Crisis Perceptions and Innovation Realities in a Complex World

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I - What is EIRMA?

is an **independent** not-for-profit organisation

provides a **European perspective** on the global management of applied R&D and innovation

engages +**120 major companies** which are based in 18 countries
operating in a **wide range of sectors**

gathers world-class R&D performers

– Vision and Mission

« EIRMA aims to be the preferred network for European open exchange of best practices in research, development and innovation for a sustainable world, across all industrial sectors »

Through its new mission statement

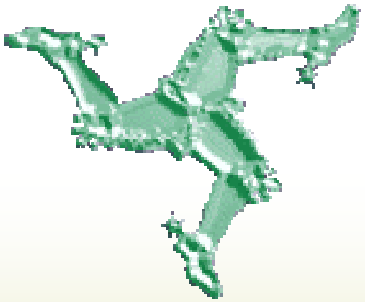
« EIRMA enables to foster the best possible industrial research, development and innovation ground in Europe by promoting exchange of best practices, experience sharing and networking with the ultimate goal of making European R&D and Innovation a major contributor to a more liveable, sustainable world and an attractive place for its major stakeholders. »

What does EIRMA offer?
Three Complementary Legs

Provide a balanced overview,
make effective use of members' time and effort,
help achieve synergies, demonstrate impact and value

Programme of events

+/-18 meetings per year
in various forms & for different audiences



Publications

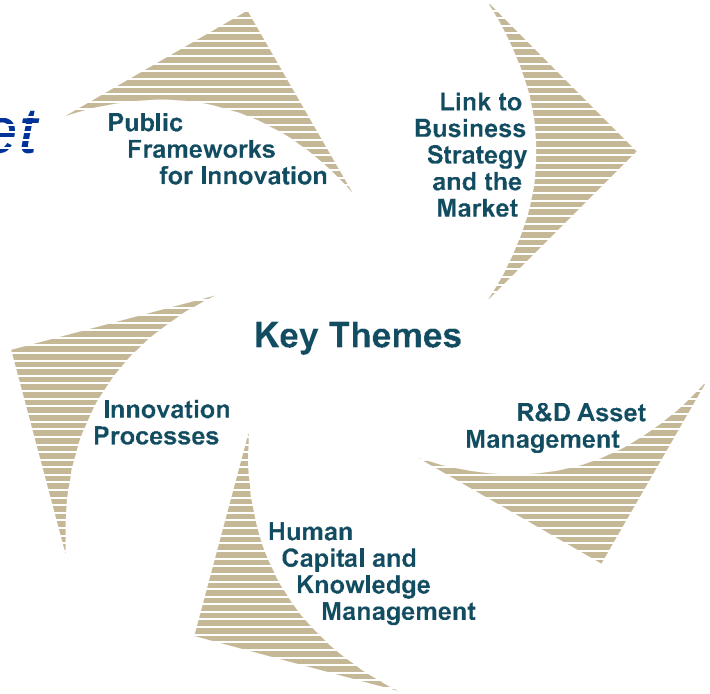
Electronic and printed information
(Website, Reports, Meeting Records)

Outreach (Special EU / DG Research Round table /FP8/ April 6) in Brussels

Public policy work at European and International levels
External talks, sister organisations, etc.

A **topical programme** as a basis for informal benchmarking organised around **five main themes**:

- *Link to Business Strategy and the Market*
- *R&D Asset Management*
- *Human Capital and Knowledge Management*
- *Public Frameworks for Innovation*



A clear focus on improving global business performance through **more effective applied R&D**

II- In a Nutshell...

What makes EIRMA unique?

Ø Access to a vibrant **network** of **global R&D performers** coming from different business sectors

Ø Open and honest discussion between practitioners, exchange of pragmatic experience with people who face similar challenges

Ø The “give and take” approach: based on mutual exchange of ideas between all members

Who can participate to EIRMA activities?

Ø Any company carrying our R&D in Europe can join EIRMA and benefit from the self-learning opportunities

Ø All managerial staff – junior to senior – of member companies are able to take advantage of our resources and networks.

In a Nutshell…

How is EIRMA funded?

EIRMA is an independent, not-for-profit body

Members fund EIRMA through their membership and meeting participation fees
We receive no public subsidies, although we do take part in some sponsored projects

Who runs EIRMA?

EIRMA is a **member-led** association:

Ø Member companies elect a Governing Board, which define strategy and oversees a Secretariat of five people based in Paris who handle all day-to-day activities

Ø A Programme Planning Committee of experienced R&D managers in member companies selects relevant topics in the programme

The world of today...and tomorrow

« Everyone takes the limit of his vision for the limit of the world » (Schopenhauer)

« Scientific disciplines are in an accelerated acceleration » (Buckminster Fuller), i.e. new ideas appear more quickly than we can reorganize to respond to them

Transcience (at the boundaries of disciplines) becomes key

Crisis Perceptions and Innovation Realities in a Complex World

In the news today

Europe horizon 2020 plan

Vision 2050 (WBCSD)

60% SME versus 40% large companies in Europe

Cloud computing

Protecting people is better than protecting jobs

The death valley between R&D and innovation

In the news today

Irrational fears...and decisions (GMO, nanotech, stem cells,...)

Inclusive Innovation

Knowledge management: do we know what we know and what we do not know? How about what we do not know that we do not know?

Get young people in scientific education versus only humanities

Responsible partnership (RTO's, Universities, Industries)

Crisis

How about being in permanent crisis management?

A bad conjuncture or a natural opportunity?

A risk + an opportunity (for change)

Risk:

Negative, threatening, dangerous, abnormal, an accident

Opportunity:

Gate to possible improvement, desirable utopy, emergence of new paradigm

Risk

Risk ≡ hazard + outrage

Possible exposure to a loss (material, human,physical,psychological,…)

In our western world :

never as much safety

never as much risk adverse

Sources: Department of Health and Human Services, National Center for Health Statistics.

SOURCE: The 1991 Information Please Almanac, *Boston: Houghton Mifflin, 1991, pp. 817, 820.*

Mortality Death Rates for Selected Causes

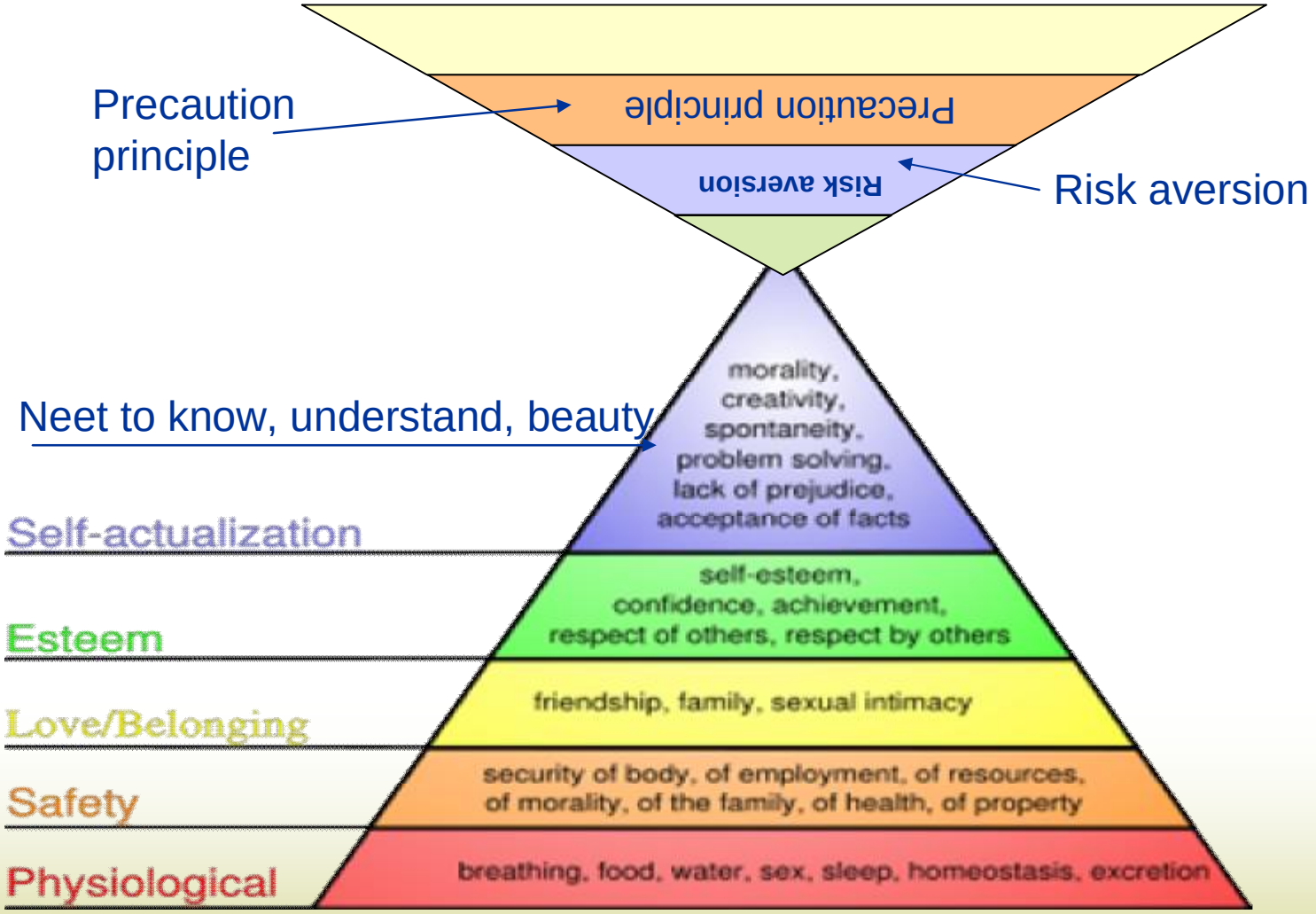
Death Rates per 1,000

Cause of Death	1989	1988	1985	1980	1950	1945-49	1920-24	1900-04
Typhoid fever	n.a.	n.a.	—	0.0	0.1	0.2	7.3	26.7
Communicable diseases of childhood	n.a.	n.a.	n.a.	0.0	1.3	2.3	33.8	65.2
Measles	0.0	—	—	0.0	0.3	0.6	7.3	10.0
Scarlet fever	n.a.	n.a.	1.0	0.0	0.2	0.1	4.0	11.8
Whooping cough	0.0	—	—	0.0	0.7	1.0	8.9	10.7
Diphtheria	n.a.	n.a.	—	0.0	0.3	0.7	13.7	32.7
Pneumonia and influenza	30.3	31.5	27.9	23.3	31.3	41.3	140.3	184.3

Cause of Death	1989	1988	1985	1980	1950	1945-49	1920-24	1900-04
Cancer	199.9	198.2	191.7	182.5	139.8	134.0	86.9	67.7
Diabetes mellitus	18.7	16.1	16.2	15.0	16.2	24.1	17.1	12.2
Major cardiovascular diseases	375.3	394.5	410.7	434.5	510.8	493.1	369.9	359.5
Diseases of the heart	295.9	311.7	325.0	335.2	356.8	325.1	169.8	153.0
Cerebrovascular diseases	58.9	60.9	64.0	74.6	104.0	93.8	93.5	106.3
Nephritis and nephrosis	8.9	9.1	9.4	7.6	16.4	48.4	81.5	84.3
Syphilis	0.0	0.0	0.0	0.1	5.0	8.4	17.6	12.9
Appendicitis	0.2	0.2	0.2	0.3	2.0	3.5	14.0	9.4

Cause of Death	1989	1988	1985	1980	1950	1945-49	1920-24	1900-04
Accidents, all forms	37.2	39.7	38.6	46.0	60.6	67.6	70.8	79.2
Motor vehicle accidents	18.9	20.4	18.8	23.0	23.1	22.3	12.9	n.a.
Infant mortality[3]	n.a.	9.9	10.6	12.5	29.2	33.3	76.7	n.a.
Neonatal mortality[3]	n.a.	6.4	7.0	8.4	20.5	22.9	39.7	n.a.
Fetal mortality[3]	n.a.	n.a.	7.9	9.2	19.2	21.6	n.a.	n.a.
Maternal mortality[3]	n.a.	n.a.	0.1	0.1	0.8	1.4	6.9	n.a.
All causes	868.1	883.9	890.8	883.4	960.1	1,000.6	1,157.4	1,621.6

The Maslow Sand-glass



Can we avoid crisis?

No, because:

We are living in a **complicated** world

i.e. many factors are involved, although predictible, e.g. a very complicated watch where the only evolution may be wear, ...but mostly...

We are living in a **complex** world or system

i.e. complexity means that the system as a whole can generate **"emergent properties"** that the separate components do not have

Hence prediction becomes difficult with the standard tools of extrapolation

Complexity

In a complex system:

the whole is not necessarily the sum of the parts

the system components or « agents » can modify their behaviour according to past experience (learning or adaptative systems act like changing the game's rules while playing)

a qualitative/quantitative change may suddenly happen in a system's behaviour while there was only very light and progressive modifications : this is known as bifurcation.

Examples of complex systems

- Spreading of a rumor
- Snow avalanche, landslip
- Spreading of an epidemy and vaccination action
- Financial markets and stock exchange evolution
- Criminal networks and terrorism development
- Weather evolution
- Public opinion shaping and idea propagation
- **Emerging collective behaviour**
- Coexistence of living organisms (from cells to people)
- Systemic psychotherapy (cf. Palo Alto group: Watzlawick, Bateson,...)
- **Diffusion of innovation**

Is the situation hopeless, then?

No, but we need **other tools**, because:

- Change is there to stay and get faster
- Our world is a complex system
- Reponse times get shorter
- The world gets more and more networked ("The world is flat"- T. Friedmann)
- The global population is increasing
- We get more vulnerable to loss of electricity, information systems, world epidemies, limited water supply,etc...
- Complex geopolitics and fundamentalisms
- We are more risk averse then ever in history

Tools, old and new

Best of both worlds: reduce risk
increase opportunities

Good old strategic watch (vigilance & anticipation)

Risk management / Innovation (2 sides of the medal)

Attitudes and ethics

Scenario method (revisited)

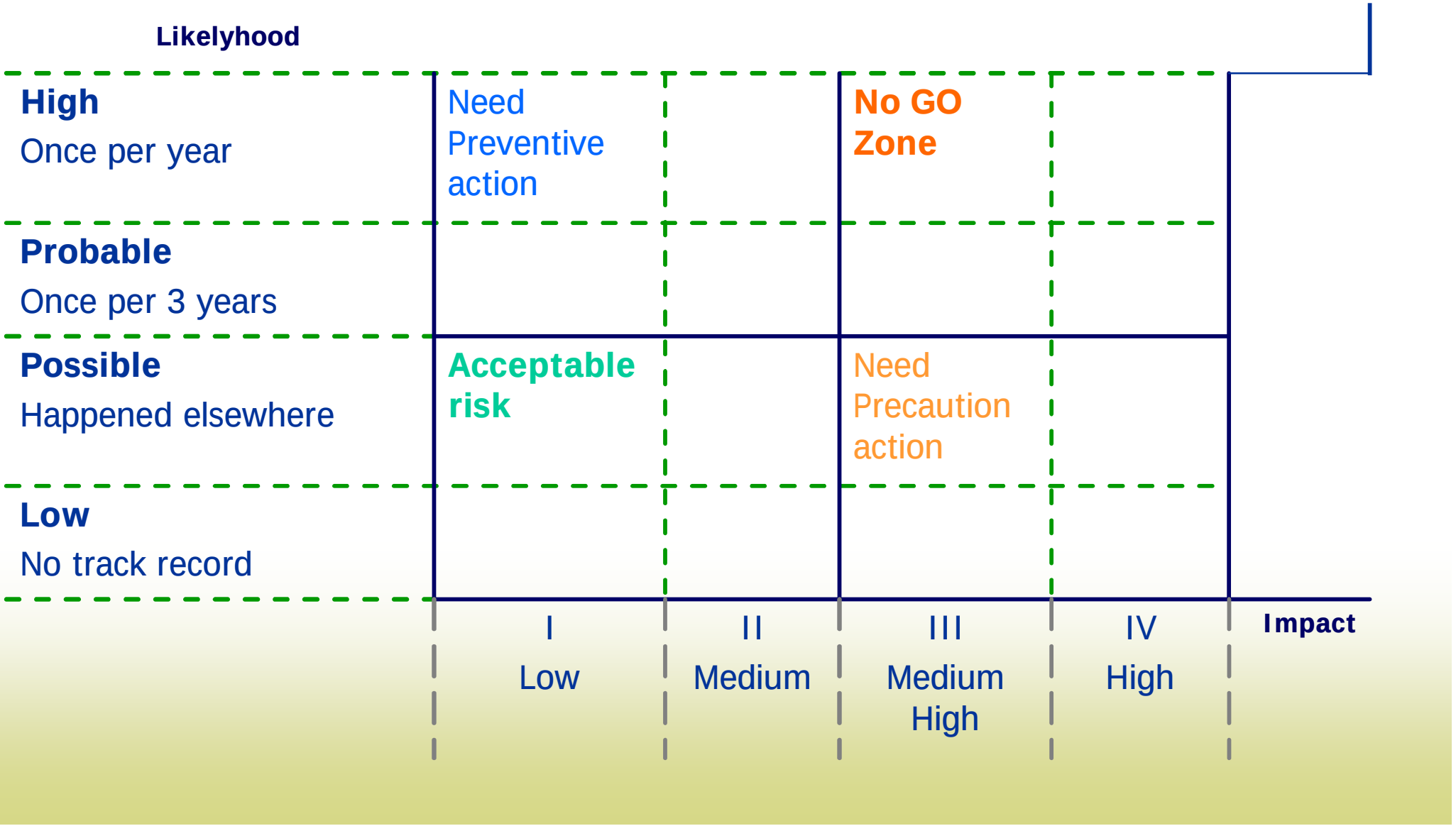
The “wisdom of crowds” (+ communities of practice)

Transdisciplinary approach: crossing boundaries

Complexity as a resource

Build community resilience

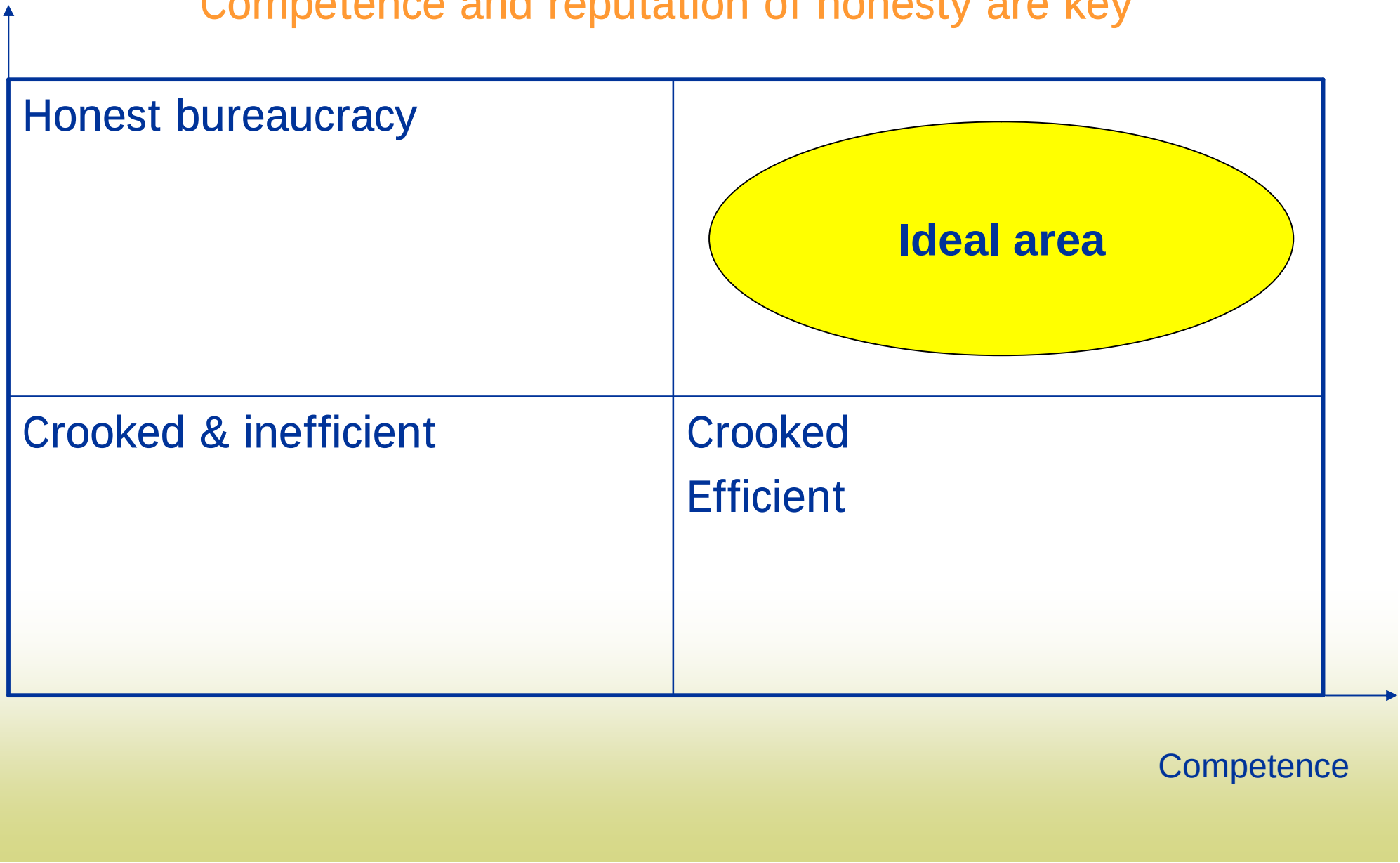
Risk management



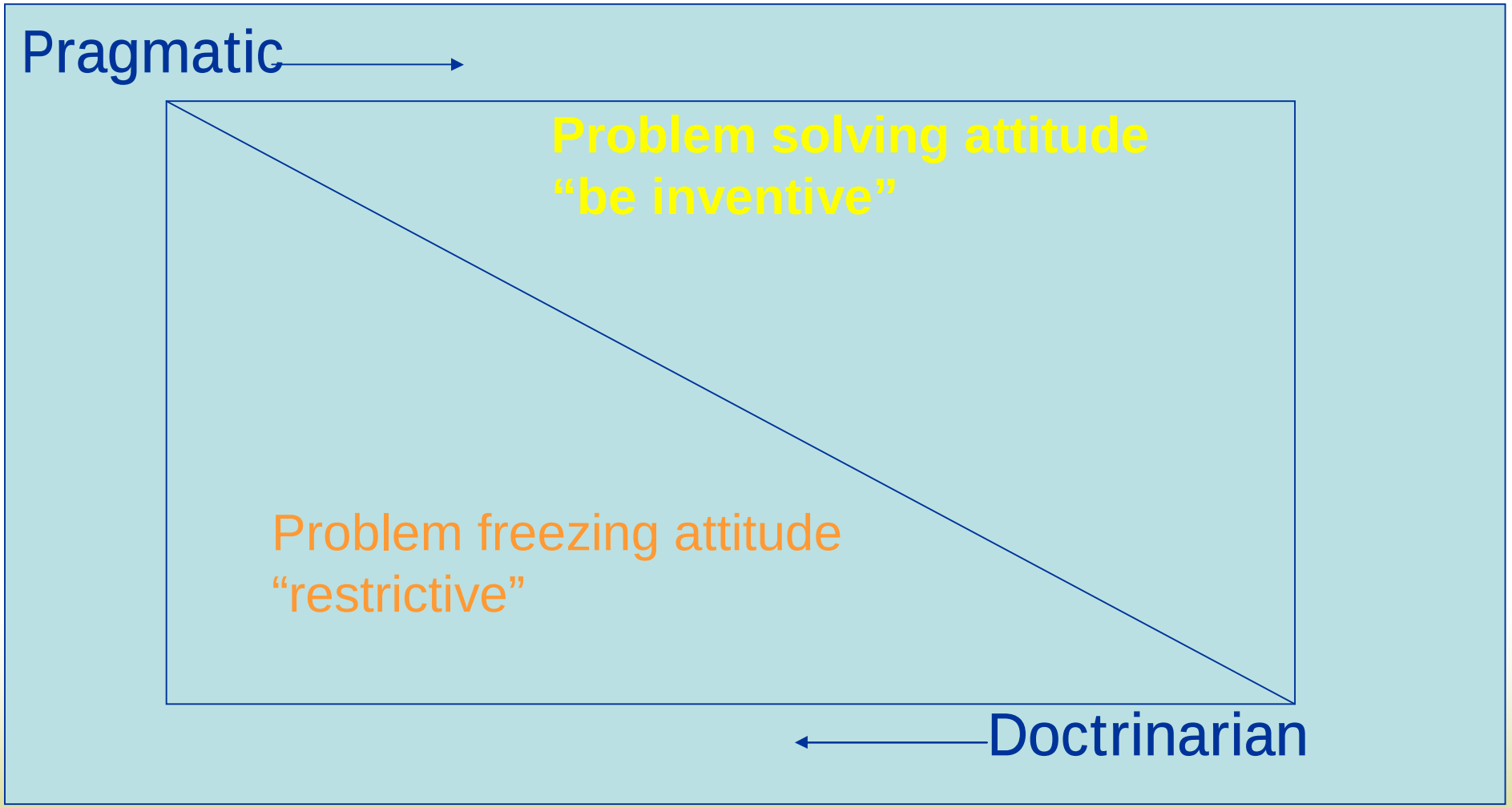
Attitude, professionalism and ethics

future teams : project oriented (film casting model)

Competence and reputation of honesty are key

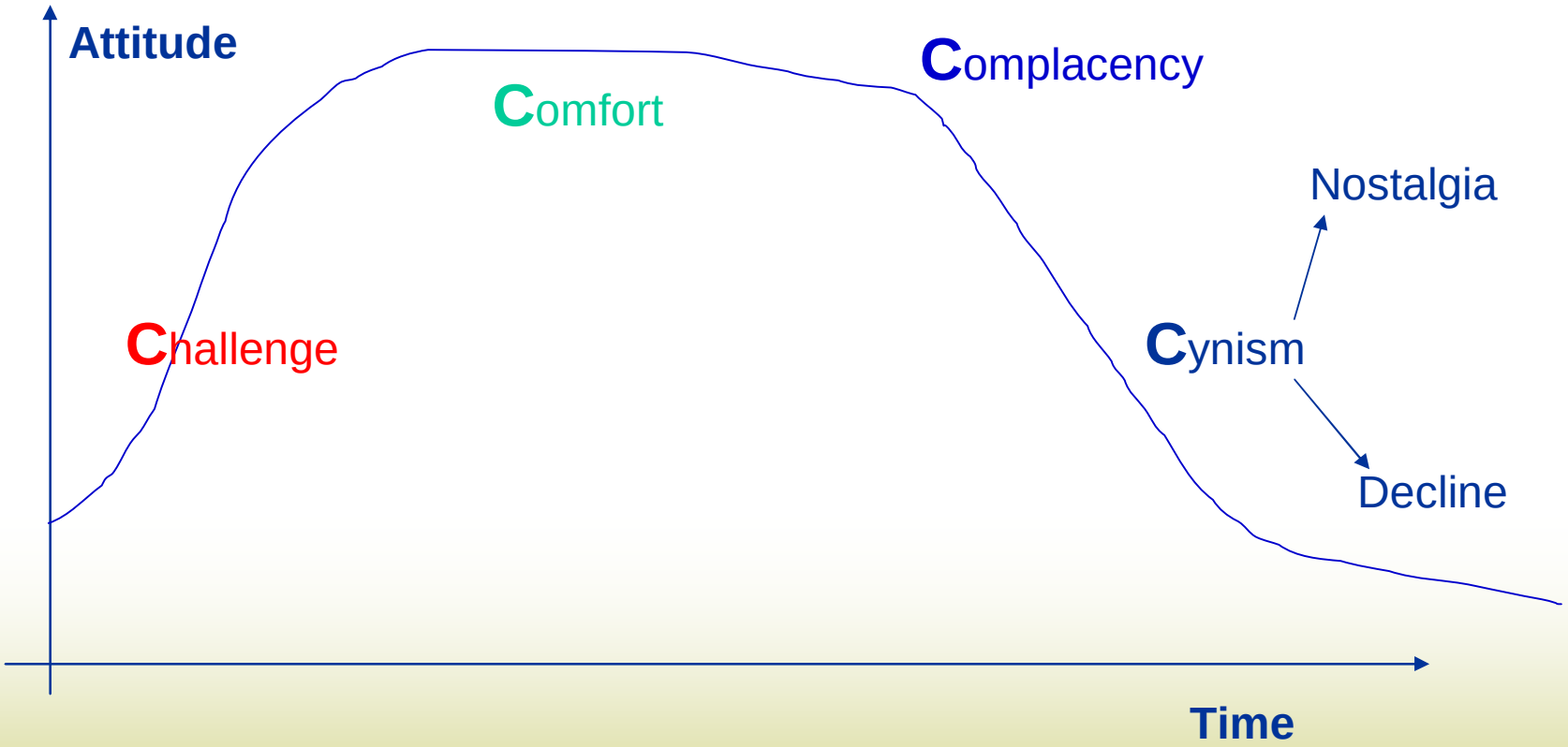


Attitude, professionalism and ethics



Attitude, professionalism and ethics

The 4C's (from Georges Anthoon: "talent en action" Ed. Lanoo Campus)



Scenarios method

Today as a consequence of tomorrow: 2-5 years

Future in the making: 5 to 10 years

Prospective: 25 years and more

Scenarios building: facts, figures, trends and extrapolation

Scenarios method

Nasa's department of the impossible

P.Kourilsky's (Prof.@ Collège de France) irreversibility criterion

Inventive solution vs restrictive solution

Intuition (paradigm change):

« better pigeon breeding didn't foster telegraphy »

The “wisdom of crowds”
crowd sourcing open innovation

Galton : Plymouth cattle fair 1906

(Sir Francis Galton 1822-1911)

- Ø 787 answers **à** avg 1197 lbs vs 1198 lbs
- Ø Most of the people: no experts

à Thesis: under certain conditions, estimates of a crowd is ≥ estimate of best experts

It looks like errors correct themselves mutually

The “wisdom of crowds”

Conditions:

Large enough group

Sufficiently diverse group (cognitive and conceptual)

Free and independant judgement of each person

Disagreements and oppositions are better than consensus or compromise

The “wisdom of crowds”

Even the best expert may be biased whereas errors of a large, diverse and free enough group tend to cancel each other out

combined approach (experts + group estimate)

Difference with **Delphi method** (Rand Corp. 1960):

extract opinion of a group of experts : anonymous, statistical group response with iteration

-Panel of “experts” (bias of individuals)

-Forces each expert to defend his viewpoint against other experts (bias of group, influence of dominant individuals)

Examples (Surowiecki):

- Open source software development and quality (Linux, etc…)
- Google’s algorithm quality: search results ranked according to the “votes” (people that have linked to a page) it receives

Transdisciplinary approach

Transdisciplinary teams bring:

- Ø Cross fertilization : some invariants tackled differently
- Ø Tend to raise “dumb questions” **à** reduce absurd decisions

The 6 blind men and the elephant (body, leg, ear, tusk, trunk, tail)

- Ø Tend to look at hidden side of things

(cf. Freakonomics- S. Levitt & S. Dubner-Harper Collins New York 2005)

- Ø Avoid ≠ kind of errors:
  - subjectivity
  - Casino syndrom
  - Making up for missing information
  - Innumeracy (cf. John Allen Paulos- Pinguin Mathematics 1988)

Transdisciplinary approach

- Desperate search for consensus
- Influence of past experiences
- Influence of context
- Trying to force identification with « similar » past experiences
- Thinking shortcuts
- Examples: Santa Fe Institute, Max Planck Institut,...
  - Ø Nasrodine and the chariot

Complexity as a resource

Hypothesis:

Our world is a complex auto-adaptative system, with many interactive agents and with a hard to predict **emerging** future (i.e. The system can adopt a behaviour that the detailed knowledge of its components could not let anticipate)

Main idea:

turn the constraint of complexity into an opportunity

How?

Using some macroscopic tools

(cf. Harnessing complexity- R. Axelrod &M.D. Cohen; The Free Press- New York 1999)

Complexity as a resource

3 topics : variation, interaction & selection

Variation: balance out variety and uniformity

- Ø System is adaptative **à** agents are created, destroyed, duplicated (with possible errors), recombined
- Ø Agents can be grouped in “types” sharing some property/behaviour
  - ü Examples: -people infected by a virus or not
    -PC or Mac type computers
    -Linux or Microsoft users

  Variety is the diversity of types
- Ø Although the fine mechanism of creation, destruction and mutation cannot be understood or forecasted, one can balance

Exploration (encouraging new types) & **Exploitation** (keeping existing types)

Complexity as a resource

Examples:

- ü A company invests in new products development or/and in cost reduction for existing products?
- ü GMO or maintain existing species?

Exploitation: natural tendency

Exploration: is best when:

- Ø Long term and general order problems
- Ø Impact of exploration to be readily measured
- Ø Risks well evaluated, acceptable and no irreversibility (cf. Kourilsky's)
- Ø "not much to lose syndrom": i.e. bad outcome anyway
- Ø Breakthrough innovation, adjacent innovation, frugal innovation
- Ø Process and Product/service innovation

Complexity as a resource

Interaction

Agents do interact **à** do we want to increase interactions or limit/block them with barriers in space or time?

- Examples of situations:
  - Social networks promotion or reducing
  - Management of epidemies
  - Political issues
  - Silicon Valley (expertise+ social patterns)
  - New York's garment district, Chinatown,… (communities of practice)
  - Diamond industry (New York, Antwerp, Mumbai) / apprenticeship

Question: who should interact with whom /what and when?

Goal: trust and cooperation

Complexity as a resource

Our tools: proximity and activation factors

- Proximity: now changing with networks and www (cf. “The world is flat”)
- Milgram, 1967: 6 degrees of separation to connect any 2 people
- Activation : a trigger mechanism

  -Examples: -seasonal processes (budgets, agriculture, holiday season), avalanche, neuron activity, market activity,...)
- Too much proximity/activation: excess convergence, “consanguinity”?
- Too little proximity/activation: chaos, “Babel” syndrom?
- Right balance and semi-permeable barriers (ex: firewalls, immigration, gate keepers of all kinds **à** more precise society.
- Parallel vs serial projects: example A380 **à** issue of communication, coordination,

Complexity as a resource

Selection (in view of a given strategy)

- Which agents/strategies to destroy and wich ones to duplicate or create?
- In other words, which selection, to promote a given adaptation
  - In biology **à** natural selection
  - In our case : be able to **EXPLORE** new possibilities while **EXPLOITING** achievements
- Required **in nature**: -source of variation
  -means to retain essential character of agent
  -amplification (change in frequency of types)

Build community resilience

To help people bear their fear, let them know it is ok to
be afraid (but not paralyzed by fear)
Promote sense of community (fairness, friendship,...)
Optimism
Stability
Flexibility
Life long learning (LLL)
Distinguish capabilities from intentions and challenges from incumbents (geopolitics)

"Something to do, someone to love, something to hope for"

Thank you

Appendix 1: Responsible partnering
Business, universities, RTO's

Responsible Partnering

In today's world of Open Innovation, it is vital that companies and public research institutions work together well and for mutual benefit. **Responsible Partnering** is about ensuring that collaborative research activities and knowledge exchange are effective and reflect partners' interests. We've developed guidelines, checklists and procedures to help make this happen. You can download the 2009 version of the Handbook or visit the official website at www.responsible-partnering.org.

Responsible partnering
Business, universities, RTO's

Responsible Partnering

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_ Developed jointly with EIRMA's sister associations, EARTO, EUA and Proton Europe, Responsible Partnering was launched in March 2006 and validated through widespread consultations. A Review Conference in Lisbon in December 2007 assessed progress and identified next key steps.The guidelines have helped to shape the European Commission's recommendations to Member States in its recent Communication on management of intellectual property and knowledge transfer by universities and other public research organisations.

Responsible partnering
Business, universities, RTO's

Responsible Partnering

Originally launched to address concerns over collaborative research and knowledge transfer, Responsible Partnering now extends into other areas, such as the education and training that people receive at Doctoral level and the role of the business community in encouraging young people to take up careers in research, technology and innovation, and dealing effectively with the requirements of Europe's State aid rules.

Responsible partnering
Business, universities, RTO's

Responsible Partnering is both a change of mindset and a practical set of tools.

Concerning the mindset, a number of principles and policies to be adhered to by the management of interested partners will facilitate the development of more effective collaborations.

On the practical side, this site contains actionable recommendations on such issues as:

Identifying good partners

Constructing the Collaborative Research Agreement

Self assessment guidelines

Support of governmental authorities

Responsible partnering
Business, universities, RTO's

A significant proportion of business sector R&D, estimated today at around 18%, is performed outside the company, some by other companies, some by public research. With the R&D investment of European companies exceeding €100 billion, the payback from even small improvements in the efficiency of the outsourcing process is clear. Responsible Partnering offers the prospect of large improvements. More important, it offers the prospect of greater effectiveness: the possibility to create more value from the investment

Responsible partnering
Business, universities, RTO's

As research and technology organisations become more market-oriented, it is important that they know how to create, apply and transfer knowledge effectively. Responsible Partnering develops that capacity by creating better mutual awareness and understanding of how other innovation partners operate.

Want to know more?

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Appendix 2: Back up slides

FAQ

Is EIRMA a “lobby organisation”?

No!

Ø Our focus is on helping you learn what works well and communicating this insight

Ø We do work with public authorities on ways to improve the environment for R&D, but it is not our job to represent the interests of specific companies

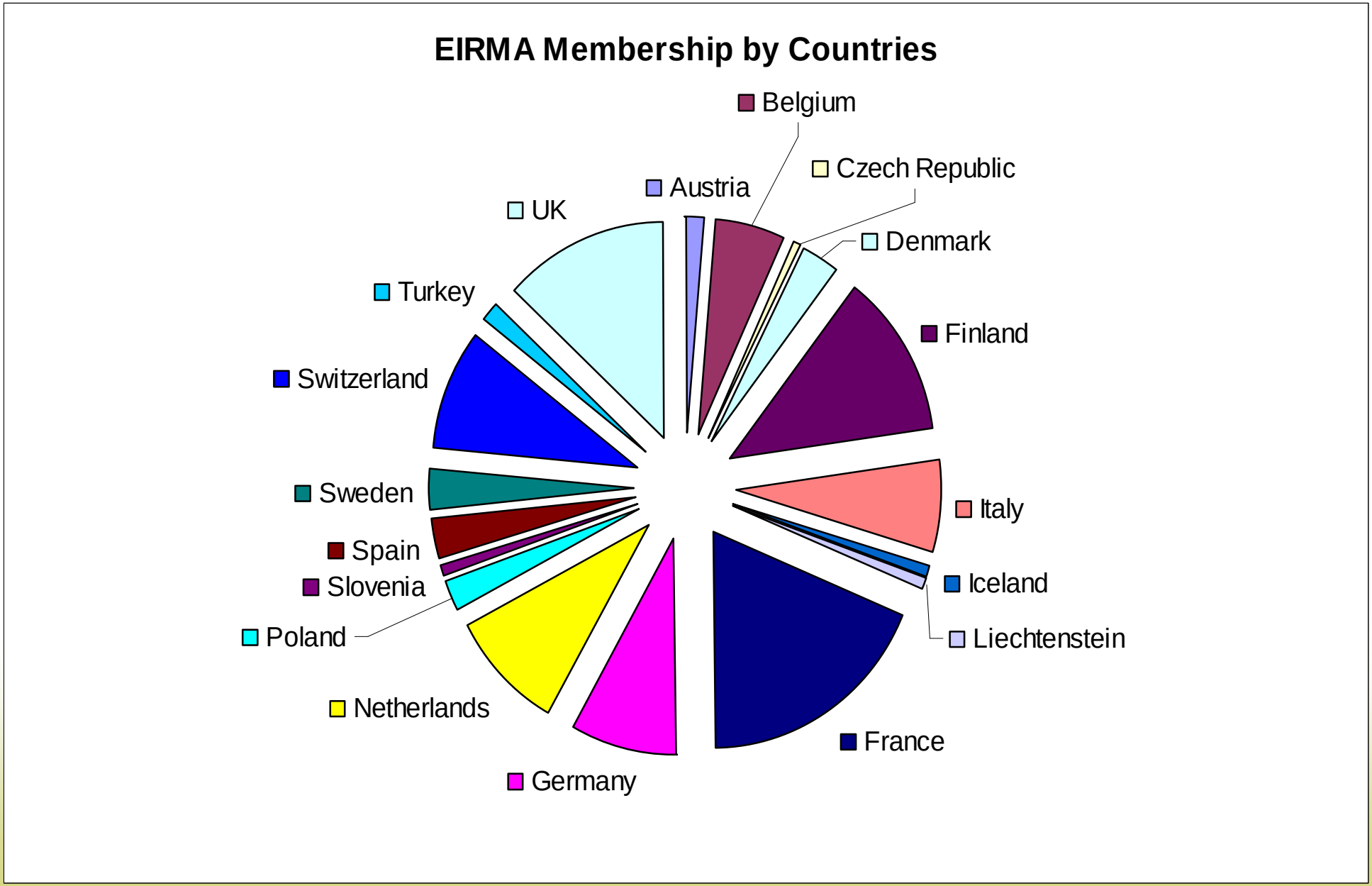
Is EIRMA a “think tank”?

Not really.

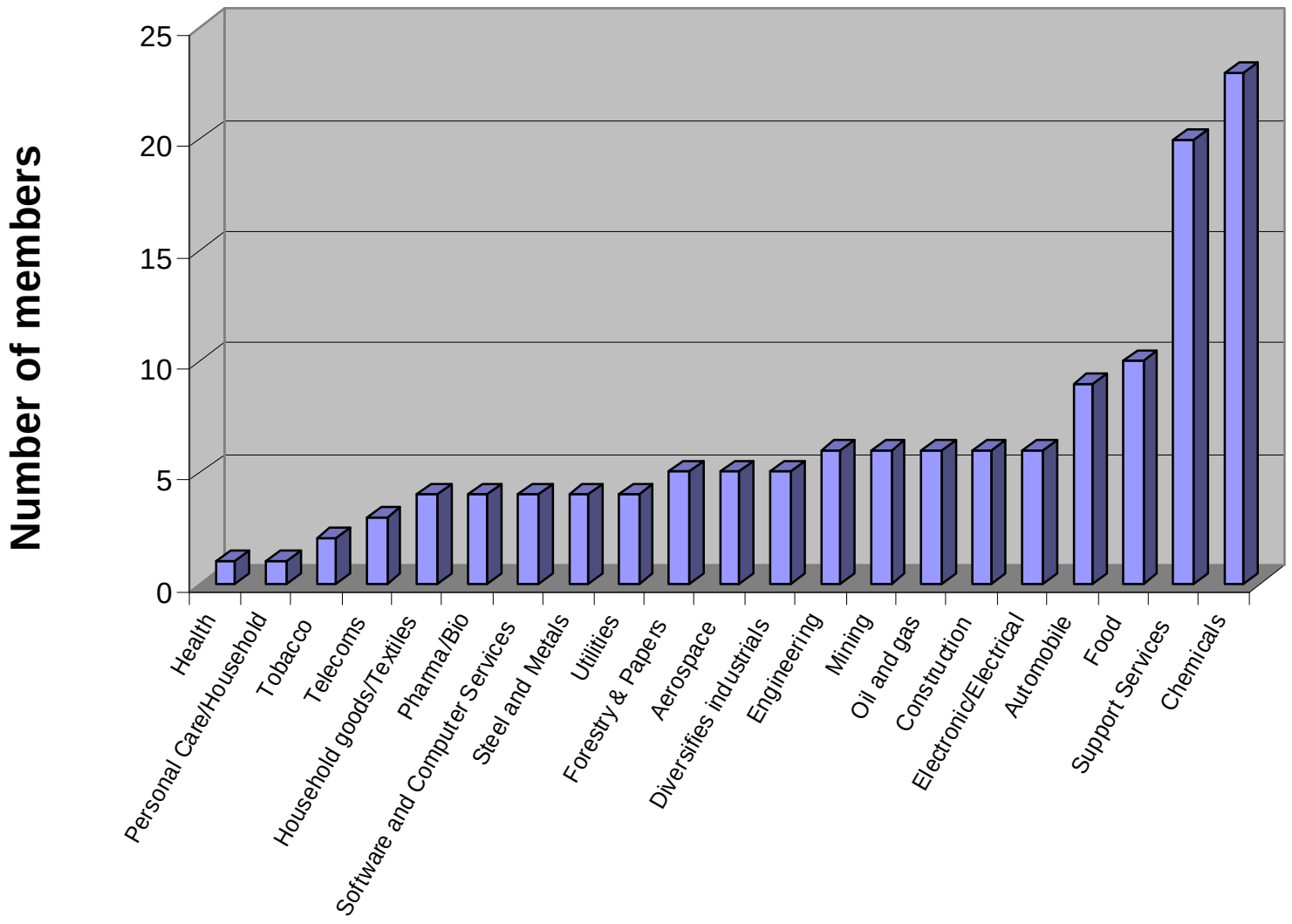
Ø Think tanks usually employ people to do research for others

Ø We concentrate on helping members to learn from each other and translate this understanding into a form that is most useful for our members.

Geographical repartition:



EIRMA Membership - Industrial Sectors



III - Membership

Costs

Annual membership fee is related to the member's total consolidated sales

- Ø Feescale ranging from 1 435 € to 8610 €
- Ø Covers the running costs of the secretariat, preparation of meetings, communications (printing & distribution of reports, etc.)

Participation fees for each activity

- Ø Cover any financial costs associated with running the event (between 480 and 1250 € depending on the type, duration of activities)
- Ø *"Give-and-take"* philosophy:
  same meeting fees for speakers, chairmen and participants