Regional Risk Assessment in The Netherlands

an introduction by Ruud Houdijk, project manager national guideline
1. Introduction
National guideline: initiators

- Dutch Association for Fire fighting and Disaster management
- Dutch Association for Medical Emergency Management
- Council of Chief Constables
- Council of Municipal Disaster Management
National guideline for regions

- Developed in cooperation with the Ministry of the Interior and Kingdom Relations and experts from nearly all Safety Regions

- 24 of 25 Safety Regions will implement

- Direct correlation with method for national risk assessment

- Scientifically sound combination of tried and tested sub-methods and new elements
Contents

1. Introduction
2. Organisation of public safety and security in The Netherlands
3. Objectives of the regional risk assessment
4. The concept of ‘risk’
5. The process for risk assessment and policy making
6. Hazard identification
7. Risk analysis
8. Risk evaluation
9. From risk assessment to policy making
10. Usability of the Dutch approach for the MiSRaR project
2. Organization of public safety and security in The Netherlands
Kingdom of The Netherlands

- 41.526 km²
- The Dutch Antilles and Aruba
- Borders with Germany and Belgium
The Netherlands: population

- 16.6 million inhabitants
- 50% living in urban areas
- average population density of 397.7 p/km²
- highest population concentrations in the western provinces (Randstad)
The Netherlands: water

- 18% of territory is water
- 50% of land is beneath sea level or threatened by rivers
3 levels of government

- Central government
- Provinces
- Municipalities
Central government

- Seeded in The Hague
- 13 ministries
- Ministries involved in safety and security:
  - Ministry of the Interior and Kingdom Relations (coordination)
  - Ministry of Justice
  - Ministry of Housing, Spatial Planning and the Environment
  - Ministry of Transport, Public Works and Water Management
  - Ministry of Health, Welfare and Sport
  - Ministry of Agriculture, Nature and Food Quality
  - Ministry of Defense
430 municipalities in 12 provinces

Municipalities responsible for:
- Fire services
- Police
- Medical emergency management
- Risk management
- Disaster preparedness

Provinces responsible for:
- Supra-municipal risk management
25 Safety Regions

- Average of 664,000 inhabitants
- On behalf of the municipalities responsible for:
  - Fire services
  - Medical emergency management
  - Disaster preparedness
  - Advice on risk management

- Same regions as the Police
- Mayors are the management (average of 17)
26 Regional Water Authorities

Responsible for the management of:

- water barriers
- water ways
- water quantity (ensuring a correct water level)
- water quality

Borders differ from the 25 Safety Regions
3. Objectives of the regional risk assessment
Objectives

- Insight in actual risks as a basis for risk management and disaster preparedness (‘policy plan’)

- Direct influence from municipalities on the policy of the Safety Regions

- Insight for the Dutch people (risk map)

- Professionalize network management capabilities
4. The concept of ‘risk’
The concept of ‘risk’

- Risk assessment has to enable ‘ranking’ of risks

- Risk is “a composition of the ‘impact’ and ‘probability’ or likelihood of a disaster or crisis”

- 2 separate, non interchangeable dimensions

- Impact is “the total of the consequences”

- Probability is “a forecast about the occurrence”
5. The process for risk assessment and policy making
Process in 6 questions

Risk assessment
- Which hazards threaten our community? (hazard identification)
- How serious are these threats? (risk analysis)
- How important are they to the political decision makers? (risk evaluation)

From risk assessment to policy making
- What are we already doing about the risks? (capability identification)
- What more can we do? (capability analysis)
- What more do we want to do? (setting objectives)
6. Hazard identification
All hazard

- Natural disasters, technology, man-made
- Disasters (single incident) and crises (discontinuity)
- In an all hazard approach a risk analysis ‘yardstick’ is needed that distinguishes between the various sorts of consequences (impact)
Hazardous situations

A combination of:

- ‘sources’ with an inherent risk
- ‘recipients’ that bare the consequences
### Types of disasters and crises

<table>
<thead>
<tr>
<th>Type of hazard</th>
<th>Type of disaster/crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Natural environment</td>
<td>1.1 Floods</td>
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<td>1.2 Wildfires</td>
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<td></td>
<td>1.3 Extreme weather</td>
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<td>1.4 Earthquakes</td>
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<td>1.5 Pests</td>
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<td>1.6 Animal diseases</td>
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<tr>
<td>2. Buildings</td>
<td>2.1 Fires in vulnerable buildings</td>
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<td>2.2 Collapse of buildings</td>
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<tr>
<td>3. Technological risks</td>
<td>3.1 Incident with flammable or explosive substances</td>
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<td></td>
<td>3.2 Incident with toxic substances</td>
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<td></td>
<td>3.3 Nuclear incidents</td>
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<tr>
<td>4. Public services</td>
<td>4.1 Disruption of power supply</td>
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<td>4.2 Disruption of drinking water supply</td>
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<td></td>
<td>4.3 Disruption of sewage handling</td>
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<td></td>
<td>4.4 Disruption of telecommunications and ICT</td>
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<td></td>
<td>4.5 Disruption of waste handling</td>
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<tr>
<td></td>
<td>4.6 Disruption of food supply</td>
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<tr>
<td>5. Transport</td>
<td>5.1 Plane crash</td>
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<td>5.2 Shipping disaster</td>
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<td></td>
<td>5.3 Traffic incidents</td>
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<td>5.4 Incidents in tunnels</td>
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<tr>
<td>6. Public health</td>
<td>6.1 Threats to the public health</td>
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<tr>
<td></td>
<td>6.2 Pandemic outbreaks</td>
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<tr>
<td>7. Social environment</td>
<td>7.1 Panic in crowds</td>
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<td></td>
<td>7.2 Public disorder</td>
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</tbody>
</table>
Risk inventory

- Municipalities and provinces are required by law to make an inventory of hazardous situations
- Risks are projected onto the provincial risk maps
- Safety Regions together analyze ‘border crossing’ risks
- Research of possibilities to automatically generating combinations of risk sources and risk recipients
- For security reasons some risks are not presented on the public risk maps
Example: the city of Dordrecht

- Storage of hazardous substances
- Vulnerable object (library)
- Outside water barriers
- Us
- Storage of fireworks
Example: water depths in case of floods

us (0,5-0,8m)
Example: Maeslantkering
Future risks

- Potential new hazardous situations for the coming 4 years, like:
  - new industries
  - new infrastructure
  - new housing projects

- New types of risks, for example new technology

- Long term risks, for example aging population and global warming
7. Risk analysis
Scenario analysis

- Risk analysis = scenario analysis

- Wilkinson: “a tool for ordering one’s perceptions about alternative future environments in which today’s decisions might be played out”

- Dutch approach: “the expected development of a disaster or crisis, described in terms of:
  - principle causes,
  - concrete triggers, and
  - final consequences for the vital interests of society.”
Objective of scenario analysis

- Ranking risks
- Determining policy options for critical elements in a risk scenario
Funnel 1: from hazards to scenarios

Realistic and representative disaster and crisis scenarios
### Impact criteria

<table>
<thead>
<tr>
<th>Vital interest</th>
<th>Criteria</th>
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</thead>
<tbody>
<tr>
<td>1. Territorial security</td>
<td>1.1 Infringement of the territorial integrity</td>
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<tr>
<td>2. Physical safety (public health)</td>
<td>2.1 Number of fatalities</td>
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<td>2.2 Number of seriously injured &amp; chronically ill</td>
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<td>2.3 Physical suffering</td>
</tr>
<tr>
<td>3. Economic security</td>
<td>3.1 Financial costs</td>
</tr>
<tr>
<td>4. Ecological security</td>
<td>4.1 Long-term damage to flora &amp; fauna</td>
</tr>
<tr>
<td>5. Social and political stability</td>
<td>5.1 Disruption to everyday life</td>
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<tr>
<td></td>
<td>5.2 Violation of the democratic system</td>
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<tr>
<td></td>
<td>5.3 Social psychological impact: public (out) rage and anxiety</td>
</tr>
<tr>
<td>6. Safety of cultural heritage</td>
<td>6.1 Damage to cultural heritage</td>
</tr>
</tbody>
</table>
## Risk classification: impact

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Limited consequences</td>
</tr>
<tr>
<td>B</td>
<td>Substantial consequences</td>
</tr>
<tr>
<td>C</td>
<td>Serious consequences</td>
</tr>
<tr>
<td>D</td>
<td>Very serious consequences</td>
</tr>
<tr>
<td>E</td>
<td>Catastrophic consequences</td>
</tr>
</tbody>
</table>
1. Territorial security

- The actual or functional loss of use of parts of the Dutch territory

- Examples: rivers bursting their banks, terrorist attacks, secession of a region, outbreak of animal disease, attack by a foreign power and chemical, biological or nuclear contamination.

- 1 criterion, 3 indicators:
  - the area of the territory at risk or affected (geographical demarcation);
  - the period of time for which the region is at risk or affected;
  - the population density of the region concerned.
2. Physical safety (or public health)

- The disruption of the functioning of the people of the Netherlands

- 3 criteria:
  - fatal injuries, immediate or premature death within a period of 20 years;
  - seriously injured and chronically ill;
  - physical suffering in terms of lack of basic necessities of life.
3. Economic security

- The undisrupted functioning of the Netherlands as an effective and efficient economy

- 1 criterion: amount of euro’s in terms of repair costs for damage sustained, extra costs and loss of income
4. Ecological security

- Undisturbed continued existence of the natural environment in and around the Netherlands

- Long-term impact on the environment and on nature (flora and fauna) in terms of harm to designated wildlife and scenery conservation areas, and harm to the environment in the broad sense
5. Social and political stability

- Undisrupted continuing existence of a social climate in which individuals can function undisturbed and groups of people can live together peacefully within the framework of the Dutch democratic constitutional state and shared values

- 3 criteria:
  - disruption to everyday life
  - violation of the local and regional democratic system
  - social psychological impact: public (out) rage and anxiety
6. Safety of cultural heritage

- Undisturbed continued existence of the physical remains of the past that are valued by society because of collective memories, national identity, scientific research and/or education of future generations.

- Not the commercial value

- Measured in terms of uniqueness, loss of national identity, limited possibilities for restoration and importance as source for science and education.
Risk classification: probability

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Very unlikely</td>
<td>0.005 - 0.05%</td>
</tr>
<tr>
<td>B</td>
<td>Unlikely</td>
<td>0.05 - 0.5%</td>
</tr>
<tr>
<td>C</td>
<td>Possible</td>
<td>0.5 - 5%</td>
</tr>
<tr>
<td>D</td>
<td>Likely</td>
<td>5 - 50%</td>
</tr>
<tr>
<td>E</td>
<td>Very likely</td>
<td>50 - 100%</td>
</tr>
</tbody>
</table>
Risk diagram: a fictional example
Risk analysis tool

- **Office Excel file**
8. Risk evaluation
Funnel 2: from assessment to priorities

Priority scenarios
Risk diagram: an example
Bestuurlijke prioriteitstelling
9. From risk assessment to policy making
Capaciteiteninventarisatie

- Eerste knelpuntenanalyse t.b.v. bestuurlijke prioritering risico’s
- Risicobeheersing: adviescapaciteit en inzet daarvan
- Operationele prestaties:
  - Welke eenheden en bijstand? Afgezet tegen een tijdsas en tijdstip van de dag
  - Kwalitatieve knelpuntenanalyse:
    • Waar zit de flessenhals?
    • Waar zijn ‘blinde vlekken’ in de regio?
Kenmerken capaciteitenanalyse

- Handelingsperspectieven voor prioritaire risico’s
- Scenarioanalyse
- Verbetermogelijkheden in de ‘vlinderdas’
- Expert judgement
Soorten capaciteiten

- Infrastructuur
- Volksgezondheid
- Handhaving & toezicht
- Financiën
- Bouw & bedrijvigheid
- natuur
- Ruimtelijke hoofdstructuur

- Risicobewustzijn verhogen
- Bron wegnemen
- Ontwikkeling voorkomen
- Blootstelling beperken
- Reactievermogen verhogen

Sociaal economische context
Stappen capaciteitenanalyse

- Capaciteitenlijst
- Capaciteitenselectie
- Gerichte capaciteiteninventarisatie: wat doen we al?
- Capaciteitenanalyse: verbetermogelijkheden
- Advies o.b.v.:
  - Haalbaarheid
  - Bestuurlijk afbreukrisico
  - Quick wins
  - Kosten-baten
  - Etc.
10. Usability for MiSRaR
In the rebound: the 6 questions

Risk assessment
- Which hazards threaten our community? (hazard identification)
- How serious are these threats? (risk analysis)
- How important are they to the political decision makers? (risk evaluation)

From risk assessment to policy making
- What are we already doing about the risks? (capability identification)
- What more can we do? (capability analysis)
- What more do we want to do? (setting objectives)

But…:
- Cost-benefit analysis