



European
Commission



Joint Research Centre

the European Commission's
in-house science service

Resilience in a globalised world

Understanding Risk

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Resilience: Where will the next shock come from?

- Geopolitics ?
- Energy ?
- Climate ?
- Environment ?
- Resources ?
- Industry ?
- Supply Chain ?
- Economy ?
- Digital World ?
- Finance ?

It's a complex world....

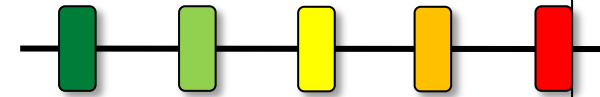
Squeezing out profit margins



Aviation: Safety first!

- **Remove on-board engineer**
- **Minimise fuel calculations**
- **Increase duty hours**
- **Minimise maintenance**

Safety

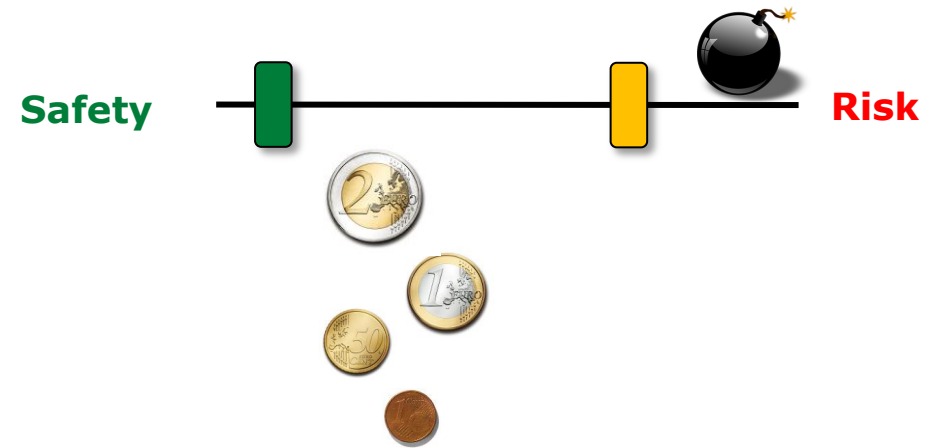


Risk

Regulations!

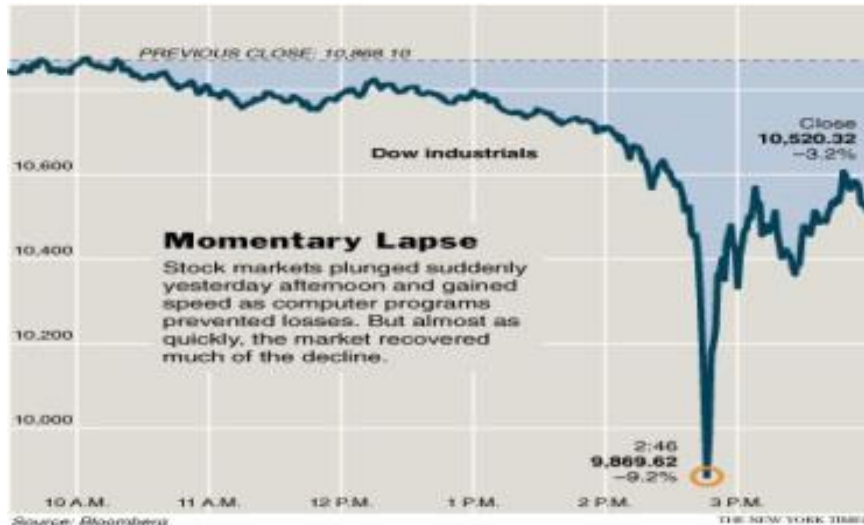


Power Grid: Scrapping costly redundancy

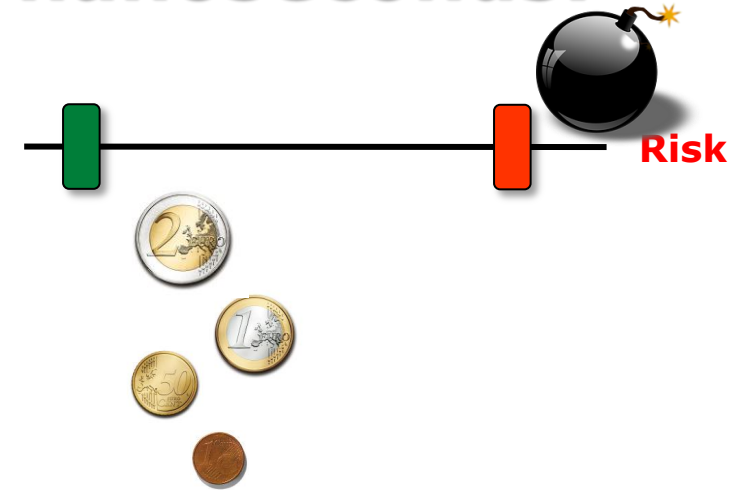


Blackouts under rare snow events

Financial Markets: Chasing nanoseconds!

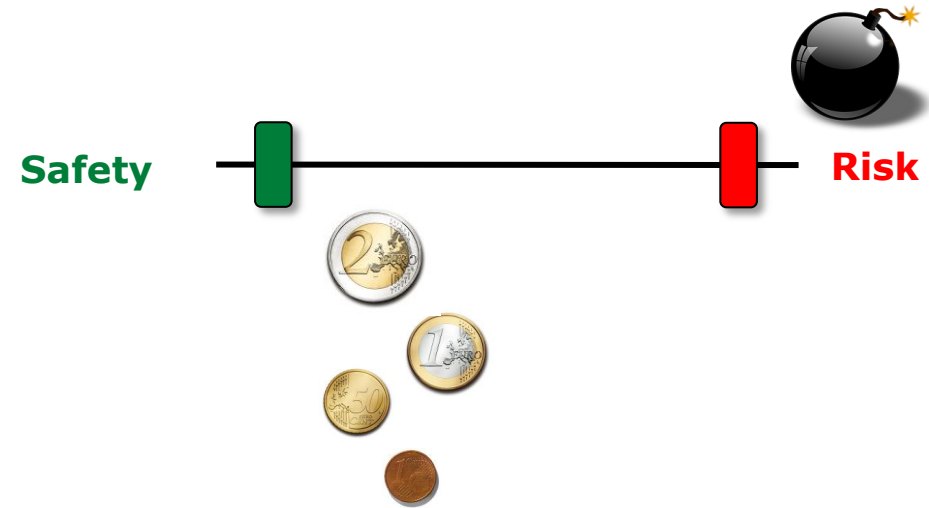


Safety



High Frequency Trading impacts

Resource Exploitation

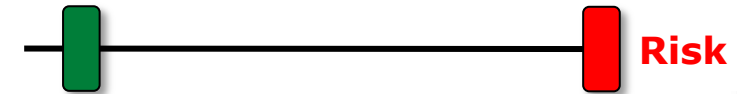


Allowing a single source of failure

Banks: Risky bets on borrowed funds



Safety



Risk



"Too big to (let) fail."

Leaving the risk for others?



The big picture is highly complex



Scientific modelling

EARTHINSIGHT
BY NAFEEZ AHMED
HOSTED BY THE GUARDIAN



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Nasa-funded study: industrial civilisation headed for 'irreversible collapse'?

Natural and social scientists develop new model of how 'perfect storm' of crises could unravel global system

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Posted by
 Nafeez Ahmed
 Friday 14 March 2014
 18:28 GMT
 theguardian.com
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This Nasa Earth Observatory image shows a storm system circling around an area of extreme low pressure in 2010, which many scientists attribute to climate change.
 Photograph: AFP/Getty Images

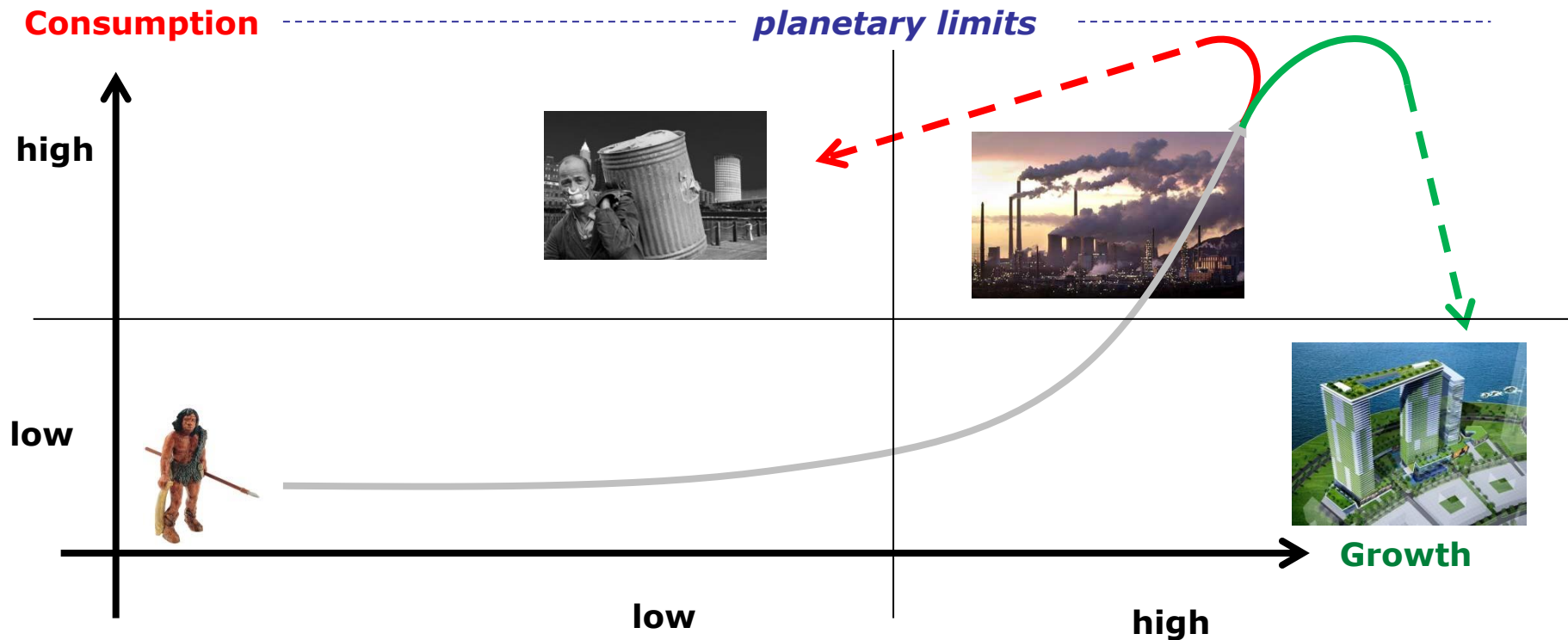
A new study partly-sponsored by Nasa's Goddard Space Flight Center has highlighted the prospect that global industrial civilisation could collapse in coming decades due to unsustainable resource exploitation and increasingly unequal wealth distribution.

<http://www.theguardian.com/environment/earth-insight/2014/mar/14/nasa-civilisation-irreversible-collapse-study-scientists>

Nasa-funded study of 2014 predicts the irreversible collapse of modern society!

- **resources** becoming more scarce
- **fragile interdependencies**
- **lack of resilience**
- **end of unlimited growth**

Decoupling growth from consumption?



More reading: A safe and sustainable future, DNV GL report,
<https://www.dnvgl.com/technology-innovation/broader-view/sustainable-future/index.html>

Science is essential

1. Identifying systemic risk
2. Defining what to measure (and how!)
3. Modelling complex effects
4. Providing automated monitoring
5. Assessing risk across sectors
6. Highlighting future risks
7. Suggesting critical limits

Financial Markets:



*Nature 2012, volume 2,
article 541, 02.08.2012*