

TECHNOLOGICAL RISK

What are the real dangers, if any, of toxic chemicals, the greenhouse effect, microwave radiation, nuclear power, air travel, automobile travel, carcinogens of all kinds, and other threats to our peace of mind?

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Probing the nature of risk

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October 2021

Risk

Related to ...

... science

... technology

Major issue:

Political

Social

Causes ...

... uneasiness about scientific process

Risk and benefits go together

Miracles of modern chemistry

Chemical contamination

“Clean” electricity from nuclear power plants

Nuclear accidents

Vaccines against disease

Harm (probabilistically rare) widely publicized

Parents refuse to immunize children

Fluoridation of drinking water fights tooth decay

Fear of chemicals

Combating COVID-19 anti-vaxxers: Lessons from political philosophy



... link ... between the African communitarian philosophy of Ubuntu (Humaneness) and positive freedom

... isiZulu phrase, *Umntu ngumuntu ngabantu*, (I am, because we are)

... implies that: I am part of my community, where the good I do reflects back onto the society.

Identifying Strategies to Boost COVID-19 Vaccine Acceptance in the United States

The three Cs:

Boosting COVID-19 vaccine acceptance in the United States can be achieved by

(1) boosting confidence in the safety and effectiveness of the COVID-19 vaccines,

(2) combating complacency about the pandemic, and

(3) increasing the convenience of getting vaccinated.

Σιγά, χτυπήσαμε
ένα παγάκι και το
βάφτισαν
παγόβουνο!

Όλα αυτά είναι
φέματα για να
πουλήσουν
σωσίβια

Τα σωσίβια είναι
επικίνδυνα. Άκουσα
ότι 1 στα 100,000
μπορεί να
ξεφουσκώσει

Γιατί να μην
μπορώ να
διαλέξω μάρκα
σωσιβίου;

Μας πουλάνε παραμύθι
ότι πνίγεται κόσμος,
ενώ ξεκάθαρα πρόκειται
για χειμερινούς
κολυμβητές

Δεν μπορείς να με
αναγκάσεις να βάλω
σωσίβιο, είναι
αντισυνταγματικό

Εχω δυνατό
οργανισμό,
προτιμώ να
κολυμπήσω

ΟΚ κάποιοι πνίγονται,
αλλά για τις χιλιάδες
που πεθαίνουν απ' την
πείνα δεν λέτε τίποτε

Δεν είδα ποτέ μου
παγόβουνο με τα μάτια
μου, άρα δεν υπάρχουν.

We are both ...

... beholden to technology

... suspicious of associated risks

Especially when they are unfamiliar

An uneasy cohabitation!

Risk = price we pay for benefits

Hard to estimate

Even for experts

Most of us agree that ...

... there is no point in exposing ourselves to a risk
for which we get nothing in return

... we ought to accept great risks if the stakes are high

Trivial risks that scare us

High level nuclear wastes in geologic storage
may leak in 1000s of years

Real risks that don't bother us

Accidental electrocutions

Most of the world uses domestic distribution
voltage higher than 110 V → economic gains

Lighting accidents (fatal)

Smoking!

Some doctors smoke!

More prevalent among

Less educated

Blue collar workers

Difficulties related to risk ...

... assessment

... management

Importance of ...

... public understanding of the issue

Threats to life

Morbidity (sickness)

Mortality (death)

Important risk issues

Value of (human) life

Regulation of risk

Specific risk examples

Toxic chemicals

Chemical carcinogenesis

Transportation

Highway safety

Air transportation

Radiation

[Ionizing](#)

[Non-ionizing](#)

More specific risk examples

Energy

Fossil fuels

Wind turbines

Nuclear winter

Global politics

Nuclear war

Nuclear winter

[Dr. Strangelove](#)

Risk depends on ...

... (geopolitical and economic) location

Visible in developed nations

... time

Became important in last 40+ years

Necessary background for appreciation of risk

Likelihood of rare events

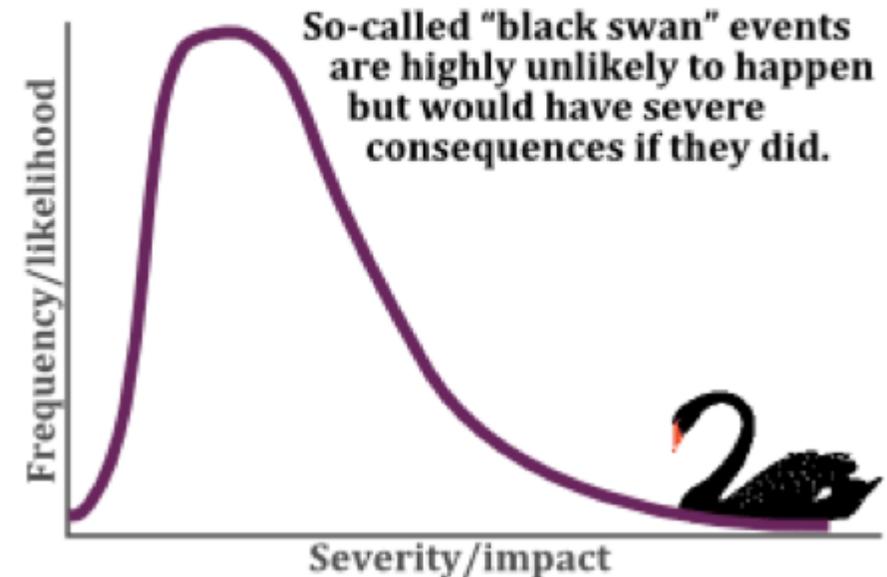
Black swan events

Minimal knowledge of ...

... statistics

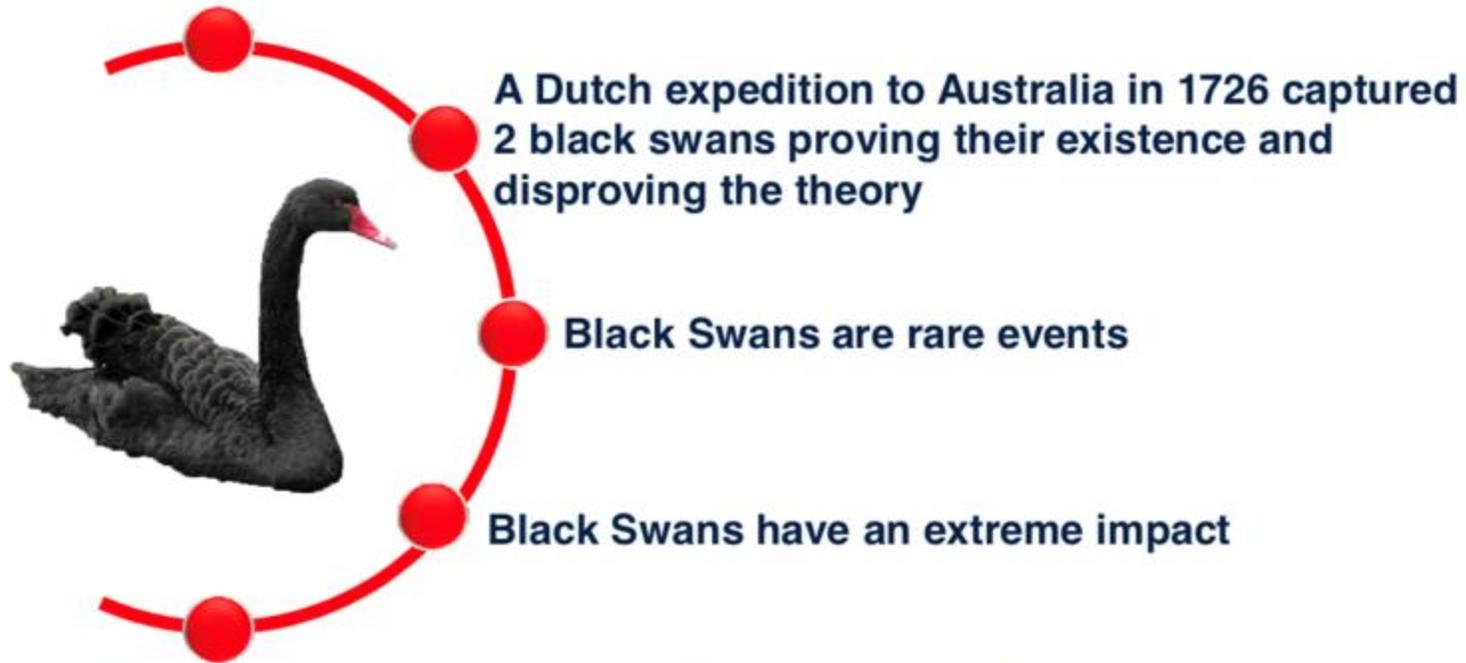
... probability

The Black Swan



The Black Swan Theory

Since Roman times 'all swans are white' was a fundamental truth



Black Swans can only be predicted retrospectively not prospectively

What is a 'Black Swan' event?

- A 'Black Swan' is an event which cannot be foreseen, but when it occurs changes the whole understanding of the market.
- The theory is outlined in Nicholas Taleb's book 'The Black Swan' published in 2010.
- It is so-called as, prior to discovering black swans in Australia, Europeans believed that all swans were white.
- In fact, a lack of knowledge and experience showed that their understanding of nature was fundamentally mistaken.
- *'All observed swans are white – hence all swans are white'*
- By assuming some event is 'impossible', people and companies become complacent and this leads to lack of preparedness.



A look into the future

Obvious risks may not be serious

Nuclear accidents

Toxic chemicals in the air

Less obvious risks represent more severe dangers

Global climate change

Tipping point

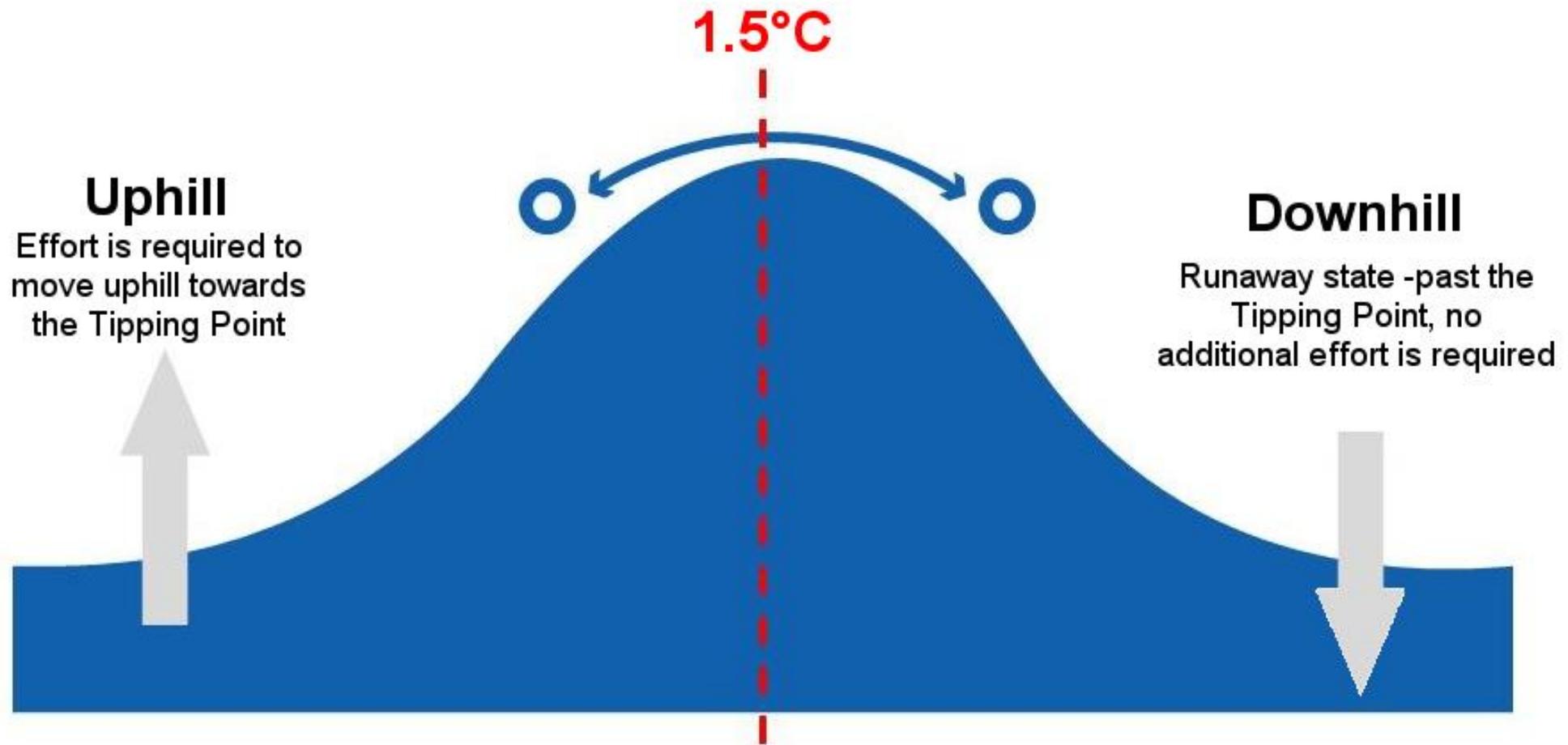
Overpopulation

Time scale for solving?

Pandemics

Asteroids

Tipping Point Effect



The Tipping Point

A tipping point in the climate system is a threshold that, when exceeded, can lead to large changes in the state of the system.

CLIMATE TIPPING POINTS

The world has already crossed nine 'tipping points' that will lead to catastrophic climate change, scientists have warned.

■ TIPPING POINTS
➔ CONNECTIVITY

1

Amazon rainforest
Frequent droughts

2

Arctic sea ice
Massive losses

3

Atlantic circulation
A slowdown since 1950s

4

Boreal forest
Increase in fires

2

5

Coral reef
Mass die-offs

6

Greenland ice sheet
Ice loss accelerating

3

7

Permafrost
Melting

8

West Antarctic ice sheet
Ice loss accelerating

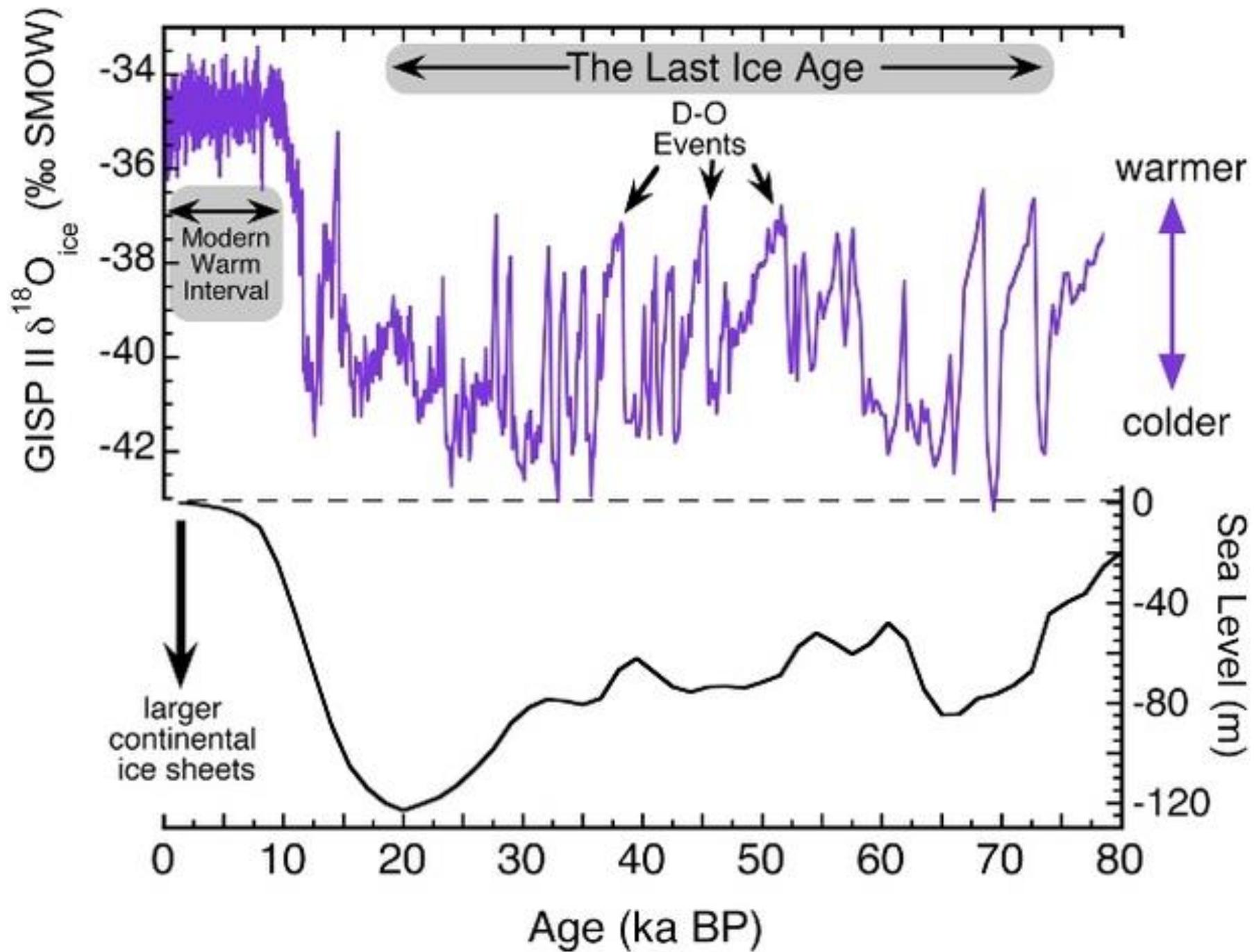
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Wilkes Basin
East Antarctica ice loss accelerating

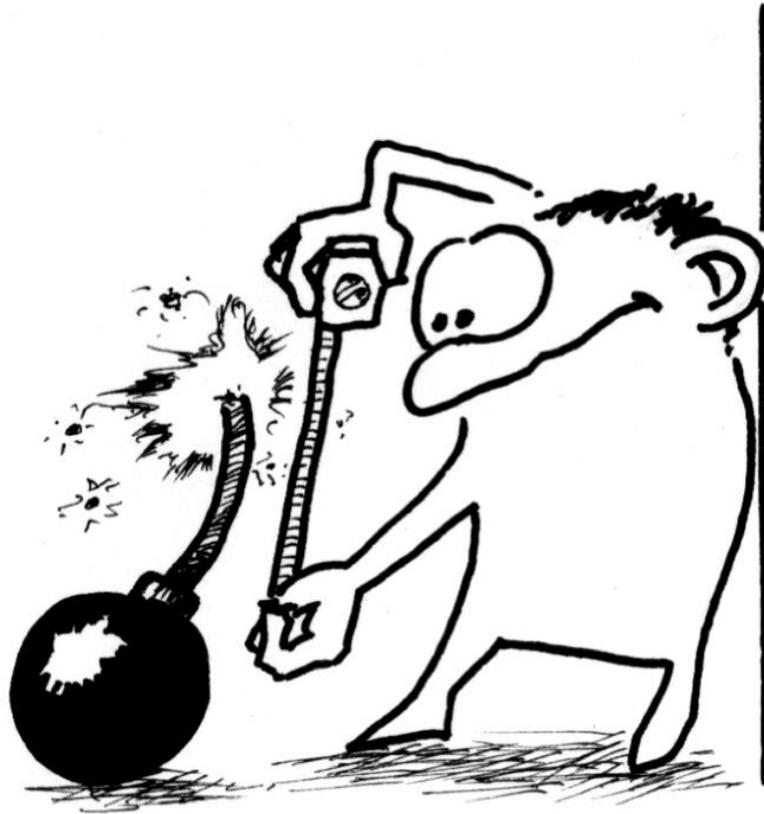
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RISK PERCEPTION



RISK ANALYSIS



RISK MANAGEMENT

- (1) = 16/10/2021 = Paravantis (1 από 4)
- (2) = 23/10/2021 = Paravantis (2 από 4)
- (3) = 30/10/2021 = Paravantis (3 από 4)
- (4) = 6/11/2021 = Paravantis (4 από 4)
- (5) = 13/11/2021 = Makridis (1 από 3)
- (6) = 20/11/2021 = Makridis (2 από 3)
- (7) = 27/11/2021 = Makridis (3 από 3)
- (8) = 4/12/2021 = Ibrahim (1 από 3)
- (9) = 11/12/2021 = Ibrahim (2 από 3)
- (10) = 18/12/2021 = Ibrahim (3 από 3)
- (11) = 8/1/2022 = Dagoumas (1 από 1)

<https://eclass.unipi.gr/courses/DES216/>