OVERVIEW OF METHODOLOGIES

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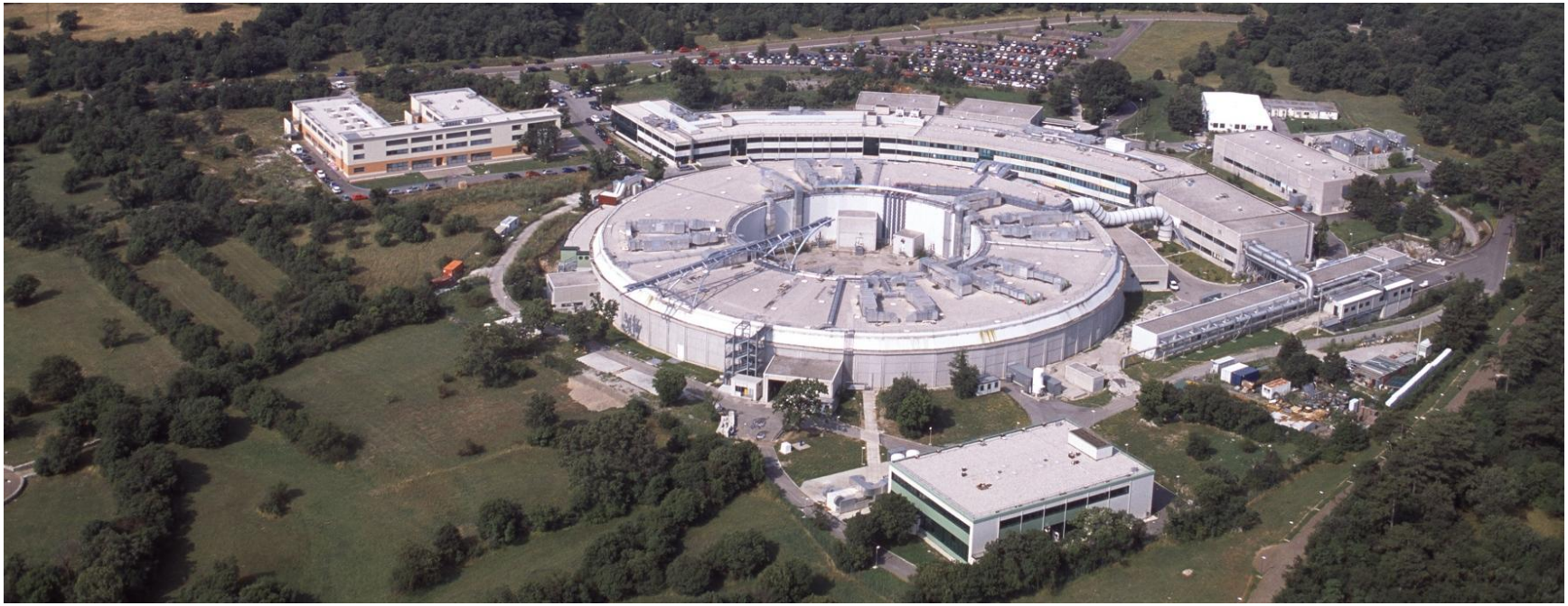

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Outline

- What does impact mean?
- What do I want to know?
- In which assessment situation am I?
- How to answer my question?

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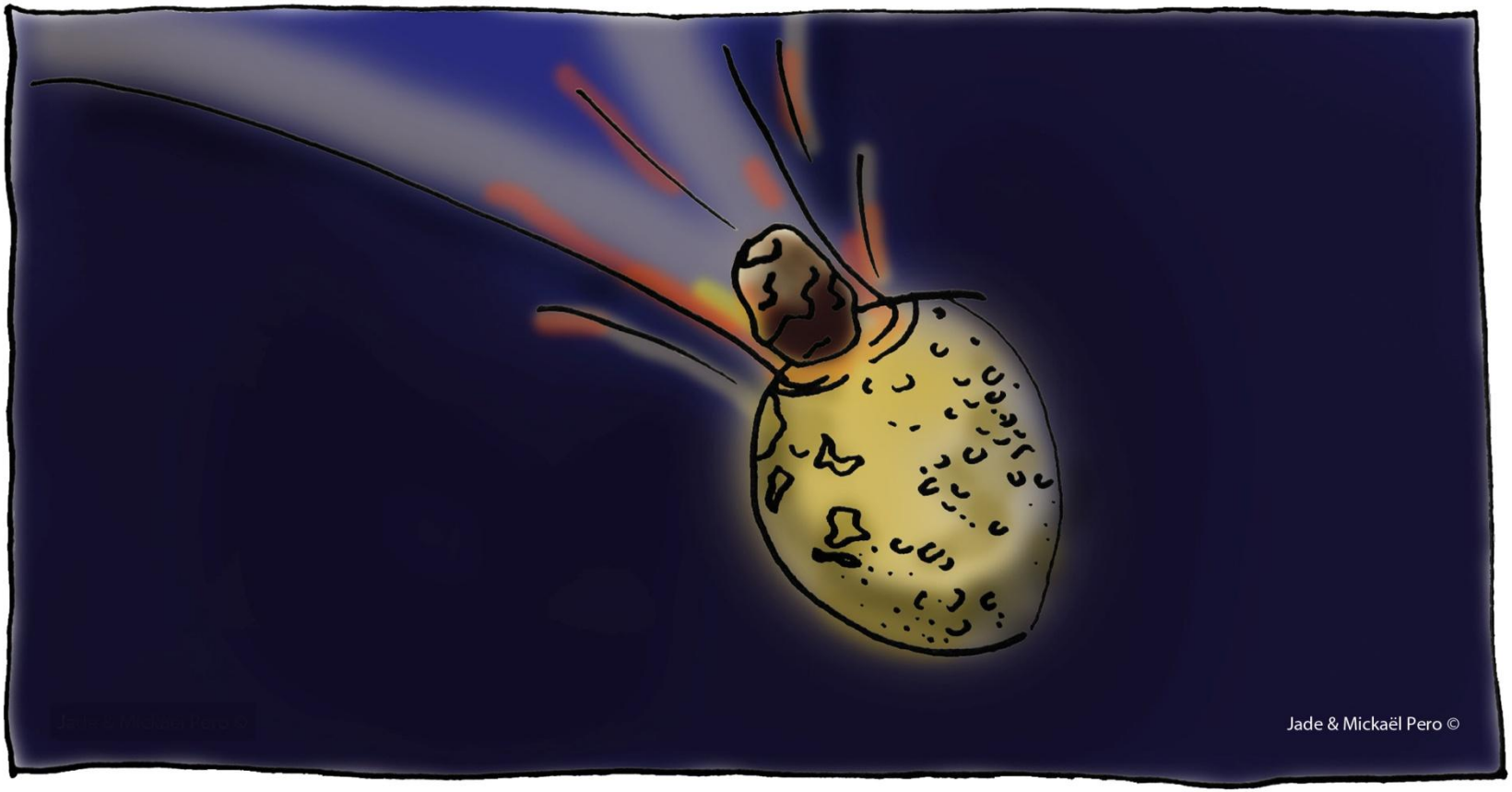
What does impact mean?



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Definitions (OECD)

Output	Good and / or service produced / delivered by the intervention (e.g. Research Infrastructure services to the scientific community)
Outcome	Initial change attributable to the intervention (e.g. publications from users)
Impact	Further long term change attributable to the intervention (e.g. general quality and visibility of local research)

Source: http://ec.europa.eu/europeaid/evaluation/methodology/glossary/glo_en.htm#04

Tangible vs. Intangible	Tangible assets are assets including human-made (produced) non-financial assets and non—produced natural assets, and excluding intangible (non—produced) assets such as patents or goodwill.

Source: http://stats.oecd.org/glossary/detail.asp?ID=2642

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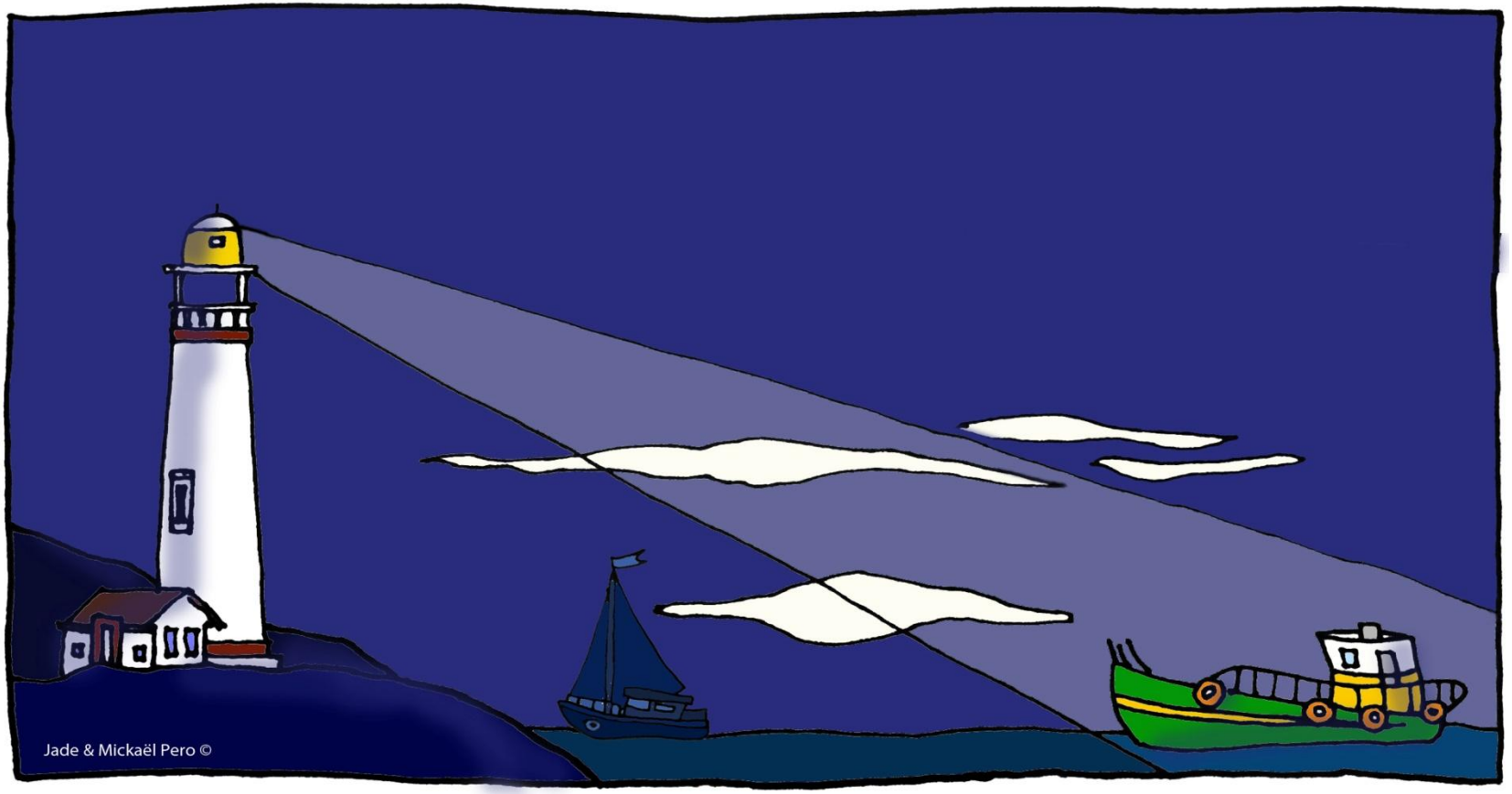
What do I want to know?



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Source: FenRIAM

Services & Solutions

Access & Maintenance time

Outputs

Science & Technology	*Jobs*	*Quality of life*	*Ecology*	*Project Risk*	
Users User proposals New standards, procedures, quality controls methods Revenues Sc. Events Sc. & Tech. networks Industrial use	Increased Human & Social capital Master / PhD Theses Scolarships Training at the RI Change in working culture	Working conditions Health care demand Education demand Future perspectives of skilled and young people	Energy mgmt Water mgmt Waste mgmt Noise control Emissions by travels & commuting	OPERATION Financial Risk Supply Risks Supply Risks	**Outcomes**
Dev. Metadata Publications IPR Instruments & Products Contract with industrials or suppliers New firms	Jobs (econ. activity) Jobs (new firms) Career Quality of jobs Wages Competitivity General level of skills, knowledge and know-how	New medical apps. Education infra. School activities Cultural diversity Social cohesion	Radiation risks Chemical risks Biodiversity Public awareness Biodiversity	DECOMMISSIONING Lack of Pol. support Lack of Pub. Accept. Decom. risks Security risks	**Impacts**

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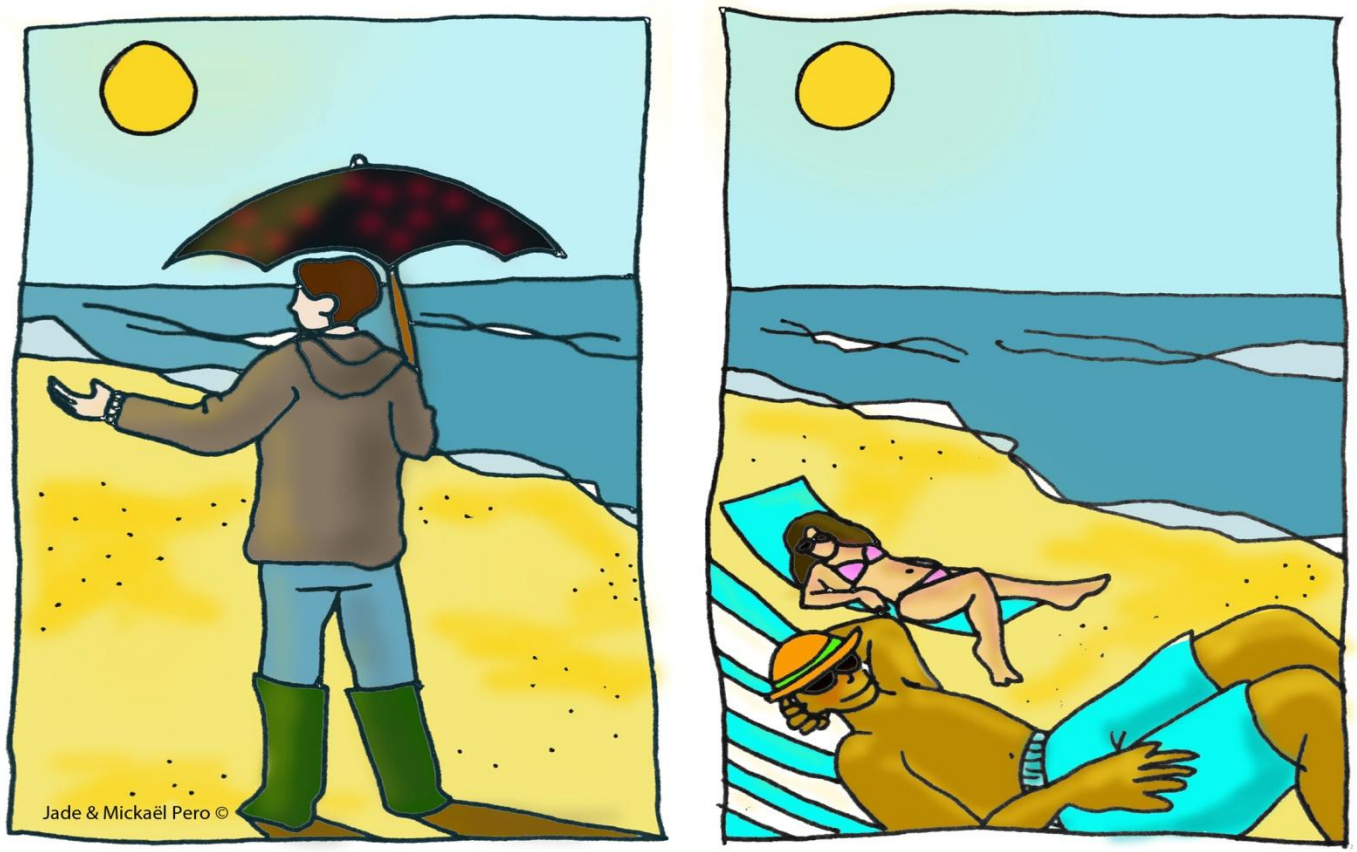
Assessment situation: a word on complete and incomplete information



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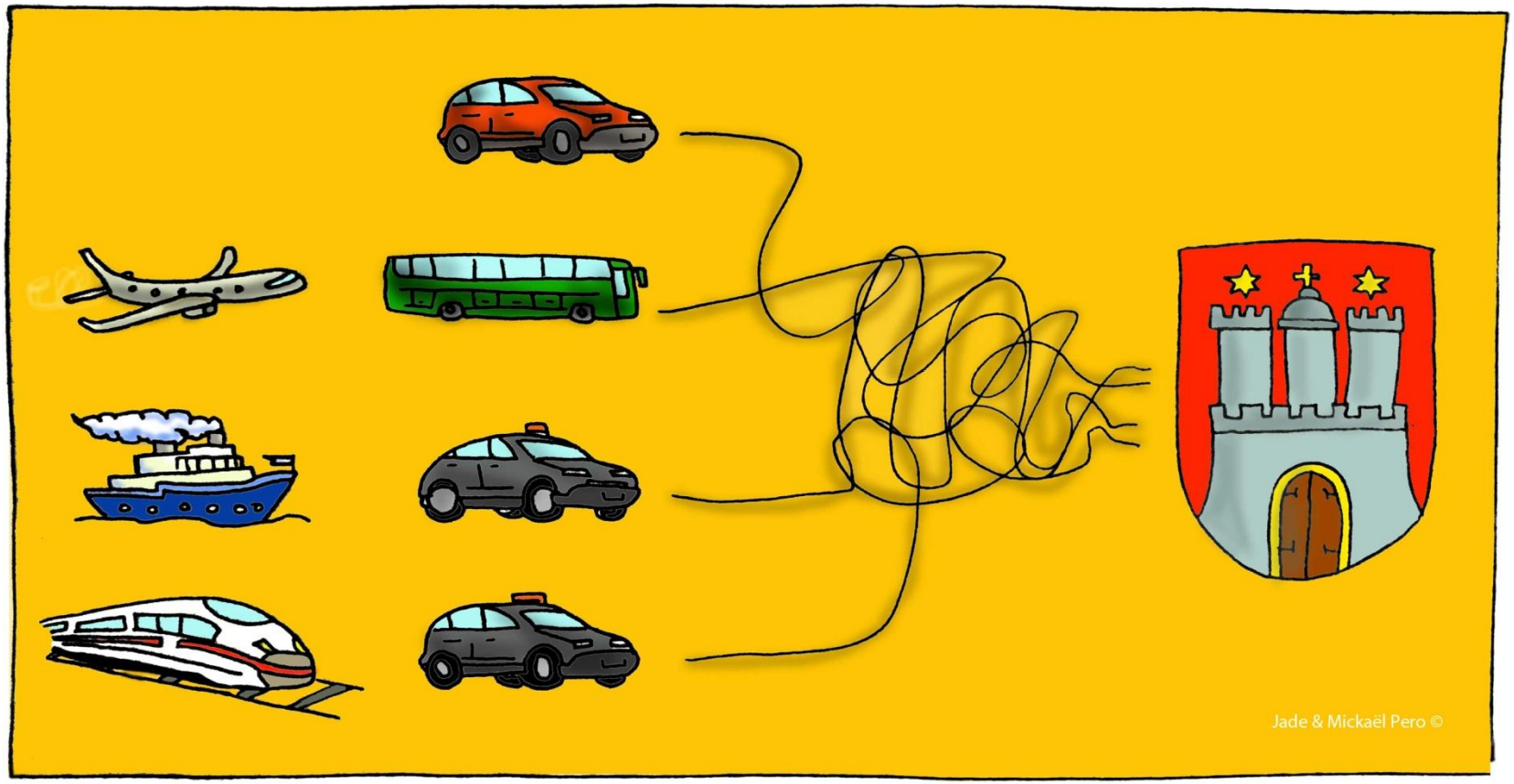
How to answer my question?



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More definitions: Methods and Data (Source: OECD, Wikipedia)

Designs and Data	
Quantitative vs. Qualitative Methods	Quantitative designs approach social phenomena through quantifiable evidence, and often rely on statistical analysis of many cases to create valid and reliable general claims Qualitative designs emphasize understanding of social phenomena through direct observation, communication with participants, or analysis of texts, and may stress contextual and subjective accuracy over generality → The choice of design mostly depends on your research question!
Quantitative vs. Qualitative Data	Quantitative data is data expressing a certain quantity, amount or range. Usually, there are measurement units associated with the data, e.g. metrics, in the case of the height of a person. It makes sense to set boundary limits to such data, and it is also meaningful to apply arithmetic operations to the data. Qualitative data is data describing the attributes or properties that an object possesses. The properties are categorized into classes that may be assigned numeric values. However, there is no significance to the data values themselves, they simply represent attributes of the object concerned. → Generally data and methods of the same type overlap…but not always!

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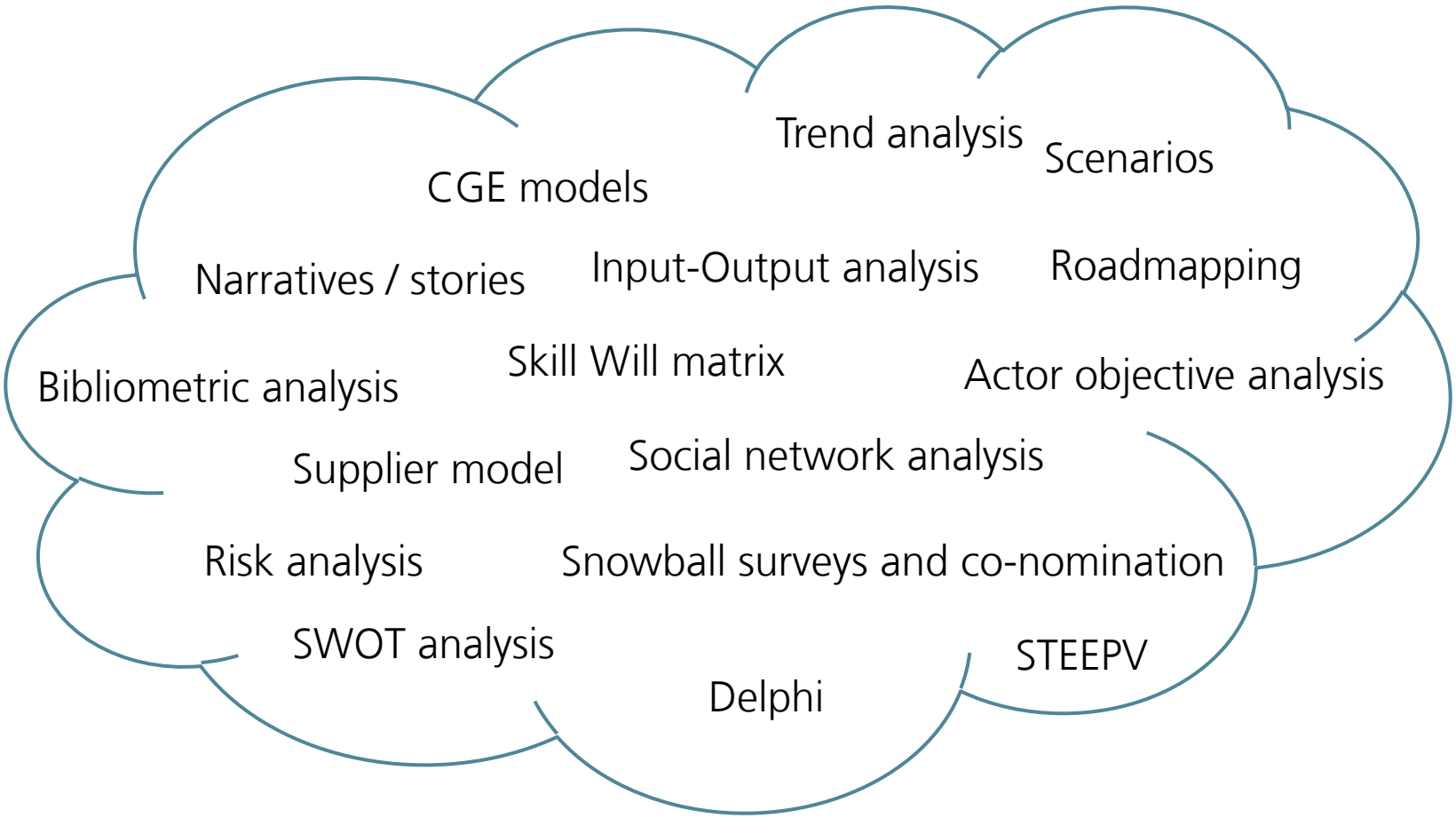
Methods



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Research Methods: Nature vs. Time dimension

		Nature	
		Qualitative	Quantitative
Time dimension	Ex Ante	How RIs will interact with its environment	How much an RI will affect its environment
	Ex Post	How RIs did interact with its environment	How much an RI did affect its environment

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Research Methods: mapping

		Nature	
		Qualitative	Quantitative
Time dimension	Ex Ante	Risk analysis Scenarios Snowball surveys /co-nom. Skill Will matrix Delphi STEEPV Roadmapping SWOT analysis Actor objective analysis Expert panels Public Hearings	Input-Output Analysis / CGE Trend analysis SWOT analysis Supplier model
	Ex Post	Narratives / stories Network analysis	Input-Output Analysis / CGE Bibliometric Analysis Supplier model S.N.A Econometric indicators

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Examples

		Nature	
		Qualitative	Quantitative
Time	Ex Ante	**Example 1** Scenarios	**Example 3** I/O
	Ex Post	**Example 2** Network Analysis	**Example 4** Econometrics

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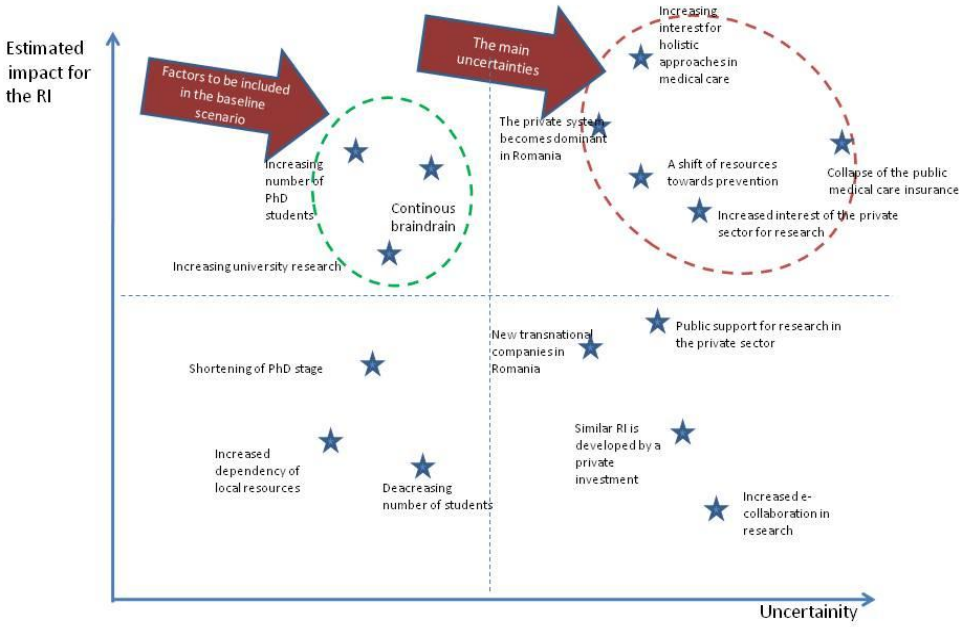
Example 1: How an RI will interact with its environment?

Objective
Assess the social and economic impact of the regional RI „Colentina Hospital" (Source: RIFI Case Study)

Qualitative Research Design
(Scenario Workshop). Steps:

1. Identification of Stakeholders (i.e. universities, PROs, authorities, firms etc.)
2. Assessment of current types of interactions between RIs and stakeholders (strenghts and weaknesses)
3. Assessment of how and why these current interactions would change over time (i.e. drivers of change)
4. Positioning the drivers of change on a Impact vs. Uncertainty plot.
5. Focus on High Scale Low Uncertainty („baseline scenario") and High Scale, High Uncertainty („Main Uncertainties)

Source: RIFI Collentina Case Study



Results

•Base: RI in a System with rapid flow of HR
•Uncertainties: Dominance of the private medical sector / holistic approach on healthcare

Example 2: How an RI did interact with its environment?

Objective:
Investigate how RIs can affect networks in a given scientific field

Qualitative Research Design (Social Network Analysis). Steps:
1. Identify the specific field covered
2. Gather article data
3. Build up network
4. Build up clusters

Data Collection Method
•Database (WoS, Scopus)

Results
•RI clusters show similar citations per publications than other clusters over time
•RIs are connected to specific clusters (similar research partners over time), and fufil a „representative role“

Example 3: How much economic activity will an RI generate?

Objective:
Estimate the additional economic activity induced by the implementation of an RI

Quantitative Research Design:
Input Output Analysis. Use tables describing the interdependencies between economic sectors to estimate the effect of a new investement (i.e. RI)

Data Collection Method:
1. Official Input-Ouput tables
2. RI Investment per sector

Results:
For Fermi@Elettra case study:
•Construction (140 M€ direct effect & 121 M€ indirect effect)
•Operation (about 11 M€ / year direct effect & 8 M€ / year indirect effect)

Example 4: How much an RI did affect its environment?

Objective
Evaluate the scale to which an RI contributes to a scientific community in terms of international collaborations

Quantitative Research Design
- Econometric model (gravity model)
- Home vs Foreign collaboration pairs between institutions
- Research Infrastructure as variable

Data Collection Method:
- Scientific publications and affiliations of authors

Results
- RIs contribute to improving the visibility of institutions. Intensity of collaborations between a home and foreign organisation increase by a factor of 1.2 when RIs are involved

Remarks

- Level of Analysis
- Causality / Attribution
- Counterfactual
- Mix-methods approach
- Sample Heterogeneity
- Horizon

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Recommendation for an RI impact assessment

- Clarity of the initial question
- Time constraints
- Method application
- Data availability
- Specificity of RIs

Thank you!

More information at http://www.fenriam.eu/

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Diversity of indicators

In general:

- Data: available and if not, collectable
- Time: Short term vs. long term
- Scope: individual, group
- Location: local, regional, national, international
- Can be subjective, mostly when dealing when exploring the long term

In the context of Research infrastructures

- Limitation in comparability in the RI context
- Attribution problem

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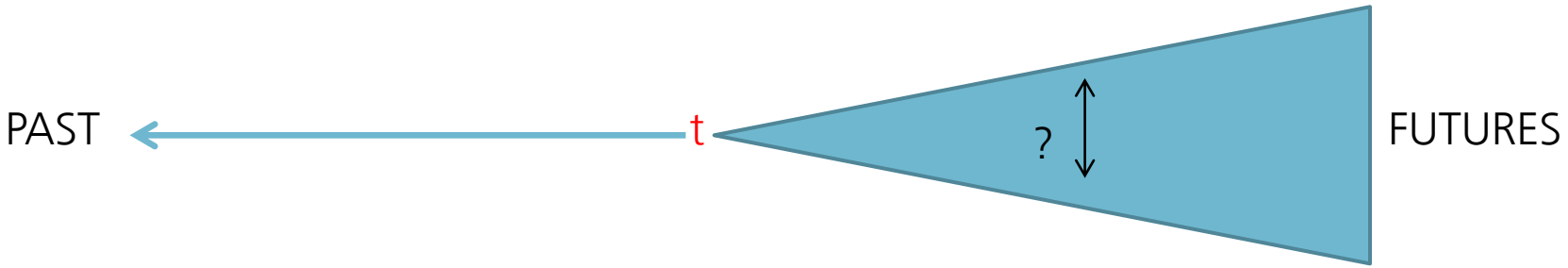
Assessing with complete information



METHODS w.r.t t	EX-POST	EX-ANTE
UNCERTAINTY	LOW	HIGH
RESOURCES	DATABASES PEOPLE	PEOPLE (DATABASES by hypothesis)

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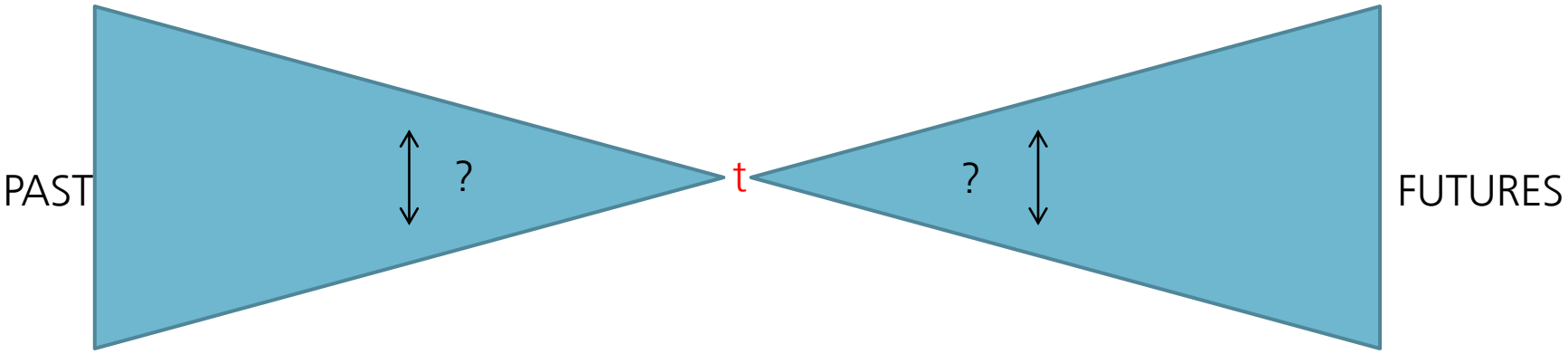
Assessing with incomplete information



METHODS w.r.t t	EX-POST	EX-ANTE
UNCERTAINTY	HIGHER	HIGHER
RESOURCES	DATABASES (PEOPLE)	PEOPLE (DATABASES)

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Example 4: How much an RI did affect its environment?

Objective
Evaluate the scale to which an RI affect its environment (Source: CERN supplier's model Bianchi-Streit & al. 1984

Quantitative Research Design
1. Quantification of the „secondary economic utility" of an RI procurement orders defined as the sum of inreased turnover + cost savings
2. Vehicles: New products, Marketing, Quality, maintenance of production capacity etc.

Data Collection Method:
1. Interview High Tech suppliers (160 in the study, 519 firms in total)
2. Estimate the increased sales and cost savings due to CERN contracts

Results
1. „Economic Utility" in monetary terms: 4080 million Swiss Francs vs. RI cost of 6945 million Swiss Francs (E.U. of about 60% of the overall RI costs)
2. High tech industries supplying CERN less subject to economic uncertainty