




The analysis of physical effect of natural hazard for Natech risk assessment

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Outline

- Background
 - Natech risk assessment
 - Risk assessment of chemical industries
- Data collection
- Results
 - Five categories
- Concluding remarks

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Background

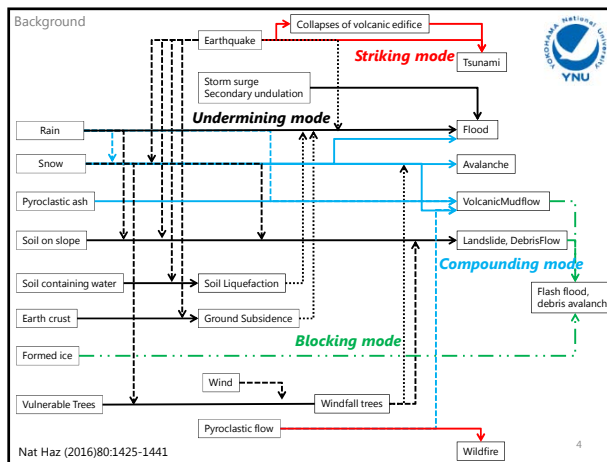
Natech

Natech ... Natural Hazard triggered technological accidents

- One natural hazard can cause several kinds of hazardous impacts
 - can affect a large area and become transboundary events
 - can impact several parts of installation / several facilities at the same time
- One natural hazard can trigger others (cascading natural disaster)




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Background

Natech risk analysis

1. Analysis of lessons learned including local experience from former natural events
2. Identification of parts of a facility which may be affected by natural hazards
3. Analysis of impact of natural hazards
 1. Analysis of hazardous properties of substances and mixtures
 2. Analysis equipment behaviour
 3. Analysis of the impact of loss of supply means
 4. Impact of safety measures



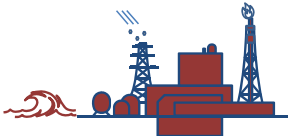
Report of the workshop on natech risk management (23-25 May 2012 Dresden, Germany), ENV/JM/MONO(2013)4, OECD


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Background

Natech risk management: leaning lessons

- The knowledge or experience of natural hazard
 - Natech risk awareness
 - Adequate preparedness
 - Proper emergency planning
- Indigenous to a particular area
 - Global climate change
 - Technology transfer





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Background

Natech risk analysis

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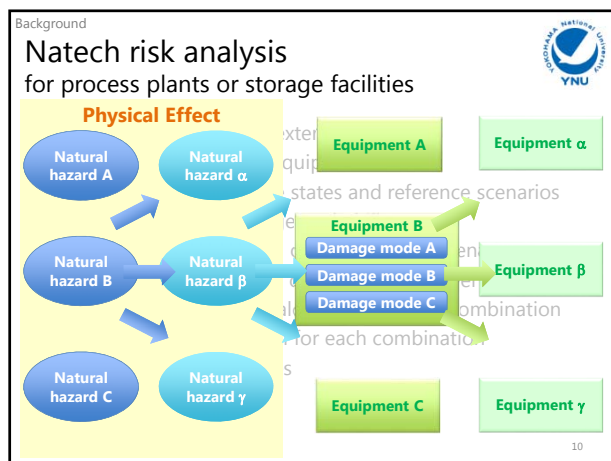
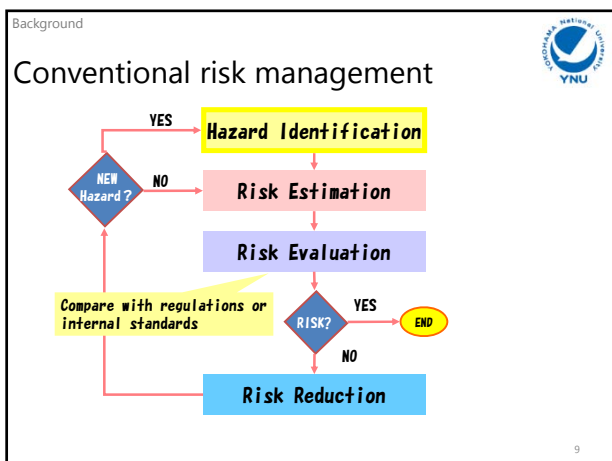
Report of the workshop on natech risk management (23-25 May 2012 Dresden, Germany), ENV/JM/MONO(2013)4, OECD 7

Background

Natech risk analysis for process plants or storage facilities

1. Characterization of the external event
2. Identification of target equipment
3. Identification of damage states and reference scenarios
4. Estimation of the damage probability
5. Consequence evaluation of the reference scenario
6. Identification of credible combinations of events
7. Frequency/probability calculation for each combination
8. Consequence calculation for each combination
9. Calculation of risk indices

E.Renni et al., Awareness and mitigation of NaTech accidents: Toward a methodology for risk assessment, CHEMICAL ENGINEERING TRANSACTIONS, 19(2010):383-389 8



The aim of this study

- Systematic approach for preliminary Natech risk assessment is needed
 - Focus on physical impact
 - Applicable in unified manner

**Analysis physical effects of natural hazards
Develop an inventory for Natech risk assessment**

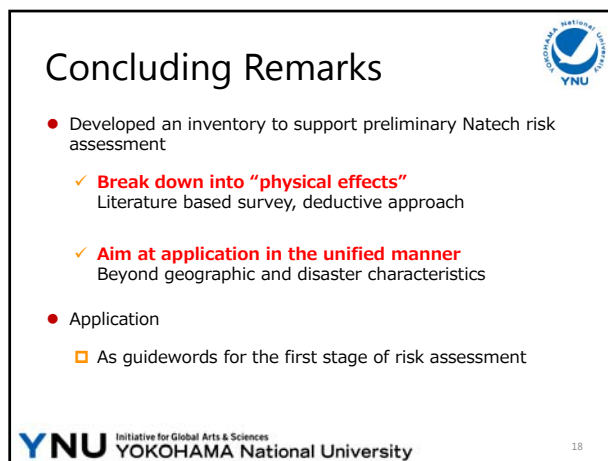
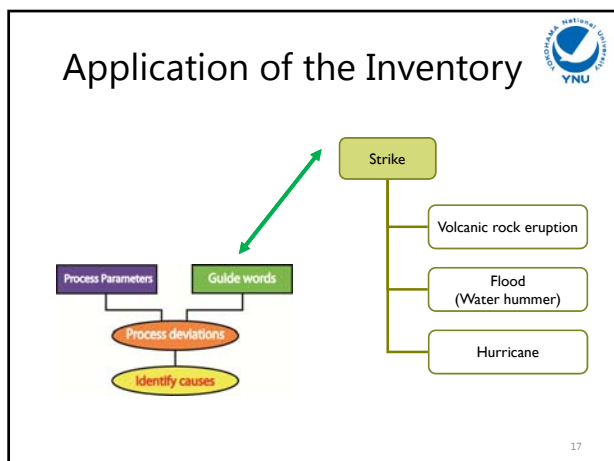
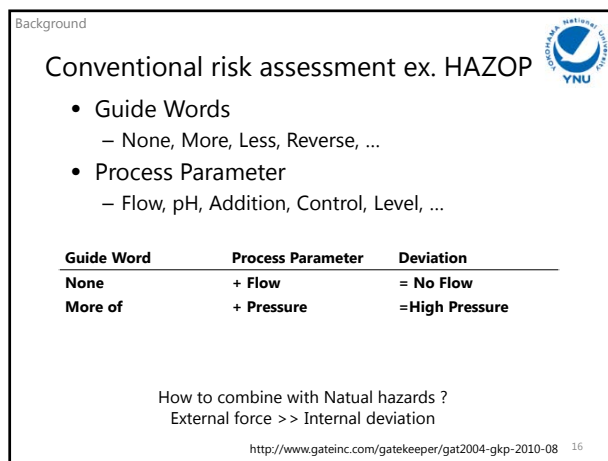
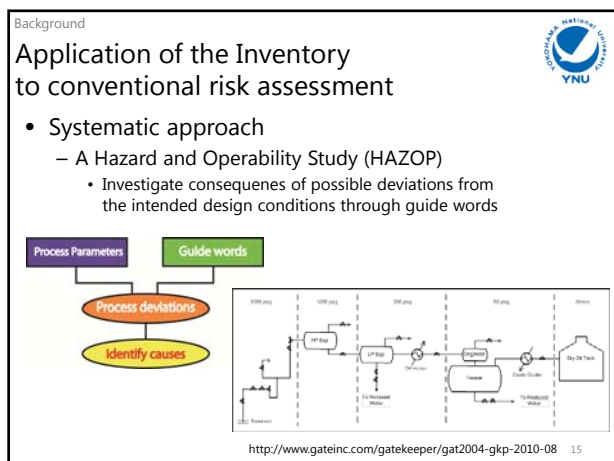
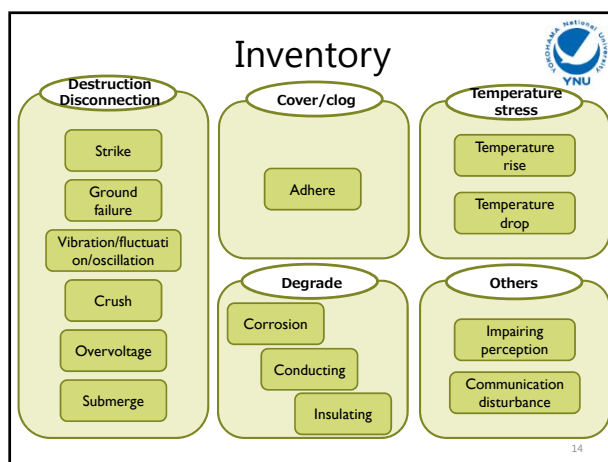
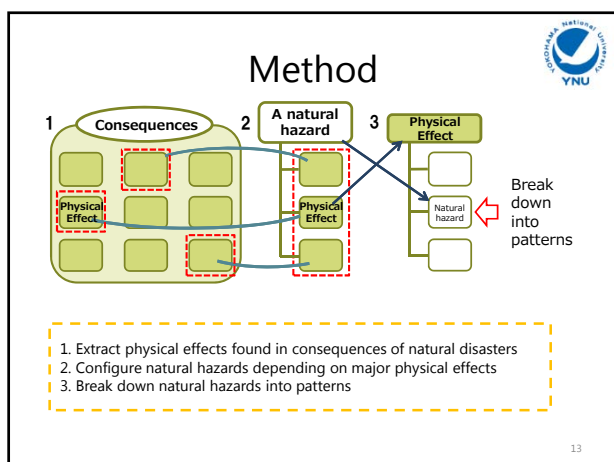
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Method

- Literature and database survey
 - Asahi news database
- Natural hazards
 - Meteorological
 - torrential rain
 - Strong Wind, Hurricane, Tornade
 - Flood
 - Heavy snow
 - Lightning
 - Hail
 - Terrestrial
 - Earthquake
 - Volcanic eruption
 - Land slide, Avalanche
 - Hydrological
 - Tsunami
 - High tide
 - Others
 - Heat wave
 - Cold wave

- How each natural hazard impacted
- What physical effect caused destruction, malfunction, or control failures.

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Thank you very much for your attention.

