CHALLENGING BOUNDARIES IN RISK ASSESSMENT – sharing experiences

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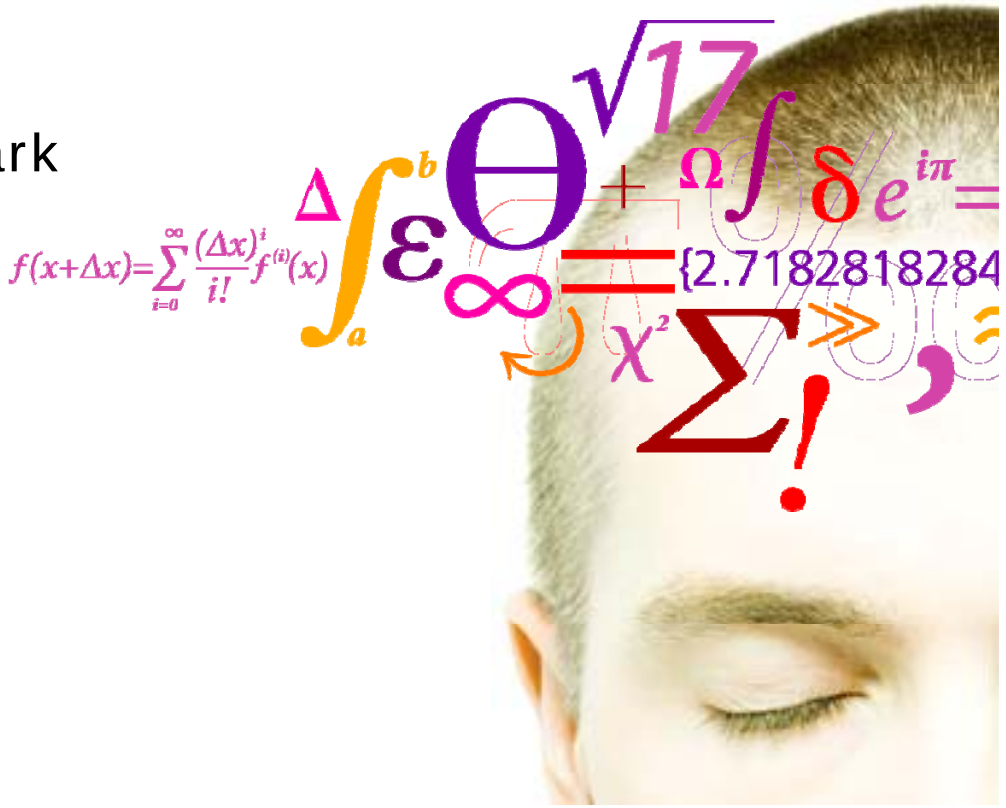
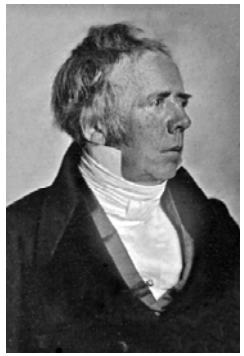
Research and risk assessment: Two sides of the same coin?

Henrik C. Wegener, MSc, MPA, PhD
Executive Vice President
Chief Academic Officer
Technical University of Denmark



Dealing with risks before science based risk assessment

Lay mans hard earned experiences, combined with misbelieves and superstition

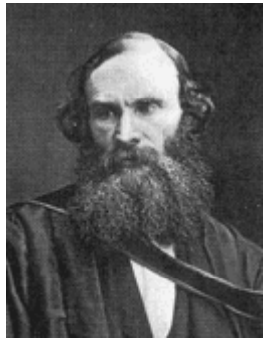


Every country has it's champion: Hans Christian Ørsted, 1777-1851

Nature can be understood through careful observation, experimentation and validation.

The application of natural sciences expels misbelieves and superstition

Technical and natural sciences should be used for the benefit of society

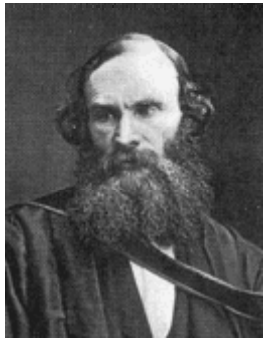


Lord Kelvin, 1883

"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of *Science*, whatever the matter may be."

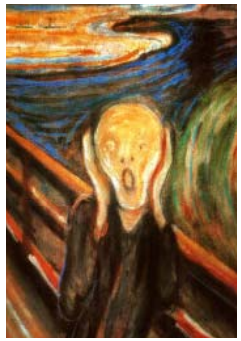
But also the coin of science has another side

Natural & technical sciences



Social sciences

Humanities



"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it;

The world as it is percieved by us

Fast forward to the present: Evidence based policy-making in Europe

”This is why scientific evidence in policy-making is so important for Europe. Policies are legitimate and accepted by people if they are sufficiently motivated, efficient and respectful of social and individual rights.”

Janez Potocnik, Commissioner for Science and Research (2008).

Risk assessment is omnipresent in modern society

- Transportation
- Building and construction
- Energy production and transmission
- Finance
- Insurance
- Environment
- Food
- Animal health
- Human health
- Etc.

The need for risk assessment is growing, because our societies are rapidly changing

Major challenges require a fundamental transformation of many of the basic systems and services that sustain the way we live to day

- A growing and aging population
- A resource constrained planet
- Climate change
- Environmental degradation and pollution

There is an unlimited need for good science to support decision making in politics, industry and civil society. We don't have the time, nor the resources, to make major mistakes in terms of the decisions we make as societies in the coming decade.

Two sides of the same coin?

Science

- Answering difficult questions through careful observation, experimentation and validation
- A process of ”organized skepticism, where ideas are tested to death”
- The process is messy, ”open ended”, and new knowledge constantly emerges to challenge the popular scientific view on how the world works.

Risk Assessment

- Answering difficult questions through careful analysis and evaluation of information from research, as well as from other sources, in a well organized process
- Ideally, the result is the least imperfect interpretation of the state of the science at the time of conduct
- Time constrained, and a conclusion must be reached, which is useful for the risk manager

Two sides of the same coin?

EU_{2010}: 246 billion €

$World_{2006}$: ~ 1,3 million scientific papers (~45% EU)

Research

Risk assessment

$EFSA_{2011}$: 75 mio €

$EFSA_{2011}$: 658 scientific opinions, reports, guidance documents and statements

EU_{2008}: ~1,5 million researchers

Researcher

Risk assessor

$EFSA_{2012}$: 167 scientific panel and committee members

Inputs from research and other sources to risk assessment

Feed backs from risk assessment to science / scientists

Inspira-tion

- Data needs
- Research questions

Coope-ration

- Multi disciplinarity
- Meeting place for experts

Communi-cation

- Show relevance of research
- Develop strong communication skills

Research data and funding for research - do the two coins have another side?

- Research data are abundant, but do not often fit the risk assessors needs
- Research funded nationally and in the EU is not optimally aligned with risk assessment needs

Horizon 2020
- a lot of coins

- Excellent Science (25 million €)
- Competitive Industries (18 million €)
- Better Society (32 million €)

- A challenge-based approach will bring together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities.

- to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.

Horizon 2020
- do some of the coins come with two sides?

Horizon 2020 will tackle societal challenges by helping to bridge the gap between research and the market by, for example, helping innovative enterprise to develop their technological breakthroughs into viable products with real commercial potential. This market-driven approach will include creating partnerships with the private sector and Member States to bring together the resources needed.

Source: The Horizon2020 homepage

Are research that promotes innovation and research that supports risk assessment two sides of the same coin?

Recommendations for DG Research

- The DG Research, as the primary funder of the framework programs , has a special responsibility to ensure that the projects it supports fully understand the importance of producing material which is useful, accessible and meaningful to policymakers.

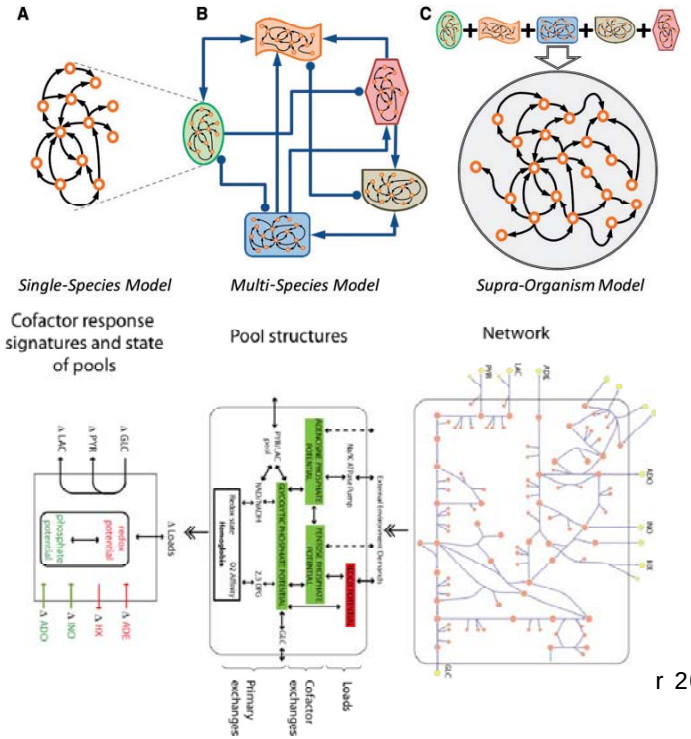
- The DG also has a key role to play in ensuring that project results are disseminated across the European Commission and inform policy making at the highest level in those areas which have major economic, social and scientific relevance for the EU.

Report: Scientific Evidence for Policy Making, DG Research 2008

Many new and exciting developments in research will advance risk assessment dramatically in the years to come, and EU should be at the forefront!

- Bio- and eco systems informatics
  - *E.g. real time whole genome sequencing of infectious agents with all relevant denominator data*
- *In silico* modeling of all biological and ecological systems and their interfaces
  - *QSAR models*
  - *Microbiomes*
  - *Metabolomics*

Risk assessment and systems biology will come together in new and exciting ways



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Are the two sides of the coin finally coming together?

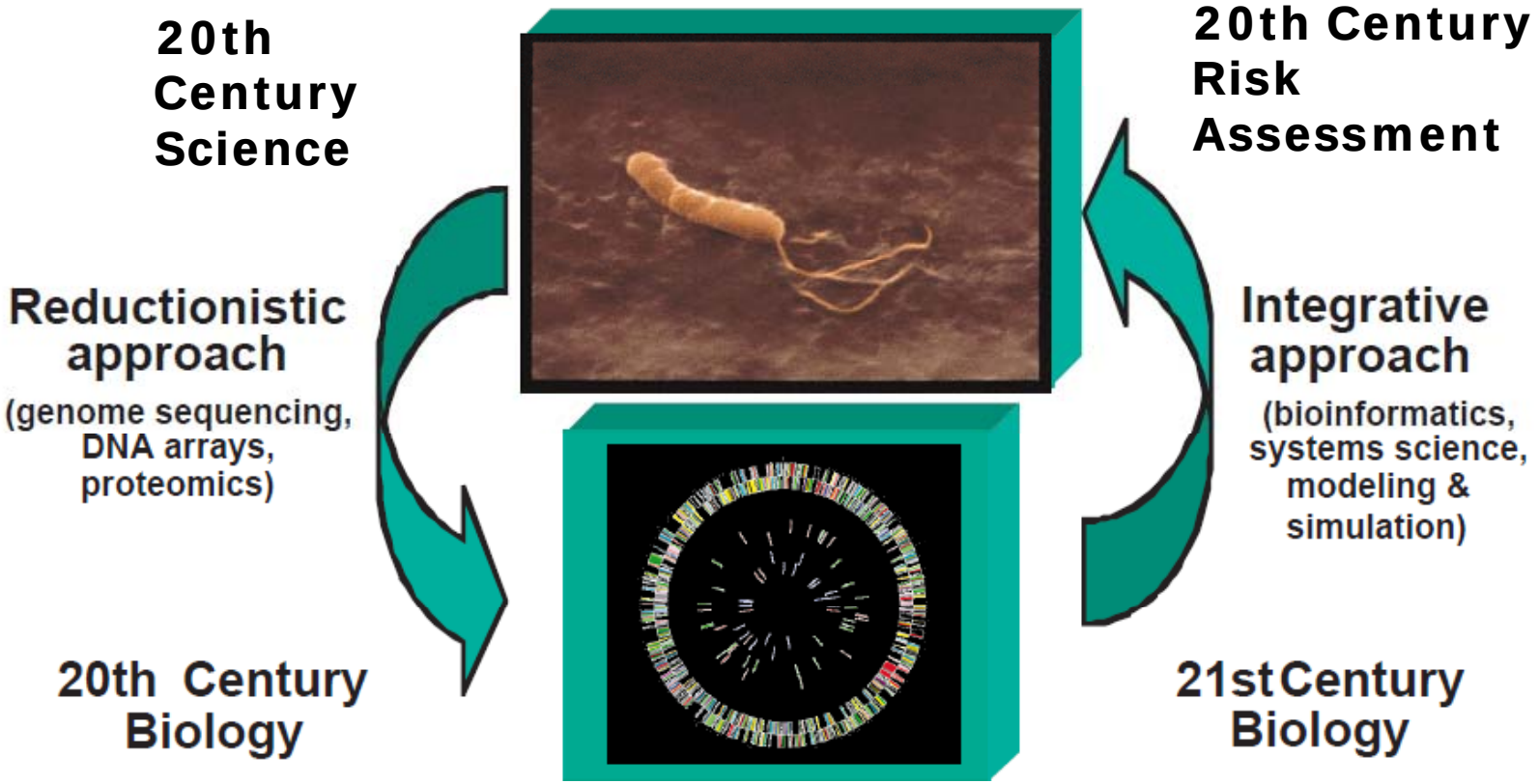


Figure 1. The shift in emphasis of biological research. Biology has traditionally followed a reductionist approach in which individual components of a living system are studied separately. It is becoming clear that we need to reverse the process and to study how these components interact to form complex systems using an integrative approach.

Mod. from Palsson B, 2000

On your ten years birthday!

The character of a ten year old:

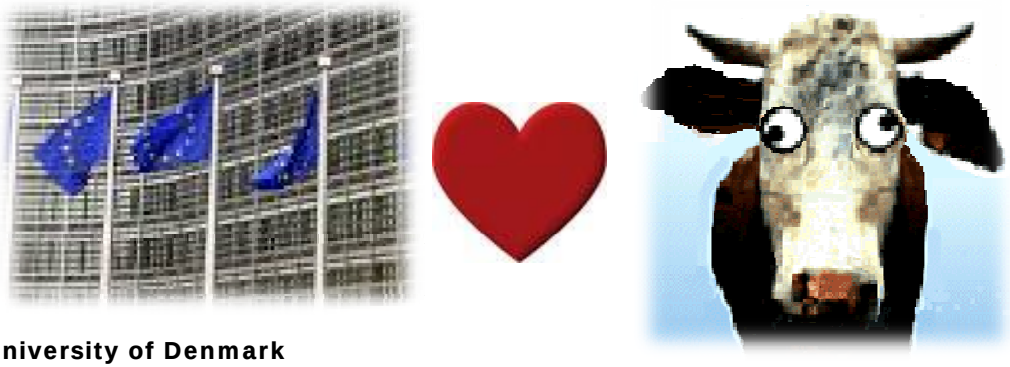
Ten is such a stable age - psychologically, intellectually, socially.

Nearly all tens are very happy, easy going, and balanced.

A ten year old knows how to enjoy the simple things in life to the fullest.

Parents can learn a lesson from ten's joy in life!

Parents? We know the farther, but who was the mother?




Technical University of Denmark
DTU
Thank you for your attention!