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Political discourse networks and the conflict over software patents in Europe

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Abstract. In 2005, the European Parliament rejected the directive 'on the patentability of computer-implemented inventions', which had been drafted and supported by the European Commission, the Council and well-organised industrial interests, with an overwhelming majority. In this unusual case, a coalition of opponents of software patents prevailed over a strong industry-led coalition. In this article, an explanation is developed based on political discourse showing that two stable and distinct discourse coalitions can be identified and measured over time. The apparently weak coalition of software patent opponents shows typical properties of a hegemonic discourse coalition. It presents itself as being more coherent, employs a better-integrated set of frames and dominates key economic arguments, while the proponents of software patents are not as well-organised. This configuration of the discourse gave leeway for an alternative course of political action by the European Parliament. The notion of discourse coalitions and related structural features of the discourse are operationalised by drawing on social network analysis. More specifically, discourse network analysis is introduced as a new methodology for the study of policy debates. The approach is capable of measuring empirical discourses both statically and in a longitudinal way, and is compatible with the policy network approach.

Keywords: software patents; intellectual property rights; political discourse; policy networks; social network analysis

Between 1997 and 2005, the question of whether software patents should be allowed in Europe became one of the most contentious issues in which the European Parliament (EP) and the other European institutions have ever been involved. At the end of the political process, the EP rejected the directive 'on the patentability of computer-implemented inventions' (COM 2002), which had been drafted and supported by the European Commission, the Council and well-organised industrial interests, with an overwhelming majority. We offer an explanation of this unusual case based on the notion of discourse networks. A presumably resource-poor anti-software-patents ('anti-SWP') coalition, composed mainly of individuals, small and medium-sized companies (SMEs) and some social movement organisations (SMOs), was able to prevail over a pro-software-patents ('pro-SWP') coalition composed

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mainly of multinational software firms. In this article, we argue that an explanation for the success of the anti-SWP coalition should be sought in the realm of political discourse.

An important part of political mobilisation, conflict and decision is the various verbal and symbolic interventions that precede and accompany them. The insight that discourse matters in politics predates what has sometimes been called the 'linguistic turn' in the social sciences or the 'argumentative turn' in political science. In line with argumentative discourse analysis (Hajer 1993, 1995, 2002) and discursive institutionalism (Schmidt & Radaelli 2004; Schmidt 2008), we posit that the political process can be interpreted as a conflict over discursive hegemony between two discourse coalitions and that one coalition was more successful than the other in attaining this goal before the decision was made. The configuration of the discourse gave leeway for an alternative course of political action by the EP.

We will employ a new tool called 'discourse network analysis' (Leifeld 2009, 2010a) in order to measure the European discourse on software patents in a dynamic way. This method draws on social network analysis and establishes the link between the actors and the contents of a discourse at several critical steps. For any given policy debate, our approach allows identification of a discrete spectrum of networks, which we call 'affiliation networks', 'actor congruence networks', 'conflict networks', 'concept congruence networks' and 'dynamic discourse networks'. Each of these items operationalises a certain aspect of a policy debate.

Discourse coalitions in political conflicts

Schmidt and Radaelli (2004; Schmidt 2008) argue that the discursive dimension is often neglected in explanations of political processes and particularly in explanations of policy change. Discourse 'assists in the attempt to integrate structure and agency – and thus to explain the dynamics of change' (Schmidt & Radaelli 2004: 192). Similarly, Emirbayer and Goodwin (1994) criticise network analysis for missing out on the cultural embeddedness of historical networks, particularly in terms of political discourse. They believe that structure, agency and culture should be analysed jointly in order fully to understand political phenomena. The structure of the discourse constrains the set of feasible actions by political actors and thus makes up a 'fourth institutionalism' (Schmidt 2008). For example, if public policy debates tend to ignore a policy instrument, it is unlikely to be implemented; thus, discourses precondition political action, much like other kinds of institutions. At the same time, agency is still important because the skills of political actors in developing, establish-

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ing and referring to the right ideas at the right time and thus influencing the evolution of the discourse over time is critical (Schmidt 2008: 315).

The structure of political discourses

To determine the configuration of the discourse that conditioned the decision of the EP in 2005, the literature on discourse coalitions and framing offers promising starting points. Hajer's argumentative discourse analysis suggests that the discursive space is composed of several *discourse coalitions* whose members centre around common storylines (Hajer 2002: 12). A discourse coalition is a 'group of actors who share a social construct' (Hajer 1993: 45) and who try to influence policy processes by imposing their perspective on others. Social constructs give meaning to the social environment. They are shared interpretations through which the world is perceived and which structure individual and collective action. In the tradition of symbolic interactionism, the discursive construction of shared interpretations is called 'framing'. A frame simplifies and condenses 'the "world out there" by selectively punctuating and encoding objects, situations, events, experiences, and sequences of actions within one's present or past environment' (Snow & Benford 1992: 137). This process of constructing or framing political problems is a highly significant element of the political process. In a political conflict, frames define the problem, offer solutions and describe ways to arrive at this solution – that is, they function as diagnostic, prognostic and motivational frames (Benford & Snow 2000). Successful frames or 'frame bundles' (Haunss & Kohlmorgen 2009) in a political mobilisation will often combine these three elements and integrate them into consistent narratives or storylines (Hajer 1993; Polletta 1998).[1]

In order to influence policy processes, discourse coalitions have to be relatively stable with regard to their core (most central) frames and actors. Their members must show strong ideational congruence within the coalition and aim at showing only a low degree of ideational overlap with opposing coalitions. Each coalition should therefore show an idiosyncratic framing pattern with a high level of agreement within a coalition and a high level of conflict between coalitions.

The success of a discourse coalition

Hajer (1993: 48) argues that, in order to be successful, a discourse coalition has to dominate the discursive space, and the institutional practices in the political domain have to reflect this discursive dominance. The frame bundle of a successful coalition will therefore contain and dominate the core

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frames of the conflict. The dominant coalition will appear more prominently in the news media, gain a larger constituency, and it will be able to integrate the core frames into a more consistent storyline than its opponents.

The discourse around a political conflict is constantly in flux. Discourse coalitions therefore permanently have to realign and regroup some of their frames. These frame alignment processes (Snow et al. 1986) can only succeed if the members of a discourse coalition maintain a high level of congruence, which crucially depends on the coherence of its members in terms of common arguments. In other words, the sharing of common arguments is more helpful than a situation in which diverse arguments are widely dispersed among the members of a coalition and when pairs of actors rarely agree on the same arguments. In social network terms, the dominant discourse coalition should exhibit more clustering and a higher density on the ideational congruence relation.

In addition to congruence at the actor level, the discursive politics literature with its emphasis on narrative fidelity and storylines suggests that frames should also be well integrated in order to facilitate policy success (Hajer 1993; Polletta 1998; Fisher 1984). Snow and Benford assume that, in order to be successful, mobilisations should not rely on too narrow a set of frames, while at the same time they should avoid 'frame overextension' that adds too many different aspects that lead to a disintegration of the frame set (Snow & Benford 1988: 206; but see Kliment 1998 for a critical position). A successful coalition should therefore manage to bundle a variety of different arguments in a broad, but still integrated, set of frames, while unsuccessful discourse coalitions are more likely to reiterate the same limited set of arguments over and over again.

In sum, the literature on discourse coalitions and framing suggests several indicators for the success of discourse coalitions *vis-à-vis* other discourse coalitions when influencing policy making (for their operationalisation, see Table 1):

- Successful coalitions are *stable over time* with regard to their core frames and actors.
- Internally, their members show *strong ideational congruence*.
- Externally, they stand united against competing coalitions.
- Successful coalitions attract a *large constituency*.
- Successful discourse coalitions *dominate the core frames* of a conflict.
- They are able to *integrate the frames* they employ into a consistent storyline.
- Their *frame bundle is sufficiently broad*, but not too diverse.

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Table 1. Operationalisation of theoretical constructs

Construct	Operationalisation
Stability of coalitions over time	Time slices of an actor congruence network
Ideational congruence within coalitions	Actor congruence network; weighted density; global clustering coefficient
Competition between discourse coalitions	Conflict network; weighted within- and between-block density
Large constituency	Number of vertices per coalition in the actor congruence network
Domination of the core frames	Affiliation network and concept congruence network; degree centrality and positive or negative tendency
Integration of frames in a coherent storyline	Concept congruence network; average weighted degree/weighted density
Broadness and diversity of a frame bundle	Concept congruence network; number of concepts per discourse coalition, qualitative diversity of concepts per cluster

Starting from these general considerations, we argue in this article that the structure of the policy discourse on software patents facilitated a departure from the historical pathway initiated by the European Commission in 1997 with its Green Paper 'Promoting innovation through patents' (COM 1997). More specifically, an anti-SWP coalition was able to dominate the policy discourse, which led to an adoption of its interpretation by the EP as the decisive institution. At the same time, the pro-SWP coalition was not able to monopolise key economic arguments. By arguing that the structure of the political discourse was conducive to the rejection of the software patent initiative by the EP, we provide a discursive-institutionalist explanation of the political outcome in the European conflict over software patents.

Discursive hegemony is never the only factor that will explain policy outcomes. Entrenched power structures and interest coalitions do not lose their importance by adding a discursive layer. But the more public and the more politicised a decision-making process is, the less can the discursive level be ignored. If a parliament with more than 700 members and weak party discipline decides in a highly politicised situation, the attractive power of ideas is of crucial importance. A discursive explanation of the outcome of the European conflict over software patents can thus aid structure- or resource-oriented explanations (e.g., Haunss & Kohlmorgen 2010).[2]

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A short history of the software patents conflict

As outlined in the introduction, the software patents conflict between 1997 and 2005 has been one of the most contentious issues in European Union (EU) politics. At the beginning of the discourse in June 1997, when the European Commission published its Green Paper with the title 'Promoting innovation through patents' (COM 1997), nobody would have foreseen the contentious trajectory of this conflict. In contrast, it was generally assumed that this arcane issue would be resolved by the specialists and experts of the patent community with minimal interference.

In retrospect, the software patents conflict in Europe was clearly an example of increasingly politicised disputes about intellectual property rights worldwide (Haunss & Shadlen 2009). The issue soon started to attract the attention of many small software programmers and the free and open source community at large. The Internet consultation launched by the Commission received 1,450 responses within two months, with 91 per cent of the responses rejecting the proposed patentability of software. Thousands of individuals, organisations and firms signed the 'EuroLinux Petition' calling for a prohibition of software patents in Europe, and in February 1999, FFII (the Federation for a Free Information Infrastructure) was founded to mobilise against the proposed directive. They stood against resourceful and powerful European business associations ranging from the general European industry association UNICE (now Business Europe) to technology associations like the Business Software Association (BSA) and the European Information, Communications and Consumer Electronics Industry Technology Association (EICTA).

After the Commission had ignored all the critical submissions in its 2002 proposal for a directive 'on the patentability of computer-implemented inventions' (COM 2002), a turbulent decision-making process followed. In the first reading, the EP followed in its majority the software patent opponents' arguments and *de facto* reversed the directive's intentions with a series of amendments, which the Commission and the Council almost completely removed in the so-called 'common position' in 2005. In the second reading in the EP, the directive was finally rejected with a huge majority of 648 to 14 votes (Eimer 2008).

During this conflict, an increasing level of public attention was paid to the issue. Whereas software patents were a topic for a specialised audience of patent professionals in 1997, eight years later the issue was present in the politics, economics and technology pages of regular daily newspapers. Media discourse on the software patents conflict occurred in three waves following the institutional decision-making process. Relatively low-profile press coverage accompanied the consultation phase and the publication of the proposal

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for the directive (wave 1). More intense media attention followed the EP's first and second reading (wave 2 and wave 3, respectively). In line with these institutionally structured media attention cycles, the group of actors whose statements appear most often in the press are the Members of the European Parliament (MEPs). They account for 18.8 per cent of the statements in our dataset, followed by civil society organisations, SMEs, large corporations and business associations – each responsible for 10–12 per cent of the claims.

Data

Our analysis draws on data collected in a research project on European intellectual property conflicts (Haunss & Kohlmorgen 2009), specifically on 124 newspaper articles about software patents from four key countries (Germany, United Kingdom, France and Poland) published between 1997 and 2005. The article selection was designed to capture all claims that have been reported in quality newspapers in the four countries that were most important in this conflict. The claims were manually coded using predefined codes from a codebook (Haunss & Kohlmorgen 2008) based on the coding scheme developed in the Europub project (Koopmans 2002). The coding scheme was adapted and expanded after initial coding of a subset of the articles. The software Discourse Network Analyzer (Leifeld 2010a) was used to assign actor and category tags to the text data and extract social networks from these structured data.

For the discourse network analysis, only those claims were considered where an interpretation of the claim was reported in the article. A report that only mentions the date of a demonstration and the number of participants, for example, contains a claim but no frame, as it does not tell anything about the motives of the demonstrators apart from their aim. If, however, an article contains the information that an FFII spokesperson stated during an FFII-led conference that software patents would be bad for small IT companies, this is encoded as a claim because it is a public statement containing a frame: 'Software patents are bad *because they negatively affect the competitiveness of small and medium-sized enterprises*.' In this context, frames are the reasons that are given for a specific instance of claims-making. They are sometimes explicit and often implicit arguments or concepts used by the actors. A claim can be any intervention in a political conflict (a statement, a petition, a demonstration, a resolution, etc.). In the software patents conflict, 82 per cent of the reported claims were verbal statements.

Coding only claims that have been reported in newspapers limits the analysis to a subset of the total claims made in the conflict since not all claims are

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reported. There may thus be a selection bias towards certain actors and action forms. However, we assume that unreported claims are less important than reported claims because they remain invisible to most of the decision makers as well (for a more detailed discussion, see Earl et al. 2004).

The coded articles contain 355 substantial claims where an interpretation, reason or argument was given why this claim was made. If the claim was made in support of the software patents directive, it was coded as being a positive statement; if it was made against the directive, it was coded as a negative statement. A total of 17 statements were ambiguous or neutral, but since they account for less than 5 per cent of all claims and since it was often not clear whether their ambiguity was the result of the reporting or the claimant's intention, they were omitted from the analysis, leaving us with 338 valued claims. The categorisation works in a similar way as category-based, computer-assisted, qualitative data analysis, but the coder additionally specifies the actor to whom the statement can be attributed.

For the discourse network analysis, we thus compiled a list of the claims containing information about the actor, the concept (frame) the actor referred to, a dummy variable indicating whether the concept was used in a positive or negative way (for or against software patents), and the date of the claim.

Method

We employ a new tool called 'discourse network analysis' (Leifeld 2009, 2010a) in order to measure and visualise the political discourse on software patents. Discourse network analysis is a combination of category-based content analysis of newspaper data and social network analysis (Wasserman & Faust 1994). Hence, it is more formal than most other approaches dealing with policy discourse. For any given policy debate, a set of five basic types of discourse networks can be generated: affiliation networks, actor congruence networks, conflict networks, concept congruence networks and dynamic discourse networks. Operationalising policy debates by employing social network analysis is a natural choice, as discourse, especially the alignment of actors by common claims, is essentially a relational phenomenon, and social network analysis can be conceived of as a 'methodological toolbox' for relational analysis (Kenis & Schneider 1991).

The method is related to political claims analysis (Koopmans & Statham 1999) because it focuses on the same unit of analysis: the statement (or the claim, in the language of political claims analysis). Both approaches incorporate actors *and* the concepts they employ, which goes well beyond some other empirical approaches to political discourse; as Steensland (2008: 1031)

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observes, 'few existing studies link frames with the actors who sponsor them, thus presenting an oddly disembodied picture of framing processes'. In addition, discourses or the co-evolution of actors and ideas, are rarely analysed systematically in a longitudinal way (Hall 1993). Discourse network analysis is well equipped to analyse discourse in a dynamic perspective.

A third advantage of discourse network analysis over competing approaches to the empirical analysis of political discourse is that it allows us to disentangle complex discursive structures in a bottom-up approach. Discourse coalitions are sometimes identified *post facto* by drawing on expert interviews. The result is often a bipolar discourse with two distinct, non-overlapping and internally homogeneous coalitions. Discourse network analysis, in contrast, allows us to identify sub-coalitions within a discourse coalition, or to assess the multiple cleavage lines that are actually present in the discourse, rather than merely to classify actors into coalition A or B. The approach reduces complexity to a degree that is understandable while at the same time maintaining enough complexity to avoid oversimplification. Thus, we can relax the exogenous assumption of homogeneous discourse coalitions and measure the actual empirical structure of the discourse instead.

The basic form of a discourse network is the *affiliation network*. From affiliation networks, we can construct *actor congruence networks*, *conflict networks* and *concept congruence networks* as well as dynamic versions of these network types. To begin with, there is a set of actors, $A=\{a_1, a_2 \ldots a_m\}$, and a set of concepts, $C=\{c_1,c_2 \ldots c_n\}$. An actor can either agree or disagree with a concept. Thus, there are two binary relations between actors and concepts, one for agreement and one for disagreement: $R=\{r_1, r_2 \ldots r_l\}$ with $l=2$.[3] There is also a set of discrete time points $T=\{t_1, t_2 \ldots t_k\}$ because the discourse network can be repeatedly observed.

The most basic form is a bipartite graph of actors referring to concepts either in a positive or in a negative way at a certain time point. The bipartite graph is called *affiliation network*:

$$G_{r,t}^{aff} = \left(A, C, E_{r,t}^{aff}\right) \tag{1}$$

with $\{a, a'\} \notin E_{r,t}^{aff} \wedge \{c, c'\} \notin E_{r,t}^{aff}$. In this equation, a' denotes an actor who is not identical with actor a, and c' denotes a concept that is not identical with concept c. $E_{r,t}^{aff}$ refers to the set of edges in the affiliation graph G^{aff} at time t and for relation r. Alternatively, an affiliation network can be expressed as a rectangular $m \times n$ matrix $X_{r,t}$ for each relation and time period with row actors referring to column concepts. For practical purposes, both relations – agreement and disagreement – can be collapsed into a single, multiplex network with different kinds of edges representing the relations.

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Applied to the empirical data, an actor is connected to a concept in the affiliation network if she or he makes a claim in which they use this concept. Figure 1 provides an illustration of an affiliation network. It can simultaneously show actors and concepts as well as their interrelations, which goes beyond most existing measurement approaches to political discourse. Moreover, the data can be subdivided into several time slices in order to obtain repeated measurements of the discourse.

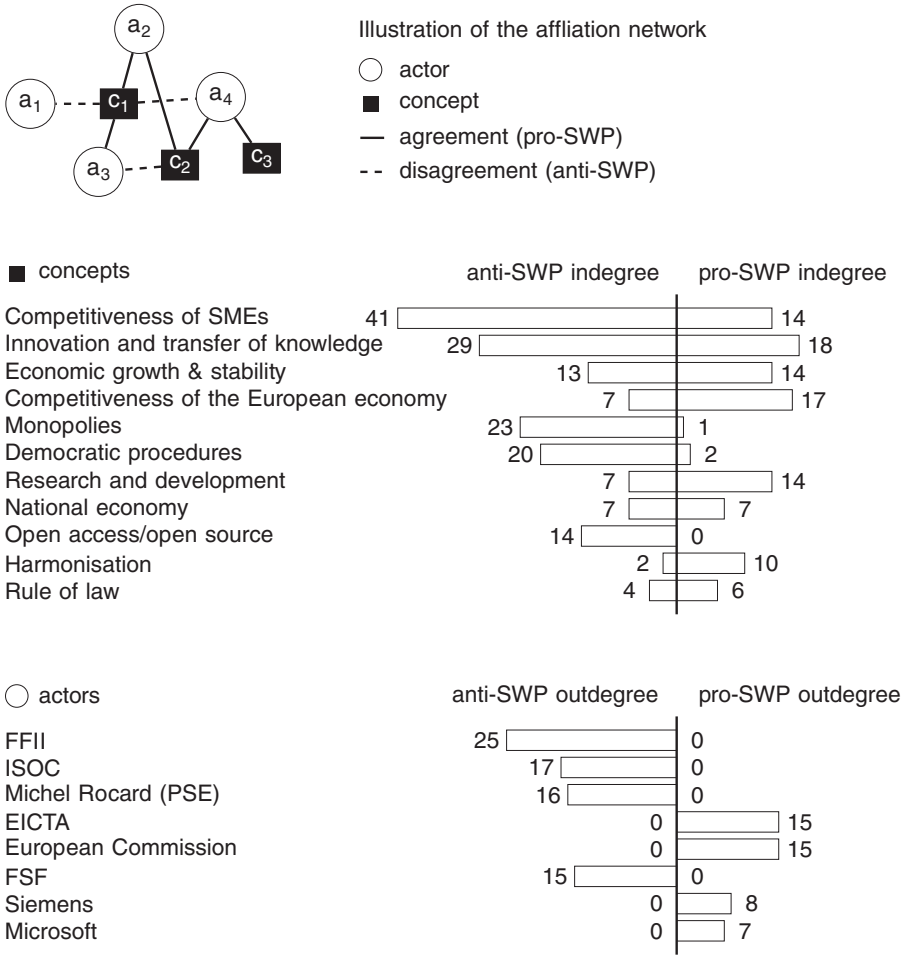

Figure 1. Affiliation network, 1997–2005.
Note: The size of the bars is proportional to the concept's indegree or actor's outdegree centrality. Degree centrality corresponds to the number of negative statements (left of the middle line) plus the number of positive claims (right of the middle).

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The measurement of empirical discourse coalitions requires another abstraction from the structured text data. The affiliation network can be converted into an *actor congruence network* by interpreting the number of common statements between two actors as a measure of their discursive similarity. The basic idea is that the more concepts two actors agree (or both disagree) on, the more similar they are in terms of common arguments in the discourse, and the more likely they will belong to the same discourse coalition. Thus, it is straightforward to move from a bipartite affiliation graph to a co-occurrence graph where actors are connected to other actors and where the edge weight between these actors represents the number of common statements. The overall topology of the resulting congruence network can be used as a map of the discourse where clusters of actors represent discourse coalitions.

This can be achieved by multiplying the affiliation matrix by its transpose:

$$Y^a_{r,t} := X_{r,t} X^T_{r,t} \tag{2}$$

Equivalently, an edge in the graph can be defined in terms of the intersection of the adjacent concept vertices ('neighbours') of two actor nodes in the bipartite affiliation graph. Let $N_{G^{aff}_{r,t}}(a)$ be the set of neighbours of vertex a – that is, the set of concepts to which the actor refers. Then the following equation makes up an actor congruence network with vertex set A and the set of edge weights W_t:

$$G^a_t = (A, W_t) \quad \text{with} \quad w_t(a, a') = \sum_{r=1}^{l} \left| N_{G^{aff}_{r,t}}(a) \cap N_{G^{aff}_{r,t}}(a') \right| \tag{3}$$

As is the case with actors, we can also construct a *concept congruence network* based on the affiliations. In this co-occurrence network, two concepts are connected if they are used by the same actor in the same way, and the edge weight between two concepts equals the number of actors referring to both concepts:

$$Y^c_{r,t} := X^T_{r,t} X_{r,t} \tag{4}$$

and

$$G^c_t = (C, W_t) \quad \text{with} \quad w_t(c, c') = \sum_{r=1}^{l} \left| N_{G^{aff}_{r,t}}(c) \cap N_{G^{aff}_{r,t}}(c') \right| \tag{5}$$

This yields a map of the concepts in a discourse. Clusters of concepts can be interpreted as coherent storylines.

So far, co-occurrence networks of actors or concepts have been representations of similarity between actors or between concepts. However, there is another piece of information hidden in the original data: conflictual relations,

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or dissimilarity between vertices. For example, one actor makes a claim in a positive way while another actor makes the same claim in a negative way – in other words, one actor rejects the claim of the other actor. We expect conflict ties to be prevalent between the clusters of a congruence network, but not within clusters as suggested by argumentative discourse analysis (Hajer 1993: 45). The notion of a conflict network is related to an actor congruence network, but the definition of an edge weight is different:

$$G_t^{confl} = (A, W_t) \quad \text{with}$$
$$w_t(a, a') = \left| N_{G^{aff}_{r=1,t}}(a) \cap N_{G^{aff}_{r=2,t}}(a') \right| + \left| N_{G^{aff}_{r=2,t}}(a) \cap N_{G^{aff}_{r=1,t}}(a') \right| \tag{6}$$

or

$$Y_t^{confl} := X_{r=1,t} X_{r=2,t}^T + X_{r=2,t} X_{r=1,t}^T \tag{7}$$

Political discourse is essentially a dynamic rather than a stable phenomenon. Discursive interactions are conditional on past interactions. One way to measure change over time is to subdivide the whole discourse into several time slices. We will do this in the analysis of the three waves of the software patent conflict. Beyond simply comparing static pictures, it is possible to use dynamic network visualisation tools in order to make clear the changing roles of actors between the time slices in an animation.

Employing time slices basically divides time into discrete segments, although time is actually continuous. However, by using discrete time steps, one may lose some information. Generating a continuous-time animation would be desirable. The Discourse Network Analyzer software offers several more nuanced ways to create dynamic discourse networks or to aggregate dynamic data into static representations. The description of these longitudinal algorithms, however, is beyond the scope of this article (see Leifeld (2010b) for details).

The discourse networks of the software patents conflict

As noted above, the aggregate affiliation network of the software patents conflict between 1997 and 2005 is fairly complex. Therefore, Figure 1 shows an illustration of the affiliation network plus the indegree centrality[4] of the most prominent concepts (represented by the size of the bars), the outdegree centrality of the most active actors, and the empirical tendency of these concepts and actors toward the anti-SWP or pro-SWP camp.

The core frames used by the actors were *competitiveness of SMEs* (SME; indegree: 55), *innovation and transfer of knowledge* (ToK; indegree: 47), *eco-*

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nomic growth/stability (G&S; indegree: 27), *competitiveness of the European economy* (CEE; indegree: 24), *monopolies* (MON; indegree: 24), *democratic procedures* (DEM; indegree: 22) and *research and development* (R&D; indegree: 21).[5] The five most central of these frames were highly disputed. The SME and ToK frames were clearly dominated by the opponents with a ratio of 14:41 and 18:29, the G&S frame was equally used by both sides (14:13), the frames CEE and R&D were dominated by the pro-SWP coalition (17:7, 14:7), and the MON and DEM frames were owned almost exclusively by the opponents (1:23, 2:20).The most visible actors were the Foundation for a Free Information Infrastructure (FFII; outdegree: 25), the Polish Internet Society (ISOC; outdegree: 17), the French MEP Michel Rocard (outdegree: 16), the European Information & Communications Technology Industry Association (EICTA; outdegree: 15), the European Commission (outdegree: 15) and the Free Software Foundation (FSF; outdegree: 14).

Figure 2 shows the actor congruence network G^a for the whole time period 1997–2005. Bridges (Wasserman & Faust 1994: 114 ff) and important actors are labeled, and line width reflects the edge weight, which measures the number of concepts two actors share. Two distinct discourse coalitions with very few overlapping statements are clearly visible. This strong polarisation, which is not generally found in all policy conflicts, can be interpreted as a first indicator of the politicisation and significance of the conflict. The anti-SWP discourse coalition on the left is composed of dedicated initiatives against software patents (e.g., FFII, stop-swpat.de, or NoSoftwarePatents.com), nongovernmental organisations (NGOs) (like CPTech or Attac), free/open source software (F/OSS) organisations like the FSF, Linux Verband (LiVe) and ISOC, and a substantial number of MEPs from all major groups in the EP. The pro-SWP discourse coalition is mainly composed of hardware and software firms like Siemens, Nokia, Microsoft, Alcatel, Philips, and SAP, their European and national industry associations (EICTA, BSA, ZVEI), a number of MEPs and patent lawyers who might profit from the introduction of software patents (e.g., the Computer Law Association), with EICTA being the most central and most active political actor. The EP and the German government act as bridges. However, this is due to inexact reporting where claims were attributed to 'the government' or 'the parliament'. If these claims could be disaggregated to specific MEPs or government agencies, their bridging role would most likely disappear, leaving two completely separate discourse coalitions.

How have these coalitions developed over time? In Figure 3, we have subdivided the data into three time slices according to the three media attention cycles and created the actor congruence network for each time slice. Several interesting things can be observed. The overlap between the two discourse coalitions disappears, and the congruence network is composed of

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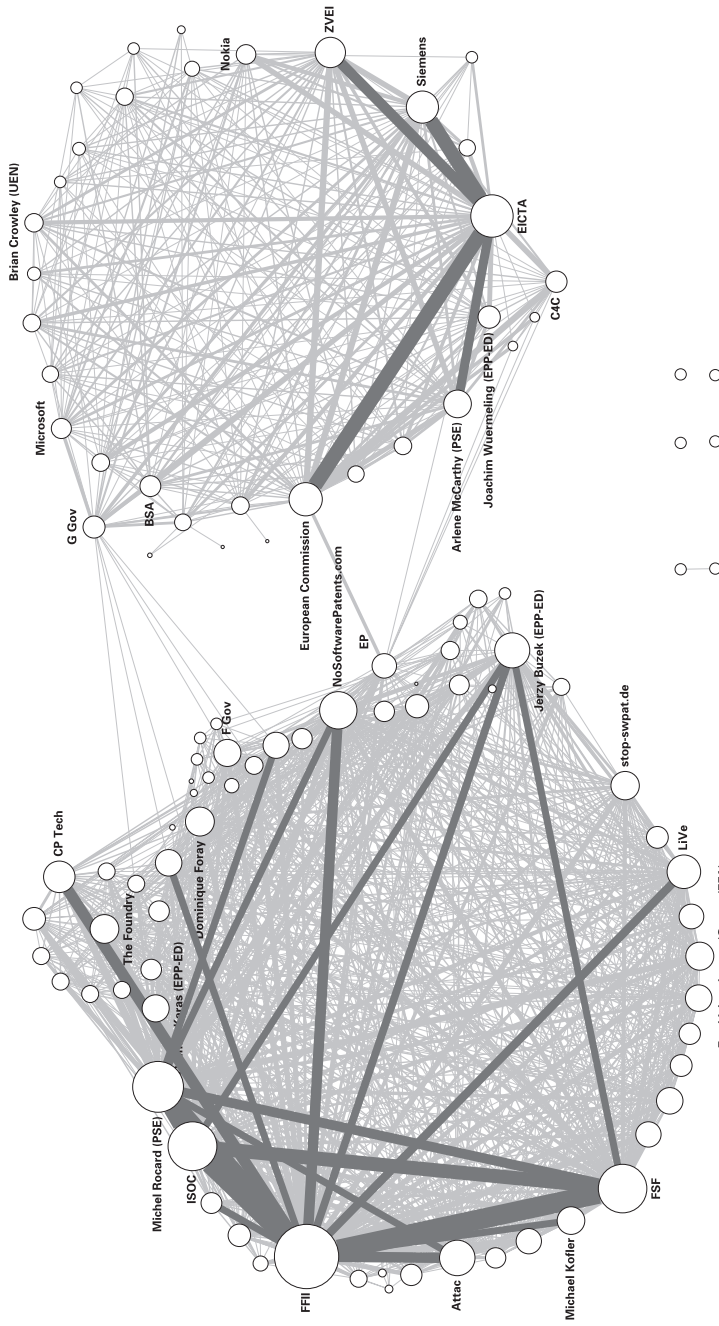

Figure 2. Actor congruence network, 1997–2005.
Note: Circles represent actors, size corresponds to degree centrality, line width reflects the number of concepts shared between two actors.

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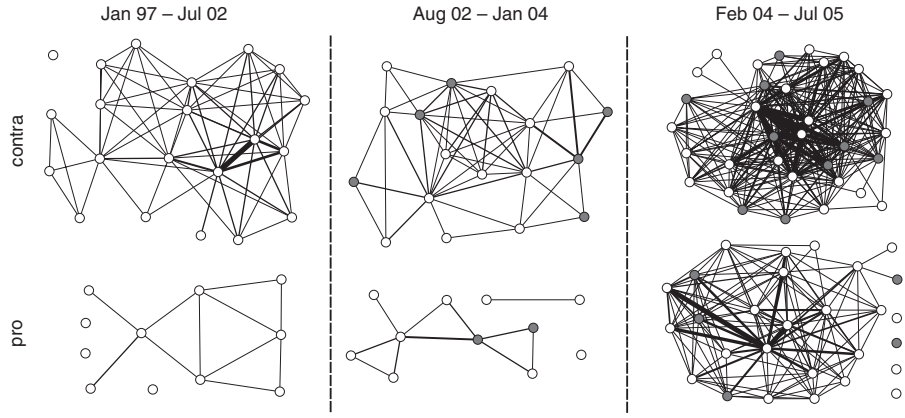

Figure 3. The actor congruence network subdivided into three time slices.
Note: White nodes are organisations or private individuals, grey nodes represent MEPs.

two distinct components during each of the three time periods (if isolates are not counted as components). The apparent broker role of the German government and the EP thus disappears if we control for time. There are indeed two distinct and stable discourse coalitions as predicted by argumentative discourse analysis. MEPs only start to join the media discourse during the second wave, which seems plausible because the second wave corresponds to the first reading in the parliament. Moreover, software patents become more contested over time, with both discourse coalitions becoming more active and growing in size, particularly in the third and therefore critical period.

The overall structure of the discourse clearly shows two distinct and stable discourse coalitions competing for dominance in the political arena. The network graphs demonstrate that both coalitions are highly connected internally on the congruence relation – an indicator of strong internal agreement.

We have already seen in Figure 1 that the core concepts were highly disputed, so the conflict is characterised by strong topical overlap and frequent attacking and re-framing between the coalitions. To measure systematically the degree of in-group agreement and between-group conflict, we have classified all actors into one of the two discourse coalitions based on their tie profiles and calculated the weighted density within and between the two blocks (for the congruence relation and the conflict relation separately). *Weighted density* is defined as the ratio of the sum of all edge weights to the maximum number of possible ties. In the congruence relation, the density is 0.87 in the anti-SWP coalition, 0.84 in the pro-SWP coalition and 0.01 between the two blocks, as expected. In the conflict relation, where a tie is established if one actor uses a concept in a positive way and the other actor in a negative way, the within-

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block density is 0.00 in the anti-SWP coalition and 0.02 in the pro-SWP coalition, and the between-block density is 0.67. This confirms that re-framing was the dominant strategy in this conflict. The discourse coalitions could have engaged in a competition by using distinct sets of frames, but this is apparently not the case in this highly contested political process.

A more detailed analysis allows us to explain why the anti-SWP coalition was able to prevail over the coalition supporting the directive. Figure 4 shows the concept congruence network of the software patent conflict. To highlight the underlying structure more clearly, we use the m-core with m = 5 of the concept congruence network. An *m-core* (or *m-slice*) is a maximal sub-graph containing the lines with a weight equal or greater than *m* and the vertices incident with these lines. Grey edges represent co-usage of concepts by oppositional actors, while black lines stand for co-usage of concepts in support of

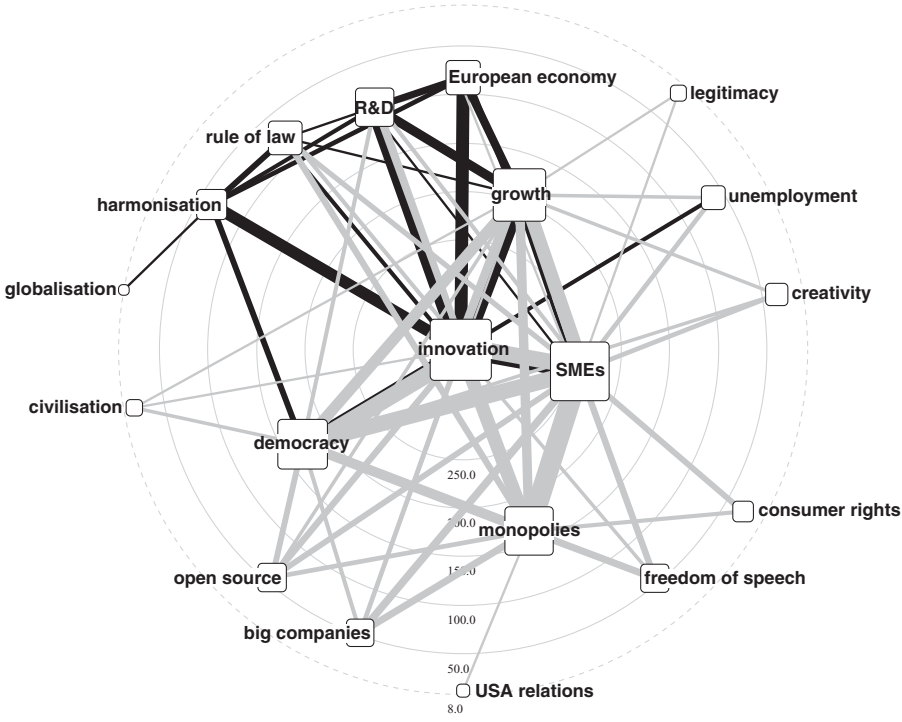

Figure 4. m-core (with m = 5) of the multiplex concept congruence network of frames, 1999–2005.

Note: Squares represent concepts, size and position correspond to degree centrality, and line width reflects the number of actors sharing two concepts. Edge color indicates whether concepts are shared by actors supporting (black) or opposing (grey) the software patents directive. Abbreviated concept names are used for better readability.

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the software patents directive. The line width represents the number of actors referring to both concepts in the same way, and the size and position of the nodes is a function of their degree centrality (Freeman 1978).

Two important insights can be gained from Figure 4: first and most important, both opponents and supporters of the directive referred to multiple core concepts of the controversy in their statements, but the opponents did this in a more coherent manner, dominating the core concept 'innovation', which they tightly bundled with arguments about 'competitiveness of SMEs', 'economic growth and stability', 'monopolies', 'democratic procedures' and 'research & development'. The frame bundle of the supporters contained 'competitiveness of SMEs' only at its margin and was clearly centred around 'innovation', 'competitiveness of the European economy', 'harmonisation' and 'R&D', which are less central on average than the anti-SWP concepts. The successful coalition thus indeed dominated the core frames.

Second, the network analysis shows that the opponents of software patents were able to bundle together a more diverse array of arguments, ranging from consumer rights over questions of democracy, labour market and open access to economic arguments. The pro-SWP coalition, on the other hand, was limited to economic and legal arguments. The fact that the average degree (discarding edge weight) of the concepts used by the opponents is still 5.3 at the 5-core level, in combination with the high density of the actor congruence network, indicates that these concepts have been used by many actors concurrently – a sign of a well-integrated discourse coalition. The average degree of the frames used by the supporters of the directive was – despite the smaller number of concepts – lower than that of the opponents (4.2). The successful coalition thus integrated a broad set of frames without overextending them – many aspects were addressed, but this did not lead to disintegration of the framing. Despite their number, the various frames were still tightly held together in an integrated narrative that made innovation an issue of supporting SMEs and tied their interest to the democratic legitimacy of the European institutions.

To measure the visibility and cohesion of the coalitions in the discourse, Figure 5 plots some relevant network statistics for the three time periods shown in Figure 3. The anti-SWP coalition quantitatively dominated the discourse in all three phases of the conflict. In the first two waves, the number of actors was about twenty in the anti-SWP discourse coalition and about ten in the pro-SWP coalition. In the third time slice, the anti-SWP coalition had 36 active members and its counterpart 26. Even the newspaper data – rather fragmentary in this regard – thus reflects the stronger mobilisation capacity of the anti-SWP coalition.

A similar dominance can be observed when considering the coherence of the coalitions. We employ weighted density and the weighted global clustering

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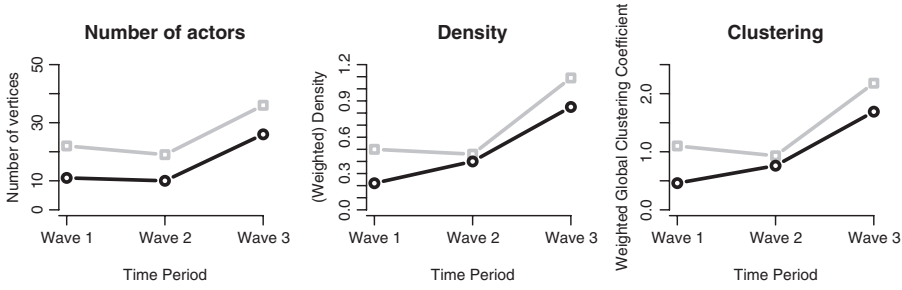

Figure 5. Network statistics for the two coalitions of Figure 3.
Note: Grey squares indicate the anti-SWP discourse coalition, and black circles the pro-SWP coalition.

coefficient as two measures of coherence of the coalitions on the congruence relation. Density can be interpreted as a measure of overall agreement between the actors in the network. Clustering is high if there are many closed triplets (triads). Clustering and density are highest if everybody agrees with everybody else. High density and clustering values indicate that a discourse coalition is compact and conveys a coherent policy image.

High density and clustering values for the opponents of software patents over all time periods show that they conveyed a higher congruence throughout the media discourse. The pro-SWP coalition, on the other hand, failed to provide a coherent storyline. Instead, its members used diverse concepts, and there was only limited agreement on these concepts in the media. Only one actor (EICTA) had a central position in the third wave and combined the arguments of all other actors. In contrast, the opponents of software patents frequently shared the same arguments, and hence their coalition appeared more compact. They were consequently able to convey a coherent policy image against software patents.

Based on these indicators, we can conclude that the opponents of software patents were able to acquire and maintain hegemony over the discourse throughout the conflict. As Baumgartner and Jones (1991) point out, the group of policy actors that has the most coherent policy image attracts a large constituency and is likely to win over competing groups of actors in policy making. Those who want to change the status quo will collaboratively try to convey a coherent image of their desired policy to the public in order to convince decision makers and their voters. In the sense of Baumgartner and Jones, our analysis has provided clear evidence for the superiority of the anti-software-patent policy image and its associated discourse coalition. The defeat of software patents in Europe is therefore in line with the theoretical predictions, even though it may be impossible to measure rigorously the extent

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to which an individual decision maker was actually influenced by the discourse versus other factors. Experimental studies may shed light on this final step in the causal chain. However, anecdotal evidence from newspaper accounts and interviews with participants in the conflict supports our interpretation. In the final stage of the decision-making process, the EP was the decisive actor. At this point, the conflict was already highly politicised, and MEPs were no longer consistently following the recommendations of the rapporteurs of their respective parties. Instead, cross-party coalitions emerged for and against the directive. In this situation, it is straightforward to assume that the discursive hegemony of the anti-SWP coalition was a key factor that led the majority of the MEPs to reject the directive in their final vote.

Discussion and conclusion

Our analysis has provided evidence for the existence of two competing discourse coalitions in the European conflict over software patents. We have been able to identify the core framing strategies of the competing coalitions and to measure the structure of the discourse both statically and in a dynamic way. Most importantly, we have provided bottom-up empirical evidence for the hegemony of a discourse coalition composed of opponents of software patents. Specifically, the analysis in the preceding section has produced the following interesting findings:

- The constellation shows all elements of a highly politicised conflict. The actors are split into two very distinct discourse coalitions which do not share a single conviction. However, topical overlap between the coalitions is large, and conflicts between the coalitions (but not within coalitions) are prevalent.
- The bipolar structure is stable over time. In all three political waves, the opponents of software patents are better organised, their arguments are more congruent, and they have a larger constituency and are more visible in the media.
- At the level of the contents of the discourse, the anti-software-patent coalition dominates the core frames and manages to bundle together various arguments coherently, while both the heterogeneity and the integration of the pro-SWP story line are far less pronounced.

These findings provide a discursive-institutionalist explanation of the policy outcome in 2005 when the EP rejected the directive proposed by the European Commission in its 1997 Green Paper. The proponents of software

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patents failed to monopolise key economic arguments, gather a large constituency in the media, provide a coherent policy image, and present their arguments in a compact and congruent manner. The discourse network analysis of the conflict confirms the notion that discourse does matter and is able to offer a conclusive explanation why the opponents of software patents won over the adherents of software patents.

Our analysis has focused on the policy debate rather than the resource endowment of the actors – a variable often used in the interest group literature (Bennett 1999; Bouwen 2004; Burns 2004; Dür 2008; Grande 1996; Hayes-Renshaw & Wallace 1997; Eising 2004; Beyers 2004; Kohler-Koch 1997). While it may seem at first glance that a resource-poor 'grassroots' coalition won over a resource-rich coalition of multinational corporations, we cannot fully rule out that the distribution of resources is less clear than it may seem. We do not suggest that resources are irrelevant in political conflicts. They certainly matter, and in many cases command over resources will strongly influence or even decide the outcome. Yet because political conflicts, by definition, occur at least partially in the public domain, the discursive level will always play a role, too. Sometimes, financial resources determine success in the discursive realm – and the €4 million spent by the software industry in the third phase of the conflict (Gehlen 2006) possibly saved them from an amended directive that might have clearly forbidden software patents in Europe. But more often, even if resources play a role, a careful analysis of the discursive level will enhance resource-based analysis and can offer consistent explanations even where the latter alone will fail.

The network analysis of political discourse is, furthermore, able to qualify and substantiate several assumptions of the existing literature on framing and discourse coalitions. It allows us to measure discursive dominance and gives us a tool to operationalise notions of narrative fidelity, frame congruence and the coherence of coalitions.

Our analysis has demonstrated the applicability and usefulness of discourse network analysis for the empirical analysis of political discourse. This method is capable of producing insights that are unobservable when relying on conventional interpretive or aggregate statistical approaches. Particularly, the discourse network framework allows one to:

- measure discourse coalitions empirically instead of simply assuming that a certain predefined number of coalitions exists;
- measure discourses in a multidimensional way and discover cleavage lines or subgroups even within discourse coalitions, rather than imposing a one-dimensional, reductionist constraint on the data;

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- track the evolution of a discourse over time (either on the basis of discrete time slices or as a continuous-time animation); and
- observe the overall topography of the discourse on the actor level, concept level or a combined display, thus providing the 'missing link between actors and concepts' (Steensland 2008).

Discourse network analysis can be combined with the analysis of policy networks (Adam & Kriesi 2007; Kenis & Schneider 1991; Lang & Leifeld 2009) by considering discursive similarity or actor congruence as yet another network relation beside resource exchange, contact making or influence attribution, and by assessing its impact on other relations or policy outcomes. However, discourse network analysis expands beyond actors and is in fact broader in scope. In the vein of Emirbayer and Goodwin (1994) and the literature on discursive institutionalism (Schmidt 2008; Schmidt & Radaelli 2004), the approach allows one to incorporate cultural elements into the explanation of historical phenomena. At the theoretical level, it may therefore enrich other frameworks dealing with the ideational structure of policy domains beside argumentative discourse analysis, such as the Advocacy Coalition Framework (Sabatier & Weible 2007) with its emphasis on coalitions centring around similar belief systems of actors, the study of Epistemic Communities (Haas 1992; Roth & Bourgine 2005), and the involvement of technocratic actors into policy making, or Punctuated Equilibrium Theory (Baumgartner & Jones 1991) and its focus on diverging policy images generated by groups of policy winners and policy losers in a boundedly rational world. It would be beyond the scope of this article to relate discourse network analysis to each of these theoretical frameworks in detail.

In our specific case, the analysis of the conflict about software patents in Europe demonstrates the existence of coalitions and offers an analysis of a key factor that explains why one coalition was able to prevail over the other. Future research might be able to pinpoint at the micro-level how decision makers in the EP perceive discursive structures and whether discourse always translates one-to-one into political action by formal decision makers. At the meso-level, however, we are convinced that discourse network analysis provides useful tools to qualify why and how discourse matters in policy making.

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Appendix Table 1. Frames used in the conflict

Frame	Example
Accountability	The European Patent Office is not accountable for its policies.
Civilisation	We need to preserve a civilisation where non-market areas and human knowledge are respected.
Communism	Those who are against software patents are modern communists.
Competitiveness of big companies	Software patents serve big companies.
Competitiveness of European economy	The CII Directive prevents disadvantage for European companies in the global market.
Competitiveness of SMEs*	Software patents have a negative impact on the work of small software developers.
Compliance with international treaties	Software patents are against European law.
Consumer rights	Software patents lead to less choice for consumers.
Costs	Software patents raise costs for economic activities.
Creativity	Patents on software impede creativity and innovation.
Crime	A CII Directive that is too weak would make Europe a copycat paradise.
Democratic procedures	It is questionable whether the decision-making process for the CII Directive followed democratic procedure.
Economic growth/stability	Patents are necessary to assure economic growth.
Efficiency, competence	MEPs are misinformed about the Directive.
European identity	The directive contradicts the Lisbon strategy.
Freedom of speech/expression	Software patents hamper freedom of speech and civil rights.
Globalisation	We need to implement the World Trade Organisation treaty.
Harmonisation	Patents on computer programmes are necessary as there is a need for harmonisation within the EU.
Innovation and transfer of knowledge	Too many patents impede innovation.

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Appendix Table 1. *Continued*

Frame	Example
Legitimacy	After the enlargement, the Council position does not represent the positions of the new Member States.
Marketisation	Software patents lead to marketisation of knowledge and block the creation of knowledge.
Monopolies	Big companies use patents to freeze innovation.
National economy	Denmark will lose 800 jobs if the CII Directive is rejected.
(Neo-)liberalism	Those who are against software patents are against free markets.
Open access/open source	Software patents would endanger the development of open source software.
Public interest	The strengthening of the interests for intellectual property rights holders threatens the interests of the general public.
Relation with United States	Europe should not follow the American software patents model.
Research and development	Patents offer incentives to invest time and money in research.
Rule of law	Legal clarity must be reached.
Scope	The scope of the Directive should be restricted to trade.
Social and cultural development	Software patents would endanger the free circulation of knowledge.
Tolerance	The lobbying campaign against the CII Directive was offending.
Unemployment	A rejection of the CII Directive could cause job losses.

Note: * Small and medium-sized enterprises.

Appendix 2. Actors present in the press

1&1 GmbH
ADB (Advanced Digital Broadcast)
AFUL (Association Francophone des Utilisateurs de Linux et des Logiciels Libres)
AIPPI (Association Internationale pour la Protection de la Propriété Intellectuelle)
Alcatel
Arlene McCarthy (PSE)
Attac
Bernard Caillaud
BITKOM (Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e.V.)
Brian Crowley (UEN)
Stiftung bridge
BSA (Business Software Alliance)
BVMW (Bundesverband mittelständische Wirtschaft)
C4C (Campaign for Creativity)
Campact
CCC (Chaos Computer Club)
CDU (Christdemokratische Union)
CEA-PME (Confédération Européenne des Associations de Petites et Moyennes Entreprises)
Chris Forsyth
Civil Platform PL
ComArch
Computer Law Association
CP Tech (Consumer Project on Technology)
Daniel Cohen
Daniel Cohn-Bendit (Greens/EFA)
Danny O'Brien
DL (Démocratie Libérale)
Dominique Foray
EICTA (European Information & Communications Technology Industry Association)
emcita
EP (European Parliament)
Ericsson
ESR Pollmeier
EuroLinux
European Commission
European Governments
Eva Lichtenberger (Greens/EFA)
F Gov (French Government)
FFII (Federation for a Free Information Infrastructure)
FI Gov (Finnish Government)
Florence Autret
Freiheit.com
FSF (Free Software Foundation)
G Gov (German Government)
Gilles Savary (PSE)
Grania Langdon-Down
Greens/EFA
Hiltrud Breyer (Greens/EFA)
IBM
Intel
International Law Association
ISOC (Internet Society Poland)
Jacques Mairesse
James D. Zirin
Jerzy Buzek (EPP-ED)
Joachim Wuermeling (EPP-ED)
Joris van der Hoeven
Klaus-Heiner Lehne (EPP-ED)
Lawrence Lessig
Les Verts
LiVe (Linux Verband)
Lowells
Magix

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Appendix 2. Continued.

Malcolm Harbour (EPP-ED)
Marek Lazewski
Maria Berger (PSE)
Mercedes Echerer (Greens/EFA)
Michael Kofler
Michael Lang
Michel Rocard (PSE)
Microsoft
Monica Frassoni (Greens/EFA)
Munich
Netzwerk Neue Medien
Nicola Liebert
Nokia
NoSoftwarePatents.com
O'Reilly Media
Opponents of software patents
Othmar Karas (EPP-ED)
P Gov (Portuguese Government)
Paul Stevens
PCF (Parti Communiste Français)
Pernille Frahm (GUE/NGL)
Peter Jelf
Philippe Simonnot
Philips
PL Gov (Polish Government)
PS (Parti Socialiste)
Ralph Nader
Rebecca Harms (Greens/EFA)
Reinier Bakels
Richard Stallman
Robert Bond
SAP
Siemens
SPRO (Stowarzyszenie Polski Rynek Oprogramowania)
stop-swpat.de
The Foundry
Toine Manders (ALDE)
UK Gov (British Government)
UMP (Union pour un Mouvement Populaire)
YDP (Young Digital Planet)
ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e.V.)

Notes

1. In the remainder of this article, we will use the terms 'social construct' (Hajer 1993), 'concept' (Roth & Bourgine 2005), 'category' (Hsieh & Shannon 2005) and 'idea' (Braun & Busch 1999) to denote a single, abstract ideational item – for example, an interpretation, a solution concept or an attribution of causality. 'Claims' (Koopmans & Statham 1999) or 'statements' (Carley 1992) are concrete instances of these concepts, issued by a specific actor at a specific date in a certain way. The terms 'frame' (Benford & Snow 2000), 'storyline' (Hajer 2002) and 'frame bundle' (Haunss & Kohlmorgen 2009) denote the aggregate collection of concepts employed by a certain group of actors.
2. This explanation cannot fully account for the reasons why specific actors joined or left the discourse coalitions at a specific point in time because this dynamic is influenced by mechanisms outside the discursive level. Information about actual cooperation and resource exchange relationships would be needed to explain the network development, which is beyond the scope of this study (but see Haunss & Kohlmorgen (2010) for a network analysis of the cooperation relation between the actors involved in the conflict).

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3. In the software patents conflict, negative statements nicely correspond to the anti-SWP coalition and positive statements to the pro-SWP coalition. As shown below, however, using positive and negative statements will yield cleavage lines of higher dimensionality in many other case studies.
4. 'Indegree' refers to the number of (incoming) citations of a concept; 'outdegree' is the number of (outgoing) citations by an actor (Wasserman & Faust 1994).
5. For a complete list of coded frames, see Appendix Table 1.

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