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Methods for the identification of emerging risks: an overview.

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Outline

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- **On methods**
  - **What for?**
    - **Horizon Scanning**
    - **Risk analysis** (identification/assessment/management)
    - **Foresight**
  - **Which framework?**
  - **Which method(s)?**
    - **Does the Geo-R&D Context influences selection?**
    - **How many methods?**
  - **How to contribute to the (post)indentification process?**
  - **How to combine them? What methodology?**

- **On identification of emerging risks & (missed) opportunities**
  - **Identification strategy**
    - **Scanning strategy, Filtering strategy, Knowledge sources, etc.**
  - **Identification methodology**
    - **Scanning frameworks, Methods, etc.**
  - **Post-identification strategy**
    - **Interconnecting, Assessing, Managing, Responding, Communicating, etc.**

- **Questions?**

On methods

On methods: What for?

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- **Horizon Scanning**
  - "The systematic examination of potential **threats**, **opportunities** and likely future **developments** which are at the margins of current thinking and planning. Futures research (foresight) may explore **novel** and **unexpected** issues, as well as persistent problems or trends" (Defra, 2002).

- **Risk analysis**
  - "a systematic and strategic process of *identification*, *assessment* and (sometimes) *management* of **uncertain** issues (e.g. hazards and developments), which may **potentially** develop into **threats** or (missed) **opportunities**, depending on their perceived **probability** of occurrence and type of **impacts**" (Popper, 2010). **"NEW"**

- **Foresight**
  - "an **open** and **collective** process of purposeful, future-oriented **exploration**, involving **deliberation** between heterogeneous actors in science and technology arenas, with a view to formulating **shared visions** and **strategies** that take better account of future **opportunities** and **threats**" (Keenan and Popper, 2007).

Why foresight?

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- Foresight is increasingly becoming a key and systematic instrument for the development and implementation of research and science, technology and innovation (STI) policy

But, what type of foresight?

SMART Foresight: Key phases

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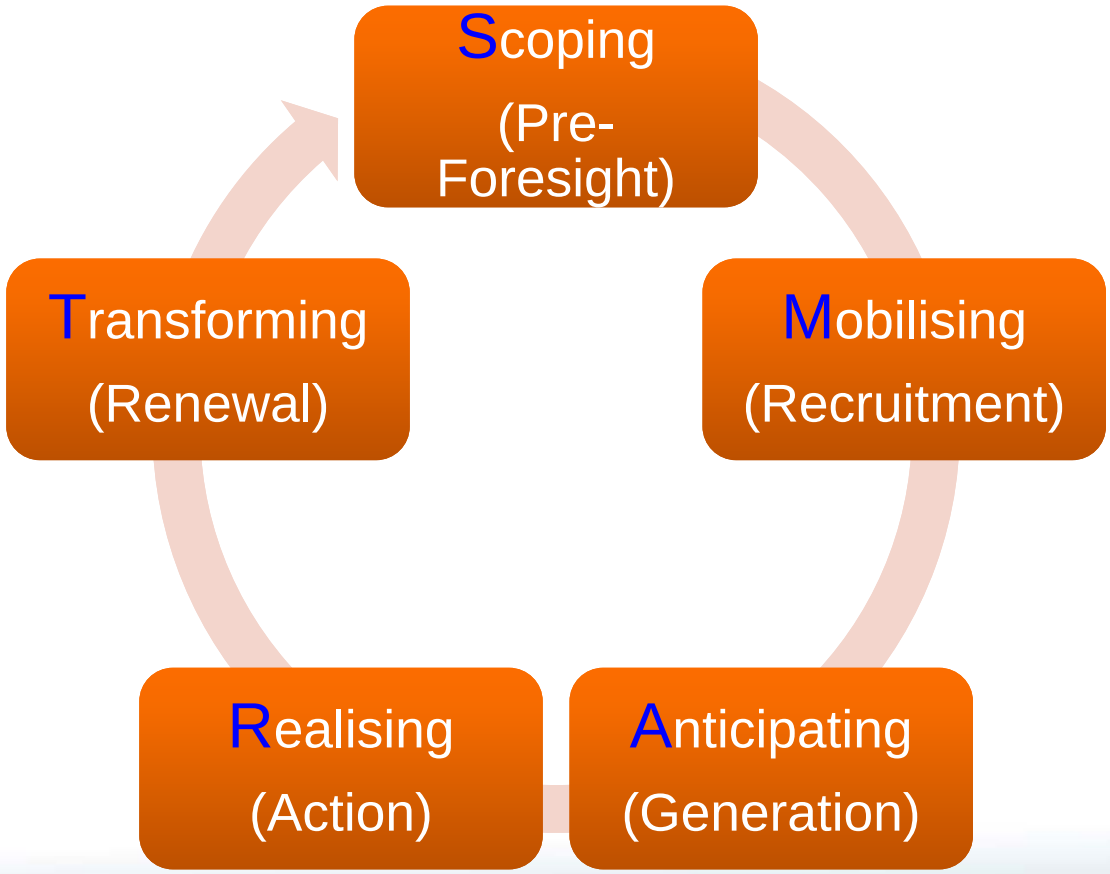

SMART Foresight: Key features

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Scoping | Mobilising | Anticipating | Realising | Transforming

Aspirations

- Aim
- Objectives
- Resources
- Scale & Domain
- Methodology
- Etc.

Engagement

- Recruiting experts
- Steering Group
- Champions
- Facilitators
- Users
- Etc.

Possible Futures

- Generating visions
- Scenarios
- Roadmaps
- Trends/drivers
- Key technologies
- Etc.

Commitment

- Recommendations
- Strategies
- Decisions
- Actions
- Plans
- Etc.

Intelligence

- Renewal
- Evaluation
- Learning
- Impact assessment
- Dissemination
- Etc.

On methods: Which framework?

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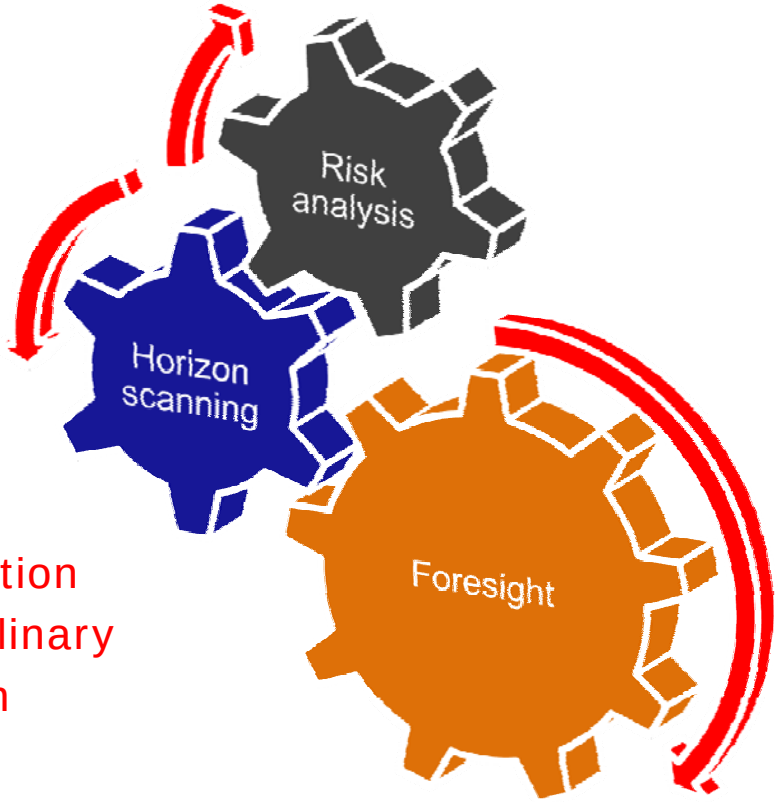
- **Classification of methods**
  - By their **nature**
    - **Qualitative**
    - **Quantitative**
    - **Semi-quantitative**
  - By their **knowledge source**
    - Based on **creativity** and insight
    - Based on **interaction** and participation
    - Based on **expertise** and interdisciplinary
    - Based on **evidence** and information
  - By their **potential contributions to…**
    - The **Horizon Scanning** process
    - The **Risk Analysis** process
    - The **Foresight** process



On methods: Which method(s)?

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Qualitative	Quantitative	Semi-quantitative
Methods providing meaning to events and perceptions. Such interpretations tend to be based on subjectivity or creativity often difficult to corroborate.	Methods measuring variables and apply statistical analyses on quantitative data.	Methods which apply mathematical principles to quantify subjectivity, rational judgements and viewpoints of experts and commentators (i.e. weighting opinions)
1. Backcasting 2. Brainstorming 3. Citizens panels 4. Conferences/workshops 5. Essays /Scenario writing 6. Expert panels 7. Genius forecasting 8. Interviews 9. Literature review 10. Morphological analysis 11. Relevance trees /logic charts 12. Role play / Acting 13. Scanning 14. Scenario /Scenario workshops 15. Science fictioning (SF) 16. Simulation gaming 17. Surveys 18. SWOT analysis 19. Weak signals /Wildcards	20. Benchmarking 21. Bibliometrics 22. Indicators / time series analysis 23. Modelling 24. Patent analysis 25. Trend extrapolation / impact analysis	26. Cross-impact / structural analysis 27. Delphi 28. Key / Critical technologies 29. Multi-criteria analysis 30. Polling / Voting 31. Quantitative scenarios / SMIC 32. Roadmapping 33. Stakeholder analysis

Source: R. Popper (2008)

On methods: Which method(s)?

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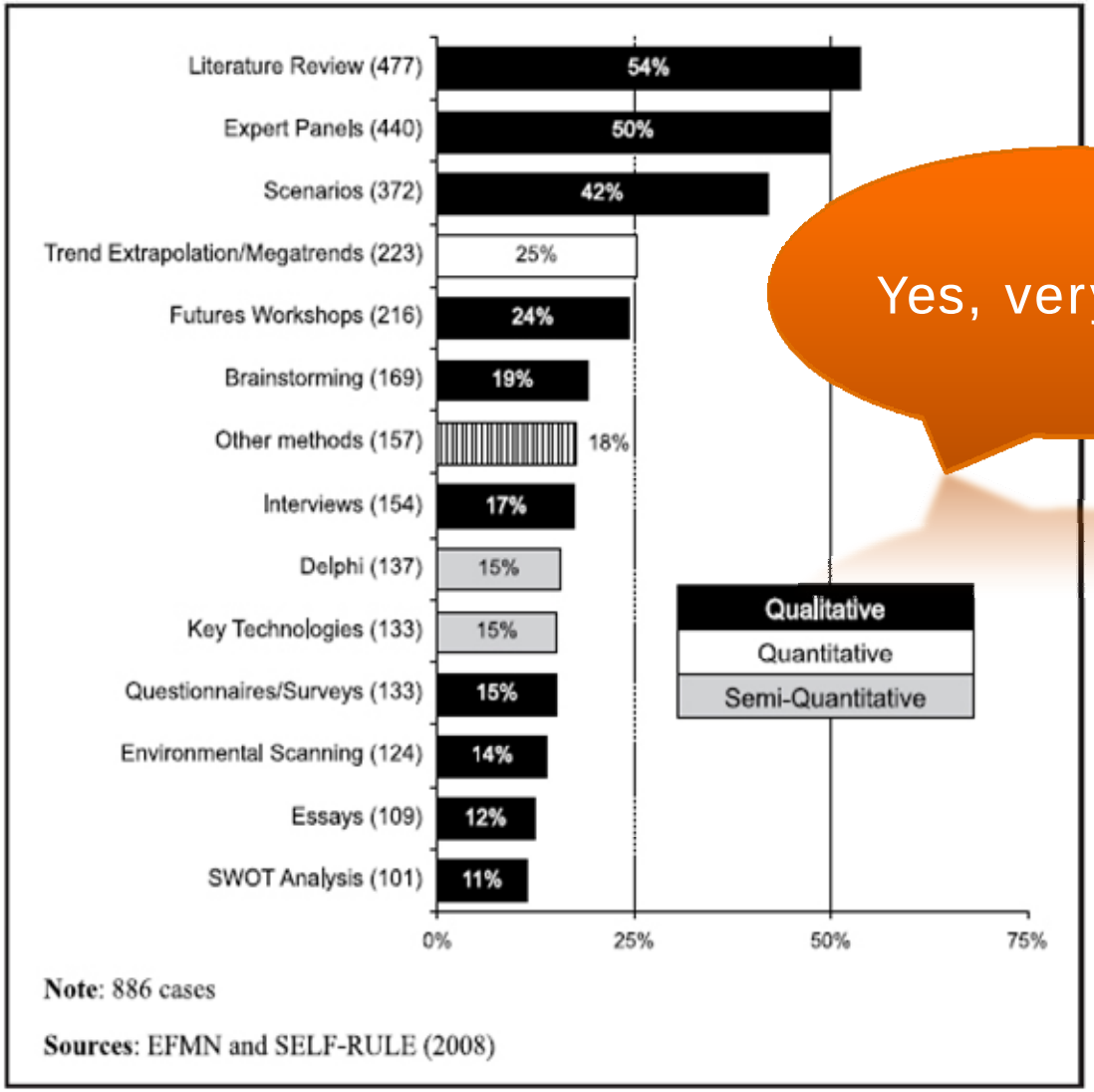
Is the selection influenced by the intrinsic **nature** of methods?

Figure 5 Nature of most commonly used foresight methods — Popper (2008)



Note: 886 cases

Sources: EFMN and SELF-RULE (2008)

On methods: Which method(s)?

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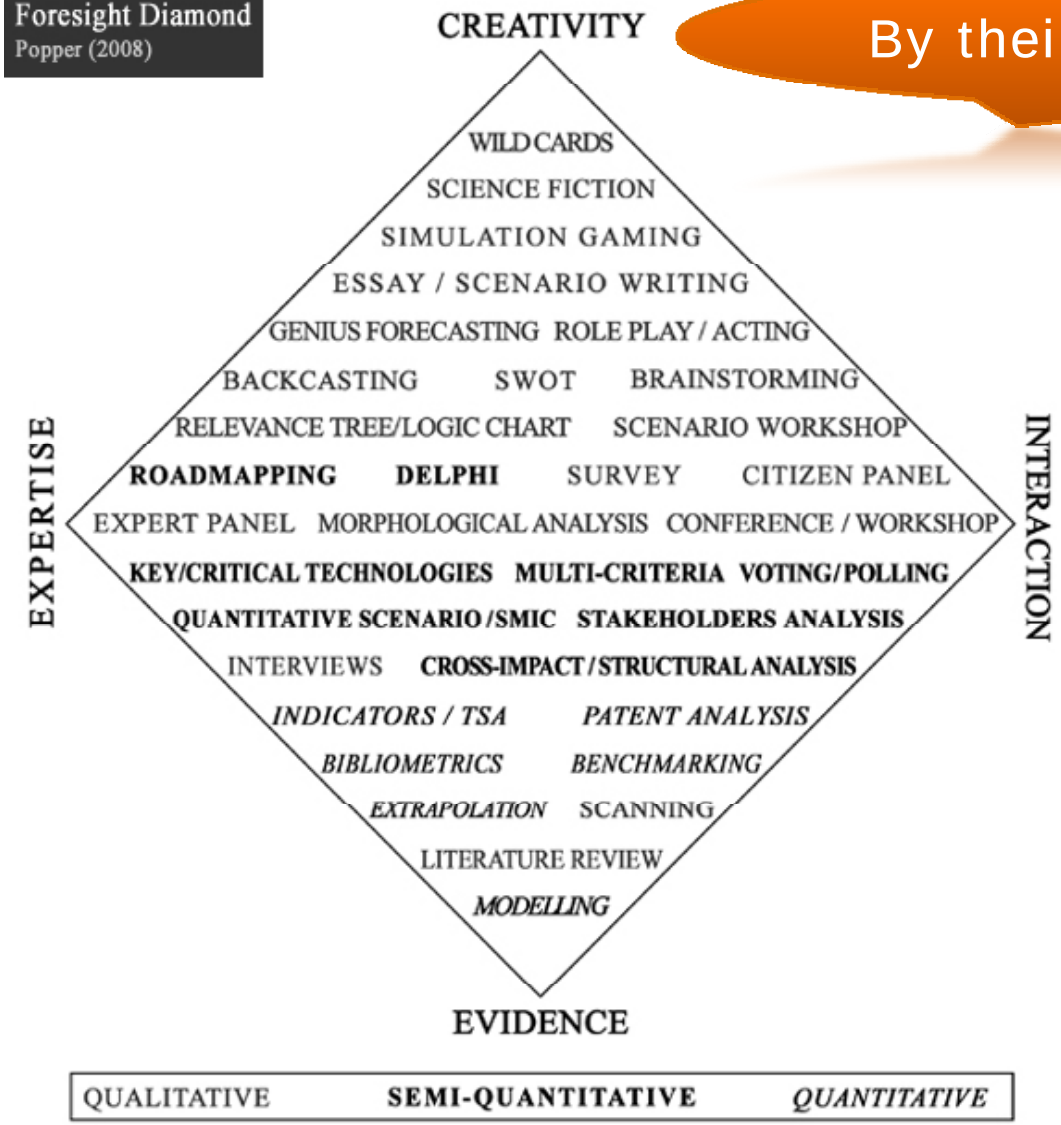
Foresight Diamond
Popper (2008)



By their knowledge source?

Creativity

"The only real valuable thing is intuition … Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world" (Albert Einstein, 1929)

Expertise

"If an elderly but distinguished scientist says that something is possible, he is almost certainly right, but if he says that it is impossible, he is very probably wrong" (Arthur Clarke,1962)

Interaction

"the world is ruled by those who show up" (Anonymus)

Evidence

"There are three kinds of lies: lies, damned lies, and statistics" (Benjamin Disraeli, 1924.

On methods: Which method(s)?

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Is the selection influenced by the **capabilities** of methods?

Yes, highly

On "average", foresight studies use from 5 to 6 methods

Figure 4 Number of methods used in foresight exercises

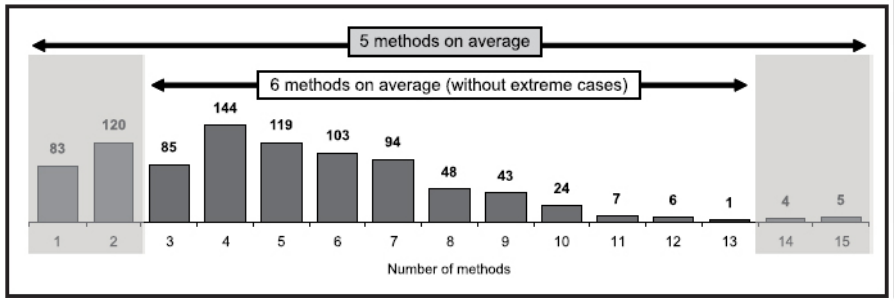
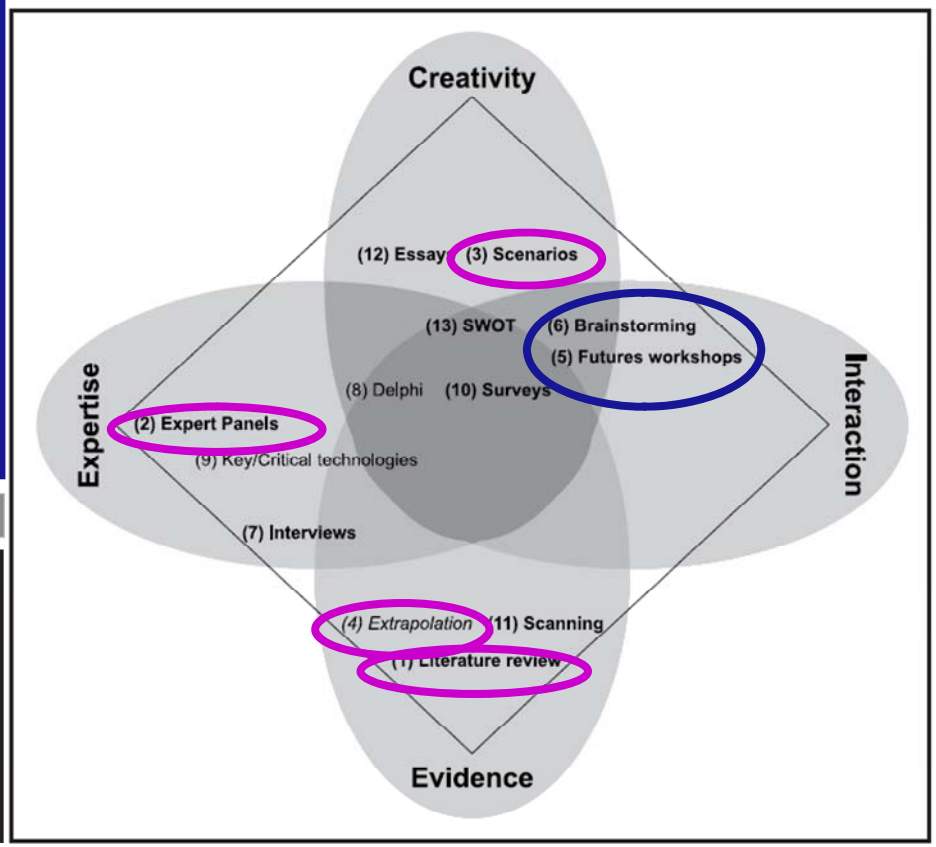


Figure 6 Capabilities of most commonly used foresight methods Popper (2008)



On methods: Mind the process!

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Potential contribution of qualitative methods Source: Popper (2008)

	Methods / Activities	Foresight Phases					Type of method
		Pre-Foresight	Recruitment	Generation	Action	Renewal	
1	Backcasting	●	●	●●●	●●●	●	Qualitative
2	Brainstorming	●●●	●●	●●●●	●●●	●●●	
3	Citizens Panels	●●	●	●●●	●●●●	●●●	
4	Conferences/Workshops	●●	●●	●●●	●●●	●●●	
5	Essays/Scenario Writing	●●	●	●●●●	●●	●●●	
6	Expert Panels	●●●	●●	●●●●	●●●	●●●	
7	Genius Forecasting	●●	●	●●●●	●●	●	
8	Interviews	●●	●●	●●●	●●	●●●●	
9	Literature Review (LR)	●●●●	●●	●●●	●●	●●	
10	Morphological Analysis	●	●	●●●	●●●	●	
11	Relevance Trees/Logic Charts	●●	●	●●●	●●●	●●●	
12	Role play/Acting	●	●●	●●●	●●●	●	
13	Scanning	●●●●	●●	●●●	●●●	●●	
14	Scenarios/Scenario Workshops	●	●	●●●●	●●●	●●	
15	Science Fictioning (SF)	●	●	●●●●	●	●	
16	Simulation Gaming	●	●	●●●	●●●	●	
17	Surveys	●●●	●●●	●●●●	●●●●	●	
18	SWOT Analysis	●●	●	●●●●	●●●●	●●	
19	Weak Signals/Wild Cards	●●	●	●●●	●●	●	

Legend of symbols: little/no contribution [●], some contribution [●●], significant contribution [●●●], major contribution [●●●●]

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Potential contribution of quantitative and semi-quantitative methods

	Methods / Activities	Foresight Phases					Type of method
		Pre-Foresight	Recruitment	Generation	Action	Renewal	
20	Benchmarking	●●●	●●	●●●	●●●	●●●	Quantitative
21	Bibliometrics	●●●	●●●	●●	●	●	
22	Indicators/Time Series Analysis (TSA)	●●●	●	●●●	●●	●●	
23	Modelling	●	●	●●●	●●●	●	
24	Patent Analysis	●●●	●●●	●●	●	●	
25	Trend Extrapolation/Impact Analysis	●●●	●	●●●	●●	●●●	
26	Cross-impact/Structural Analysis (SA)	●●	●	●●●	●●●	●●	Semi-Quantitative
27	Delphi	●	●●	●●●●	●●●	●●	
28	Key/Critical Technologies	●●	●	●●●	●●●	●●	
29	Multi-criteria Analysis	●●	●	●●●	●●●	●●	
30	Polling/Voting	●●	●●	●●●●	●●●●	●●●	
31	Quantitative Scenarios/SMIC	●	●	●●●●	●	●●	
32	Roadmapping	●●	●	●●	●●●●	●●	
33	Stakeholders Analysis/MACTOR	●●	●●●	●●	●●●	●●	

Legend of symbols: little/no contribution [●], some contribution [●●], significant contribution [●●●], major contribution [●●●●]

Note: the tables (above) provide an impressionistic view of the contribution that 33 methods might make to each phase of the foresight process. The "potential contribution" is represented with bullets. For example: *Backcasting* may have little/no contribution [●] in the *Pre-Foresight*, *Recruitment* and *Renewal* Phases, whereas significant contribution [●●●] in the *Generation* and *Action* Phases

Source: Popper (2008)

On methods: Combining methods

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Frequency of combinations

L (or blank) = below 19%
M = 20-39%
H = 40-59%
VH = above 60%

Figure 15 Methods mix – or methods combination matrix (MCM) Popper (2008)

Ranking by frequency of use	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Methods Combination Matrix (MCM)	**Literature Review**	**Expert Panels**	**Scenarios**	*Trend extrapolation/Megatrends*	**Futures Workshops**	**Brainstorming**	Other methods	**Interviews**	Delphi	Key Technologies	**Questionnaires/Surveys**	**Environmental Scanning**	**Essays**	**SWOT Analysis**	Technology Roadmapping	*Modelling and simulation*	**Backcasting**	Stakeholder Mapping	Cross-impact/Structural Analysis	*Bibliometrics*	**Morphological Analysis**	**Citizens Panels**	**Relevance Trees**	Multi-criteria Analysis	**Gaming**
1 **Literature Review**	477	H	H	H	M	M	M	M		M															
2 **Expert Panels**	VH	440	M	M	M	M		M	M	M															
3 **Scenarios**	H	H	372	H	M	M	M																		
4 *Trend Extrapolation/Megatrends*	VH	VH	VH	223	M	M	M	M		M	M	M	M			M									
5 **Futures Workshops**	VH	VH	H	M	216	M	M			M															
6 **Brainstorming**	VH	VH	H	M	H	168	H	M	M	M	M	M		M											
7 Other methods	VH	H	H	M	H	H	157	M	M	M	M	M		M											
8 **Interviews**	VH	VH	H	H	M	M	M	154			H	M		M											
9 Delphi	VH	VH	M	M	M	H	M		137	M	M	M													
10 Key Technologies	VH	VH	M	H	M	M	M	M	M	133		M		M	M										
11 **Questionnaires/Surveys**	H	VH	H	H	M	M	M	H	M		133	M		M											
12 **Environmental Scanning**	VH	VH	H	H	M	H	VH	M	M	M	M	124	M	M				M							
13 **Essays**	H	H	H	H	M	M	M	M				M	109												
14 **SWOT Analysis**	VH	H	H	M	H	H	VH	M	M	M	M	M		101				M	M						
15 Technology Roadmapping	VH	VH	M	M	H					H					72										
16 *Modelling and simulation*	H	M	VH	VH								M				67									
17 **Backcasting**	H	H	H	H	M	M		M				M				M	47								
18 Stakeholder Mapping	VH	VH	H	VH	H	VH	VH	H		M	M	VH	M	H				46	M	M	M		M		
19 Cross-impact/Structural Analysis	VH	VH	VH	VH	M	VH	VH	VH	M		VH	VH	M	VH				M	36		M				
20 *Bibliometrics*	VH	H	M	VH	M	H	VH	VH		VH	H	VH	H	H				H		22	M		M		
21 **Morphological Analysis**	VH	VH	VH	H	H	VH	VH	VH	M	M	H	H	VH	M			M	H	H	M	21		H		
22 **Citizens Panels**	H	VH	H	M	VH	H	VH	H	M		M	H	M	H				M	M			19			
23 **Relevance Trees**	VH	VH	VH	VH	VH	VH	VH	VH	M	M	H	VH	VH	VH				VH	M	M	H		17		
24 Multi-criteria Analysis	VH	M		VH	M	M	M			M	M	M	M			H								11	
25 **Gaming**	VH	VH	VH	VH	VH	VH			M			H				H	M	VH	M						6

Key: Low (blank); moderate (M); high (H); very high (VH); **bold** = qualitative; *italic* = quantitative; normal = semi-quantitative

Note: 886 cases

Sources: EFMN and SELF-RULE (2008)

On methods: Combining methods

R. Popper (2010)

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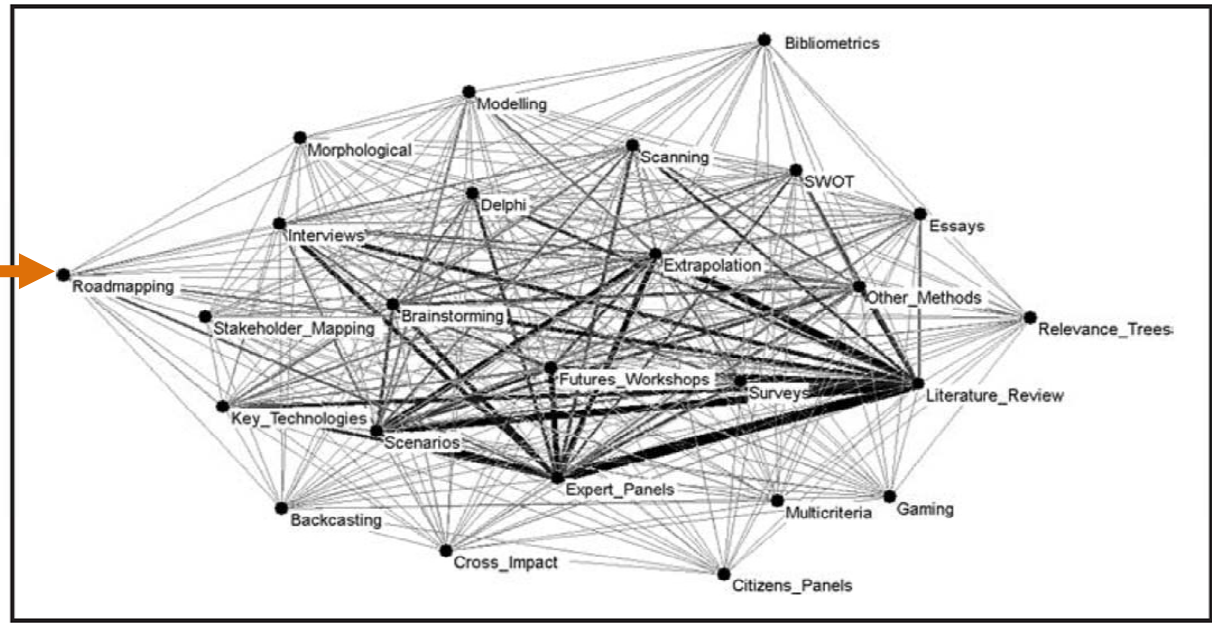
Figure 16 Using 3D mapping tools to visualise the ''methods mix'' Popper (2008)



On methods: Combining methods

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Figure 16

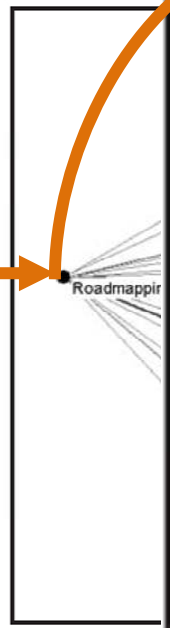
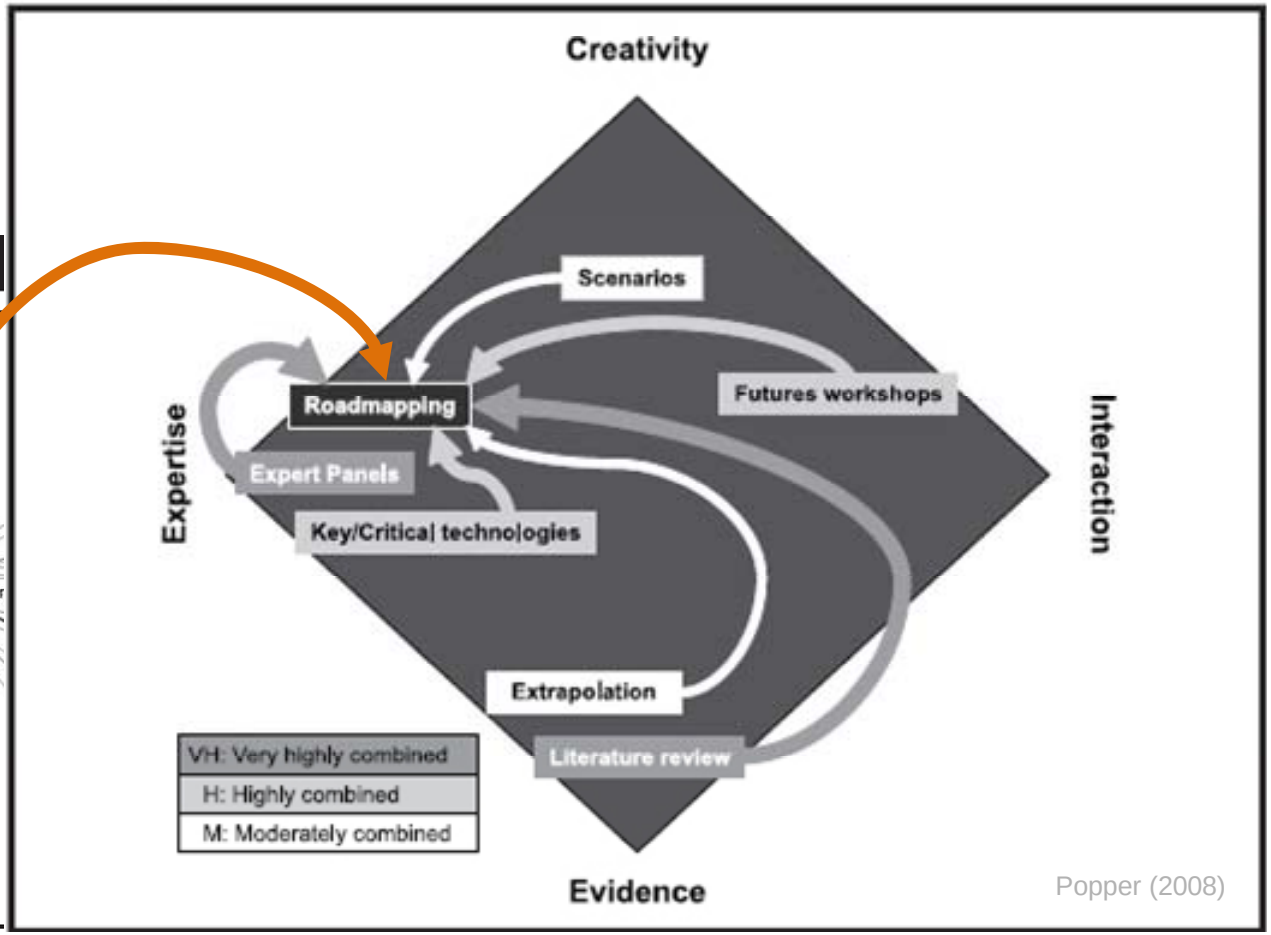


Figure 17 Using the Foresight Diamond to visualise the "roadmapping mix"



Popper (2008)

On methods: Geo-R&D context…

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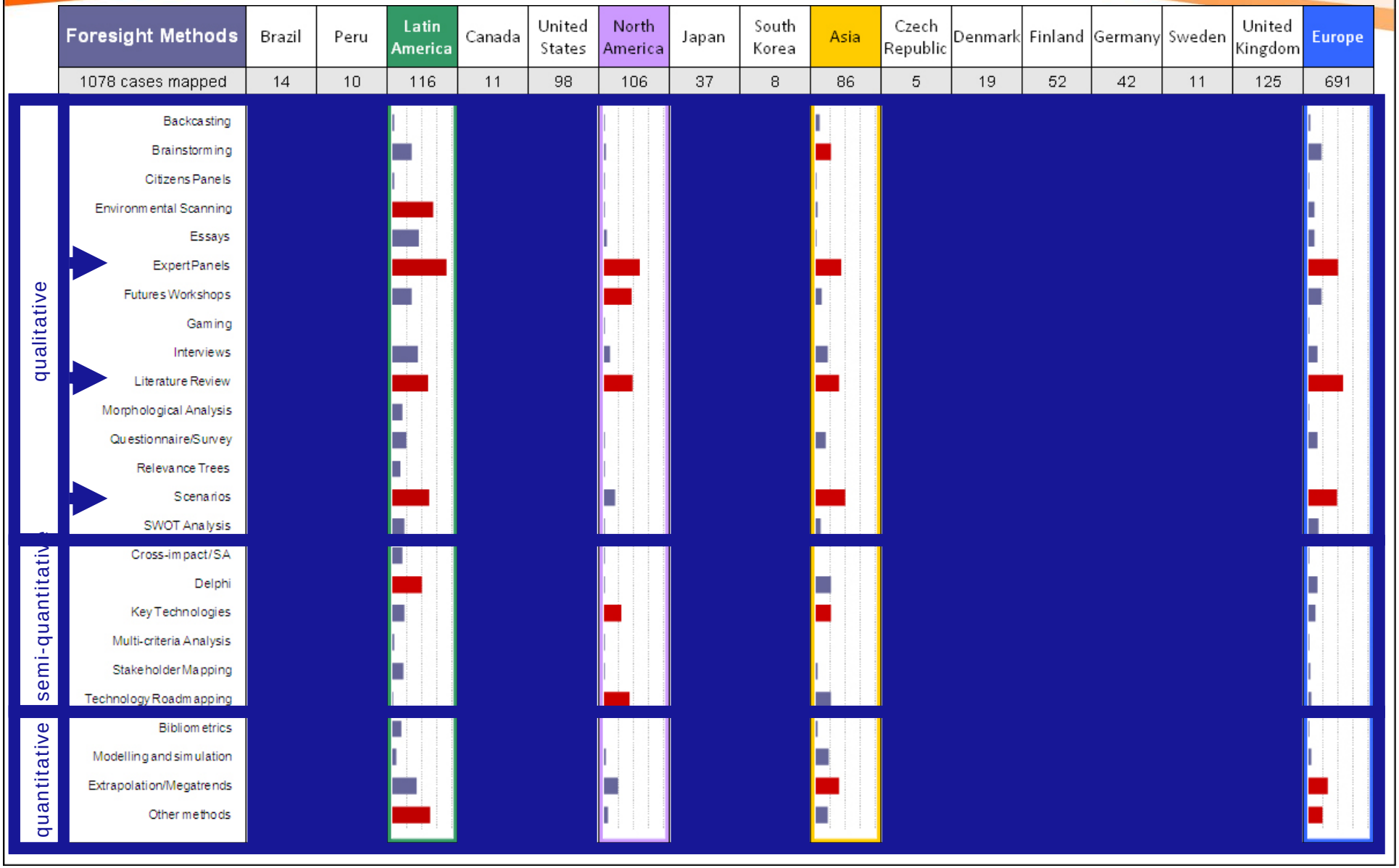

On identification of emerging risks & (missed) opportunities

Identification Scope

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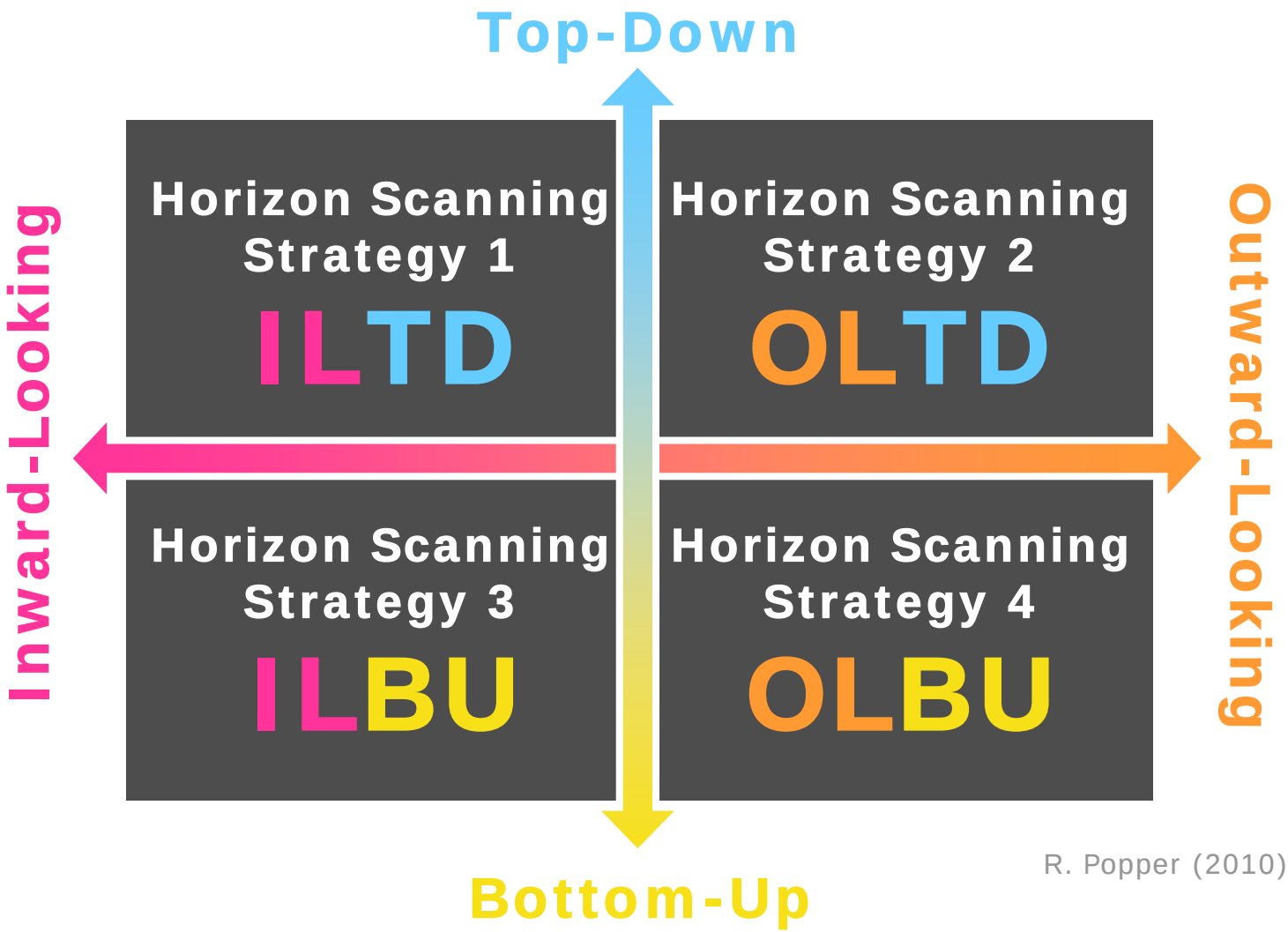

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Identification Sources (1/3)

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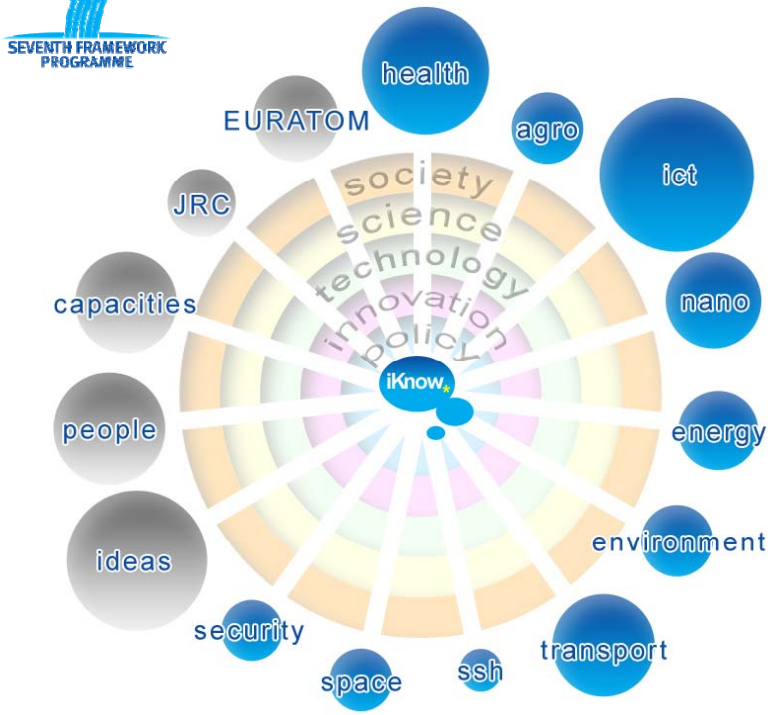
2009 Space (primarily Inward-Looking)

interviews



Outward-Looking & IL: 2010 Space

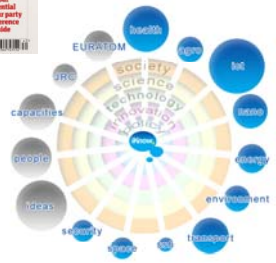
Etc.

interviews

social networks

blogs

scientific journals



Identification Sources (2/3)

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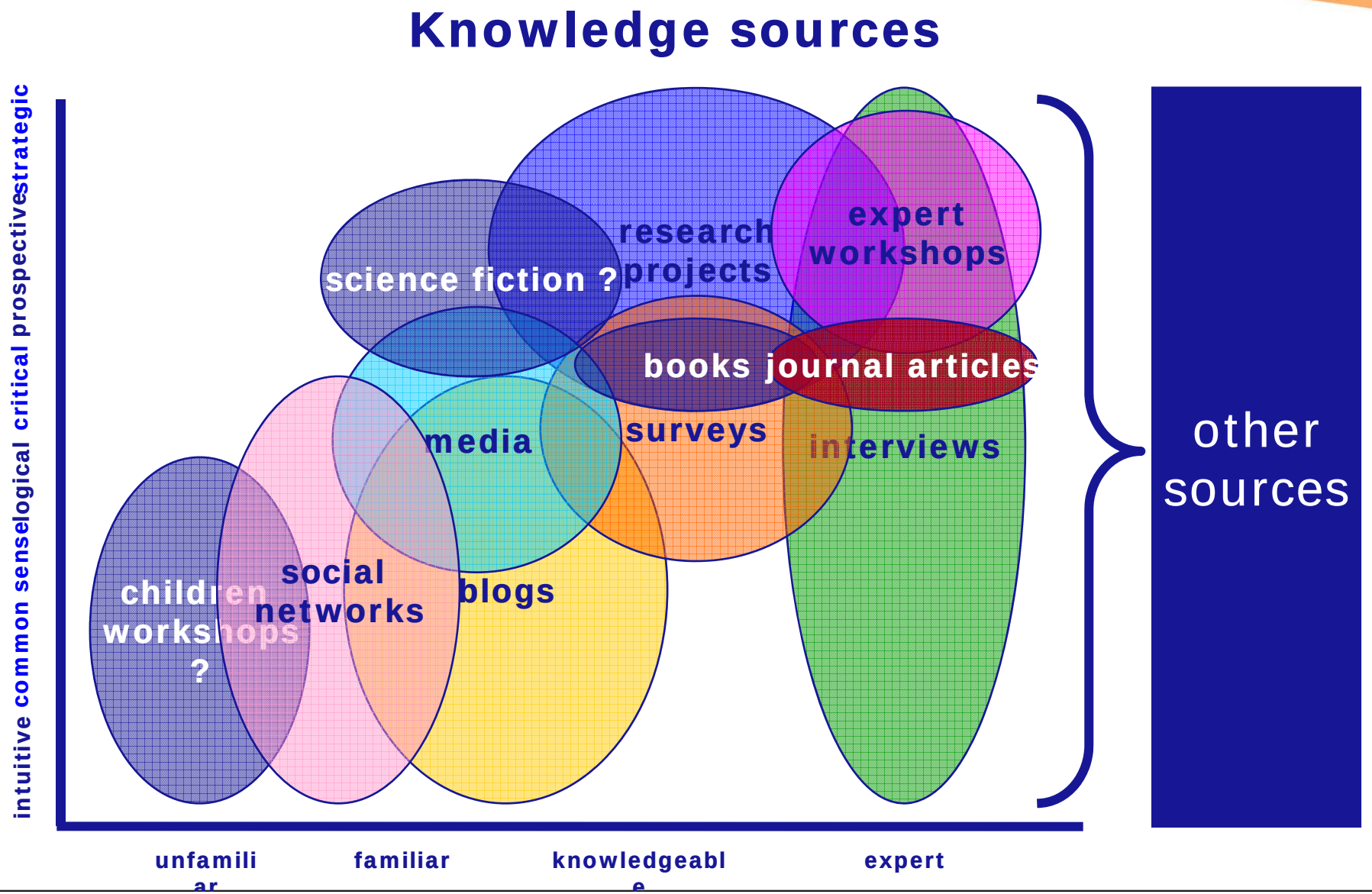

Identification Sources (3/3)

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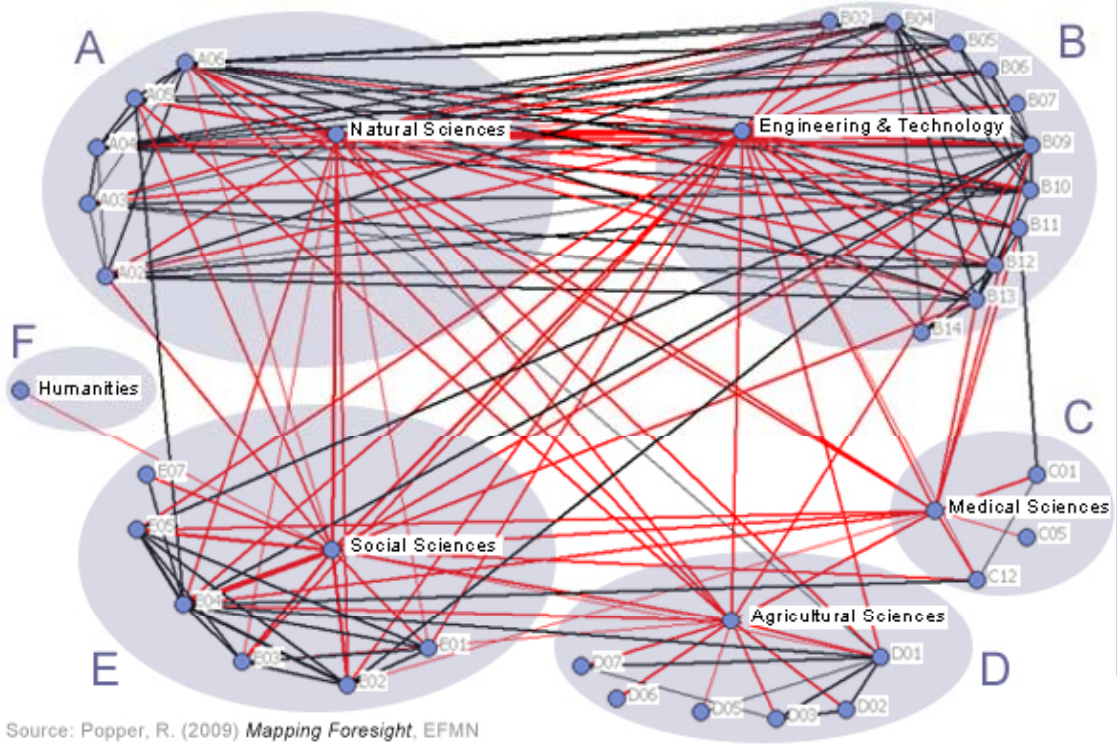
Introducing SNA and systemic analyses into our *Mapping Foresight* work

In a way, research in Social Sciences is the 'binder' of all research topics in the foresight exercises. This is quite the opposite with research within Humanities, which have the least salient links to other research topics in the exercise.



Source: Popper, R. (2009) *Mapping Foresight*, EFMN

A	Natural sciences
A04	Chemical Science (key broker)
A06	Biological Science
B	Engineering & Technology
B02	Industrial Biotechnology & Food Sciences
B04	Manufacturing Engineering
B09	Environmental Engineering (key broker)
B10	Materials Engineering
B11	Biomedical Engineering
B12	Electrical and Electronic Engineering
B13	Communications Technologies (key broker)
C	Medical sciences
C01	Medicine General
C05	Pharmacology & Pharmaceutical Sciences
C12	Public Health & Health Services (key broker)
D	Agricultural sciences
D01	Crop and Pasture Production (key broker)
E	Social sciences
E01	Education
E02	Economics
E03	Commerce, management, tourism & services
E04	Policy and Political Science (key broker)
E05	Studies in human society

Health (392 projects scanned 2007-2010) € 6.1 billion

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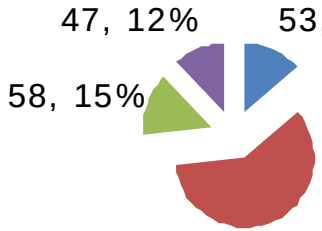
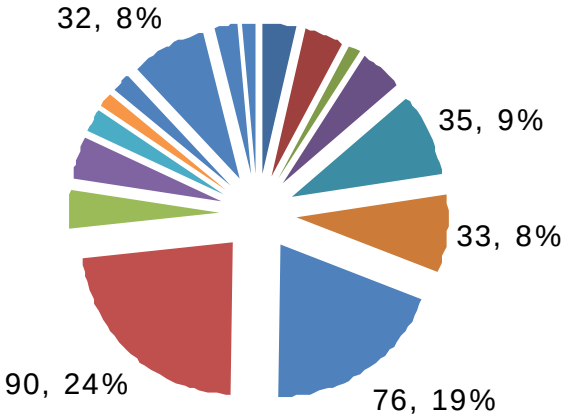
FP7 (11%)
Coo (19%)

- Biotechnology, generic tools and medical technologies for human health
- Translating research for human health
- Optimising the delivery of health care to European citizens
- Other actions



iKnow*



- High-throughput research
- Detection, diagnosis and monitoring
- Prediction of suitability, safety and efficacy of therapies
- Innovative therapeutic approaches and interventions

3 Integration of biological data and processes: large-scale data gathering, systems biology

4 Research on the brain and related diseases, human development and ageing

2 Transnational research on infectious diseases

1 Transnational research on other major diseases: cancer, cardiovascular disease, diabetes/obesity, rare diseases, other chronic diseases

- Translation of clinical outcome into clinical practice, including better use of medicines
- Quality, efficiency and solidarity of health care systems
- Enhanced health promotion and disease prevention
- Horizontal cooperation and support actions
- SICA on Optimising the delivery of health care to European citizens

5 Coordination and Support actions

- Responding to EU policy needs
- Specific International Cooperation Actions (SICA)

36 WI-WE

14 Wild Cards
22 Weak Signals

KBBE (139 projects scanned 2007-2010)

€ 1.9 billion

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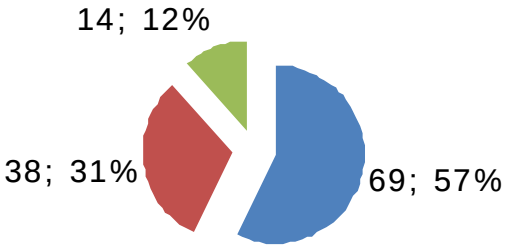
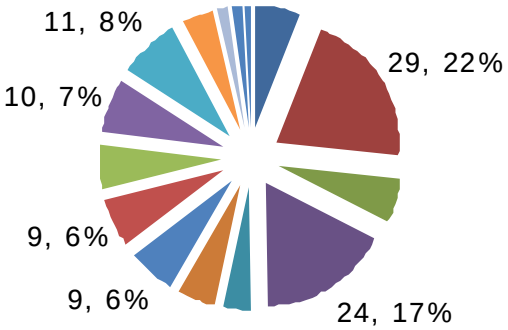
FP7 (4%)
Coo (6%)

- Sustainable production and management of biological resources from land, forest and aquatic environments
- Fork to farm: Food (including seafood), health and well-being
- Life sciences, biotechnology and biochemistry for sustainable non-food products and processes





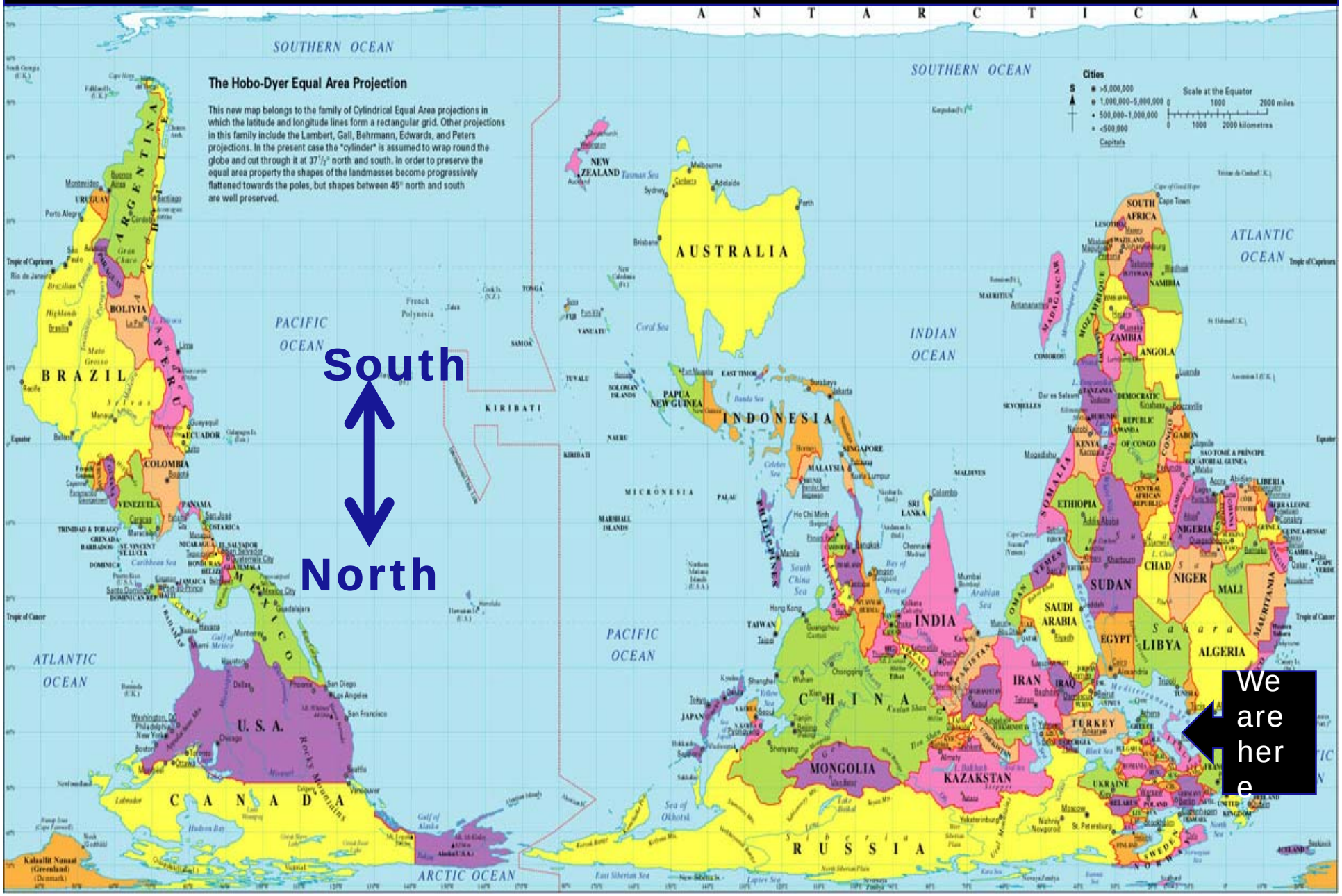
- Enabling research
- **1** Increased sustainability of all production systems (agriculture, fisheries and aquaculture)
- Optimised animal health production and welfare across agriculture, fisheries and aquaculture
- **2** Socio-economic research and support to policies
- Consumers
- Nutrition
- **5** Food processing
- **5** Food quality and safety
- Environmental impacts and total food chain
- **4** Novel sources of biomass and bioproducts
- **3** Marine and fresh-water biotechnology (blue biotechnology)
- Industrial biotechnology: Novel high added-value bioproducts and bioprocesses
- Biorefinery
- Environmental biotechnology
- Emerging trends in biotechnology

16 WI-WE

10 Wild Cards
6 Weak Signals

Interpretations are really important

McArthur's Universal Corrective Map of the World



Identification methodology

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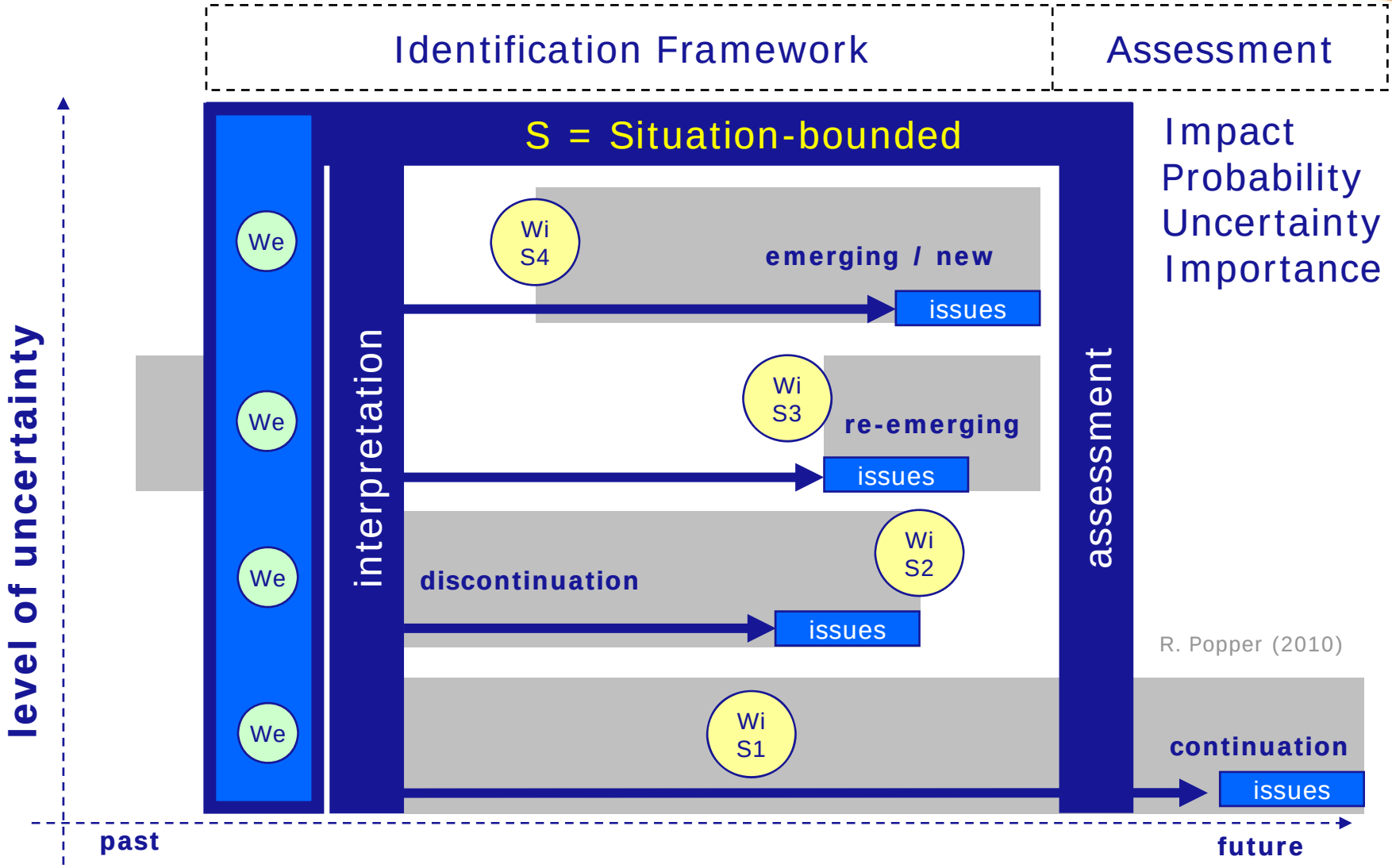

Identification: using workshops

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The University of Manchester

R. Popper (2010)

efsa
European Food Safety Authority

Step 1: ready...

historic/past issues

Identification: using workshops

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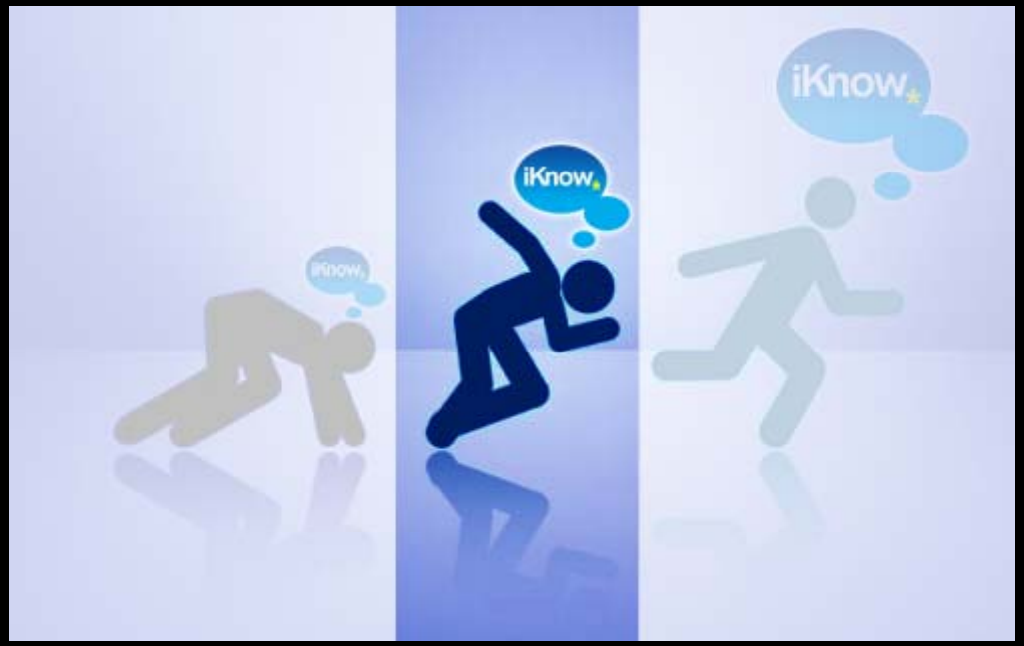

Step 2: steady...

issues generated by Your Team

Identification: using workshops

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Step 3: go! – brainstorming on:

unexpected drivers synergies
solutions to Grand Challenges
your own work / expertise

Identification: using workshops

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Workshop Outcomes

iKNOW outcomes

'wild' situations

- Wild features / factors
- Interpretations
- Impacts
- Actors
- Actions*
- (Weak) Signals

actions & recommendations

- Policy
- Business
- Research

Post-identification: interconnecting

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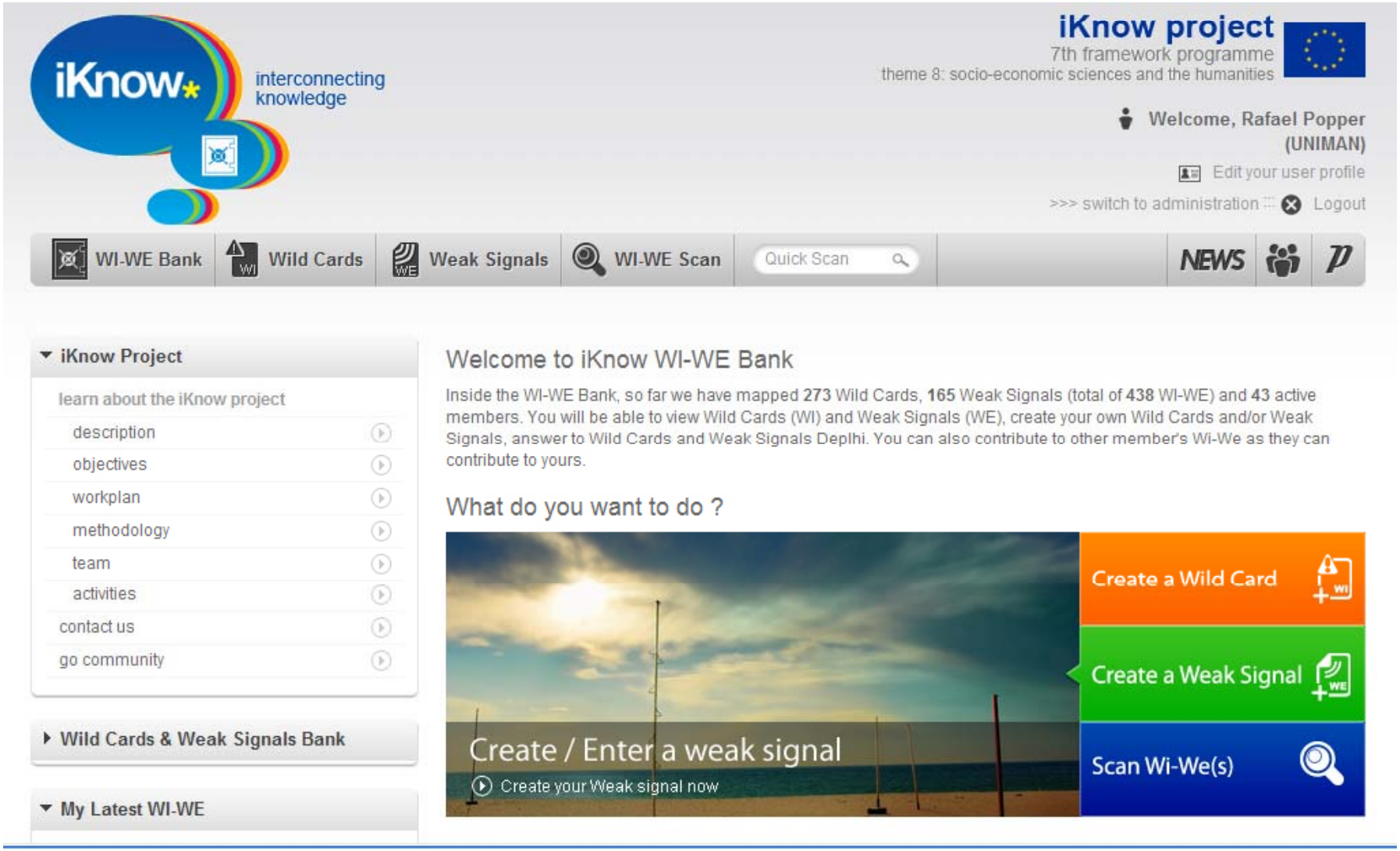
Issue Management System



Post-identification: interconnecting

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Identification of emerging issues

top Wi-We keywords

top Wi keywords

top We keywords

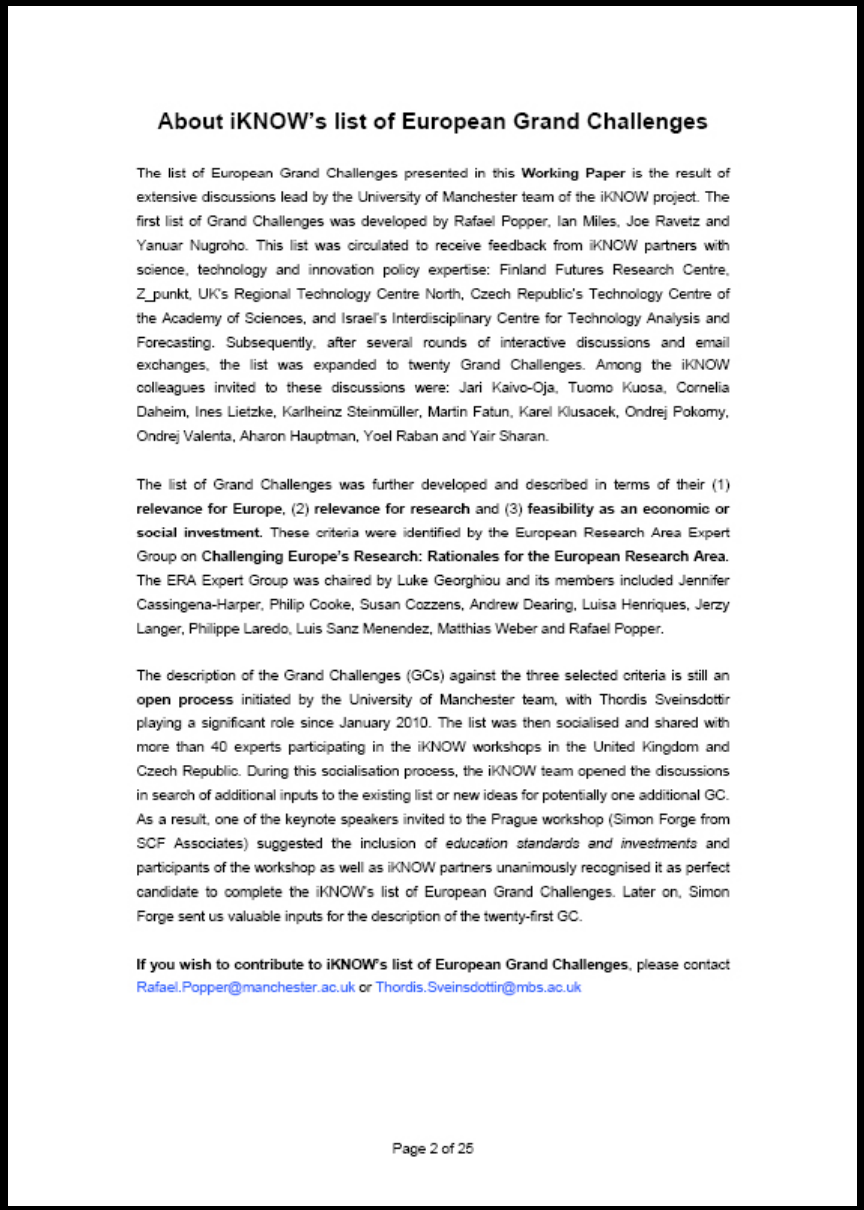
Filters: European Grand Challenges

European Grand Challenges

21 Challenges of the 21st Century

www.iknowfutures.eu
Working Paper

June 2010



About iKNOW's list of European Grand Challenges

The list of European Grand Challenges presented in this **Working Paper** is the result of extensive discussions lead by the University of Manchester team of the iKNOW project. The first list of Grand Challenges was developed by Rafael Popper, Ian Miles, Joe Ravetz and Yanuar Nugroho. This list was circulated to receive feedback from iKNOW partners with science, technology and innovation policy expertise: Finland Futures Research Centre, Z_punkt, UK's Regional Technology Centre North, Czech Republic's Technology Centre of the Academy of Sciences, and Israel's Interdisciplinary Centre for Technology Analysis and Forecasting. Subsequently, after several rounds of interactive discussions and email exchanges, the list was expanded to twenty Grand Challenges. Among the iKNOW colleagues invited to these discussions were: Jari Kaivo-Oja, Tuomo Kuosa, Cornelia Daheim, Ines Lietzke, Karlheinz Steinmüller, Martin Fatun, Karel Klusacek, Ondrej Pokorny, Ondrej Valenta, Aharon Hauptman, Yoel Raban and Yair Sharan.

The list of Grand Challenges was further developed and described in terms of their (1) **relevance for Europe**, (2) **relevance for research** and (3) **feasibility as an economic or social investment**. These criteria were identified by the European Research Area Expert Group on **Challenging Europe's Research: Rationales for the European Research Area**. The ERA Expert Group was chaired by Luke Georghiou and its members included Jennifer Cassingena-Harper, Philip Cooke, Susan Cozzens, Andrew Dearing, Luisa Henriques, Jerzy Langer, Philippe Laredo, Luis Sanz Menendez, Matthias Weber and Rafael Popper.

The description of the Grand Challenges (GCs) against the three selected criteria is still an **open process** initiated by the University of Manchester team, with Thordis Sveinsdottir playing a significant role since January 2010. The list was then socialised and shared with more than 40 experts participating in the iKNOW workshops in the United Kingdom and Czech Republic. During this socialisation process, the iKNOW team opened the discussions in search of additional inputs to the existing list or new ideas for potentially one additional GC. As a result, one of the keynote speakers invited to the Prague workshop (Simon Forge from SCF Associates) suggested the inclusion of *education standards and investments* and participants of the workshop as well as iKNOW partners unanimously recognised it as perfect candidate to complete the iKNOW's list of European Grand Challenges. Later on, Simon Forge sent us valuable inputs for the description of the twenty-first GC.

If you wish to contribute to iKNOW's list of European Grand Challenges, please contact Rafael.Popper@manchester.ac.uk or Thordis.Sveinsdottir@mbs.ac.uk

Filters: European Grand Challenges

Criteria to select Grand Challenges

Attractiveness

Criteria 1: Relevance for Europe

Question: Is it relevant to address at a European level?

- Does it show European added value?
- Is it based on an issue which is pan-European or regional within Europe e.g. Baltic/ Mediterranean?
- Does it correspond to a policy/strategy area that is already addressed at European level or has substantial potential to do so?
- Does it concern/have relevance for most Europeans?
- Is there a minimum critical effort required that cannot be achieved without European cooperation?
- Does it secure a distinctive European position in addressing a global challenge?
- Is there a specific advantage for European industrial or other actors to work together in the framework of the challenge?

Criteria 2: Relevance for Research

Question: Is there a clear research dimension contribution?

- Is research a critical component of the response to the challenge?
- Does the challenge have the potential to mobilise the research community and induce gains in efficiency and effectiveness?
- Will there be benefits to training and education?
- Will the knowledge generated be accessible to others in Europe who might benefit (if necessary on commercial terms)?

Feasibility

Criteria 1: Socio-economic feasibility

Question: Is it feasible as an economic or social investment?

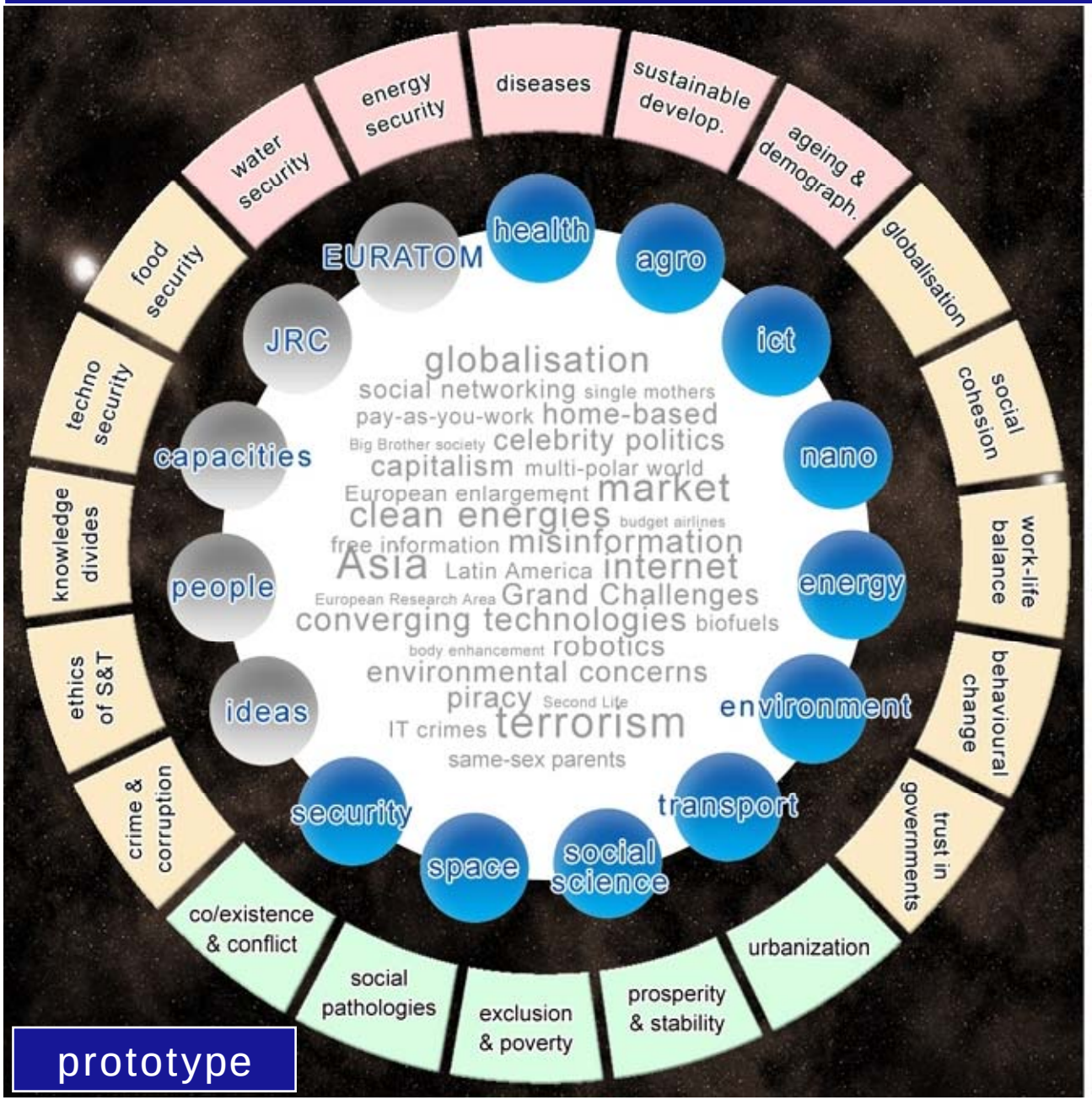
- Can projects/programmes be framed to address aspects of the challenge in terms of SMART objectives (Specific, Measurable, Achievable, Relevant and Timebound)?
- Do the achievable goals nonetheless represent stretch targets? Can a viable economic case be made?
- Is there a decision path that will mobilise the necessary resources?
- Is there a research base of sufficient size and quality in Europe from which to launch the initiative?
- Is there a sufficient industrial capability or policy implementation capability in Europe to be able to realise the outcomes of the project/programme?
- Is there buy-in from all major groups of actors?
- Is there clear appeal for the research community to become engaged?
- Does it capture the public and the political imagination?

References

- Georghiou, L., Cassingena Harper, J., Cooke, P., Cozzens, S., Dearing, A., Henriques, L., Langer, J., Laredo, P., Sanz Menendez, L., Weber, M. and Popper, R. (2008). **Challenging Europe's Research: Rationales for the European Research Area (ERA).** Report of the ERA Expert Group, European Commission, DG Research, EUR 23328 EN. Available at http://ec.europa.eu/research/era/pdf/eg7-era-rationales-final-report_en.pdf

List of iKNOW Grand Challenges

interdisciplinary and interactive early warning system



prototype

interconnecting knowledge
(convergence-interdisciplinary)

new research questions

new research agendas

impact on Grand Challenges

identification of problems

identification of solutions

relevance to EU research

sense-making

pattern recognition

emerging issues

informing policy

possible futures

Major EU state elects neo-fascist leader 001

Transhumanism becomes a significant force 002

Universal electronic systems breakdown 003

Wheat crisis hits humans and animals 004

Floods in Europe cause mass migration 005

FP7 themes: health | agro | ict | nano | energy | environment | transport | ssh | space | security

ERA goals: mobility | infrastructures | rtd institutions | knowledge sharing | joint programming | cooperation

Blue Sky Policy Brief 005
02.2010

Author(s)	Joe RAVETZ, Rafael POPPER and Thorda SVEINSDOTTIR (University of Manchester), Rob ASHWORTH (Regional Technology Centre North)
Contributor(s) UK workshop participants in the ENVIRO-TECH group	David ALEXANDER (University of Florence), Joe BALLANTYNE (The Futures Company), Alastair BROWN (UK Climate Impacts Programme), Steve CONNOR (Creative Concern), Tony DIGGLE (SAMI Consulting), Pierre ROSSEL (Swiss Federal Institute of Technology at Lausanne), Anna SACIO (Institute for Sustainable Technologies)
Manifestation	Sudden development
Importance for EU	★★★★★
Strategic attention	by 2030 ★★★☆☆ by 2050 ★★★★☆
Type of impact	Very negative
Inspired by	Brainstorming session and group discussions in the iKNOW Workshop in Manchester (February 2010)
Key words	flooding, mass-migration, disaster response, environment

Potential impacts in Europe	
infrastructures	★★★★★
people's lives	★★★★★
legislation & regulation	★★★☆☆
economy & business	★★★★☆
defence & security	★★☆☆☆
government & politics	★★☆☆☆
environment & ecosystems	★★★☆☆
science & technology	★★★★☆

Negligible ★ Minor ★★ Moderate ★★★ Major ★★★★ Critical ★★★★★

Wild card

Serious protracted flooding of low-lying areas leads to mass migration to higher lying areas and forces a rethink in low country policies. This could be due to e.g. sea level rise, exceptional tide, storm surge, summer drought and consequent fluvial flooding. Migration would flow in unsuspected directions, e.g. Africa which would lead to overcrowding in higher lying areas. This would lead to ghetto formation and possibly civil unrest. Social inequality would increase as higher lying areas would be inhabited by the rich whilst lower lying and high risk areas would be inhabited by the poor.

Surprises ('wild' scenario features)

The wild factor here is not necessarily the flooding itself, which could be inevitable with ongoing rapid climate change. The lack of preparedness and policy measures to cope with the flooding and the likelihood of this happening within the next 20 years would make this a wild card. The issue of migration also adds wildness to this card and the scale and unprecedented way of the migration from lower lying areas. We are at the moment too focused on local disaster plans and not holistic cross-national plans to respond to disasters such as flooding. Migration from EU countries to Africa would make this wild card very wild, as migration stream in this direction is unprecedented in recent history and many African countries are not well prepared to receive a high volume of displaced people. Higher lying and thus sought after areas would quickly become over crowded, and civil unrest is likely to follow. This would also put a strain on natural resources in the most inhabited areas and consequently energy and food safety would be threatened.

Outburst of the black economy 006

Pervasive self-diagnosis and self-treatment 007

Invisibility spray available in "Boots" 008

China's investment and services "great wall" 009

Abrupt disintegration of the Euro Zone 010

FP7 themes: health | agro | ict | nano | energy | environment | transport | ssh | space | security

ERA goals: mobility | infrastructures | rtd institutions | knowledge sharing | joint programming | cooperation

Blue Sky Policy Brief 010
02.2010

Author(s)	Thorda SVEINSDOTTIR, Ian MILES, Rafael POPPER, Yanuar NUGROHO, Joe RAVETZ, (University of Manchester)
Contributor(s) UK workshop participants in the NANO-SSH group	Julia DE CLERCK-SACHSSE (European Commission), Dalina DUMITRESCU (Institute for Business Administration in Bucharest), Gabriele GRIFFIN (University of York), Dirk JOHANN (Austrian Centre for Social Innovation), Javier MEDINA (Universidad del Valle), Konrad MICIUKIEWICZ (Planning and Landscape Newcastle University)
Manifestation	Rapid development
Importance for EU	★★★★★
Strategic attention	by 2030 ★★★★☆ by 2050 ★★★☆☆
Type of impact	Very negative
Inspired by	Brainstorming session and group discussions in the iKNOW Workshop in Manchester (February 2010)
Key words	Euro zone, financial crises, civil unrest, financial markets, economic crises

Potential impacts in Europe	
infrastructures	★★★★☆
people's lives	★★★★★
legislation & regulation	★★★★☆
economy & business	★★★★★
defence & security	★★★★☆
government & politics	★★★★★
environment & ecosystems	★☆☆☆☆
science & technology	★★★★☆

Negligible ★ Minor ★★ Moderate ★★★ Major ★★★★ Critical ★★★★★

Wild card

In order for this to be classified as a wild card this would have to happen quite rapidly. It would be largely unforeseen and any weak signals would go unnoticed. There is a chance that this might benefit some nation states whilst others would be worse off. The impact of this would be on a massive scale and this would lead to the collapse of governments and international institutions. This could potentially give the power over financial practices back to some of the nation states.

Surprises ('wild' scenario features)

What would be wild about this card is that the economy of the EU will be brutally affected and the deregulation between countries will be evident. The flow of capital and the role of Euro will drop leading to a competitive devaluation of "new" countries in Europe. There will be huge speculation and proposals of the Deutschemark as de facto European currency.

Also, what could be considered wild will be the apparent failure of Eurobased common currency as all efforts to integrate member states' monetary systems come to nothing. Countries pull out of the Euro and revert to national currency or perhaps an entirely non European Currency like the Yen or the Dollar? The EU might disintegrate into different currency zones.

Loss of balance and widening of gaps among the European countries. Rich countries increase the gap against poor countries. Loss of economic integration affects political and cultural integration. Loss of funding of the European project. What is also a wild feature here is the scale of the impact of this wild card, which will be felt throughout societies and even throughout the world.

Post-identification: Communication strategy

Author(s)

Contributor(s)

Manifestation

Strategic attention

Type of impact

Inspired by

- iKNOW workshops
- iKNOW interviews
- iKNOW delphi
- iKNOW scanning
- iKNOW Community

Related to

Keywords

Short description

Surprising features

iKnow interconnecting knowledge

Wheat crisis hits humans and animals

004

FP7 themes: health | agro | ict | nano | energy | environment | transport | ssh | space | security

ERA goals: mobility | infrastructures | rtd institutions | knowledge sharing | joint programming | cooperation

Blue Sky Policy Brief 004
02.2010

Author(s)	Yanuar NUGROHO (University of Manchester), David CAIN (Regional Technology Centre North), Rafael POPPER, Joe RAVETZ, Thordis SVEINSDOTTIR (University of Manchester)
Contributor(s) UK workshop participants in the ENVIRO-SSH group	Peter ELLWOOD (Health and Safety Laboratory), Fiona LICKORISH (DEFRA), John REYNOLDS (SAMI consulting), John TURNPENNY (University of East Anglia) and Martin FATUN (Technology Centre)
Manifestation	Gradual development
Importance for EU	★★★★★
Strategic attention	by 2030 ★★☆☆☆ by 2050 ★★★☆☆
Type of impact	Very negative
Inspired by	Brainstorming session and group discussions in the iKNOW Workshop in Manchester (February 2010)
Key words	Food, crops, disease, wheat, mono-culture, consumption, humans, animals

Potential impacts in Europe	
infrastructures	★☆☆☆☆
people's lives	★★★★★
legislation & regulation	★★★☆☆
economy & business	★★★★★
defence & security	★★★★☆
government & politics	★★★☆☆
environment & ecosystems	★★★☆☆
science & technology	★★★★★

Negligible ★ Minor ★★ Moderate ★★★ Major ★★★★ Critical ★★★★★

Wild card

This wild card (also called "wheat comes a cropper") concerns the emergence of a new pest or disease which specifically targets wheat and wipes out the whole wheat crop. This leads to a severe worldwide shortage of a staple food for humans and animals. Because of the genetic mutation, emerges a new pest or disease that targets and destroys all wheat crop and this spreads quickly across the globe. The impact is severe as the worldwide food supply for humans and animals are in serious shortage. This happens as human (and animals alike) becomes overly dependent on one particular source of main food. Large farms with mono-culture crops dominate massive farming areas, which are, while producing lots of food, also creating alarming risks to humanity and the environment. This situation is created by market push which always seeks for cheapest sources of food but unintentionally creates a highly vulnerable system easy to break down. In addition standardisation in food and farming industry makes the whole system vulnerable.

Surprises ('wild' scenario features)

What make this a wild card? In general, over-reliance of human and animals alike on only a few species makes human life much more vulnerable. Any disruption that affects these species would create massive impact to humans and animals. While we have bigger farms around, actually what we also have is fewer suppliers in terms of variety/variance. This increases the risk as we rely more on less variance of foods. Another feature that makes this wild card feral is that with genetic engineering, advanced new pest/disease easily develops whose progress might escape our observation. As we only have mono-culture, we have no crop resistance when the disease spreads: the impact will be devastating. This situation will become worse when we only have smaller gene pool to breed new crops as we will not be ready if the wild card manifests.

Disclaimer: The wild card presented in this brief may not happen at all or in the near future. iKNOW is a new EU funded research project aimed to explore surprising events (wild cards) and emerging issues (weak signals) potentially shaping or shaking the future of Europe and the world. Further information at www.iknowfutures.eu

Policy Brief ID

Links to FP7

Links to ERA

Impacts in Europe

- infrastructures
- peoples' lives
- regulation & legislation
- defence & security
- government & politics
- environment & ecosystems
- science & technology

Page 1 of 4

Exploiting iKNOW Policy Briefs

Imaginary Call

Thematic area(s)

Research topic

Objective

Expected impact

Importance for Europe

Blue Sky Policy Brief 001 – Major EU state elects neo-fascist leader

Recommended research

Thematic area

Social Sciences and Humanities (SSH) and Security.

Research topic

Future changes in Europe's political landscape.

Recent electoral results in various member states demonstrate a gradual shift to right wing and nationalistic politics. Members of far-right wing and extreme nationalist parties are also winning seats in local, national and EU governmental institutions. The reasons for the shift by voters to the far-right could be attributed to, among other factors, the increasing power of global actors (i.e. loss of the national vision/agenda) and increasing migration. Recent history has demonstrated the consequences of unbridled right wing extremism and research is vital to determine the cause of recent shift toward this ideology so that appropriate response can be formulated.

Objective

Research could focus on shift in public perception which gives rise to far-right electoral shift by studying the roots of right wing support. Research could, for that purpose, focus on analysing mass media and political discourse in order to understand attitudes towards far-right ideology. Research can be both backward and forward looking in that it examines past and contemporary far-right support as well as the future of far-right support in Europe. Research could focus on challenges such as poverty, inequality and immigration to determine their role in public support for far-right ideology.

Expected impact

Research should a) determine the scale of the shift towards far-right political ideology; b) determine variations and commonalities between far-right movements in Europe c) devise strategies for appropriate policy responses across EU; d) inform common legislation and regulation across EU; e) inform educational strategies that will increase democratic participation and teach the history of far-right movements and their influence on European history.

Importance for Europe

Europe has seen, in recent history, the devastating effect of extreme far-right support. It is vital that policy responses which aim to monitor and respond to this shift are informed by research which aims to understand this attitude shift as well as predict foreseeable implications these changes may have. It is furthermore important that EU forms a coherent legislative response that could guide member states in forming their legislation.

iKNOW is a Blue Sky foresight and horizon scanning research and technology development (RTD) initiative aimed to advance knowledge and tools for the early identification and analysis of events and developments potentially shaping and shaking the future of science, technology and innovation (STI). iKNOW is run by an international consortium lead by the University of Manchester and sponsored by the European Commission Directorate General for Research. By supporting Blue Sky RTD the EC aims to create more proactive European research policies that will be capable of anticipating challenges and opportunities associated to emerging issues, wild cards and weak signals (WI-WE). Wild Cards are situations/events with perceived low probability of occurrence but potentially high impact if they were to occur. Weak Signals are unclear observables warning us about the probability of future events (including Wild Cards). They implore us to consider alternative interpretations of an issue's evolution to gauge its potential impact.

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Thank you! Any questions?

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