EU-Russia Regional Cooperation Networks: Assessment of EU Influence in the Russian Northwestern and Southern Regions

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Abstract

This paper investigates the configuration, structural properties, development and effects of the interorganizational network structures induced by the regional cooperation with the EU in the Northern Dimension and the Black Sea Synergy initiatives on governance in the Russian northwestern and southern regions. The empirical evidence indicates that the northwestern region is more prone to sub-national integration with the EU and regional cooperation with the EU is more efficient, has stronger effects on regional governance patterns, and generates higher levels of social capital in the northwestern region than in the southern region due to horizontal differentiation and higher degree of decentralization, cohesion, intersectoral interaction, and intensity of cooperative effort in the northwestern regional interorganizational governance structures.

Keywords

Regional cooperation, Russian northwestern and southern regions, European Union, interorganizational networks, network governance, sub-national regionalism, sub-national integration, democratic governance

Introduction

Academic debate on EU external relations has mainly been focused on EU's capacity to export its norms and standards beyond its borders within the different legal frameworks, such as Partnership and Cooperation Agreements, Stabilization and Association Agreements, or European Neighborhood Policy. Very little research has been devoted to the analysis of the character, the degree, and the effects of EU involvement in domestic governance structures of its neighboring countries as well as to the internal factors that would account for the resistance to or acceptance of EU norms. Moreover, studies of EU-related democratization processes and acquisition of norms of good governance in the EU neighboring countries are mostly concerned with national-level changes and countries exhibiting authoritarian tendencies (*e.g.* Russia or Belarus) are often considered to be impervious to EU influences.

Focusing on the EU-Russia sub-national cooperation, this paper addresses this gap in the literature by offering an explanation of how the networks among regional public, civil society, and private-sector actors involved in the EU sponsored projects and cooperation initiatives with the European actors can generate social capital, build support for democracy among local and regional actors, and improve governance in the neighboring countries at the sub-national level, even when national-level conditions are not favorable for EU influences. The paper also outlines factors that inhibit or catalyze EU-related transformations.

After a short theoretical reflection on the peculiarities of the EU-Russia center-to-center and sub-national level dynamics and a brief discussion of theoretical models relevant to this research, I conduct network analysis of complex regional interorganizational systems in the Russian northwestern and southern regions to explore the embeddedness of the regions in the EU-related structures, examine the strength of cooperative efforts, identify the key actors of cooperation with the EU and analyze their propensity to influence decision-making processes in the regions. I also examine regional actors' resource attributes that affect their structural network positions and help to explain the evolution and the development of the regional systems.

Peculiarities of the EU-Russia center-to-center and sub-national level dynamics and theoretical models for regional cooperation

It is generally assumed that Russia will not be able to benefit from the democratization processes related to the European integration and the enlargement of the European Union due to the lack of the EU conditionality as it is not an EU candidate country and will not become one in the foreseeable future.

Additionally, scholars of the EU-Russia relations have primarily focused on the analysis of the center-to-center dynamics arguing that Russia is not and will not be part of the EU integration as both sides are ambivalent about the desirability of deepening their relationship due to serious mistrust problems (Roberts, 2006; Trenin, 2005; Emerson, 2005). Among the factors affecting the relations between the two parties scholars mention Russia's new assertiveness as a regional power and its dissatisfaction with the way the EU is imposing its norms and values on its large neighborhood, and the EU's dissatisfaction with Russia's coercive energy policy, politics in the Caucasus, and lack of commitment to economic diversification and eroding democracy.

However, despite strained relations between Moscow and Brussels, interaction between the two sides at the sub-national level has grown substantially in both depth and

scope (Stoliarova, 2007; Obydenkova, 2006; Lankina and Getachew, 2006; Prozorov, 2004). Russian provinces have been actively interacting with the EU institutions, member-states and regions of member-states in various projects and programs under the EU-Russia Partnership and Cooperation Agreement and the EU's TACIS (Technical Assistance to CIS countries), ENPI (European Neighborhood and Partnership), and CBC (Cross-Border Cooperation Program) instruments. In addition to the EU-sponsored programs, Russian regional actors have been involved in a multitude of inter-regional economic, social, cultural, and educational partnerships and cooperation initiatives with different European actors. Very few studies have been concerned with the assessment of these sub-national cooperation processes. This paper argues that with a strong focus on the Moscow-Brussels relations some important changes occurring at sub-national level might have been overlooked.

There are several theoretical models that are relevant for the research on the EU-Russia regional cooperation. However, their thorough investigation is not the main purpose of this study; rather they are provided for better conceptualization of the regional cooperation and sub-national integration phenomena.

First, certain aspects of the Europeanization theory (Morlino, 2002; Cowles, Caporasso, Risse 2001) can be applied to this analysis. According to the Europeanization framework, sub-national integration with the EU may cause change at the domestic level as the regional cooperation networks between the Russian regional actors and European regional, national and supranational actors can allow for the gradual transfer of the EU democratic norms and values into the domestic sub-national politics.

Second, consideration of EU external governance models (Lavenex, 2008, 2004; Klitsounova, 2007; Tiirmaa-Klaar, 2006; Noutcheva, Emerson, 2005) can be helpful in understanding the EU's involvement in the regional decision-making processes through the modes of horizontal interaction between the EU and the Russian actors.

Third, the aspects of the theory of regionalization (Obydenkova, 2006; Makarychev, 2000) stipulating that regions bordering foreign countries are prone to external influences can be helpful in explaining the development of the sub-national regionalism between the EU and the regions of Russia bordering the EU.

Fourth, Lankina and Getachew's (2006) geographic incremental theory of democratization is useful in connecting the EU's external influence factor to internal sub-national democratization processes. The scholars conducted case studies of EU's involvement and statistical analysis of openness and democracy levels in Russia's regions, and found out that the EU's aid and a region's geographic location are significant factors in explaining variation in democracy at the sub-national level. Therefore, according to the scholars, regions that are closer to the EU and that are primary recipients of the EU aid tend to be more pro-democratically developed than other regions. However, besides aid programs there are all kinds of inter-regional partnerships and initiatives between the EU and Russian regional actors that can not be regarded simply as 'aid' projects as they have multiple sources of funding coming both from the EU and the Russian sides (national, regional, and municipal budgets, regional intergovernmental organizations, and private sector) and are established to the mutual benefit of participating parties.

Obydenkova (2006) explored cooperation between Europe and the regions of Russia (she applied the term 'transnational regional cooperation') and examined factors that explain the level of integration of a region in European politics and also factors that explain the establishment and the development of the transnational regional cooperation and found the geographical factor less important in explaining regional development and the emergence of transnational regional cooperation.

While several studies explored the factors explaining the emergence of the sub-national regionalism, very little research has been devoted to the factors that explain the level of engagement of the sub-national units in the regional cooperation and the character, the degree, and the effects of the regional cooperation on the domestic sub-national social, political, and economic infrastructures. Additionally, very few studies have been concerned with the exact structural mechanisms, through which regional cooperation processes influence democracy and governance at the sub-national level.

This study addresses these issues on the basis of the two regions, Russian northwestern and southern regions, that are included in the regional dimensions of the EU foreign policy- Northern Dimension (ND) and the Black Sea Synergy (BSS), respectively. The ND and the BSS initiatives complement already existing regional cooperation policies of the EU (like TACIS and ENPI) and the EU member states in the regions and specifically focus political attention at the regional level. These regional cooperation initiatives address the specific challenges and opportunities arising in the regions and represent intensified inter-regional and transnational regional cooperation between the EU, its member states, and the regions of the member-states, and the neighboring countries and the regions of those countries.[1] Both initiatives aim at developing regional networking and include a multitude of regional actors by covering a wide range of sectors, such as transport, the environment, justice and home affairs, cooperation in the field of culture, health care, nongovernmental cooperation and civil society development, the promotion of trade and investment, economy, business and infrastructure, cross-border cooperation, information technology, science, education and research. The initiatives are financed from multiple sources including budgets of individual countries and regions of participating countries (both Russian and the EU), EU financial instruments, international financial institutions (*e.g.* European Bank for Reconstruction and development (EBRD), European Investment Bank (EIB), Nordic Investment Bank (NIB)), and the private sector.

Administratively speaking, Russian northwestern and southern provinces that are involved in the BSS and ND initiatives have a status of the so called 'border regions', therefore they have special bilateral agreements with the federal government granting them considerable autonomy in pursuing intense international and inter-regional cooperation with foreign actors (Gella, 2007; Prozorov, 2004). Thus internally, the northwestern and southern regions have similar legal conditions in respect to their ability to engage in international activity.

It is interesting that according to different analyses, the northwestern region of Russia is much deeper involved in the European integration and is more advanced in terms of democratic governance than the southern region from economic and political openness and transparency and accountability of institutions, to provincial government strength and independence and the level of maturity of civil society and social capital (Petrov, 2005; Lankina and Getachew, 2006). Variation in the structure, the intensity, and the effects of the regional cooperation with the EU might be a significant factor explaining these regional differences.

[1] For more information on the Northern Dimension, see http://ec.europa.eu/external_relations/north_dim/
For more information on the Black Sea Synergy, see http://ec.europa.eu/external_relations/blacksea/index_en.htm

Regional cooperation networks in the Russian northwestern and southern regions

Network Perspective

Regional cooperation framework creates an opportunity structure that provides economic, social, and cultural benefits and geographical mobility for various organizations, companies, educational institutions, firms, and provincial government bodies in the Russian northwestern and southern regions. Therefore, different regional actors voluntarily enter this structure and deliberately choose to use the resources offered by it: additional financial support and an opportunity to make partners, improve information processing capabilities, lower uncertainty and reduce transaction costs, learn more about regional environment by establishing strong contacts and socializing with diverse regional actors, and occupy a prominent position in the region by becoming connected to important actors in the regional socio-economic, cultural and political arenas.

Complex interactions among different regional actors in the EU-Russia regional cooperation dimension form interorganizational networks. For the purpose of this study, regional cooperation network can be defined as a structure consisting of agents (or nodes/actors) represented by all kinds of cultural, educational, economic, civil society, and public-sector actors and links among the agents- complex interactions through EU programs and regional projects, partnerships, and cooperation initiatives with the European actors. Regional cooperation networks represent a peculiar form of regional network governance as interdependent interconnected private, public, and civil society actors cooperate in a more or less institutionalized infrastructure to address common regional problems – environmental, social, economic, cultural, and other, which in most cases transcend the borders of single provincial governments.

Consideration of the structural properties and the evolution of the northwestern and southern regional cooperation networks is important for understanding the strength, effectiveness and development of the EU-Russia regional cooperation and its effects on the social, political, and economic activity in the northwestern and southern regions. Therefore, the main questions for this study are:

- Are there any differences in the configuration and functioning of the southern and northwestern interorganizational infrastructures induced by the EU-Russia regional cooperation?
- What effects do these differences have on the regional governance and social infrastructures?
- What structural factors account for the difference in the levels of democratic governance and involvement of the northwestern and southern regions in the European integration?

It is hypothesized that there are significant differences in the configuration of the northwestern and southern regional cooperation networks that help explain why the northwestern region is deeper involved in European integration and is more advanced in terms of democratic governance than the southern region.

Structuralist perspective presupposes that the structural position of agents in the set of relations they maintain explains the patterns of their behavior, the constraints and the opportunities emerging for them in the system, and influences the probability of achieving some goals (Jackson, 2008; Semitiel García, 2006; Burt, 2000). According to Semitiel García (2006, p.8), 'from a methodological point of view, the network perspective is not reductionist but holistic, as opposed to individualistic, and interdisciplinary; …actors are purposeful, intentional agents, with social and economic motivations, and their actions are

influenced by the net of relations in which they are embedded'. Social network analysis scholars argue that complex interactions among network agents create structural interdependences among them, and agents have a capacity to impact each other through these interdependencies (Wasserman and Faust 1994; Granovetter 2005). Therefore, network linkages have important consequences for all the network actors: the relationships a given actor has with others in the system affect its perceptions, norms, beliefs, values, visions, ideas, and behavior.

Network structures and substructures can be rigorously analyzed using a set of network analysis tools, which are uniquely designed to confront specific research questions of interest. Social network analysis is characterized by a distinctive methodology encompassing techniques for collecting data, statistical analysis, visual representation, etc. Depending on the focus of research and the level of analysis, scholars study structural attributes and characteristics of ego-networks (a focal node (ego) and the nodes to whom ego is directly connected to plus the ties among them), or network clusters, or structural features of the whole networks (Kilduff and Tsai, 2003).

This study is focused on the analysis of the network-level characteristics of the EU-Russia regional cooperation systems, since the main aim of the study is to compare whole interorganizational systems in the Russian northwestern and southern regions and examine structural factors that explan the regional differences. Over the past decade, there has been a steady increase in the number of studies focusing on whole interorganizational networks; however, network-level research has primarily been theoretical or based on descriptive case studies performed at single point in time (Provan, Fish and Sydow, 2007). This study contributes to the interorganizational network literature by conducting an empirical longitudinal study of the northwestern and southern regional cooperation networks.

Modeling the regional cooperation networks

Representative samples of one hundred regional actors in each region were selected for this study. The actors were selected from 8 provinces in the Russian Northwestern Federal District and 9 provinces in the Russian Southern Federal District that are included in the EU's Northern Dimension and the Black Sea Synergy regional initiatives and are covered by the majority of regional cooperation programs, projects and partnerships.[1]

The actors selected for the analysis include provincial administrations existing in the regions, economic and business actors, various non-governmental organizations and associations and other third-sector actors, educational institutions, local newspapers and media agencies, environmental organizations, and other regional actors participating in the regional cooperation with the EU. The data on the organizations were taken from multiple sources: EU TACIS, ENPI, and CBC reports, EU regional project databases, EU regional cooperation reports, the Northern Dimension and the Black Sea Synergy resources and reports, Euroregion's websites, Russian regional actors' archives and websites

[1] The Northwestern selected province: St. Petersburg (Leningrad) oblast, Novgorod oblast, Vologda oblast, Arhangelsk oblast (excluding Nenets Autonomous District), Pskov oblast, Republic of Karelia, Murmansk oblast, and Kaliningrad oblast

The Southern selected provinces: Rostov oblast, Astrakhan oblast, Krasnodar Krai, Stavropol Krai, Republic of Adygeya, Kabardino-Balkar Republic, Karachaevo-Cherkessk Republic, Republic of Kalmykiya, Republic of North Osetia

(information on European partners), websites of provincial governments, and different local and regional newspapers, journals, and brochures.[1]

The organizations were selected in a way that each sector of the regional cooperation was represented by a more or less equal number of organizations. In addition, the samples were also composed of more or less equal number of private and third-sector actors. Due to the geographical peculiarity of the regional cooperation, in the northwestern region there are important Northern Europe –related organizations like the Office of the Nordic Council of Ministers, Finnish Cultural and Academic Institute, and Regional Support Bureau, which were included in the analysis as a separate block as they are involved in several areas of the regional cooperation– economic, social, civil society, environmental and educational. Additionally, compared to the multitude projects aimed at improving transportation systems between northwestern Russia and Northern Europe, there were only two transportation cooperation initiatives in the southern region in 1999, and they were primarily concerned with improving sea-line roots for trade and economic cooperation; therefore, organizations participating in those projects were not included as a separate entity, but as part of the economic and business sector of the regional cooperation.

The literature on interorganizational network analysis mentions several ways of measuring relationships between organizations. Certain studies favor measuring the strength of the tie between two organizations in a network on the basis of a three-point, five-point, seven-point, or nine-point scale, where the highest number corresponds to the strongest alliance (Singer and Kegler, 2004; Gulati and Gargiulo, 1999; Contractor and Lorange, 1988; Nohria and Garcia-Pont, 1991). Some studies measure network relations with binary data representing the presence (1) or absence (0) of a relationship (Rowley, Behrens and Krackhardt, 2000). Some studies use the measure of frequency of interaction; this is usually calculated as the number of transactions occurring per unit of time (Kalleberg, Knoke, and Marsden, 1995). Other studies interpret the intensity of the network tie as the intensity of interaction through the joint activities, projects, or events held together or the number of partnerships existing between two actors, which reflects the degree to which an actor has relationships with other actors through a number of joint activities linking them together (Dyer and Singh, 1998; Gulati, 1995; Hagedoorn and Duysters, 2002; Koka and Prescott, 2002; Soh, 2003).

This study follows the last approach to measuring the strength of a network tie and applies normalization to achieve consistency in dynamic range for the set of data. Therefore, the strength of the relationship between two network actors is measured by the normalized intensity of interaction through cooperative effort– the number of EU-related regional cooperation projects/initiatives/programs/activities that existed between two

[1] For information on Tacis, see http://europa.eu.int/comm/external_relations/ceeca/tacis/; For ENPI programs, see http://www.together50years.eu/EN/mn3_hr/enpi.htm; For information on the Northern Dimension initiatives, see http://ec.europa.eu/external_relations/north_dim/doc/index.htm; For information of the Black Sea programs, see http://www.blacksea-bc.net/index.php?page=MAP;
For information on the neighborhood initiatives, see http://www.delrus.ec.europa.eu/en/p_647.htm; For information on cooperation partnerships, see http://www.delrus.ec.europa.eu/en/p_258.htm; For external cooperation programs, see http://ec.europa.eu/europeaid/where/neighbourhood/regional-cooperation/enpi-cross-border/index_en.htm; For Euroregions, see http://www.siauliai.aps.lt/saule/about.html, http://www.euroregionbaltic.eu/members.php, http://euregio.karelia.ru/site/?lang=eng
Baltic Euroregion Network http://www.benproject.org/en, For the information about regional partnerships, see the websites of the provincial governments and regional and local newspapers

actors divided by the total number of cooperative efforts in the system. The normalized intensity of interaction through cooperative effort is an adequate measure of interorganizational relations in the regional cooperation systems, as the whole concept of regional cooperation is based on cooperative measures that help to link different regional actors together and form regional alliances.

The data on the strength of the network ties corresponds to the actual cooperative effort in the northwestern and southern systems. In many cases, besides the actors enumerated in official program design documents, other regional actors were involved in the implementation of cooperation programs/initiatives/partnerships/projects/events and it was important to consider them in the analysis. For instance, in the southern region it sometimes happened that provincial administrations were not mentioned in the project design documentation; however, in practice they took active part in the project by making decisions concerning public events designed by the project, or/and subjecting project finances to bureaucratic control, or making decisions concerning actors that should be involved/excluded from the project, or participating in project activities at different stages of project implementation. Or, as another example, many initiatives that were primarily designed for establishing cooperation among various economic actors included civil society actors, like in the case with the joint EU /Finnish /Swedish/ Russian Development Program (northwestern region) called 'Euro-Russia regional development', which was designed to improve the investment conditions and networking of companies across the border between Russia and the EU through investment projects. Many actors from other sectors like Northwestern Association of Workers, Russian Institute for Radio Navigation and various environmental organizations were involved in the implementation of the program. It also sometimes happened that actors that were initially included in the project design documents did not participate or withdrew from the program/initiative/partnership/project at the early stage of its implementation for different reasons.

Therefore, the information on project participants was verified through multiple sources including program evaluations, project intermediate and final reports, local newspapers, provincial websites, organizations' websites and reports, and any information available on project events. Thus, the data on the relations between actors in the systems corresponds to the actual activities in the regions.

At first, two-mode cooperation program/initiative/partnership/project by organization matrix was constructed for each region at time 1 (1999), when the majority of cooperation programs were already taking place since all sorts of regional partnerships in addition to already existing TACIS programs were launched in 1997 under the PCA agreement, and some of the regional business and economic contacts were established even before 1997; and then at time 2 (2006), when the latest consistent data on the regional cooperation were available. Then these four two-mode matrixes were converted into four square matrixes (actor by actor). The resulting matrixes represent valued graphs, where the strength of relationships is measured by the normalized intensity of interaction through cooperative effort. The data in the matrixes was symmetrized due to its reciprocal character.

The resulting matrixes were then converted into UCINET, NETDRAW and MATLAB files and analyzed with UCINET, NETDRAW and MATLAB tools and techniques. [1] The combination of these programs was necessary for the strength of the

[1] UCINET is a comprehensive program for the analysis of social network data as well as other 1-mode and 2-mode data. The program is capable of reading and writing a multitude of differently formatted text files, as

analysis, as each of the programs has its own advantages and disadvantages in measuring network characteristics and parameters.

Analysis of the northwestern and southern regional cooperation networks

Network Centralization

While collaboration has become common in different areas, there are few methods to assess and evaluate the effectiveness of cooperative initiatives. In the interorganizational field, network analysis can rigorously assess the degree to which and by whom information and other resources are exchanged in the network (Valente and Davis, 1999; Provan and Milward, 1995). For that reason, network analysis is the widely preferred method for evaluating the evolution and effectiveness of cooperative partnerships (Tanjasiri, Tran, Palmer, Valente, 2007). Network analysis provides statistical measures of intensity of cooperative efforts within a network and the degree to which all the actors of the network have equal access to network exchanges and opportunities.

It is generally argued that effective network governance and effective functioning of interorganizational networks depends on the degree of network decentralization (Tanjasiri, Tran, Palmer, Valente, 2007; Joas, Kern, and Sandberg, 2007; Putnam, Leonardi, and Nanetti, 1995; Putnam, 1993). Decentralization is associated with more efficient information flows, greater knowledge and advance intelligence of possible changes in cooperation structures (Zmerli and Newton, 2007). Decentralization and participation strengthen governance and build social capital in society (Narayan, 1999).

Network centralization in network analysis measures the degree to which an entire network is focused around a few central nodes (Scott, 2000) or 'dominated by a few places' (Irwin and Huges, 1992). Most central actors in governance networks are those who have important decision-making and coordinative roles; they are key to understanding the circulation of ideas and information in the network and network performance, in general. From governance perspective, centrality deduces the type of governance network from whether the network is dominated by public, private, or civil society decision makers (John and Cole, 1998). According to Scott (2000), actors have higher centrality to the extent they can gain access to and/or influence over others. Centralization affects the spread of information, ideas and practices in a network as central nodes have more influence and control over how information, resources and practices spread to others and in most cases, given the position of control and power, act as bottlenecks and slow diffusion (Tanjasiri, Tran, Palmer, Valente, 2007; Valente, 1995).

Another important negative feature of centralization is that if the central nodes in a centralized network are removed or damaged, the network quickly fragments into unconnected sub-networks (Krebs, 2008). A network centralized around a well connected

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well as Excel files. It can handle a maximum of 32,767 nodes (actors). The analysis methods include centrality measures, subgroup identification, role analysis, elementary graph theory, and permutation-based statistical analysis. In addition, the program has strong matrix analysis routines, such as matrix algebra and multivariate statistics. For more information, please see http://www.analytictech.com/ucinet.htm

NETDRAW is a program written by Steve Borgatti for visualizing both 1-mode and 2-mode social network data. It can handle multiple relations at the same time, and can use node attributes to set colors, shapes, and sizes of nodes.

MATLAB is a numerical computing environment and programming language. Maintained by The MathWorks, MATLAB allows easy matrix manipulation, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs in other languages.

group can fail abruptly if that group is disabled or removed. In governance networks highly central nodes can hurt a network if they are pursuing their own agenda. A less centralized network is considered a much better structure for cooperative efforts, since it has no single points of failure and it is resilient in the face of many intentional attacks or random failures as many actors or links can fail while allowing the remaining actors to still reach each other over other network paths (Krebs, 2008).

Therefore, centralization helps to measure how resilient cooperation networks are and how effective cooperation processes are in terms of equitable sharing of information, resources, and influence and distribution of decision-making power among network actors.

Network centralization can be measured by means of UCINET program. The eigenvector approach is used to measure centralization of the regional cooperation networks, as it takes into account the entire pattern in the network. Unlike other centrality measures that weigh every contact equally, eigenvector measure assigns relative scores to all network agents based on the principle that linkages to high-scoring agents contribute more to the score of the agent in question than equal linkages to low-scoring nodes (Bonacich, 2007).

Figures 1 and 2 represent regional cooperation networks visualized in NETDRAW at time 1 (1999) and Figures 3 and 4 depict networks at time 2 (2006). Table 1 reports the networks' centralization indexes calculated by the eigenvector routine and Tables 2 and 3 report centrality scores for 10 most central network actors.

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The results of the analysis indicate important differences in the structural composition and evolutionary development of the regional cooperation systems. In 1999, the southern regional cooperation network appeared to be two times more centralized than the northwestern network (61.32% compared to 32.17%) implying higher inequality in the distribution of information, resources and decision-making power among the network actors. In 2006, the southern network remained highly centralized (59.58%), while the northwestern network developed into a decentralized system (15.22%) compared to previous 32.17%) indicating much more equitable sharing of network resources and influence among the network actors.

The results of the analysis demonstrate that in the 1999 southern cooperation network provincial administrations hold 'global' network central positions, which implies that they are the most influential network actors in the regional cooperation processes. Moreover, cooperation activity seems to occur most intensely within provinces and there is the lack of inter-provincial interorganizational linkages. Rostov, Krasnodar, Stavropol provinces and the republic of Adygeya seem to have some interconnectedness, while cooperative activity in the republic of Karachaevo- Cherkessia and Astrakhan province is largely isolated from the other provinces.

The 2006 southern regional cooperation network remains highly centralized around provincial governments. The number of inter-provincial interorganizational linkages increased, implying that more actors operating in different provinces established

cooperative contacts; however, actors from the republic of Karachaevo- Cherkessia and Astrakhan province remain quite isolated from the rest of cooperative structure. It is important to note that actors from the journalism sector form a cohesive cooperative alliance close to the center of the network, while in 1999 they were largely isolated from each other. The same holds true for the social sector actors. This means that in the centralized interorganizational system where control and power positions are occupied by the public sector actors, these actors try to find their own niche of influence and act strategically to benefit from the network exchanges.

Additionally, in the 2006 network centrality indexes of provincial administrations increased while indexes of many other actors decreased implying that the whole system became more asymmetrical. Big standard deviations for centrality measures (both in 1999 and 2006) show that in the southern cooperation network control, power and influence are unequally distributed in the system as there is a big difference between highly centralized and highly peripheral actors. Highly peripheral actors in the southern regional cooperation network are highly constrained by the limited access to other actors and network information and resources.

In contrast with the southern network, the center of the 1999 northwestern network is shared by organizations coming from various sectors: economic, education and science, social sector, culture, journalism, and public sector; though overall, economic and business actors prevail in the central positions and perform 'connector-function', as many of the interorganizational linkages among different sectors go through economic and business actors. As far as public sector is concerned, St. Petersburg and Novgorod province administrations and administration of the republic of Karelia are more influential in regional cooperation processes than the other administrations. Additionally, important actors in the regional cooperation processes are organizations specifically focused on the integration of the northwestern region with Europe: the Office of the Nordic Council of Ministers, Finnish Cultural and Academic Institute, Regional Support Bureau, and Austrian Cooperation Bureau KulturKontakt. Another important feature of the northwestern network is that many interorganizational linkages transcend the geographic boundaries of single provinces, implying that organizations from different provinces extensively cooperate with each other.

While in the 1999 northwestern network cooperative effort is largely segmented into collaboration areas and economic actors prevail in the core of the network, in the 2006 network the composition of the cooperative effort becomes much more diverse and the core of the network is shared by representatives from all the sectors of the regional cooperation. These finding go in line with the European integration theories that stipulate that economic interaction is the driving force of integration and the spillover effect from economic interaction and economic interdependencies will quickly create strong incentives for integration in further sectors. Standard deviation figures for centrality indexes indicate that there was not a very big difference between most central and least central actors in the 1999 northwestern network unlike in the southern cooperation network (both in 1999 and 2006), but in the 2006 northwestern network the difference became even smaller, which implies more equitable distribution of network resources and decision-making power. Another important feature of the 2006 northwestern network is that almost all the central actors from the 1999 network conceded their central positions to other actors. This indicates strong mobility and adaptability of the northwestern cooperation system.

The results of the centralization analysis indicate significant differences in the configuration of the regional cooperation networks in the northwestern and southern

regions, which have important implications for the regional integration processes. The southern cooperation network appeared to be a highly centralized system with asymmetrical distribution of decision-making power and network resources largely controlled by the public sector actors. The northwestern network, on the contrary, turned out to be much more decentralized, implying more equitable distribution of influence and control, and access to network exchanges. Longitudinally speaking, the northwestern network showed a tendency toward a further decentralization, while the southern system demonstrated little change in the patterns of governance over time.

Network Cohesion

Network cohesion is associated with the level of interconnectedness and embeddedness of network actors in the networking structure. High network cohesion is important in interorganizational networks, as the degree of network cohesion correlates with the levels of trust and social capital in the system (Hanneman and Riddle, 2005).

There are different approaches to characterizing the extent of interconnectedness and form of 'embedding' of actors in networks. Social network analysts usually use the combination of different approaches. The most popular ones are: density, transitivity, and compactness. Density is usually defined by the extent that all actors in the network are connected. It describes the general level of connectedness and measures the ratio of the number of ties that exists in the network to the number of possible ties, if each network actor were linked to every other actor (Scott, 2000). Transitivity is associated with the existence of all the possible connections in triads. Interorganizational networks with high level of transitivity are considered to be more cohesive, stable, balanced, and harmonious. The concept of compactness is based on the 'distance' between actors. More compact, or cohesive networks, have shorter distances between network actors.

Tables 4, 5, and 6 report the results of the cohesion analysis.

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All the measures of network cohesion indicate that the degree of cohesiveness of both regional cooperation systems increases over time, however, in the northwestern network it increases at a faster pace and the northwestern network is more cohesive than the southern one both in 1999 and in 2006. Therefore, the northwestern system generates higher levels of trust and social capital.

Centralization and cohesion analysis indicate that the regional integration processes in the northwestern region represent a cohesive, stable and balanced structure with equal opportunities for the regional actors and equitable sharing of power, influence and control among them. The northwestern cooperation network approximates a good network governance model based on self-organization, adaptability, mobility, and collective action. In the southern system, public sector actors are dominating cooperation and controlling integration processes occurring in the region, while other network actors are not very well connected and cooperative effort is largely segmented.

Network structural differentiation

Embedding of actors in dyads, triads, clusters, and groups are different ways in which the structure of social networks may display 'texture', and all of these forms of embedded structures in a network speak to the issue of differentiation of network actors (Hanneman and Riddle, 2005). This differentiation may have horizontal or vertical nature involving unequal rankings or in other words, hierarchy.

In interorganizational networks a form of vertical differentiation discussed by network analysts is structural hierarchy, were the actors might not be subordinate or superior to other actors in terms of their actual position, but might be structurally ranked being placed at different structural levels of the network, when big distance between these levels would indicate structural hierarchy and therefore, significant differences in access to decision-making process. Collins (2009) argues that when organizational field is characterized by power inequality, interorganizational networks are subordinate to dominant actors; however in interorganizational systems network characteristics like reciprocity and interdependence can temper vertical differentiation over time.

Burt's structural hierarchy method is used for the analysis of structural differentiation of the northwestern and southern regional cooperation networks. Figures 5 and 6 display the results of the analysis.

-Figure 5 here-
-Figure 6 here-

The results of the analysis indicate that in the southern cooperation network there is a relatively big distance between network clusters, which reflects inequality in power and barriers to effective network exchanges and information flows. Big distances between clusters indicate vertical differentiation of the southern network, while smooth continuous placement of nodes in the northwestern networks reflects horizontal differentiation.

Another important feature of the northwestern network is that the network clusters are diverse meaning that they are composed of actors coming from various sectors, therefore the decisions are made in diverse collaborative environments. It is possible to conclude that northwestern interorganizational governance network involves stable horizontal interactions between groups of actors that represent a plurality of organizations.

The clusters in the southern networks are composed of predominantly same-sector actors (especially in 2006 network), which does not contribute to openness and dynamism of the system. Therefore, it is possible to make a judgment that the southern cooperation network is far from the Putnam's (1993) ideal of a horizontally structured network with equitable sharing of resources and information, where actors are inter-connected and tied to one another.

Intersectoral linkages

Scholars argue that cooperation between different actors (public, private, civil society, mass media, etc) is crucial in modern society as it helps to solve intractable development problems and builds social capital, which is critical to stability, democracy and economic development (Brown and Ashman, 1996). Maloney and Robteutscher (2007) argue that for democratic governance there have to be linkages between civil society and both the state and the market, as civil society has to 'mobilize and activate influence on state-market mechanisms'.

Joas, Kern, and Sandberg (2007) explored transregional cooperation among various actors in the Baltic Sea region and found out that participatory decision-making and mutual influence were essential for solving important regional problems. According to Narayan (1999), interorganizational collaboration networks that contain high number of intersectoral cross-cutting ties have better governance capabilities and higher adaptivity to evolving complex societal and economic problems.

EU-Russia regional cooperation aims at solving complex transregional problems in the Northern Dimension and the Black Sea Area and the problems existing in the Russian northwestern and southern regions. It is important to see whether the regional cooperation networks are structurally equipped to tackling such problems. A high level of cross-cutting intersectoral ties would be an indicator of networks' flexibility and effectiveness in turbulent regional environments. According to Sorensen and Torfing (2005), if actors from different sectors are equally involved in the decision-making processes, they will tend to develop a sense of joint responsibility and ownership for the decisions, which will oblige them to support, rather than hamper, their implementation.

Figures 7 and 8 display the results of the intersectoral analysis. Each network was rotated in a way to represent regional cooperation sectors grouped together and linkages among them.

-Figure 7 here-
-Figure 8 here-

The results of the analysis indicate that in the southern regional cooperation network there is the lack of cross-cutting ties in the system and some sectors of cooperation are disconnected. In addition, in accordance with the previous findings, public sector actors occupy dominant position in the system by having strong links to all the other sectors thereby controlling the system. As far as the northwestern regional cooperation network is concerned, it had higher level of cross-cutting ties than the southern network in 1999, and in 2006 it developed into a very cohesive system with more or less evenly distributed strong intersectoral linkages.

Therefore, it is possible to conclude that in the northwestern region regional integration processes are effective and efficient, while in the southern region high level of centralization of political control over cooperation processes poses the principal obstacle to greater sub-national regionalism.

Strength of cooperative effort

Based on the models used in information theory and electrical engineering, I developed a method to evaluate the strength of cooperative effort of the regional cooperation networks. For characterizing the strength of cooperative effort, I use the normalized entropy of the probability mass function induced by the distribution of cooperation initiatives among organizations in the network, which is defined for a network as follows:

$$\tau = \frac{1}{\log \frac{2}{S(S-1)}} \sum_{i=1}^{S} \sum_{j=1}^{i-1} n_{i,j} \log n_{i,j} \ ,$$

Where $n_{i,j}$ is the normalized number of cooperation initiatives between organizations *i* and *j:*

$$n_{i,j} = \frac{N_{i,j}}{\sum_{k=1}^{S}\sum_{l=1}^{k-1} N_{k,l}}$$

$N_{i,j}$ is the number of cooperation initiatives between organization *i* and organization *j*, *S* is the size of the network (total number of nodes in the network), τ is a normalized measure of the strength of cooperative efforts ranging from 0 to 1. τ is 0 when there is only one link in the whole network (assuming network always has at least 1 link). τ is 1 when there are links of equal strength established between every pair of organizations in the network, implying that network forms a complete graph, or in other words, is fully and equally connected.

It is important to note that the distribution of link strengths plays extremely important role in determining the value of τ. In the extreme situation when all the pairs in the network are connected by weak ties and there is one very strong tie, τ will still be very close to zero indicating low effectiveness of the cooperative efforts. In other words, uniformity of the distribution of link strengths in the system determines the strength of cooperative effort of the system. Table 7 reports the scores for the strength of cooperative activity in the regional cooperation networks.

-Table 7 here-

According to the results of the analysis, the strength of cooperative activity grows in both networks. However, in the northwestern network, the strength of cooperative activity is significantly higher and the difference between the 1999 value (0.50) and the 2006 value (0.69) is bigger than the difference between the southern networks scores (0.25 in 1999 and 0.34 in 2006). This implies that the strength of cooperative effort increases faster in the northwestern network and therefore, the northwestern system has better cooperative dynamics.

To illustrate the development and evolution of cooperative processes in the system, I model Smooth Cooperative Effort Strength Field in MATLAB program.
Smoothing is performed using Gaussian kernel to facilitate visual attractivity of the data. The values of pixels in the field are described by the following formula:

$$I(i,j) = \frac{1}{C}\sum_{k=1}^{S}\sum_{l=1}^{S}\exp\left[-\frac{(k-i)^2+(l-j)^2}{2\sigma^2}\right]N_{k,l}$$

Where $N(k,l)$ is the number of cooperation initiatives between organization k and organization l, $I(i,j)$ is the cooperative efforts strength between organization i and organization j, σ is the smoothing parameter and C is the normalization constant:

$$C = \frac{1}{\sum_{k=1}^{S}\sum_{l=1}^{S}\exp\left[-\frac{(k-i)^2+(l-j)^2}{2\sigma^2}\right]}$$

S is the size of the network (total number of nodes in the network).

Figures 9, 10, 11, and 12 depict visualized representations of Smooth Cooperative Effort Strength Field of regional cooperation networks modeled in MATLAB program.

-Figure 9 here-
-Figure 10 here-
-Figure 11 here-
-Figure 12 here-

The results of the analysis indicate that the strength of cooperative effort increases in both networks over time; however, in the northwestern network it increases faster and it is much more evenly distributed across the system. This implies that in the northwestern network more actors are engaged in cooperative effort with many other actors and therefore, have access to information about processes occurring within different policy sectors and capability to influence regional events. The strength of cooperative effort indicates better awareness of regional processes, bigger openness of the whole system, and better participation, mobilization, and adaptation capabilities of the northwestern actors.

Additionally, as discussed previously, decentralization and participation strengthen governance and build social capital in society. Therefore, it is possible to conclude that due to the structural peculiarities of the networks, the northwestern network generates social capital more intensely and has a stronger effect on democratic governance.

Factors explaining agents' degree of power and centrality in the networks

The analysis has been so far focused on the structural peculiarities of the southern and northwestern regional cooperation networks. In the course of the analysis significant structural differences and network development tendencies were discovered and their implications for the functioning of the networks and the overall network effects on democratic governance and policy processes in the regions were discussed.

It is important to understand the factors that explain the positions of power and centrality in the regional cooperation networks. It is hypothesized that an actor's degree of centrality and power in the northwestern cooperation network is a function of its size, alliance proactiveness, level of activity in local environment, and international competence.

Size is defined as the total number of people working for an organization. Bigger organizations might have more contacts with other organizations (both formal and informal), and therefore may have better awareness of opportunities provided by regional cooperation. It may also happen that European actors might be interested in involving bigger partners in projects and initiatives because of trust and reliability issues: they might have better knowledge about bigger regional actors than smaller ones.

Alliance proactiveness is defined as the total number of partners. If an organization is already engaged in partnerships with other organizations, there might be a better chance that it will get engaged in collaboration with other actors in the regional cooperation framework. The level of activity in local environment is defined as the number of public events organized by an actor during the period of time of one year. And international competence is defined as the level of engagement in international activity of any kind- whether having international partners, or participating in exchanges, conferences or other events, or having strategic international partners. International competence was measured on a 3-point scale- '0' for no competence, '1' for moderate competence and '2' for high competence.

It is hypothesized that power and centrality of an actor in the southern cooperation network depends on its size, budget/income, and whether it comes from the public sector. Public sector variable was coded as '1'. All the other sectors were coded as '2', '3', '4', etc.

For the first dependent variable- centrality- degree centrality measure was chosen. Degree centrality was chosen as a measure of most advantageous position in the network in terms of network resource exchange and information flows. Degree centrality indicates how many other network actors are in direct contact with a particular actor. The more nodes connecting to an actor, the higher is its degree, and therefore, the greater the potential to be in the center of events and other network exchange processes (e.g. information flows, financial flows, activities).

The second dependent variable- power- was defined as an eigenvector centrality measure. As discussed previously, actors connected to more actors tend to be more central. But this measure does not account for differences in the centrality of one's partners. Actors who are connected to many well connected actors are more powerful than those who are connected to an identical number of poorly connected actors. In other words, those who are in contact with well-connected or 'popular' actors will tend to be more central than those who are connected to the unpopular. I use eigenvector centrality to capture this aspect. This measure assumes that the centrality of a given actor is an increasing function of the sum of all the centralities of all the actors with whom an actor is connected.

Therefore, the models for the analysis are described as follows:

$$\textit{Power 1999} = ß_0 + ß_1\text{Size} + ß_2\text{Activity} + ß_3\ \text{Alliance} + ß_4\ \text{Competence} + ß_5\ \text{Sector} + ß_6\text{Budget/Income} + e$$

$$\textit{Power 2006} = ß_0 + ß_1\text{Size} + ß_2\text{Activity} + ß_3\ \text{Alliance} + ß_4\ \text{Competence} + ß_5\ \text{Sector} + ß_6\text{Budget/Income} + e$$

$$\textit{Centrality 1999} = ß_0 + ß_1\text{Size} + ß_2\text{Activity} + ß_3\ \text{Alliance} + ß_4\ \text{Competence} + ß_5\ \text{Sector} + ß_6\text{Budget/Income} + e$$

$$\textit{Centrality 2006} = ß_0 + ß_1\text{Size} + ß_2\text{Activity} + ß_3\ \text{Alliance} + ß_4\ \text{Competence} + ß_5\ \text{Sector} + ß_6\text{Budget/Income} + e$$

Multiple regression method was used to estimate the significance and the effect of the parameters discussed above on the position of centrality and power in the networks. Tables 8 and 9 report the results of the analysis.

-Table 8 here-
-Table 9 here-

The results indicate that the size of an actor, the budget/income, and sector orientation (whether an actor belonged to the public sector) were statistically significant factors that had a positive effect on the position of centrality and power in the 1999 southern network. High coefficient for the sector orientation was expected from the previous analysis and goes in line with the previous findings. In 2006 southern network, size, budget/income and sector orientation are still statistically significant positive predictors of an actor's centrality and power in the network. Interestingly, in 2006, the level of an actor's local activity became a significant positive predictor of centrality and power. This may indicate that when an actor is engaged in cooperative networking processes, it may acquire support from like-minded organizations and gain strength and

popularity in the region by active participation in the life of the local community and organization of various events and activities. Therefore, over time public sector actors will have to start taking such 'popular' regional actors into account, thereby creating conditions for the increase in their centrality and power in the regional cooperation infrastructure.

As far as the northwestern network is concerned, in 1999, statistically significant positive predictors of an actor's centrality were the size of an actor, alliance proactiveness, international competence, and sector orientation. Statistically significant positive coefficients for the sector orientation (economic sector) were expected from the previous analysis and go in line with the previous findings indicating that in the northwestern region in 1999 the central aspect of regional cooperation was economic integration. Budget/income and the level of local activity turned out insignificant variables in predicting actor centrality and power in the northwestern 1999 network. In the 2006 network, power and centrality were dependent on the alliance proactiveness, international competence, and local activity variables. Size, sector orientation and budget/income turned out insignificant.

The findings indicate interesting tendencies in the regions. The probability that an actor becomes central in the regional cooperation with the EU in the northwestern region is highly dependent on its international competence and alliance proactiveness implying that the overall level of networking and outreach capabilities and mobility of an actor are important in determining whether it will occupy a central and powerful position in the regional cooperation process. Therefore, it is possible to conclude that the northwestern actors are oriented towards sub-national integration. In the southern network, centrality and power are more a function of local factors indicating that Russian southern actors are more oriented towards internal regional arena rather than external integrative processes.

Conclusion

The results of the network analysis of the regional cooperation structures in the northwestern and southern regions indicate significant regional differences that have important implications for democratic governance in the regions. The analysis demonstrated that regional cooperation with the EU plays a significant positive role in creating connections among Russian local organizations, NGOs, companies, educational institutions, and provincial governments in both northwestern and southern regions. However, due to the peculiarities of the regional structures, regional cooperation with the EU has a stronger effect on the development of an interconnected regional infrastructure in the northwestern region.

According to the analysis, the northwest region, which has higher level of democratic governance, is embedded in a dense and decentralized network governance structure. On the contrary, southern region happened to have sparsely connected, largely fragmented, and highly centralized regional cooperation structure. Northwestern regional cooperation network showed the prevalence of horizontal modes of decision-making, while southern network happened to be vertically differentiated. The results of the analysis indicate that in the northwestern network there is a fairly equal distribution of power, influence and control among network participants; therefore, the northwestern network approximates a good network governance model based on self-organization, adaptability, mobility, and collective action. This indicates efficiency in the regional integration processes in the northwestern area.

In the southern region, the public sector actors are dominating decision-making processes and control integration processes occurring in the regions, which significantly

impedes regional information diffusion and resource exchanges. In the southern cooperation structure high level of centralization of political control over cooperation processes poses the principal obstacle to greater sub-national regionalism.

Another important difference between the northwestern and the southern region is that in the northwestern region, regional cooperation network has a much higher level of intersectoral cross-cutting ties, which indicates that the northwestern regional structure is richer in social capital and is also more participatory, open, and democratically legitimate than the southern one. High level of cross-cutting ties in the system also indicates its effectiveness, mobility and adaptivity to evolving complex regional social, economic, and environmental problems.

Another important finding is that the level of centrality and power in the northwestern network (among other factors) depends on an actor's alliance proactiveness and international competence, which implies that networking capabilities and knowledge of transregional and international environment are important factors in determining whether an actor will get engaged in the regional cooperation infrastructure and become central and influential in it. In the southern region, interorganizational power and centrality are functions of local factors. This indicates that actors in the northwestern region are more motivated and inclined to cooperate with international actors and most important, already have significant international experience. On the contrary, actors in the southern region are more oriented towards local action arena.

The main goal of this study was to discover the main tendencies and the patterns of governance in the regional cooperation systems and discuss their implications for democratic governance and sub-national integration in the northwestern and southern regions of the Russian Federation. The dimension that was neglected in this analysis is the micro-level of individual organizations and individuals. This aspect was ignored not because it is considered to be of less importance, but because this study has been specifically focused on a comparative assessment of the systemic features of the regional cooperation. However, this is a serious limitation of the study as it analyzes structural properties of the systems and their effects, but does not explain why the networks have these structural configurations and why these significant differences in structure exist. The actual configuration and functioning of the regional cooperation networks depend on the regional contexts in which they emerge and operate, and thorough examination of regional historical, cultural, and geopolitical factors that may help to explain structural peculiarities of the networks is necessary. Regional experts are needed to provide a context for the study. Explaining regional cooperation network differences is my current research area.

Figures and Tables

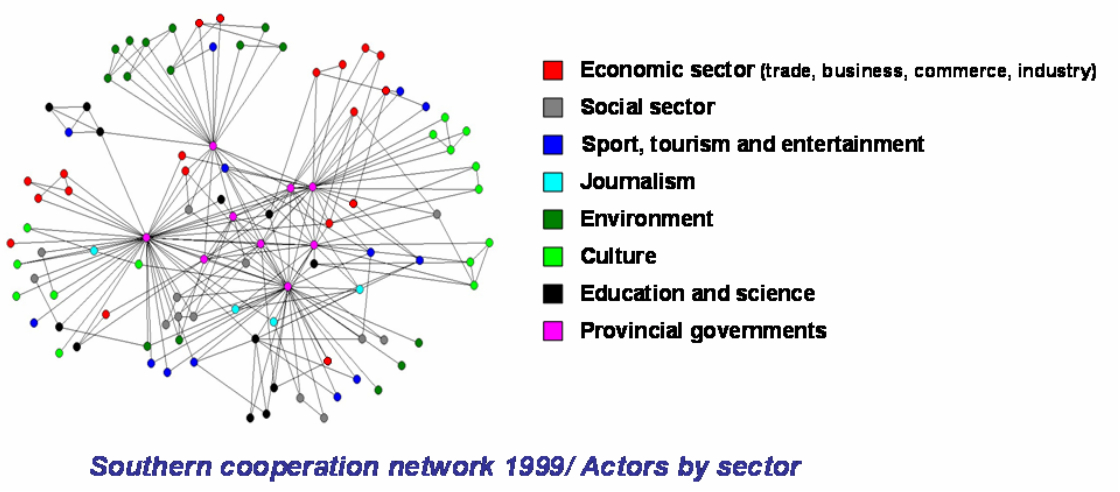


Figure 1

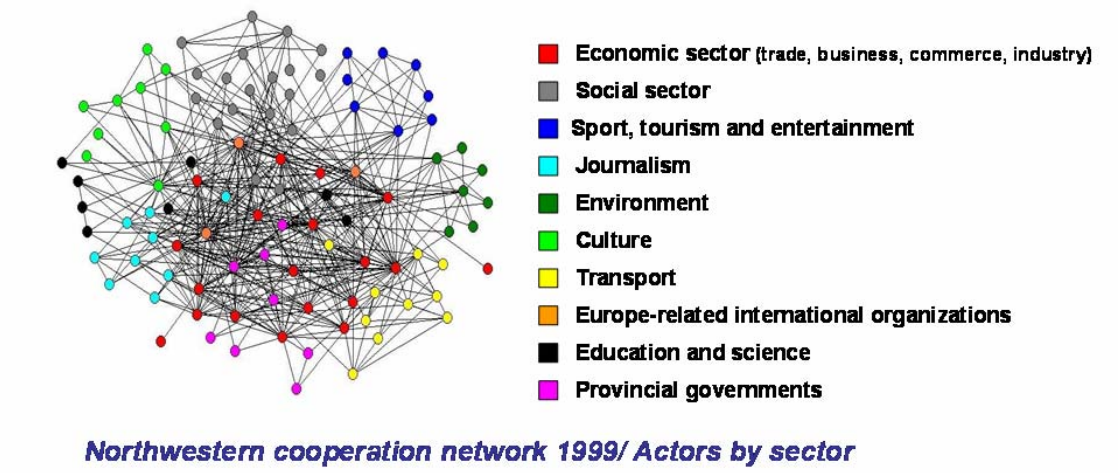


Figure 2

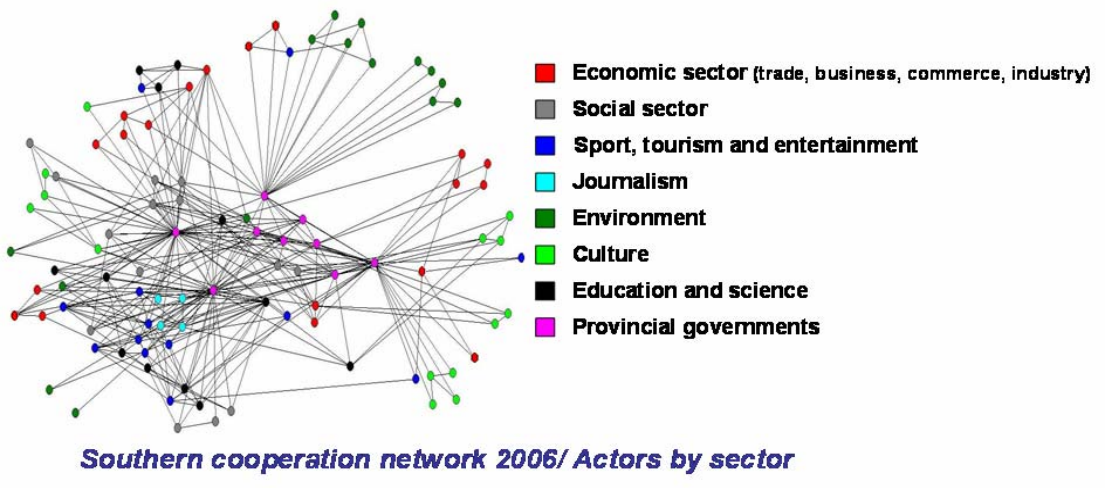


Figure 3

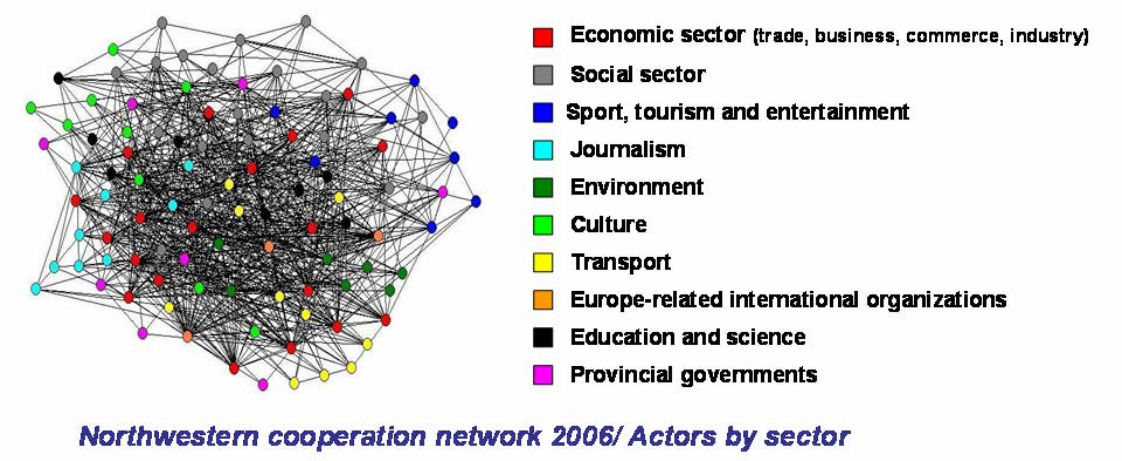


Figure 4

NETWORK CENTRALIZATION (N = 100)[a]

	Centralization
Southern Cooperation Network 1999	61.32%
Southern Cooperation Network 2006	59.58%
Northwestern Cooperation Network 1999	32.17%
Northwestern Cooperation Network 2006	15.22%

[a] The closer the centralization is to 100%, the more centralized the network.

Table 1

Southern Cooperation Network 1999

Degree centrality indexes	*Betweenness Centrality indexes (normalized)*	*Eigenvector Centrality indexes*	*Closeness centrality indexes*
Krasnodar gov (71)	Krasnodar gov (42.1)	Rostov gov (0.45)	Krasnodar gov (64)
Rostov gov (63)	Rostov gov (28.3)	Krasnodar gov (0.44)	Rostov gov (61)
Stavropol gov (41)	Stavropol gov (26.2)	Stavropol gov (0.24)	Stavropol gov (56)
Astrakhan gov (40)	Astrakhan gov (22.7)	Astrakhan gov (0.18)	Astrakhan gov (56)
Maikop gov (25)	Maikop gov (10.1)	Maikop gov (0.15)	Elista gov (53)
Cherkessk gov (18)	Cherkessk gov (8.3)	Cherkessk gov (0.13)	Cherkessk gov (52)
Elista gov (18)	Elista gov (6.5)	Elista gov (0.12)	Maikop gov (52)
Nalchik gov (16)	Nalchik gov (5.9)	Kuban university (0.09)	Vlad gov (51)
Kuban University (15)	Vlad gov (2.4)	Nalchik gov (0.08)	Nalchik gov (49)
Vlad gov (12)	Kuban University (1.9)	Vlad gov (0.07)	Stavr University (46)

Southern Cooperation Network 2006

Degree centrality indexes	*Betweenness Centrality indexes (normalized)*	*Eigenvector Centrality indexes*	*Closeness centrality indexes*
Krasnodar gov (78)	Krasnodar gov (41.3)	Krasnodar gov (0.48)	Krasnodar gov (66)
Rostov gov (73)	Rostov gov (27.3)	Rostov gov (0.46)	Rostov gov (63)
Stavropol gov (71)	Stavropol gov (26.2)	Stavropol gov (0.25)	Stavropol gov (58)
Astrakhan gov (56)	Astrakhan gov (24.7)	Astrakhan gov (0.22)	Astrakhan gov (56)
Elista gov (33)	Elista gov (14.4)	Maikop gov (0.18)	Elista gov (54)
Cherkessk gov (25)	Region obr (12.2)	Cherkessk gov (0.15)	Cherkessk gov (54)
Kuban University (18)	Cherkessk gov (10.1)	Elista gov (0.13)	Maikop gov (53)
Maikop gov (16)	Maikop gov (7.5)	Assotsiatsia NKO (0.12)	Vlad gov (51)
Region obr (15)	Kuban University (2.4)	Kuban University (0.12)	Nalchik gov (50)
Ekologika (14)	Ekologika (1.9)	Vlad gov (0.08)	Ekonom (48)

Table 2

Northwestern Cooperation Network 1999

Degree centrality indexes	*Betweenness Centrality indexes (normalized)*	*Eigenvector Centrality indexes*	*Closeness centrality indexes*
Transphere (31)	Transphere (20.3)	Transphere (0.21)	Transphere (41)
Vneshtorgbank (29)	Vneshtorgbank (19.2)	Vneshtorgbank (0.19)	Vneshtorgbank (40)
ATV (25)	ATV (17.2)	St University (0.17)	ATV (40)
St University (24)	NCMB (14.5)	NCMB (0.15)	Logist part (37)
NCMB (21)	Assotsiatsia sots org (13.8)	ATV (0.15)	Vneshtorgbank (35)
St Petersburg gov (19)	St University (11.9)	St Petersburg gov (0.12)	St Petersburg gov (31)
Novgorod gov (18)	St Petersburg gov (10.5)	Logist part (0.11)	Novgorod gov (29)
Logist part (16)	Logist part (9.8)	Novgorod gov (0.09)	St University (27)
Assotsiatsia sots org (15)	Novgorod gov (7.3)	Assotsiatsia sots org (0.07)	Assotsiatsia sots org (25)
RSB (14)	Shkola prav (5.1)	RSB (0.06)	RSB (21)

Northwestern Cooperation Network 2006

Degree centrality indexes	*Betweenness Centrality indexes (normalized)*	*Eigenvector Centrality indexes*	*Closeness centrality indexes*

North-West Assoc (17)	North-West Assoc (9.2)	North-West Assoc (0.13)	North-West Assoc (25)
Econ Dev (16)	Econ Dev (8.4)	Econ Dev (0.11)	Econ Dev (23)
Cult Init (16)	Cult Init (7.9)	Cult Init (0.11)	Cult Init (22)
Sev prirodoohran (14)	Sev prirodoohran (7.6)	Sev prirodoohran (0.09)	Transphere (19)
St University (13)	St University (7.3)	Transphere (0.08)	Journalism CT (18)
Petrozavodsk Univ (12)	Journalism CT (7.1)	Journalism CT (0.08)	Sev prirodoohran (18)
Resource Center (12)	Transphere (6.9)	Resource Center (0.07)	St University (17)
Journalism CT (11)	Petrozavodsk Univ (6.7)	St University (0.06)	Petrozavodsk Univ (15)
Transphere (10)	Resource Center (6.4)	Petrozavodsk Univ (0.06)	Resource Center (14)
St Petersburg gov (9)	St Petersburg gov (6.1)	KulturKontakt (0.05)	St Petersburg gov (11.1)

Table 3

NETWORK DENSITY (N = 100)[a]

	Density
Southern Cooperation Network 1999	7.03 %
Southern Cooperation Network 2006	10.27 %
Northwestern Cooperation Network 1999	13.32 %
Northwestern Cooperation Network 2006	36.67 %

[a] The closer the density is to 100%, the denser the network.

Table 4

NETWORK TRANSITIVITY (N = 100)

	Transitivity
Southern Cooperation Network 1999	14 %
Southern Cooperation Network 2006	21 %
Northwestern Cooperation Network 1999	48 %
Northwestern Cooperation Network 2006	81 %

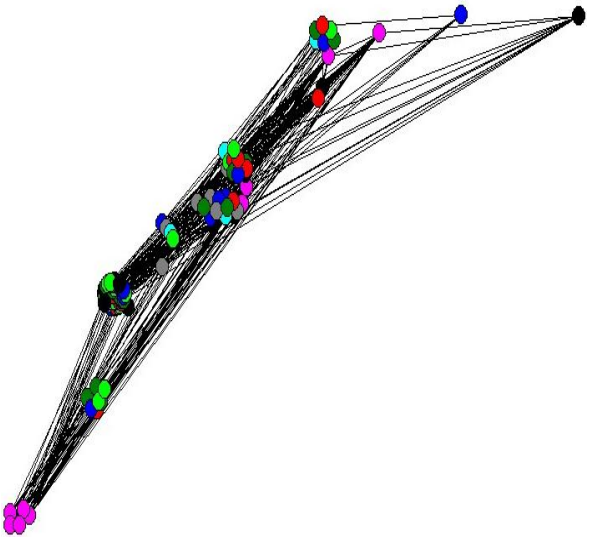
Table 5

NETWORK COMPACTNESS (DISTANCE-BASED COHESION) INDEXES (N = 100)[a]

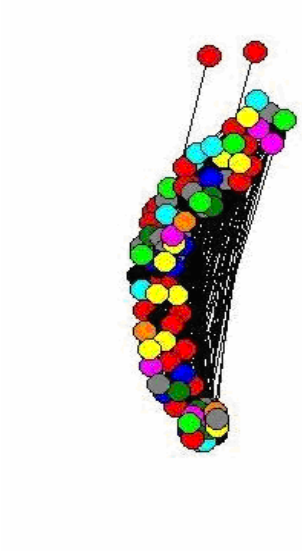
	Compactness Indexes
Southern Cooperation Network 1999	0.332
Southern Cooperation Network 2006	0.344
Northwestern Cooperation Network 1999	0.546
Northwestern Cooperation Network 2006	0.620

[a] range 0 to 1; larger values indicate greater cohesiveness.

Table 6

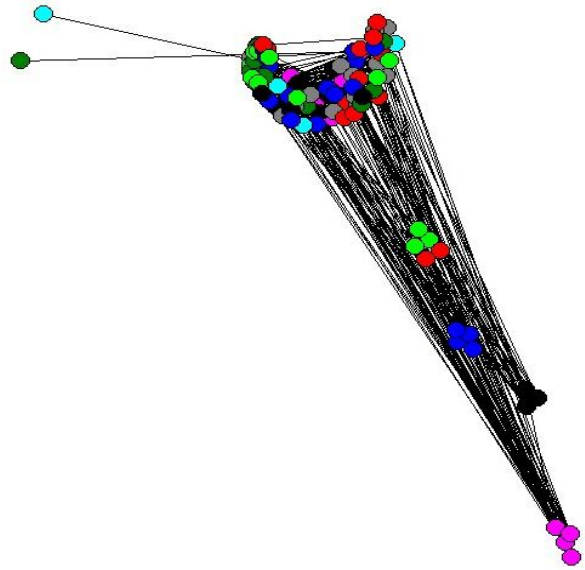


Hierarchy/ Southern network/ 1999



Hierarchy/ Northwestern network/ 1999

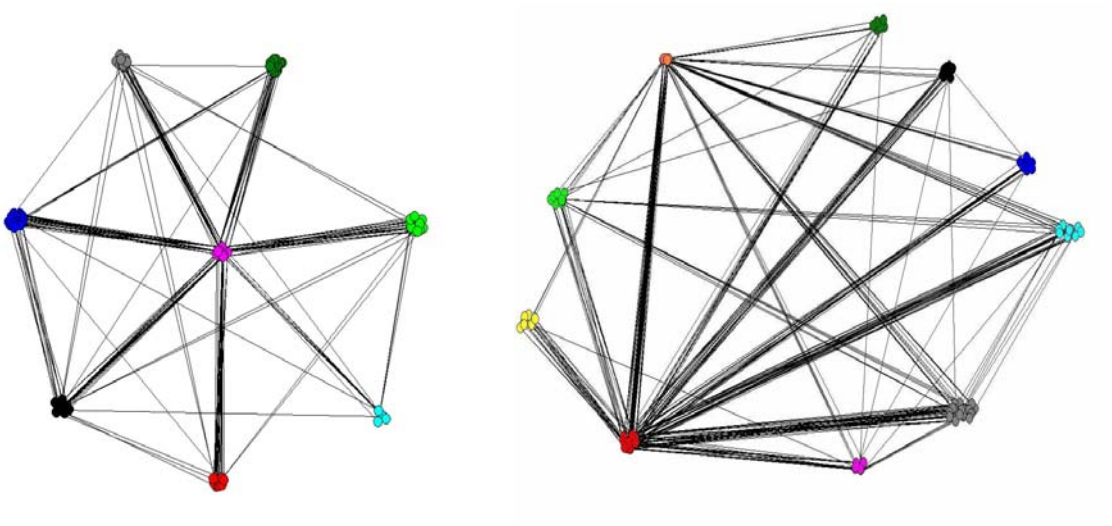
Figure 5



Hierarchy/ Southern network/ 2006

Hierarchy/ Northwestern network/ 2006

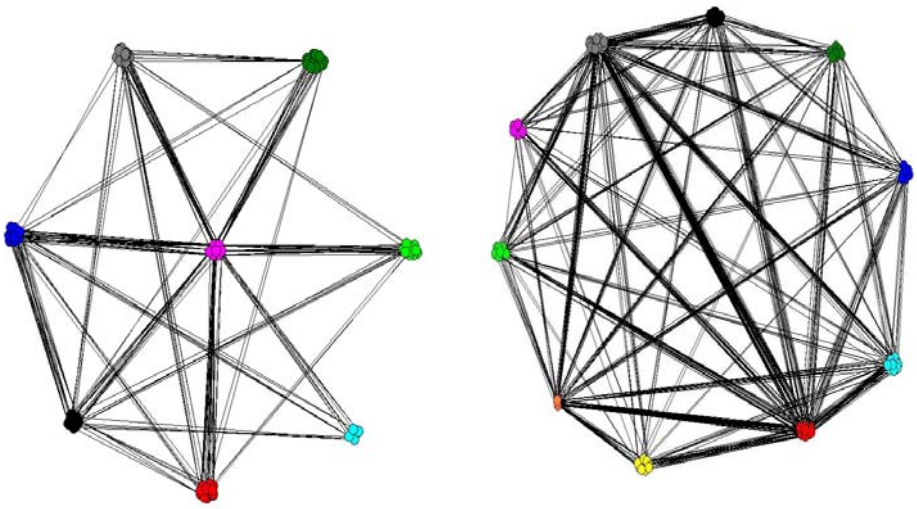
Figure 6



Southern network / Intersectoral Interaction 1999

Northwestern network / Intersectoral Interaction 1999

Figure 7



Southern network / Intersectoral Interaction 2006

Northwestern network / Intersectoral Interaction 2006

Figure 8

Strength of cooperation τ	Southern99	Southern06	Northwestern99	Northwestern06
	0.25	0.34	0.50	0.69

Table 7

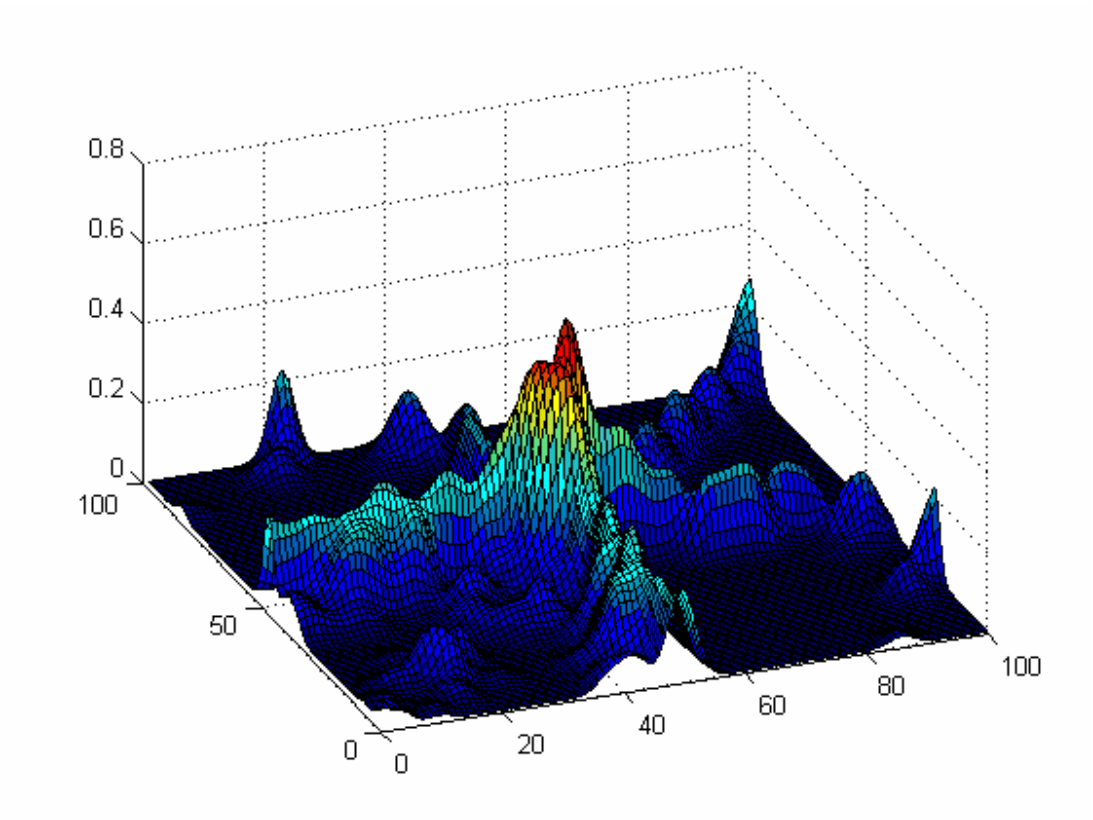


Figure 9: Cooperative effort field/Southern Network 1999

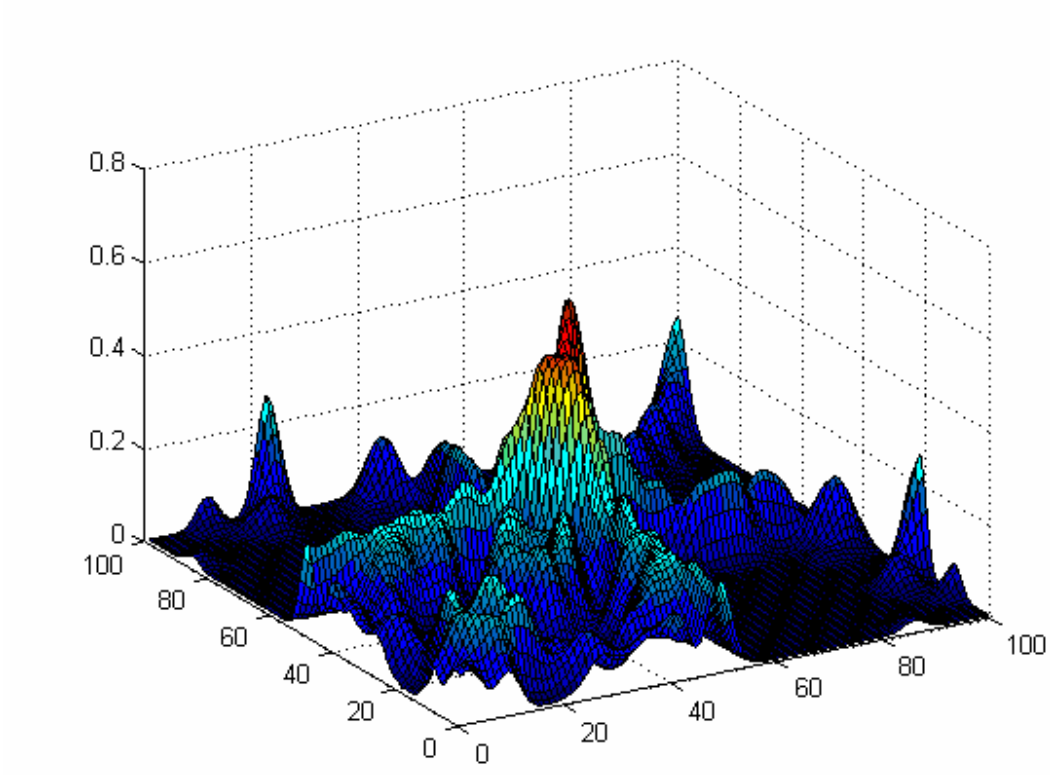


Figure 10: Cooperative effort field /Southern Network 2006

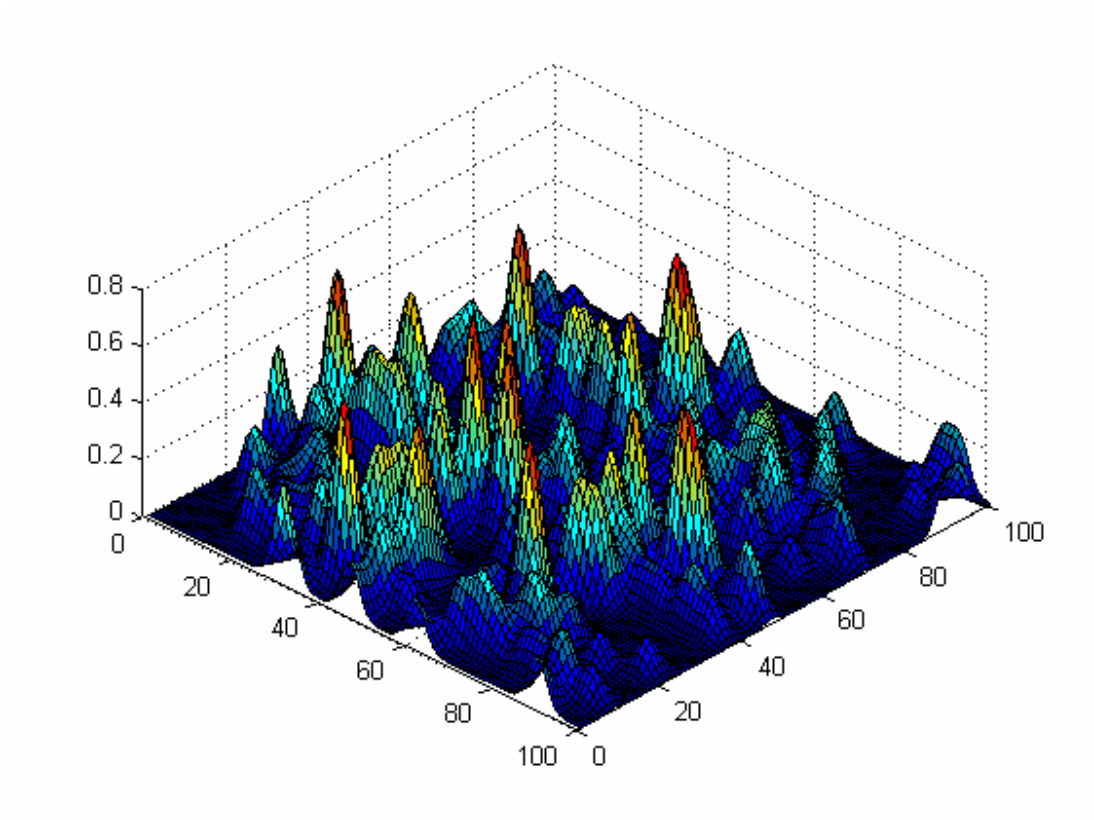


Figure 11: Cooperative effort field /Northwestern Network 1999

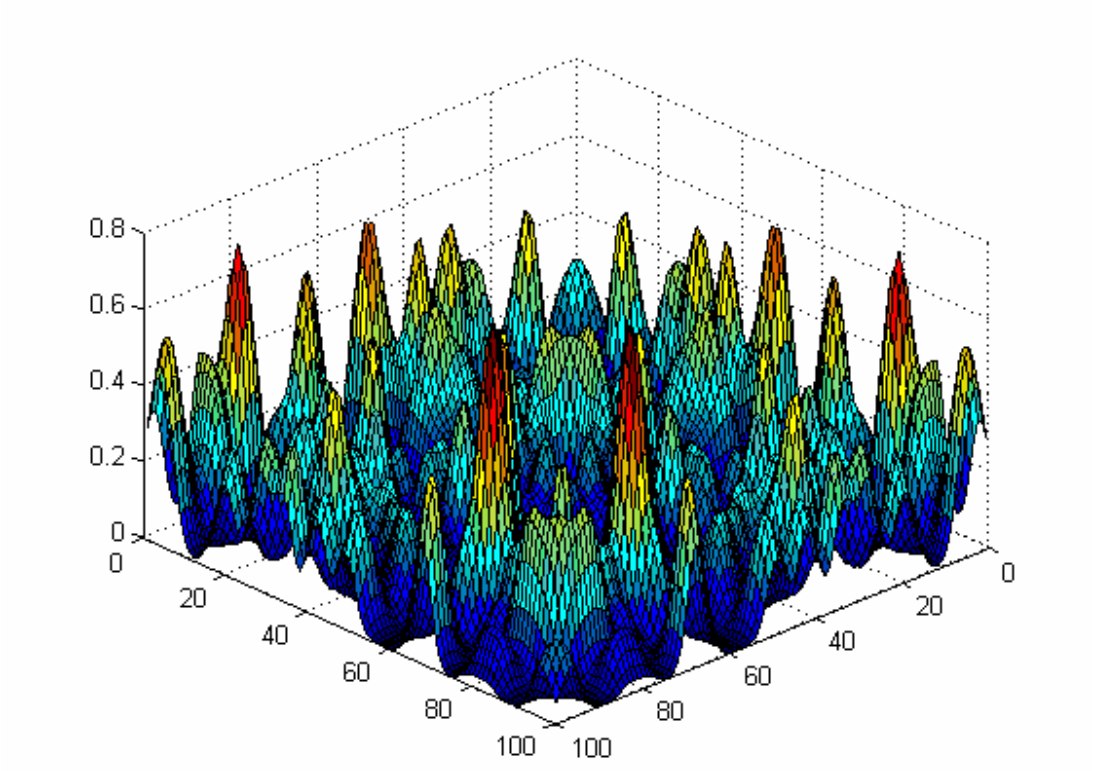


Figure 12: Cooperative effort field /Northwestern Network 2006

	Size	Level of Activity	Alliance proactiveness	Sector	International Competence	Budget/Income
Centrality 1999	0.31*	0.12	0.36	'1'-0.74**	0. 27	0.19*
Power 1999	0.28*	0.09	0. 24	'1'-0.67*	0. 23	0.15*
Centrality 2006	0.34*	0.13*	0.43	'1'-0.62*	0.29	0.14*
Power 2006	0.30*	0.10*	0.37	'1'-0.44*	0.25	0.08*

* *significant at the .05 alpha level*
** *significant at the .01 alpha level*

Table 8: Southern Network

	Size	Level of Activity	Alliance proactiveness	Sector	International Competence	Budget/Income
Centrality 1999	0.12*	0.34	0.27**	'2'-0.37**	0.42**	0.31
Power 1999	0.07*	0.31	0.24*	'2'-0.32**	0.40*	0.29
Centrality 2006	0.13	0.26*	0.32*	none	0.37*	0.25
Power 2006	0.10	0.28*	0.30*	none	0.35*	0.19

* *significant at the .05 alpha level*
** *significant at the .01 alpha level*

Table 9: Northwestern Network

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