



An evaluation framework for network-based policy measures

or: What is the role of network analysis in the evaluation of network-based instruments?

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Lessons from a comprehensive interdisciplinary approach”

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Why evaluation ?

- Evaluation of
 - R&D collaboration networks
 - Policy instruments to stimulate the emergence of R&D collaboration networks
- Policy instruments need public money
 - Need to scrutinize proper use
- Part of the policy cycle and of policy learning
 - Ex-ante
 - Accompanying/Monitoring
 - Ex-post (short- and long-term)

Some basics about evaluation of policy instruments

- Key questions
 - Is it appropriate? → justification of need for intervention, market & system failure
 - Is it **effective**? → assessment of instruments against objectives
 - Is it efficient? → costs vs. benefits
- Effectiveness is the main issue for network analysis
 - Input → immediate output → immediate outcome → longer-term impact
- Additionality
 - Input additionality: Have additional funds been leveraged?
 - Output & outcome additionality: Have additional private and social returns been generated?
 - **Systemic (or behavioural) additionality**: Have any sustainable effects been produced in the research and innovation system?
 - Cognitive capacity
 - Competencies
 - Behaviour and strategies
 - Structural/networks
 - Institutional

European research policy: Four „high-level“ objectives in a nutshell

- Objective 1: To stimulate the emergence of **new communities of sufficient size** to generate new breakthroughs in research
 - FPs as one major contributor by bringing together financial and intellectual resources
- Objective 2: To integrate the **European Research Area**
 - FPs, now also new specialised instruments and structural funds
- Objective 3: To **stimulate innovation**
 - Generate new ideas by bringing people from different disciplines and environments together (creating innovation in networks, surmounting technological barriers between partners)
- Objective 4: To give impulses for national and regional R&D communities by way of **dissemination and access** to cutting-edge scientific knowledge
 - Different types of instruments
 - Multi-level networks

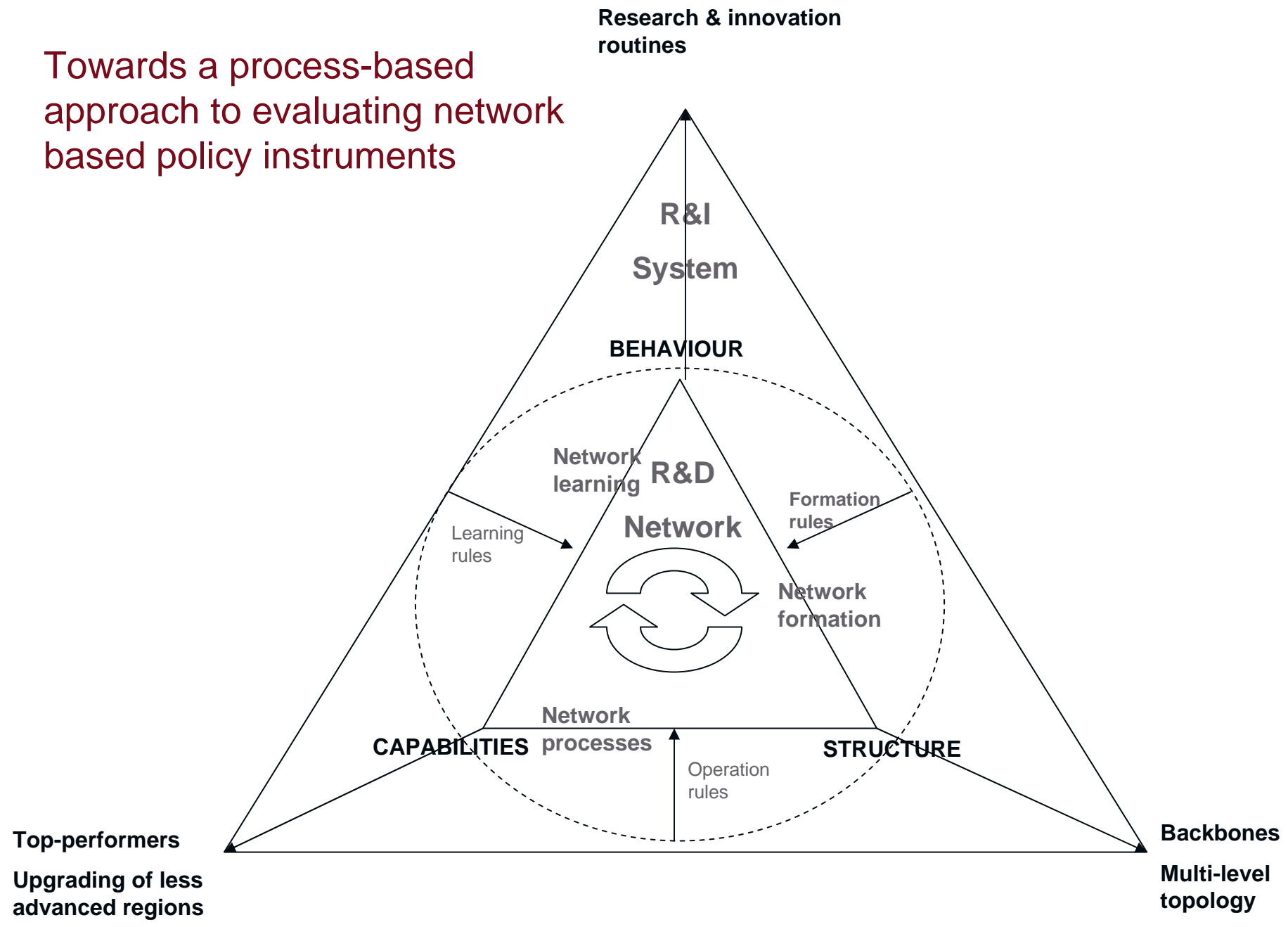
Objectives of the framework programmes

- As part of a broader portfolio of policy instruments, FPs must have more modest objectives
 - Embedded FP in the wider context of the ERA policies
 - Embedded in a multi-level collaborative research funding context
- The standard objectives...
 - knowledge exploration/generation (objective 3)
 - Knowledge diffusion/exploitation (objective 4)
- ...but also new structural objectives with FP 6
 - Create capacities of sufficient size (objective 1)
 - Connect different communities and locations (objective 2) ??
- Relative importance of these objectives differs by areas
 - Different mixes of instruments

State of the art of network analysis for evaluation

- See recent studies by DG INFSO, DG RTD, DG JRC, but also of some Member States
 - Participation statistics
 - Widespread use of centrality measures for assessing „roles“, identifying central actors
 - Connect and compare with different types of networks (e.g. publications, patents, collaboration, collaborations at different levels) to reveal correlations
 - Link with output indicators, e.g. technological leadership, etc.
- Criticism of court of auditors that evaluations are of limited usefulness
 - Assessing long-term impacts is difficult, but essential for programme management
 - Little is know about the longer-term impacts
 - Problems of capturing intervention logic (at least until FP 6)

Towards a process-based approach to evaluating network based policy instruments



Framework of evaluation

- Network studies contribute mainly to investigating „systemic additionality“ in three respects
 - Structural changes („backbone“)
 - Sustainable knowledge production and diffusion („capabilities“)
 - Behaviour of agents („learning“)
- Process-based evaluation along the legs of the triangle
 - 1st leg: Create semi-stable structures, backbone, hubs and their roles
 - 2nd leg: Build up of capabilities and embedding in individuals and organisations
 - 3rd leg: Learning and behavioural changes
- Different levels are affected
 - Individuals
 - Organisations
 - Networks and network structures
 - (Macro-institutional level)
- Different time scales
 - Medium-term outcomes (individual capabilities, organisational capabilities, network structures)
 - Longer-term impacts (individual behaviour, organisational strategies, backbones, embedding in global networks, etc.), possibly after several funding cycles
 - ...and beyond that even sustainable institutionalisation

What can network analysis contribute? – ex ante

- *Exploring the intervention logic and rationale at network level*
- Agent-based modelling as virtual laboratory to experiment with different policy interventions to explore their effects on network structure, actors, knowledge production along the full cycle (e.g. SKEIN)
 - Reflects a theory of R&D collaboration network evolution
 - Can operate over different cycles/generations of funding programmes
- Agent-based models to explore basic effects of types of interventions on network performance, e.g. in terms of knowledge production (e.g. givers/traders model)
 - Policy experiments with stylized interventions on a given network
- Generalised insights into determinants of network formation (e.g. econometric)

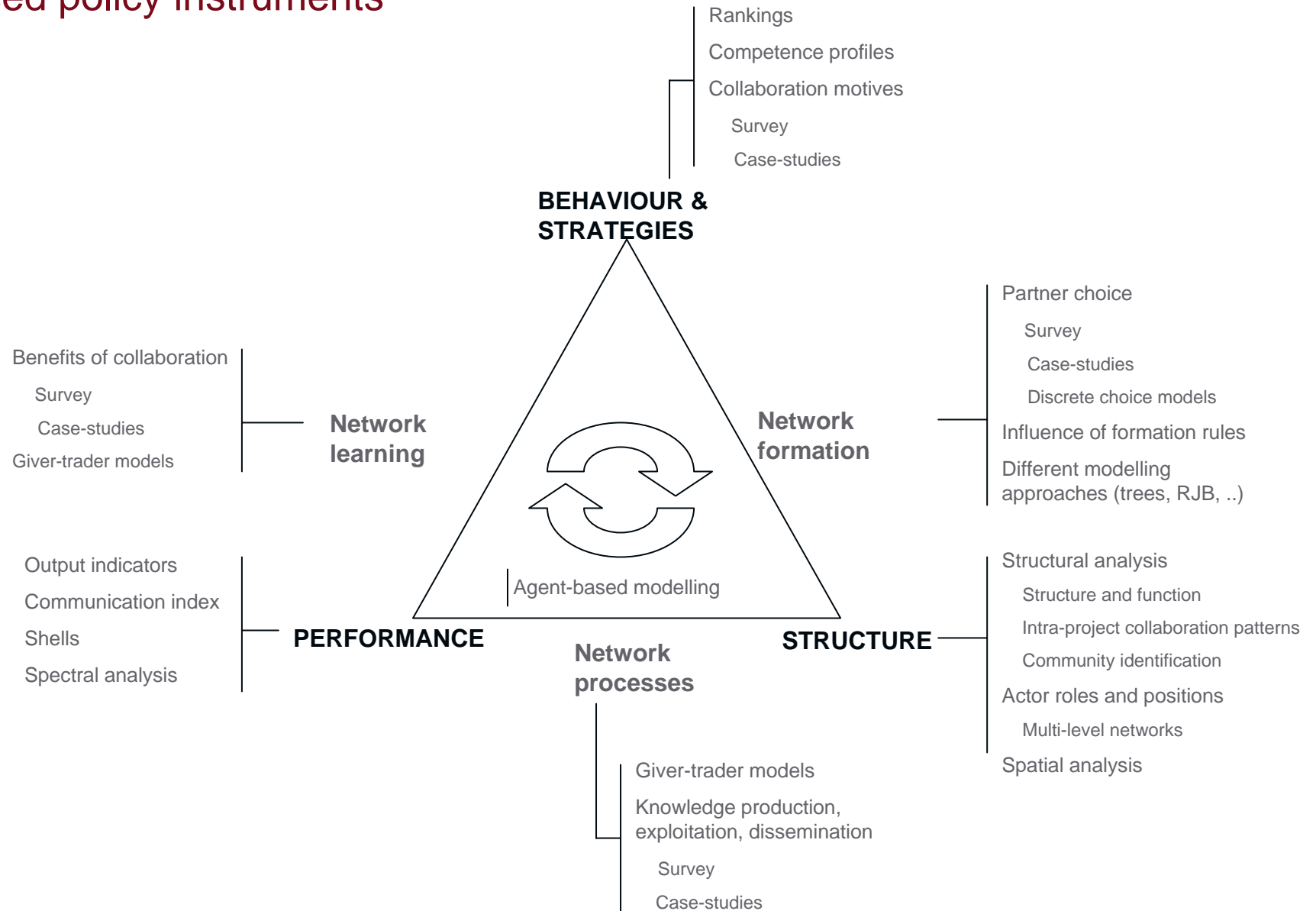
What can network analysis contribute? – accompanying/monitoring

- *Covering the immediate outputs/outcomes at the end of an intervention cycle at the network or actor levels*
- 1st leg
 - Monitoring evolution of network structures, e.g. in thematic or spatial terms
 - Identification emergence of new communities, e.g. across thematic programmes (e.g. Netzcope)
 - Monitoring internal cooperation practices (intra-project)
- 2nd leg
 - Diffusion properties of networks (e.g. communication index)
 - Instrumental vs. structural function of instruments
 - Link with output data (!)
- 3rd leg
 - Changes in networking behaviour (case-studies, survey)

What can network analysis contribute? – ex-post

- *Focuses on longer-term, sustainable impacts in the research and innovation system*
- 1st leg
 - Identification of the emergence of new backbone structures („key European players“)
 - Transformation of the multi-level topology of R&D collaborations
- 2nd leg
 - Changes in performance of actors (e.g. depending on their previous role in networks)
- 3rd leg
 - Institutionalisation of coalitions

Towards a process-based approach to evaluating network based policy instruments



An assessment

- Network evaluations look (still) mainly at the effects at network level, not at the impacts on the research and innovation system
- Modelling has the potential to significantly improve ex-ante evaluation and the exploration of intervention logics
- Several new approaches and tools for analysing the structural properties of networks have become available, suitable for studying individual actors' roles as well as aggregate network properties
- A major issue remains the combination with output and performance data, to study the medium- and long-term effects on the agents
- Data quality has become better, but could be further improved
 - Complementary datasets
 - Intra-project information
 - Quality of edges/links

