  - Municipalities Law (5393; 03.07.2005)



## CHANGES IN THE REGULATIONS & ORGANIZATION

### Changes in Post-Disaster Management

- **Institutional Attachments**
  - to the Prime Ministry
    - General Directory of Disasters of the Ministry of Public Works and Settlements (MPWS) and
    - the Kandilli Observatory
  - to the Ministry of the Interior (2000)
    - Directorates of Civil Defense for Rescue and Emergency
  - to the Prime Ministry (1999)
    - General Directorate of Emergency Management



## CHANGES IN THE REGULATIONS & ORGANIZATION

### Changes in Post-Disaster Management

- Establishment of “Disaster and Emergency Management Directorate”

By Integration of:

- the ‘General Directorate of Emergency Management of Turkey’ under the Prime Ministry,
- the ‘General Directorate of Disasters’ under the MPWS
- the ‘General Directorate of Civil Defense’ under the Ministry of Interior

as attached to Prime Ministry (Law No. 6902; 29.05.2009).



## CHANGES IN THE RESEARCH

### From crisis management toward risk management

- Master Thesis
- Doctoral Thesis

involved with

- the collaborated projects
- individual efforts
- Data?
  - Accessibility: Permissions – individual relations
  - Compatability of data (different types)



## An Integrated Earthquake Vulnerability Assessment Framework for Urban Areas

Prof. Dr. Şebnem Düzgün  
Earthquake Engineering Research Center  
Geodetic and Geographic Information Technologies  
Middle East Technical University, Ankara Turkey

### Overall Vulnerability

### Integrated Vulnerability Assessment Framework

### 3D Visualisation

MOVE Outreach Workshop  
Konya, Turkey, 15-16 September 2011

## MEASURING VULNERABILITY IN COMPLEX SYSTEMS

Sakir KUNDAK

### Interactions of Different Types of Vulnerabilities

### Some remarks

- Importance of vulnerability components may change according to specific features of settlements / community and scale.
- Synergy among different types of vulnerabilities should be taken into account.
- It is crucial to find out root causes of vulnerabilities for a starting point.
- Recovering / adapting capacity (related to resilience) is important to assess vulnerability as well.

Figure 1 - Spatial variations of vulnerability components

Figure 2 - Spatial variations of vulnerability components

systemic vulnerability and na-tecs

Kundak & Turkoglu, 2007

## Fragmented & Individualized Nature of Disaster Risk Research & Policy

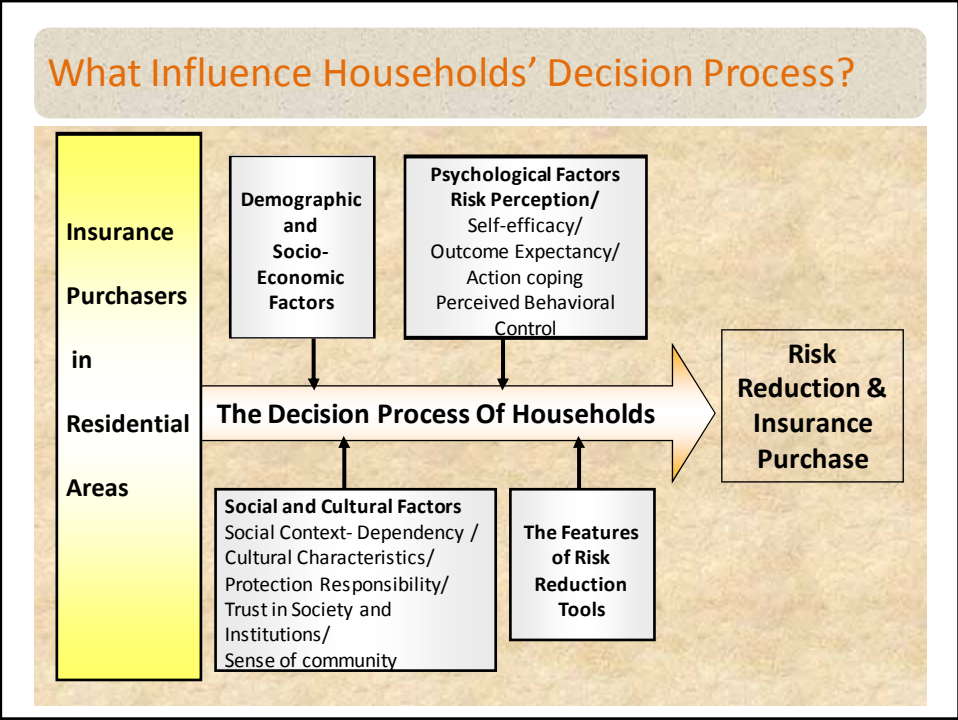
- Emphasis on Post-Disaster Interventions
- Resistance toward Pre-disaster Intervention
  - Conflicts in Concepts: risk mitigation, vulnerability reduction, coping capacity, resilience
- Conflicts in Institutional Capacities & Tasks & Responsibilities?
- No Coordination between Institutions & Research
- Emphasis on Parcel & Building-Scale Interventions (Retrofitting)
- No Solutions for Different Scales (Regional, Urban, Neighbourhood, Building-Blocks (
- Leaving Households to their Decision Process
- Individualized Risk Management



## Turkish Catastrophe Insurance Pool

- **Aimed:**
  - Compulsory Purchase
  - Risk Rated Premiums Linked to Safer Construction
- **In Reality:**
  - Voluntary Purchase
  - Inaccurate Risk-rated Premiums
  - No Link to Construction Practices
    - ▶ **Social Exclusions & Injustice & No Risk Mitigation**
      - Un-authorized Houses:
        - Low Income Households at High Risk
      - Eligible & Authorized Houses:
        - Individualized - Hh Decision Process





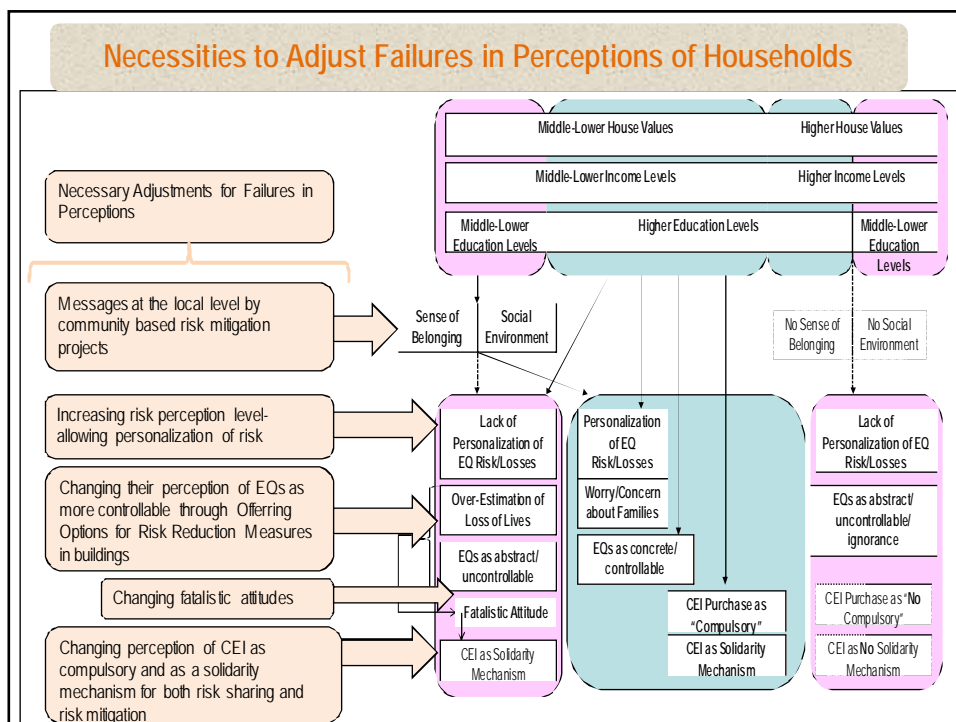
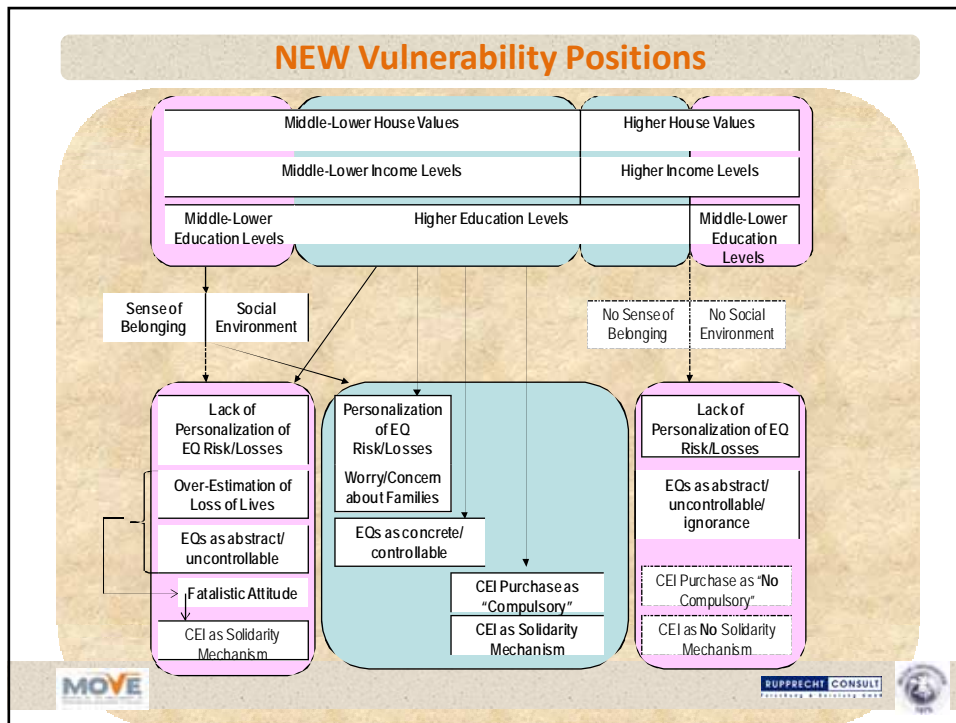
### Methodology of the Research & Sample Selection

**Questionnaires in Zeytinburnu, Istanbul**

**With the Hhs who have already written insurance policies**

**From the Insured Usages Database of Zeytinburnu (from TCIP)**

**Sample Size: 1000 Hhs**  
**All Insureds: 12185 Ins**  
**Insured Houses: 10556 Hhs**





## KENTGES: A CHANGE toward RESTRUCTURATION in Urban Development

### KENTGES: BÜTÜNLEŞİK KENTSEL GELİŞME STRATEJİSİ INTEGRATED URBAN DEVELOPMENT STRATEGY 2008

- **Ministry of Public Works and Settlements**

Among 100 actions

- 1- Re-organization of the Disaster Law and Regulations
- 2- Identification and Assessment of Natural Hazards
- 3- Production of Integrated Hazard Maps
- 4- **Risk Mitigation** (Law-Regulation-Booklets)
- 5- Risk Reduction Research Projects
- 6- Preparing A Guide for "Safe Settlement Design"
- 7- Identification of Hazards Threatened the Human Health and Settlement Safety
- 8- Determination of Settlement Strategies for Energy Efficiency and Climate Adaptation

### Responsible:

Prime Ministry  
Disaster and  
Emergency  
Management  
Presidency



## Conclusion: What we need in Research & Policy?

- Focus on risk reduction (SAVING LIVES & Physical Environment) in each concept
  - Capacity, resilience, vulnerabilities, etc.
- Define stakeholders at each scale/ level and their responsibilities
  - National; Regional; Urban; Local/ Community; Household
- Provide coordination between stakeholders



## Conclusion: What we need in Research & Policy?

- Action oriented solutions
  - **Community-based Risk Reduction (Participation)**
  - Urban regeneration for risk reduction in already developed areas
    - **Creating Indexes (Hazard; Vulnerability; Resilience)**
    - **Urban risk sectors (EMPI Approach)**
    - **Including social factors** – increasing capacities for risks reduction
  - Settling in safe development areas
  - Creating Financial Solutions : Continuous and sustainable oriented to risk reduction



Thanks  
for your attention...

