NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

One Health - an introduction

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Food safety initiative
World Health Organization

“It is the duty of civil servants to serve the people – without the peoples interest constantly at heart, their work is useless!”

Mao

“Some see things that are and ask: Why?
I see things that never were and ask: Why not?”

Robert Kennedy

“I have been accused of many things but not even my worst enemy has accused me of being afraid of speaking my mind!”

Lee Kwan Yew

Dealing with risks before science based risk assessment

Lay mans hard earned experiences, combined with misbelieves and superstition

So Now:

We know everything

No ?

How big is the burden of foodborne diseases?

Reported human cases

What we know from surveillance data

What we need to know

Actual human disease burden

But then we could compare the incidence of reported cases

at least in the EU?

Well:

Observe these (old) EU reported
incidence rates for campylobacteriosis !!

(of course theoretically they could all be true)

DK: 63

F: 5.4

I: 0.4

Ro: 0.0

Table 1: Reported human campylobacteriosis in EU-27, Norway and Switzerland in 2008 (EFSA, 2010c)

Country	Population (million)	Reported human campylobacteriosis Cases	Incidence rate (per 100.000)
Austria	8.319	4,301	51.7
Belgium	10.667	5,111	47.9
Bulgaria	7.640	19	0.2
Cyprus	0.789	23	2.9
Czech Republic	10.381	20,174	194.3
Denmark	5.475	3,470	63.4
Estonia	1.341	154	11.5
Finland	5.300	4,453	84.0
France	63.753	3,424	5.4
Germany	82.218	64,731	78.7
Greece	11.214	-	-
Hungary	10.045	5,563	55.4
Ireland	4.401	1,752	39.8
Italy	59.619	265	0.4
Latvia	2.271	0	0.0
Lithuania	3.366	762	22.6
Luxembourg	0.484	439	90.7
Malta	0.410	77	18.8
Poland	38.116	257	0.7
Portugal	10.618	-	-
Romania	21.529	2	0.0
Slovakia	5.401	3,143	58.2
Slovenia	2.026	898	44.3
Spain	45.283	5,160	11.4
Sweden	9.182	7,692	83.8
The Netherlands	16.486	3,341	20.3
United Kingdom	61.194	55,609	90.9
EU-27	497.528	190,820	40.8
Norway	4.737	2,875	60.7
Switzerland	7.593	7,877	103.7

Note: Population basis for calculating EU-27 IR excludes Greece, Portugal and is corrected for 52% coverage in the Netherlands

So – Food Safety systems have not exactly triumphed

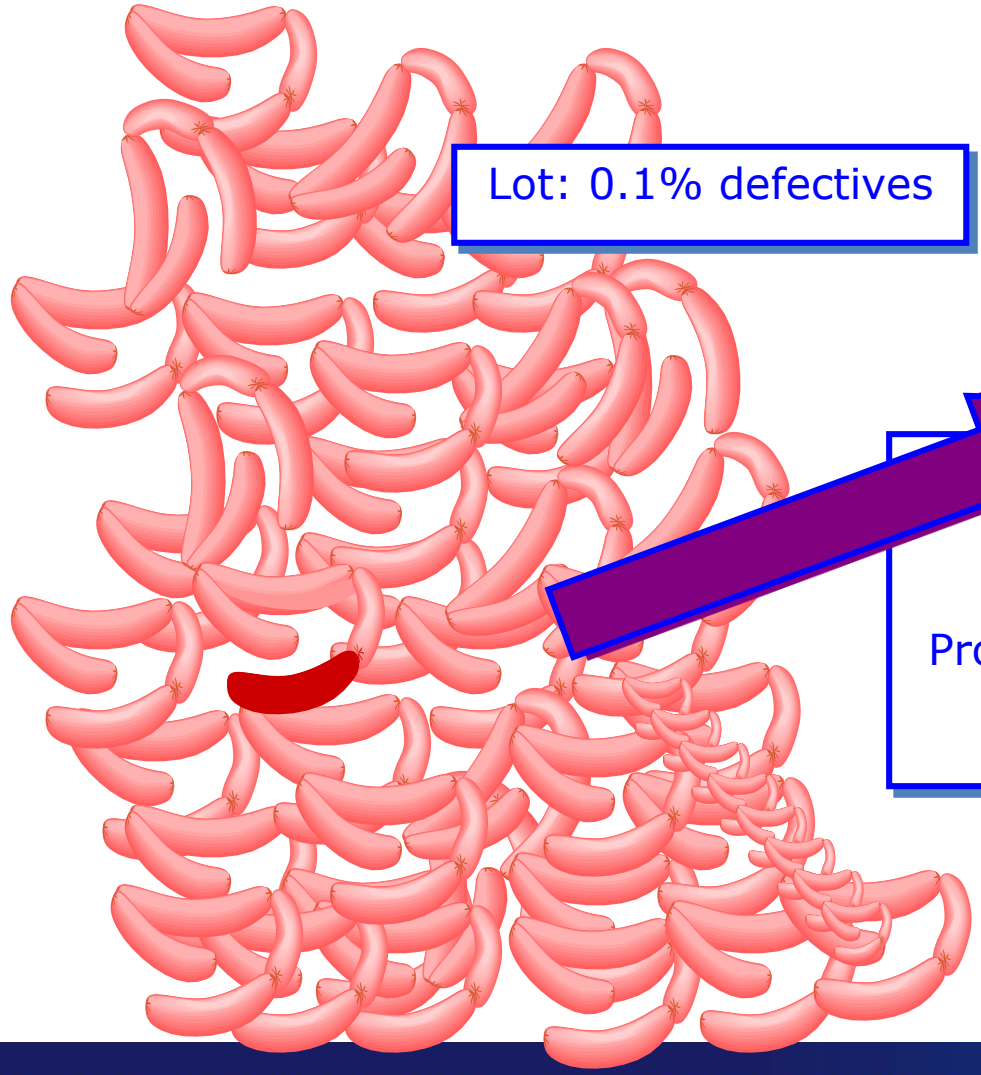
Why is that?

Have we had no succes at all?

Did we not try anything new?

And by the way – what was wrong with old-school?

Safety cannot be achieved by senseless testing



Lot: 0.1% defectives

10 samples:

Probability of detection ~ 1%

Risk Analysis Internationally

- Food standards are developed on the basis of independent scientific assessments
- FAO/WHO expert bodies agrees the science

Expert bodies

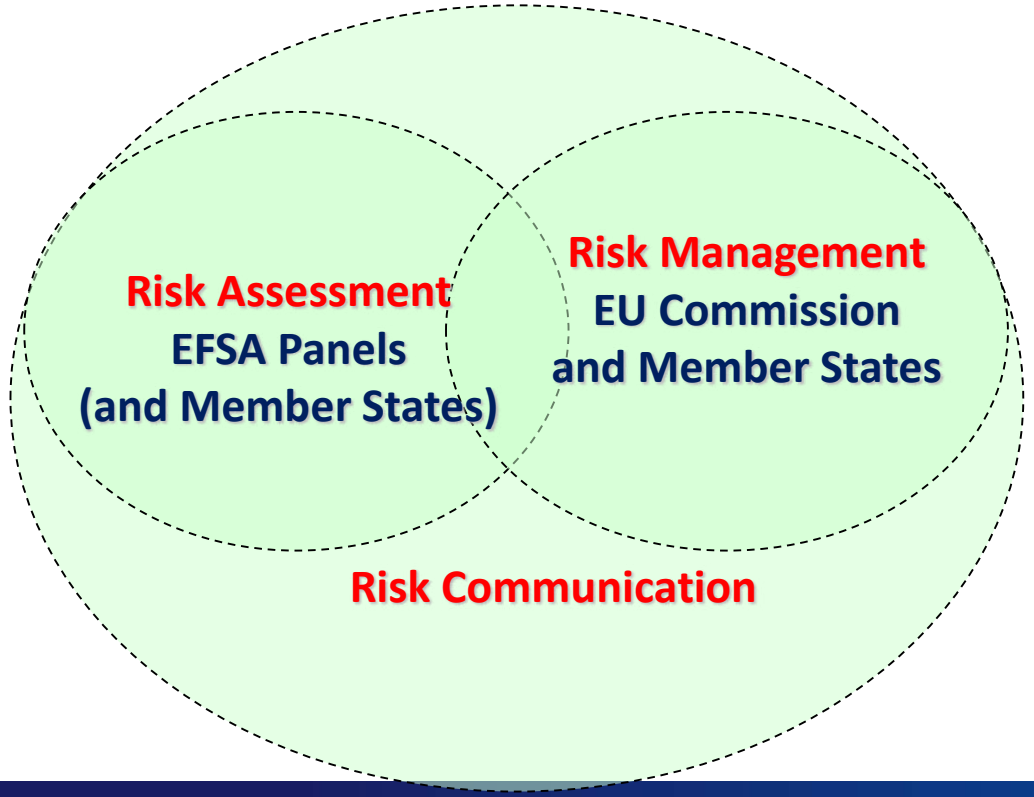
JECFA
JMPR
JEMRA
Ad hoc

Codex Committees

CAC
CCFAC
CCRVDF
CCPR
CCFH

Risk Analysis Internationally (EU)

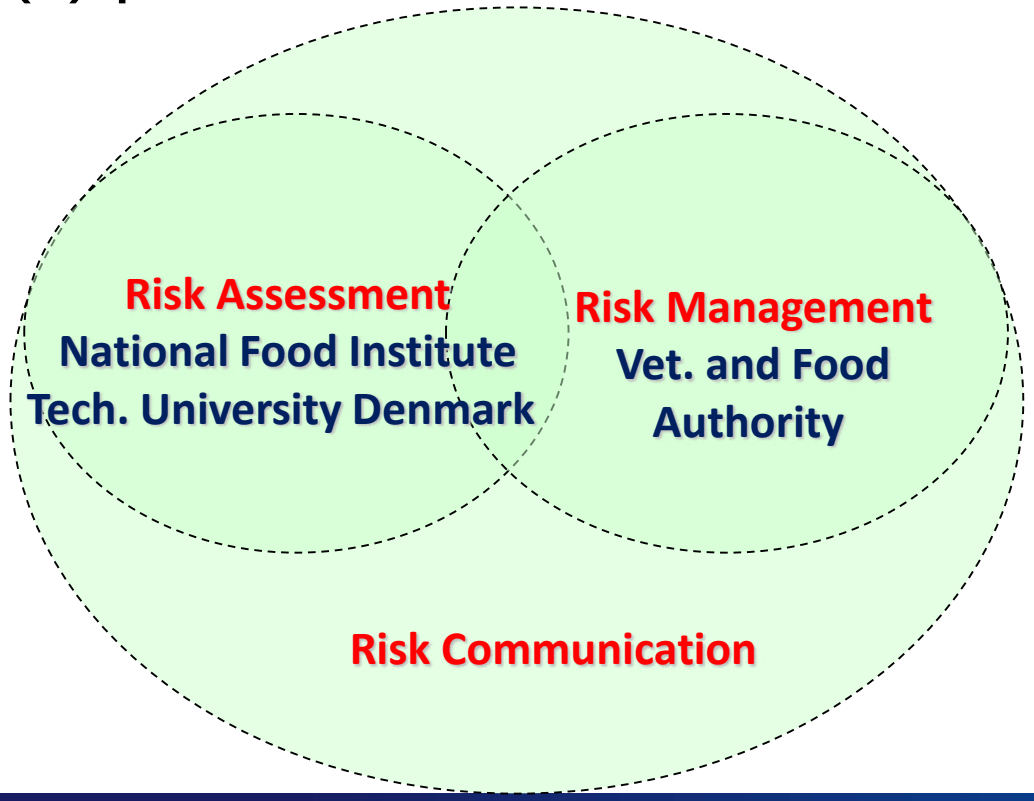
- Food safety is an EU competency area (as opposed to e.g. health)
- EFSA expert panels agrees the science – EFSA independent of EU Commission



Risk Analysis Nationally

- Risk assessment and Risk management functionally separated
- (National) Institute(s) provide the science and the risk assessment

ANSES and BfR are National Independent Risk Assesors



WHAT EFSA DOES

HOW EXPERTS ARE SELECTED

EFSA seeks out high-calibre experts to serve on its Scientific Committee and Scientific Panels

- Open call to scientists from EU Member States and beyond
- EFSA chooses candidates with proven excellence in one or more scientific fields within its remit
- Open, transparent selection procedure

INDEPENDENCE…

- From risk managers
  (EU Commission, Member States)
- From private interests

Guaranteed through a policy covering all actors and working processes:

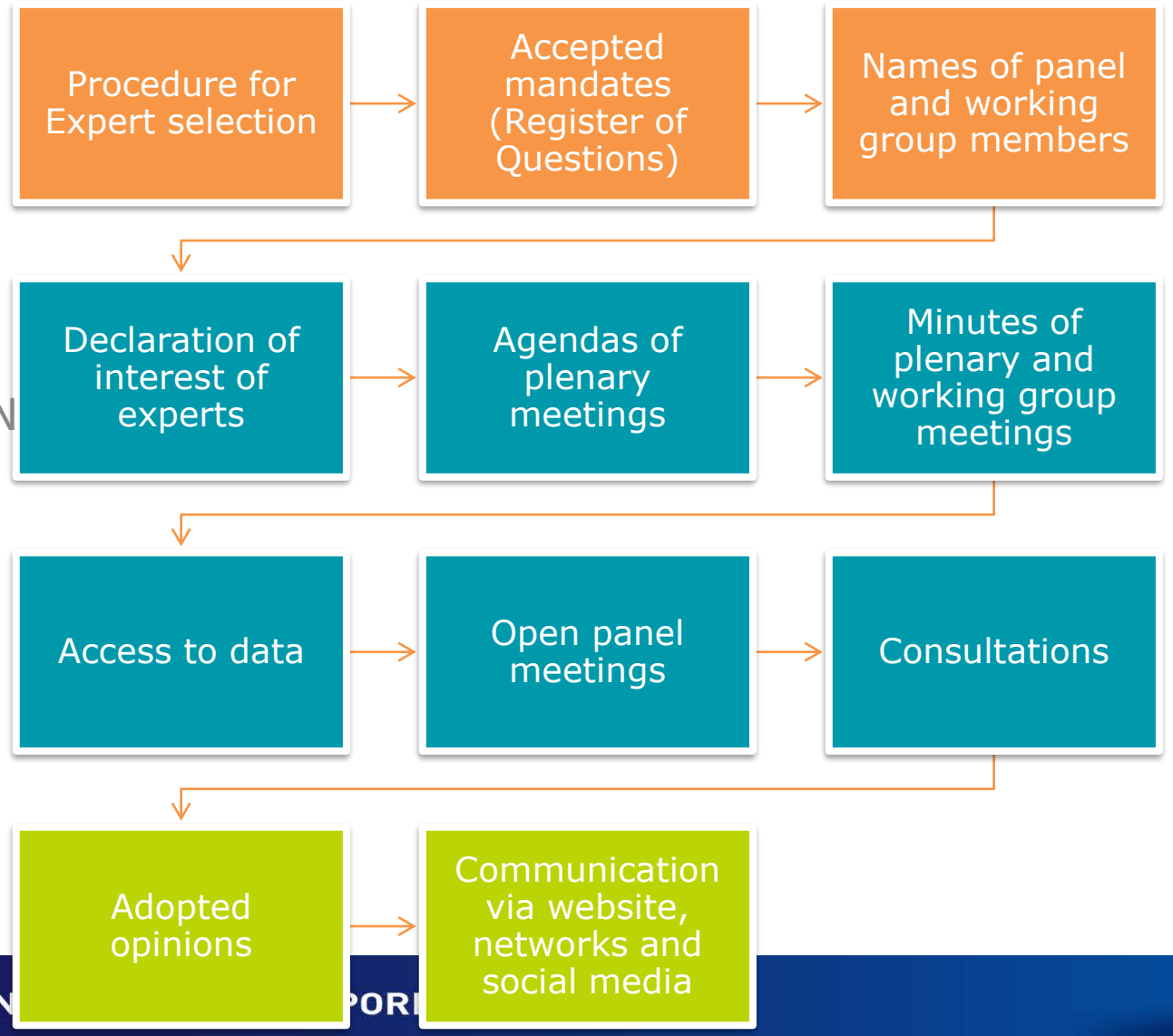
- Organisational governance
  Management Board
- Governance of scientific processes Mandates, selection of experts, collegial decision making, transparency, declarations of interest

INDEPENDENT, TRANSPARENT SCIENCE

RECEIPT OF REQUEST

ASSESSMENT

ADOPTION & COMMUNICATION



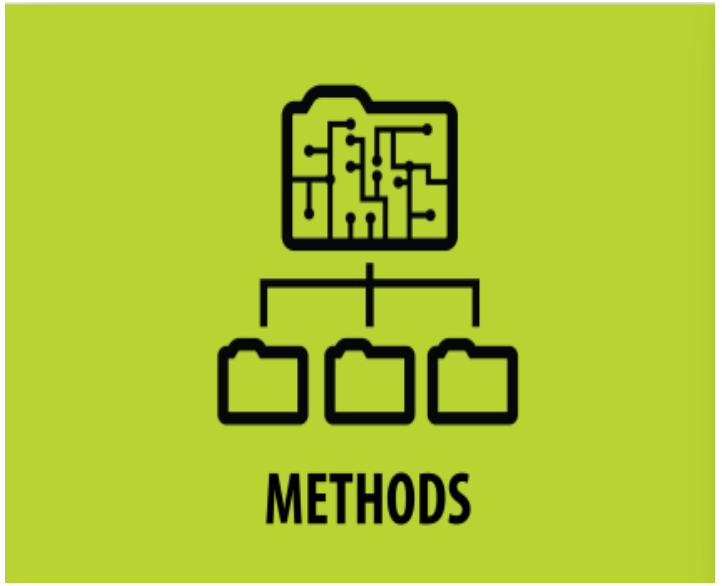
NOTE:

Risk Assessment does not really come from EFSA Secretariat,

It comes from:

Independent Experts

TOOLS FOR THE JOB



Two sides of the same coin?

Science

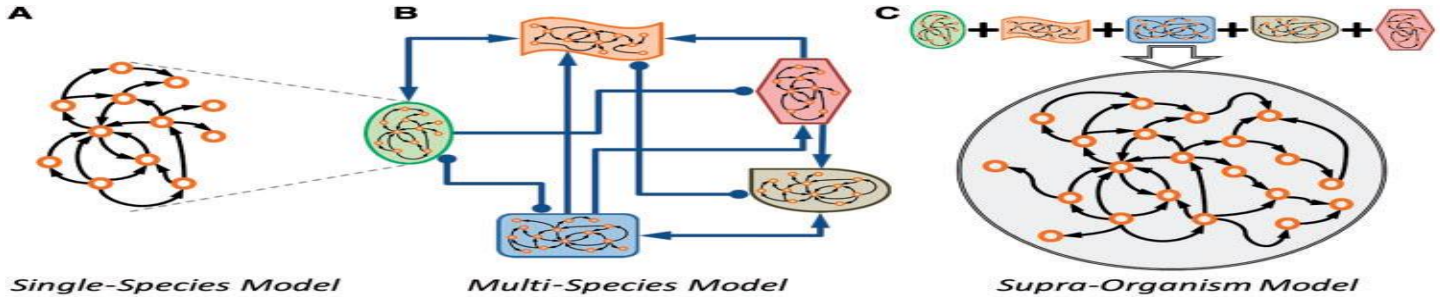
- Answering difficult questions through careful observation, experimentation and validation
- A process of ”organized skepticism, where ideas are tested to death”
- The process is messy, ”open ended”, and new knowledge constantly emerges to challenge the popular scientific view

Risk Assessment

- Answering difficult questions through careful analysis and evaluation of information from research, as well as from other sources
- 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

Many new and exciting developments in research will advance risk assessment dramatically in the years to come

- 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*



QSAR:
Quant. Structure-Activity Relationship

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

NEW CHALLENGES AND THREATS

Environmental risks e.g multiple stressors and bees

Evaluation of the safety of new products

- e.g. novel foods

Development of new assessment methods:

- nanotechnology, active and intelligent packaging
- '-omics', less animal testing

Chemical mixtures/ combined toxicity of substances in food

Antimicrobial resistance

Hazards linked to globalisation: plant pests, animal diseases, vector-borne diseases

Multiple Chemicals

Human risk assessment of combined exposure to multiple chemicals poses several challenges:

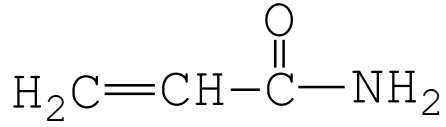
- the complexity of the terminology and problem formulation, (thus: two chemicals with effect on the same receptor are not combined)
- The fact that traditional toxicology only looks at one chemical and typically only from one source (thus: food, but not water and air)
- the toxicological profiles and exposure patterns in test species and humans

Acrylamide – Need for further action

In June 2015, EFSA issued a scientific opinion following a thorough risk assessment :

▶ Based on animal studies, EFSA confirms previous evaluations that acrylamide in food potentially increases the risk of developing cancer for consumers in all age groups.

▶ Since acrylamide is present in a wide range of everyday foods, this concern applies to all consumers but children are the most exposed age group



Bisphenol A

in food containers: returnable beverage bottles, infant food lids etc

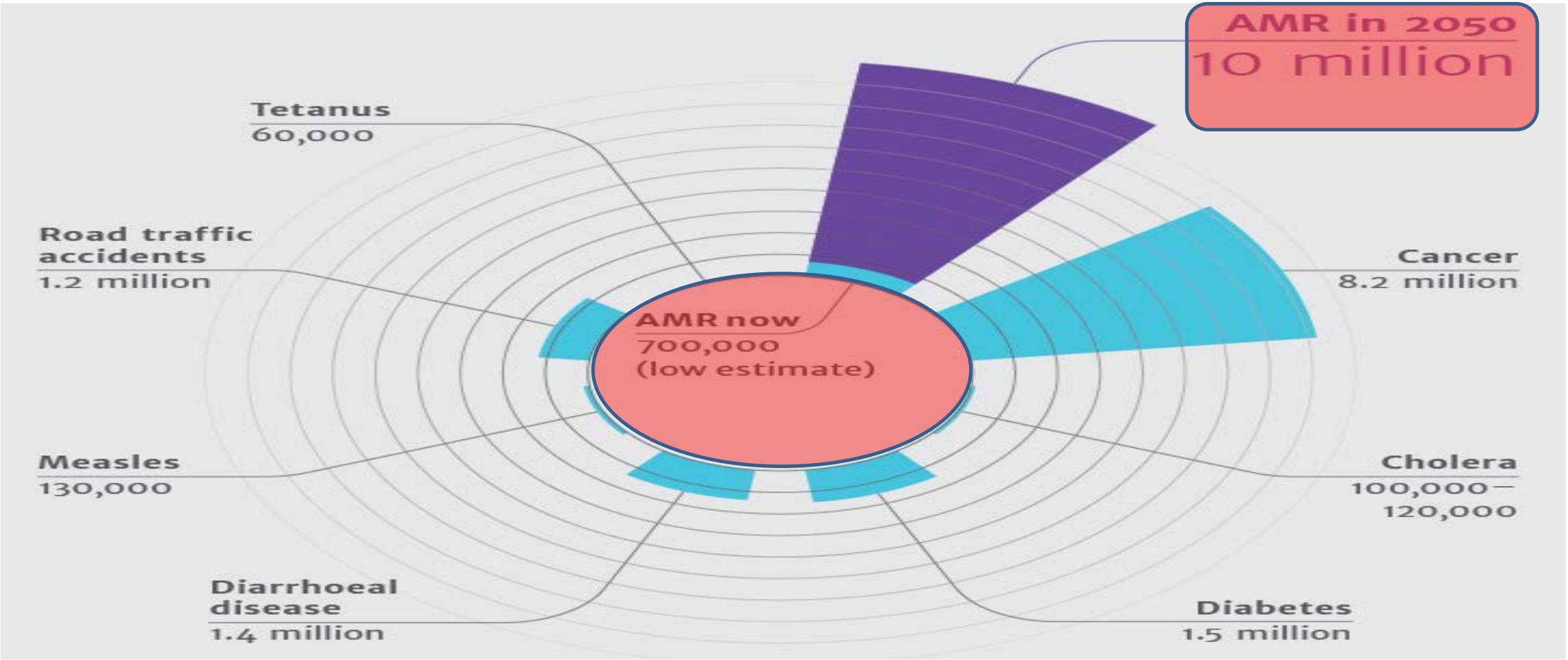
Hormonal effects – Endocrine Disruptor

EFSA published its comprehensive re-evaluation of BPA exposure and toxicity in January 2015 reducing TDI (Tolerable Daily Intake) for BPA from **50 to 4** µg/kg bw/day. The TDI was made temporary and EFSA committed to reevaluate

2017: "A *protocol* has been accepted, so now ready to start analysing the new data to make an updated assessment."

Experts from Denmark, France, Germany, NL, N, S and CH appointed in the protocol working group

Deaths fromAntimicrobial resistance(AMR)



Economic impact estimated up to 0.5-3% GDP

Source: O'Neill, 2014.

Prevention in a global food market

New National & Regional Focus

- Foodborne disease is not prevented through end-product testing or border control alone
- More efficient food safety systems focus on prevention as close to the source as possible
- Full burden of disease relative to safety and consumption (+nutrition) needs to be considered
- New agricultural products will most likely affect both nutrition and food safety in the future

reinforcing the need to

Prevent through sensible practices and good production methods

Defined and/or assessed through relevant risk assessments