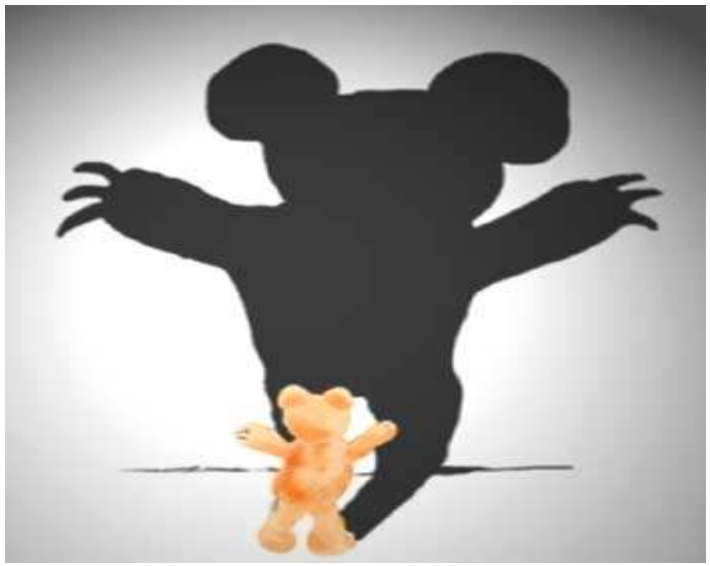
# Acceptance of Risk

## How people perceive and evaluate threats to their health and environment



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# What Do We Know?

Janus face –
roman god of ambivalence/ambiguity

# RISK PERCEPTION

# Principles of Hazard Perception

- Human behavior is guided by perceptions, not by scientific knowledge about “facts”
- Perceptions are a well-studied subject of social science research: they differ from expert assessments, but they follow consistent patterns and rationales
- There are four genuine strategies to cope with threats: fight, flight, playing dead, experimentation

**FIGHT**

**Playing dead**

**FLIGHT**

# Qualitative Risk Characteristics

- with respect to the nature of risk:
  - dread
  - familiarity
  - personal experience (perceptible by human senses)
  - natural versus artificial risk source

- with respect to the risk situation:
  - voluntariness
  - controllability
  - fair distribution of risks and benefits
  - confidence in risk management

# Qualitative Benefit Characteristics

- with respect to the nature of the benefit:
  - Commonly agreed social need such as competitiveness or quality of life
  - Familiarity (comprehensibility)
  - Personal experience (control over benefits)

- with respect to the social situation:
  - Embedding in positive social context
  - Compatibility with one's own lifestyle
  - Fair distribution of risks and benefits
  - Confidence in risk management and regulation

# Dominant Risk Perception Clusters

- *Emerging danger:* randomness as threat
- *Creeping danger:* confidence or zero-risk
- *Suppressed danger:* myth of cycles
- *Weighing risks:* applied only to betting
- *Desired risks:* personal challenge

# Cluster: Creeping Danger

- Key characteristics
  - Long delay between exposure and effect
  - No possibility to detect the danger by human senses
  - Reliability on information from third parties
- Key variable trust:
  - If yes: risk-benefit balancing accepted
  - If no: request for zero risk (no benefits considered)
  - If maybe: orientation on external criteria

# Cluster: Pending Danger

Key characteristics

- Low-probability, high-consequence risk
- Sophisticated technology with little long-term familiarity
- Little time for warning and emergency measures

- High sensibility for indicators of human failures or organizational problems (high reliability)
- Concern about randomness of catastrophic events
- Risk aversion most frequent response

# Cluster: Suppressed Danger

- Key characteristics
  - Belief in cyclical nature of hazard
  - Idyllic image of nature
  - Attitude: It won't happen to me
- Key responses:
  - Re-settlement in the risk-prone area (until forced otherwise)
  - Demand for public aid and assistance
  - Moral hazard (Insurance)
  - More recently: Search for someone to blame

# HDR Project Risks : Basel Case Study

## The Project:

In the City of Basel (a major town in Switzerland) a geothermal bore was drilled to a depth of 5,000 m bgl. In December 2006 fracing for reservoir stimulation started.

## The Event:

On December 8, 2006 a seismic shock with a magnitude 3.4 occurred. Several buildings in close distance to the epicentre were damaged. As trigger of the seismic shock the fracturing process of the HDR project was identified. In the following time several additional shocks with magnitudes > 3 happened.

## The Result:

The project was stopped. The relevant Authorities decided to order a Risk Study for the decision if the project may proceed. Current losses/claims were: High financial losses to compensate damages, high financial project losses, high reputational losses for the operational company, extreme loss of trust in the population, huge time loss.
Final result after the Risk Study: The project was not continued.

# Basel- Risk Appraisal

## Sociological Considerations:

- ***Exposure Problem:*** As only 5,000 households would directly benefit from the DHM project compared to 542,000 residents who would be exposed to the tremors by feeling them in their daily life is not a favourable ratio.
- ***Equity problem:*** Further, as the area where the damage occurs does not correlate with the area of the planned heat distribution, inequity between benefactors and risk bearers is created.
- ***Avoidability:*** There are indications that future induced earthquakes will not be perceived by the population as reasonable - the population feel a material, sanitary and mental threat from earthquakes.
- ***Risk Cluster:*** The qualitative interviews demonstrated that the earthquakes were perceived as pending dangers nor natural cycles

# Quotes

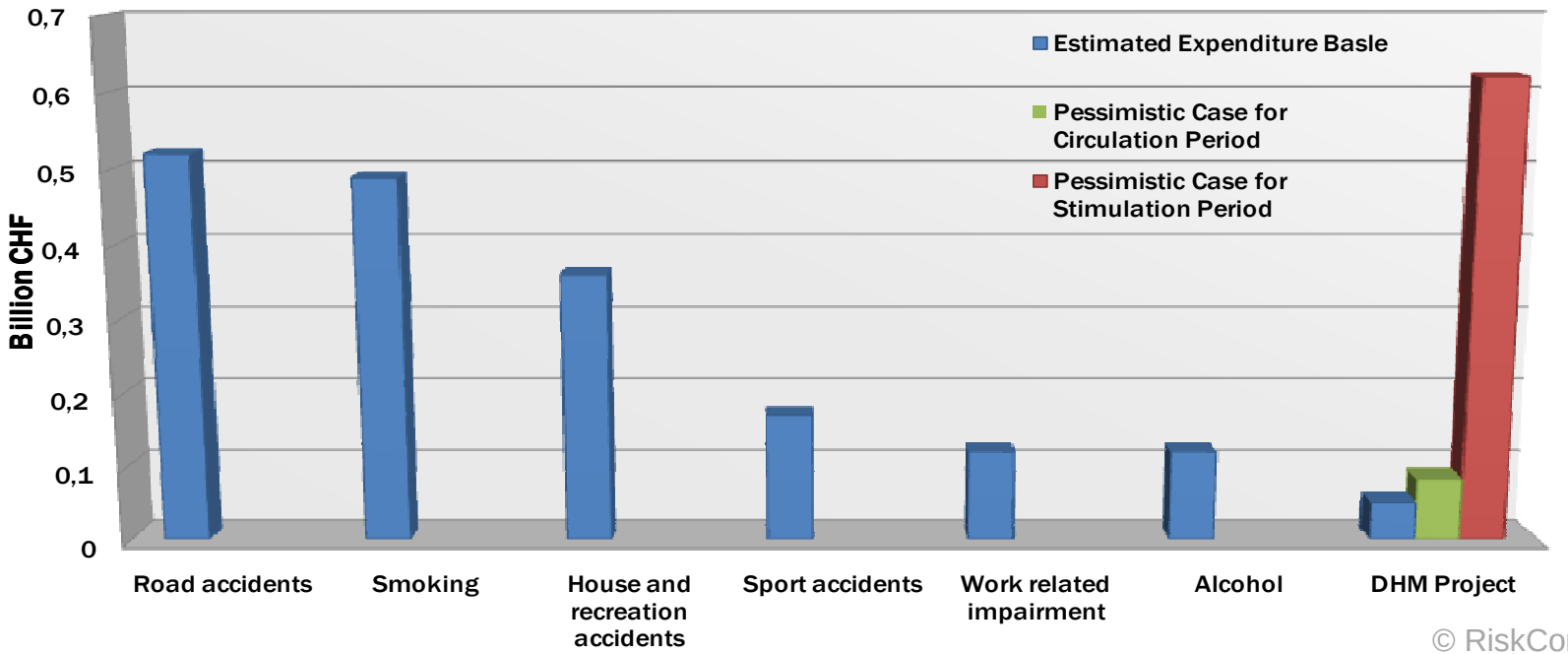
- *"After the bang I took a guided tour to the site and was very surprised at first that no project manager was there to respond to the numerous questions. There was a complete absence of risk dialogue, which in my opinion jeopardised the people's acceptance for the project."*

- *"Geothermal energy will profit from anti-nuclear activists becoming more important."*

- *"Generally we are absolutely positive about geothermal energy, but we have to know who will take responsibility for an OK."*

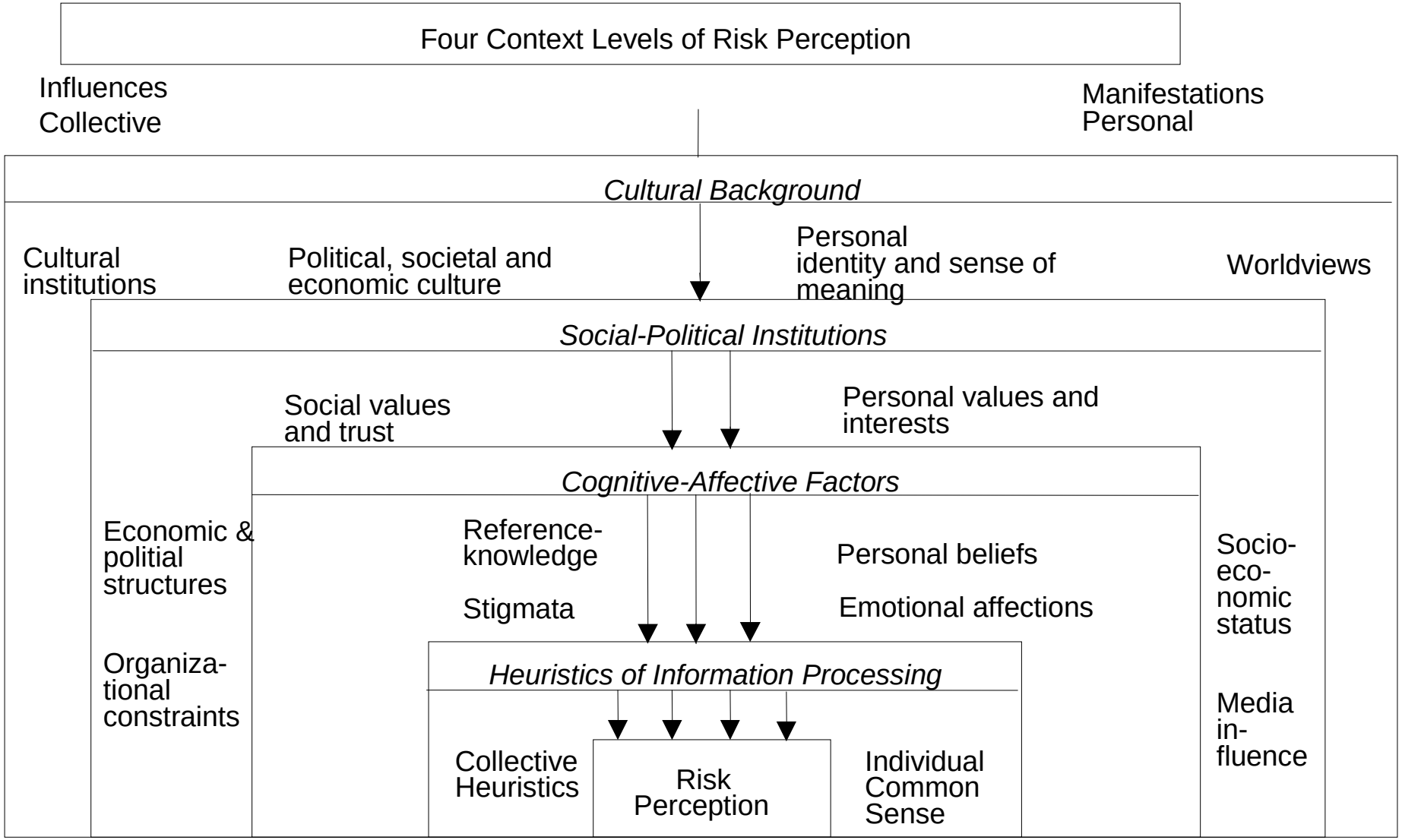
- *"If a political consensus is reached, we would endure the quakes. But there has to be a legal basis that provides the necessary framework. Then details such as the question of liability insurance and compensation are secondary."*

# Basel- Risk Appraisal




| | Road accidents | Smoking | House and recreation accidents | Sport accidents | Work related impairment | Alcohol | DHM Project |
|---|---|---|---|---|---|---|---|
| Estimated Expenditure Basle | 0,52 | 0,49 | 0,36 | 0,17 | 0,12 | 0,12 | 0,05 |
| Pessimistic Case for Circulation Period | | | | | | | 0,083 |
| Pessimistic Case for Stimulation Period | | | | | | | 0,62 |

# Integrative Approach(Rohrmann/Renn)



# Risk Perception

## Empirical Results

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- with respect to causal factors
  - Risk characteristics such as personal control, dread or familiarity (highly influential)
  - Personal value orientation  (selectively important)
    - Materialistic
    - Hedonistic
    - Work Ethics
    - Post-materialistic
  - Trust in institutions (creeping danger: high)
  - Stigma Effects  (selected risks but then very powerful)
  - Socio-demographic variables  (minor effect)

# Empirical Results

- with respect to countries
  - Trust:
    - Europe: low in regulation, high in science, high in NGOs
    - US: medium in regulation, split on science, polarized regarding NGOs
    - Japan:  normally high in regulation, high in science, medium to low in NGOs
  - Relevance of risk characteristics
    - Europe: -- artificiality –no personal control -dread,
    - USA:: --familiarity, --dread, --unfair
    - Japan: --artificiality – no institutional control, -foreign

# Risk Perception

## Implications

# Implications for Risk Management and Communication

- **For communication**
  - Provide the *right* audience with the *right* information through the *right* source and channel
  - Provide *proactive communication* about all issues that matter to people and their risk-benefit perception

- **For management**
  - *Design technologies* in a way that they reduce the potential for fear and increase the confidence in the potential benefit for society and consumers
  - Incorporate the views and opinions of all stakeholders in the *process* of risk analysis and governance

# Summary

- People behave according to perceptions not facts
- Perceptions follow consistent patterns, but their expression may vary from culture to culture
- Perceptions are governed by qualitative characteristics, semantic patterns, trust, and value orientations
- Of special importance are the clusters of pending risks and emerging risks
- The patterns and mechanisms of risk perception are rather universal yet their relative weight differ from culture to culture

# Not to forget:

Risk managers cannot produce certainty but can help people to develop coping mechanisms to deal prudently with the necessary uncertainty that is required for societies to progress