Combining Foresight Methods for Impacts

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Outline

- Framing the issue
- How are methods used? Evidence from foresight mapping
- Using and selecting methods
- Further exploring the relation between methods and objectives (and expected impacts)
- Ordering methods according to foresight ‘principles’
- Ordering methods according to foresight ‘stages’
- Summary conclusions

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What's the issue?

- There are already many different methods used in foresight exercises, with more methods coming online all the time
- Methods can be combined in many different ways to create an overall methodology (foresight process)
- It would seem obvious that any methodological approach should be sensitive to the sorts of impacts sought from foresight
- Ideally, it should be possible to select and combine methods to achieve certain impacts. But how well do we understand this relationship? And can we use it to guide methodological design?

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Which are the most popular methods?

Results of an analysis of the European Foresight Monitoring Network (EFMN) database

(~800 exercises)

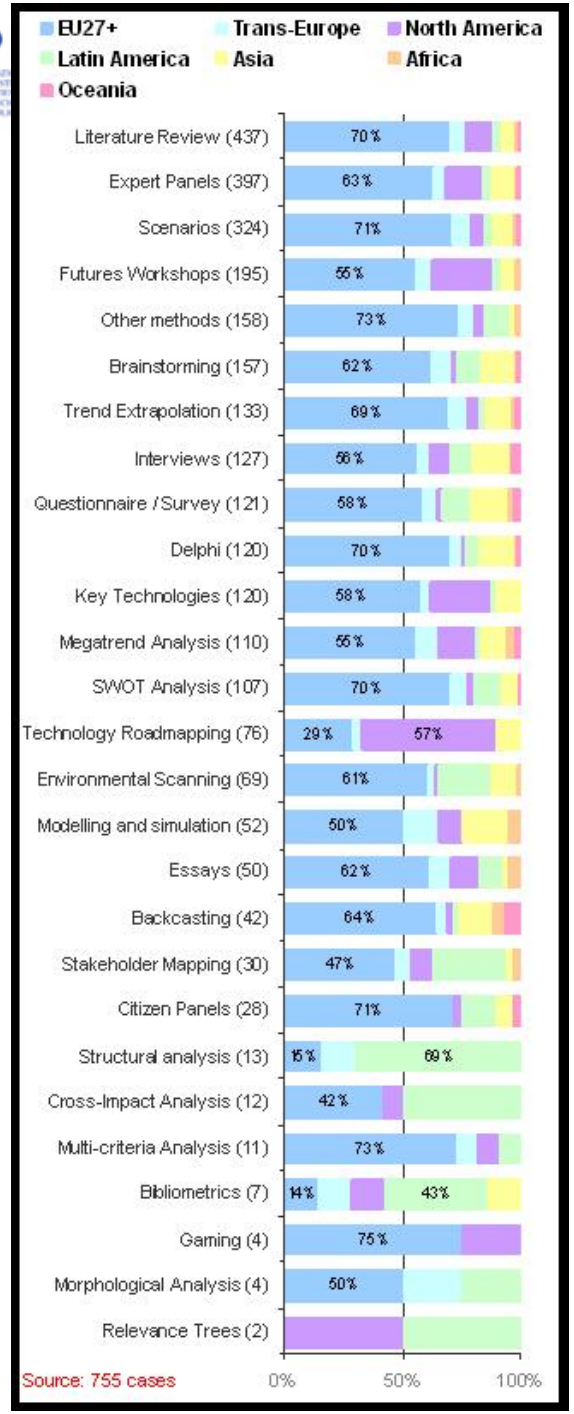
Common Foresight Methods

- The ***most widely used*** methods are without doubt literature review (437), expert panels (397) and scenarios (324). Despite these high numbers, we still believe that literature review and other generic methods are being under-reported in the database; it is hard to imagine a study without some review of relevant literature, in particular.

- Other ***commonly used*** methods are futures workshops (195), brainstorming (157), trend extrapolation (133), interviews (127), questionnaires / surveys (121), Delphi (120), key technologies (120), megatrend analysis (110) and SWOT analysis (107).

- Some ***less frequently used*** methods are technology roadmapping (76), environmental scanning (69), modelling and simulation (52), essays (50) and backcasting (42). More than half of the cases using technology roadmapping are from North America. We are surprised by the low frequency with which scanning is reported.

- ***Rarely used*** methods include stakeholder mapping (30), citizen panels (28), structural analysis (13), cross-impact analysis (12), multi-criteria analysis (11), bibliometrics (7), gaming (4), morphological analysis (4) and relevance trees (2). The numbers here may not do justice to the application of some of these tools in sub-national exercises in France and Spain, where methods such as structural analysis, morphological analysis and relevance trees are known to have been applied. We hope that further mapping efforts will improve the sub-national data and give a more accurate picture here.



Methods Frequency (Popper *et al*, 2007)

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Top 10 foresight methods per region (Popper *et al*, 2007)

Top 10	EU27+ (485 cases and 1835 methods) **Average 4**	Trans-Europe (61 cases and 192 methods) **Average 3**	North America (109 cases and 328 methods) **Average 3**	Latin America (24 cases and 188 methods) **Average 8**	Asia (51 cases and 280 methods) **Average 6**	Africa (10 cases and 47 methods) **Average 5**	Oceania (15 cases and 35 methods) **Average 2**
1	**Literature Review** (63%)	Literature Review (48%)	Expert Panels (57%)	Other methods (71%)	Expert Panels (80%)	Scenarios (60%)	**Backcasting** (33%)
2	**Expert Panels** (52%)	Scenarios (41%)	Futures Workshops (46%)	Expert Panels (67%)	Scenarios (57%)	**Megatrend Analysis** (50%)	Interviews (33%)
3	**Scenarios** (47%)	Expert Panels (30%)	Literature Review (45%)	Literature Review (67%)	Literature Review (55%)	Literature Review (50%)	**Citizen Panels** (33%)
4	**Other methods** (24%)	Futures Workshops (23%)	**Technology Roadmapping** (39%)	**Environmental Scanning** (63%)	Interviews (45%)	Futures Workshops (40%)	**Questionnaire / Survey** (27%)
5	**Futures Workshops** (22%)	Brainstorming (21%)	**Key Technologies** (28%)	Brainstorming (63%)	**Questionnaire / Survey** (39%)	Expert Panels (40%)	**Megatrend Analysis** (20%)
6	**Brainstorming** (20%)	**Megatrend Analysis** (19%)	Scenarios (17%)	**Questionnaire / Survey** (58%)	Brainstorming (37%)	**Essays** (30%)	Trend Extrapolation (20%)
7	**Trend Extrapolation** (19%)	Trend Extrapolation (19%)	**Megatrend Analysis** (16%)	Interviews (50%)	Delphi (35%)	**Questionnaire / Survey** (30%)	Delphi (20%)
8	**Delphi** (17%)	Other methods (19%)	Interviews (10%)	SWOT Analysis (50%)	Trend Extrapolation (27%)	**Modelling & simulation** (30%)	Scenarios (13%)
9	**SWOT Analysis** (15%)	**Modelling & simulation** (13%)	**Essays** (6%)	Scenarios (42%)	**Megatrend Analysis** (25%)	Trend Extrapolation (30%)	Brainstorming (13%)
10	**Interviews** (15%)	**Questionnaire / Survey** (13%)	Trend Extrapolation (6%)	**Structural analysis** (38%)	**Modelling & simulation** (25%)	Other methods (30%)	Expert Panels (13%)

Source: **Popper *et al* (2007)**

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The A to Z of Foresight Methods Combination (Popper *et al*, 2007) 1 / 3

	METHODS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	Backcasting		37%	5%	26%	7%	47%	23%	5%	23%	47%	21%	9%	14%	2%	47%	12%	5%	12%	7%	2%	16%	5%	9%	0%	19%	28%
B	Brainstorming	11%		7%	26%	9%	69%	43%	1%	26%	70%	14%	3%	19%	1%	45%	31%	6%	30%	31%	2%	13%	8%	7%	1%	9%	18%
C	Citizen Panels	12%	59%		41%	18%	76%	71%	0%	47%	47%	6%	6%	35%	6%	59%	41%	6%	18%	0%	0%	24%	24%	0%	0%	0%	18%
D	Environmental Scanning	18%	60%	12%		13%	62%	40%	3%	25%	80%	13%	3%	28%	2%	47%	33%	10%	23%	25%	3%	27%	13%	10%	5%	15%	35%
E	Essays	5%	19%	5%	13%		32%	29%	2%	17%	49%	32%	5%	14%	2%	33%	14%	5%	5%	10%	3%	8%	6%	5%	2%	6%	22%
F	Expert Panels	6%	27%	4%	10%	6%		34%	1%	20%	65%	16%	1%	17%	0%	34%	15%	2%	17%	22%	1%	7%	3%	16%	1%	5%	15%
G	Futures Workshops	5%	32%	6%	13%	9%	64%		2%	13%	61%	21%	2%	13%	1%	41%	14%	2%	13%	23%	1%	7%	3%	18%	0%	5%	14%
H	Gaming	50%	50%	0%	50%	25%	75%	75%		0%	50%	25%	0%	0%	0%	100%	0%	0%	25%	0%	0%	50%	0%	0%	0%	75%	50%
I	Interviews	9%	32%	7%	13%	10%	63%	21%	0%		65%	15%	3%	42%	1%	35%	17%	4%	8%	9%	4%	9%	5%	7%	2%	6%	19%
J	Literature Review	5%	24%	2%	12%	7%	57%	28%	0%	18%		16%	1%	15%	0%	41%	14%	2%	15%	20%	2%	5%	2%	12%	1%	8%	21%
K	Megatrend Analysis	8%	16%	1%	7%	17%	50%	33%	1%	14%	55%		2%	24%	1%	49%	9%	3%	13%	21%	3%	4%	2%	6%	1%	16%	24%
L	Morphological Analysis	80%	80%	20%	40%	60%	60%	80%	0%	60%	80%	40%		40%	20%	100%	40%	40%	20%	20%	0%	60%	60%	20%	0%	40%	40%
M	Questionnaire / Survey	5%	23%	5%	15%	8%	56%	22%	0%	42%	57%	25%	2%		1%	38%	20%	7%	19%	8%	3%	6%	8%	4%	1%	7%	20%
N	Relevance Trees	50%	50%	50%	50%	50%	50%	50%	0%	50%	100%	50%	50%	50%		50%	50%	100%	0%	0%	50%	50%	50%	0%	0%	50%	50%
O	Scenarios	6%	20%	3%	9%	7%	40%	25%	1%	13%	54%	19%	2%	14%	0%		11%	2%	12%	9%	0%	5%	3%	5%	0%	12%	24%
P	SWOT Analysis	6%	52%	8%	24%	11%	66%	33%	0%	23%	70%	13%	2%	28%	1%	42%		8%	20%	23%	2%	14%	11%	6%	2%	2%	14%
Q	Cross-Impact Analysis	15%	62%	8%	46%	23%	62%	23%	0%	38%	54%	31%	15%	62%	15%	46%	54%		15%	23%	15%	15%	38%	8%	0%	23%	15%
R	Delphi	5%	42%	3%	14%	3%	61%	25%	1%	9%	61%	16%	1%	22%	0%	38%	17%	2%		28%	2%	4%	0%	6%	1%	2%	11%
S	Key Technologies	3%	39%	0%	14%	5%	71%	39%	0%	9%	75%	23%	1%	8%	0%	25%	17%	3%	25%		3%	2%	0%	35%	2%	7%	10%
T	Multi-criteria Analysis	13%	38%	0%	25%	25%	38%	25%	0%	50%	88%	50%	0%	38%	13%	13%	25%	25%	25%	38%		25%	0%	13%	13%	38%	38%
U	Stakeholder Mapping	24%	62%	14%	55%	17%	83%	45%	7%	34%	66%	17%	10%	24%	3%	55%	41%	7%	14%	7%	7%		21%	0%	10%	17%	41%
V	Structural Analysis (MICMAC)	15%	85%	31%	62%	31%	77%	46%	0%	46%	62%	15%	23%	69%	8%	62%	69%	38%	0%	0%	0%	46%		0%	0%	8%	15%
W	Technology Roadmapping	6%	14%	0%	8%	4%	80%	48%	0%	11%	70%	10%	1%	6%	0%	23%	7%	1%	8%	55%	1%	0%	0%		0%	7%	11%
X	Bibliometrics	0%	40%	0%	60%	20%	60%	0%	0%	40%	80%	20%	0%	20%	0%	20%	40%	0%	20%	40%	20%	60%	0%	0%		20%	60%
Y	Modelling and simulation	14%	23%	0%	16%	7%	30%	18%	5%	13%	59%	34%	4%	14%	2%	66%	4%	5%	4%	14%	5%	9%	2%	9%	2%		45%
Z	Trend Extrapolation	8%	17%	2%	15%	10%	38%	18%	1%	15%	62%	20%	1%	16%	1%	51%	8%	1%	8%	8%	2%	8%	1%	6%	2%	17%	
	13,088 combinations	229	898	132	454	288	1652	961	32	588	1860	573	62	581	25	1289	518	110	504	588	62	237	128	338	38	289	652
	2,584 applications	**43**	**140**	**17**	**60**	**63**	**361**	**190**	**4**	**113**	**414**	**119**	**5**	**113**	**2**	**309**	**83**	**13**	**100**	**110**	**8**	**29**	**13**	**71**	**5**	**56**	**143**
	3 categories	**Qualitative**																**Semi-quantitative**							**Quantitative**		

Source: **Popper *et al*, 2007** (Global Foresight Outlook 2007)

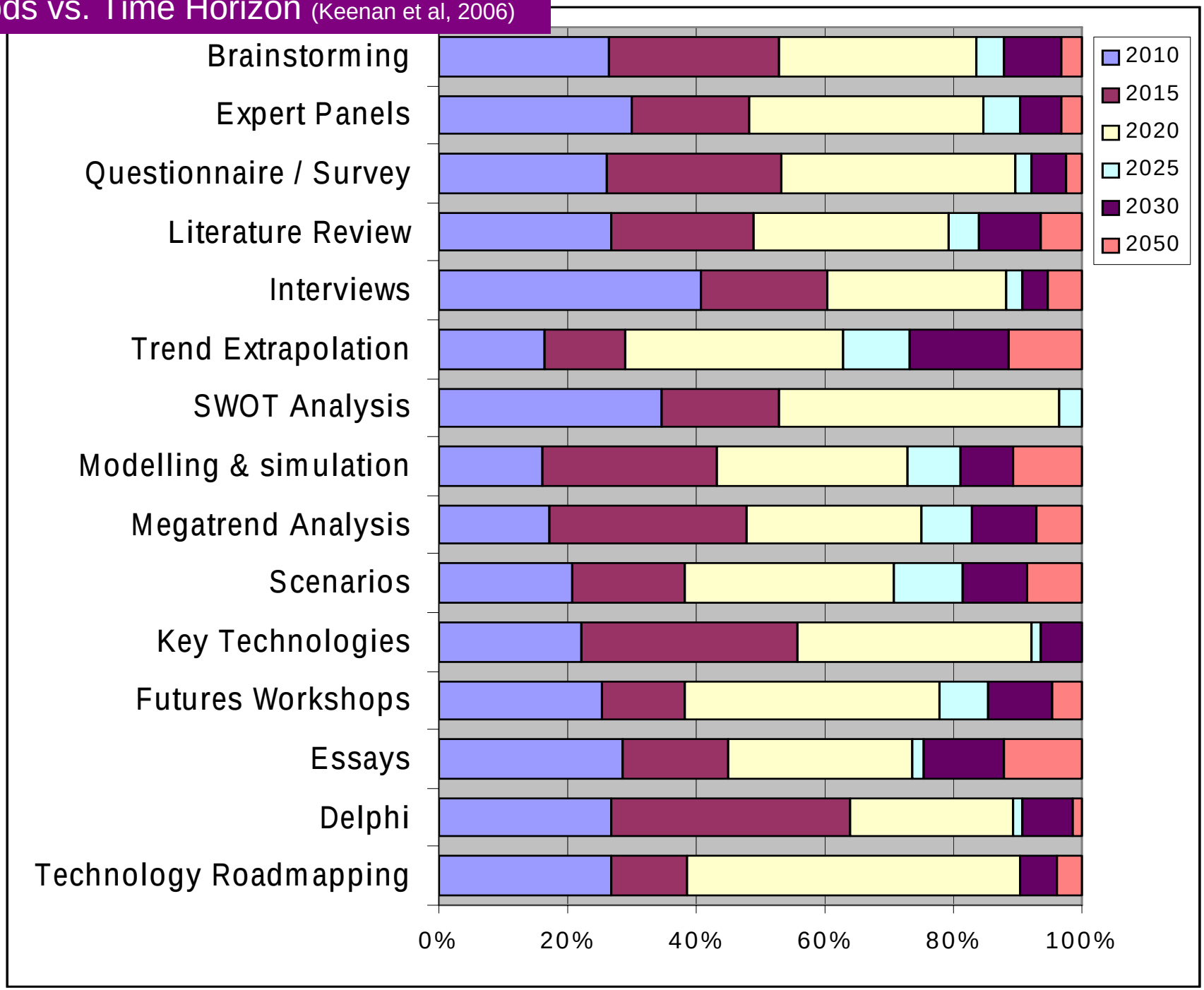
The A to Z of Foresight Methods Combination (Popper *et al*, 2007) 2 / 3

- As expected, most methods are highly combined with ***expert panels***, ***literature review*** and ***scenarios***. However, in order to avoid repetitions we do not refer to these in subsequent highlights but we hope the reader will keep this in mind.
- ***Backcasting*** is often combined with brainstorming (37%), trend extrapolation (28%) and environmental scanning (26%).
- ***Brainstorming*** is often combined with futures workshops (43%), SWOT (31%), key technologies (31%), Delphi (30%), environmental scanning (26%) and interviews (26%).
- ***Citizen panels*** are very often combined with futures workshops (71%), brainstorming (59%), interviews (47%), environmental scanning (41%), SWOT (41%), and questionnaire /survey (35%).
- ***Environmental scanning*** is often combined with brainstorming (60%), futures workshops (40%), trend extrapolation (35%), SWOT analysis (33%), questionnaires / surveys (28%), stakeholder mapping (27%), interviews (25%) and key technologies (25%).
- ***Essays*** are often combined with megatrend analysis (33%) and futures workshops (29%).
- ***Expert Panels*** are often combined with futures workshops (34%) and brainstorming (27).
- ***Futures Workshops*** are often combined with brainstorming (32%).
- ***Gaming*** was only applied in 4 cases of the sample and it was mainly combined with futures workshops, modelling and simulation.
- ***Interviews*** are often combined with questionnaires / surveys (42%) and brainstorming (32%).
- ***Literature Review*** is commonly combined with futures workshops (28%).
- ***Megatrend Analysis*** is commonly combined with futures workshops (33%).
- ***Morphological Analysis*** was used in 5 cases. It was combined with backcasting, brainstorming, stakeholder mapping and structural analysis.

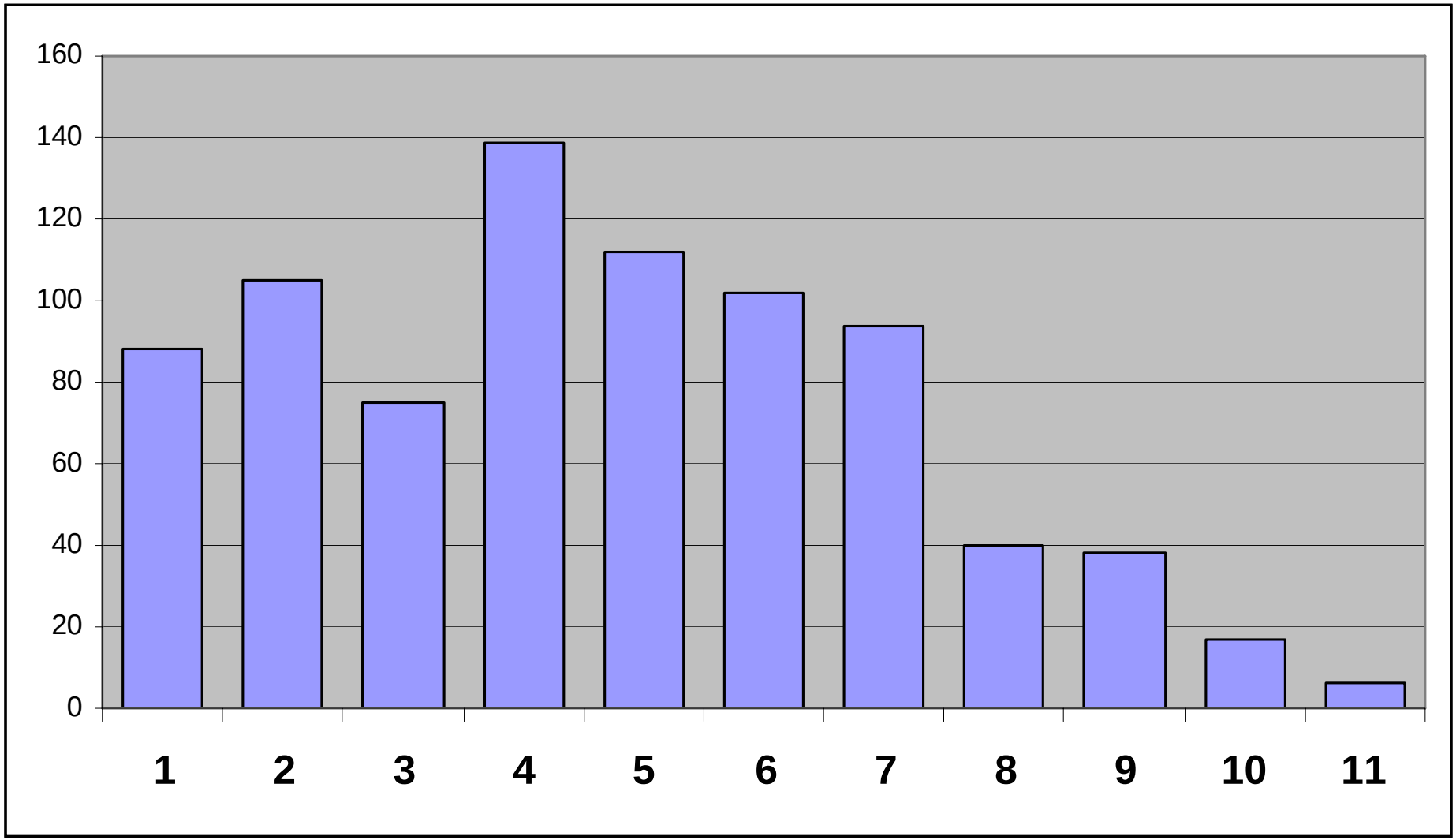
The A to Z of Foresight Methods Combination (Popper *et al*, 2007) 3 / 3

- ***Questionnaires / surveys*** are often combined with interviews (42%) and megatrend analysis (25%).
- ***Relevance Trees*** was used only in 2 cases. In both cases it was combined with cross-impact analysis.
- ***Scenarios*** are commonly combined with futures workshops (25%).
- ***SWOT Analysis*** is commonly combined with brainstorming (52%), futures workshops (33%) and questionnaires / surveys (28%).
- ***Cross-Impact Analysis*** is often combined with brainstorming (62%) and questionnaires / surveys (62%).
- ***Delphi*** is commonly combined with brainstorming (42%), key technologies (28%) and futures workshops (25%).
- ***Key Technologies*** is commonly combined with brainstorming (39%), futures workshops (39%), technology roadmapping (35%) and Delphi (25%).
- ***Multi-criteria Analysis*** has been used in 8 cases only with half of those combining it with interviews and megatrend analysis.
- ***Stakeholder Mapping*** is often combined with brainstorming (62%), environmental scanning (55%), futures workshops (45%), SWOT (41%) and trend extrapolation (41%).
- ***Structural Analysis*** is often combined with brainstorming (85%), questionnaires / surveys (69%), SWOT (69%) and environmental scanning (62%) and stakeholder mapping (46%)
- ***Technology Roadmapping*** is often combined with key technologies (55%) and futures workshops (48%).
- ***Bibliometrics*** was used in 5 cases and was mainly combined with environmental scanning, stakeholder mapping, and trend extrapolation.
- ***Modelling and simulation*** is often combined with trend extrapolation (45%) and megatrend analysis (34%).
- ***Trend Extrapolation*** is mainly combined with the three most common methods (expert panels, literature review and scenarios).

Methods vs. Time Horizon (Keenan et al, 2006)



No. of Methods reportedly used in Foresight exercises (Keenan et al, 2006)



Typical selection criteria

- Proof of concept – learning from other sites of application
- Available resources (time, money . . .)
- Nature of desired participation
- Suitability for combination with other methods
- Desired outputs of a foresight exercise (e.g. product vs. process)
- Quantitative / Qualitative data requirements of methods
- Methodological competence often a key factor

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Let's start with objectives (a proxy for impacts)

(Keenan and Popper (eds.), 2007)

Informing decision-making processes

- Formulate funding and investment priorities for public policies • Evaluate existing strategies against potential futures, and devise future-proof strategies • Develop reference material for policy-makers and other actors to use, broadening the knowledge base around which decisions are made, thereby resulting in better informed public policies or organisational strategies • Provide anticipatory strategic intelligence to innovation system actors • Detect and analyse weak signals to 'foresee' likely future changes and to gain insights into complex interactions and emerging drivers of change • Identify new S&T, business, societal, policy and political opportunities • Increase awareness of possible risks, and hence the basis for more effective contingency planning, and the design and development of appropriate forms of resilience

Assisting the implementation of decisions

- Improve implementation by enabling buy-in to decision-making processes • Increase understanding and build trust between participants, thereby contributing to the building of shared agendas • Develop widely shared visions of the future with which actors can identify and thereby better co-ordinate their activities, be they individuals or organisations • Disrupt 'lock-in' thinking and challenge fixed mindsets • Build hybrid networks and strengthen communities • Aid communication, understanding and collaboration across boundaries, be they geographical, organisational or disciplinary in nature • Deepen dialogue with society and improve governance

Creating new capabilities

- Enhance strategic capabilities of organisations by helping to develop a language and practice for thinking about the future – something that is often termed a 'foresight culture' • Enhance the standing and image of organisations using foresight, showing them to be future-oriented and open, and attractive places for investment

Objectives ⇔ Methods?

- Each objective could be addressed through any number of methodological approaches
- Moreover, most exercises will have multiple objectives
- Result: Complexity!
- Here, we present two alternative starting points for ordering and thereby selecting methods:
  - Principles of foresight
  - Stages in the foresight process

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(Methodological?) Principles

Future-oriented

Participative

Evidence-based

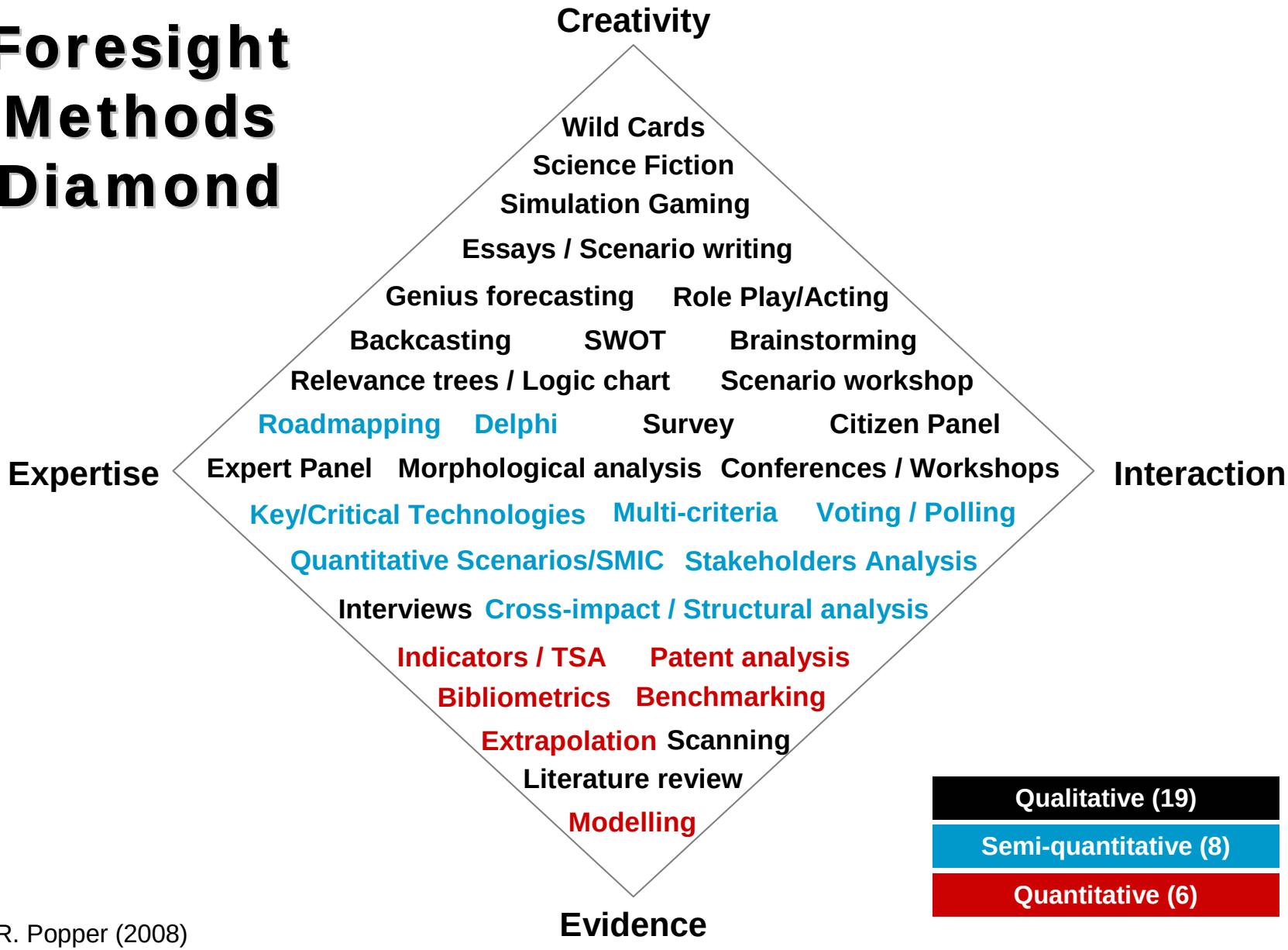
Multidisciplinary

Coordinating

Action-oriented

There have been some attempts to map methods against principles such as these

Foresight Methods Diamond



Qualitative (19)

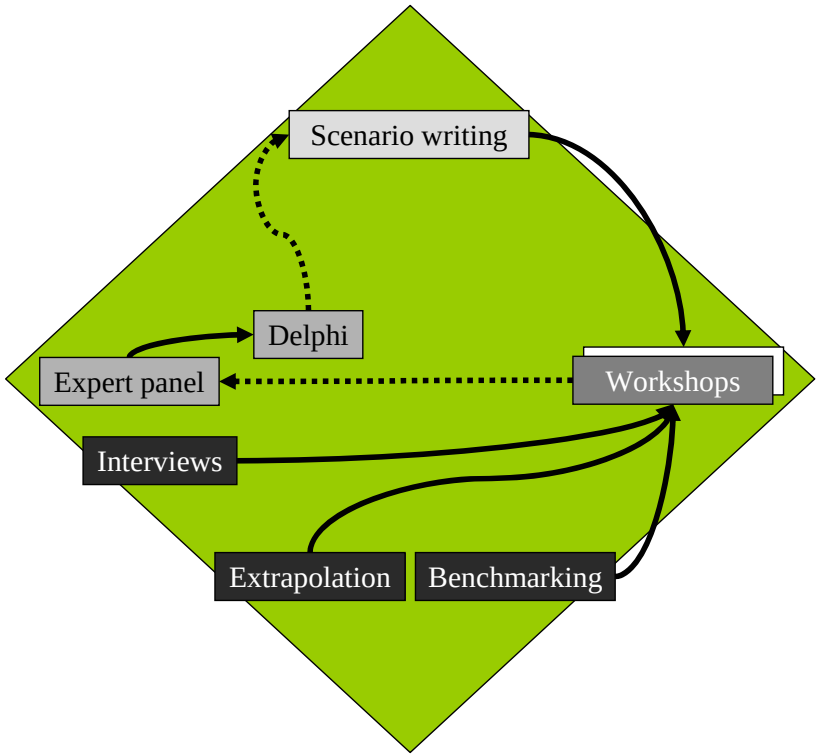
Semi-quantitative (8)

Quantitative (6)

R. Popper (2008)

Tracing a methodology – hypothetical case featured in the Guide to RI Foresight

(Keenan and Popper (eds.), 2007)

Large-Scale RIs	Research Process (RP) Diamond
Stage 1: (deskwork) to map current RI capacities and limitations (based upon expert interviews), extrapolation of important trends, and international benchmarking with the US and Japan.	
Stage 2: International workshop to identify and scope possible RI options.	
Stage 3: Expert panel to define statements for a Delphi, to be used to obtain views on RI options and the factors that underpin them. International online Delphi.	
Stage 4: (deskwork) to generate baseline scenarios that are used to 'test' the spectrum of RI options.	
Stage 5: Multiple options drafted that set out assumptions and priorities. These are discussed and revised in workshops.	

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Assessment of foresight methods

Barend van der Meulen, 2007

Table 1: Strengths of foresight methods in terms of five methodological aspects of foresight processes

Method	Expertise input	Enhancing creativity	External interaction	Strategy development	Dissemination of results
Expert-based methods					
Panels	●●●●		●	●●●	
Essays	●●●	●●			●●
Delphi method	●●●	●		●	●
Indirect expert methods					
Surveys	●●				
Interviews	●				
Review studies	●●			●●	●
Bibliometrics	●●			●	
Interactive methods					
Conferences	●		●●		●●●
Workshops	●●	●	●●●	●	●●
Brainstorm sessions	●	●●	●●		
Strategy making					
Scenario studies	●●	●●		●●●	●●●
SWOT analysis	●	●	●	●●	●
Road mapping	●●●		●●	●●●	●

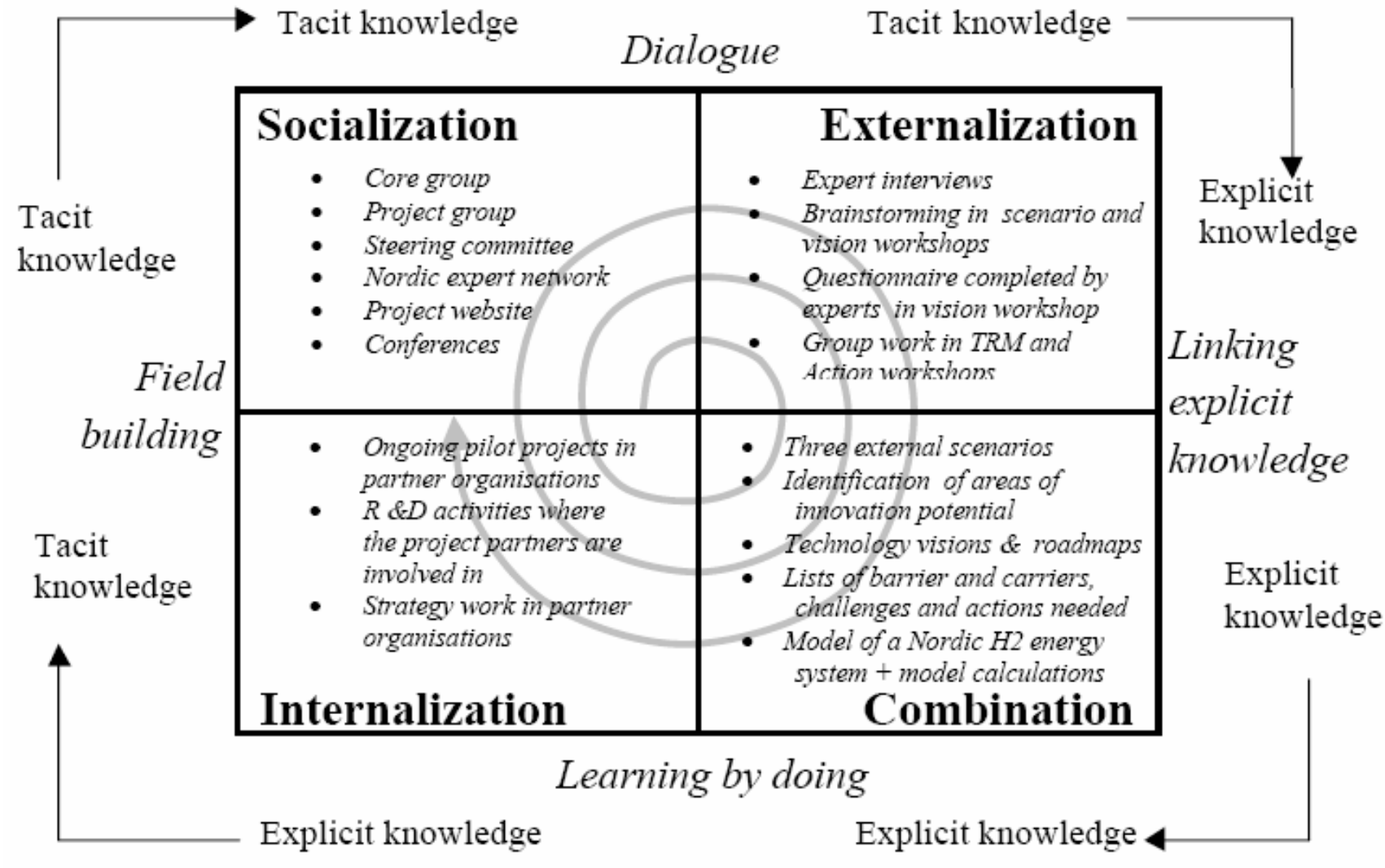
Stages Approach: Cycles of 'Extension' and 'Concentration' (Rémi Barré, 2001)

- Foresight exercises consist fundamentally of a succession of 'extension' and 'concentration' steps: the participants in the exercise engage in interactive activities consisting of an exploration and hypothesis-building stage (extension), followed by a selection – convergence and synthesis stage (concentration).

- Foresight methodologies are the ways by which these extension and concentration steps are carried out. Such extension - concentration sequences lead to a description of Foresight as a learning process from tacit to codified knowledge transformation cycles

Stages using Nonaka's SECI Model

(Eerola & Joergensen, 2002)



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Z_punkt Corporate Foresight Toolbox

Basic Process

Monitoring	Analysis	Projection	Transformation
Recognising Relevant Trends.	Understanding Drivers of Change.	Anticipating the Future.	Draw Implications for Business.

Toolbox

Weak Signals	Key Factors	Scenarios	Strategic Management
Environmental Trends	Emerging Issues	Roadmaps	New Business Development
Consumer / Industry Trends	Wild Cards	Creative Processes / Workshops	Portfolio Innovation
Z_trend database	Customer Foresight	Innovation Contexts	

Five mental acts (stages) of Foresight

- Understanding
  - Gains a shared understanding and mutual appreciation of topics and influencing factors as systems in their own contexts
- Synthesis and Models of the future
  - Explores alternative courses for development and their integration into designs for a new context
- Analysis and Selection
  - Analyses the alternative futures and decisions on the desired future
- Transformation
  - Establishes the relationship between the future and the present for the change programme
- Action
  - Creates plans to inform present day decisions concerning immediate change actions to provide structural and behavioural transformations

Systemic Foresight Methodology, SFM [Saritas, 2006]

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Mental Acts & Methods

Understanding	Synthesis & Models	Analysis & Selection	Transformation	Actions
Scanning	Gaming	SWOT Analysis	Scenario Planning	Priority Lists
Bibliometrics	Scenarios	Multi Criteria Analysis	Backcasting	Critical/Key Technologies
Literature Review	Wild Card Analysis	Morphological Analysis	Relevance Trees	R&D Planning
Interviews	Syst.Dynamics Simulation	Cross Impact Analysis	Road Mapping	Action Planning
Benchmarking	Weak Signals	Prioritisation (e.g. Delphi)	Linear Programming	Operational Planning
Syst. Analysis Modelling	Mega trends Analysis	Voting	Strategic Planning	Impact Assessment
Panels Conferences	Panels Conferences	Panels Conferences	Panels Conferences	Panels Conferences

Creativity / Expertise / Evidence

Interaction

Summary conclusions

- We have sought to present some of the ways foresight analysts have attempted to classify methods with a view to aiding their selection by practitioners
- However, all attempts at ordering methods should be treated with caution because of
  - Complexity of multiple objectives / principles / stages
  - Versatility of many methods
- Such classifications should therefore serve only as a guiding point of departure and should not be strictly adhered to

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