

What is Risk?

Different perspectives and implications
for risk management

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What is Risk?



What is risk?

History

Observations

Present

Future



Risk offshore platform



Where is the risk?

**Mental
construction?**

What is Risk?



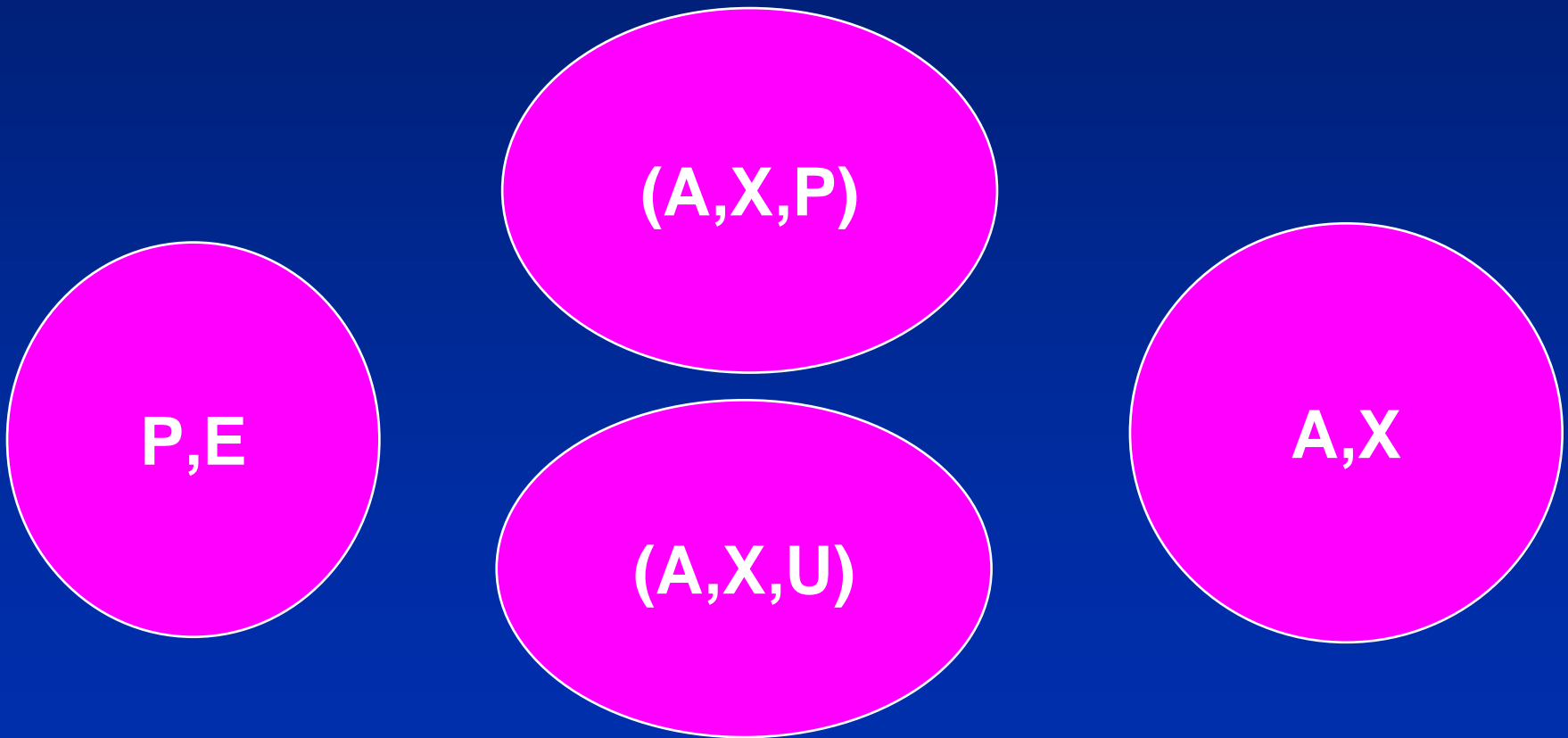
Merriam-Webster online Dictionary:

What is Risk?

- possibility of loss or injury
- someone or something that creates or suggests a hazard
- the chance of loss
- the degree of probability of such loss

Scientific Risk Community:

What is Risk?



A: Event, X: consequences of A



(A,X,P)
P,E

LNG plant

LNG plant

(A,X,P)
P,E

(A,X,U)



Conclusion on risk acceptability, $P \leq 10^{-5}$

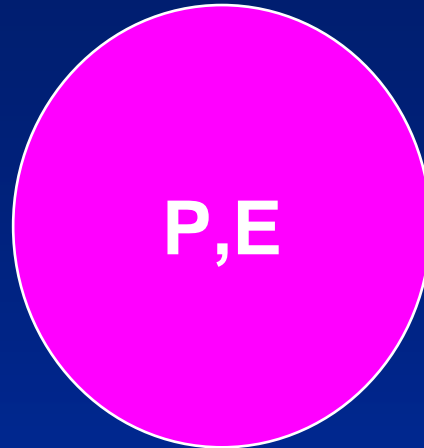
**Risk reduction processes (ALARP) based
on P and E**

Social scientist critique of risk assessments

Risk-informed decision-making, not risk-based

- Risk assessment consultants and the formal decision-making remain relatively unaffected

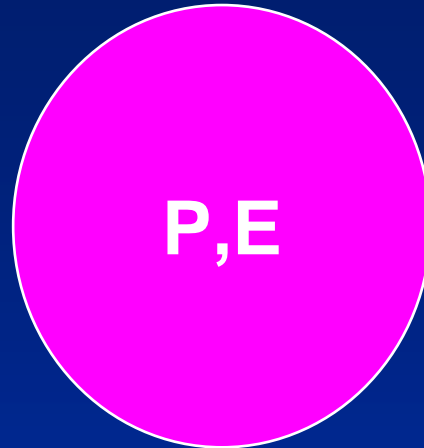
What is Risk?



- Risk equals expected loss
- Risk is the probability of an adverse outcome

A: Event, X: consequences of A

What is Risk?

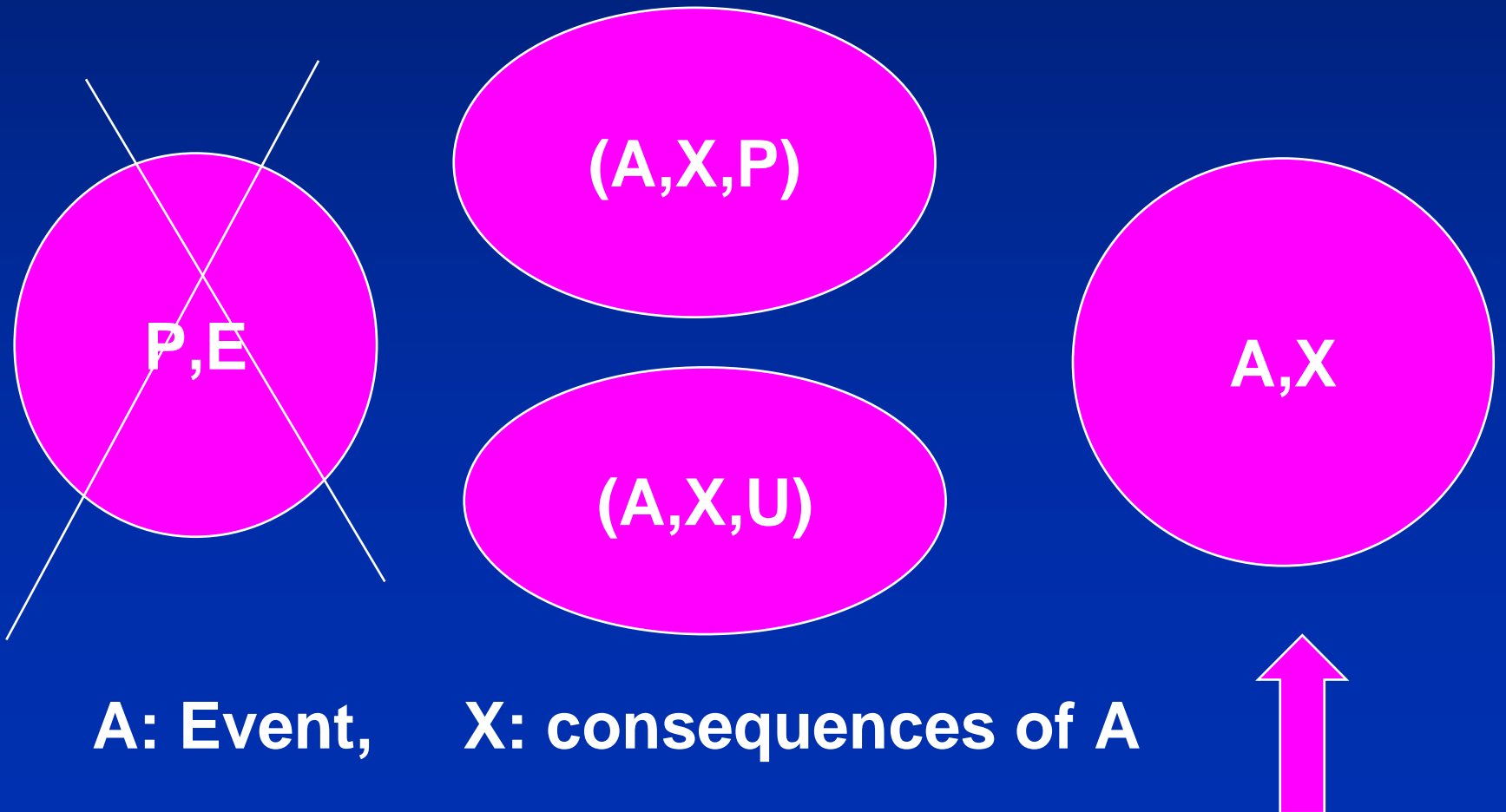


- Risk equals expected disutility
- Risk refers to situations with known probabilities for the randomness the decision maker is faced with

A: Event, X: consequences of A

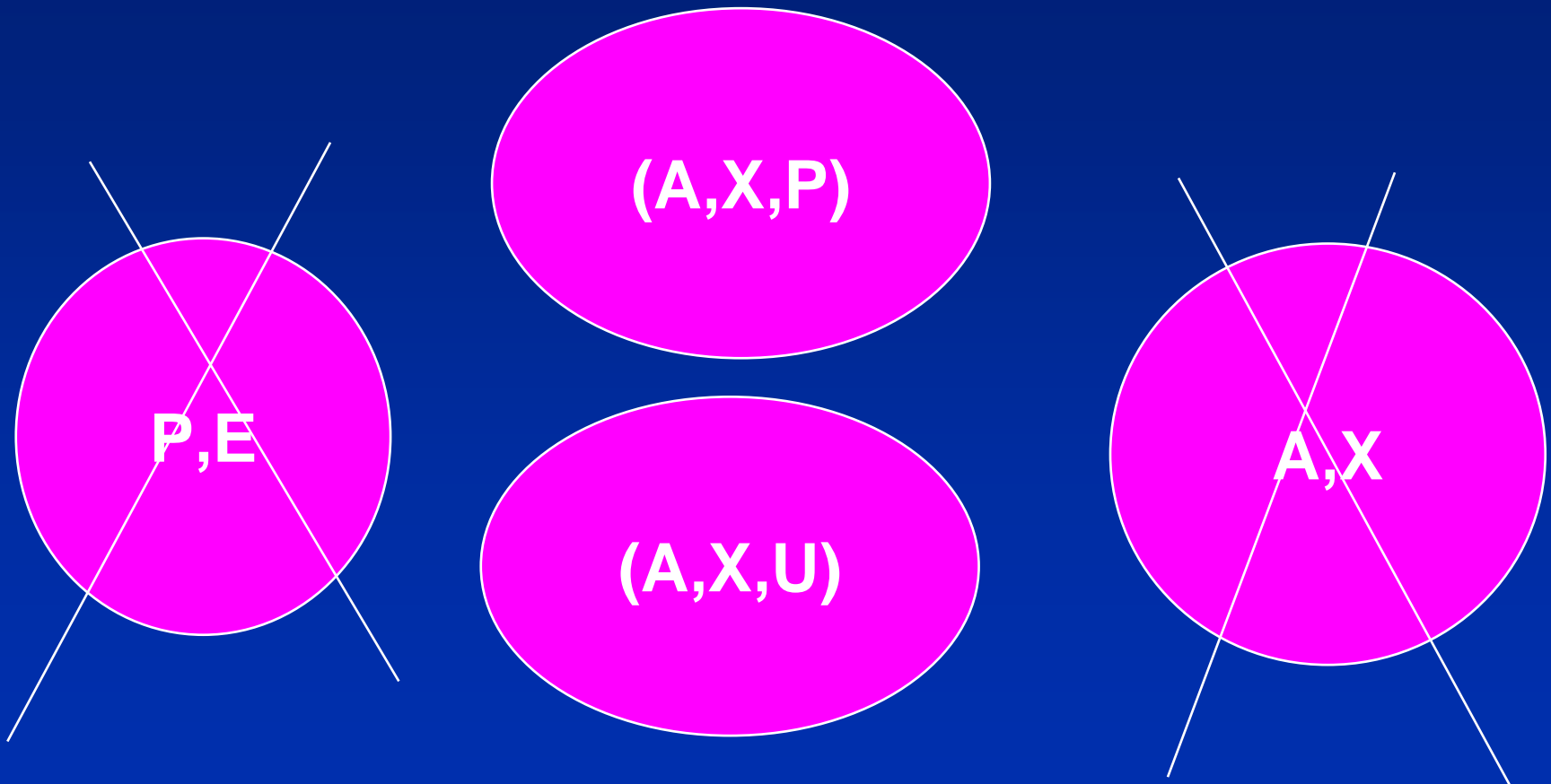
Scientific Risk Community:

What is Risk?



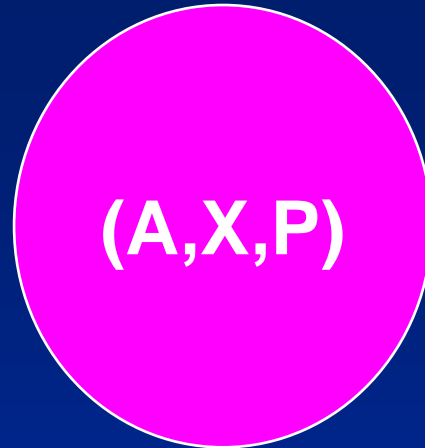
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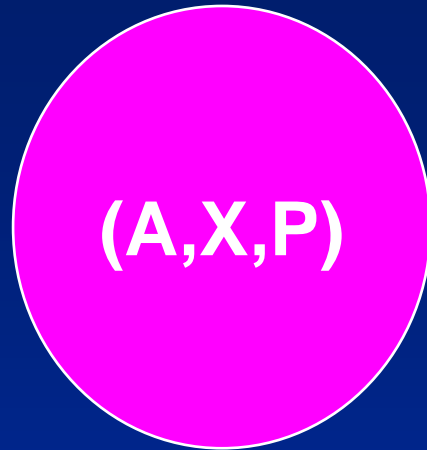
What is Risk?



- Risk is combination of probability of an event and its consequences (ISO 2002)
- Risk is a measure of the probability and severity of adverse effects
- Risk is defined as a set of scenarios s of which has a probability p and a consequence c

A: Event, X: consequences of A

What is Risk?



- What is the meaning of P?

Probability of an
attack next year

P(falling)



1000 m

What is a probability?

Relative frequency
interpretation

P^* of P

Subjective
probabilities

$P(A|K)$

Jacob Bernoulli (1654-1705)



From gambling to the
real world

Goal: Determine probabilities with
a high level of accuracy

Moral certainty

What is risk?

(A, X, P)

Relative frequency
interpretation

$(A, X, P, P^*, U(P, P^*), K)$

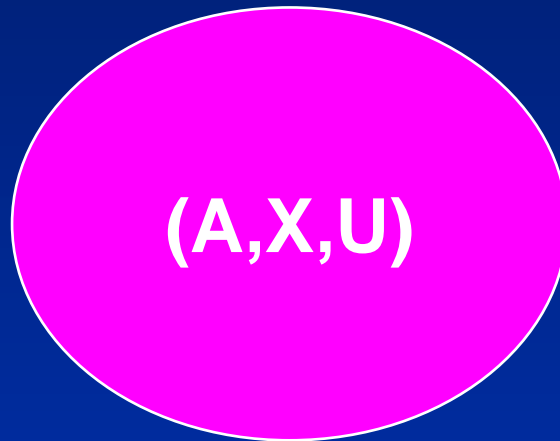
Subjective
probabilities

(A, X, P, K)

$P_f, P(P_f)$ – probability of frequency
approach

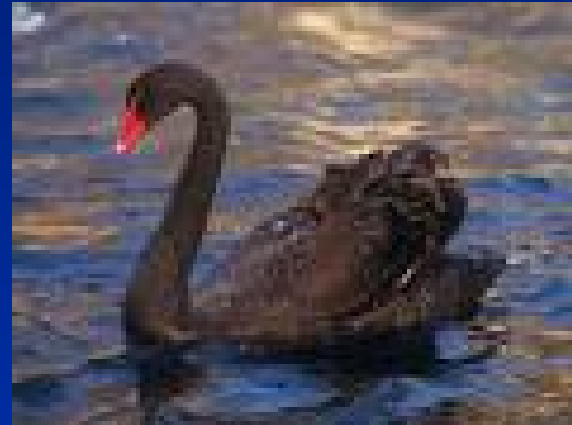
Scientific Risk Community:

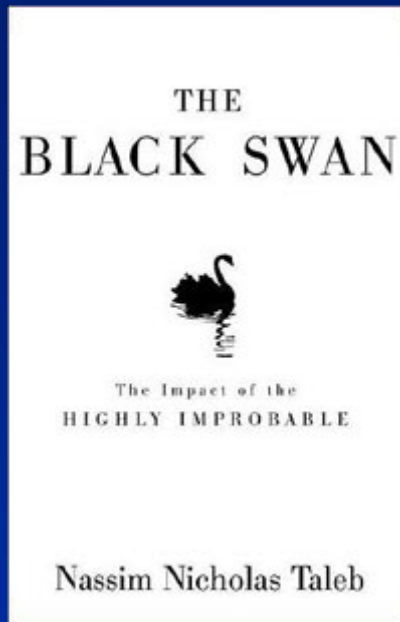
What is Risk?



Aven 2007, Aven and Renn 2008

Risk description: (A,X,U,P,K)





Nassim N. Taleb



- **Mediocristan**
(Normalistan)
- **Extremistan**

Uncertainties in phenomena and processes

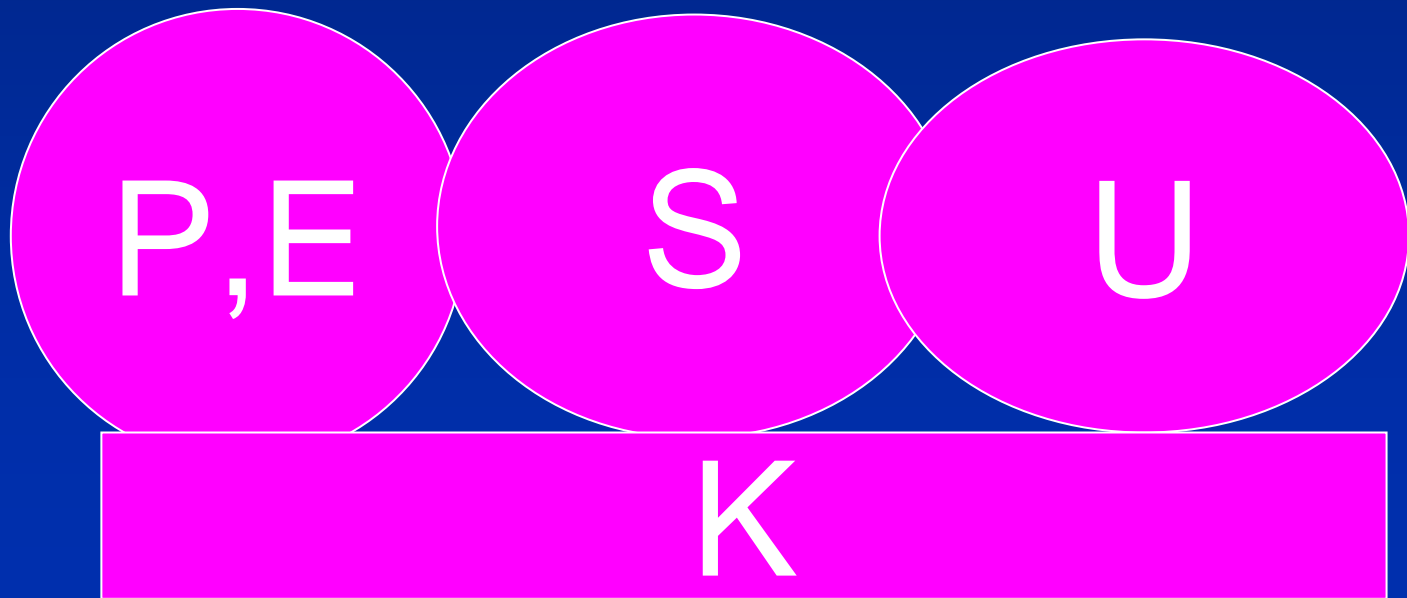


$$P(\text{health problems} \mid K) \\ = 0.01$$

Surprises



Risk description



Effect on Risk Management (A,X,U,P,K)

- A broader risk picture
- "Mechanistic" use of risk assessment cannot be justified
- More management involvement
- Serve the industry? Society? LNG-plant

ALARP

- Risk shall be reduced to a level that is as low as reasonably practicable
- "Grossly disproportionate",



U?

What is Risk?



**ISO (2007) draft:
risk is the effect of
uncertainty on
objectives**

**Should we search for one
universal perspective?**

Development trends

- Broader risk perspective
- Uncertainty assessments
 - Flage, R., Aven, T. and Zio, E. (2008) Alternative Representations of Uncertainty in Reliability and Risk Analysis – Review and Discussion. ESREL 2008
- Incorporating human and organisational factors

TERJE AVEN

Risk Analysis

Assessing Uncertainties Beyond
Expected Values and Probabilities

 WILEY

Wiley 2008