The Actor-Process-Event Scheme (APES):

Issues of Validity and Reliability for Network Applications

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Work in progress – comments most welcome.

Abstract

One of the major shortcomings for the use of Social Network Analysis (SNA) in comparative policy research is the lack of practical but valid and reliable procedures to generate comparable network data. With the Actor-Process-Event Scheme (APES) we suggest such a tool that transforms information gained from qualitative cases studies on political processes into quantifiable data that can be analyzed with SNA methods. In this paper, we present the current version of the web-based APES software application, discuss its conceptualization and point out possible applications. In the reminder of the paper we discuss issues of validity and reliability that are crucial for an SNA application of APES generated data and provide a brief outlook on further APES related research.

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Introduction

The concept of policy networks has gained both importance and acceptance in political science as an illuminative concept to describe and understand relations between political actors. After a first phase characterized by a rather uncritical use of the term 'networks' and its conceptualization it became clear that for comparative research a metaphorical understanding of the concept does not add much to a theoretically well-founded and empirically supported knowledge about the connectivity of political entities and phenomena (Dowding 1995; Van Waarden 1992). The scholarly debate and empirical research revealed clearly that policy networks have to be seen rather as an approach to describe and analyze actor relations within a policy domain than as a theory in itself. Instead, the concept turned out to be most fruitful in combination with middle-range theories of the state and public policy-making (e.g., Weible and Sabatier 2005).

The methods of Social Network Analysis (SNA)[1] provide the tools to analyze these patterns in actor relations in a systematic way and have attracted also considerable interest from the social and behavioral science community in recent decades. Because network data typically draws on survey and questionnaire data, however, the application of SNA usually involves an expensive and time-consuming data collection procedure. Depending on the circumstances of the research project, data gathering may even completely fail, e.g., when crucial actors do not cooperate with the researcher and refuse to indicated their contacts and relations with other actors in the network. In contrast to classical surveys, the sampling of population units is much more restricted in network studies (Franke 2005) and missing data

[1] For an introduction see Hanneman and Riddle (2005), Serdült (2002), Scott (2000); on an advanced level Wasserman and Faust (1995) and Carrington et al. (2005).

may change the characteristics of the network under consideration significantly (Marsden 2005). Network studies are therefore typically extensively case oriented (a single policy domain or process under investigation). Comparative research was only possible on very few cases, except for large and well funded research teams.

Another research stream that has to deal with many restrictions for comparative research are comparative case studies (Eckstein 1975; Yin 1993; Yin 2003). Many case studies on different policy domains and processes are available that provide an in-depth knowledge on single policy issues, processes or subsystems. But generalizations and comparative analyses are very limited due to the "uniqueness" and "complexity" of the single cases under investigation. Comparative case study research therefore often remains very descriptive.

In recent years, many qualitative case study oriented research incorporated a network approach to describe political processes and interactions between actors. But very often, again, data requirements did not meet the conditions for an application of SNA or the resources of the research project were too limited to gather (costly) network data. In spite of the practical hurdles, however, we think that the network concept is important for comparative political analysis and that policy networks should be treated as a variable in models of the political process. That is why we started looking for a systematic approach to generate network data in an inexpensive way, harnessing existing information on political processes from qualitative case studies at the same time.

As many policy analysts we did case studies on archival records and guideline based interviews (Hirschi 2000; Hirschi, Schenkel, and Widmer 2002; Klöti et al. 2005; Vögeli 2003; Widmer and Hirschi 2005). Our cases studies were based on thick descriptions focusing on the participation and influence of political actors in decision-making processes, mainly in

Swiss foreign policy. We realized then that our thick descriptions of decision-making processes could provide an empirical basis for a more systematic analysis of the underlying actor structure by deriving patterns of interactions between political actors from a detailed sequence of events that occurred in the political process under investigation. The result of this data transformation was the invention of the Actor-Process-Event Scheme (APES).[2] We developed APES originally as a graphical representation of policy processes (such as foreign policy decision-making, see Klöti et al. 2005; Klöti, Serdült, and Widmer 2000). We then improved and expended APES to an analytical tool (Serdült and Hirschi 2004b). The latest innovation of APES is a web-based software application (Serdült et al. 2005).

In this paper, we briefly give an account of the logic behind APES as a tool to derive network data from qualitative case study material. We then introduce the APES software and its application. Finally, we turn to questions of validity and reliability of APES and discuss directions for further improvements of its application.

The Actor-Process-Event Scheme (APES)

The basic assumption of APES is that a political process consists mainly of a sequence of linked events in which a variety of actors from public and private organizations are engaged – governmental agencies, members of parliament, interest groups, sometimes also scientists or journalists , etc. These actors or group of actors are trying to exert influence on policy articulators, formulators, decision-makers, and implementers over the course of the policy process (Widmer, Schenkel, and Hirschi 2000: 20). In SNA, affiliation networks and actor-event networks respectively (Wasserman and Faust 1994: 291-6) are in essence based

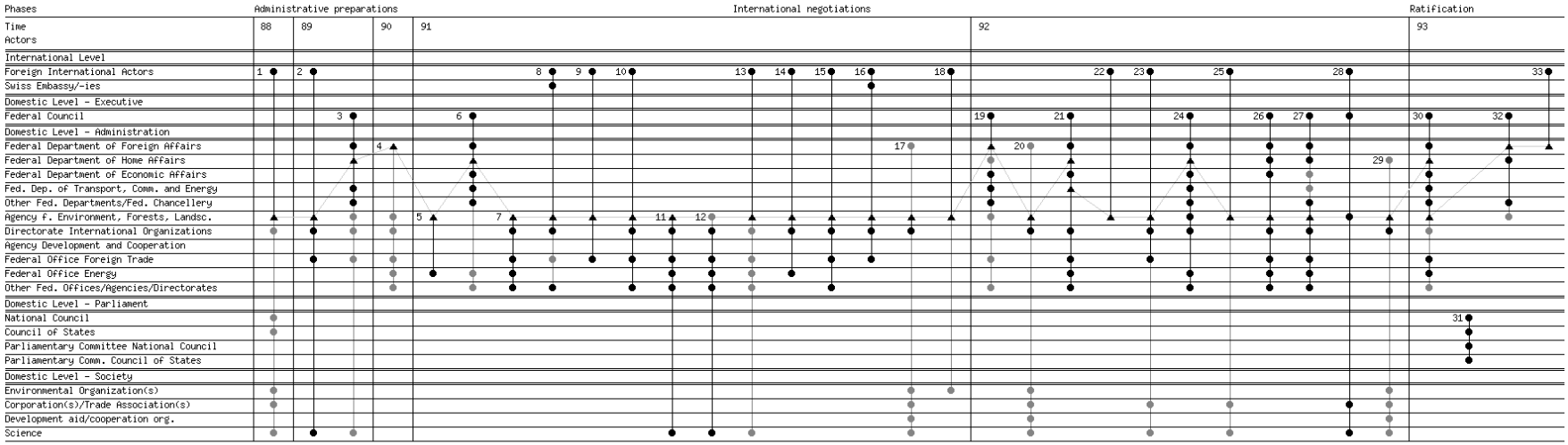
[2] APES was developed within the NRP42 research project on Swiss foreign policy (Klöti et al. 2005; SNF research grant no. 4042-46410) and inspired by earlier work of Klöti (1984) and Buser (1984).

on the same idea. We therefore regard the participation of political actors in a political process as a good indicator to operationalize the structure of a political process in the sense of a policy network (Serdült and Hirschi 2004b: 139).

As a consequence, it becomes necessary to systematically gather information on a) crucial events in the policy process under investigation, b) actor participation in the events, and c) the process links that connect the individual events of the policy process with each other. APES stores these three pieces of information, systematizes them and provides a graphical representation that links actor participation with a chronological sequence of events in a two-dimensional space. Figure 1 illustrates the APES for the Swiss ratification of the 1992 United Nations Framework Convention on Climate Change (Rio Convention), which will serve as our illustration case throughout this paper.

The **United Nations Framework Convention on Climate Change (UNFCCC)** was signed at the Earth Summit in Rio de Janeiro in June 1992 and came into force on 21 March 1994, after 50 states (among them Switzerland) have ratified the international agreement. In Switzerland, the ratification of the UNFCCC involved an intensive inner-administrative and political negotiation process on the country's position towards international climate change policy. The official Swiss position was formulated in several committees and working-groups at different governmental levels. An Interdepartmental Working Group (IWG) on the "Evolution of the Climate System" was set up in 1989 (event 3 in the corresponding APES, see Figure 1). The agencies in charge (mainly the Agency for the Environment, Forests and Landscape and the Directorate for International Organizations in the Federal Department of Foreign Affairs) consulted representatives from the civil society and business circles (especially environmental organizations and the energy industry) from time to time, but only scientific circles (ProClim) were permanently involved in the decision-making process. The Swiss government (Federal Council) was regularly part of the preparation and decision-making process, although only in the run-up to the international conference the policy process has shifted from the administrative to the governmental level.

Figure 1: APES for the Swiss Ratification of the 1992 UN Framework Convention on Climate Change



1 IPCC expert talks, 01. Nov 88
2 IPCC working group sessions, 31. Oct 89
3 Founding IWG (GIESEC), 01. Nov 89
4 Coordination meeting IKEH, 09. Nov 90
5 Bilateral talks FOE-AEFL, 21. Jan 91
6 Decision Federal Council Participation, 30. Jan 91
7 Sessions subgroub , 04. Mar 91
8 1st PrepCom session, 05. Mar 91
9 Preparatory meeting Geneva, 13. Mar 91
10 2nd PreCom session, 18. Mar 91
11 IWG (GIESC) sessions, 27. Mar 91
12 Inner-administrative preparations, 10. Jun 91
13 1st INC negotiation round, 12. Jun 91
14 2nd INC negotiation round, 19. Jun 91
15 3rd PreCom session, 12. Aug 91
16 3rd INC negotiation round, 09. Sep 91
17 1st NGO hearing, 01. Nov 91
18 4th INC negotiation round, 01. Dec 91
19 Decision Federal Council Particip. NGOs, 03. Feb 92
20 2nd NGO hearing, 13. Feb 92
21 Decision Federal Council 4th PrepCom, 01. Mar 92
22 4th PrepCom session, 03. Mar 92
23 5th INC negotiation round/1, 01. Apr 92
24 Decision Federal Council 5th INC, 29. Apr 92
25 5th INC negotiation round/2, 04. May 92
26 Decision Federal Council Rio Conference, 20. May 92
27 Decision Federal Council Signing, 01. Jun 92
28 Signing of the convention, 12. Jun 92
29 3rd NGO hearing, 01. Oct 92
30 Decision Federal Council Message, 31. Mar 93
31 Parliamentary approvement, 20. Sep 93
32 Decision Federal Council Ratification, 11. Nov 93
33 Ratification, 10. Dec 93

The APES actor axis (the vertical dimension of the scheme) indicates the corporate actors (Coleman 1974) that were participating in the political process. The single actors are distinguished along political hierarchy levels and organizational distinctive features. In our illustrative case of Swiss foreign policy-making in Figure 1, the actor hierarchy includes five distinct levels: 1) the international level with foreign international actors and Swiss embassies abroad, 2) the Swiss federal government (Federal Council), 3) the Federal Administration, 4) the national parliament[3], and 5) societal actors. The participation of a specific actor in a particular event is indicated with a bullet (●); joint event participation is illustrated by connected bullets (●–●). The actors in charge are symbolized by triangles (▲) and are linked by a dashed line (---).

The APES time axis (the horizontal dimension of the scheme) is based on the concept of the policy cycle (Howlett and Ramesh 1995: 9-15). Depending on the scope of the research project, this dimension covers either a complete policy cycle including agenda-setting, policy formulation, decision-making, implementation, evaluation/reformulation/termination of the policy, or a selection of specific stages of the policy cycle. Our analysis of Swiss foreign policy-making focused on the stages of policy formulation and decision-making (i.e., on decision-making in the broader sense, in delimitation to policy implementation). In spite of entitled criticism on this "stage heuristic" and the limits of its application (Sabatier 1999: 6-7), the policy cycle concept is in our view a useful instrument to structure a complex political process into analytically manageable units (see also Parsons 1995: 79-81).

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[3] APES aggregates all parliamentary actors, namely the political parties, into one category so far. In a next version of APES, we plan to indicate the event participation of political parties that are represented in the parliament separately.

The single stages under consideration, however, have to be concretized theoretically and the type of events that are considered for actor participation need to be defined before individual actors can be assigned to specific events. The definition and containment of the relevant events of a particular policy process has to be done in accordance with the specific characteristics of the object under investigation and is therefore strongly dependent on parameters of the political system and characteristics of the policy domain or subsystem under consideration. This delimitation step is very similar to the necessity to determine network boundaries in network studies (Marsden 2005: 9-10; Wasserman and Faust 1994: 30-5).

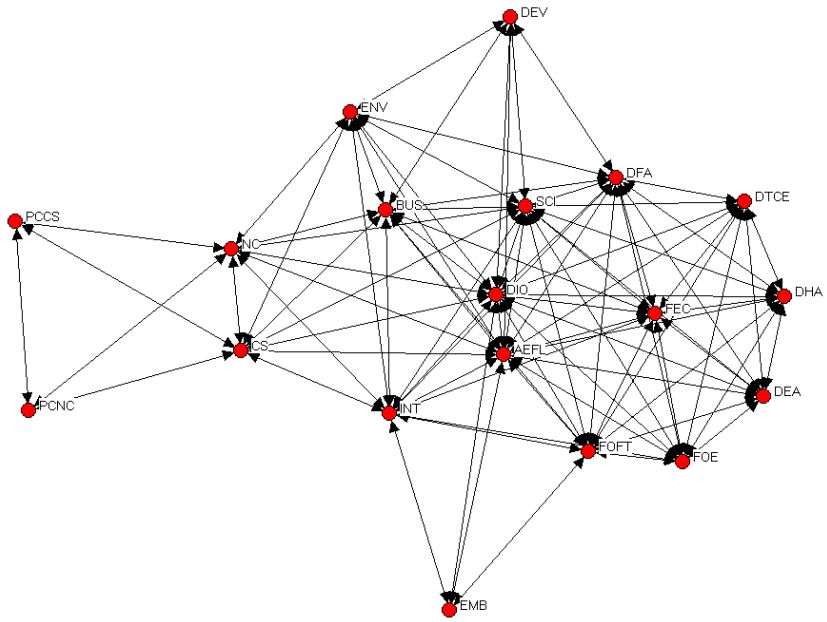
Without clear-cut criteria about what constitutes an event, APES cannot be applied in a consistent way over the whole policy process under investigation. In our study on Swiss foreign policy-making we defined the following event categories as crucial for an analysis of the decision-making on international treaties such as the 1992 UN Convention on Climate Change: inner-administrative preliminary investigations; development of preliminary draft; consultations outside the administration; consultations within the administration; international negotiations; consultations between departments/ministries and proposal to the government; decisions of the government; initialization and signing of the treaty; domestic (typically parliamentary) approval of the treaty; ratification. Two main sources for tracing empirical evidence for actor participation in these distinct event types were used: 1) actor participation as it was indicated in written reports on the particular events (such as protocols, negotiation reports, file notes of administration agencies, etc.); 2) information given by the actors themselves, based on guideline based interviews with representatives of participating and non-participating actors (Serdült and Hirschi 2004a; Vögeli et al. 2005).

From Policy Process to Policy Networks

Beyond its graphical function of visualizing the political process under investigation, APES systematizes the actor-event participation data for a structural analysis. Based on the APES of a political process, two distinct data matrices can be derived: a) an actor-by-event matrix, and b) an actor-actor matrix containing data about the procedural links between political actors. The actor-by-event *matrix a)* (for which APES is but a graphical representation) can then be transformed into an actor-actor contact frequency matrix by modifying the two mode *matrix a)* into a one mode *matrix a*).* Optionally, this actor-actor *matrix a*)* based on the event participation data can then be combined with the actor-actor *matrix b)* gained from the process links between the leading actors in the policy process (this procedure is described in detail in Serdült and Hirschi 2004b: 146-7). The resulting matrices can then be analyzed using a social network analysis package such as UCINET (Borgatti, Everett, and Freeman 2002).

Figure 2 shows the decision-making network of our illustration case of the Swiss ratification of the 1992 UN Convention on Climate Change using NetDraw (Borgatti 2002).

Figure 2: Policy Network of the Swiss Ratification of the 1992 Convention on Climate Change



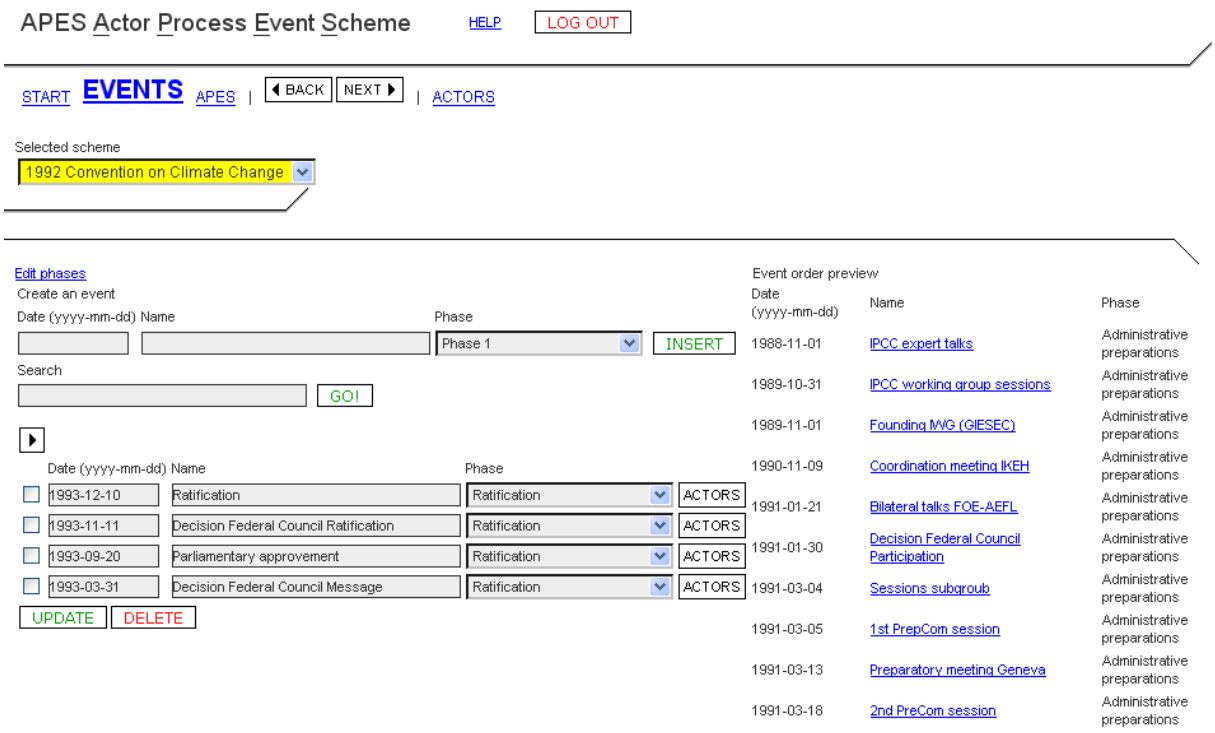
The **policy network of the Swiss ratification** of the 1992 UN Convention on Climate Change indicates the strong interactions between agencies from the public administration that were in charge with the dossier, mainly the Agency for Environment, Forests and Landscape (AEFL), the Directorate for International Organizations (DIO), and the Federal Office of Foreign Trade (FOFT). The only societal actors in the core of the network are representatives of science (SCI) who were involved in preparatory work and were also represented in the Swiss delegation to the international negotiations. The Swiss government (the Federal Council, FEC) takes a central position in the inner-administrative decision-making network since every important step in the decision-making process (composition of the Swiss negotiation delegation, Swiss participation in the conference, signing of the convention, proposal to the parliament, ratification) had to be approved by the Federal Council. The two chambers of the parliament (National Council, NC, and Council of States, CS) are only at the periphery of the network; the parliament could only decide on the result of the negotiation process but not on the process itself. Environmental (ENV) and development aid (DEV) organizations were consulted but played only a minor role in the Swiss negotiation process.

The APES Software Tool

The described procedure to transform data on political processes into network data (for more detail see Serdült and Hirschi 2004b) resulted in the elaboration of APES as software tool. Our primary goal was to have a graphical solution at our disposal that replaces the time

consuming (and nerve-wrecking) placing of bullets and lines in a two dimensional space of actors and events over time. This step can now be done automatically by the APES program.[4] APES in its current version is a web-based program that allows the use of qualitative case study data on political processes for a systematic comparative analysis. Focusing on the actor participation in political events, APES provides a graphical representation of the political process under investigation. A standardized procedure of the data acquisition allows furthermore the comparison of multiple cases.

Figure 3: Data Input Mask of the APES Web-based Software Tool



With APES, the researcher is – after the input of a sequence of events and the participating actors (see Figure 3) – able to get a graphical representation of the policy process under consideration (as it was illustrated for the Swiss ratification of the UN Convention on Climate Change in Figure 1). In a next version of the program we will add an option to export

[4] The APES program is available on the website http://pwi-apes.unizh.ch/. The program is free for noncommercial use. Please contact apes@pwi.unizh.ch to get a personal account.

the underlying actor-by-event and actor-actor matrices as raw data for an application in a social network analysis software such as UCINET (Borgatti, Everett, and Freeman 2002) or Pajek (Batagelj and Mrvar 1996). A later version will include also a graphical network application and an option to calculate some basic network measurements directly within the APES program.

Options for APES Applications

As a systematized transformation procedure APES provides various options for a structural analysis of case study material on political processes. In principle, APES can be applied to any policy process in any political system. Although originating from our analysis of decision-making processes, the APES software tool is designed in a general form which basically allows the input of any sequence of events and related actor participation, however these events and actors are defined in a particular research project. Nevertheless, we see the strength of APES mainly in four areas:

1. as a user-friendly tool for the recording and graphical representation of data on political processes;
2. as a pretty straightforward but systematic way to generate network data from qualitative cases studies on (political) processes;
3. as a systematization of qualitative data on political processes for the comparative analysis of multiple cases;
4. as an analytical tool for a systematic re-analysis of existing case study material on political processes, mainly from the perspective of policy networks.

Issues of Validity and Reliability for Network Applications

The APES data transformation procedure from (qualitative) process data to (quantitative) structural data is based on a set of conceptual decisions that become crucial when the data is analyzed with formal methods provided by social network analysis (SNA). The reminder of the paper therefore discusses some consequences of such conceptual decisions for the results of a SNA application of APES generated data. Two questions are in the center: 1) Does an SNA application of APES data really measure what it pretends to measure (validity)? 2) Do we obtain the same (or at least very similar) scores at repeated measurements on the same units (in our case: political processes), on the assumption that the true scores remained the same (reliability)?

Validity

For practical and analytical reasons, APES includes inevitably only a selection of actors and events. This selection process involves choices by the researcher that are supposed to be best possible founded in theoretical considerations to be aware of how these choices eventually effect the results of a formal analysis of the data.

Regarding the selection of the relevant actors, the researcher must first – as it is the case for any network study – define the population to be studied, i.e., determine the relevant actors in the political process under investigation. In the case of rather short processes with a small, closed set of actors this issue is relatively easy to deal with. For more complex processes, the boundaries of the set of relevant actors may be difficult (if not impossible) to determine. In more complex cases, we suggest to group individual actors in categories along institutional criteria to start with a rough distinction between different levels of actors: international and domestic political level, public and private actors, governmental and parliamentary actors, etc. In accordance with structural characteristics of the political system

under consideration, the researcher can then differentiate as many actor categories and individual actors as necessary for each actor level under investigation.

In this way, it is possible also to design an APES for a specific actor group and analyze the specific underlying network structure (e.g., linkages between actors from public administration and civil society). Looking at individual actor levels separately is more adequate especially when the density of available information on the political process under investigation varies from actor level to actor level. Depending on the available data, the researcher may also vary the level of aggregation of the relevant actors, e.g., by considering departments instead of individual public administration agencies.

Unlike classical network studies, where network boundaries usually have to be defined beforehand, APES gives the researcher more room for experimentation with wider or more narrow actor populations since the costs for the data acquisition are relatively low, especially when a qualitative case study on a political process is the starting point for an APES application. This advantage of APES does not, however, excuse the researcher from defining the set of actors that is included in a specific APES application; omitted or over represented actors may change network characteristics significantly.

Boundary specification is not only crucial regarding the relevant actors but also with respect to the relevance of individual events that are included in an APES application. The validity of the resulting policy network is mainly dependent on three factors: 1) how the boundaries of the process under study as drawn, 2) the criteria to be used to select crucial events within the process under study; and 3) the availability of data on the selected events (see also Laumann and Knoke 1987). Since every policy process is different and strongly dependend on the characteristics of the policy subsystem and/or the political system under consideration, the researcher has to clarify how broad or narrow the process under

investigation and the relevant events within this process should be defined. A more sophisticated application of APES also differentiates between different type of events (such as consultations, negotiations, formal decisions, etc.) to get a more elaborated picture of the policy networks underlying a particular policy process. It is also possible to specify actor relations within an event, for instance active versus passive participation of individual actors or conflictive or cooperative behavior, depending on the data that is available on the specific events under investigation (and whether these theoretical specification are in fact empirically measurable).

Reliability

From the angle of the reliability of an APES application, it is crucial whether the data transformation delivers the same (or at least very similar) results when it is applied by different researchers (inter-coder reliability) or done with other instruments, e.g. survey and questionnaire methods as they are typically used in network studies (inter-instrumental reliability).

Inter-coder reliability strongly depends on how clearly and explicitly actor categories and crucial events are defined. Ideally, an APES application includes distinct rules on how individual actors are assigned to specific events within the policy process under study, resulting in a specific codebook for actors and events. We will pay more attention to this issue in line with our analysis of multiple cases within a comparative analysis of different types of policy processes.

Inter-instrumental reliability is more difficult to assess since – as we demonstrated earlier in this paper – the strength of an APES application lies in cases where other data collection procedures are either too expensive or not possible for practical reasons. In addition, APES provides a practical and inexpensive way to generate network data from

qualitative case studies, i.e., the raw data that is transformed by APES is already at the researcher's disposal. It can be assumed, though, that network studies generally show significant instrumental effects (Burt 1983a; Burt 1983b; Marsden 1990; Marsden 2005).

Outlook

We presented but a first step of a reliable, valid and practical tool to generate network data from information on political processes. The proposed procedure provides an easy to follow, not too technical solution to develop structural data based on qualitative case study material.

Besides the technical improvement of the APES software application (integration of data export options and basic network applications), our current APES related research moves into two directions: 1) refining the APES data transformation regarding its validity and reliability and 2) applying APES to multiple cases for a comparative analysis of qualitative case studies.

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