MULTIDISCIPLINARY RISK ASSESSMENT AND FOOD SAFETY DECISION-MAKING

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VLAARDINGEN, THE NETHERLANDS

Istanbul, 8 May 2015

OUTLINE

- Introduction to Unilever
- Codex Risk Analysis approach for governments
- Unilever Food Safety principles and processes
  - Food Safety Assurance from idea to market
  - Independent “Integrated” Risk Assessment
  - Risk assessment case study
- Risk Communication challenge

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•Unilever is one of the world's leading suppliers of "fast-moving consumer goods".
Our products are sold in over 190 countries and used by 2 billion consumers every day.
Vaseline
sheer infusion
NEW
STRATYS 3
VITAMIN BURST
BODY LOTION
Surf
Twilight Sensations
small & mighty
Rama
Original
margarine
FLORA
original
made with seed oils
containing heart healthy Omega 3&6*
COOKING WITH SCHOOLS
Light
MAYONNAISE
A Good natural source of OMEGA 3
OMO
奥妙 全自动
高浓度洗衣液
It's the taste
80
PG tips
decaf
MAGNUM
COLOMBIA AROMA
CHOCO-CAPPUCCINO
COLOMBIAN SELECTED COFFEE
4
BEN & JERRY'S
Chocolate Macadamia
A FLAVOUR WITH A MISSION
ICE CREAM
Chocolate & Vanilla Ice Creams with Chocolatey Covered Macadamia Nuts

FAST FACTS - 2014

EMERGING MARKETS NOW REPRESENT

57%

OF TURNOVER

€1 BILLION

INVESTED IN R&D WORLDWIDE

TURNOVER OF

€48.4 BILLION

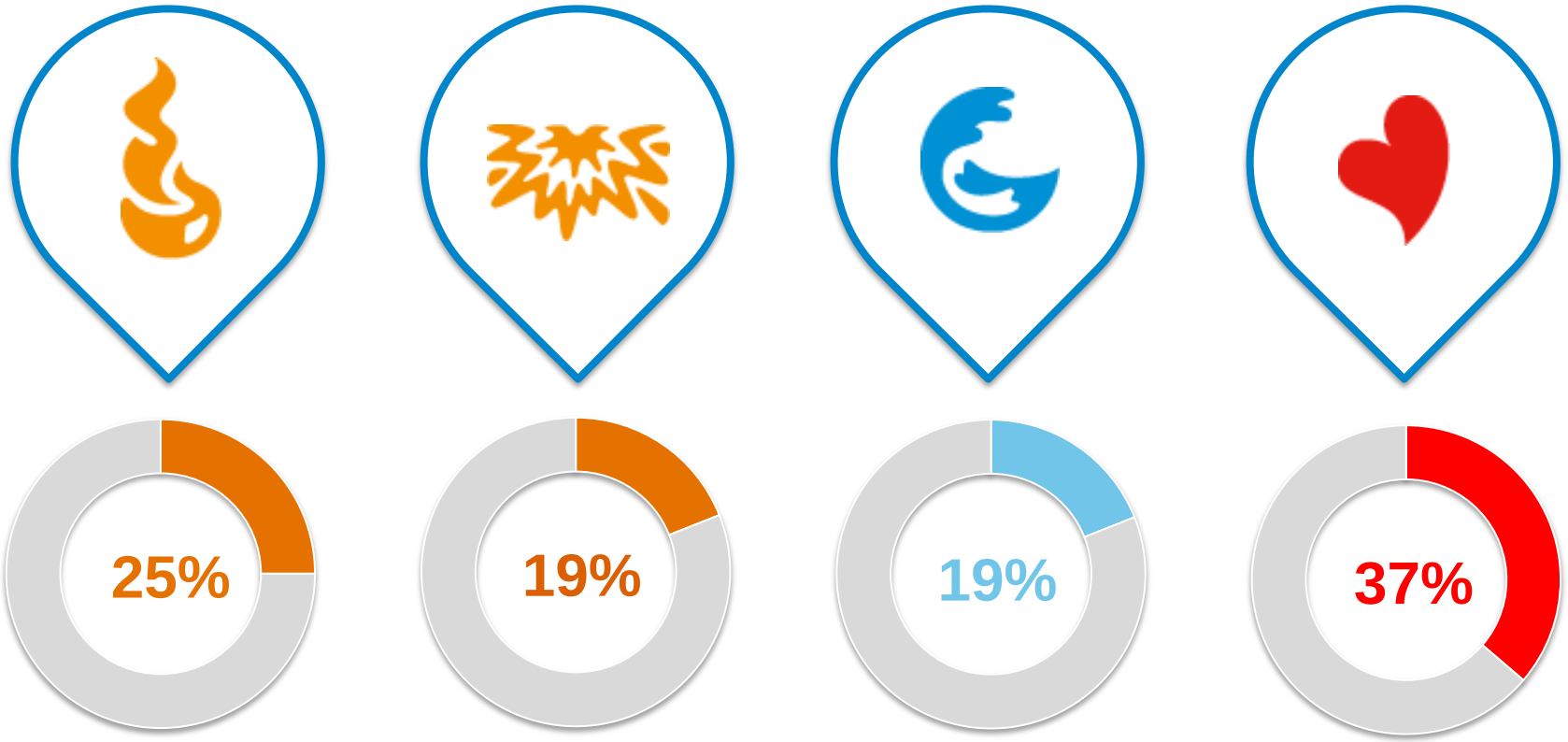
AT END OF 2014

172,000

EMPLOYEES AT THE END OF THE YEAR

UNILEVER'S PORTFOLIO OF CATEGORIES

TURNOVER BY PRODUCT CATEGORY



FOODS

REFRESHMENT

HOME CARE

PERSONAL CARE

OUR €1 BILLION BRANDS

13 Unilever brands have a turnover of €1 billion or more

Personal Care

Dove, Rexona, LUX, AXE, sunsilk

Foods

Knorr, HELLMANN'S, Rama

Refreshment

Lipton DRINK POSITIVE, MAGNUM

Home Care

OMO, Surf

SIX MAJOR R&D SITES

- more than 6,000 R&D professionals
- 92 locations globally with deploy R&D teams

Port Sunlight
UK

Colworth
UK

Vlaardingen
The Netherlands

Trumbull
USA

Bangalore
India

Shanghai
China

Codex Risk Analysis approach for governments

FAO/ WHO Food Standards

CODEX alimentarius

Global authority for international guidelines, standards, and recommendations on food safety

CODEX ALIMENTARIUS

- International food standards organization, established in 1963 by FAO and WHO
- Codex standards formally recognized by WTO (SPS and TBT Agreements (1995))
- 186 member States (plus EU).
- Active participation of 219 IGO/NGOs
- “Covering 99% of the world’s population”

CODEX ALIMENTARIUS

- Establishes international food safety standards to:
  - protect the health of consumers
  - ensure fair practices in trade

- Issues food safety management “principles” through its standards and guidelines

- National authorities can choose to implement Codex standards and guidelines in their regulation/law

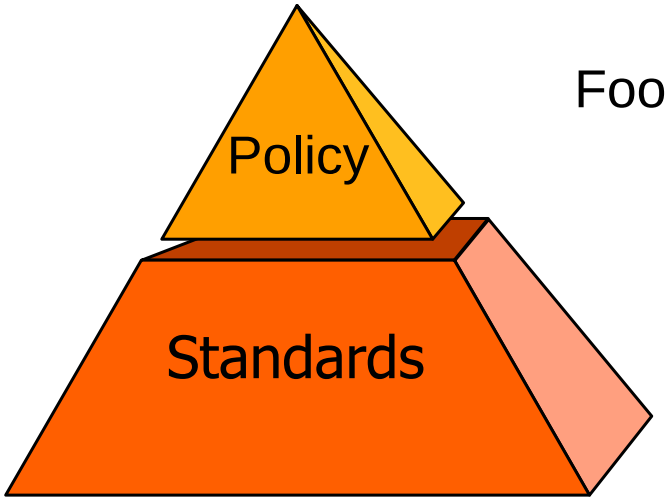
CODEX ALIMENTARIUS

"Modern food safety management developed by Codex"

- Developed over the last 50 years – an evolution!
- In many countries, food safety management evolved from control by governments to food safety management by industry.
- Evolving from "testing for safety" to "safety assurance", based on using Good Practices & HACCP principles by industry.
- Evolving from unique national standards to internationally harmonized standards.
- Evolving from focus on hazard-based decision-making to advocating risk-based decision-making.

FOOD SAFETY IS A PARTNERSHIP

Country level

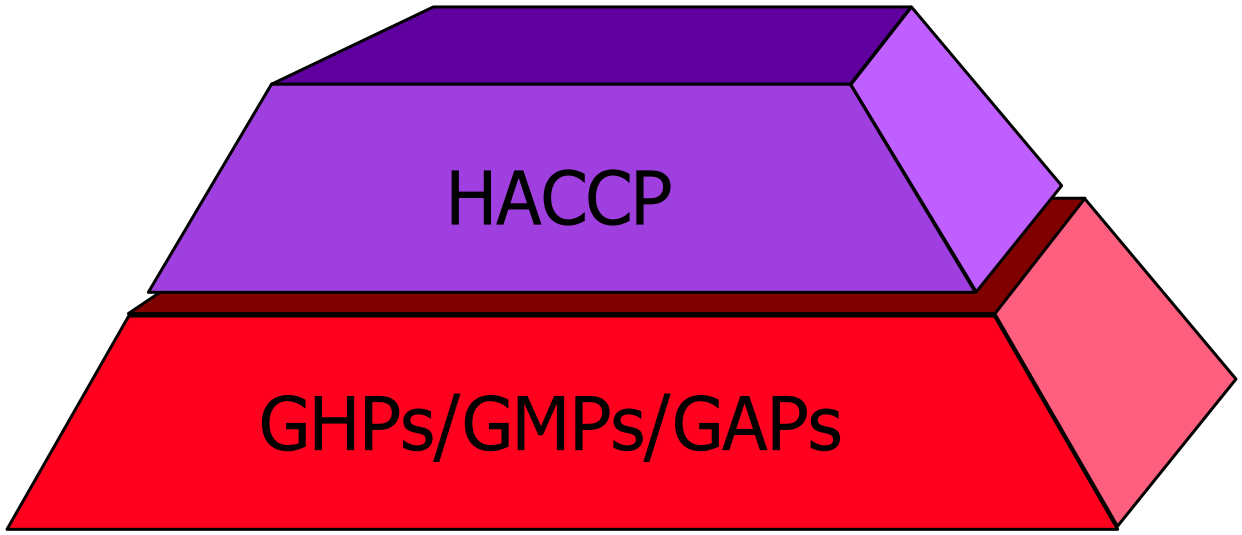


Food Safety *Control* (Risk focused):

- high level, generic law / guidance to industry
- (sometimes specific standards, criteria)

Operation level

Food Safety *Management* (Hazard focused):

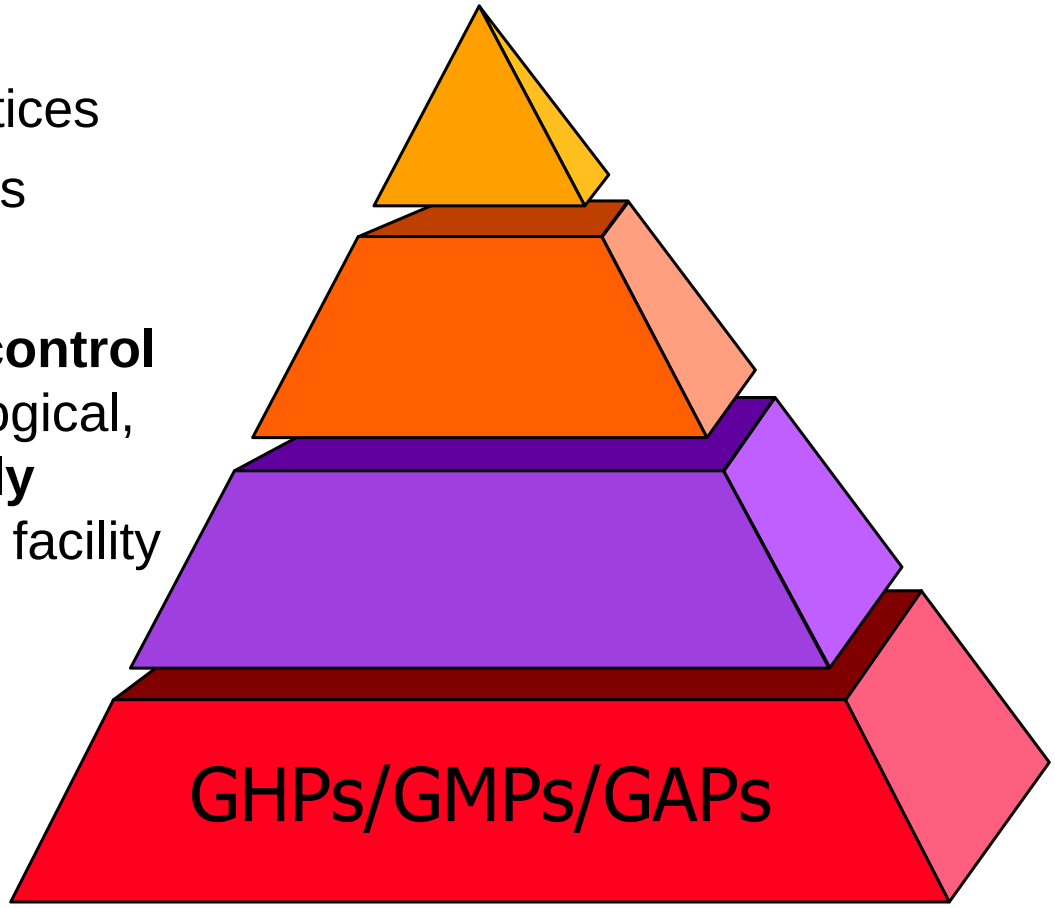


- Local, specific management
- Includes ALL Hazards

GOOD PRACTICES ARE FOUNDATIONAL

- **Food safety assurance** is founded on Good Practices
  - Good Hygienic Practices
  - Good Manufacturing Practices
  - Good Agricultural Practices

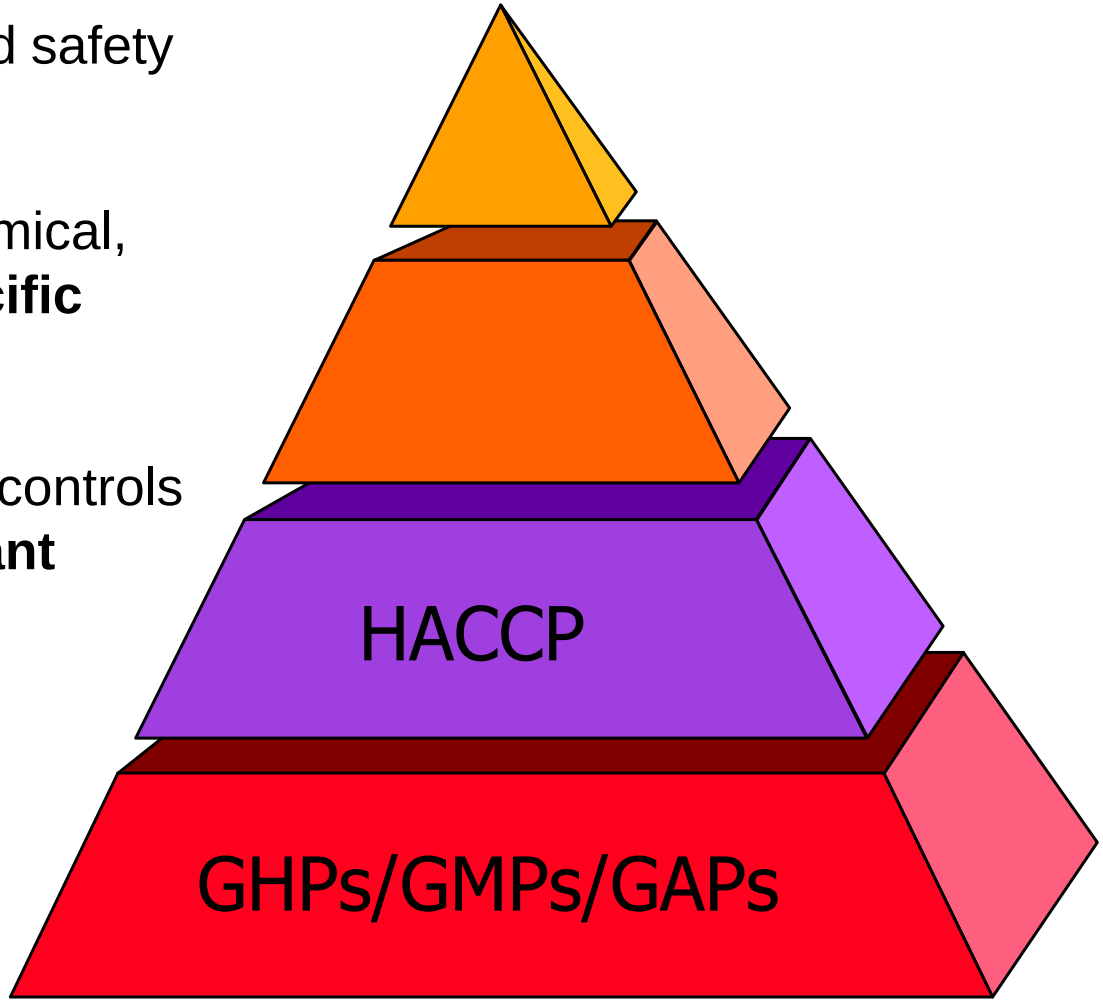
- Concerns **prevention and control measures** for hazards (biological, chemical, physical) **generally** relevant for a manufacturing facility



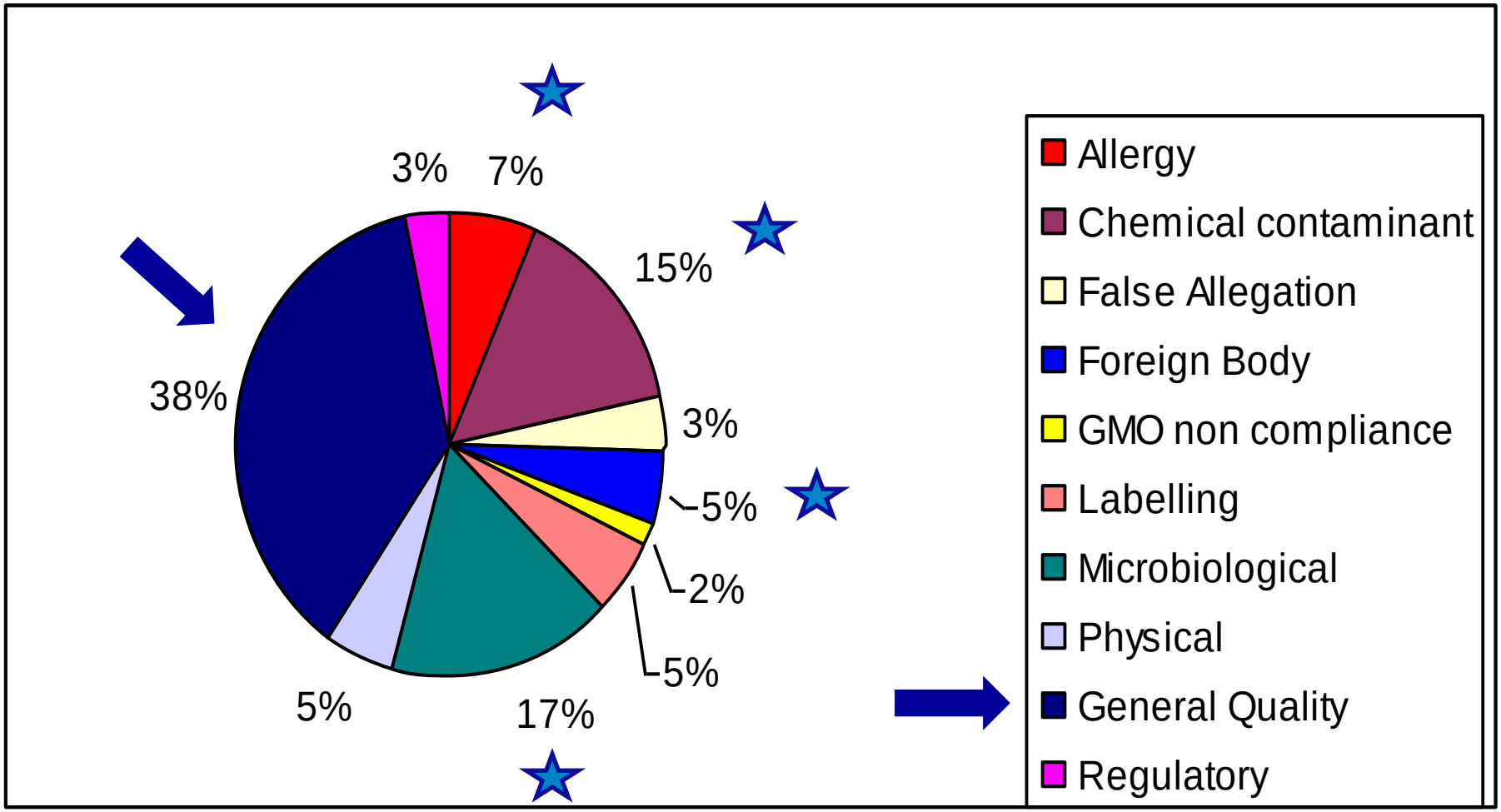
HACCP IS ESSENTIAL

- **Hazard Analysis Critical Control Point** (HACCP): a risk-based and systematic approach for food safety assurance

- **All hazards** (biological, chemical, physical) relevant for a **specific** food operation (e.g. product/processing-line) are considered and appropriate controls are put in place for **significant hazards**



WHAT TYPICALLY CAUSES ISSUES WITH FOOD?

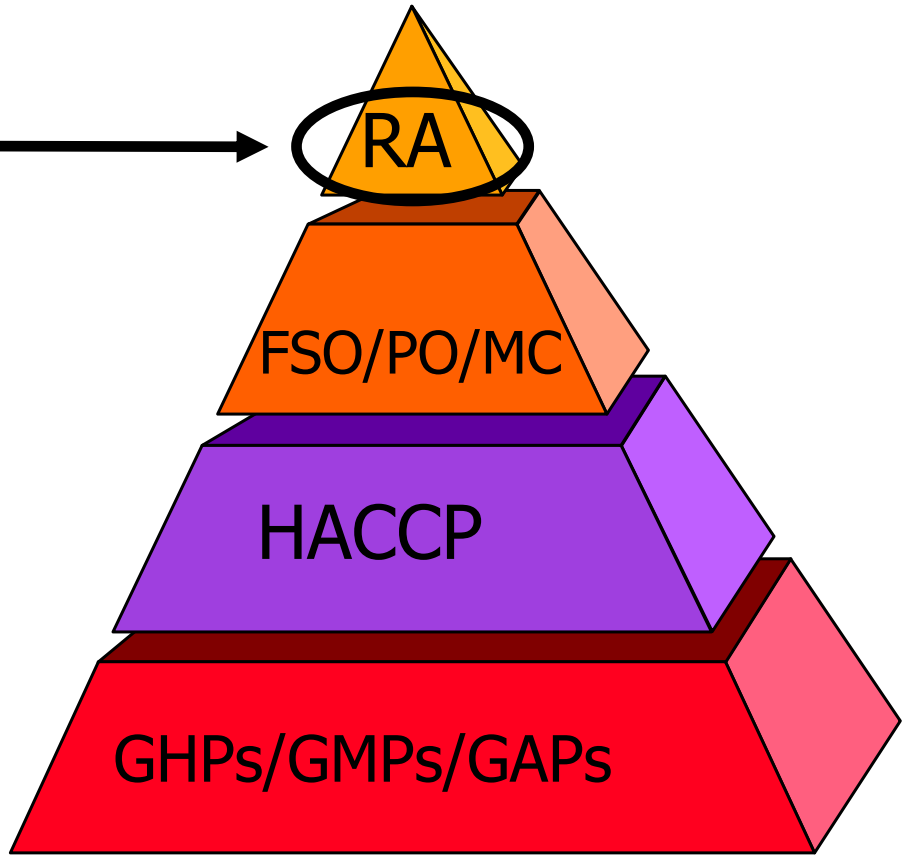


RISK ANALYSIS: THE FRAMEWORK

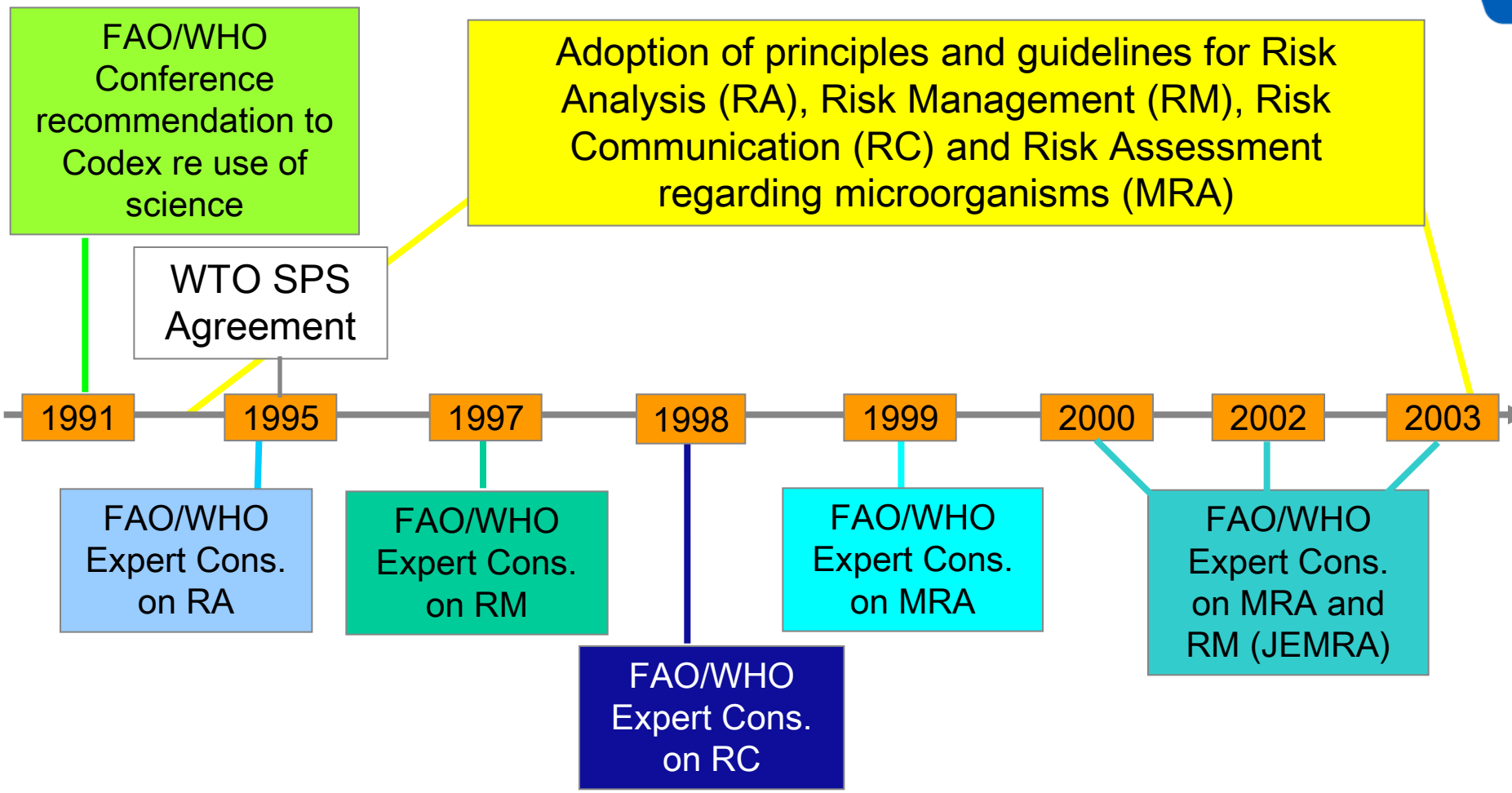
- **Risk Analysis**:
  - Risk Management
  - Risk Assessment
  - Risk Communication

- Triggered by World Trade Organisation (WTO)

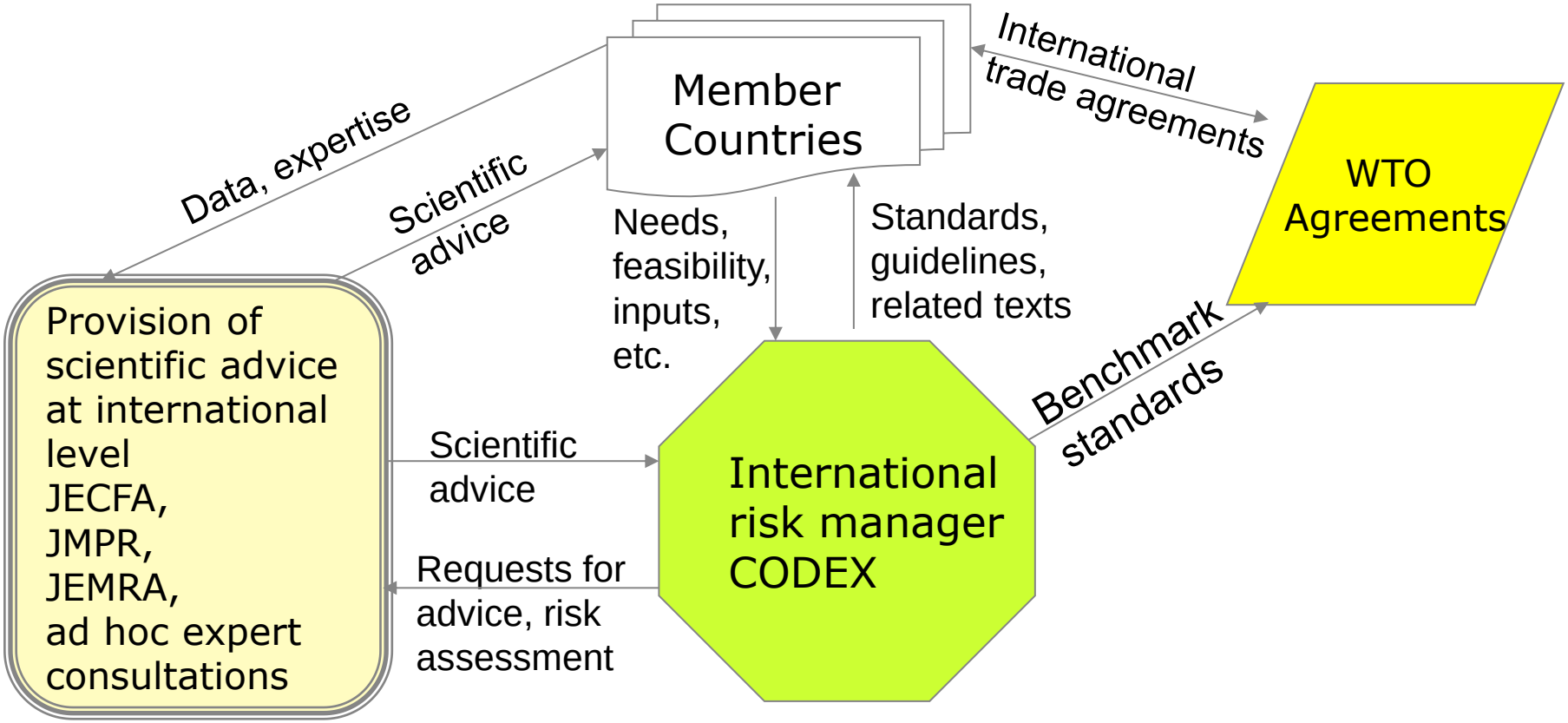
- Advocated by many governments and inter-governmental organisations (FAO, WHO)



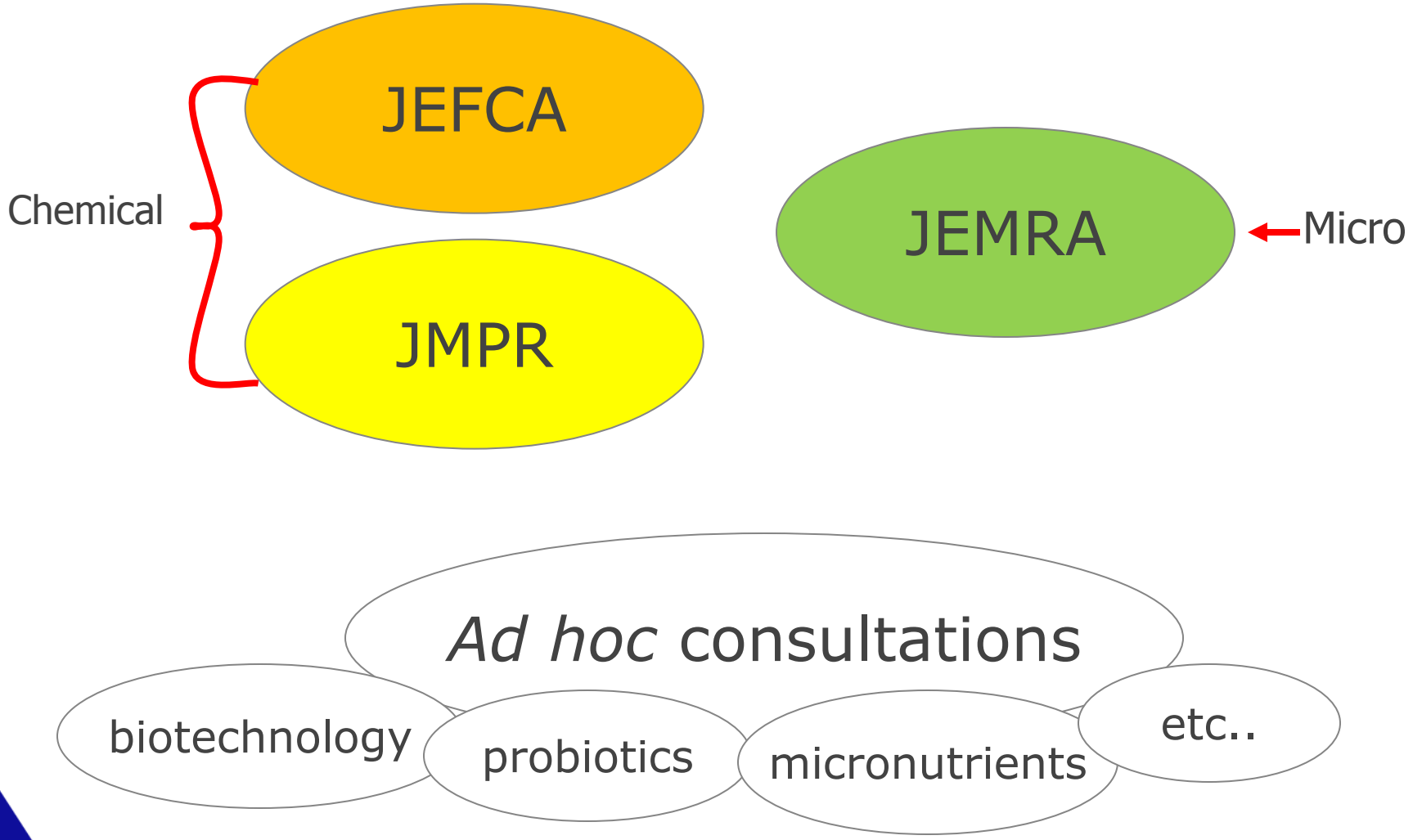
RISK ANALYSIS: CODEX TIMELINE



RISK ANALYSIS: THE CODEX PROCESS

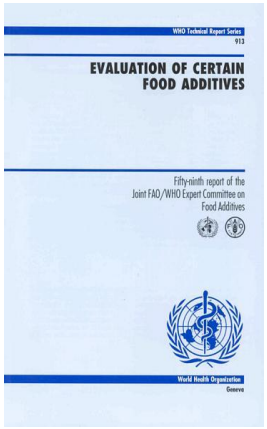


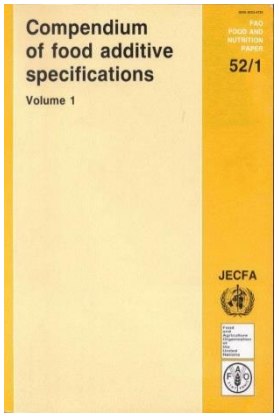
RISK ANALYSIS: SCIENTIFIC ADVICE

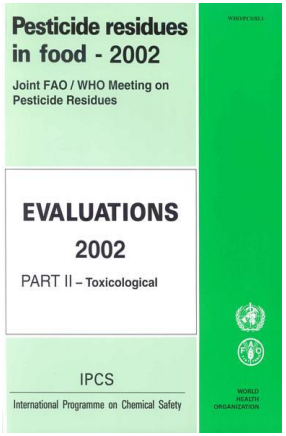


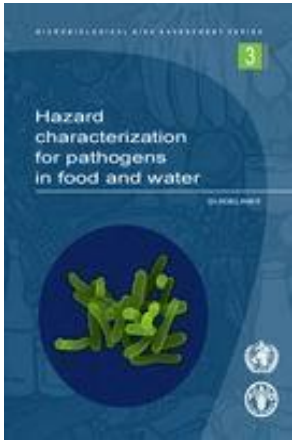
RISK ANALYSIS: SCIENTIFIC ADVICE OUTPUT

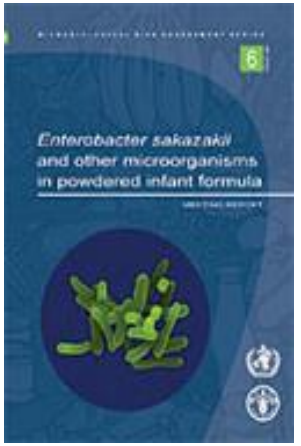
- Meeting reports
- Technical reports
  - Microbiological Risk assessments
  - Monographs for specific chemical in foods
  - Toxicological evaluations
- Summary reports
  - Rapid information dissemination for risk managers and less technical readers











RISK ANALYSIS: APPLICATION

Risk analysis - a tool that all governments/food safety authorities can use to achieve better food safety outcomes and improve public health

It can be used to:

- develop an estimate of the risks to human health and safety,
- identify and implement appropriate measures to control the particular risk(s),
- support and improve the development of standards

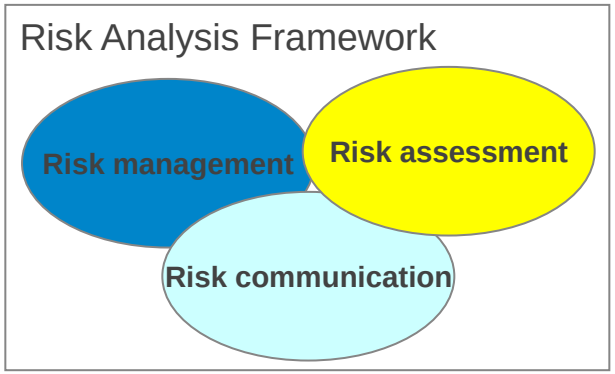
RISK ANALYSIS: THE FRAMEWORK

“Risk Management” driving “Risk Assessment”

- What is the specific issue? Is there really a risk?
- What information from a risk assessment would facilitate decision-making of risk manager?
- How best to mitigate realistic risks. What are the options?

Risk Assessment follows a structured and scientific approach to evaluate risks in four steps:

- Hazard Identification
- Hazard Characterization
- Exposure Assessment
- Risk Characterization



PROCESS STEPS: MICROBIOLOGICAL RISK ASSESSMENT

Hazard identification

- Identify food-borne pathogen of interest

Hazard Characterization

- Determine the dose-response relationship (volunteers, animals) when possible, or investigate outbreaks

Exposure Assessment

- Calculate the exposure to the hazard at consumption from hazard level and consumption volume/frequency

Risk Characterization

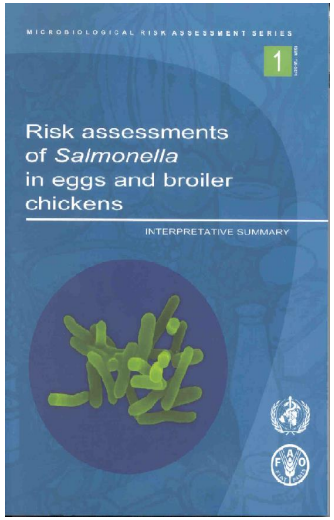
- Combine exposure and dose-response to obtain an estimation of the prevailing risk level or rate of illness

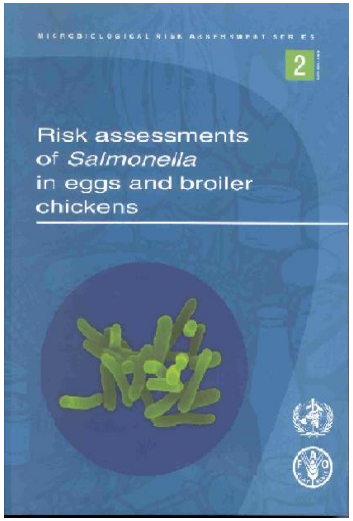
RISK ANALYSIS: ROLES & RESPONSIBILITIES

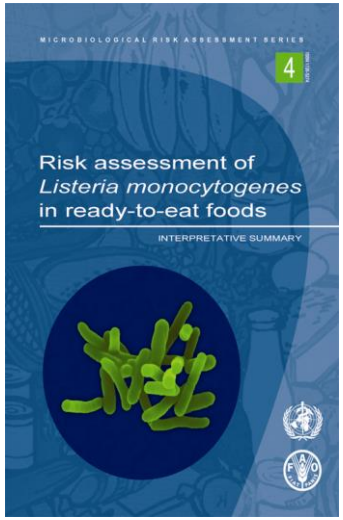
- Risk Manager:
  - Codex Committee for Food Hygiene (CCFH)

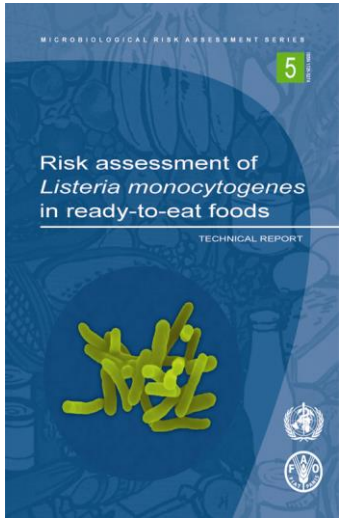
- Risk Assessor:
  - Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment (JEMRA)

RISK ANALYSIS: JEMRA OUTPUT

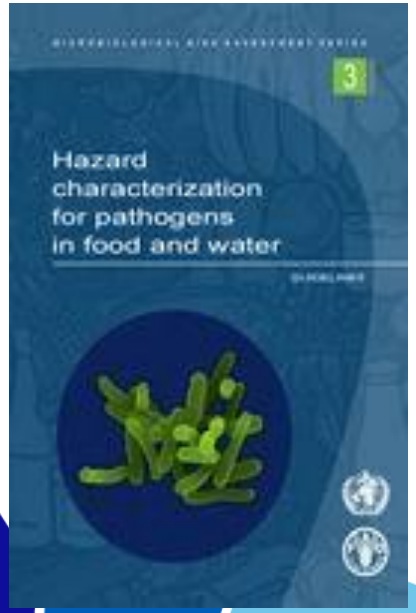








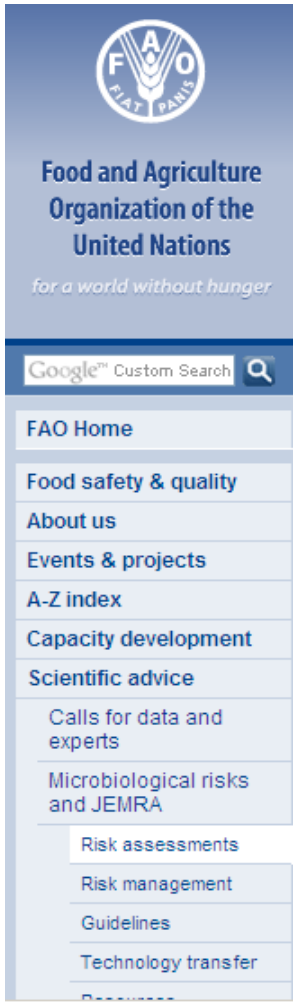
MRA reports



"how to" guidelines

Guidelines on principles/process

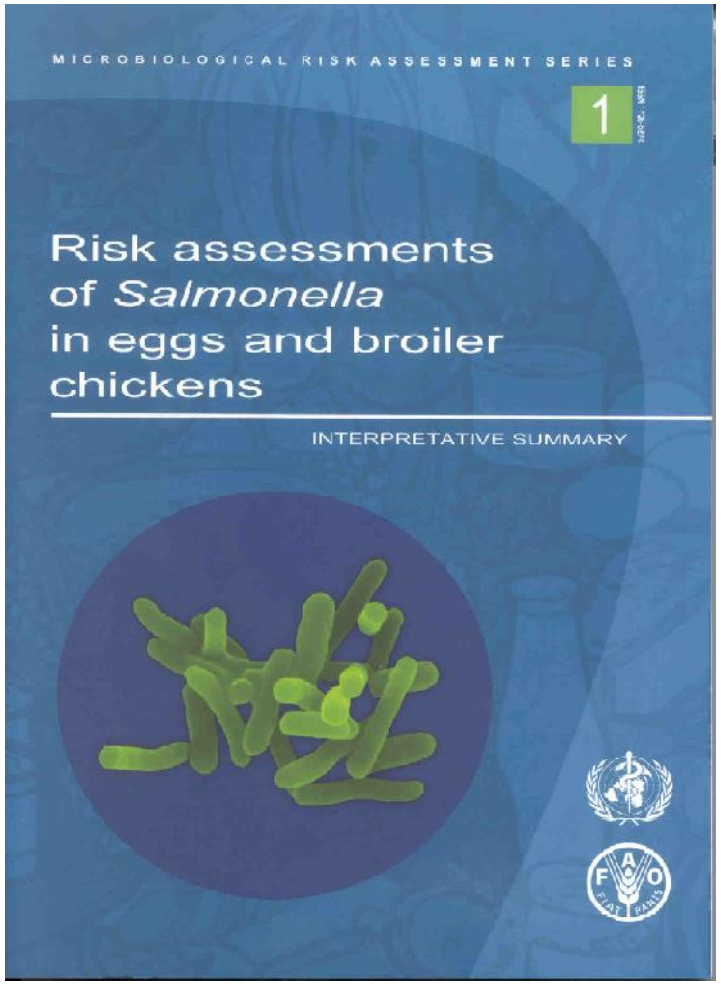
RISK ANALYSIS: JEMRA RISK ASSESSMENTS



- Microbiological hazards associated with fresh produce
- Viruses in foods
- Enterohaemorrhagic *Escherichia coli* (EHEC) in meat and meat products
- *Vibrio* spp. in seafoods
- *Salmonella* in eggs and broiler chickens
- *Campylobacter* spp. in broiler chickens
- *Cronobacter spp.* and other micro-organisms in powdered infant formula
- *Listeria monoctogenes* in ready-to-eat foods

http://www.fao.org/food/food-safety-quality/scientific-advice/jemra/risk-assessments/en/

RISK ANALYSIS: MRA USE IN STANDARDS



codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

JOINT OFFICE: Viale delle Terme di Caracalla 00100 ROME Tel: 39 06 57051 www.codexalimentarius.net Email: codex@fao.org Facsimile: 39 06 5705 4593

Agenda Item 10 (c) **CX/FH 04/10-Add.3**
December 2003

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD HYGIENE

Thirty-sixth Session
Washington DC, United States of America, 29 March – 3 April 2004

DISCUSSION PAPER ON RISK MANAGEMENT STRATEGIES FOR *SALMONELLA* SPP. IN POULTRY

Prepared by Sweden with the assistance of Australia, Brazil, Canada, China, Czech Republic, Denmark, France, Germany, Netherlands, New Zealand, Thailand, USA, the European Commission and ALA

BACKGROUND

At its 34th session in Bangkok, the Codex Committee on Food Hygiene was informed about the outcome of the FAO/WHO expert consultations on risk assessment on *Listeria* and *Salmonella*. It was noted that there was a need to develop a discussion paper on Risk Management Strategies for *Salmonella* spp. in broilers based upon the risk assessment document (FAO Food and Nutrition Paper 72). The committee agreed that a drafting group, led by Sweden should develop a discussion paper to be considered at its next Session. The drafting group met in Uppsala, Sweden, the 25-26th of February 2002.

RISK ANALYSIS: MRA USE IN STANDARDS

***JEMRA* MRAs**	***Codex* standards**
Listeria monocytogenes in ready-to-eat (RTE) foods	General principles of food hygiene for management of *L. monocytogenes*
Cronobacter spp. (*E. sakazakii*) in infant formula	Recommended international code of practice for foods for infants and children
Vibrio spp. in seafood	Risk management strategies for *Vibrio spp.* in seafood
Salmonella spp. in broiler chickens and eggs *Campylobacter* spp. in broiler chickens	Risk management strategies for *Salmonella* and *Campylobacter* in poultry

RISK ANALYSIS: ADOPTED BY MANY GOVERNMENTS

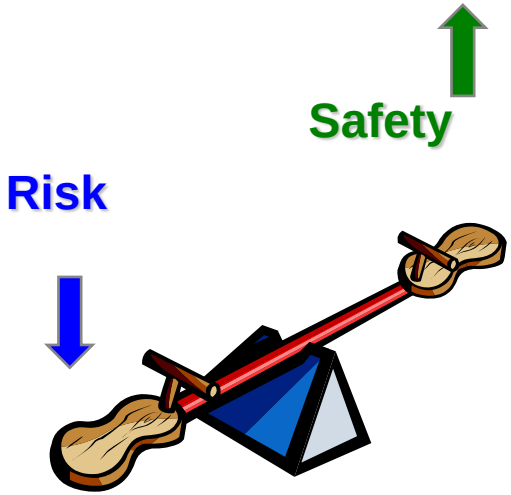
- To assess the level of risk in a (sub-)population due to a **specific** hazard associated to a **particular** food on the market, produced by (many) businesses
- To decide on the acceptability of an estimated risk
- To evaluate interventions that may eliminate the estimated risk or reduce it to an acceptable level

- Role of Industry assuring safety of on-market products:

  Industry has to implement proper product & process designs and manage these effectively during production (i.e. GHP/HACCP) to meet the food safety benchmarks set by governments (e.g. general food law, standards, criteria)

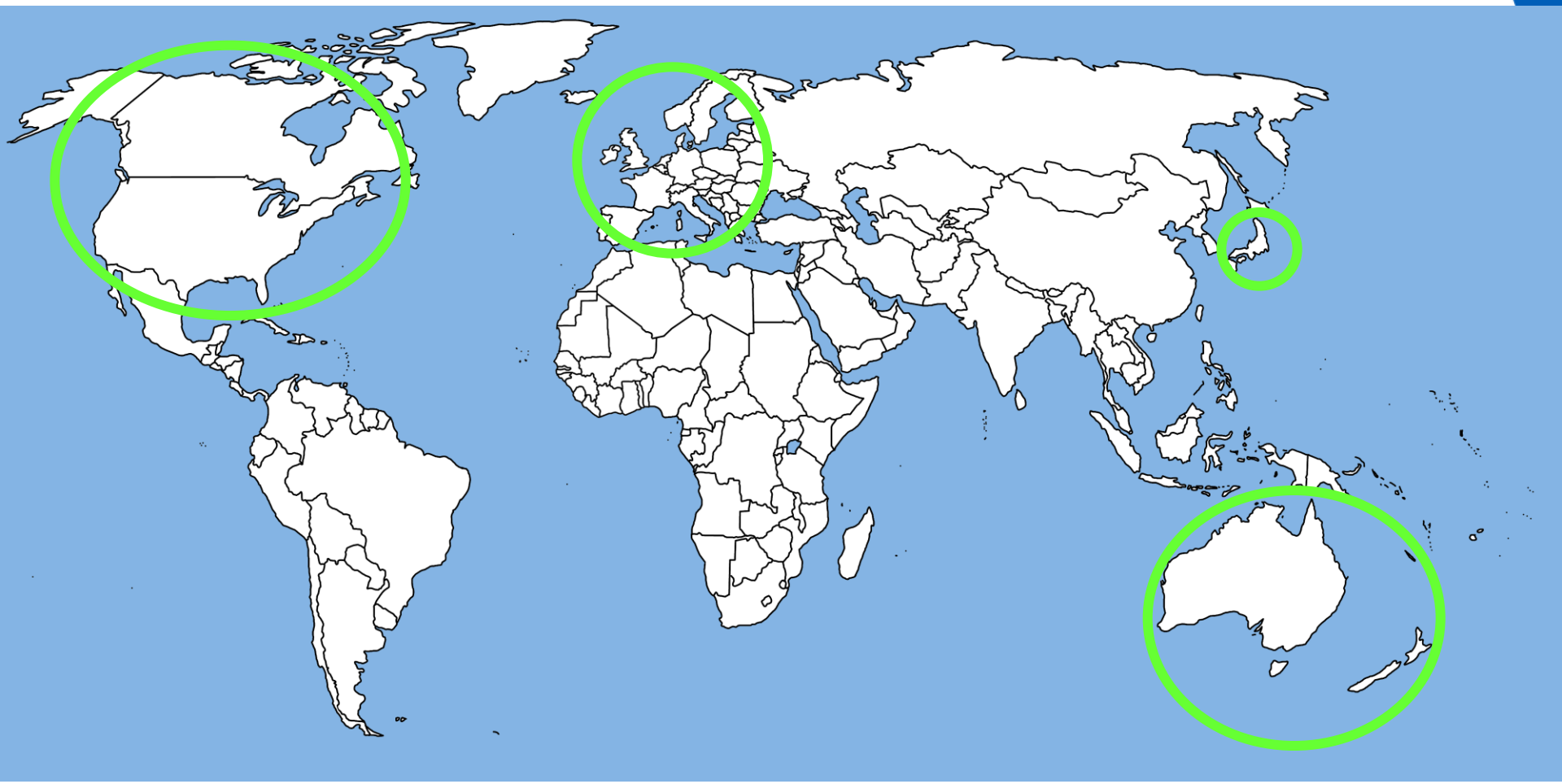
CODEX SAFETY AND RISK PRINCIPLES

- Safety means “no harm”
- 100% safety does not exist (i.e. no “zero risk”)
- There is always a *risk* that a certain harm is caused by a specific hazard
- Risk assessment estimates the harm caused (probability + severity)
- Governments decide on risk acceptability
- Risk analysis provides a framework for assessing, managing and communicating the risk



FAO/ICD/WHO Basic awareness course of MRA, Topic 1, http://www.sp-lab.net/fao/MRA/

MODERN FOOD SAFETY MANAGEMENT MAP



Moderns risk-based food safety management well implemented and practiced

Unilever Food Safety principles and processes

- Food Safety Assurance

FOOD SAFETY ASSURANCE PRINCIPLES

- Safe performance of foods on the market needs to be assured.
- Industry uses standards / guidelines from competent authorities to benchmark product safety.
- Preventative approaches key in product innovation and marketing.
- Safe performance on the market needs to be monitored and actions need to be taken when issues arise.

UNILEVER'S SAFETY GOVERNANCE

Set out in "Code of Business Principles"

- ***Consumers***: Products safe for their intended use
- ***Employees***: Safe & healthy working conditions
- ***Environment***: Environmental care built in product/use
- ***Innovation***: Sound science / rigorous product safety standards

Product Safety is based on:
Safety by Design & Execution

HOW DO WE MAKE SAFE FOOD?

Design of a safe product by R&D

Execution of safe design by factories

- *Monitor safe market performance*

- *Manage issues*

“SAFE BY DESIGN & EXECUTION”

Product safety is “designed in” into innovations

A) Specifically understanding, e.g.:

- ingredients, final formulation, external factors
- processing, handling
- post-process contamination
- intended use and intended user (consumer group)

Key Unilever expertise

B) Considering the available safety “benchmarks”:

- Regulations (e.g. standards, limits, criteria)
- Guidelines from governments
- Industry standards/guidelines
- “History of safe use data”

Public domain

“SAFE BY DESIGN & EXECUTION”

Steps in establishing a safe design:

- Identification of all realistic hazards
- Defining preventive measures
- Establishing effective controls for significant hazards
- Validating control measures, from lab-scale to pilot scale

SAFE DESIGN: SCALED–UP VALIDATION

“SAFE BY DESIGN & EXECUTION”

Safe Product and Process designs are executed by:

- Factory Level
  - Validating designs at operational-scale
  - Implementing designs in good management systems (GHP & HACCP)
  - Verifying ongoing control during manufacture
  - External audits to validate operation/management
  - Running Tracing & Tracking system
- Market Level
  - Monitoring on market performance and new insights
  - Issue Management
  - Reviewing safe design & execution as appropriate

“SAFE BY DESIGN & EXECUTION”

Needs to cover all types of hazards

Microbiological hazards

- e.g. Campylobacter, Salmonella, Listeria monocytogenes

Chemical Hazards

- Industrial and environmental contaminants (e.g. heavy metals)
- Biologically derived contaminants (e.g. mycotoxins)
- Improperly used agrochemicals (e.g. pesticides)
- Improperly labelled food additives (e.g. allergens)

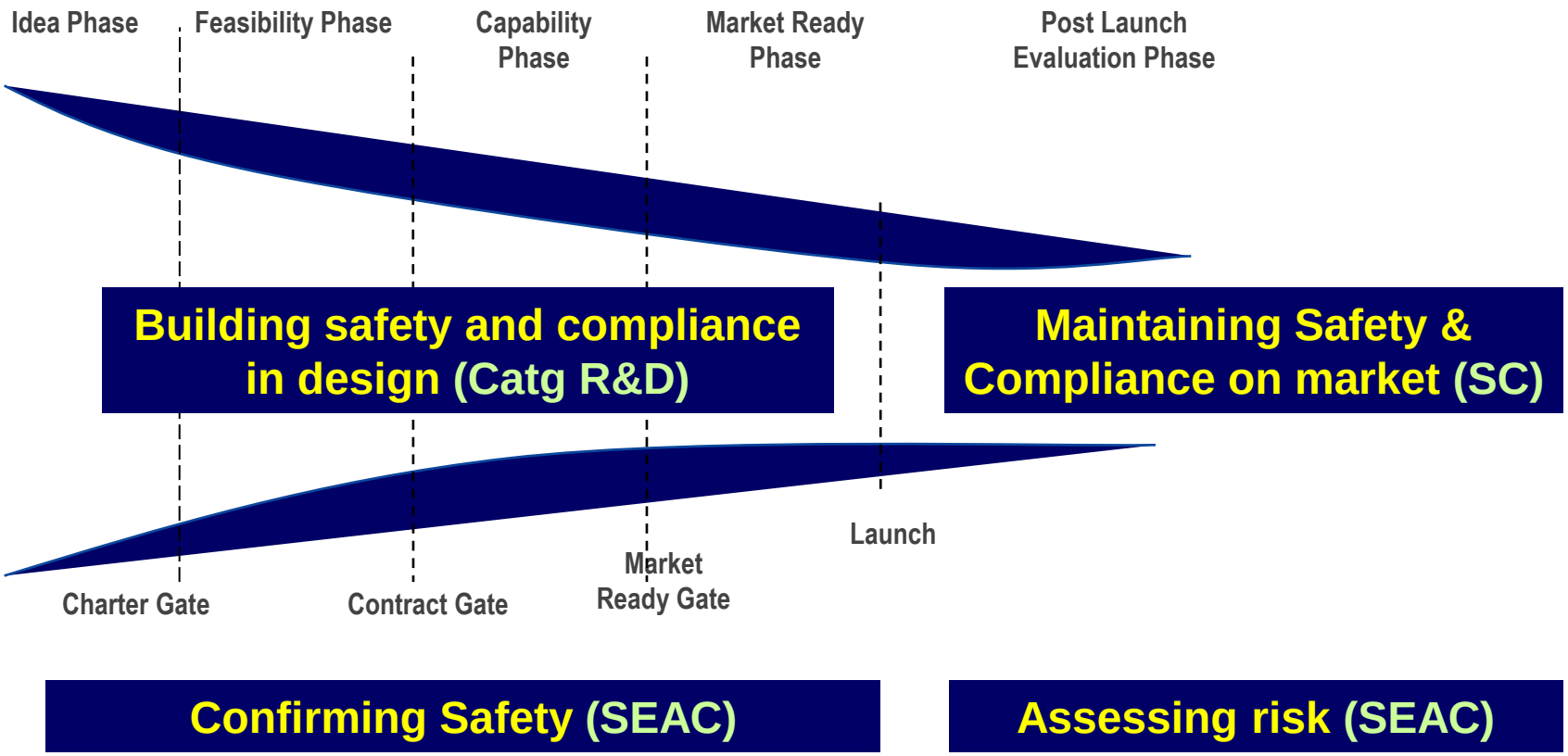
Physical Hazards

- e.g. Choking hazards, hazards causing burns or cuts

Unilever Food Safety principles and processes

- Independent “Integrated” Risk Assessment

UNILEVER'S INNOVATION FUNNEL



SEAC IS BASED IN THE UNITED KINGDOM

ROLE OF SEAC

Independent safety assessments as part of assurance of human safety and environmental care

- Toxicology
- Microbiology
- Contaminants
- Chemistry
- Physical Hazards
- Occupational Hygiene
- Occupational & Process Safety
  Environmental lifecycle
- Environmental management systems
- Sustainability

Risk Assessment
to inform
Risk Management

Design safety

Safe performance
on the marketplace

CAN WE USE A NEW INGREDIENT SAFELY?

Risk-based approach:

can we use x percent of ingredient y in product z?

CAN WE USE A NEW INGREDIENT OR PROCESS SAFELY?

Will it be safe

- for our consumers?
- for our workers?
- for the environment?

RISK ASSESSMENT FOR ALL AREAS

Multidisciplinary use of Risk Assessment in SEAC:

- Chemical Risk Assessment
- Microbiological Risk Assessment
- Occupational Risk Assessment
- Environmental Risk Assessment

RISK-BASED APPROACH TO EVALUATE DESIGN SAFETY OF INGREDIENTS

Product type

Ingredient level

Consumer habits

Amount of product

Frequency of use

Route of exposure

Retention factor

3. Exposure assessment

1. Hazard identification

2. Hazard characterization

Toxicology data

Safe history of use

Human data

QSAR

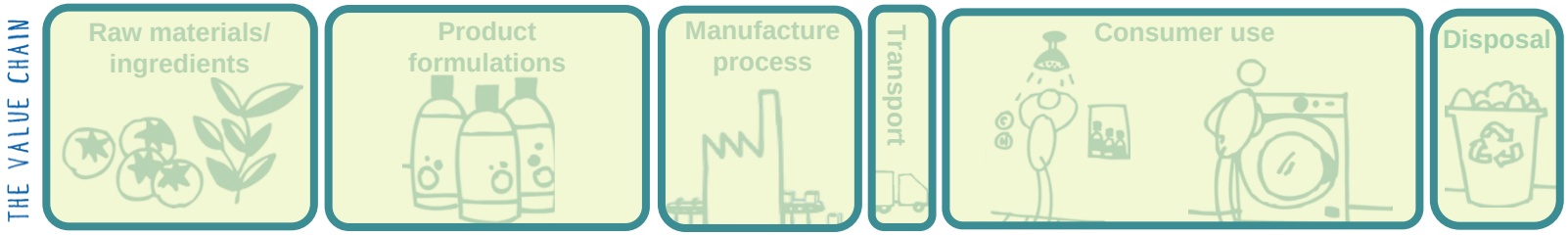
Biological equivalence

4. Risk characterization

Overall safety evaluation

SEAC PROVIDES AN INTEGRATED RISK ASSESSMENT

Integrated COE Safety and Environmental Sustainability Impact solutions underpinned with Value Chain Thinking



Category R&D and SC Inputs are required across the value chain for our COES risk and impact assessments

Consumer, Occupational, Environmental & Sustainability (COES) **exposure scenarios & data**

SEAC Outputs and early engagement across the value chain enable us to manage risks / impacts around complex Unilever innovations

Safety by Design
Safety Prognosis (identify key risks & data)

Formal post-launch monitoring (if warranted).
On-going monitoring & review of new data.

Risk Assessment for clinical / consumer studies

Business Continuity – managing C & E safety risks in the market

COE Safety Risk Assessment for Market
→ safety risk management decision

Environmental Sustainability Assessments of impacts of products and processes

Unilever Food Safety principles and processes

- Risk assessment case study

SIMULATING ‘SAFE’ SHELF-LIFE FOR NEW MARKETS

MICROBIOLOGICAL RISK ASSESSMENT

Newly designed “White sauce” culinary product

Key product characteristics

- Heat treatment > 90ºC-10min, in-pack
- pH= 6.0, A_w=0.997, Stored chilled

Relevant hazard?

- *Bacillus cereus*
- Benchmark: 10^5 cfu/g

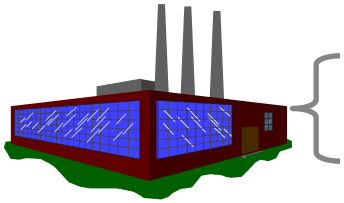
Design question?

- The likely failure rate to meet benchmark on markets that differ in supply chain & consumer home chill temperatures

Disciplines involved

- Microbiologists
- Food Scientists
- Risk Assessors / Analysts
- Mathematical modellers

EXPOSURE ASSESSMENT: KEY ELEMENTS



Bacterial concentration in raw materials

Heat treatment

Bacterial heat resistance

Prevalence and Bacterial concentration in processed food

Time in pre-retail (transport + warehouse)

Time in retail (local market, supermarket)

Time in consumer fridge

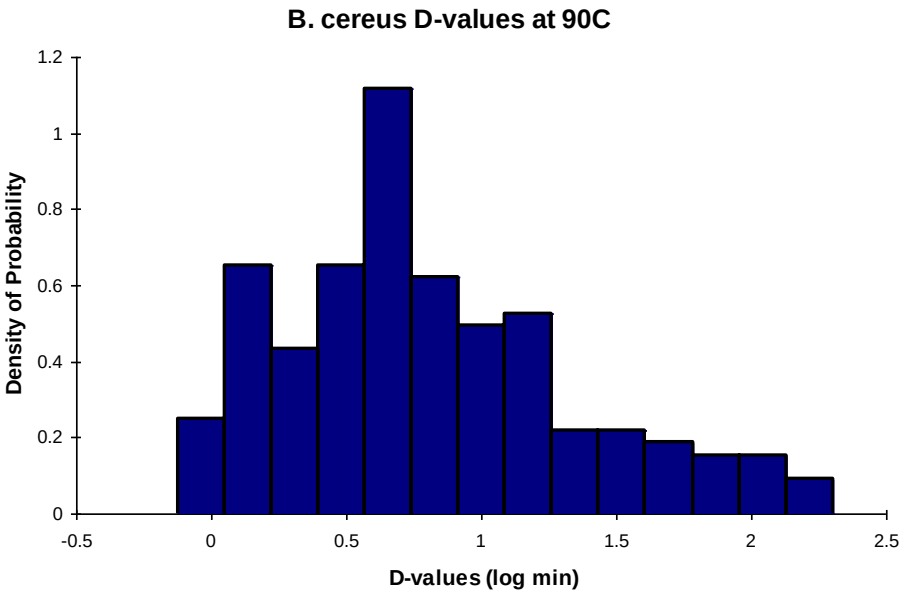
Lag time and growth rate of surviving spores, at chilled temperatures

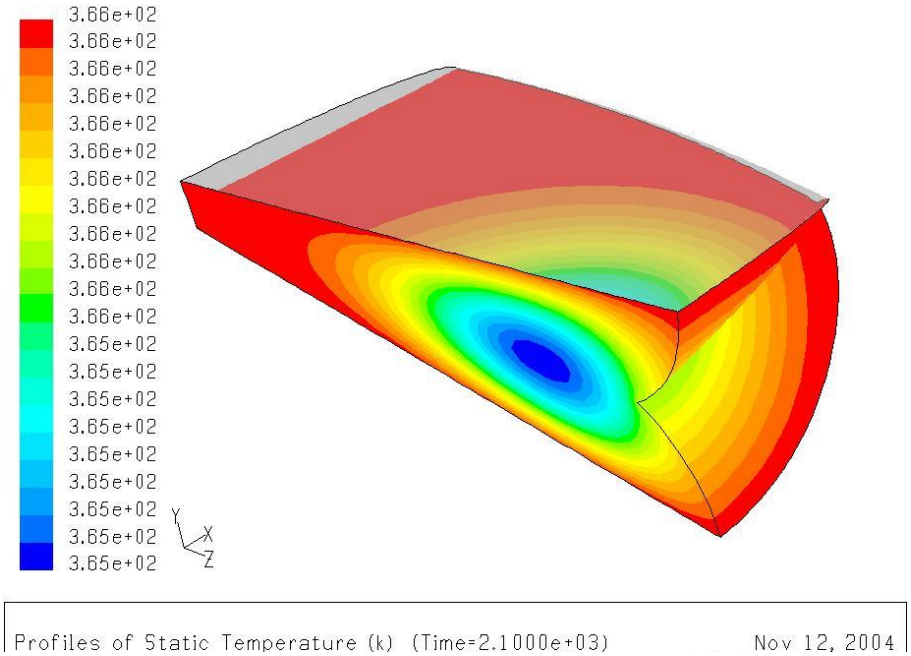
Temperature of pre-retail fridges

Temperature of retail fridges

Temperature of consumer fridges

HEAT TREATMENT ASPECTS/INACTIVATION

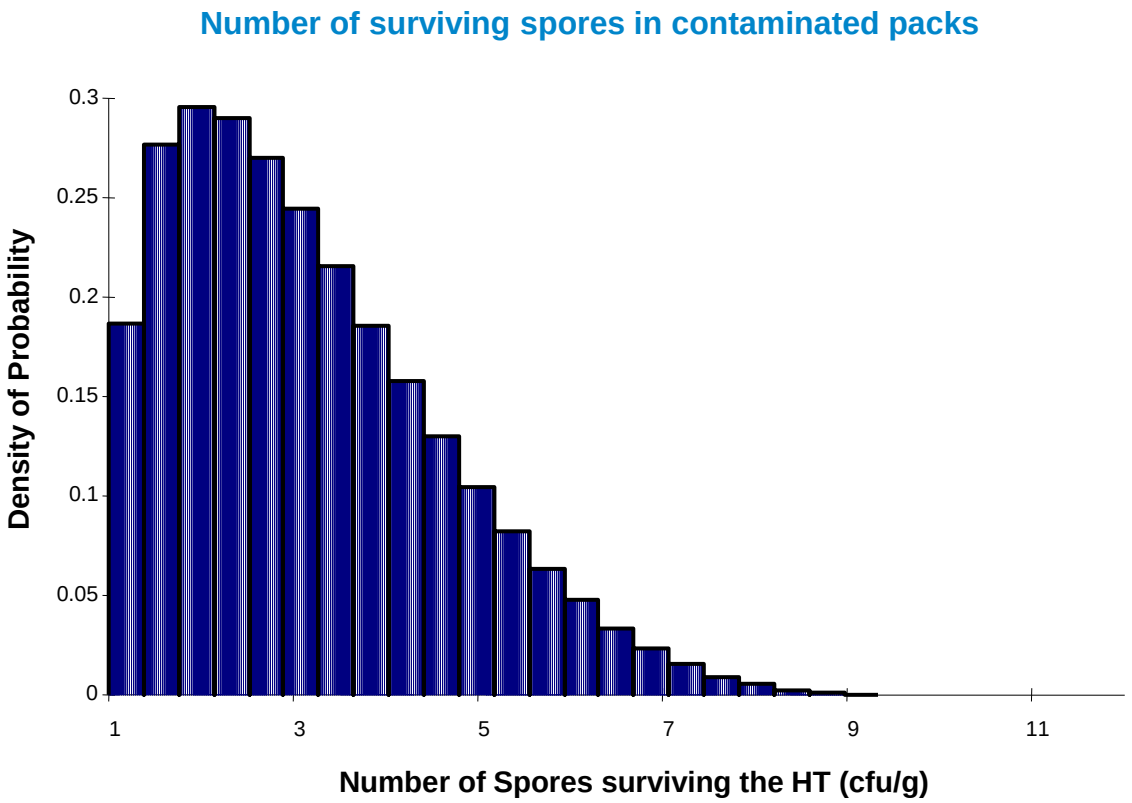




Variability in spore heat resistance

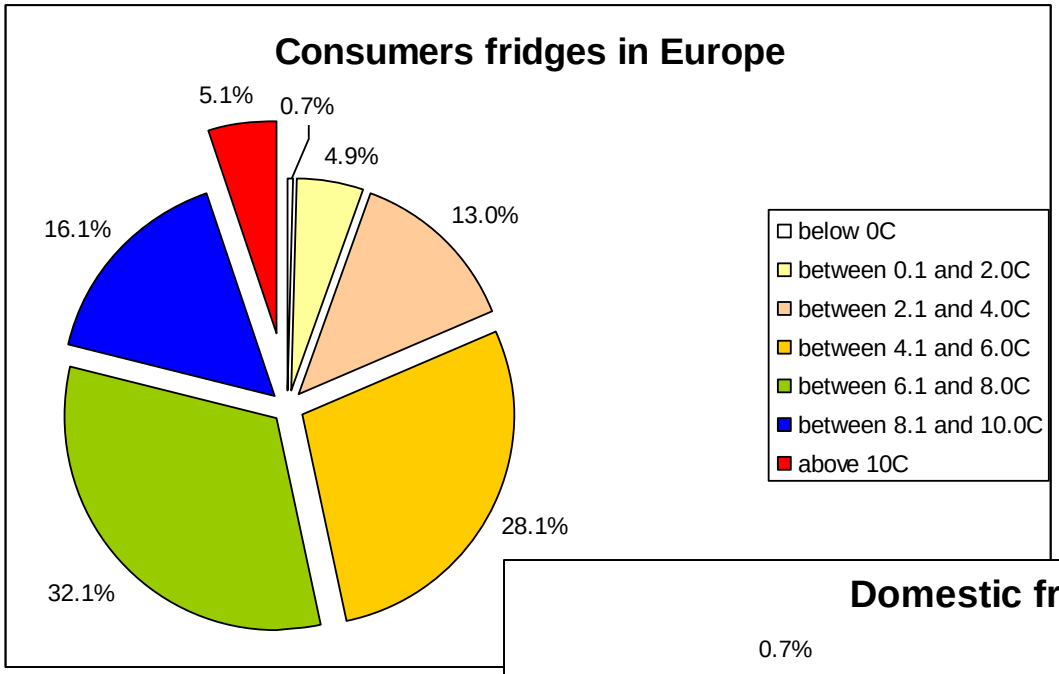
Variability in heat impact

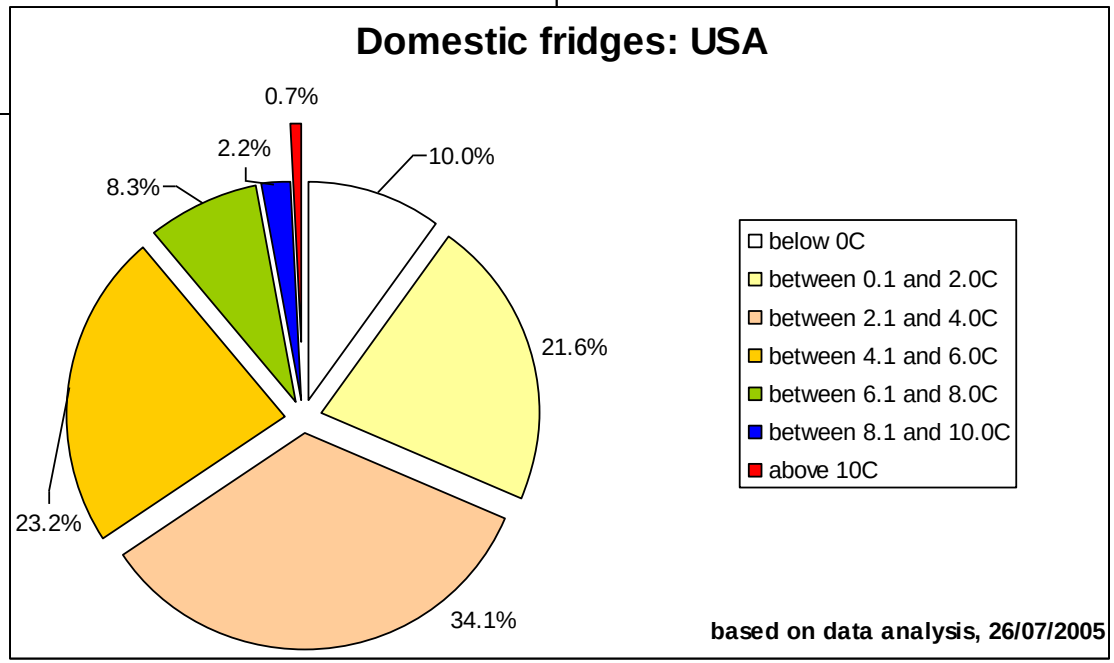
HEAT TREATMENT ASPECTS/SURVIVORS



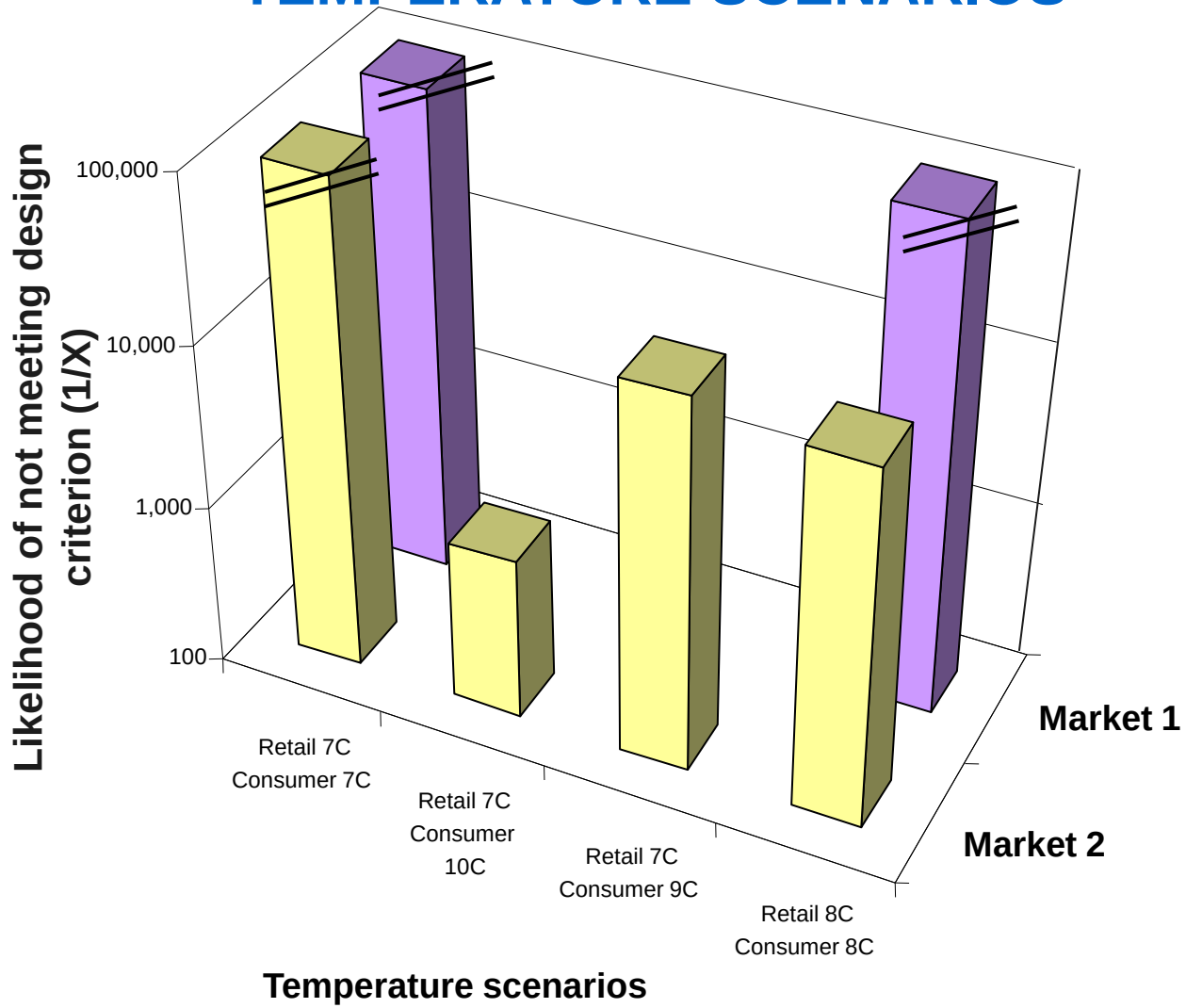
J.-M. Membré, A. Amézquita, J. Bassett, P. Giavedoni, C. de W. Blackburn, L.G.M. Gorris. 2006. A probabilistic modeling approach in thermal inactivation: estimation of postprocess Bacillus cereus spore prevalence and concentration. Journal of Food Protection, 69: 118-129.

TEMPERATURES IN COLD-CHAIN





PREDICTED FAILURE RATES ON DIFFERENT MARKETS FOR DIFFERENT TEMPERATURE SCENARIOS



VALUE OF RISK ASSESSMENT MODELLING

- Strengthens food safety assurance, by improving “safety by design”
- Results very informative for internal decision-making:
  - Informs on “risk” factors
  - Points out key data-gaps
  - Defines window for testing / validation
- Running what-if scenario’s fast and saves resources

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Risk Communication challenge

CONSUMER TRUST IS LOW

- Consumers are not confident that food is safe
- Despite efforts of government to have strong, internationally harmonized approaches to food safety control and management
- Despite all the science that is underpinning product innovation

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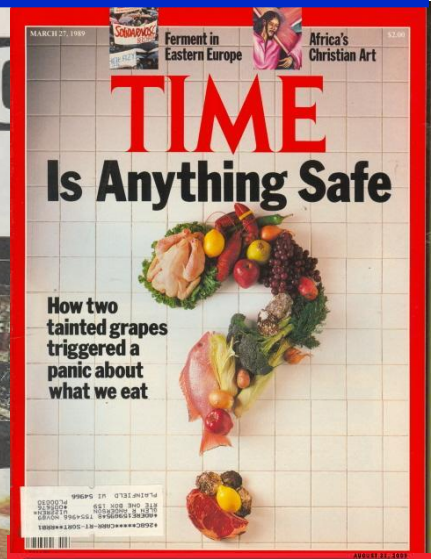
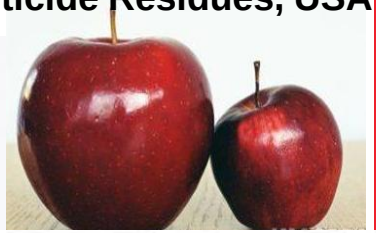
Food Safety seems “not under control”…..



The Washington Post

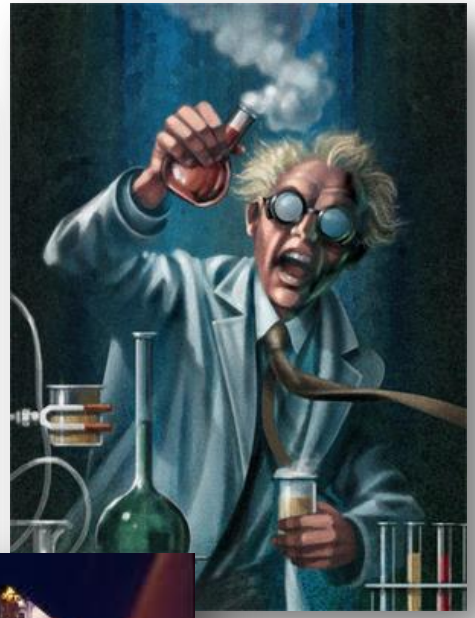
U.S. facing 'grievous harm' from chemicals in air, food, water, panel says (May 7, 2010)

98% Of Apples Have Pesticide Residues, USA



Eat at Your Own Risk

MEDIA ”SCIENTIST”



Various sources, Google Images

WHY CAN'T FOOD JUST BE SAFE?

- Each day consumers ingest a wide range of food; putting their faith in industry and government

- Significant erosion of general public knowledge about food safety:
  - Understanding of where food comes from and how it is made
  - Their contribution to safe food (Good handling practices)
  - Eating a varied diet / physical activity

- Consumers do not have the expert knowledge of risk managers / scientists
- Scientists don't all agree
- Risk managers may be poor at communicating acceptable risk

Bob Buchanan (amended)

RISK ASSESSMENT – DIFFERENCES IN APPROACHES

Expert	Public
Scientific	Intuitive
Probabilistic	Yes / No
Acceptable risk	Safety
Changing knowledge	Is it or isn't it?
Comparative risk	Discrete events
Population averages	Personal consequences

Willem Gerritsen, Consumer Perception of Food Risks. www.fsra.eu/secure/unit1.ppt

CONSUMER RISK ATTITUDE

- Concerned, even when hazards are not relevant
- Overestimate some risks (technological risks)
- Underestimate other risks (lifestyle risks)

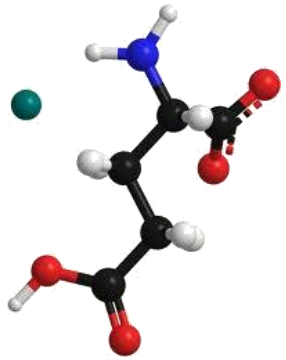
Example in case:

- E-numbers used for additives and commonly found on food labels throughout the European Union.

E-NUMBERS REPRESENT SAFE ADDITIVES

- E numbers are codes for substances that can be used as food additives within the EU. The "E" stands for "Europe".
- Safety assessment and approval are the responsibility of the European Food Safety Authority (EFSA) [1].
- E-numbers therefore represent additives that the EU Member States deem to be safe
- The Chemicals that E-numbers represent may be natural ingredients or artificial chemicals, categorized by function

4.1 E100–E199 (colours)
4.2 E200–E299 (preservatives)
4.3 E300–E399 (antioxidants, acidity regulators)
4.4 E400–E499 (thickeners, stabilizers, emulsifiers)
4.5 E500–E599 (acidity regulators, anti-caking agents)
4.6 E600–E699 (flavour enhancers)
4.7 E700–E799 (antibiotics)
4.8 E900–E999 (glazing agents and sweeteners)
4.9 E1000–E1599 (additional chemicals)



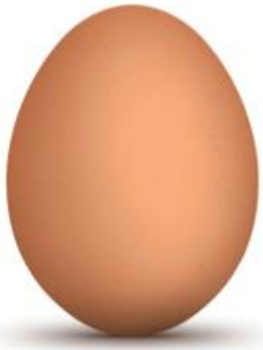
(1: http://www.efsa.europa.eu/en/topics/topic/additives.htm)

HOW WOULD A LABEL LOOK LIKE?

AN ALL-NATURAL BANANA

INGREDIENTS: WATER (75%), **SUGARS (12%)** (GLUCOSE (48%), FRUCTOSE (40%), SUCROSE (2%), MALTOSE (<1%)), STARCH (5%), FIBRE E460 (3%), **AMINO ACIDS (<1%)** (GLUTAMIC ACID (19%), ASPARTIC ACID (16%), HISTIDINE (11%), LEUCINE (7%), LYSINE (5%), PHENYLALANINE (4%), ARGININE (4%), VALINE (4%), ALANINE (4%), SERINE (4%), GLYCINE (3%), THREONINE (3%), ISOLEUCINE (3%), PROLINE (3%), TRYPTOPHAN (1%), CYSTINE (1%), TYROSINE (1%), METHIONINE (1%)), **FATTY ACIDS (1%)** (PALMITIC ACID (30%), OMEGA-6 FATTY ACID: LINOLEIC ACID (14%), OMEGA-3 FATTY ACID: LINOLENIC ACID (8%), OLEIC ACID (7%), PALMITOLEIC ACID (3%), STEARIC ACID (2%), LAURIC ACID (1%), MYRISTIC ACID (1%), CAPRIC ACID (<1%)), ASH (<1%), PHYTOSTEROLS, E515, OXALIC ACID, E300, E306 (TOCOPHEROL), PHYLLOQUINONE, THIAMIN, **COLOURS** (YELLOW-ORANGE E101 (RIBOFLAVIN), YELLOW-BROWN E160a), **FLAVOURS** (3-METHYLBUT-1-YL ETHANOATE, 2-METHYLBUTYL ETHANOATE, 2-METHYLPROPAN-1-OL, 3-METHYLBUTYL-1-OL, 2-HYDROXY-3-METHYLETHYL BUTANOATE, 3-METHYLBUTANAL, ETHYL HEXANOATE, ETHYL BUTANOATE, PENTYL ACETATE), 1510, NATURAL RIPENING AGENT (ETHENE GAS).

INGREDIENTS OF AN ALL-NATURAL EGG



INGREDIENTS: AQUA (75.8%), **AMINO ACIDS (12.6%)** (GLUTAMIC ACID (14%), ASPARTIC ACID (11%), VALINE (9%), ARGININE (8%), LEUCINE (8%), LYSINE (7%), SERINE (7%), PHENYLALANINE (6%), ALANINE (5%), ISOLEUCINE (5%), PROLINE (4%), TYROSINE (3%), THREONINE (3%), GLYCINE (3%), HISTIDINE (2%), METHIONINE (3%), CYSTINE (2%), TRYPTOPHAN (1%)); **FATTY ACIDS (9.9%)** (OCTADECENOIC ACID (45%), HEXADECANOIC ACID (32%), OCTADECANOIC ACID (12%), EICOSATETRAENOIC ACID (3%), EICOSANOIC ACID (2%), DOCOSANOIC ACID (1%), TETRACOSANOIC ACID (1%), OCTANOIC ACID (<1%), DECANOIC ACID (<1%), DODECANOIC ACID (<1%), TETRADECANOIC ACID (<1%), PENTADECANOIC ACID (<1%), HEPTADECANOIC ACID (<1%), TETRADECENOIC ACID (<1%), HEXADECENOIC ACID (<1%), EICOSENOIC ACID (<1%), DOCOSENOIC ACID (<1%), OMEGA-6 FATTY ACID: OCTADECADIENOIC ACID (12%), OMEGA-3 FATTY ACID: OCTADECATRIENOIC ACID (<1%), EICOSAPENTAENOIC ACID (EPA) (<1%), OMEGA-3 FATTY ACID: DOCOSAHEXAENOIC ACID (DHA) (<1%)); **SUGARS (0.8%)** (GLUCOSE (30%), SUCROSE (15%), FRUCTOSE (15%), LACTOSE (15%), MALTOSE (15%), GALACTOSE (15%)); **COLOUR** (E160c, E160a), E306, E101; **FLAVOURS** (PHENYLACETALDEHYDE, DODECA-2-ENAL, HEPTA-2-ENAL, HEXADECANAL, OCTADECANAL, PENTAN-2-ONE, BUTAN-2-ONE, ACETALDEHYDE, FORMALDEHYDE, ACETONE); SHELL (E170), ALSO CONTAINS BENZENE & BENZENE DERIVATIVES, ESTERS, FURANS, SULFUR-CONTAINING COMPOUNDS AND TERPENES.

www.foodnavigator.com/Business/Naturally-opposed-Balancing-new-technologies-with-consumer-perceptions

CONSUMERS ARE SCARED BY E-NUMBERS

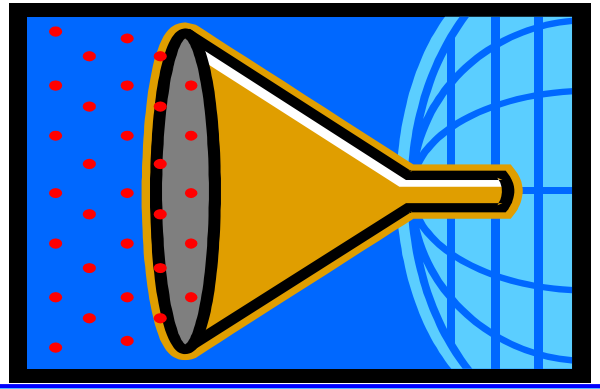
- They have no direct knowledge of what the system represents; they don't understand the scrutiny of safety

- They are confronted with information on apparent risks
  - increased incidence of eczema, asthma and allergies
  - Cancer, hyperactivity; decreased learning ability
  - Obesity, and millions of other illnesses

- They are unaware of the benefits / function of additives

- They are confused, getting mixed messages

BUILDING CONSUMER CONFIDENCE

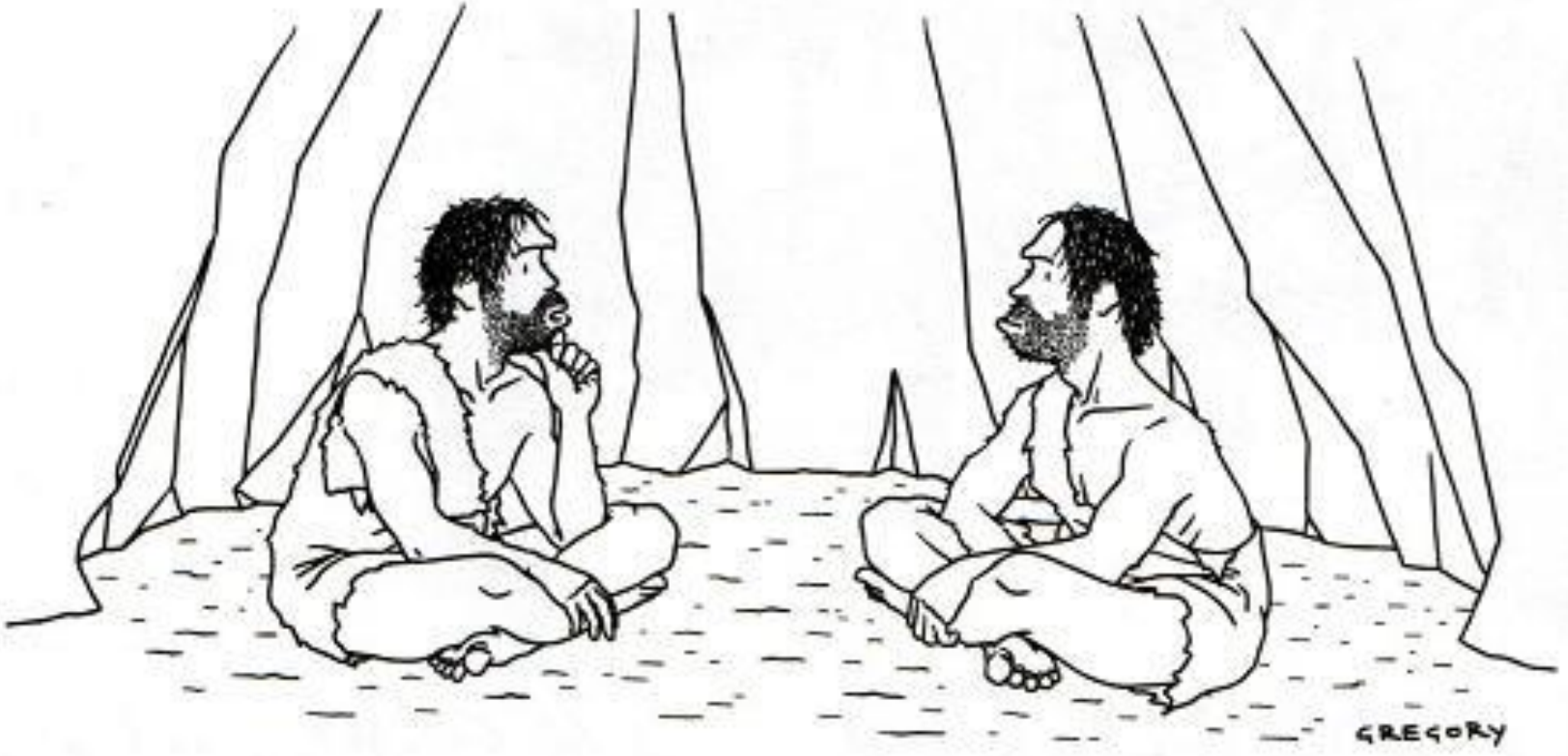


Safety – integral part of Government Standard setting & Industry Innovation process

Risk – a challenge to communicate to the general public, consistently

Trust of consumers – the ultimate target for both government and industry

FOOD FOR THOUGHT
…….IN THE BEGINNING ….



"Something's just not right—our air is clean, our water is pure, we all get plenty of exercise, everything we eat is organic and free-range, and yet nobody lives past thirty."

谢谢

Unilever

有家就有联合利华