Effectiveness of policies for innovation on a local level: a comparative study of social networks

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LIST OF ABBREVIATIONS

EU	European Union
ERDF	European Regional Development Fund
GDP	Gross Domestic Product
R&D	Research and Development
RTDI	Research, Technology Development and Innovation
DG RTD	Directorate-General for Research and Innovation (European Commission)
SF	Structural Funds
ESF	European Social Fund
SMEs	Small and Medium Enterprises
ICT	Information and Communication Technologies
NSRF	National Strategic Reference Framework
NUTS	Nomenclature of Territorial Units for Statistics
DG REGIO	Directorate-General for Regional Policy (European Commission)
GOVERD	Public Expenditure for Research and Development
BERD	Business Private Expenditure for Research and Development
HERD	Higher Education Research and Development
IUS	Innovation Union Scoreboard
RIS	Regional Innovation Scoreboard
IPR	Intellectual Property Rights
EPO	European Patent Office

EXECUTIVE SUMMARY

The dissertation project aims to study the link between social reflexivity, as theorised by Donati (2011), and "team-efficiency/effectiveness" in EU-funded innovation projects, focusing on the role played by social networks of pre-selected innovation projects both in Germany and Netherlands. In each country, one project, which for some characteristics was supposed to have produced the property of social reflexivity and a control project were selected. The general objective of the research was to study the effect of social reflexivity on efficiency/effectiveness as independent (explanatory) variable, emerging in the context of innovation projects in two countries/regions in which many different stakeholders (university, firms, other organisations) enter into a network to develop together a new product or a new technology to put on the market.

In the first chapter of this dissertation, the theoretical background of the research has been presented starting from the conceptualisation of social reflexivity of Donati and explaining the use that Donati has done of the morphogenetic approach elaborated by Archer in outlining four main paths to change at the end of the morphogenetic process in which the emergence of social reflexivity is the main discriminant. His Theory of the Society and the main differences with other relevant theories has been reported. For example, a particular attention has been given to another theorisation of "team" reflexivity (West 1996), which is widely used in the innovation literature when detecting the link between reflexivity and performance in innovation projects. In this dissertation, it has been chosen to adopt the theorisation of Donati, who conceives social reflexivity as a property of the networks and advances a more comprehensive and complex conceptualisation of social reflexivity that consider reflexivity working on three orders of relationships. After the introduction of the theoretical background, the main thesis and hypothesis of this dissertation have been advanced. The main thesis of this dissertation is that the presence of social reflexivity at a team level allows more efficient and effective results at the end of the project, more precisely that the team-efficiency/effectiveness of such particular projects depends on many determinants which are more related to the quality of the relations that teams (analysed as networks) are able to produce by themselves and throughout the relationship with their external institutional environments during the time span of the project. The other explaining variable in this research was the specific institutional and cultural setting in which the projects were developed as external variable (policy implementation at a regional level). A third hypothesis that can be verified is about the interplay of social reflexivity and policies in enhancing outperforming of innovation projects. The main policy literature regarding the programme of incentives (ERDF –European Regional Development Fund), to which the four

selected projects belong, concluded the chapter with the aim of explaining the relevance and the use that the selected countries have done on a regional level of this specific source of structural funds in the programming period 2007/2013.

In the second chapter of this dissertation, the methodology and the design chosen for comparing the cases have been explained reporting the variables considered in the study in a most similar case design. Furthermore, the need to adopt a mix-methods design to networks when detecting the emergence of social reflexivity in innovation projects has been explained. The operationalisation of the concept of social reflexivity and the indicators chosen for its measurements in both interview and questionnaire used in this research were explained, pointing out the explorative way chosen in this research in order to grasp this quite abstract concept. The chapter concluded with the explanation of the general sampling strategies, which were followed during the research.

In the third chapter, the main criteria used for selection of countries, regions and cases were reported in explaining the correlations analyses done on available innovation outputs (Regional Innovation Scoreboard 2012) on a European Union level, in order to be able to select two countries and regions inside the European Union, which presented significantly different innovation outputs and presumably two different policies for innovation on a local level, but at the same time not too broad differences in terms of economic development and higher education system. The main criteria followed for the selection of the cases (projects) concluded the chapter.

In the fourth chapter, the two main methods used in this research to collect data were explained: the interview and the questionnaire. The need to have a mix-methods approach in order to detect perceptions of change in the networks during the time span of the projects has fostered the integration of two different methodologies and thus the use of two different methods. The initial semi-structured interview was more thought to collect data about perception of changes in the time (longitudinal). The questionnaire was adopted in a later phase in order to have a cross-sectional measurement of the whole network at the end of each project. The main problems and limitations encountered in the collection and analysis of the data concluded the chapter.

The fifth chapter was completely devoted to the analysis done on the quantitative data collected through the use of the questionnaire. The choice to present before the quantitative analysis, rather than the qualitative, although whose data were collected before, was suggested by the fact that the end of the project was the starting point for the respondents to start reconstructing changes occurred in their networks. For the analyses conducted, the matrices of

the four whole networks were used in order to make some comparisons between their structural characteristics. The first dimensions for interpretation, which emerged from the analysis of the quantitative data, were introduced here in order to make clear what emerged from the structural analysis, which have been later used and integrated by the dimensions emerged in the analysis of the qualitative data.

The sixth chapter is the longest of the whole dissertation because it reports for each project the content analysis done of the semi-structured interviews and aimed at reconstructing perceptions of changes in the networks, which allowed to understand if networks have produced social reflexivity, especially on the third orders of relationships. The results from the two different types of analysis were triangulated in the seventh chapter in order to understand which were the most relevant dimensions for interpretation that emerged from both analyses. An integrated interpretation of the results was reported first on a local level, considering dimensions, which emerged with different intensity in the two different countries, followed by an integrated interpretation of the results as compared between networks, where dimensions, which emerged in both countries, were reported. The verification of the thesis and main hypotheses of this dissertation with some policy recommendations concluded the chapter.

In the last eighth chapter, or general conclusions, the main results of this dissertation were summarised in outlining results, which can add value to current literature about reflexivity, performance and innovation and results, which are more oriented to inform policy for further improvements of EU innovation policies.

1 THEORETICAL CHAPTER

1.1 Introduction

The main aim of this dissertation is to explain the role and relevance of social reflexivity in outperforming of EU-funded innovation projects on a regional level in Germany and in the Netherlands. The first half of the following theoretical chapter aims at collocating the research question of this dissertation in the theoretical debate about the concept of (social) reflexivity. Social reflexivity is a concept used by Donati for describing reflexivity at the meso-level of the social networks, which builds upon the prior theorisation of Archer about the analytical category of reflexivity in contraposition to the analytical category of habitus introduced by Bourdieu. Furthermore, Donati applies in his whole Theory of the Society the morphogenetic approach to change elaborated by Archer (1995) in order to analytically disentangle the effects of structure, culture and agency. In order to comprehend how the concept of social reflexivity was used by Donati, in his own theorisation, it is meant to be important here to briefly outline how his Relational Theory of the Society builds upon other previous theories and what is his particular contribution to the relational sociology framework and the main differences to other relevant theories and theorisations of reflexivity at a team level (West 1996). Especially, his theorisation of four different paths to social change as a product of a morphogenetic process, is considered to be central for the following dissertation. After introducing the theoretical background of "social reflexivity" the main thesis and specific hypotheses of this dissertation will be here advanced. A last part about integration of theoretical assumptions from innovation theory, social reflexivity debates and social network analysis together will show why a cognitive approach to social network analysis has been considered here to be suited to detect social reflexivity in these particular social networks.

The second half of this chapter is aimed at introducing the main policy literature about the specific EU programme of incentives (ERDF – European Regional Development Fund), to which the four selected projects in the two selected countries/regions belong. The main aim is to contextualise the four selected projects and to describe the goals of this specific policy of the European Union, which aims at contributing significantly to innovation in European regions. The state of the art, some past policies examples and current evaluation at the level of country/regions will be here introduced.

1.2 Theoretical background

This part of the chapter is devoted to explain the main theoretical assumptions, which inspired the formulation of this dissertation. In order to fully comprehend how the concept of social reflexivity was achieved and applied by Donati in his relational theory of the society, it is here needed to explain first the general collocation of his theory in the framework of the relational sociology and second, his epistemological perspective, which has to be linked to the critical realism (Archer, Bhaskar) and the morphogenetic approach to social change (Archer 1979; 1995). This epistemological perspective has allowed him to formulate a theory in which "the relation has a proper *sui generis* reality – another order of reality – which comes about through an interplay among agency, structure and culture, always implying the three dimensions and not only the latter two; in his mind, the sociologist must inquire into that and treat the relation as a *third* beyond any schematic and strong dualistic framework (*Erklaerung/Verstehen*; structure/culture; holism/individualism; micro/macro analysis; agency/system) (Donati 2013a: 220-221). The relationship is 'triadic', not simply dyadic, because it is the 'emerging phenomenon among subjects in interaction' (Donati 1991:27; Donati 2013:302) and does not work as a 'mechanical' concept at all." (Ruggieri 2014:52). This citation makes clear the strong influence of the work of Archer in the Theory of Donati, especially regarding the attempt to overcome the so-called dichotomy structure/agency (in contraposition to the Structuration Theory of Anthony Giddens) and regarding the fact that the relation possesses his own reality and thus cannot be reconducted to a supra-ordinated system and cannot work in a mechanical way (in contraposition to the New Functionalist Theory of Luhmann). Building on these fundamental theoretical assumptions he developed further the concept of social reflexivity, starting from the Archer's original concept of reflexivity as a mediating force between structure and agency. Similar concepts of group or team reflexivity widely used in the psychology of organisation to define reflexivity at a team level will be confronted here with the concept of social reflexivity, explaining why in this dissertation it was chosen to study reflexivity as it has been formulated in the theory of Donati. Finally, the application of the morphogenetic approach to social change has allowed Donati to elaborate four different paths to social change, resulting at the end of the morphogenetic process, in which the presence of social reflexivity plays a key role in defining a network (the creative one) in which actors make use of relational feedback and are able to steer the network in a relational manner.

1.2.1 The relational sociology framework

The theory of the society (relational sociology) developed by Donati is one of the first theories in the relational sociology framework to appear in the 1980s (Powell and Dépelteau 2013). This theory can be considered one among the many different approaches/theories inside the framework of the relational sociology. The main approaches or theories inside the relational sociology framework refer to "Actor-network-theory, the figurational approach of Elias, social network analysis, the late Bourdieu's work, the formalism of G. Simmel, some texts of Marx and Durkheim, (neo) Weberian approaches, critical realism, symbolic interactionism, and many other social scientists, theories, or approaches have been associated with relational sociology" (Powell and Dépelteau 2013: XVI). In the theorisation of Donati, the concept of social relation, as already introduced above, is of fundamental importance to understand the difference, in ontological terms, with other theories inside the same framework (relational sociology): "From the perspective of an epistemology which I call critical, relational and analytical realism, a social relation is an emergent effect of a reciprocal action (ego-alter inter-action) between actors/social subjects who occupy different positions in a societal configuration (a system, a network, or other arrangements)" (Donati 2014:13). From this first definition of social relation it can be understood that Donati refers strongly to the epistemology of the critical realism in his theorisation, in keeping with Archer's view of relationships as emergent effects with their own properties and powers, which are distinct from the individual actors with whom the relationship has been formed. In common with other theories/approaches inside the framework of relational sociology the theory of Donati and "most relational sociologists reject the ideas that individuals are isolated and driven only or even mostly by internal properties, or that social phenomena are "social things," meaning external and constraining or enabling forces that impose themselves on individual and collective actors." (Powell and Dépelteau 2013: XV). Most of the theorisations inside the framework of the relational sociology try to overcome the classical dichotomy between subject/object and voluntarisms and determinisms, seeing social relationships as dynamic and fluid processes (Powell and Dépelteau 2013).

1.2.2 Theories of (social) reflexivity in the social sciences

As already introduced above, the first step to understand the concept of social reflexivity in the theory of Donati, is to refer to the more general concept of "reflexivity," which is very much used and debated in the current social sciences and in the social theory. The adoption of the reflexivity concept of Archer from Donati comes from the need to maintain the following

three analytically distinct dimensions of every social phenomenon: agency, structure and culture. Reflexivity is the force that mediates between agency and structure for Archer, "it is through reflexive deliberation on their social situations and the range of available actions that people exercise agency to reproduce or change their circumstances (Archer 2003). Reflexivity is the means through which people identify, order and revise their 'ultimate concerns' to which they commit themselves." (Weaver 2012:397). In the Structuration Theory, structure is both medium and outcome of the agency (Porpora 2013), so the two dimensions are "conflated," using the Archer terminology, which means that there is no account for the role of the human agency in shaping and transforming (through the exercise of personal reflexivity) the social structure. The same can be held for the dimension of culture, which is also conflated into the structural dimension.

Archer elaborated the analytical model of the morphogenetic approach in order to keep separated these three dimensions when studying every social phenomenon: "as an explanatory framework, the morphogenetic approach endorses a stratified ontology for structures (Archer 1995), cultures (Archer 1988) and agents (Archer 2000) because each has emergent and irreducible properties and powers – and explains every social outcome as the product of their interplay. Outcomes, which can be broadly reproductory or largely transformatory, depend upon the intertwining of structure, culture and agency, but not by rendering them inseparable, as in the "central conflation" (Archer 1995: 93-134) of Giddens, Bourdieu and Beck, which makes for an amalgam precluding the examination of their interplay." (Archer 2010b:274).

The main thesis of Archer is that toward the end of the 20th century the category of habitus (Bourdieu) has begun to decrease as a relevant tool in investigating the structure of the capitalist democracies. This made the category of reflexivity an "imperative" in order to find explanations to the problems created by the globalisation process, which require more reflexive decisions from the agents rather than traditional routine responses. The Relational Theory of the Society of Donati also applies the analytical model of the morphogenetic approach. The main thesis of the relational sociology of Donati is that, as a result of the process of globalisation, society and each of its sub-systems differentiate themselves according to a prevailing code or type of reflexivity. The three types of personal reflexivity proposed by Archer (communicative, autonomous and meta-reflexivity) can be correlated by Donati with different subsystems of the society (the market, the political system, the third sector, the families). Distinguishing through these types of reflexivity, his relational sociology tries to overcome the reductive and undifferentiated thesis of the Reflexive Modernity, in which the difference between structure and agency are analytically conflated. The relational sociology of Donati also tries to extend this

notion of reflexivity to social networks, considering reflexivity not only as a strictly personal mental activity (internal conversation) but also as being inherent to social structures in an interactive way (producing social reflexivity): "If Alter is another person or people, then, Donati suggests, this is social reflexivity which has an interactive character." (Weaver 2012:398). Social reflexivity may arise in a network due to repetitive interactions between the actors and, at the end of the morphogenetic process, gives rise to a relational good/bad perceived by the actors of the network as "those outcomes of a communicative and affective nature (i.e., trust, care or mutual concern/domination, fear, loneliness), which emerge from the reciprocal relation between people" (Weaver 2012:398).

This relational good/bad is external to actors in the network and it can be seen as the product of their relationships. Social reflexivity is the reflexivity produced by the social networks, since, for Donati, there cannot be structures without relationality. This way of conceiving a relation as a "third" or "triadic" in a network has the aim to outline that there are actually three orders of relationships with their own reflexive processes, which take place in every network: first order relationships between ego and alter in a network, second order relationships when ego reflects about alters' relationships in a network and third order relationships, when the reflexivity is about relationships as a common good, as for example described by Archer: "collective reflexivity derives from the relationality of Ego and Alter, and their subjective acknowledgement - under their own descriptions – that their relationship has a worth that exceeds them as two individuals as well as objectively being irreducible to them. In other words, their relationship itself has emergent properties and powers." (Archer 2013a:154).

The next step will be to understand how these networks are working, in the theorisation of Donati, which are able to produce the property of social reflexivity. Two main important characteristics considered here are the use of relational feedback among the agents and the relational steering of the network. Especially regarding these two characteristics of the networks, Donati explains why his theory is far from the theorisations of functionalism and, in particular from the New Functionalism of Luhmann, about the way of considering relationships and social networks. The use of relational feedback in the interaction phase of the morphogenetic process (T2-T3) allows the network to elaborate variance "in a relational way" and not as a machine, as explained by Donati: "People feedback by changing their minds and redefining their goals and/or rules so as to create relationally a new set of opportunities that are not the result of positive or negative feedback, as in a machine, but of a reflexive network." (Donati 2013a:220). This is exactly the first point in which Donati rejects the idea from the functionalism and, especially from Luhmann that a social relation is only to be considered as a form defined by re-entry

operations, which uses a binary code, i.e., positive and negative feedbacks to select and stabilise variations. As Donati points out, "For Luhmann, social forms – i.e., distinctions – are 'not relational' (in the sense that they do not consist of social relations); they exist only as communicative systems." (Donati 2013a:211). As it is known social networks are for Luhmann contingent, interactive and 'local' (Donati 2013a), so they have many problems in defining their boundaries and stabilising themselves. But it is especially the negation of different logics for producing variety (opportunities) in the network that seems to be not recognised in the theory of Luhmann, where only positive or negative feedback are recognised in the morphogenetic process from "the creation of variety, to selection, and then to the stabilisation of a variety of social relations." (Donati 2013a:212).

Other more relational logics for the production of the variety in the network are recognised to have a role in reflexive networks from Donati, such as "role-playing, exchange, conflict as an integrating process, dyadic encounters, circular interaction, and reference groups" (Donati 2013a:220). All these logics are able to produce variance in the network in a relational way, refusing the yes/no alternative, but relating "to other agents in terms of 'both-and' or 'neither/nor', leaving out the "either-or'." (Donati 2013a:220).

The second aspect of reflexive networks, i.e., networks able to produce the property of social reflexivity, is strongly related to the use of relational feedback among the agents. This is the relational steering of the network, i.e., the type of governance that a reflexive network is able to put in place. In the Theory of Luhmann steering of social systems will be even more difficult in the future because of the explosion of the world of communications, so for him social networks are too contingent to stabilise and the governance/steering will result to be much harder (Donati 2013a). There are other theorists (Veld et al. 1991; Termeer 2007) pointing out these problems and suggesting how social networks could be able to steer in the future "the growth of complexity by means of a convergence on values and shared practices that render diversities compatible with each other." (Donati 2013a:223). But these authors in Donati's view are not considering the processes of reflexivity in fostering the capacity of steering social networks on the three orders of relationships: "they ignore the inner reflexivity of single agents/actors, the reflexivity of subjects in relation to each other, the reflexivity of relations that make the networks, and the structural reflectivity of networks." (Donati 2013a:225). The relational steering for Donati, can be a coordination mechanism that enables stable configurations to emerge, because it is based on relational feedback between the actors, and on a governance type which is relational and based on the norm of solidarity (reciprocal empowerment and enhancement) and the principle of subsidiarity (helping each other) among the partners: "Relational steering consists in sharing the

relationality of the network as a common good (a relational good) among subjects that intend to accomplish a project open to new opportunities." (Donati 2013a:225).

Another relevant approach to reflexivity in the social sciences is the theorisation about "team reflexivity" (West 2000) in the field of the psychology of organisation, which is considered to be central for this dissertation, because it is widely used in studies, which already detected the link between team reflexivity and better team performance (West et al. 1997; Hammedi et al. 2011; Hoegl et al. 2006). In these studies, team reflexivity on a team level is always seen as a "list" of certain actions/behaviors, which the team, as an undifferentiated whole, performs during the project like planning, questioning, reviewing past events with self-awareness, learning at a meta level, etc. (West 1996). Team reflexivity has been seen here as a process of "conscious reflection on team functioning" (Schippers et al. 2013:8), which can be induced during the project as a practical intervention that can improve the final performance of the project. Some studies detecting this link between team reflexivity and final performance found evidence about the role of reflexivity in fostering virtuous processes of team adaptation and adjustments (Argyris & Schoen 1978; Hoegl et al. 2006; Schippers et al. 2013), but other studies showed that the effects of reflexivity are more ambiguous than it has been assumed (Moreland and McMinn's 2010, Klueger and DeNisi 1996). For example, the study of Klueger and DeNisi (1996) "showed that over one-third of feedback interventions led to negative rather than positive effects on performance." (Schippers et al. 2013:8). This because the link between team reflexivity and action (in this case to learn from the negative feedback and to improve) is not automatic. As further research confirmed the link between team reflexivity and team performance is mediated by team learning, defined by Wilson, Goodman and Cronin (2007:1043) as a "change in the group's repertoire of potential behavior." So, only if a team is able to learn and change after an induced team reflexivity intervention (negative feedback) it is then more likely that the final performance will improve.

There are some limits in this way of theorising team reflexivity, which has led to adopt in this dissertation the concept of social reflexivity of Donati, instead of that of team reflexivity of West. The first limit refers to capture only the "behavioral" dimension of reflexivity, considering reflexivity as something that can be easily achieved planning some sessions in which there is discussion, feedback and reflection on past events, rather than being also a cognitive process, that takes place during the time. This way of conceptualising reflexivity does not take into account individual differences of the partners and of the sectors (public/private) they belong to. Regarding this point, I evaluated that the theory of Donati is more complex and complete for my research question. This point represents also the innovativeness of the dissertation, because

until now there were already some studies about the link between reflexivity and efficiency/effectiveness in innovation projects, but the type of reflexivity investigated there has been very broadly defined as some more or less reflexive induced actions of the group as a whole as mentioned before, rather than a (social) reflexivity that pertains already to teams/networks, and that can orientate action. This does not take into consideration the effects that reflexivity, especially social reflexivity, has on the three orders of relationships and that reflexivity is a process always present in every relationship, as well explained by Archer in saying that "joint action is rarely nonreflexive, non-discursive, and free from learning." (Archer 2013a:150). Of course, reflexive processes can be fostered in a team, but especially in mixed contexts, where different organisations are involved, with their own different logics and languages, this collective reflexive process cannot be exercised and reduced only giving to the other partners some more or less negative feedback, which could even hamper and destroy the relationship. It would be rather worth to invest in a process, where the actors recognise the value of their partnership and their relationality, in order to be able to steer the partnership in a way that is most beneficial for all of them.

1.2.3 The morphogenetic approach and four paths to social change

The use that Donati has made of the morphogenetic approach (1995) elaborated by Archer, has allowed him to elaborate four different paths to social change resulting at the end of the morphogenetic process (T4). These paths explain different possible structural configurations social networks may assume at the T4 of the morphogenetic process (Donati 2013a, b):

- **Morphostasis**: at the end of the morphogenetic process the same initial structural conditions are confirmed (no structural change). There was no social reflexivity in this network, the actors maintained stabile the initial conditions and were reproducing them at the end giving no space to any social change. (Mere reproductive network).
- **Development or Growth**: this form of network is just an evolution of the initial one. There are some elements of systemic progress which are due to an adaptation between positive and negative feedbacks between the agents. This type of network does not produce social reflexivity but is purely adaptive.
- **Interactive network with no emergent/stability**: this form of network is just based on interactions that do not produce any kind of relational stability. It is a kind of chaotic network, which is also not supposed to have produced social reflexivity.

- **Creative morphogenesis:** at the end of the morphogenetic process a real change, a new social form with different powers and properties is emerging. The new structure of the network emerges and stabilises itself, and it is completely different from the structure at time T1. The kind of steering emerging from this network regulation is a relational one, in which the actors, through social reflexivity developed at a network level, are able to reflect about themselves in the relation to the others and about the relation in itself (relationality) and orientate their actions in order to maintain the goodness of the network during the time.

The morphostasis path is the only one which does not produce any kind of social change. The other three are different paths of morphogenesis: adaptive, interactive and creative. But only the creative morphogenesis is indicative of a network, which was able to produce social reflexivity and to let emerge a new structural form. These four paths to social change arise because of different logics in selecting opportunities in the networks, which were already explained above. The different logics for distinction, that inform how opportunities were selected, are: "*i) competitive and non-competitive logics; ii) individual logics and relational logics; iii) instrumental logics and expressive logics* (and so on)." (Donati 2014:59).

Given such complexity and the co-existence of more levels in the process of innovation, the morphogenetic approach has been considered here to be a valid analytical tool to disentangle the effects of structure, agency and culture within the innovation process and to interpret their intertwined causal influences on each other in a specific time span. For this reason, this analytical model was adopted in this dissertation, in order to understand if at the end of the morphogenetic process (in the case of this dissertation at the end of each innovation project) networks containing the property of social reflexivity (creative networks) were stabilising themselves.

In the Relational Theory of the Society (Donati 1991), relationships are considered as "sui generis" realities, which are able to create an entity or property that emerges by these relationships and acts within the relationships. When considering how to analyse such an emergence of properties, Donati (2011) proposed applying the notion of reflexivity to social networks and argued that networks are also able to express and develop a kind of collective reflexivity that he called "social reflexivity." Therefore, the use of the morphogenetic approach could allow, on an aggregate level, at each temporal time of the morphogenetic process, to see how the social reflexivity is working. The elaboration of the model of the morphogenetic approach proposed by Donati (2011), displayed in the following table 1.1 has to be seen as a

model from T1 to T4. In this dissertation T1 has been identified with the start of the project and T4 with its end. The social interaction between the different actors involved in each project took place between T2 and T3. In the following model, we can see the position of social reflexivity in the morphogenetic approach at these different temporal stages (from T1 to T4).

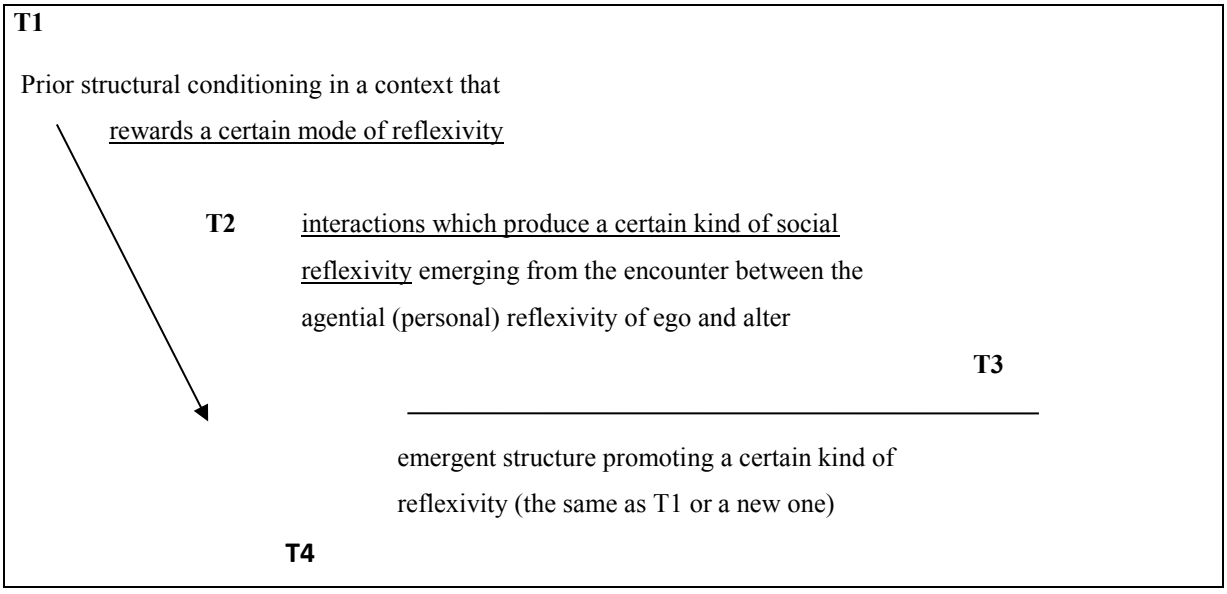

Figure 1.1: Model of the morphogenetic process elaborated by Donati. Source: Donati, P. (2011), Modernization and relational reflexivity, International Review of Sociology – Revue Internationale de Sociologie, Vol. 21, No. 1, March 2011, p. 31.

1.3 Thesis and hypothesis

This dissertation aims to study the link between "social reflexivity," as theorised by Donati (2011), and "team-efficiency/effectiveness" in innovation EU-funded projects, focusing on the role played by social networks of pre-selected innovation projects both in Germany and in the Netherlands. In each country, one project was selected, which for some characteristics was supposed to produce the property of social reflexivity, and, as a control, another project with characteristics that could probably have not produced social reflexivity (see chapter about selection of the cases), was selected. The general objective of this research is to study the effect of social reflexivity on efficiency/effectiveness as independent (explanatory) variable, emerging in the context of innovation projects in two countries/regions in which many different stakeholders (university, firms, other organisations) entered into a network to develop together a new product or a new technology to be put on the market inside the framework of the ERDF policy funds of the European Union.

The main thesis is that the presence of social reflexivity at a group level allows more efficient and effective results at the end of the project. By analysing team efficiency/effectiveness in innovation projects the focus was on the presence or absence of "social reflexivity" inside these teams. The other explaining variable in this research was the specific institutional and cultural setting in which the projects were developed as external variable (implementation of ERDF policy at a regional level). A third hypothesis that can be advanced is about the interplay of social reflexivity and policies in enhancing outperforming of innovation projects.

The final results should lead to discuss about the importance of facilitating the emergence of social reflexivity in order to improve the results of private-public-partnerships in innovation projects. Regarding the relational context of innovation projects, it is expected to show that the great diversity brought in these projects from actors from different domains of the society (university, industry, third sector) can be valorized and constitute an advantage when the network is able to produce social reflexivity.

1.4 Innovation, social reflexivity and social network analysis

In this part of the theoretical chapter, after illustrating the theoretical background of the social reflexivity concept in the social sciences and introducing the main thesis and hypotheses of this dissertation, the "practical" integration of different approaches to innovation, social reflexivity, and social network analysis in this dissertation will be here explained.

Recently there has been an attempt to link the social network analysis with the morphogenetic approach of Archer in order to study the meso-level of the social reality referring always to the interplay of these three elements: structure, agency and culture (Lazega 2013, Donati 2013a, b). Generally, there is more interest in the social network analysis towards approaches in which the structural preconditions and the agency of the individuals are conceptualised as dynamic and interrelated processes: "Recently, network analysts, especially methodologists who created 'network statistics' during the last 30 years, have been able to develop a dynamic and multilevel perspective on social structure. In this approach, the main focus is on the co-evolution of structure and behavior (see for example Snijders 2001; Snijders et al. 1999, 2007a, b). This development is independent but strikingly similar to the attention given by social realists such as Archer or Donati (2010) to structure and agency." (Lazega 2013:168). A "relational turn" in social network analysis took place in the last thirty years in trying to bring back culture and agency in social network analysis, which was strongly linked to structuralism and defined as a method of structural analysis (Scott 2000) at its birth. The lack of

a more cultural perspective in social network analysis, which would take into considerations "social meanings by which individuals understand and construct their world" (Pachucki & Breiger 2010:206) has led many relational sociologists to consider more deeply meaning and culture in the dynamics of social networks (Fine & Kleinman 1979, 1983; Di Maggio 1987; White 1992; Brint 1992; Emirbayer & Goodwin 1994; Emirbayer 1997; Franzosi 1998; Mische 2003; Mohr & White 2008; Fuhse 2009; Crossley 2009; Pachucki & Breiger 2010). Especially agency has gained much more attention after the pivotal work of Harrison White *Identity and Control,* in which "White makes the claims that agency is "the dynamic face of networks," that "stories describe the ties in networks," and that "a social network is a network of meanings" (White 1992: pp. 65, 67, 245, 315)" (Pachucki & Breiger 2010:208).

Furthermore, a recent "relational turn" occurred also in innovation studies. Especially Fløysand and Jakobsen (2010) claimed for a "need for an empirical programme that, contrary to the best practice studies within the systems of innovation approach, highlights the interplay of innovation with their cultural, social and territorial contexts." (Fløysand & Jakobsen 2010:331).

The main critic of these two authors to the best practice studies within the systems of innovation approach is that innovation has been even more studied and conceptualised as a kind of performance that under certain conditions can be reproduced and recreated. In fact, they would suggest to apply a more relational approach in innovation studies coming back to the studies of Granovetter, Polanyi, Hägerstrand and Lundvall, in which the specific cultural preconditions of each place are recognised to be very important variables for the success of the innovation. Lundvall's studies, for example, suggested that "the process of innovation is uncertain and disruptive. He stressed how research and innovation from time to time produces 'results which were neither anticipated nor looked for'. This view on innovation as an interactive process highlights the complexity of systems of innovation." (Fløysand & Jakobsen 2010:330).

In bringing together all these different theoretical assumptions in a coherent approach for the following dissertation, i.e., perspectives from social network analysis, morphogenetical approach, social reflexivity and innovation studies, some limits were considered in the practical/empirical application.

The main limits of this theoretical approach are in the practical application of the morphogenetic approach to the innovation projects, which are temporary projects. Some relevant questions here are: what are the main problems occurring when applying a morphogenetic approach to the study of social networks? How to measure the "degree" of change on one hand and stability of social networks from time T1 to time T4? What can be the role of "social

reflexivity" as theorised by Donati (2011) in explaining change in social networks and how can it be measured?

The use of a morphogenetic approach to analyse change/stability in social networks brings many difficulties in the moment of the empirical application of the model because it is difficult to "decide" when a change occurs in a network. This problem was also outlined by Lazega (2013) when trying to differentiate between morphogenetic and morphostatic processes. He asks himself: when should a change of a network be considered enough of a change and constitute a real case of morphogenesis? In the "lifecycle" of a network the changes on a structural level can be real or homeostatic, "driving the structure, after a strong perturbation, back to the state that has structural similarities with the point of departure" (Lazega 2013:169). The volatility of networks makes it difficult to understand when a network really stabilises itself.

For this reason, in the following dissertation, the analytical model of the morphogenetic approach will be used in an explorative way, especially regarding the concept of social reflexivity that needs to be further described and observed in the specific context of each network/project. A way to come closer to the concept of social reflexivity in using a social network analysis was to refer to the theoretical approach of the cognitive social structures (Krackhardt 1987, 1990; Kilduff & Tsai 2003; Balkundi & Kilduff 2006; Kilduff & Krackhardt 2008; Mehra et al. 2006, 2014).

1.4.1 Cognitive approach to social network analysis

A quite recent theoretical approach inside the social network analysis, which considers in particular actors' perceptions of social networks and how these perceptions may affect in turn the networks in which actors are embedded, is the so-called cognitive approach to social network analysis, also known as cognitive social structures. (Krackhardt 1987, 1990; Kilduff & Tsai 2003; Balkundi & Kilduff 2006; Kilduff & Krackhardt 2008; Mehra et al. 2006, 2014). This cognitive approach to social network analysis referred in part to the previous work of Heider (1958), who developed the balance theory, arguing that people have a desire to believe that their friends are friends with each other and they may feel uncomfortable (dissonant) if this is not the case, closing or adding ties in order to have a balance among them. In the following dissertation, the structural measurements of social networks were detected as cognitive social structures, especially using LAS (locally aggregated structure) and SLICES (individual perceived network) (see chapter about methods). It is argued here that, in order to grasp social reflexivity at the three orders of relationships, the use of a cognitive approach to social network analysis can be mostly beneficial.

First, there is inside the cognitive approach the idea that actors have perceptions about their social networks, this implies that they reflect about them. Second, this attention to individual perceptions and cognitions brings back the individual into the social network analysis, thus agency, contributing to a relational sociology, which tries to overcome the structure/agency dichotomy: "we are bringing the importance of individual cognition, personality, and action back into a network research area that has tended to neglect if not completely ignore the importance of the microfoundations of structural constraint." (Kilduff & Krackhardt 2008:7). The need to use a cognitive approach to social network analysis was more driven from the necessity to have a measurement of social reflexivity on the three orders of relationships. Regarding the first order of relationship (EGO-ALTER) the social reflexivity was measured as being the actual reciprocity between what EGO and ALTER answered regarding the existence of their relationship. In the second order of relationship, the social reflexivity was measured as a correlation between the whole (actual) network and the perceived network of each respondent (SLICE). In the third order of relationship, social reflexivity was more "descripted" rather than measured, in the answers respondents have given during the interview, using the "Visual Network Scales" approach (Mehra et al. 2014), which are figures of networks helping informants reflecting about their own network from a more distanced view and reconstructing changes occurred during the time. The use of a cognitive approach to social networks was seen as the closest way to grasp "social reflexivity," in analysing mostly correspondence between actual and perceived, implying a reflection process: "actual networks are reflected in, constituted by, and sometimes discrepant with the perceptions of individuals" (Kilduff & Krackhardt 2008:264). Of course, this operationalization, which will be further explained in the methodological chapter, have some limits regarding the informant accuracy in reconstructing relationships, which occurred in the past (Bernard, Killworth & Sailer 1984). Another problem at the level of the third order of relationships, was that in reconstructing changes in the networks, only respondents' perceptions of change were used, following the cognitive approach to social networks: "networks are constituted in the minds of individuals as memories, thoughts, and desires. Network change can be traced in the changing perceptions of individuals concerning the creation and disappearance of ties between actors." (Kilduff & Krackhardt 2008:264). The limit of this approach to detect change is that perceptions of change can be more or less accurately recalled from the informants (Bernard, Killworth & Sailer 1984) and present many biases (Kilduff & Krackhardt 2008: 24): "People perceive the same network differently, with some individuals achieving a high degree of accurate perception, whereas other individuals lead their organisational lives in relative ignorance of the actual network of relationships within which work is accomplished." These

different perceptions and "ignorance" about the actual network will further serve as indicators of reflexive processes, for this reason they are not here seen only as a methodological limit of the research.

1.5 Use and relevance of EU-structural funds for Innovation

In the next half of this chapter, the main literature dealing with policy evaluation about the ERDF (European Regional Development Fund) incentives programme in the period 2007/2013 will be presented, in order to understand the main aims of this policy first at the level of the European Union and then on a more focused level for the countries and regions of interest in this dissertation. As previously introduced in the hypotheses of this dissertation, a more external hypothesis about the role of different policies for innovation at a local level has been advanced. Therefore, it is here needed to understand if the same source of EU-incentives for innovation (ERDF) has been implemented differently in the two countries/regions, in order to understand if the different way of implementing the policy may also have had a role in outperforming of innovation project.

Here are considered evaluations about projects realised in the last programming period of the EU-Structural funds (2007-2013) in both countries with some examples of the projects. For the programming period 2007/2013 there are ex ante, medium and post-evaluations available. When reading these reports, it is possible to find outlined some common trends by the European Union in evaluating these projects. For example, it is clear that even more important is considered to be "to use strategically" such funds in order to fully support the innovation strategy of each region in a diversified way, which means that the concrete use of the funds has been even more adapted to each regional innovation system, considering for each region its strengths and weaknesses. Very important is also the aspect of an integrated use of the funds, to outline that each region should have "the best chance of developing competitive advantages and maximizing synergy between the different sources of Community funding for Innovation." (European Commission 2010b:6).

1.5.1 European Cohesion Policy and the "Europe 2020" strategy

There are different funding opportunities for innovation projects on a European Union level. In this dissertation, it has been decided to focus on innovation projects financed by the structural funds because of the interest in the regional dimension of innovation in different countries, and the only European funds working on this level in the innovation field were

structural funds. In the case that the main interest of this dissertation would have been in international innovation projects other types of European funds, like The 7th Framework Programme or the Territorial Cooperation Programme, would have been more suited for the research.

The main resources available for innovation projects are of many kinds and have to be linked to the "Cohesion policy" of the European Union and in particular to the new "Europe 2020 strategy," which the European Union is trying to achieve in order to reach the following five objectives: employment of 75% of the population aged 20-64; R&D investment should reach 3% of the EU's GDP (gross domestic product); reduction by 20% of the green-house gas emissions, increment of the use of renewable energies in final energy consumption by 20% and increment by 20% of the energy efficiency (so called 20/20/20 climate/energy targets); share of early school leavers under 10% and completion of tertiary education by at least 40% of the 30-34 aged of the EU; and the reduction of poverty (European Union 2010a, b). This in order to make clear that the cohesion policy of the European Union is not only trying to pursue investments in innovation policies and actions, but innovation has been recognised to be among the priorities of the European Union to assure sustainable development and to improve regional development gaps between regions of the European countries. For example, in the programming period 2007-2013, a total budget of 347 billion euro (European Union 2009a, b) in all over the European regions have been allocated under the cohesion policy and innovation, and R&D policies have resulted to be among the themes which were much more supported by the structural funding on a regional level. "The comparison of two programming periods clearly shows an upward trend of earmarking more financial resources in support of RTDI activities. According to a recent report commissioned by DG RTD to Technopolis, the EU's Structural Funds (SF) investments on this kind of activity increased from € 29.5 billion during the 2000-2006 programming period to roughly about € 70 billion allocated in the current period 2007-2013. Hence, the SF has become now even more important instrument than they used to be in the previous programming period for promoting innovation." (Walendowski, Kroll, Stahlecker, Baier, Wintjes & Hollanders 2011: 54).

This need of enhancing a regional view in innovation policies has been stressed in many official documents by the EU in the last years, such as the "Fifth Report on Economic, Social and Territorial Cohesion" and it is especially important when considered in combination with the EU regional policies challenges: "National and regional governments should, accordingly, develop smart specialization strategies to maximise the impact of Regional Policy in combination with other Union policies." (European Commission 2010b:6).

Under “Structural funds” has to be understood differentiated types of EU funds:

1. The European Regional Development Fund (ERDF);
2. The European Social Fund (ESF);
3. Cohesion Fund;
4. EU Solidarity Fund.

The main aim of all of these funds is to promote economic and social cohesion in order to reduce disparities between countries and regions. The Cohesion policy as a whole in Europe represents the largest source of finance directed to EU Member States for investments in growth and jobs. Inside the European Union, as mentioned before, there are huge differences in terms of how these resources are managed by the regions and how important they are for the economic development of the regions. Regarding this point seems to be even more important to harmonise the EU regional policies with the cohesion policies, in order to use strategically and in a region-tailored way this important source of investment (European Commission 2010b). The aim of the following section is to introduce the European Regional Development Fund (ERDF).

1.6 ERDF (the European Regional Development Fund)

The European Regional Development Fund is the fund of the European Union, which focuses on these four priorities areas: innovation and research; the digital agenda; support for small and medium enterprises (SMEs) and the low carbon economy. The allocation of the resources to the regions depends on the “status” of the regions in the following categories: convergence regions, transition and competitiveness/employment regions. At the end of this dissertation, in the Appendixes E and F, it is possible to see the eligible areas under the convergence objective and the regional competitiveness and employment objective for Germany and the Netherlands in the last programming period 2007/2013. About the contribution of ERDF to innovation policies and their effectiveness at a country/regional level the last data available refer to September 2016 (European Commission 2016a, b).

The scope of these evaluations is to analyse the role of ERDF in national and regional RTDI (research, technology, development and innovation) performing. In a very general way these reports described what the main characteristics of the national and regional innovation systems of all the European Union countries were, in which data were available, and what has been the specific role of the ERDF funding in each of these countries and regions. Furthermore,

these reports will be used in order to select the countries and regions, where to carry out this research (see chapter about selection of countries/regions/cases).

For example, data from a specific report (Walendowski, Kroll, Stahlecker, Baier, Wintjes & Hollanders 2011) were used in order to select the regions for this dissertation on the basis of their use of the structural funds for their regional innovation system. Here, it will be presented another evaluation study, whose results can be useful to understand similarities and differences among EU-regions in using EU public funding for innovation. This study is a "synthesis report" written by the expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013 under the DG-REGIO of the European Commission (Wolleb, Naldini & Ciffolilli 2010).

In the first part of this report countries were grouped regarding their different types of governance of RTDI policy into three groups:

1. **"Centralised" type of governance**, where the central government controls RTDI policy and the local authorities and local agencies implement those policies, such as, for example, small countries as the Baltic States, Cyprus, Luxembourg, Malta and larger countries as Bulgaria, Poland, the Czech Republic, Greece, France, Hungary, the Netherlands, Portugal, Romania, Slovenia and Slovakia (Wolleb, Naldini & Ciffolilli 2010).
2. **"Mixed" type of governance**, where the competences on RTDI policies are shared between the central government and regions or other local bodies. In this context, usually, the central government put in place a regulatory framework and the regions/local authorities implement the strategy according to their needs. Countries in this group are: Austria, United Kingdom, and the three Nordic Member States (Wolleb, Naldini & Ciffolilli 2010).
3. **"Regionalised" type of governance**, here regional governments are responsible both for regulation and implementation of the RTDI on a regional level. Depending on the type of "decentralisation" in the country, there can be also different types of governance: in Belgium, Germany, Italy and in the competitiveness regions of Spain, both national and regional levels of government have their specific competences for RTDI policies for both regulation and implementation according to their national laws (Wolleb, Naldini & Ciffolilli 2010).

To keep in mind these differences is very important regarding a further better understanding of the coordination system between different levels of power in the implementation of the RTDI policies and to be able later to evaluate efficiency/effectiveness in the different regions/countries in the use of such funds. Coordination here has to be understood between the central government and the regions, but also between different ministries in one country or between regions with different levels of development in another country.

Results from this report on a national level showed that, already in the past programming period 2000/2006, there was the tendency to focus on SMEs, and this in particular in cohesion countries. In both cohesion and competitiveness regions and countries there was the tendency to try to involve more firms to gain support/investment for their innovation activities. There was also the tendency to promote research and innovation poles, clusters and networking, in which different actors from different realms (business, university, research centres) could benefit from different kinds of instruments in order to cooperate among each other (Wolleb, Naldini & Ciffolilli 2010). On a regional level, it has been observed that "planning and management tend to be more regionally-focused, with more decentralisation of responsibility and the creation of new local agencies than in the previous programming period." (Wolleb, Naldini & Ciffolilli 2010:7).

This "regionalisation" of RTDI systems in the European Union has had the consequence to increase the number of potential actors involved that in turn may lead to fragmentation and effective coordination problems.

1.6.1 Use and relevance of ERDF funds in the Netherlands (2007/2013)

As it can be seen from the Appendix E at the end of this dissertation, all regions in the Netherlands are grouped under competitiveness/employment regions (European Union 2009b). In the last programming period 2007/2013 Netherlands started five programmes under the Regional Competitiveness and Employment Objective. One among these five programmes has been co-financed by the ESF (European Social Fund) and worked on a national level. The other four programmes were all co-financed by the ERDF (European Regional Development Fund) for each NUTS 1 region (North, East, South and West). The main priorities under this programming period for Netherlands were: to promote strongly research and innovation; to support research and development projects through R&D investments; to support businesses, especially SMEs and to create new jobs; to generate private investments leverage; to raise the level of skills and qualification of the workforce by improving training measures; to address poverty and social

exclusion; to improve information and communication technology (ICT) and services, especially by improving their access and use by SMEs; to improve the environment by promoting sustainable growth and combating climate change. (European Union 2009b).

In the official document called "the Dutch National Strategic Reference Framework (NSRF)" (European Union 2008) the priorities are divided into six priorities areas: strengthening innovation and entrepreneurship, raising the attractiveness of regions, investing in the socio-economic viability of cities, increasing the labour supply, promoting an inclusive labour market, and increasing adaptability and investing in human capital. Being the regional differences not so huge in terms of per capita GDP and employment the Dutch policy for innovation is more oriented to improve the growth potential of all regions. In the NSRF Document it was stipulated that the four regional operational programmes must devote at least 50% of the resources to innovation (European Union 2008). From the last evaluation report available (European Commission 2016b) it can be confirmed that, as stipulated in NSRF document, the regional economic policy in the Netherlands was mostly aimed to stimulate innovation in the context of specific already existing regional industrial clusters (European Commission 2016b). The total amount of the ERDF contribution for the Netherlands was 830m euro, 42% of the total funding, the rest of the funding was largely provided by national public funding and a smaller contribution came from the national private funding. Around 43% of the total ERDF allocation was devoted to SMEs support, R&D and innovation. The total number of RTD projects, which were co-financed was 550, among them 519 were cooperation projects between enterprises and research institutes (European Commission 2016b). Another feature of the regional innovation systems of the Netherlands was that there seemed to be a paradox as Netherlands is quite strong in the production of scientific knowledge and patents but weak in application and commercialisation. Four possibilities for improvements were identified: stimulating innovative SMEs, improving the attractiveness of the Netherlands as a location for knowledge intensive activities, improving innovation through strong and internationally leading innovation clusters and establishing an excellent climate for both learning and research (Broersma & Edzes 2010). I am now going to describe how these targets where addressed in the programming period 2007-2013 and the role of ERDF in the regional innovation policy. As previously explained, the ERDF fund is used in order to co-finance the regional economic innovation policy. The four NUTS 1 regions are administered by four management authorities. According to the operational programmes almost 43% of the total ERDF funds were prioritized to innovation policy, this amount was almost equally distributed on three policy areas: boosting applied research, knowledge transfers and poles and innovation friendly environment (Broersma & Edzes 2010).

In general, it can be said that for the Netherlands, the contribution of the ERDF for Innovation and RTD was substantial contributing for one third of the costs (34.7%) (European Commission 2016b). The regions actually differ among themselves because they show different policy-mix and different clusters of innovative industries as already mentioned before. It is important to remember that, in general, the national innovation policy aims to improve the already existing innovation clusters at a regional level. One of the programmes that has been established already in the programming period 2000-2006, was the "peaks in the delta" programme, which has been replaced starting from 2010 by a regional programme called "strong regions" (Wintjes & Hollanders 2012; Technopolis, UNU-MERIT & Fraunhofer, 2013). This programme has facilitated closer collaboration between regional governments, large cities, regional development organisations and industries by putting in place economic opportunities. This programme has been replaced in 2010 by the programme "Strong regions" which stimulate economic opportunities in the four following regions (Technopolis, UNU-MERIT & Fraunhofer, 2013):

- Randstad region;
- Energy-junction Groningen;
- Brainport Eindhoven;
- Food and Nutrition East Netherlands.

For the Netherlands, it will be presented one regional programme inside the overarching programmme "Peaks in the Delta" carried out in the period 2007-2013 in East Netherlands. The Peaks in the Delta programme in the East Netherlands has focused on the following peaks: innovative clusters around the University of Wageningen, research centre of Wageningen, University of Twente and the University of Radboud. Already by the year 2010 the programme was evaluated to be effective: "the first short-term effects were already visible: improved cooperation and knowledge sharing between government, institutions and companies, strengthening of the connections between the education and labour market, and the development of new products and services." (Technopolis, UNU-MERIT & Fraunhofer 2013:52).

In the long run, it is expected to have better trained and qualified staff in the region, the establishment of new companies, high qualitative and competitive products and services. In this region, this programme was considered to be very important by the applicants so that without this programme, it would not have been possible to start the projects (Technopolis, UNU-MERIT & Fraunhofer 2013). The Eastern region tries to push existing food/nutrition and

health/technology clusters as already mentioned. The two projects that will be selected for this dissertation will be located in both these two clusters.

1.6.2 Use and relevance of ERDF funds in Germany (2007/2013)

In Germany, the Cohesion policy for the programming period 2007-2013 has fostered the realisation of 8294 projects, among them 3368 were cooperation projects between enterprises and research institutes (European Commission 2016a). The main priorities, as outlined also in the NSRF document (European Union 2008), for Germany were: continuing support to SMEs; support to business start-ups; introduction of new financial engineering instruments for SMEs; support to R&D and Innovation; improving education and training; improving the environment and combat climate change; investments in environmentally-friendly transport (European Union 2008).

As can be seen from the Appendix F at the end of this dissertation, the status of the regions in Germany is twofold: there are regions under the Convergence Objective (Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt, Thüringen, and Lüneburg), all other regions fall under the Competitiveness/Employment Objective (European Union 2009a).

For the programming period 2007-2013 there have been put in place 36 programmes: the ERDF and the ESF supported 18 programmes each, one regional programme for each of the 17 Federal States and Lüneburg. There were also two programmes at federal level, one for transport and the other one for education and training activities. Germany participated also in 23 European territorial cooperation programmes (European Union 2009a). The total amount of ERDF contribution for Germany was 16108mn euro, 61% of the total funding contribution, the rest of the funding came largely from other national public funding and in a smaller percentage from national private funding. Around half (56,4%) of the ERDF funds were allocated for supporting enterprises and innovation. In particular, 29,3% of these funds were devoted to Innovation and RTD (European Commission 2016a).

The strategic objectives for Germany were grouped in four dimensions as outlined in the NSRF document (European Union 2008): innovation and development of the knowledge-based society as well as strengthening the competitiveness of the economy; increasing the attractiveness of regions for investors and citizens through sustainable regional development; more and better jobs; and developing regions to promote opportunities and reduce differences. The priorities are then separated between East and West Germany. In the convergence regions, per capita GDP should increase to above 75% of the EU average. Other targets for Germany as a whole were the

increase of the R&D expenditure to 3% and the increase of the employment rate to 70%. In Germany, it is very important to stress that ERDF funds are regulated and implemented on the level of the Länder (NUTS 1 regions). "The financial share of ERDF in Länder spending for innovation is significant (10% for competitiveness and 30% for Convergence regions)" (European Union 2008:46). In general terms, among German regions there is a bigger variability than among Netherlands regions in terms of policy mix, use of structural funds and specialization of the economy and this does not only depend on being in the convergence or in the competitiveness regions. Both federal and Länder programmes tried to strength key technologies in the private sector, to develop technology oriented networks and to increase R&D capacities. The Länder have taken into consideration the federal instruments in designing the policies. For this reason, they try to complement those policies in targeting beneficiaries not covered by the federal programmes (Technopolis, UNU-MERIT & Fraunhofer 2013).

Regarding EDRF in Germany it can be said that in convergence regions more projects were financed under the policy area of "knowledge transfer poles" (65.54% of all ERDF), than "boosting applied research" (23.86% of total ERDF) and "innovation friendly environment" (10.60% of total ERDF) (Schwab 2010). The main measures financed were "direct support via grants for R&D projects," measures to support networks and clusters and funding for infrastructures (Schwab 2010:9). In competitiveness regions "knowledge transfer and poles" has been more supported (46.6% of the total ERDF), followed by "boosting applied research" (35.8% of the total ERDF) and "innovation friendly environment" (17.6% of total ERDF). The measure that was more supported was "networking and cluster development." Other measures were "to bring innovative products to the market" and "to accompany innovation processes by means of external assistance." (Schwab 2010:9).

An evaluation report (Schwab 2010) synthetized the main challenges for the future for the German innovation system stressing the importance of a regional economic development strategy which tries to put together research and private sector. This should lead to choose adequate instruments and a policy mix which targets the needs of the different regions. Another important challenge will be for Germany the potential of creative industries and the development of new instruments for innovation services (Schwab 2010). The report concludes by showing that these regional differences allow space for experimentation and learning and the importance to put in place a coherent and comprehensive regional development strategy for each German region (Schwab 2010). Among the regions belonging to the group of regions with strong focus on industrial employment it will be presented here the case of the "ExzellenzNRW Cluster" of North Rhine-Westphalia (Technopolis, UNU-MERIT & Fraunhofer 2013). This was a cluster policy

aimed at promoting cooperation between companies, research institutions and public support along value chain in 16 industries and technology fields. It is particularly fruitful and has been recognised to be the collaboration between the local actors and the professional cluster management (Technopolis, UNU-MERIT & Fraunhofer 2013). Among the most successful clusters in this region there was the "it's OWL – Intelligente Technische Systeme OstWestfalenLippe," which has won a prize in a national competition called "Leading Edge Cluster Competition." This cluster is specialised in the area of mechanical engineering, electronics and industry and automotive supply industry, which are also among the economic specialisations of the whole region (Technopolis, UNU-MERIT & Fraunhofer 2013).

The North Rhine-Westphalia region is also interesting because it presents not only strengths in cluster policy, as in the East Netherlands, but also in other actions like legislative changes aimed at enabling higher education institutions to operate more entrepreneurially and to intensify knowledge transfer to industry (Technopolis, UNU-MERIT & Fraunhofer 2013). Structural aspects of the region have to be also considered, as that of being the most populated region of Germany with one of the densest higher education and public research landscape in the whole Europe and that one half of the 50 largest industries in Germany are located there. These structural aspects of the selected regions will be explained more in-depth in the chapter about the selection of the countries/regions/cases. The two projects for Germany, to conduct the research for this dissertation, will be selected in this region and will consider the sector of biotechnology in collaboration with mechanical engineering.

1.7 Conclusions

This chapter was devoted to presenting the context, both from a theoretical and from a policy point of view, in which the research question of this dissertation emerged. Could social reflexivity, conceptualised as a property of social networks, have an impact about outperforming of EU-funded regional innovation projects? Can social reflexivity be a variable that explains a supposed variance in the performance of two projects in two different countries, which are beneficiaries of the same policy (ERDF-fund) but are regulating the policy in different ways? The first part of this chapter introduced the theoretical debate about (social) reflexivity in the social sciences and explained the relevant theoretical approaches needed to study social reflexivity in innovation projects, i.e., the morphogenetical approach and the cognitive approach to social network analysis. The second part of this chapter was aimed at describing the policy

context of the projects, which will be further selected. Especially on a national level, some data about aims, use and relevance of ERDF funds for the two countries have been introduced.

2 METHODOLOGY AND DESIGN OF THE RESERCH

2.1 Introduction

This chapter aims at explaining first, which kind of design of the research was planned to be followed during the research; second it is here explained the methodological considerations applied to operationalize the concept of social reflexivity. Finally, the sampling strategies will be introduced.

2.2 Design of the research

For the purposes of this dissertation it was decided to choose a most similar case design of the research (King, Keohane & Verba 1994; Mahoney 2004; King, Felin &Whetten 2009), being this research a comparative one. The aim was to select first the two countries in which to conduct the research, then two regions inside those countries and finally two projects (one to produce the property of the social reflexivity and the other one as a control project) in each of the two regions. All the phases of these selections will be explained in more depth in the next chapter of this dissertation. Actually, the selection phase of the countries and regions has been done at the very beginning of the research in order to be later able to choose the appropriate comparative design. In the case of this research the two selected countries were Germany and the Netherlands, as already introduced in the theoretical chapter, when reporting the literature about the two different innovation policies in the two countries. The reason why a most similar case design was chosen, was that the differences between the two selected countries and later their regions, were not so huge in terms of economic development as it will be further illustrated in the next chapter. Therefore, many independent variables for the research, could be controlled in order to detect the effect of the two explaining variables on the dependent variable. In this research design the choice of the cases allowed the variation of the dependent variable, which was the “team performance” as described in previous studies (Schrader and Goedpfert 1996; Madhavan and Grover 1998). Team performance can be defined as the extent to which a team is able to meet established quality, cost and time objectives (Schrader and Goedpfert 1996). The team performance can be described by its constitutive variables team effectiveness and team efficiency. “Team effectiveness refers to the degree to which expectations regarding the quality of outcomes are met, whereas efficiency relates to adherence to schedules and budgets” (Hoegl and Parboteeah Praveen 2006:114). One of the two independent variables considered in this research design is the presence in the network of the social reflexivity property. As previously explained in the theoretical chapter of this dissertation, Donati conceives social reflexivity as the

capacity of a network in itself to be reflexive about the relationships developed inside the network at a meta level and to take these into consideration when deciding for further action. Social reflexivity has to be seen as an emergent property of the network. The other independent variable considered here is more external to the network: the different implementation of innovation policies in the two countries on a regional level, which could also have had a role in explaining the variance of the dependent variable (outcome).

The three hypotheses that I advance here are:

1. If the network is able to produce social reflexivity and to stabilise itself (creative morphogenesis), there can be an effect on final performance in its variables effectiveness/efficiency.
2. If there are different ways of implementing innovation policies outside the teams, there will be different results in terms of final performance.
3. An interplay between the first two hypotheses can have an effect on the final performance.

The first hypothesis is an internal one and the second one considers the broader institutional and cultural setting in which the projects are embedded, which could in turn foster or inhibit the emergence of social reflexivity in the networks. It is advanced a third hypothesis that an interplay of the two may have effects on final performance. As reported in the table 2.1 about the variables considered in this research, two innovation projects as "cases" for each country has been further selected; one project will be that which is supposed to produce the social reflexivity property and the other one will serve as a control.

The independent variables which were controlled were the following:

- All four projects have been financed under the same programme of funds of the EU (European Regional Development Fund – ERDF in the programming period 2007-2013) and worked under the same rules in each country. The projects should have similar goals (product or technology development).
- All four projects presented similar structural characteristics (length, number of people in the working group, budget, etc.) in both countries and regions.
- The two projects in both countries were located in the same region and when it was possible by the same university.
- The selected regions in Germany and Netherlands presented not too broad differences in terms of economic development and university system.

- The sector of the projects was in general terms life sciences and in particular the two projects selected in Germany were in the sector of biotechnology and in the Netherlands in the sector of biotechnology applied to food.
- All four projects were aimed at producing an innovative product/service to be put on the market.
- The partners could have had previous collaborative projects in the past with the same or with other partners.
- The partners in each project came both from the private and the public sector (Public Private Partnership).

Table 2.1: Variables scheme

	Netherlands (2 projects)	Germany (2 projects)
Independent controlled variables	Same sector of the projects	Same sector of the projects
	Similar structural characteristics of the projects (length, number of partners in the working group, budget, etc.)	Similar structural characteristics of the projects (length, number of partners in the working group, budget, etc.)
	Partnership public-private	Partnership public-private
	Selected regions in Germany and the Netherlands should present not too broad differences in terms of economic development and university system	Selected regions in Germany and the Netherlands should present not too broad differences in terms of economic development and university system
	Projects financed under the same programme of funds of the EU (European Fund for Regional Development – 2007/2013)	Projects financed under the same programme of funds of the EU (European Fund for Regional Development – 2007/2013)
	All projects should be either aimed at producing an innovative product or service to be put on the market	All projects should be either aimed at producing an innovative product or service to be put on the market
	The projects should have similar goals	The projects should have similar goals
	The partners could have had previous collaborative projects in the past with the same or with other partners	The partners could have had previous collaborative projects in the past with the same or with other partners
Explaining independent variables		
External to the group	Different implementation of policies for innovation/regional system of innovation	Different implementation of policies for innovation/regional system of innovation
Internal to the group	Social reflexivity	Social reflexivity
Interplay of the two	Interplay of the two independent variables	Interplay of the two independent variables
Dependent variable	Output performance (satisfaction of the partners, personal evaluation about the results in terms of efficiency and effectiveness)	Output performance (satisfaction of the partners, personal evaluation about the results in terms of efficiency and effectiveness)

The three independent (explanatory) variables not under control were:

- Social reflexivity as internal explanatory variable.
- Different implementation of policies for innovation resulting in different regional innovation contexts as external explanatory variable.
- Interplay of the first two independent variables.

The dependent variables I would like to observe are:

- Efficiency (final goals are fulfilled in budget and in time).
- Effectiveness (the way of working during the process is optimal for the fulfillment of intermediate/final goals of expected quality).

2.3 Methodology

The methodology followed to select the countries/regions and the projects (as cases) will be further explained in the next two chapters of this dissertation. In the next parts of this chapter it will be explained how the concept of social reflexivity was operationalized in the research and some preliminary explanation about the sampling strategies will be introduced.

2.3.1 Mix-methods approach to social networks

In order to understand if a project has produced social reflexivity during its whole-time span has needed the use of a different set of data. In addition, the four paths to change suggested by Donati needed further empirical confirmation. For this reason, this research has to be intended as an explorative one, given that there is not yet substantial empirical work about social reflexivity in social networks. In Donati's view, social reflexivity is a kind of collective capacity to reflect about the relationship within the relationship that pertains also to networks, not only individuals. This capacity cannot be given a priori, but is co-created as an emergent effect by the network. Actors in the network, when considering to act, orientate themselves not only versus their reciprocal relationships, but they are also reflexive about the product of their relationships, as explained in the theoretical chapter.

Indicators like centrality or density at a given time can be only in part indicators of social reflexivity. For this reason, it was needed to consider these networks at different temporal times, especially to have more information about "change" in the networks. The main idea behind the typology of networks of Donati is that the degree of structural change in a network, from the beginning until the end of the morphogenetic process, can be indicative about the emergence or not of the property of social reflexivity. A creative network, resulting at the end of the morphogenetic process, is the only one that produces social reflexivity, and that displays a structural change from time 1 to time 4 of the morphogenetic process. Therefore, in trying to operationalize social reflexivity, indicators of structural change were identified. This need to understand if there was structural change in the networks has led to adopt a methodology, which

could inform about change in the networks during the time span of the projects. For this reason, it was opted, from an analytical point of view, to consider the length of the project as the time span of the morphogenetical process, so that T1 has to be intended as the beginning of the project, T2-T3 is the middle of the project and T4 its end. The main methodological limitation of this research consists in the fact that all projects that were selected, were already at their final stage or already concluded. This means that there was no space for a network analysis to be conducted at different temporal times but instead a reconstructive perspective had to be preferred.

Therefore, the methodology that was applied in a very explorative way, was a mix-method qualitative and quantitative one (Dominguez and Hollstein, 2014). The starting point was a semi-structured interview, which was aimed at grasping perceptions of change in the networks from the side of the partners, followed by a questionnaire, which was thought to reconstruct for each project the whole network at the end of the project. The methods of interview and questionnaire will be further explained in the chapter five of this dissertation. It was necessary here to explain the adoption of a mix-methods approach to social networks in order to introduce the main indicators that were considered to operationalize (and measure) the degree of social reflexivity in each network. The adoption of a mix-methods approach allowed to have both a more longitudinal perspective (qualitative) to be integrated by a cross-sectional measure of the structure of the network at a precise temporal time (T4). During the interviews, the partners could express their perceptions about the degree of social reflexivity in their teams at different temporal times of the projects in a retrospective way. In order to have a "visualisation" of the actual network structure to be directly used during the interview, the methodology of net-map (Schiffer & Hauck 2010; Schiffer, Hauck & Abukari 2013) was introduced, which allowed the partners to produce their network-map and to "see" their own network on the top (Krackhardt 1987). This was for them the starting point for a more in-depth reflection process about the collaborative relationships developed during the project, which was carried out with the use of a second methodology to help them to reconstruct the changes that have been brought into the network's structure at the actual situation, from the beginning of the project until its end. This second methodology used "visual network scales" (Mehra et al. 2014), which are images of networks that helped the informants to reconstruct changes in the structure of their own network. Both these methodologies come from further elaboration of the cognitive social structures approach (Krackhardt 1987; Kilduff & Tsai 2003; Mehra et al. 2014).

After the collection and a first analysis of all the interviews and net-maps collected, it was possible to reconstruct the whole network of each project. In delimiting the networks, as nodes, were considered only those partners, who were mentioned at least from three interviewed

partners. Given that new relevant partners emerged, who were not previously interviewed, it was decided to use a questionnaire. In the questionnaire, the respondents were asked about the collaboration relationships with their partners giving them a predefined list of the partners in the network. The cognitive social structures approach (Krackhardt 1987; Kilduff & Tsai 2003; Mehra et al. 2014) was used in elaborating the questionnaire.

2.3.2 Operationalisation of the social reflexivity property

At this point the operationalization of the concept of social reflexivity can be introduced here in explaining the main indicators, which were considered in the interview and in the questionnaire. Given that the analysis of the collected material was done starting from the whole network of each project and then reconstructing the changes from the end until the beginning (see chapters about the analyses), it will be first presented the main indicators of social reflexivity used in the questionnaire.

The main indicator of social reflexivity in a team was expressed by a correlation analysis between the whole network and the single ego-networks reconstructed by each partner. It was assumed that in a network with a high degree of social reflexivity and relationality the most of the partners are able to reconstruct their collaborative relationships and the collaborative relationships between the other partners in the network, despite their position in the network. Other indicators of social reflexivity in a network can be its cohesiveness expressed by the measurement of the density of the network, the degree of reciprocity and the intensity of the relationships (strength of ties). All these network indexes can be informative about the existence of a real relationship between the partners that can be more or less reciprocated and can vary its intensity during the time. Centrality can be also a good indicator of social reflexivity, if it is assumed that in a team there are more partners, who can be central, given that the relationships between the partners should be more developed on a horizontal basis rather than on a hierarchical one, where there is only one person who coordinates the whole project. Brokerage and structural holes were also considered to inform about the degree of social reflexivity, if it is assumed that in a network with social reflexivity there are a plurality of relationships with partners, who do not come from the same organisations and brokers are needed for a better coordination.

As explained in the theoretical chapter, Donati's definition of social reflexivity is so complex and abstract that it cannot be completely grasped in strictly applying a classical social network analysis, because, as reported from Archer "standing in a relationship" to another(s) says

anything at all about the *qualitative* relations, or what I call the real relationality existing between the parties involved." (Archer 2013a:152).

Therefore, it was needed here to apply a more qualitative approach in order to understand what happened in these networks during the time span of the projects and which kind of *real relationality* the partners have developed among themselves. For this reason, it was decided to analyse the interviews' content in order to understand more in-depth the context of each project and the role of some factors in enhancing or impeding the emergence of social reflexivity. The process of coding started constructing a quite comprehensive macro structure containing ten categories (families of codes) in order to organise the codes in a way to permit later a comparison between the projects. It was tried to cover all arguments treated in the interviews and during the process of the coding in itself, when some new idea emerged. These ten families of codes have to be seen as a kind of organiser of all codes, which recurred in all four projects. For this reason, the relevance of the families of codes can be measured and compared between the projects as well as the most recurring single codes. Nevertheless, for the purposes of this dissertation, it was preferred to give here more importance to the content reported in the most recurring codes, rather than to their numerical relevance. The art of analysis, which was conducted was a content analysis (Maying 2010, 1983), some of the ten families have to be reconducted to Donati's literature, especially the family regarding "structural change," which was constructed in order to comprehend all those passages in the interviews, where the respondents were reporting a perception of change in the network. Given that, for Donati there is social reflexivity only in the case that a network completely changed its structure from the beginning to the end of the morphogenetic process, this category was the most important when deciding if a network has produced the property of the social reflexivity. Other more deductive categories were in part linked to other literature like those regarding the starting conditions and the final evaluation of the project. All the other families of codes emerged in a more inductive way during the coding phase.

There are codes, which are specific for one single project due to some specificities of the project, which are not present in all projects. Nevertheless, all codes belong to one family of codes. For example, in the family "problems," there were reported all codes referring to different types of problems encountered during the projects, some problems are peculiar of one project, for certain reasons, other more general problems, on the other hand, may occur in another project too.The families of codes that were used for the further qualitative analysis are reported here:

1. **Starting conditions**: this group of codes refers to the beginning of the project, how long has the preparatory phase taken, for example? Was the partner from the beginning involved in the project? What were the reasons entering the project or the main restrictions/opportunities?
2. **Organisation of the project**: this group of codes refers to the different organisational forms taken by the projects such as team work, subgroups, emailing or telephone calls.
3. **Roles**: this group of codes refers to the different expected roles reported by the respondent referring to another partner in the project.
4. **Collaboration**: this group of codes refers to whom the respondent has collaborated with.
5. **Feelings**: this group of codes refers to the different feelings reported by the respondents during the interview.
6. **Needs**: this group of codes refers to the different needs of the persons/organisations involved.
7. **Problems**: this group of codes refers to the problems encountered during the project that have challenged the collaboration between the partners.
8. **Competences**: this group of codes refers to the different competences reported during the interviews by the participants: relational competence, communicative competence, technical competence, etc.
9. **Opportunities and evaluation**: this group of codes refers to the different perceived opportunities entering and doing the project and to the evaluation of the project, both specific and general.
10. **Structural change**: this group of codes refers to the reported change in different phases of the project: T1 at the beginning of the project, T2-T3 during the project and T4 at the end of the project. Other codes may refer to change in the position of the respondent and to the patterns of relationship (instant bond, roller coaster, increasingly close, etc.) with the other partners.

This qualitative approach was more taught to allow a narrative reconstruction of "what happened in the network during the whole-time span of the project," especially regarding perceptions of change in the overall network. For example, the quantitative approach explains better the structure of the networks at the end of the projects, on the other hand, the qualitative data are meant to explain more in-depth the perceived changes occurred in the networks during the time span of the project. It is needed here to explain that it is considered a limit of the research to have had just one structural measurement of the structure of the network (at T4) and not in all

phases of the project (T1 and T2-T3). This is mainly due to the fact that the projects were already finished when the collection of the data started. The use of the interviews and the methodology of the visual network scales was aimed at reconstructing perceptions of changes in the networks during the time, but of course, we are here speaking about perceptions, which can be very precise in some cases but also very lacking in some other cases. A structural measurement of the network for all three phases of the projects would have been more precise in reconstructing the changes in the networks, nevertheless the use of a qualitative approach to estimate perceptions of change, has allowed to collect richer data about the meanings of those perceived changes in the context of each project.

2.3.3 General sampling strategies

In order to introduce the next two chapters about the selection of the countries/regions and of the cases, it is needed here to introduce the main criteria followed for the sampling. Once identified the two countries/regions where to carry out the research, the next steps were to select the projects in each region and to start collecting the data. Given that, at the beginning of the research, it was particularly difficult to directly enter in contact with the different partners involved in each project, it was chosen to start connecting first with the project leader(s), in order to have also a facilitated access later to the other participating partners in the projects. The need to select from the beginning projects that probably have developed the property of the social reflexivity and control projects, has led to prefer a first interview with the project leader in order to have more information about the presence in the teams of some elements, which are peculiar of reflexive groups such as face-to-face encounters, shared decision-making processes, teamwork, and internal evaluation procedures at any stage of the project, etc. For these reasons, the first step was to contact the project leader of each project to ask him/her for some cooperation in organising the interviews with the other partners in order to obtain through his/her mediation a facilitate contact with the other partners in the project. The project leader was asked to give the email details of at least one person for each organisation involved in the project, with a preference for partners who have had a more operational/practical role in the project. After the interview with the project leader his/her network map was analysed (supposing that his/her map would be the most complete one because of his/her leading role in the project) and it was possible to have a first look in the constellation of the partners from his/her particular point of view. It was tried to have the email contacts of the partners who were more central for him/her, but also to have the point of view of more peripheral actors. In a second phase, the suggested partners were

contacted and interviewed. In some cases, it was possible to have more than one person interviewed from the same organisation. In the Appendixes C and D, at the end of this dissertation, it is possible to have a deeper look in the characteristics of the projects and an overview about all the data collected. Given the fact that for the interviews were mainly selected partners, who were directly suggested by the project leader, it was decided to adopt later a questionnaire to be sent to all relevant partners in the network. The net-maps collected during the interviews were analyzed to better understand how to delimit the whole network of each project. In the second round were contacted through email not only the partners, who were interviewed in the first round, but also new actors, who emerged in the net-maps of the already interviewed partners and therefore were considered to be also relevant in the network. The whole network of each project was delimited taking into the predefined list of actors, partners who were mentioned at least from three already interviewed partners. Once defined the whole network and the list of the participating partners for each project, all those partners in the predefined list were asked to answer the questionnaire.

2.4 Conclusions

This methodological chapter served for introducing the main methodological considerations concerning the design of the research, the operationalization of the social reflexivity concept and the explanation of the sampling strategies followed in order to collect the data. It was decided to apply a mix-method approach to social network analysis, given the complexity and abstractness of the concept of social reflexivity, which needed to be better grasped not only using a structural network analysis but integrating the quantitative social network analysis with a more qualitative approach, which gives count about perceptions of changes occurred in the networks of the projects and about the meaning of those changes for the projects.

3 SELECTION OF THE COUNTRIES, REGIONS AND CASES

3.1 Introduction

This chapter starts directly showing how through a correlation analysis, first two European countries and then two regions in these countries, where to conduct the research, were selected.

The main criteria to select the countries were three. First, given that all the four projects had to be selected among projects co-financed under a specific funding programme of the European Union (ERDF – European Regional Development Fund), it was decided to consider only reports and data about countries that used this specific source of funding for innovation on a regional level. Second, the selection was further refined by choosing only countries, which already performed quite high (leaders and followers) in the regional performance studies (European Commission, Enterprise and Industry 2012). Third, the scores from the Regional Innovation Scoreboard 2012 were further used to compute correlations in order to see if among these selected countries, there were two countries displaying significantly different scores in their innovation performance. Once identified Netherlands and Germany as the two countries where to conduct the research, the regional differences in both countries will be introduced in order to select the regions. At the end of the chapter the selection of the projects as cases will be introduced. This chapter aims at explaining how the two countries/regions and the four projects were selected for conducting a research about the role of social reflexivity in innovation projects.

3.2 Methodology used to select countries and regions

The work about the selection of the countries and the regions started by reading a broad literature about national and regional innovation systems in the European Union that evaluated the data coming from two kinds of sources: the reports of the Regional Innovation Monitor under the REGIO directorate of the European Commission and the evaluation reports about the effectiveness of cohesion policies, which were also carried out from the same directorate. Part of this literature was already introduced in the second half of the theoretical chapter. The research concentrated on the availability of data about the performance of innovation systems on a NUTS 1 and 2 levels for all European regions (European Commission, Enterprise and Industry 2012) and the availability of data regarding the strategic use of structural funds in the same regions, concentrating on ERDF funding. The decision to concentrate on previous evaluation studies that

focused specifically on the use of ERDF funds will be linked to the further choice to select projects exclusively financed by this programme.

3.2.1 The Regional Innovation Scoreboard 2012

In order to compare all countries and regions in an equal manner data from the Regional Innovation Scoreboard 2012 (European Commission, Enterprise and Industry, 2012) were analysed. I refined my research by selecting only regions that belong to the European Union. In the Regional Innovation Scoreboard 2012 data are available for 55 NUTS 1 and 135 NUTS 2 regions of 21 countries of the European Union and for Croatia, Norway and Switzerland. European Union Member countries not covered by this study are: Cyprus, Estonia, Latvia, Lithuania, Luxembourg and Malta. In the case of Germany, data were available only at a NUTS 1 level and for Netherlands only at a NUTS 2 level.

3.2.2 Description of the indicators used for the correlation analysis

The Regional Innovation Scoreboard 2012 (RIS) uses a set of twelve indicators, which are grouped into three innovation dimensions named “enablers, firm activities and outputs,” in order to capture performance on a regional level (European Commission, Enterprise and Industry, 2012).

In the set of indicators named “enablers” the main aim is to describe innovation external to the firm, as, for example, the availability of high-skilled workforces and of an international competitive scientific system, as well as the availability of funding for innovation projects from the public sector in the form of R&D expenditures in the government sector (GOVERD) and in the higher education sector (HERD) (European Commission, Enterprise and Industry, 2012).

The set of indicators under the name “firm activities” tries to capture the internal dimension of the firm activities like investments made for both R&D and non-R&D activities with the potential to generate innovation, as well as the efforts done by the firm to build linkages with other innovating firms and with the public sector. In the set of indicators named “firm activities” are also listed indicators about the different forms of Intellectual Property Rights generated by the firm (European Commission, Enterprise and Industry, 2012).

Another dimension measured by the Regional Innovation Scoreboard 2012 regarding innovation performance is that of the “outputs.” Inside this dimension, the set of indicators about “innovators” measure the number of firms that have introduced innovation differentiating

between innovations brought into the market and internal organisational innovation and between technological and non-technological innovations, as well as considering the presence of high-growth firms. The dimension about "economic effects" comprehends five indicators, which try to capture the economic success of innovation in employment, exports and sales due to innovation activities (European Commission, Enterprise and Industry, 2012).

3.2.3 Structural funds for innovation policies

This first stage of analysis has been refined in order to reduce the number of the countries and regions to consider. The first reduction has been made on the basis of the results of another study that identified among all European Countries, which countries are more effective in the use of their structural funds for innovation policies (Walendowski, Kroll, Stahlecker, Baier, Wintjes & Hollanders 2011). This research grouped European countries and their regions in terms of financial relevance of the structural funds for the regional innovation system and of their degree of regional governance capacity in using such funds. The result of this research was the construction of the following typology of countries and regions represented in the following table 3.1.

Table 3.1: Strategic deployment of the Structural Funds in support of innovation activities

	Low governance capacity	**Medium governance capacity**	**High governance capacity**
High financial relevance	BG, PL, SK **Capacity building quadrant**		**Empty quadrant**
Medium financial relevance	CZ, GR, HU, PT, RO, ES (Provinces)	ES (Aut.com.), IT (south), UK (Wales)	DE (East)
Low financial relevance	DK, FI, IE, NL, UK (England) **Experimentation quadrant**	SE, IT (North)	AT, BE, DE (West), FR, UK (Scotland/N.I.), ES (Cat./Bas.) **Integration quadrant**

Source: Walendowski, Kroll, Stahlecker, Baier, Wintjes and Hollanders 2011, P. 59.

The results of this research were used when deciding which countries and regions could be the most interesting for the research question of this dissertation, the role of social reflexivity in enhancing a better performance of innovation projects. First, I wanted to select countries, which are already scoring very well in their innovation outputs in order to understand if a variable

like social reflexivity could have a role in explaining the variation of their performance. Second, among countries, which are scoring well, I wanted to identify two countries with different implementation of innovation policies on a regional level and with a significant difference regarding their innovation scores.

For this reason, I was more oriented towards countries in the experimentation and integration quadrants of the table 3.1. The countries in the "experimentation quadrant" are making a less effective use of the structural funds because of a lower governance capacity rather than countries in the "integration quadrant" policies (Walendowski, Kroll, Stahlecker, Baier, Wintjes and Hollanders 2011). The further step was to understand if the results of these countries in the Regional Innovation Scoreboard 2012 scores were significantly different so to have the maximum difference regarding performance between the two countries.

3.3 Correlation analysis

The "innovation performance" scores of the participating regions in the Regional Innovation Scoreboard 2012 were used to further constrain the selection of countries/regions. The Regional Innovation Scoreboard 2012 of the European Union aimed at grouping European regions on the basis of their innovation performance in twelve output indicators in the following categories: leader, follower, moderate or modest innovators. The data presented in this report is already "normalized and shows the performance of each region for each indicator. The value of the indicator has been rescaled from a minimum value of 0 for the lowest performing region to a maximum value of 1.0 for the best performing region." (European Commission, Enterprise and Industry, 2012:61).

Positive correlations show that two regions are similar based on their innovation scores. Negative correlations show that two regions are dissimilar based on their innovation scores. Correlations are considered significant at an alpha level of $p < 0.05$. Non-significant correlations indicate that there is no evidence for a clear positive or negative relationship of innovation scores between two regions.

3.3.1 Correlations between countries

The first correlation analysis focused on all countries that were in the experimentation and integration quadrants of the table 3.1. For each country and output indicator, the mean of all regions was used. This provides a very general visualisation of how much the selected countries

correlate positively and/or negatively with each other, i.e., how similar or dissimilar they are on the basis of their innovation scores. Note again that in each of the twelve performance indicators the numerical value is used. For example, the correlation analysis shows if, across regions, the twelve indicators of country A correlate positively or negatively with the indicators of country B. The correlation matrix (Figure 3.1) clearly shows a negative significant correlation between Germany and Netherlands. There were other negative correlations between the outputs of other countries (Austria and Netherlands, Ireland and Netherlands, Denmark and Germany, Germany and Finland, Austria and France) but all these resulted not significant.

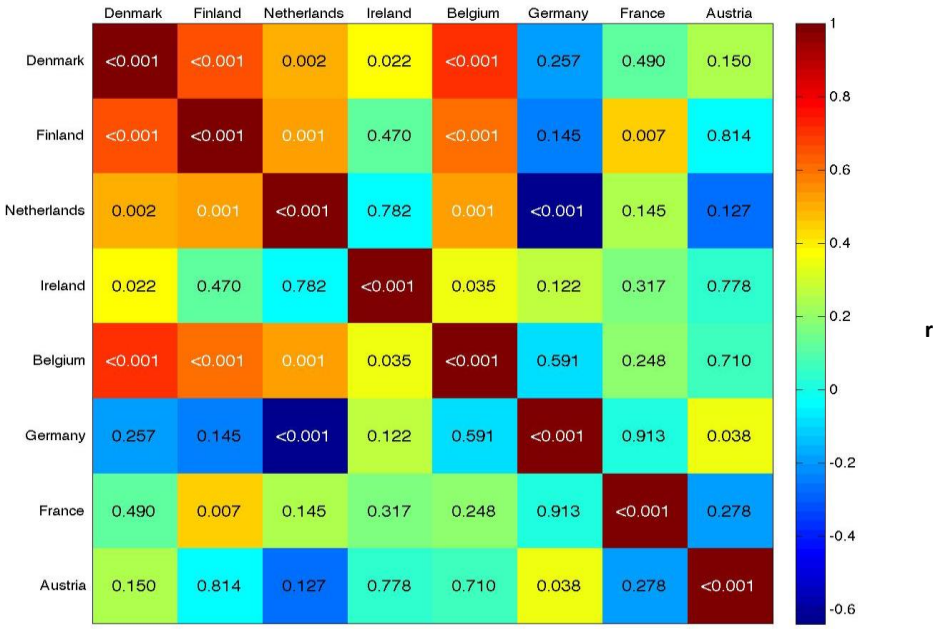

Figure 3.1: Correlation matrix between the countries (collapsed across regions). Warm colors represent positive correlations (r > 0), cold colors represent negative correlations of output indicators between regions. In each cell of the correlation matrix the p value of the correlation is shown.

The significant negative correlation between the Netherlands and Germany indicates that the twelve output indicators of Germany and the numerical results reported in the twelve output indicators of Netherlands have significantly different values. This could be explained by the fact that the two countries have two different ways of implementing innovation policies on a regional level, as it was also presented in the theoretical chapter, making them good candidates to study the effect of social reflexivity on the innovation performance. This result has given me motivation to choose these two countries for the comparison.

3.3.2 Correlation between regions

As a further step, I had a look in the data on a regional level only for Germany and the Netherlands (Figure 3.2). In Figure 3.2 is possible to see the correlation matrix for all the regions of Germany confronted with the results reported by all regions in Netherlands (r value). In the plot, the sign "x" shows where the correlation is significant (p-value).

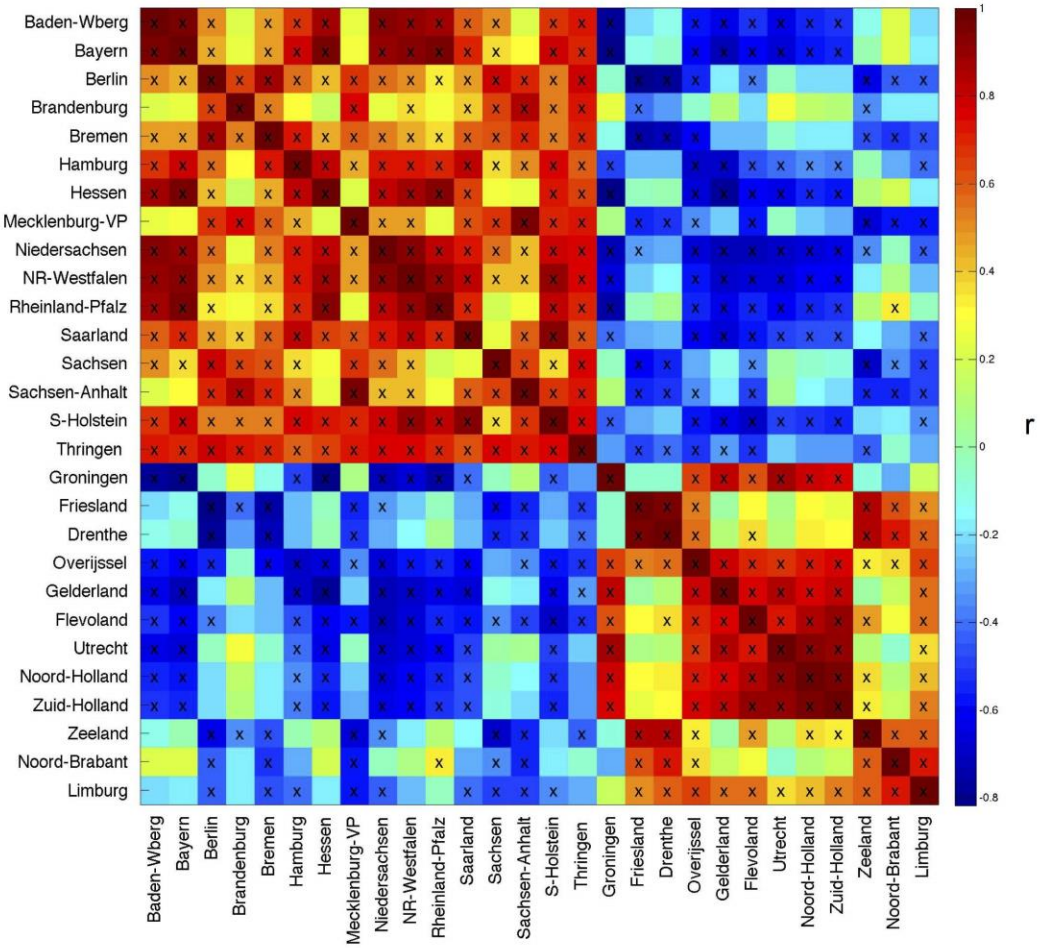

Figure 3.2: Correlation matrix for Germany and Netherland regions. Significant correlations ($p < 0.05$) are indicated with an "x."

At this point it is important to have a look at the data on a regional level only for Germany and the Netherlands. I have especially taken into consideration the two regions of Germany "North-Rhine Westphalia" in comparison with the region of East Netherlands, which comprehend the two provinces of Gelderland and Overijssel. Between these regions, the negative correlation has resulted to be significant (as in the figure 3.2) and they resulted to be feasible for a most similar case design, because of their not so different socio-economic level of development

and the structure of their economy, which is based mostly on industrial employment in North Rhine-Westphalia and Overijssel and on the service sector in Gelderland.

My aim in the selection of the regions was to combine two criteria: first, to maintain the strong negative correlation in terms of innovation outputs between regions. Second, to look at their economic indicators in order to see if they present quite similar economic development conditions.

Regarding the first criteria about the negative correlation between Gelderland and North Rhine-Westphalia in the twelve outputs indicators the following table 3.2 shows the correlation tests differentiating between all twelve indicators, without relational indicators and relational indicators.

Table 3.2: Correlation tests for the relational indicators

correlation test	**All twelve indicators**		**without relational indicators**		**relational indicators**	
	r(35)	p	r(29)	p	r(5)	p
NR-Westphalia and Gelderland	-0.682	0.000	-0.613	0.000	0.078	0.883
NR-Westphalia and Overijssel	-0.575	0.000	-0.526	0.003	0.417	0.411

The performance of the regions in the "relational indicators" was actually an interesting challenge for the analysis and for comparison. There are between the twelve mentioned indicators two indicators which are particularly important for the analysis because they show the performance of the regions in aspects of innovation which involve relational competences in "collaborating with other firms" and in "co-publishing" the results together with the partners of the project (public or private). These indicators are only in part an expression of social reflexivity in the projects, but still it is important to consider them.

In the figure 3.3 it is possible to see the performance of the two regions in the two indicators, which are considered to be "relational." For each indicator values were available at three temporal times (2007/2009/2011). As it is possible to see from the figure 3.3 the two provinces of Gelderland and Overijssel (Eastern Netherlands) are both reporting values in these two indicators, which are higher than those reported by North Rhine-Westphalia.

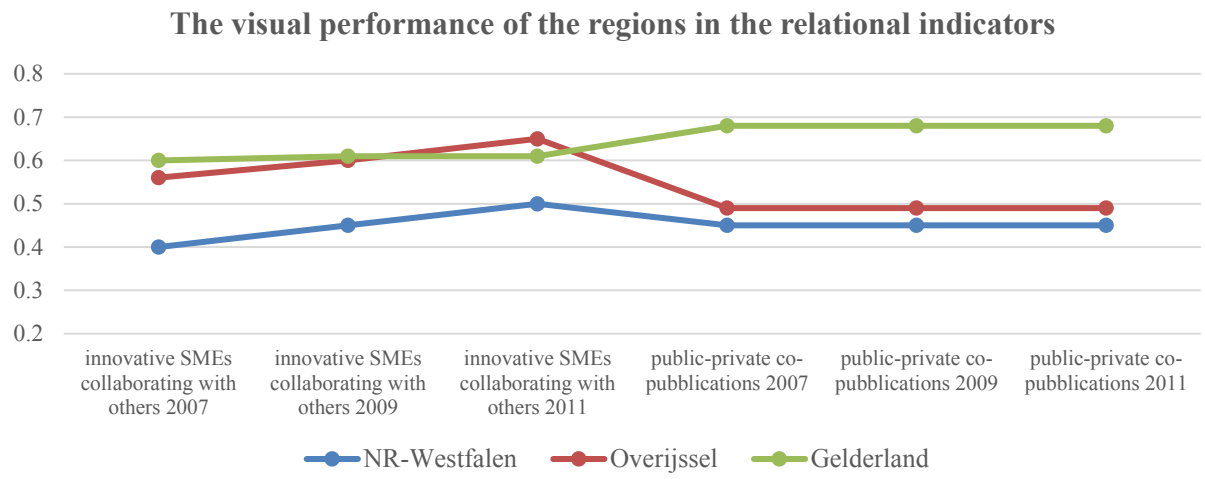

Figure 3.3: The visual performance of the regions in the relational indicators. Own elaboration from dataset: European Commission, Enterprise and Industry, 2012, p. 61.

One hypothesis here could be that social reflexivity is most likely to appear in the projects selected in the Netherlands rather than in the two projects selected in Germany, because of this good scoring of both provinces in the relational indicators. Actually, what it is of interest here is that there is a strong difference between the scoring of the two regions (especially between North Rhine-Westphalia and Gelderland) so as for the other indicators considered in the following figure 3.4. The fact that Netherlands is scoring better than Germany in the relational indicators is not so relevant here, because actually what is needed is to have this significantly different scoring in all indicators in order to maximize the contrast between the two regions selected for the study. These two indicators will be considered in interpreting the final results but for the moment it can be said that the correlation analysis without the two relational indicators is still negative significant for the two regions (North Rhine-Westphalia and Gelderland) considered as reported in the table 3.2.

In the figure 3.4 it is possible to grasp the difference between the regions considered in this dissertation in the scoring in the remaining indicators of the Regional Innovation Scoreboard 2012. Here it is clear in what aspects of the innovation the regions differ among themselves at three different temporal times (2007/2009/2011). The same as for the relational indicators, what is of interest here is "to visualise" the two very different systems of innovation. North Rhine-Westphalia is scoring better than Gelderland in almost all indicators, with the exception of the two indicators population with tertiary education and public R&D expenditures, and the two relational indicators explained above.

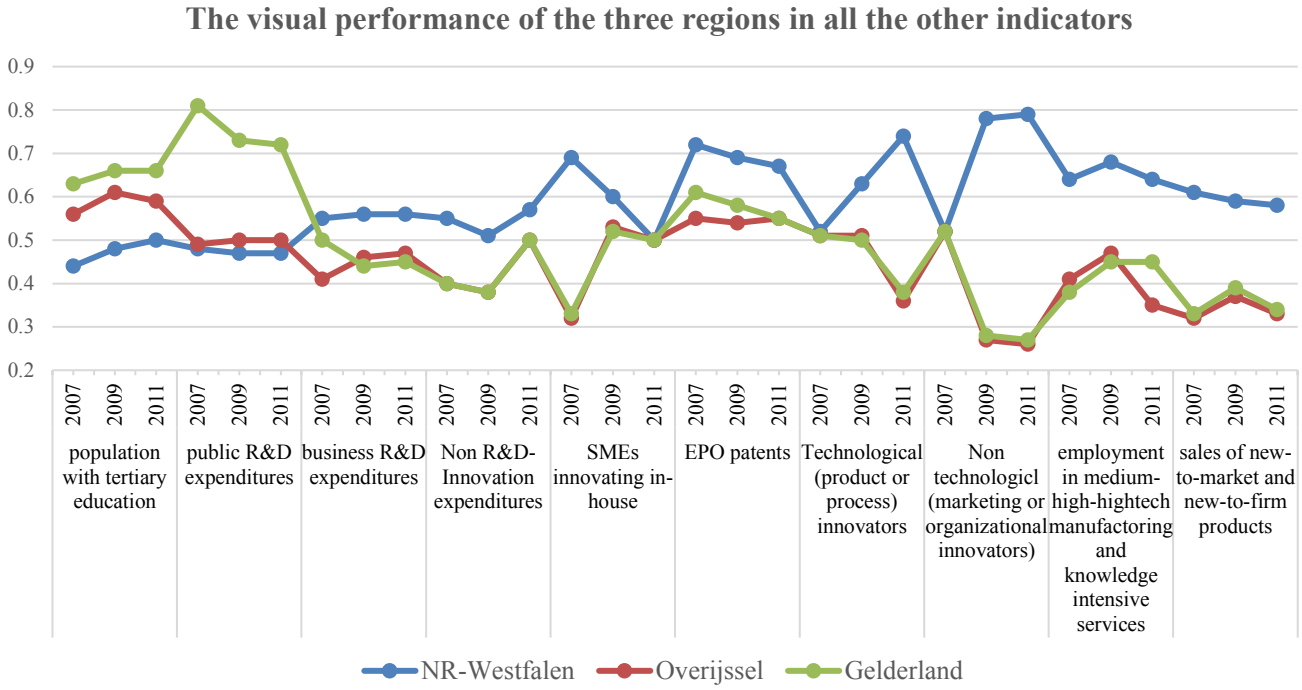

Figure 3.4: The visual performance of the three regions in all the other indicators. Own elaboration from dataset: European Commission, Enterprise and Industry, 2012, p. 61.

3.4 National System of Innovation in Germany and Netherlands

In general, the two countries perform very different in innovation outputs already at a national level. The results of the IUS 2013 (European Commission – Enterprise and Industry, 2013), based on 24 outputs indicators (12 of them have been used for the Regional Innovation Scoreboard, 2012), show already two very different country profiles at a national level.

In the IUS 2013 (European Commission – Enterprise and Industry, 2013) Germany is grouped under the innovation leader countries showing an above average performance in comparison to other EU-27 countries. Relative strengths of the German national system are registered in indicators such as "innovators" and "intellectual assets." Innovators indicator comprehends the measurement of the share of firms that have introduced innovations into the market or within their organisations, covering both technological and non-technological innovations and the presence of high-growth firms. Intellectual assets indicator comprehends the measurement of different forms of Intellectual Property Rights (IPR) as patent applications, community trademarks and community designs. Relative weaknesses of the German innovation system as a whole are reported in open, excellent and attractive research systems. Under this indicator are grouped 3 sub-indicators to measure the international competitiveness of the science system by focusing on the international scientific co-publications, most cited publications and

number of non-EU doctorate students. Under the indicator "linkages and entrepreneurship" Germany also shows a high growth rate for innovative SMEs collaborating with others and in general is performing above EU-27 average in this indicator. This set of indicators considers three indicators identical to the indicators used in the Regional Innovation Scoreboard 2012 and are: SMEs innovating in-house as % of SMEs; innovative SMEs collaborating with others as % of SMEs; and public-private co-publications per million population. In the indicator group "firm investments," that comprehends R&D expenditure in the business sector as % of GDP (the same indicator in Regional Innovation Scoreboard, 2012), Germany is performing well but a decline is registered for non-R&D innovation expenditure and sales of new-to-market and new to-firm innovations (European Commission – Enterprise and Industry, 2013).

The Netherlands is grouped under the innovation followers' countries but with an above average performance in comparison to other EU-27 countries. Relative strengths in contrast with Germany are in open, excellent and attractive research systems and for the indicators about "linkages & entrepreneurship." Relative weaknesses are in-firm investments. The Netherlands has experienced the fastest growth of non-R&D innovation expenditures (in contrast to Germany) and SMEs innovating in-house of all Member States. A strong decline is observed for knowledge-intensive services exports as % total service exports. Growth performance in firm investments and innovators is in any case above EU-27 average but in economic effects below EU-27 average. "Economic effects" group of indicators comprehends the measurement of the following sub-indicators: employment in knowledge-intensive activities (manufacturing and services) as % of total employment, contribution of medium and high-tech product exports to the trade balance, knowledge-intensive services exports as % total service exports, sales of new to market and new to firm innovations as % of turnover as well as license and patent revenues from abroad as % of GDP (European Commission – Enterprise and Industry, 2013).

Generally speaking, about these two countries, it should be also kept in mind, that Netherlands suffered more by the job-loss effects of the economic crisis and Germany even experienced a certain boom, and this consequently has also had effects on the national innovation systems of both countries.

3.4.1 Explanation of the regional differences

Before some economic indicators about the regions considered of both countries are presented, it will be presented here another study of the Regional Innovation Monitor published

in 2013 (Technopolis, UNU-MERIT and Fraunhofer 2013), in which the regions were grouped in three subgroups according to some common characteristics:

1. **"world-class performers" regions:** Baden-Württemberg, Bayern, Berlin, Hessen, Niedersachsen, Sachsen, Noord-Brabant (Technopolis, UNU-MERIT and Fraunhofer 2013).
2. **Regions with strong focus on industrial employment**: Nordrhein-Westfalen, Rheinland-Pfalz, Overijssel, Limburg, Friesland, Drenthe, Zeeland (Technopolis, UNU-MERIT and Fraunhofer 2013).
3. **Regions with a focus on the service sector and public R&D:** Bremen, Hamburg, Saarland, Thüringen, Brandenburg, Mecklenburg-Vorpommern, Schleswig-Holstein, Sachsen-Anhalt, Gelderland, Zuid-Holland, Noord-Holland, Utrecht (Technopolis, UNU-MERIT and Fraunhofer 2013).

Of course, this study made the classification for all European regions, not only for the Netherlands and Germany, for the purposes of this dissertation it will be considered here only these two countries. The purpose of this second study was "to incorporate the results of the recent published Regional Innovation Scoreboard 2012 (RIS) with a view to make a qualitative assessment of innovation policies and innovation performance" (Technopolis, UNU-MERIT and Fraunhofer, 2013:i).

In very general terms regions under "world-class performers" show these common characteristics:

1. GDP per capita between 25.000 – 35.000 euro.
2. 70% of the R&D expenditures from the private sector, 30% from the public sector.
3. High ranking in Regional Innovation Scoreboard unaffected by the crisis.

In innovation policy terms, these regions are leading regions that through mainly low-budget networks and cluster policies, tend to meliorate their already well-performing business sectors. The most of the measures adopted in these regions are on research and technology and direct support to enterprises in the form of grants, they also try to invest more in supply-side policies on a local level, where the existing good infrastructures and competences can be valorised as a catalyst for the economic development of the region (Technopolis, UNU-MERIT and Fraunhofer, 2013).

The regions which were grouped under "regions with strong focus on industrial employment" have the following common characteristics:

1. More large disparities in terms of economic development and innovation performance among them.
2. Non R&D factors as important source of growth and jobs.

The policies pursued in these regions are aimed at developing the innovation capacity of the local industries and to build partnerships between different local stakeholders (industries, universities, local development agencies). In fact, in these regions, the main measures adopted are for entrepreneurship and less attention is given to other types of instruments like technology-based firms, start-ups and spin-offs, which could increase the innovation potential of these regions (Technopolis, UNU-MERIT and Fraunhofer, 2013).

In the third group of regions "with a focus on the service sector and public R&D," we can find regions in which per capita GDP may vary widely and in most of the cases can be under the EU-27 average. Another characteristic of these regions relies on the variation of unemployment rates. Considering all regions in the European Regional Scoreboard 2012 we can find this typology of regions spread in all four types of innovation performance (leading, followers, moderate and modest).

Usually in these regions BERD (Business private expenditure for R&D) is much below of the EU-27 average and GOVERD (public expenditure for R&D) is proved to be better (Technopolis, UNU-MERIT and Fraunhofer, 2013). The next step will be to present some detailed data about economic development, structure of economy and maturity of R&D systems, in order to select regions, which are not too far from the development average of the country.

3.4.2 Economic development indicators

In this part of the chapter the main aim is to consider some economic development indicators in order to understand if the regions selected present quite similar characteristics and are not too far from the general characteristics of their countries. Data are here available on NUTS 1 and 2 levels. In the figure 3.5, in very general terms, it is possible to consider regions and countries of interest for this dissertation on the basis of their division of employment by broad sector.

The Netherlands present more population employed in the public administration, education and health rather than Germany, although the difference is not so huge. Germany present more population employed in industry rather than Netherlands. The two selected regions in both countries on a NUTS 1 level show a structure of the economy, which is really not so far from the general one of their countries.

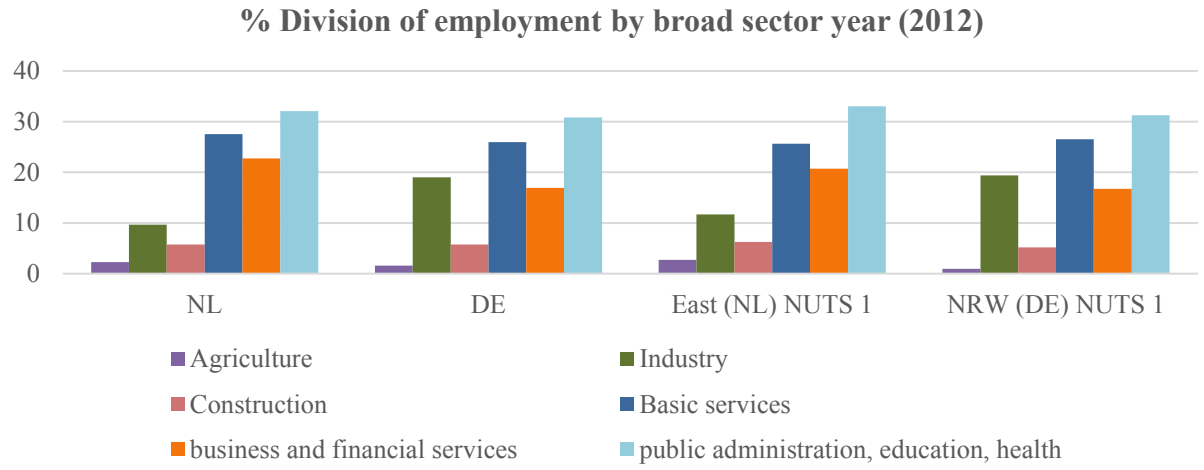

Figure 3.5: % Division of employment by broad sector year 2012. Own elaboration from dataset: European Commission, Regional and Urban Policy, 2015a, b, original source: Eurostat data.

In the next figure 3.6, it is possible to consider some data about the GDP per head by the year 2014 on a NUTS 2 level too. Both countries present values, which are above the EU-27 and EU-15 averages. But on a NUTS 1 level the values for Eastern Netherlands is quite lower than the average GDP for Netherlands as a whole. The same cannot be said for Germany, where the GDP per head for whole Germany and that for North Rhine-Westphalia are reporting the same values.

On a NUTS 2 level the two provinces of Gelderland and Overijssel are quite similar among themselves, more differences there are between different areas inside North-Rhine Westphalia, where areas around cities like Dusseldorf and Cologne are reporting values, which are higher than those of other less populated areas of the region.

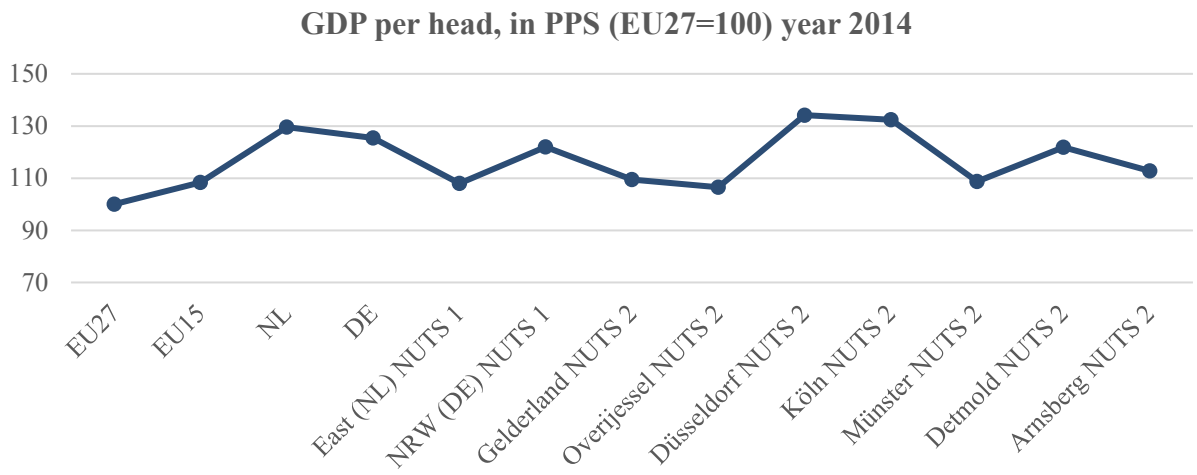

Figure 3.6: GDP per head, in PPS (EU27=100) year 2014. Own elaboration from dataset: European Commission Regional and Urban Policy, 2015a, b, original source: Eurostat data.

In the next figure 3.7, it is possible to grasp the dynamic of the employment rate (% pop. 20-64) during the time (2000-2015) on a NUTS 1 level. Countries and regions of interest for this dissertation are presenting values above the EU-27 and EU-15 averages. Here it can be seen that for Germany and North Rhine-Westphalia the trend was always increasing, even during the economic crisis years. The same cannot be said for Netherlands and Eastern Netherlands where the general trend was decreasing during the most difficult years of the economic crisis (2009-2014).

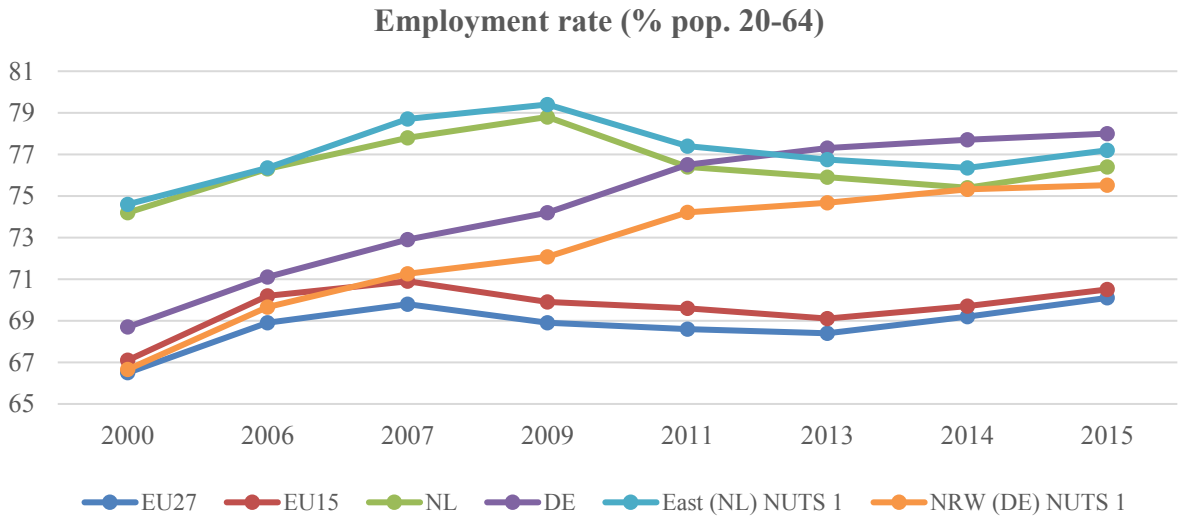

Figure 3.7: Employment rate (% pop. 20-64). Own elaboration from dataset: European Commission Regional and Urban Policy, 2015a, b, original source: Eurostat data.

The percentage of the employed (pop. 20-64) by the year 2015 is between 75% and 80% in both countries and regions. Here it is interesting to observe that Eastern Netherlands present a slightly better percentage of the employed than Netherlands in general, the opposite for North-Rhine Westphalia, where the percentage of the employed is lower than the general one for Germany.

Both countries and regions present employment percentages, which are at least 5% higher than those of the EU-27 and EU-15 averages by the year 2015. An interesting feature of the two selected regions is the distribution of their population, as it can be grasped from the figure 3.8. Here the population as percentage of the country total population by the year 2015 is reported. As we can see in North Rhine-Westphalia there are a little bit more than 20% of the total population of Germany.

At a NUTS 2 level the areas inside North-Rhine Westphalia, which are mostly populated are those of the areas nearby Cologne and Dusseldorf (Ruhrgebiet). In the Eastern Netherlands, the population is almost 20% of the total population of the Netherlands, the province of Gelderland is two times more populated than the province of Overijssel.

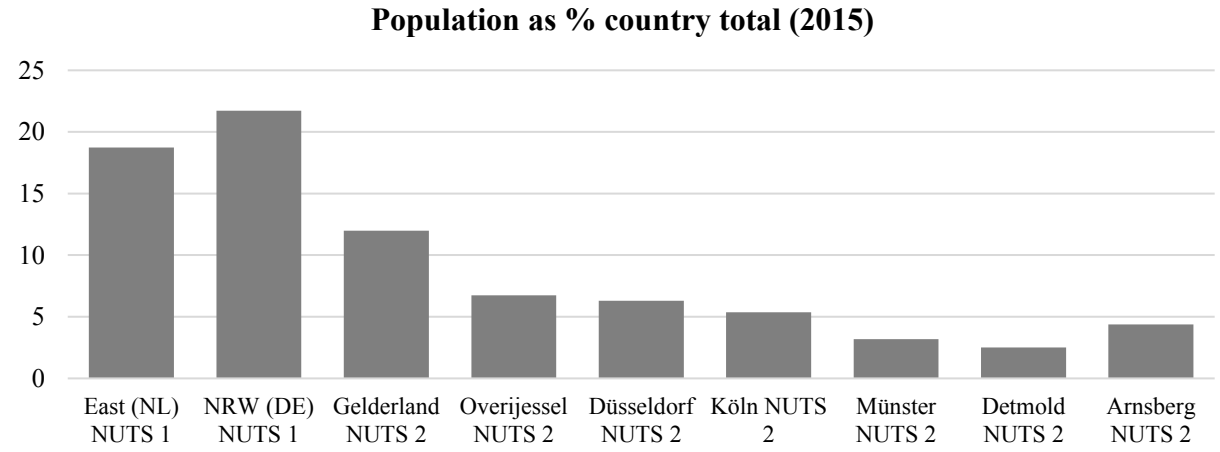

Figure 3.8: Population as percentage of country total (2015). Own elaboration from dataset: European Commission, Regional and Urban Policy, 2015a, b, original source: Eurostat data.

The last indicator considered here was already present in the twelve output indicators used for the correlation analysis and it is the R&D expenditure as percentage of the GDP. It has been already observed that the Eastern Netherlands is spending more than North Rhine-Westphalia for public R&D expenditure as percentage of the GDP (figure 3.9).

Here it is interesting to note that despite the R&D expenditure of the whole Germany is quite high (almost 3% of the total GDP), the percentage for North Rhine-Westphalia is almost 1% lower and even lower than the averages of the EU-27 and EU-15 countries. In contrast, Netherlands as a whole, devotes a lower percentage than Germany for R&D expenditure, but the Eastern Netherlands have increased during the years (2002-2013) considerably this percentage, from almost 1% by the year 2002 to almost 2% by the year 2013. This shows the continuing efforts to boost R&D in the Eastern Netherlands, where excellent universities and research centres are located, during the years.

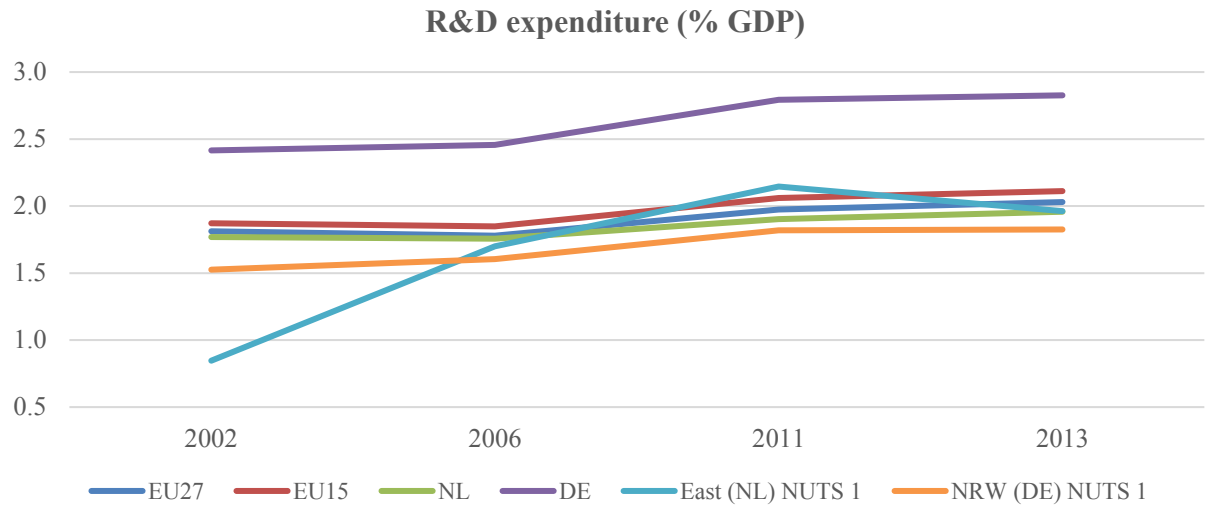

Figure 3.9: R&D expenditure (% GDP). Own elaboration from dataset: European Commission, Regional and Urban Policy, 2015a, b, original source: Eurostat data.

3.5 Selection of the projects as cases

This last part of the selection chapter aims at introducing the selected projects in each of the two selected regions: North Rhine-Westphalia and Gelderland. It serves to explain the main criteria followed in the selection phase and to explain the characteristics of each project.

In order to have the list of all projects financed by the European Regional Development Fund in the two selected regions in the EU programming period 2007-2013, the two managing Institutions of the funds on provincial/regional level in Germany and in the Netherlands, were contacted. For North-Rhine Westphalia, the federal Ministry of Economic Affairs and Energy (Ministerium für Wirtschaft, Energie, Bauen, Wohnen und Verkehr des Landes Nordrhein-Westfalen) was in charge for the operational programme for the whole region (Land). The list of all financed projects in the period between 2007-2013 was available at the webpage:

http://www.ziel2.nrw.de. Additionally, the office provided the email details of the project leaders involved in the projects that were evaluated to be interesting for this research. For the Netherlands, the managing authority in charge for the European Regional Development Fund was the Province of Gelderland for the two Provinces of Gelderland and Overijssel. The office published a list of the financed projects between 2007 and 2013 at the webpage: http://www.go-oostnederland.eu/?id=95. From this list, it was possible to find the names of the project leaders and their email contacts.

The selection of the projects was limited to those projects that started in a later phase of the EU programming period (2007-2013) to be able to select projects, which were supposed to be finished at the end of 2015, with the exception of one project in Germany that finished already in December 2013. It was decided to select only projects in the field of Biotechnology/Biomedical technologies, Food and Nutrition. This because both regions are specialised in these sectors, as it was presented in the theoretical chapter of this dissertation.

The usual length of these projects is between three and four years. The two projects selected in Germany are both specialised in the study of cells and related technologies, the two projects in the Netherlands are more dealing with nutrition improvements both in animal and human food. Once identified the two projects in the two regions, project leader(s) and other partners were asked to participate in the interview. For each project, between five and seven actors from the different organisations that joined the projects were interviewed. The semi-structured interview in itself has been divided into three parts: introduction, net-map drawing, and in the last part the respondents were asked to answer some questions about the changes in the network's structure during the time span of the project with the help of the methodology of the visual network scales (Mehra et al. 2014). The content and the use of both interview and questionnaire will be explained in the next chapter about methods.

3.5.1 Description of the cases/projects as unit of analysis

For further anonymization, the projects were given the following new names: NL_Reflexivity and NL_Control for the two projects selected for the Netherlands and DE_Reflexivity and DE_Control for the two projects selected for Germany. DE_Reflexivity, for example, is the name of the project selected in Germany, which was supposed to produce the property of social reflexivity, DE_Control is the name of the project that served as control project in Germany, the same for the Netherlands.

For the NL_Reflexivity project seven interviews were carried out with partners coming from six different organisations. For the NL_Control project there are five interviews from five different organisations. Regarding the DE_Reflexivity project there are five interviews from five different organisations and for the DE_Control there are five interviews from four different organisations. At the end of this dissertation in the appendixes C and D, it is possible to see a schema of all data collected for each project and the main characteristics of each project.

The first selected project in the Netherlands (NL_Control) was aimed at combining scientific and product-technical knowledge with the aim of foods that promote health. The collaborating partners in this project were six, both knowledge institutions and companies, operating in the Province of Gelderland (two multinational companies, three universities and one private research centre). The consortium received more than 2.6 million Euro grants from the European Regional Development Fund (ERDF), the Province of Gelderland and the Empire.

The second project that has been selected in the Netherlands (NL_Reflexivity) has involved the development and testing of new products and services with increased nutritional needs. The partners in this project were nine (one University, two research centres public/private, five companies, among them two multinationals, and one hospital). The total public co-financing for this project was more than 2,4 million Euro grants from the European Regional Development Fund (ERDF), the Province of Gelderland and the Government of the Netherlands.

The first project that I selected in Germany (DE_Control) was a project aimed at creating innovative technologies for cell culture. This consortium has been granted with circa 2.5 million Euro from the European Regional Development Fund. The partners in the project were six: one university and five companies, among them start-ups and big pharmaceutical company. The second project in Germany (DE_Reflexivity) was a project aimed at designing a production facility for cells. The partners in this project were eight: two companies, two universities with different departments (five) involved and two research centres. The main hypothesis here was that projects with a higher number of different partners/organisations could be those probably developing the social reflexivity property: (NL_Reflexivity, DE_Reflexivity); the other two projects served as control groups: (NL_Control, DE_Control). Other characteristics of the projects were considered in deciding which project could probably produce the property of social reflexivity asking each project leader about the occurrence of some characteristics, which are peculiar of reflexive groups, such as face-to-face encounters, shared decision-making processes, teamwork, and internal evaluation procedures at any stage of the project.

3.6 Conclusions

This chapter was devoted entirely to explain the main criteria followed in the selection of the countries, regions and cases of interest for this dissertation. In the selection of countries and regions two main criteria were followed: to select countries/regions, which present "significantly" different outputs regarding their innovation performance and to select in particular regions, which are not so different regarding the structure of their economy and their R&D systems and not so far from their national system of innovation. Of course, it was not possible to control every variable, given that the two selected regions, despite of being not so far regarding per capita GDP, employment, population distribution, university system and presence of excellence clusters, are quite different regarding the vocation of one region more toward industry (North-Rhine Westphalia) and the other one more toward services and public sector (Gelderland). The need to identify among European countries, two countries, which already present very different innovation outputs was dictated by the need to verify the more external hypothesis of this dissertation that the presence of different outputs can be reconducted to different ways of implementing policies on a regional level in the two countries/regions, where the projects were selected. The more internal hypothesis refers to social reflexivity developed at the team level, which can have a role in explaining the variation of the dependent variable (efficiency/effectiveness of the selected innovation projects). A third hypothesis can be also advanced here, that the interplay of both variables could explain the different performance of the selected projects.

In the last part of this chapter the criteria followed for the selection of the projects (as cases) were explained.

4 METHODS: INTERVIEW AND QUESTIONNAIRE

4.1 Introduction

In the following chapter, the two methods used in order to get the data are presented: the semi-structured interview and the questionnaire. Despite being quite structured, the interview gave rise to some narrative parts, which were later analyzed extensively in using a content analysis programme (ATLAS.ti 7.5[1]), which has allowed to attribute codes to narratives. The same codes were occurring in all the four projects with the exception of some codes, which were peculiar for each project. In general, the most of the codes were used in all four projects allowing a comparison between projects regarding, for example, the different problems, which emerged in each project or the different organisational form of each project. All codes were grouped in families of codes, which served as macro categories in order to classify the codes for further interpretation of the data. On the other side, the quantitative data collected through the use of a questionnaire, have to be divided into two types of data: network data and correlations among networks' matrices. The structural data refer to all data obtained from the matrices of the networks starting with their visualisations and comprehending other typical structural indexes such as the measurement of centralities degrees (betweenness, in and out degree), structural holes and brokerage measures. These data describe the structure of the network at a precise time (T4), giving precious information about the connectedness of a network and its cohesion. The second type of quantitative data analysis that was conducted on the matrices was a correlation between the whole network of each project and the perceived ego-networks of each person in the networks. Those correlations gave an idea about how much similar is the "cognitive picture" of each participant to the "whole" network. It is important to introduce here the different types of data collected in order to understand how the interview and the questionnaire were constructed.

4.2 Content and structure of the interview

Here it will be introduced the structure of the semi-structured interview, which comprehended three main parts: introduction and net-map (Schiffer and Hauck 2010) drawing, questions aided with the visual network scales (Mehra et al. 2014) approach and questions about the final evaluation. The full protocol used in the interview can be found at the end of this dissertation in the Appendix A. Here I am going through the full protocol of one interview, in

[1] ATLAS.ti Scientific Software Development GmbH.

order to let better understand how the interview was developed and how the figures of the visual network scale approach were used.

4.2.1 Introduction into the interview and net-map drawing

The following preliminary information and questions were asked at the beginning and during the interview to each interviewed partner:

- Introduction and some information about the aim of the research.
- Secrecy about the collection of the data; information about anonymous procedure regarding to the names for further use and publication.

General questions about the starting conditions of the project and some variations occurred during the project and work modality were asked at the beginning of the interview:

- History of past collaborations in other projects.
- Incentives to participate in the project.
- Frequency of meetings with the project's partners during the project.
- Variations occurred during the project about resources and actors.
- Type of work modality developed inside the group (mail, meetings face to face, Skype conferences, teamwork).

This introductory part to the interview was meant to start a conversation with the respondent about some important issues regarding the organisation of the project, especially regarding the initial conditions in which the project has started and the motivation to participate in it. Then the respondent was introduced to the net-map drawing with the use of a net-map like in the following figure 4.1, where he/she was asked to put the other partners in one of the three sectors/circles and to draw lines between them. Here the detailed explanations given to the respondent in order to complete his/her net-map during the interview:

- "This is just a kind of map to make a general structure of all the relationships developed inside the project. You are in the middle (EGO) and here, as you can see, there are three sectors: university/research, industry, and others. It is divided into three parts, where you can put the partners who were for you very much cooperative, quite cooperative, and less cooperative."

- "These small pieces of paper are here to help you to put people, partners, or organisations inside the map. You can write on these papers. I do not need the name of the persons. Maybe you can write the role of the person in the organisation… if it is a researcher, an entrepreneur, or whatever else."
- "You can write the role of the person, the name of his/her organisation, the gender, and even if you can also estimate so like between 20/30, 30/40, 40/50, 50+ for the age."
- "For me it is better if you put persons here inside…but if you, for example, want to put one organisation because you did not collaborate really with one person but sometimes you had some contact or some work with the organisation but not with a specific person, you can put just organisation…or, for example, if you also have a group of people and these people were interchangeable but all from the same group, you can put the group as a whole."

Figure 4.1: The net-map. VennMaker 1.4.0, Source: Software VennMaker: M. Schoenhut, M. Gamper, M. Stark and M. Kronenwett. www.vennmaker.com.

In order to generate the list of the people/organisations to be inserted in the net-map, a name generator has been given to the respondent:

- Name generator: "with whom did you collaborate in the last six months of the project? Collaboration it means here not ... or not only face-to-face encounters, but also per email, Skype, or some other types of contact."

In order to detect the relationships between the respondent and all the other partners and between all the partners from the perspective of the respondent it was asked to draw lines between the nodes:

- Relations EGO-ALTERS and ALTERS-ALTERS: "now I am asking if you can draw a line between you and all these people, and maybe you can differentiate with a straight line if you collaborated very much with them, and if less with a dotted line. Maybe you can explain to me why have you collaborated with some more and with others less in the last six months of the project. Now I am asking you if you know if all these partners were also connected among themselves in the last six months of the project. Can you connect them with a line?"

4.2.2 Visual Network Scales approach

In the second part of the interview the respondent was asked to reflect about his/her own net-map with the use of the six figures of the visual network scales approach.

4.2.2.1 Question 1: overall structure

"Now, as you can see in your net-map, you have drawn a kind of structure of all these relationships, not only between you and the other partners but also between the partners, in the last six months of the project. If you consider figures like these ones, which one do you think would depict better the situation you have already drawn in your map and why? Would you choose the same figure for the beginning of the project or another one? Has the situation been changed from one figure to another one during the time span of the project and why?"

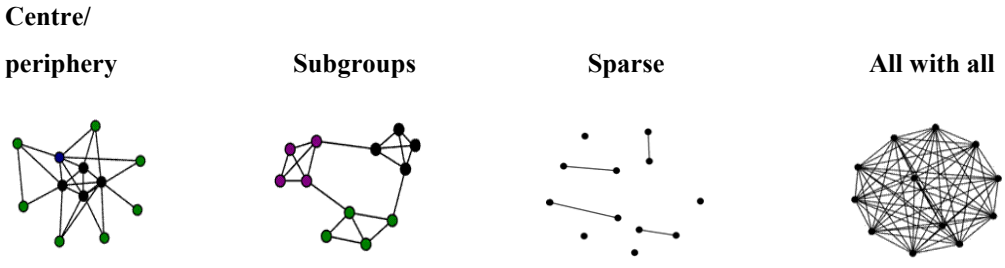

Figure 4.2: Overall Structure (visual network scales). Mehra et al. 2014.

In this first question aided with the use of the visual network scales approach, the respondent has to choose between one of the four networks as depicted in the figure 4.2: the first network is a centre/periphery network; the second one consists of interconnected subgroups; the third one depicts sparse one to one connections and the last one is a network where all are connected with all.

The respondent should choose the network, which better depicts his already drawn net-map. This is the starting point of the reflection process. Once identified a figure that depicts his network at time T4 (at the end of the project), he/she was asked to reflect about the changes in the overall structure during the project (T2-T3) and at the beginning of the project. This first question wanted to understand if the respondent perceived change in the overall structure of the network from the beginning until the end of the project.

4.2.2.2 Question 2: density

"If you have a look on these other figures, about how many times the people met and shared something together ... so do you think that during the project - at the beginning, in the middle, at the end – one or more of these figures was/were the situation of the project?"

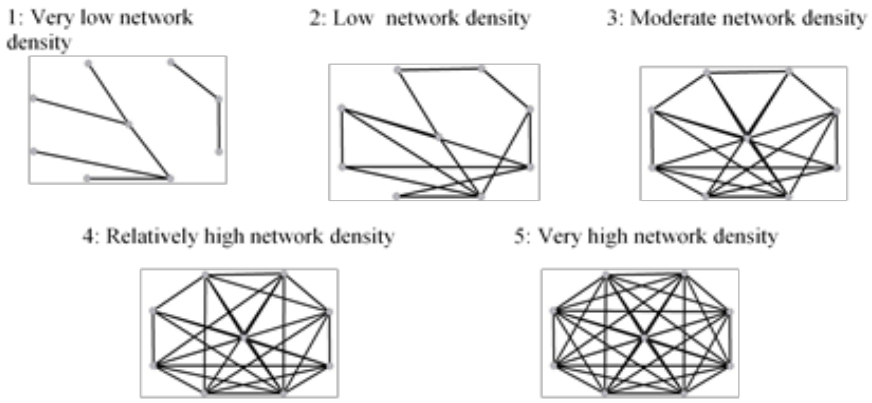

Figure 4.3: Density (visual network scales). Mehra et al. 2014.

In this question displayed in the figure 4.3, the respondent was asked to reflect about the intensity of the relationships in the network during the time span of the project. Here the aim was to understand if there were some changes more regarding the intensity rather than the structure

of the network. For some partners, it was not really easy to understand the difference between the two first questions, which needed further explanations.

4.2.2.3 Question 3: position

"Then you are in your net-map in the middle. Do you think that during the project, at the beginning or at its end, have you been in another position? Do you have the perception you have always been in the middle?"

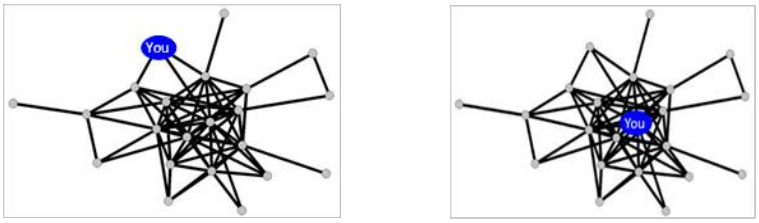

Figure 4.4: Position (visual network scales). Mehra et al. 2014.

This question displayed in the figure 4.4 was aimed at understanding where the respondent perceived him/herself in the network, more at the centre or at the periphery and if he/she has experienced a change in his/her position during the time span of the project.

4.2.2.4 Question 4: pattern of relationship

"Here, you can see there are different patterns of the collaboration between you and your partners during the time. You can choose one general for all the partners or you can also put some partners in one and other partners in another one."

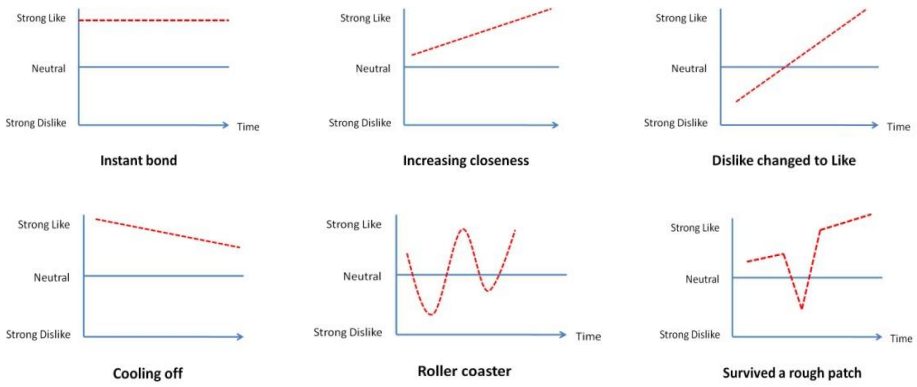

Figure 4.5: Pattern of relationship (visual network scales). Mehra et al. 2014.

In this question displayed in the figure 4.5, the respondent had to choose which graph, among these six, depicts better the pattern of the relationship, during the time, with the other partners in the project. He/she could choose only a general one or can indicate different graphs for different partners.

4.2.2.5 Question 5: brokerage 1

"Here, have you ever been in the position that you are in the middle between two partners/two organisations and you have to mediate in a conflict situation, or if there is a problem, or maybe they do not know so well each other and you have to bring them together during the project?"

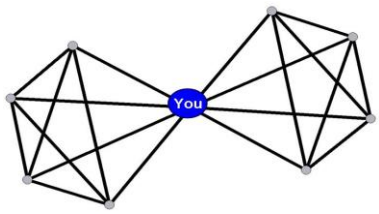

Figure 4.6: Brokerage 1 (visual network scales). Mehra et al. 2014.

This first question displayed in the figure 4.6 about brokerage was meant to understand if the partner has experienced the situation to feel between two partners or two subgroups/organisations during the project.

4.2.2.6 Question 6: brokerage 2

"Here, more general, when you find yourself in this position between two persons: they do not know each other, they do not like each other, or there are some problems. What is your personal attitude to them? Do you try to change the things, or that the two people meet or you drop one of the two people as a partner?"

This last question (figure 4.7) about brokerage was more aimed at understanding the attitude of the respondent versus playing the role of the broker.

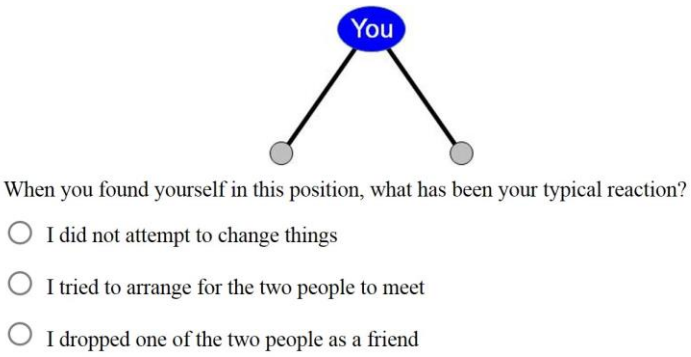

Figure 4.7: Brokerage 2 (visual network scales). Mehra et al. 2014.

4.2.3 Questions about the final evaluation

In the last part of the interview the respondent was asked some questions about the final evaluation of the project:

- "Just to conclude, if you have to evaluate this project and if you, in the future, will have the opportunity to collaborate again with these organisations and partners, would you like to collaborate again or not?"
- "What is your evaluation about the whole project, about the general objectives of the project and from your perspective?"
- "Do you think that in general the objectives of the project were reached or not in the time span of the project?"

The last questions about the final evaluation of the project wanted to understand, from a subjective point of view, the perceptions about the final performance of each project, in order to detect later, if there is a variation of the dependent variable performance, both in its constitutive variables efficiency and effectiveness to be explained by the different degree of social reflexivity developed in each team.

This protocol of the interview was the same for all the persons who were interviewed, but every interview is unique since the questions were more intended to be a kind of starting point to go more in-depth in the narration of the different project's experiences of each partner.

4.3 Content and Structure of the questionnaire

In constructing the questionnaire, it was decided to better define two aspects that were already asked in the interviews and that, after a first analysis of the interviews, were evaluated to be not yet sufficiently clear. The first one is a common and clear definition of the relationship detected, the collaboration, which was interpreted differently by the partners, who were interviewed; and the second one, was the measurement of the intensity of the relationships in the time span of the project. Another important decision that was taken was to ask to them again both their perceptions about their own collaboration relationships in the networks (EGO-ALTER) and their perceptions about collaboration relationships between the other partners in the network (ALTER-ALTER). The so called Krackhardt methodology of the cognitive social structures (Krackhardt 1987) was applied to disentangle the resulting networks (matrices). From the first question (EGO-ALTER) of the questionnaire, it was possible to reconstruct the whole network, from the second question (ALTER-ALTER) of the questionnaire, on the other side, has allowed to extract for each respondent his/her perceived network (SLICE). Generally speaking the whole network is supposed to be the most actual one because each respondent confirms directly and only about his/her own connections. But to be taken as existing, the connections must be confirmed also by the other respondents. Easily said: actor A says he/she has had a collaboration relationship with actor B. The relationship can be taken as existing only if B confirms the same. In the construction of the general whole network I considered confirming the connection between A and B only if both of them confirmed the relationship. It was more complicated when considering the missing respondents. In this case I had two scenarios:

1. A said that there was a connection between A and B, but B could not confirm because he/she did not answer the questionnaire (B missing). In this first case I have taken the relationship as existing only if the majority of the other partners in the network confirmed that A and B were connected. In this case I used the information of the second question of the questionnaire (ALTER – ALTER) in confirming what actor A said. So only when both A and the majority of the people in the network said that the relationship existed, I take it for existing.
2. Both A and B were missing respondents but I needed to know if they were connected or not to complete the whole network. Also in this case I used the information coming from the second question (ALTER – ALTER) taking the relationship as existing only if the majority of the partners in the network confirmed that relationship.

The four whole networks differentiate themselves regarding the number of partners in the network and the respondent's rate was also different in the four projects, I will explain these aspects more in-depth in the following chapter when discussing the analysis of the network data. I decided to take a quite conservative threshold for the missing (equal or more than the half of the partners in the network) as the Krackhardt methodology suggested in these cases (LAS, 1987).

The second question, allowed me to have for every person in the network his/her perceived network (SLICE). The slice is the row matrix of each respondent of the questionnaire, he/she responded for himself/herself (EGO-ALTER) but also reconstructed the relationships between the others. The slice is actually the cognitive picture each respondent has about his/her own network. Disentangling the networks in whole (actual) and perceived (slices) allowed me to compute correlations between the matrices of those networks for each project. The correlation can reveal in this case how far or close from the whole network is the perception of each respondent and in my analysis served as principal indicator of social reflexivity in the networks. I also will discuss more in-depth this part in the following chapter about the quantitative analysis.

The two problematic aspects that are introduced here are the following:

1. Definition of the detected relationship;
2. Intensity of the detected relationship.

As explained before, the second round of the collection of the data through a questionnaire gave me the opportunity to clarify and uniform some problems that arose in the analysis of the interviews. The semi-structured interview wanted to give the respondents only some input and allowing him/her to speak about his/her reflections and perceptions of the collaboration inside the network, some important aspects such as a clear definition of the relationship detected and its intensity were not so clearly bounded. In the instructions of the questionnaire I wanted to clarify better the type of relationship in which I was interested in with the following words: "This survey is designed to learn more about your work with project (name of the project) from June-December 2015. I am specifically interested in learning more about your collaboration with other partners in the field for the purposes of meeting the goals of your assigned project. I am defining collaboration in this context as one or more of the following activities: sharing knowledge related to the project with other partners, exchanging best practices with partners, and/or providing information or advice to other partners about the project's development. Collaboration in these situations may have taken the form of one or more of the

following: face-to-face exchanges, email exchanges, Skype or phone calls, or discussion during group meetings or team activities." The complete questionnaire can be found at the end of this dissertation in the appendix B.

This clarification seemed to be useful, especially because during the interviews there were some need from the partners interviewed to find a definition or to better understand what has to be meant under the word "collaboration in innovation projects." "Is collaborating just being in contact with each other?" was one of the recurring questions. Another difficult aspect for them was to remember the intensity of the relationship during the time. For this reason, I added four columns in the questionnaire with a classification in four temporal times: one/two times in a week, one/two times in a month, every two months or rarely. The respondents were asked to estimate how often their collaboration relationship had taken place in the last six months of the project. For having an idea of the strength of ties in each network it was a good idea to ask the respondents to judge the intensity of the relationship. The problematic aspect in the further analysis of the data was the difficulty to estimate the intensity, not only for themselves but also in the ALTER – ALTER relationship. This created further problems of asymmetry in the data, given that each respondent had to answer twice for the same pairs of actors. For example, first was asked C to estimate how intense was the relationship between A and B and then later in the questionnaire was asked him/her the same for B and A. Not always was the answer the same between the four options. In general, it can be said that the project leaders and other very central actors were more accurate in giving the same answers rather than other more peripheral actors whose answers were more asymmetrical. In organising the data for the analysis for every person I prepared a matrix and I have entered the data, putting 1 if they answered that the relationship was rarely, 2 if the relationship was every two months, 3 if the relationship was one/two times in a month, 4 if the relationship was one/two times in a week and 0 if they put any relationship. In the case of the asymmetry of the answer I took a mean value between the two different ratings (A/B and B/A) so to have a symmetrical matrix for each slice. In the case of the whole network the intensity was calculated as a mean between all the ratings given by the respondents.

4.4 Conclusions

This chapter was aimed at introducing the main methods used to collect the data, the interview and the questionnaire. For both methods, it was explained the use that has been done in the field and their main limitations.

5 QUANTITATIVE DATA ANALYSIS

5.1 Introduction

The following chapter is aimed to present and discuss the analysis of the collected quantitative data. The first section will be devoted to present the data collected through the use of a standardized questionnaire, which generated different types of data: networks data and correlations between networks. Networks data refer to all data that can be analyzed using the binary matrices generated from each questionnaire, comprehending the visualisation of the network and its structural characteristics, such as reciprocity, density, strength of the ties, degree centrality, etc.; correlations between networks refer to correlations computed between matrices of different networks, for example, between the matrix of the whole network of one project and the matrix of its project's leader. It has been decided to present first the quantitative data rather than the qualitative ones, in order to introduce the structure of the whole network in the last six months of each project, as the starting point for the analysis, and then to integrate the picture in a later chapter with the qualitative data which refers more to the whole length of the projects and to perception of changes in the networks. As explained in the chapter about methods, the collection of the qualitative data started before the questionnaire, and the first analyses of the net-maps collected during the interviews, has allowed to construct a more precise questionnaire which was sent six/eight months after the interviews to all partners and to those new partners, who did not emerge at the beginning of the research.

The next analysis chapter (number 6) will be aimed at presenting the qualitative analyses conducted with the aid of the programme ATLAS.ti 7.5 about the content of the interviews. The interviews were analyzed through the use of codes that were then organised in families of codes, in order to allow some comparisons between the projects on the basis of the occurrence in the interviews of the same codes and families. In the qualitative analysis chapter, some of the results from the quantitative one will be introduced in order to start to identify the main dimensions, which emerged in the analysis. Finally, the interpretation chapter (number 7) will be aimed at bringing together the results of the two different analyses presented to foster a triangulation of the data in trying to answer the questions: are the data reinforcing a common interpretation or are diverging regarding the question of the role of social reflexivity in innovation projects? Can the different data be integrated in explaining the role of social reflexivity in innovation projects?

5.2 Networks' visualisation

The content of the questionnaire was already presented in the previous chapter about methods and at the end of this dissertation (Appendix B). The aim here is to present directly the analysis conducted on the matrices. The collected matrices allow at first to visualise for the first time the whole networks of each project. The visualisation has had a very important role in this research because, during the interview, the visualisation as a method in itself was used in order to understand how the participants perceived their own networks from above in drawing their net-map. This was actually the first step to go more in-depth in reflecting about the structure of the networks with the participants during the interview, and the visualisation was also very helpful for them in reconstructing the changes in their networks. It has been explained before in the previous chapter about methods, how the whole networks were generated, the next step will be to have a closer look to those networks and to discover their structural characteristics. In discovering their main structural characteristics some of the interpretative dimensions, which emerged from the analysis will be introduced.

5.2.1 Visualisation of the first network: NL_Reflexivity

The first project presented here is the project in the Netherlands for which it has been made the hypothesis that it could probably produce the social reflexivity property. It has been already explained under which conditions the projects were selected in the previous chapter about methods, in which each project was briefly presented. The whole network of this project consists of thirteen actors who belong to these different organisations: one public university, two research centres (one public and one private), one small medium enterprise (formed by two independent start-ups), three large firms (two of them multinational) and one public hospital. The sector of the project is biotechnology applied to food. The length of the project was in total four years and it was extended for the last six months. The data collected through the questionnaire refer to the last six months of the project (06/2015-12/2015).

In the following figure 5.1, it is displayed the whole network of the project NL_Reflexivity, the respondent's rate was 69%, which means that not all the thirteen persons in the network answered the questionnaire but only nine of them. For the missing respondents, as explained in the previous chapter, the existence of the relationship was accepted only if the majority of the partners in the network confirmed it (threshold >= 7). A list of the actors and their roles in the network can be found in the Appendix D at the end of this dissertation. From a first analysis, only visualising and reflecting about this network, it can be said that the number of

males and females in the network is almost equal, the network seems to be well interconnected and there are actors from different organisations who are perceived to be very central (4), less central but still well connected are other actors and the project leader (5), more peripheral actors are both actors belonging to one research centre and the communication specialist of the firm 2 (3). The relationships between the actors seem to be quite intense.

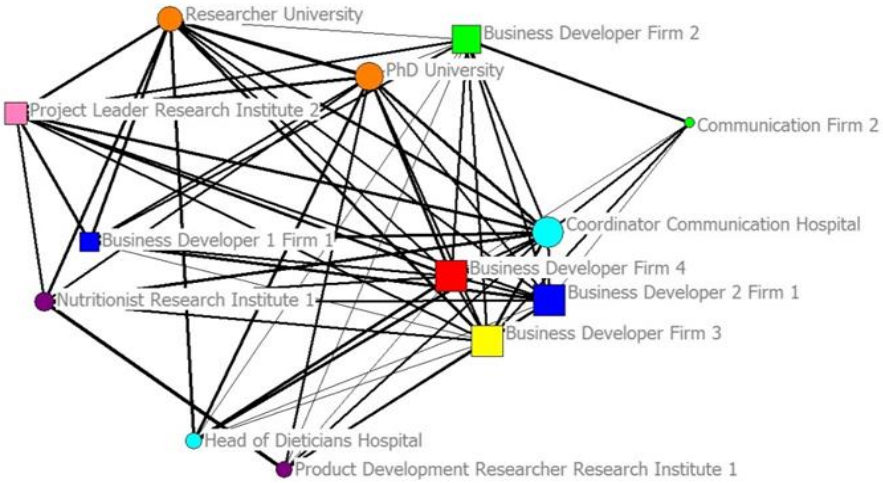

Figure 5.1: NL_Reflexivity whole network. Actors with the same colour belong to the same organisation; line weight represents strength of ties; node size and layout represents degree centrality; square = male, circle = female. Own visualisation with the use of NETDRAW (Ucinet 6)[2].

The analysis of the structural characteristics of this network can better be grasped in comparison with the other three networks that will be presented here.

5.2.2 Visualisation of the second network: NL_Control

The second network refers to the control project in the Netherlands, here the network consists of ten actors and the respondents' rate was higher than in the previous project (80%). This project was developed in the biotechnology sector applied to food and involved different actors from these organisations: two large firms (both multinational), three public universities and one research centre (private). The length of the project was four years and four months since the project was extended for one year. The data collected through the questionnaire refer to the

[2] Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

last six months of the project (06/2015-12/2015). In the following figure 5.2 the whole network of this project is depicted. Here it can be said that there are less relationships, which connect the persons in the network than in the previous one. The partners connect more with other partners/collaborators from the same organisation. The most central partners are the project leader and his collaborator. There are more clearly visible subgroups and two organisations (partners) are perceived to be very peripheral (Research Institute 1 and University 1).

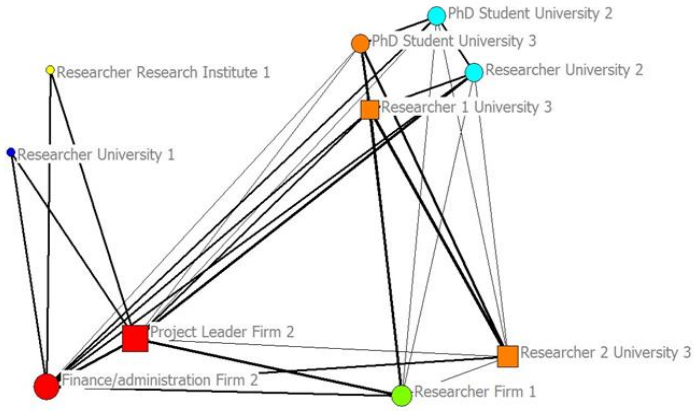

Figure 5.2: NL_Control whole network. Actors with the same colour belong to the same organisation; line weight represents strength of ties; node size and layout represents degree centrality; square = male, circle = female. Own visualisation with the use of NETDRAW (Ucinet 6)[3].

There are more females than males. Relationships' strength seems to be weaker than in the project with social reflexivity.

The two first networks' visualisations presented here referred to the two projects in the Netherlands. It has been decided to present separately each whole network and their visualisation and only at the end to make some comparisons between them and the other two projects in Germany that will be presented next.

5.2.3 Visualisation of the third network: DE_Reflexivity

The first whole network that is presented here (figure 5.3) for Germany is that of the project supposed to produce the property of the social reflexivity. This network consists of nine

[3] Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

actors from these different organisations: two small high-tech firms, one public university, one public university/hospital (three departments involved in different phases of the project) and two research centres (public/private).

The respondents' rate was 78%, which means that seven of the nine actors answered the questionnaire. The whole project consisted of two temporal phases, the phase one which lasted four years and the phase two which has to be intended not only as a continuation of the previous project but as a new project with a separated funding scheme, this phase lasted eighteen months. The data were collected in the last six months of the second phase (06/2015-12/2015).

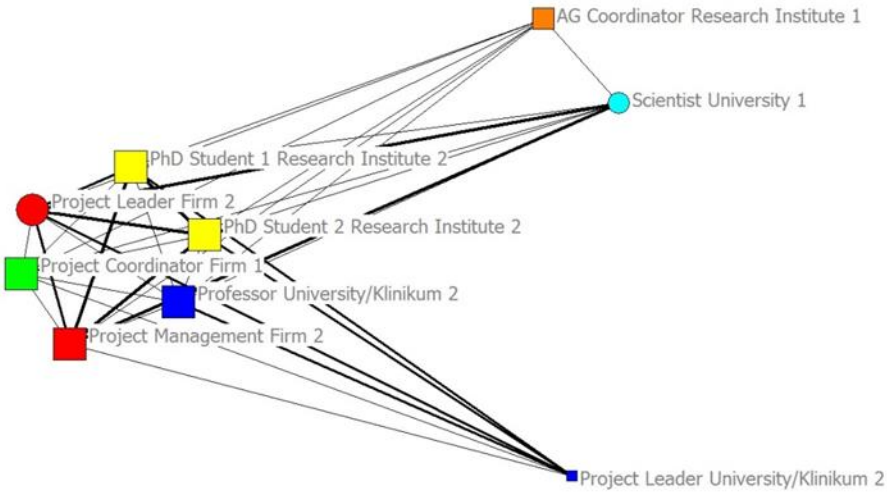

Figure 5.3: DE_Reflexivity whole network. Actors with the same colour belong to the same organisation; line weight represents strength of ties; node size and layout represents degree centrality; square = male, circle = female. Own visualisation with the use of NETDRAW (Ucinet 6)[4].

As it can be seen from the visualisation, this network shows a centre of equally central actors from different organisations, who collaborate together, and few peripheral actors/organisations which are perceived to be less central but still connected. The presence of males here is higher than the presence of females. There are two project leaders but one of them is perceived to be more central. There are some subgroups of actors in which the relationships seem to be more intense, in general the network seems to be well connected.

[4] Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

5.2.4 Visualisation of the fourth network: DE_Control

The last network's visualisation considered here (figure 5.4) is that of the control project in Germany. The data collected through the questionnaire about this project have some limitations considering the low respondents' rate (50%), which means that only half of the persons in the network answered the questionnaire, and that the project already finished at the end of 2013 (only few partners extended the length of the project for one year in order to deliver the reports). This is the shortest project (three years and two months) among all and the data collected through the questionnaire refer to the last six months of the project (06/2013-12/2013) so for the interviewed persons more than two years has passed. For the reason that the respondents' rate was so low it was difficult to reconstruct the whole network for the missing respondents. The chosen threshold was, as in the other three cases, that at least the half of the partners in the network should have answered to confirm a given relationship (threshold = 7), but only few central actors like the project leader and his collaborators were able to answer all the questions, also those about the ALTER-ALTER relationships, the other actors were only able to answer the EGO-ALTER relationships questions. This problem has led to consider to adopt a lower threshold (>= 3) for this project. But at the end it was decided to stay with the normal threshold (=> than the half of the people in the network) for many reasons: considering only the view of the project leader and his collaborators means to consider in the case of this project only the view of the university, distorting my approach to give an equal importance to all partners in interpreting the data. Adopting a more restrictive threshold means also to adopt the same threshold to all the other networks losing the richness of the most of my quantitative data. The fact that half of the respondents did not answer after many solicitations can also be interpreted as a difficulty in reconstructing their collaborations in the project even for themselves. Of course, it can be also a problem of remembering with whom I have collaborated two years ago in the project; for these reasons, it can be admitted a limitation in interpreting the data referring to this project but still the data can be reliable given that at least the half of the people in the network answered the questionnaire.

From a first view of this network it can be said that there are a lot of partners in the network who are simply unconnected. As it was explained before, this can be partly due to the low respondents' rate and the conservative threshold chosen for confirming some relationships in the case of the missing respondents, but it can be also quite close to the real situation given that only three respondents were able to fully depict the collaboration network both for themselves (EGO-ALTER) and for the other participants (ALTER-ALTER).

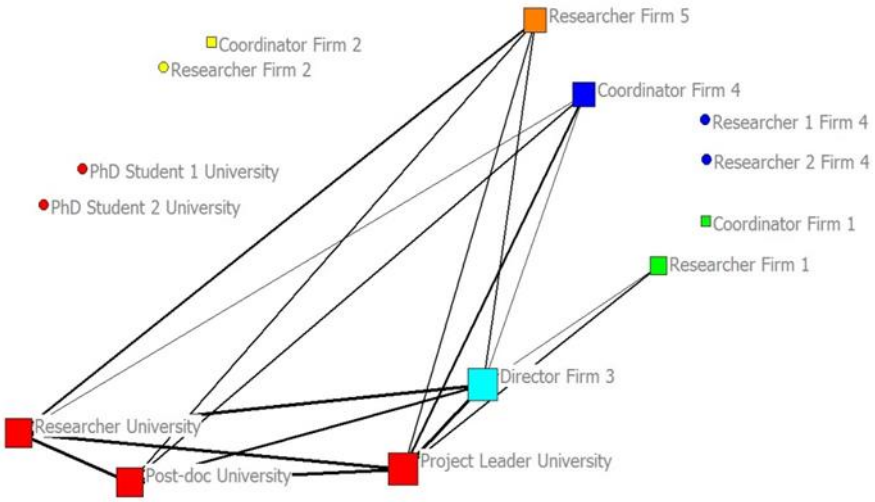

Figure 5.4: DE_Control whole network. Actors with the same colour belong to the same organisation; line weight represents strength of ties; node size and layout represents degree centrality; square = male, circle = female. Own visualisation with the use of NETDRAW (Ucinet 6)[5].

The other four respondents were just able to answer the EGO-ALTER questions of the questionnaire, which can be understood as an indicator that either they did not know about the existence of collaboration's relationships between the other partners in the network or they were unsure and skipped the questions. There were also in the other three networks some people who did not answer the ALTER-ALTER relationships' questions, but not in so many cases to impede to reconstruct the whole network as in this case. The threshold in the other three cases was still quite low to cover the answers of the missing respondents. The actors in the other three networks who did not fully answer the questionnaire were more peripheral actors, who really had a less precise picture of the network given their position in the network. In this project, the four respondents, who also did not answer the ALTER-ALTER questions were quite central actors, at least in the view of the project leader and his collaborators. For this reason, I think that they could not answer because they really did not know about the general collaboration pattern despite their position in the network. So many relationships could not be confirmed in this case, but still I cannot exclude that they really in some cases were in place, maybe with a very low intensity or more in the form of contact rather than collaboration, as defined in the questionnaire. The

[5] Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

qualitative data about this network will help in reconstructing better the situation regarding this project.

5.3 Network data comparative

Up to now it was presented the pictures of the four whole networks and it was reflected about what the pictures are simply saying, but in order to better comprehend these four networks and, more important, to make some comparisons between them, it is important to evaluate their structural characteristics using some indexes and standardized statistics. One hypothesis that it was made looking at the pictures at a whole was that in networks, with the property of social reflexivity, there were more actors from different organisations who are perceived to be central and in the control networks was mostly the project leader to be perceived as central. Another hypothesis that it had been made, just looking at the pictures, was that in projects with the property of social reflexivity there were more reciprocated interconnections (and more intense) that in projects without such property. The first hypothesis when verified can give an idea about the leadership style of the project leader and the roles of all the others. This leads to another hypothesis: in projects with the social reflexivity property, given that the leadership is more "shared" there are more actors who act as brokers in connecting other unconnected and so better diffusing information and improving the general coordination. In the control projects, the role of the project leader seems to be more traditional in leading from above the project and acting as the main broker between all the other, who remain unconnected or only connected with other actors from their own organisation.

In order to verify these first three hypotheses, some structural data will be introduced that were calculated using the matrices of the four whole networks presented above (accepting reciprocity, where the slices were used). Here five dimensions for interpretation of the data emerged, as for example, the dimension of cohesion, the dimension of relationships' intensity, the dimension of leadership, the dimension of brokerage and the dimension of network cognition.

5.3.1 The dimension of cohesion

In the table 5.1 it is possible to have a first idea about the cohesion of the networks looking in a comparative way at some typical cohesion data. The calculation of the density in a network, for example, can take a value between zero and one and says on average about all the possible connections in the network. If the density is close to one, it means that the network is very much

dense, as one occurs when all are connected with all. On the other hand, if the value is close to zero it means that there are on average few connections in the network. To be considered here is also the measurement of the standard deviation of the values of the matrix, if its value is close to 0.5, there is the maximum of the variability in the connections, otherwise if close to one or zero there is lower variability in the connections.

Table 5.1: Structural data about cohesion

	NL_REFLEXIVITY	NL_CONTROL	DE_REFLEXIVITY	DE_CONTROL
Num. actors	13	10	9	14 (7 unconnected)
Num. ties	124	60	68	32
Density (matrix average)	0.7949	0.6667	0.9444	0.1758
Standard deviation density	0.4038	0.4714	0.2291	0.3807
Reciprocity (calculated as mismatch between matrices. mean - %)	3.10%	7.10%	0	24%
Transitivity (% of triangles with at least two legs that have three legs)	62.15%	54.76 &	85.54%	58.62%
In/out-degree centralization index	22.22%	37.04%	6.25%	30.77%
Mean in/out degree centrality (normalized)	79.49%	66.67%	94.44%	17.58%
MAX. In-out degree (normalized)	100	100	100	46.15
Betweenness centralization index	2.56%	16.46%	0.45%	2.61%
Mean betweenness centrality (normalized)	1.865	4.167	0.794	0.458
MAX. Betweenness centrality (normalized)	4.226	18.981	1.190	2.885

In these four cases, we have higher density values in both projects with the property of social reflexivity and lower density values in the two control projects. This means, for example, that in the DE_Reflexivity project there are 94% of all possible connections with a very low variability. This network is the most cohesive (in the last six months of the project) in comparison with all the others. The other project with social reflexivity, NL_Reflexivity, is also very cohesive given that almost 80% of all possible connections are in place, here is the variability of the values of the matrix also quite high (0.4038). The NL_Control project shows a quite high degree of cohesion of the network with 66% of all possible connections in place and a very high variability of the connections. The DE_Control project is the only one which shows a very low degree of cohesion with only 18% of all possible connections in the network. Another important dimension is that of reciprocity of the relationships. This dimension is especially important in the theorisation of social reflexivity of Donati that was explained in the first chapter of this dissertation. The mutual recognition of the existence of a relationship between two persons can confirm reflexivity on the first order of relationships (EGO-ALTER). This analysis was

conducted with the use of the matrices of the respondent's slices and was aimed to prove the degree of reciprocity in the given relationship (collaboration) only for the respondents (not for missing). Given it was not possible to calculate the reciprocity index on the whole networks, because of their symmetry, the respondents' slices (asymmetrical) were used.

We are here trying to understand which team has reported the highest mismatch between reciprocated ties. Both respondents, A and B for example, have given confirmation or have denied to have had a collaborative relationship with each other in the last six months of the project. The project, which displayed the highest mismatch (on average) was the DE_Control project, followed by the NL_Control, as it can be seen from the figure 5.5. The two projects with social reflexivity, showed a mismatch close or equal to zero (for DE_Reflexivity there wasn't any mismatch at all). Also in this analysis, an outlier was detected for the NL_Reflexivity project. **The nutritionist of the research centre 1** has given answers which were far from those of the group (greater than two standard deviations from the group mean).

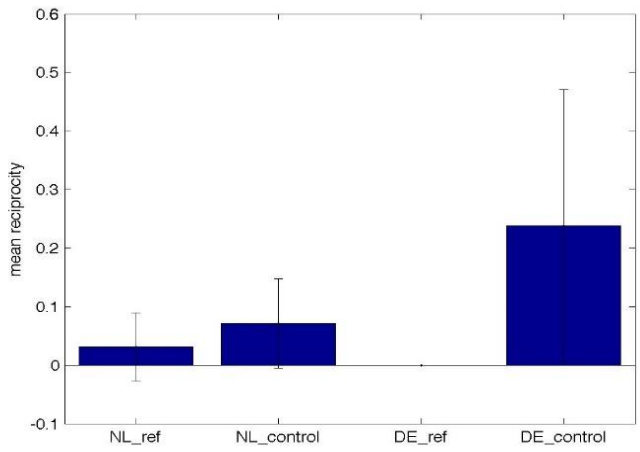

Figure 5.5: Mean reciprocity: NL_Reflexivity: mean reciprocity: 0.056, STD: 0.091; outlier: Nutritionist Research Institute 1; mean and STD without outlier: mean 0.031, STD: 0.058. NL_Control: mean reciprocity: 0.071, STD: 0.076. DE_Reflexivity: mean reciprocity: 0.000, STD: 0.000 (no mismatch for all partners). DE_Control: mean reciprocity: 0.238, STD: 0.233.

As we will see later in the analysis of the qualitative data, **the nutritionist of the research centre 1** stated that she was not so much involved in the project in the last six months. She resulted to be on the periphery of the network as we can also visualise from the whole network's visualisation. For her position in the project during the last six months, I decided to take her apart from this analysis.

Another measurement in the social network analysis that can give an idea about the structure of the network and its degree of reciprocity, is the triad census analysis. It calculates many different patterns that the triads in a network may assume, as reported in the table 5.2. In these four networks emerged mainly four types of triads: unconnected triads; triads where only two vertices are mutually connected; triads where one node is both connected with other two unconnected nodes; and triads where all nodes are connected. The two projects with the property of social reflexivity presented the highest number of complete triads, where all three nodes are connected. The two projects in the Netherlands presented the highest number of triads where one node mediates between two other unconnected nodes. The DE_Control project presents a very high number of unconnected triads and a high number of triads where there was a mutual connection between two vertices.

Table 5.2: Triad census

Triad Census	A,B,C, the empty subgraph	A<->B, C, the subgraph with a mutual connection between two vertices	A<->B<->C	A<->B<->C, A<->C, complete subgraph
NL_REF	11	24	95	156
NL_CONTROL	10	26	38	46
DE_REF	0	1	12	71
DE_CONTROL	218	117	12	17

Another important indicator of cohesiveness is closure, defined as "the emergence of a relationship between an individual's tie partners" (Quintane et al. 2013:12). As Quintane et al. pointed out the tendency towards closure is an indicator of cohesiveness because teams, which display closure "tend to be denser, with redundant pathway for information exchange, and prone to the development of group norms" (Burt 1992; Quintane et al. 2013:13). Closure is here expressed in calculating transitivity in the networks, see table 5.1, as the percentage of triangles (triads) with at least two legs that have three legs. In these four networks, as it is possible to see from the table 5.1, the two projects with the property of social reflexivity displayed the highest values in the transitivity, especially the DE_Reflexivity project (85.54%). It seems that cohesion is a very important dimension in understanding projects with the property of social reflexivity. There is also very relevant literature about the link between cohesion and performance, in arguing that teams that show higher values in cohesion's indicators are likely to be more performative, because of their capacity to maintain interpersonal relationships over time and thus to achieve a

kind of stability during the time span of the project (Sparrowe et al. 2001; Cummings & Cross 2003; Balkundi & Harrison 2006; Casey-Campbell & Martens 2009). The relevance of this dimension (cohesion) for understanding what leverage social reflexivity in innovation projects will be further proved in analysing if this dimension has been perceived by the respondents in the interviews.

5.3.2 The dimension of leadership

The degree centrality (see table 5.1) is based on every single node of the network and calculates how many times an actor has been "chosen" from all the others in the network (in-degree) and how many connections he/she has "sent" to all the others (out-degree). The betweenness centrality (see table 5.1), on the other hand, considers how frequent a node is in the shortest path to every other couple of nodes. It indicates how often an actor is in between every other couple of nodes without intermediation of any other actors in the network, so the more his/her betweenness score the more he/she is central in the network. In the table 5.1 it can be seen a mean value of all these centralities indexes for each project, this value is normalised, as for the density value, so that it can be compared in all four networks. Here the most interesting value is that of the betweenness centrality. We can see that the two projects in the Netherlands display the highest values (on average), in particular the NL_Control project. Actually, when looking the scores of each partner in the network, is possible to recognise that in the two projects with the property of social reflexivity there is less variance between the scores and more actors, who are in the shortest path to every other couple of nodes and in the two control projects the variance is much higher, since only one or two actors present very high scores and all the other present very low scores. In this regard, only one/two persons in the network are in between every other couple of nodes, the project leaders in these two cases.

Here is the measurement of the centrality indexes of importance in order to understand who has a central role in the network. Given the fact that these projects have an officially appointed project leader, one could expect that the project leader is the most central actor in the network, but, as also recent literature in this regard suggested (Mehra et al. 2006), there can be different types of leadership and leadership in itself can assume different structural configurations in social networks. To assume a leader-centred perspective could be a limit "because it assumes that there is only one leader in a group, and because it views leadership as an exclusively top-down process between the leader and subordinates (Yukl 1998:459)" (Mehra et al. 2006:232).

In this regard, centrality can be a good indicator to detect those actors, who occupy a central position in the network and could possibly be perceived as informal leaders. As already seen in the previous part about the visualisation of the networks, there are, especially in the networks that were supposed to produce social reflexivity, other relevant partners, who occupied very central positions. These emergent leaders could have had a role in the coordination of the project. The literature linked to the leadership will be further explained, when triangulating the results of the two analyses in the last chapter of this dissertation, for the moment it can be said that Mehra et al. (2006), for example, were analysing if the decentralisation of the leadership network could have an effect on the performance of the network and found that a specific leadership structure (the distributed-coordinated leadership structure) could have a role in outperforming of teams. What is of importance in this leadership structure is the mutual recognition of the leadership of both formal and informal leaders in order to improve their jointed coordination of the team (Mehra et al. 2006:235). Other more qualitative data will give the opportunity to understand if, in the context of each singular project, the formal project leader was recognising or not the emergent leadership of other actors in the network and how this dimension can be also linked to social reflexivity.

5.3.3 The dimension of relationships' intensity (strength of ties)

In addition to density and centrality it can be considered here the strength of ties (Granovetter 1973).

The analysis conducted on the matrices was the measurement of the mean value of the intensity ratings for each project. As it has been already explained in the chapter about methods, in answering the questionnaire, the respondents had four different choices regarding the intensity of the relationship in the last six months of the project: zero, if there was any connection between A and B; one if the relationship between A and B occurred rarely; two if the relationship between A and B occurred once every two months; and four if the relationship between A and B occurred one/two times in a week. For calculating the mean of the ratings, the matrices of the respondent's slices (symmetrized) were used. In the following figure 5.6 it is possible to see for each project the mean between all ratings given from the respondents and their variance.

During this analysis, there was no outlier detected. As we can see from the figure 5.6, on average, the respondents of the two projects with the property of social reflexivity gave higher ratings regarding the intensity of the relationships in the network rather than the ratings given by the respondents of the two control projects. This would confirm the hypothesis that in projects

with social reflexivity the relationships are more intense. Nevertheless, it can be also interesting to consider here the standard deviation, which was quite high in all four projects.

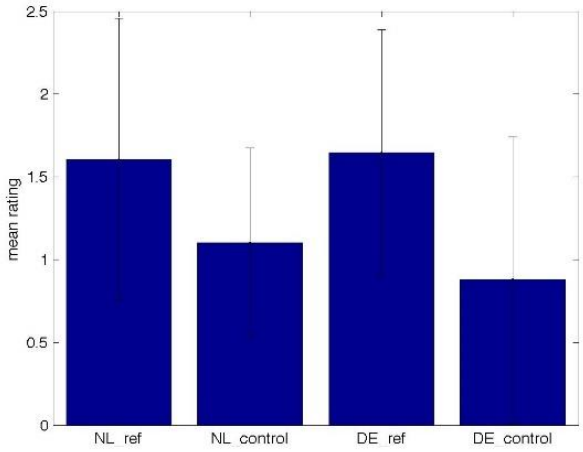

Figure 5.6: Mean of ratings. NL_Reflexivity: mean rating: 1.607, STD: 0.849. NL_Control: mean rating: 1.103, STD: 0.571. DE_Reflexivity: mean rating: 1.647, STD: 0.743. DE_Control: mean rating: 0.879, STD: 0.867.

5.3.4 The dimension of brokerage

The dimension of brokerage and the role of the brokers in each singular project, which will be presented in the next part of this chapter, are considered here to be very important dimensions in trying to understand how networks with the property of social reflexivity are. In the analysis of the quantitative data, there emerged quite soon the high presence of brokers in the projects in the Netherlands, for example. At the same time, further analysis about the presence of different typologies of brokers (Gould & Fernandez 1989) in the four networks allowed to understand the specific role of the brokers in projects with social reflexivity: connecting partners from different organisations (liaison type of brokerage).

Other measurements on the networks' data that can be here relevant to understand the role of the brokers are the number of cliques in each network and the number of structural holes (Burt 1992). The basic idea behind the concept of the structural holes (Burt 1992) is that the lack of ties among alters may benefit ego in terms of autonomy, control and information in the network. Looking at structural holes in each network means to understand who the actors are and who may profit more of their position in the network. The more the structural holes in their networks the more is their control about the network in terms of flow of information, coordination and autonomy. The number of cliques here displayed in the table 5.3 shows how many subgroups were detected in the four networks between the partners; the number of structural holes means

here how many so called “holes” were occupied by a broker in connecting two others unconnected.

Table 5.3: Cliques and structural holes

	Number of cliques	Number of structural holes
NL_REF	6	190
NL_CONTROL	6	76
DE_REF	2	24
DE_CONTROL	3	24

The two projects in the Netherlands showed a higher number of cliques rather than the two projects in Germany. The propensity to work more in teams in the two projects in the Netherlands emerged also from the analysis of the qualitative data that will be presented in the next chapter. Another indicator of the propensity to have connectors and brokers in the two projects in the Netherlands was the calculation of the number of structural holes in the networks that can be seen in table 5.3. Regarding brokerage analysis, in each project, it has been calculated how many times one partner acts in these five different typologies of brokerage and then the sum of all of them has been reported in the figure 5.7. In the next section of this chapter it will be showed who acts as a broker in each project.

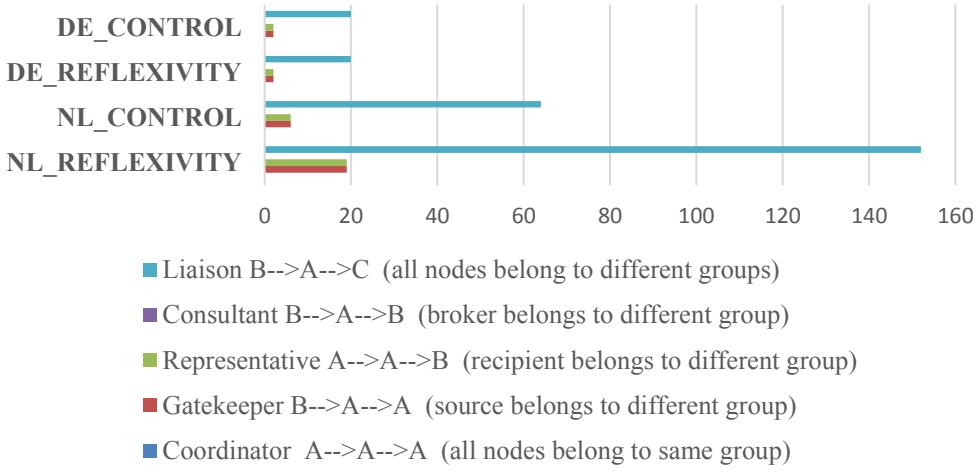

Figure 5.7: Brokerage in the four projects.

Given a flow between three actors, where the broker is the second one, there can be different brokerage positions (Gould & Fernandez 1989).

In this figure 5.7 the values are not normalized, but for each project it was just calculated how many times all actors of the four projects were in one of these five brokerage positions in their networks: the coordinator, if all three actors belong to the same group (in this case the same organisation); the gatekeeper, if source belongs to a different group; the representative, if recipient belongs to a different group; consultant, if the broker belongs to a different group and liaison, if all the actors belong to different groups (organisations). As for the previous analysis, we should keep in mind that the projects are not numerically equal, but from this table we can clearly visualise that the two projects in the Netherlands have the highest number of liaison typology of brokerage. The two projects in the Netherlands present also two other typologies, which are the gatekeeper and the representative. The two other projects in Germany present lower values in the liaison typology and very low values in the gatekeeper and representative typologies.

Coming back to the three hypotheses that were advanced at the beginning of the chapter, now it is possible to better evaluate some structural characteristics of the networks of the projects with the property of social reflexivity.

The first hypothesis was that in networks with the property of social reflexivity there are more actors from different organisations who are perceived to be central and in the control networks is mostly the project leader to be perceived as central. Looking at the centrality measures it can be said that the two projects with social reflexivity show on average higher degrees of in- and out-degree centrality; there are for sure more people in the network perceived to be central rather than in the control projects, nevertheless it seems that, looking at the betweenness centrality, the two projects in the Netherlands display a higher number of actors with the shortest geodesic path between other two actors rather than the two projects in Germany. This can be explained considering that the organisation of the two projects in the Netherlands was mostly based on teamwork between different subgroups. Further evidence comes from the analysis of the interviews regarding this dimension that will be presented at the end of this chapter. The second hypothesis was that in projects with the property of social reflexivity there are more interconnections (and more intense) that in projects without such property. This hypothesis can be confirmed looking at the density (average) of the networks, where it is clear that the two projects with social reflexivity display the highest values. For the intensity of the relationships in the four networks a mean was calculated between the different single ratings of each partner and these values also confirm the hypothesis that in the networks with the property of social reflexivity the relationships were more intense. The third hypothesis was that in projects with the social reflexivity property, given that the leadership is more “shared” there are more

actors who act as brokers in connecting other unconnected and so better diffusing information and improving the general coordination. Looking at the analysis of the cliques and brokerage, this hypothesis cannot be confirmed. It seems that there is no relationship between a shared leadership and number of brokers. Only in the NL_Reflexivity project we can see such an effect that seems to be originated by the country, given that also in the NL_Control project there was a high number of cliques and brokers. This was not the case for the DE_Reflexivity project where the leadership was more traditional in guiding a single cohesive big group to fulfill the project rather than different more or less connected subgroups. There are in the DE_Reflexivity project much less people acting as brokers between organisations. We will go further in the analysis of the brokerage later.

There are at this point some structural network analyses, which could be interesting to introduce here in order to comprehend more in-depth the network's structure of each project, considering more closely the roles actors have taken in each project. In this section of the chapter, the analysis regarding leadership and brokerage in the network will be presented separately for each project. I have chosen these two particular measurements because I think they can explain more closely the role of actors in innovation projects. As it has been already mentioned, it seemed that brokerage occurs regardless of social reflexivity, because also in the NL_Control project there were a high degree of brokerage positions in the network. Moreover, in both two projects in Germany there were few actors, who acted as brokers. It seemed that the high degree of brokerage in the two projects in the Netherlands has to do with the organisation of the project in disciplinary subgroups, which were more than in Germany (see table 5.3 about cliques). Nevertheless, from the previous general analysis, it seems that brokers have a particular role in innovation projects. The hypothesis here is that they do not only use their position in order to get benefits for their own organisations or for themselves, but they have a key role in improving sharing of information, communication and coordination for the project. Furthermore, some of those, who resulted to be brokers resulted also to be more central, so maybe emergent leaders in innovations projects are leaders because of their position as brokers or are brokers because of their position as emergent leaders?

An in-depth analysis of the brokerage typologies showed that in the two projects with social reflexivity, the liaison typology is the most recurring typology of brokerage and that not only the formal project leader occupies this particular position. In the two control projects, it is mainly the project leader who is the actor and the main mediator between organisations. It seems that there is an interplay between leadership and brokerage, and therefore the aim of this part of the chapter will be to introduce some network's structural data in order to understand if brokerage

and leadership structure can be considered constituting of networks, which produce social reflexivity.

5.3.5 Brokerage and leadership in the NL_Reflexivity project

In the structural analysis presented before about the brokerage positions in the four projects, in the figure 5.7 was reported the sum of all brokerage positions occupied by all the actors of the NL_Reflexivity project, which was in total 190. Here the aim is to analyse in detail who occupies those brokerage positions inside each whole network. In order to build the groups, which are fundamental to conduct the brokerage analysis, the different organisations, the partners belong to, were taken to form the groups. As we can see from the figure 5.8 the brokerage type of liaison is the most diffuse in the network of the NL_Reflexivity project. In this type of brokerage all actors belong to different organisations/groups: the source, the broker and the receiver. In this type of brokerage there are seven actors in the network who act as brokers between other two actors coming from different organisations.

These are mostly actors coming from the businesses involved in the project, followed by the hospital, the university and the project leader. People coming from the businesses have also higher values in brokerage typologies representative, followed by the PhD student and the two specialists of the research centre 1.

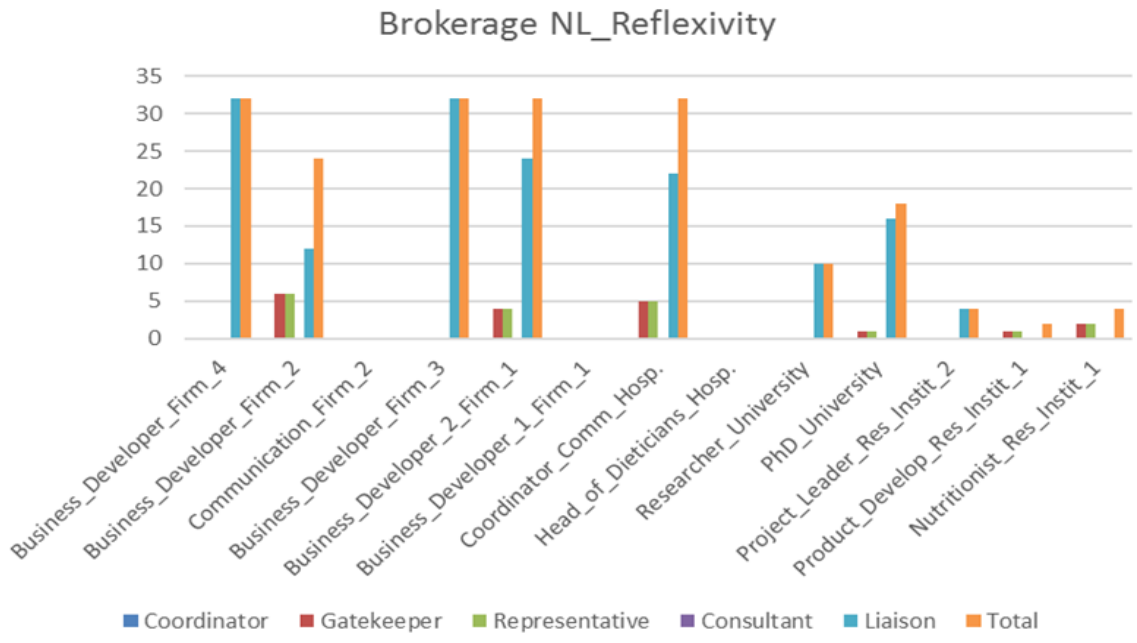

Figure 5.8: Brokerage in NL_Reflexivity project.

The perception to occupy brokerage positions between different partners was also confirmed by the interviews that are going to be explained in the next chapter regarding the qualitative data. In the next table 5.4 the scores in in-out degree centralities, betweenness centralities and the number of structural holes are reported for each actor of the NL_Reflexivity project. From this table can be grasped that this network resulted to be less centralised than the network of the control project, with more partners perceived to be central and bridging structural holes through brokerage.

Table 5.4: Degree centrality, betweenness and structural holes in NL_Reflexivity project

	NrmIn-OutDeg	NrmBetweenness	num. Holes
Business_Developer_Firm_4	100.000	4.226	32
Business_Developer_Firm_2	91.667	3.189	24
Communication_Firm_2	41.667	0.000	0
Business_Developer_Firm_3	100.000	4.226	32
Business_Developer_2_Firm_1	100.000	4.226	32
Business_Developer_1_Firm_1	66.667	0.000	0
Coordinator_Comm_Hospital	100.000	4.226	32
Head_of_Dieticians_Hospital	58.333	0.000	0
Researcher_University	83.333	1.091	10
PhD_University	91.667	2.029	18
Project_Leader_Res_Inst_2	75.000	0.406	4
Product_Dev_Res_Res_Inst_1	58.333	0.189	2
Nutritionist_Res_Inst_1	66.667	0.433	4

From this table 5.4, it is possible to recognise that those, who are brokers (liaison type) are also those, who are perceived to be more central. The project leader is not the person, who has been perceived at most as central from all the other actors.

5.3.6 Brokerage and leadership in the NL_Control project

We are now going to evaluate brokerage and leadership in the control project in the Netherlands, in order to understand if there are significant differences between the two first projects.

As we can see from the figure 5.9 the brokerage positions held by the actors of the NL_Control project differ significantly from those held by the actors of the NL_Reflexivity project. As it is possible to see from this figure only the project leader and his collaborator from

the same firm displayed the most of the liaison typology positions of brokerage (30). Another actor who presents this typology of brokerage is the researcher from the firm 1 (4).

Other actors from the universities involved in the project present other two types of brokerage typologies: the gatekeeper and the representative. The gatekeeper occurs when the source comes from a different group than the broker and receiver; representative occurs when the receiver comes from a different group than the source and the broker. This figure 5.9 shows that the project leader and the person working with him on the project from the same organisation are the actors mostly perceived as brokers between actors from different organisations.

The NL_Control project seems to be organised in different subgroups, in which the project leader has the role of the main broker. The role of the project leader in leading and coordinating the different subgroups seems to be very important and relevant comparing to the NL_Reflexivity in which there are other partners both from the businesses and from the university, who acted as brokers between organisations.

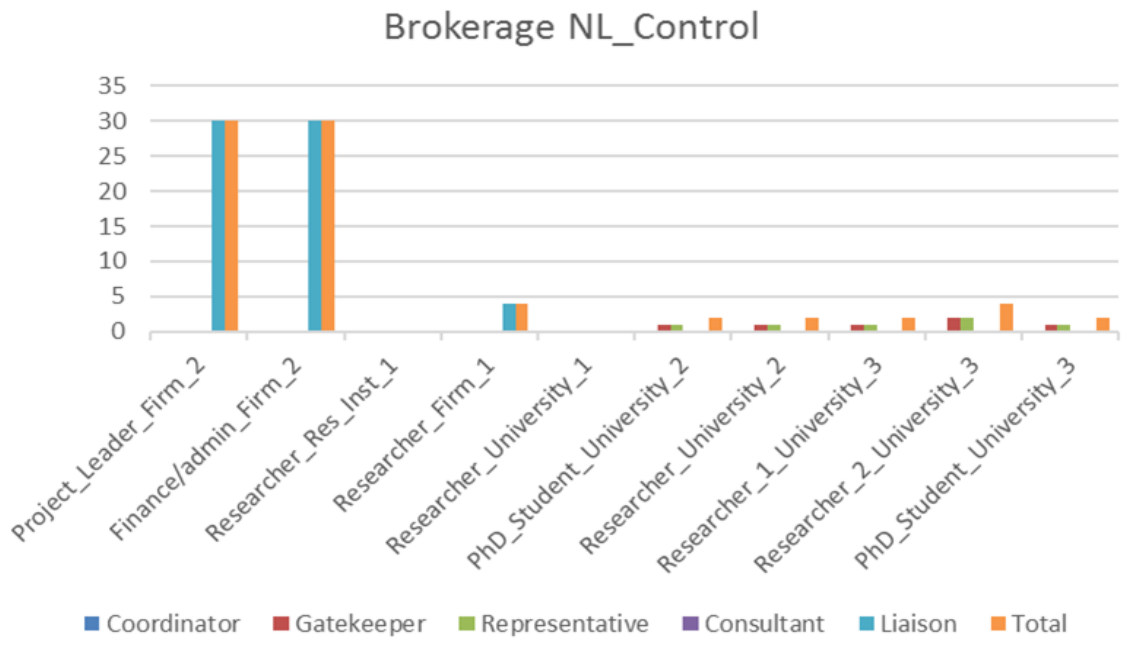

Figure 5.9: Brokerage in the NL_Control project.

This is the main difference between the two projects in the Netherlands which could explain the emergence of the social reflexivity property in the only group which presents the highest number of brokers (liaison type), a less centralised structure of the network and a more shared type of leadership.

From the next table 5.5, we can clearly grasp that despite the fact that there were more actors who were perceived to be quite central, only two main actors (the project leader and his collaborator) were acting in the role of the brokers (liaison type), bridging the most of the structural holes. The other actors in the network were holding much less brokerage positions and in the typologies gatekeeper and representative, in their own organisation.

Table 5.5: Degree centrality, betweenness and structural holes in NL_Control project

	NrmIn-OutDeg	NrmBetweenness	Num. Holes
Project_Leader_Firm_2	100.000	18.981	30
Finance/admin_Firm_2	100.000	18.981	30
Researcher_Res_Inst_1	22.222	0.000	0
Researcher_Firm_1	77.778	0.926	4
Researcher_University_1	22.222	0.000	0
PhD_Student_University_2	66.667	0.463	2
Researcher_University_2	66.667	0.463	2
Researcher_1_University_3	66.667	0.463	2
Researcher_2_University_3	77.778	0.926	4
PhD_Student_University_3	66.667	0.463	2

5.3.7 Brokerage and leadership in the DE_Reflexivity project

We are now going to analyse brokerage and leadership in both projects in Germany and comparing some results with those of the two projects in the Netherlands.

As it can be seen from the figure 5.10, in the DE_Reflexivity project, there are different partners holding the role of the broker in the liaison typology. The same typology has been already observed in the NL_Reflexivity project, where all actors (source, broker and receiver) come from different organisations. The frequency and importance of brokerage in DE_Reflexivity is much less than in the two projects in the Netherlands.

Nevertheless, the fact that more people from different organisations act as brokers in DE_Reflexivity project, we can confirm the hypothesis that in projects with the property of social reflexivity there are other actors, not only the project leader, who act as broker between different organisations. This liaison typology has been played from actors coming from the firms and from a private research centre. Only one actor from the university field acts here both as gatekeeper and as representative, mediating between his own organisation and another organisation both in transmitting “information” from another organisation to his own organisation and sending “information” from his own organisation to another organisation.

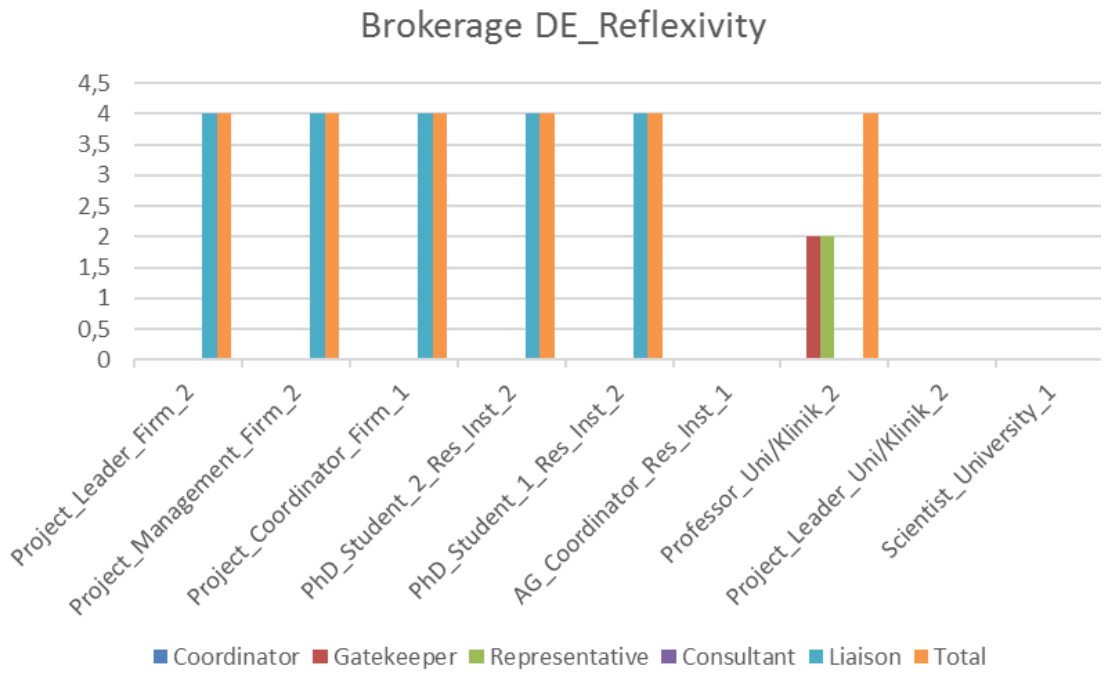

Figure 5.10: Brokerage in DE_Reflexivity project.

In the next table 5.6, we can also grasp the degree centralities, betweenness values and number of structural holes held by the actors, and recognise that, as for the NL_Reflexivity project, there are here more actors, who are both perceived to be central and that act as brokers between organisations. It seems here that all partners have an equal "importance" and that the network is very much decentralised.

Table 5.6: Degree centrality, betweenness and structural holes in DE_Reflexivity project

	NrmIn-OutDeg	NrmBetweenness	Num.Holes
Project_Leader_Firm_2	100.000	1.190	4
Project_Management_Firm_2	100.000	1.190	4
Project_Coordinator_Firm_1	100.000	1.190	4
PhD_Student_2_Res_Inst_2	100.000	1.190	4
PhD_Student_1_Res_Inst_2	100.000	1.190	4
AG_Coordinator_Res_Inst_1	87.500	0.000	0
Professor_Uni/Klinik_2	100.000	1.190	4
Project_Leader_Uni/Klinik_2	75.000	0.000	0
Scientist_University_1	87.500	0.000	0

5.3.8 Brokerage and leadership in the DE_Control project

In analysing the structural data of the project DE_Control we should keep in mind that this network is very numerous (consisting of 14 actors) and that only the half of the partners in the network answered the questionnaire.

Looking at the brokerage figure 5.11 of the DE_Control project it can be easily seen that the brokerage positions are held by few actors in the network in comparison with the previous project (DE_Reflexivity) for Germany.

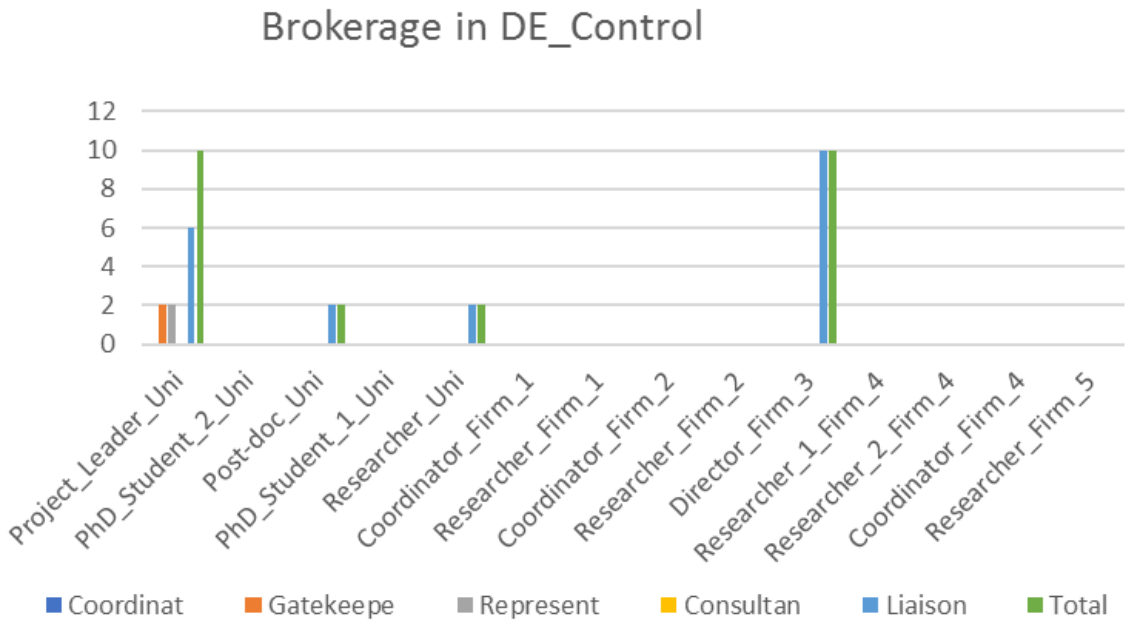

Figure 5.11: Brokerage in DE_Control project

The project leader and the director of the firm 3 display the highest number of brokerage positions, mainly the liaison typology, but not only. Other actors who act as brokers come from the university. Most of the partners from the firms in general have no brokerage positions, only firm 3, which is based in the same city of the university, presents a high number of brokerage positions. It seems that also in this network, as in the NL_Control, the main mediators between different organisations are the project leader and his collaborators. The role of the firm 3 in mediating between organisations has to be better understood looking at the qualitative data.

As it can be seen from the table 5.7, in this network, the same as for the NL_Control, those who are perceived to be central are also those who bridge the most of the structural holes holding liaison type of brokerage positions (the project leader and the director of the firm 3).

Table 5.7: Degree centrality, betweenness and structural holes in DE_Control project

	NrmIn-OutDeg	NrmBetweenness	Num. Holes
Project_Leader_Uni	46.154	2.885	10
PhD_Student_2_Uni	0.000	0.000	0
Post-doc_Uni	38.462	0.321	2
PhD_Student_1_Uni	0.000	0.000	0
Researcher_Uni	38.462	0.321	2
Coordinator_Firm_1	0.000	0.000	0
Researcher_Firm_1	15.385	0.000	0
Coordinator_Firm_2	0.000	0.000	0
Researcher_Firm_2	0.000	0.000	0
Director_Firm_3	46.154	2.885	10
Researcher_1_Firm_4	0.000	0.000	0
Researcher_2_Firm_4	0.000	0.000	0
Coordinator_Firm_4	30.769	0.000	0
Researcher_Firm_5	30.769	0.000	0

5.3.9 The dimension of network cognition

Another analysis conducted on the matrices was a Pearson correlation between the whole network and the respondents' slices for each project. This analysis served as main indicator of the presence of social reflexivity in the network. The main dimension here is that of the network cognition as developed in the cognitive network theory (Krackhardt 1990; Kilduff & Tsai 2003; Balkundi & Kilduff 2006; Kilduff & Krackhardt 2008) presented in theoretical chapter as the main approach used for social network analysis in this dissertation.

The aim is to detect if the different partners in the networks were able to reconstruct the whole network from their point of view, recognising the general pattern of collaboration created during the project, in order to understand if they have a meta-cognition of the relationships developed inside the networks; not only their relationships towards the others (EGO-ALTER) but also about the relationships between the others (ALTER-ALTER).

Of course, this operationisation of the social reflexivity concept has the main limit to cover only the first two orders of relationships and fails when considering the third order, which has to be detected in the qualitative data, when the respondents were describing how qualitatively was the collaborative relationship developed during the project. For this reason, the presence of this dimension of the network cognition will be further searched in the qualitative data too.

In order to compute the correlation, for the whole network the binary matrix of the whole network for each project was used, leaving inside the matrix the intensity values (symmetrised,

values from 0 to 4), and for the actors each slice (I symmetrised each matrix making a mean between the intensity ratings) was used.

To symmetrise the slices' matrices was necessary in order to have a mean between the ratings, as it was explained in the chapter about methods, in all four projects there were some asymmetries in the ratings of the intensity values due to the fact that in the questionnaire the respondents were asked to choose a value between 0 and 4 for each relationship twice. First, respondent C was asked, for example, to estimate how intense was the relationship between A and B and later, in the questionnaire, he/she was asked again to estimate the same between B and A.

This limitation of the questionnaire has led many respondents to give two different estimations, for example 3 and 4, or 2 and 1 for the same couple of actors depending on the direction of the relationship. This asymmetry problem was observed in each project and it seems to be due to a different hierarchy position of the actors in the network. It was for example recurrent in the case of the PhD and the supervisor, where the PhD, in evaluating the intensity of his/her relationship with the supervisor, gave himself/herself a lower value than in evaluating the same but from the side of the supervisor.

In some cases, we can also find ratings where the respondent estimated between 1 and 4, when he/she was asked to give a value about the relationship between himself/herself and a partner and 0, when vice versa he/she was asked to estimate the same relationship but from the side of the partner.

This can be interpreted as the respondent would see himself/herself more collaborative versus the partner as vice versa, rather than answering how oft was the collaborative relationship between the two persons. In order to solve those imbalances, that actually would deserve in itself a kind of analysis, for the purposes of my research question and the analysis that I considered to be relevant here, I decided to solve this problem making a mean between all couples of ratings about the same relationship. In the next table 5.8 the result of the Pearson correlation can be visualised.

First, it should be said that of course it was possible to use only the slices of the questionnaire's respondents. From table 5.8 we can see for each project how much similar or different is the picture that each actor in the network has in mind, from the whole network of the project.

As it was already explained in the chapter about methods, the whole network's matrix is built on the EGO-ALTER answers of the questionnaire for each respondent and for the missing

respondents the relationship was confirmed only if the majority (Threshold >= 50%) of the partners in the network could answer to the ALTER-ALTER questions and confirm it. The slices are the row matrices obtained from each questionnaire, which were symmetrized. The whole network should be the closest to the "real" one, since every respondent could directly confirm or deny a relationship in which he/she was involved.

The slice is actually the picture every actor has in his/her mind regarding the network and of course it can be more or less close to the whole network. This analysis gave the opportunity to see the social reflexivity problem from another perspective.

Actually, when we speak about social reflexivity in social network I think this is the analysis that really gets closer to the concept. My interest was to understand if in innovations projects, which are temporary projects, there can be an emergence during the project of a kind of consciousness about the internal relationships and what "we are" as a group of people collaborating together.

These correlations between matrices can be here the best indicator of social reflexivity in measuring how far or close is my personal cognitive picture as a partner in an innovation project from the most "actual" depicted network of the project (whole network). If we observe, for example, the values of the correlations of the projects with social reflexivity, it is quite impressive to see how many partners' slices were significantly close to the whole network.

This says a lot about a common understanding at the end of the project not only about what we have done together but about how we have done together in terms of collaboration.

Table 5.8: Pearson correlations between whole network and actors' slices for each project

Project	r	p
PROJECT NL_REFLEXIVITY		
Project Leader Research Institute 2	0.697	< 0.001
Business Developer Firm 2	0.119	0.299
Business Developer Firm 3	0.496	< 0.001
Business Developer 2 Firm 1	0.064	0.58
Coordinator Communications Hospital	0.663	< 0.001
Researcher University	0.714	< 0.001
Nutritionist Research Institute 1	0.639	< 0.001
PhD. University	0.644	< 0.001
Business Developer 1 Firm 1	0.653	< 0.001
mean	0.521	< 0.001 (t(8) = 6.212)
PROJECT DE_REFLEXIVITY		
Project Leader Firm 2	0.885	< 0.001
Project Coordinator Firm 1	0.638	< 0.001
PhD. Student 1 Research Institute 2	0.697	< 0.001
PhD. Student 2 Research Institute 2	0.717	< 0.001
AG Coordinator Research Institute 1	0.346	0.039
Scientist University 1	0.427	0.009
Project Management Firm 2	0.79	< 0.001
mean	0.544	0.014 (t(6) = 3.448)
PROJECT NL_CONTROL		
Project Leader Firm 2	0.402	0.006
Administration/Finance Firm 2	0.478	0.001
Researcher Firm 1	0.576	< 0.001
PhD. University 2	-0.081	0.595
Researcher University 2	0.38	0.01
Researcher 1 University 3	0.62	< 0.001
Researcher 2 University 3	0.224	0.139
PhD. University 3	0.011	0.944
mean	0.326	0.009 (t(7) = 3.612)
PROJECT DE_CONTROL		
Project Leader University	0.494	< 0.001
Researcher Firm 1	0.037	0.728
Director Firm 3	0.378	< 0.001
Coordinator Firm 4	-0.129	0.223
Researcher Firm 5	0.298	0.004
Post-doc University	0.534	< 0.001
Researcher University	0.537	< 0.001
mean	0.307	0.021 (t(6) = 3.117)

From the following figure 5.12, you can see the mean values of these correlations on a plot, where all the four projects are displayed. From this plot is also possible to grasp the variance in each group. The analysis of the correlations and their means has allowed a further outlier analysis, which has detected if there were some respondents, who were far from the mean of the group (less than two standard deviation from the group mean). Only in DE_Reflexivity project there was an outlier, who was the **AG Coordinator from the Research Institute 1**.

During the interview, he explained the particular role his research centre has had during the project, as "associate member," which contributed more in the initial phase of the project in giving some inputs, but was quite far, also geographically, from the two main working groups during and at the end of the project. Given his particular role in the project, the position of this partner is clearly at the periphery of the network, as it can be also observed by the visualisation of the network. For this reason, it was decided to keep him outside from this analysis and from the following ANOVA test.

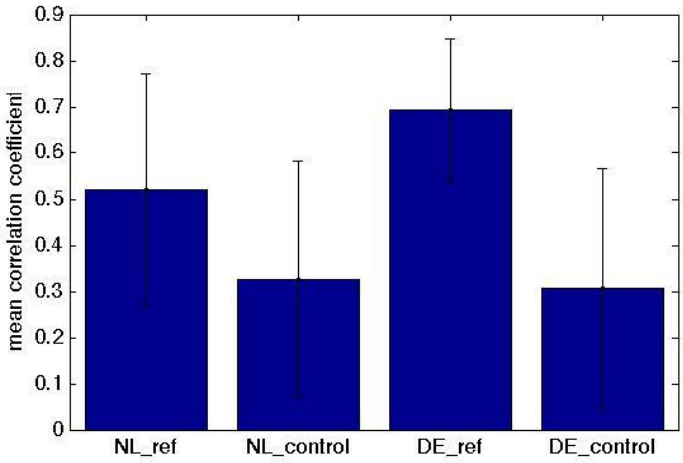

Figure 5.12: Mean values and variance between networks' correlations. Mean correlation coefficient (T-TEST) NL_Reflexivity: t= 6.212, p < 0.001, mean r: 0.521, STD: 0.252. NL_Control: t= 3.612, p = 0.009, mean r: 0.326, STD: 0.255. DE_Reflexivity: t= 3.448, p = 0.014, mean r: 0.544, STD: 0.417; outlier: AG Coordinator Research Institute 1; mean and STD without outlier: t= 10.922, p < 0.001, mean r: 0.692, STD: 0.155. DE_Control: t= 3.117, p = 0.021, mean r: 0.307, STD: 0.261.

An ANOVA test with the factors Reflexivity (yes, no) and Country (DE, NL) revealed a main effect of Reflexivity ($F_{1, 26}$ = 10.76, p = 0.003). Reflexive projects showed higher correlations between the whole and perceived networks than the control projects (Fig. 5.12). There was no main effect of Country ($F_{1, 26}$ = 0.74, p = 0.3978) and no interaction of the two factors ($F_{1, 26}$ = 1.16, p = 0.2911) as it can be seen from the following table 5.9.

This further test on the correlations led me to consider reflexivity as a property which is, at least in these four cases, country independent, as it emerged both in Germany and in the Netherlands in two very different innovation projects, at least regarding the organisation of those projects. One project, for example, was more based on teamwork, the other one was consisting on one big central group of autonomous actors from different organisations, collaborating on a more horizontal base. One of the aspects that both projects have in common is their strong interdisciplinary character, as we will see from the analysis of further qualitative data.

Table 5.9: ANOVA test on the correlations between networks

	Sum Sq.	d.f.	Singular?	Mean Sq.	F	p
reflexivity	0.61672	1	0	0.61672	10.76	0.003
country	0.04237	1	0	0.04237	0.74	0.3978
country*reflexivity	0.06656	1	0	0.06656	1.16	0.2911
error	149.037	26	0			
total	215.340	29				

5.4 Resume

We are going here to summarise some structural aspects of the four networks in order to find some similarities and differences, which could explain why in two projects there was an emergence of the social reflexivity property.

Starting with similarities, we can observe that the two projects in the Netherlands present some similar structural characteristics, but only one of the two projects produced social reflexivity. For example, they are both quite dense networks, they have both subgroups and they present a high number of brokerage positions.

At the same time, they differ regarding the role of the project leader, who in the NL_Control project is perceived to be the most central actor in the network. In the NL_Reflexivity project there are more actors, who are perceived to be at the centre. Both of two projects are organised in subgroups/teams, but in the NL_Reflexivity project the different disciplinary teams have more connections among themselves rather than in the NL_Control project. Both projects hold a high number of brokerage positions, especially of the liaison type. The NL_Reflexivity project presents many actors, especially from the businesses, hospital and university, who hold the liaison type of brokerage in connecting two actors from different organisations.

In the NL_Control project, it is mainly the project leader and his collaborator who connect actors from different organisations among themselves. Looking at the structural holes, there are

more actors who may profit from their positions in the network in terms of autonomy, flow of information and control in the NL_Reflexivity project rather than in the NL_Control project, where mainly the project leader is the actor who can profit more from his position in the network. Regarding the two other projects in Germany we have here mainly structural differences among themselves: one network (DE_Reflexivity) presents a very high density and the other one (DE_Control) a very low one with some partners, who are even unconnected.

In the DE_Reflexivity project there are more partners who are central in the network; in the DE_Control project the project leader and his collaborators are perceived to be the most central partners. In the two projects in Germany brokerage is much less present than in the two projects in the Netherlands, maybe because of the different organisation of the projects. But in the DE_Reflexivity project there are still more partners who have a brokerage role in connecting people from different organisations (liaison type).

On the other side in the DE_Control project, it is mainly the project leader and his collaborators who connect people from different organisations. In terms of autonomy, control and information flow to almost all the actors in the DE_Reflexivity project. They can profit in the same way of their position in the network. In the DE_Control project there are mainly the project leader, his collaborators and the chief of the firm 3, the persons, who may profit more from their position.

Regarding reciprocity and strengths of ties, the two projects with the social reflexivity property showed to have a lower level of mismatch between the answers given by the respondents about their relationships in the network and a higher intensity, on average, of those relationships. Projects with social reflexivity property showed also a higher correlation between the whole network and each perceived respondent's slice.

5.5 Conclusions

This chapter was devoted to the presentation of the data collected through a standardized questionnaire and their analysis. Two types of analysis were performed on these data: structural network analysis and correlations among matrices.

In the further chapter, we are going to introduce the data collected through the use of the interview and their analysis. Some dimensions for interpretation, which already emerged during the quantitative analysis will be used again in the next chapter and complemented by new dimensions, which emerged from the qualitative data analysis. In the interpretation chapter (chapter number 7) the main results of these different analyses will be integrated in triangulating the data with the aim to explain the role of the social reflexivity in innovation projects.

6 QUALITATIVE DATA ANALYSIS

6.1 Introduction

In the following chapter, it will be introduced the qualitative data analysis conducted on the interviews, which were performed in the two countries (Germany and Netherlands) in a period of time between June 2015 and December 2015. As it has been already mentioned in the chapter about methods, the interview was the first method that was used to get more details on the networks. Through a first analysis of the net-maps it was possible to reconstruct more precisely the whole network for each project, and to involve later other partners who were not interviewed before. The aim of this chapter is to present the results of the qualitative data analysis for each project in grouping the results in main dimensions. Some of them already emerged in the quantitative data analysis and together with the dimensions, which emerged from the qualitative data analysis, these dimensions will be interpreted more in-depth and triangulated in the next chapter of this dissertation. The main interpretative dimensions suggested by the analysis of the quantitative data were: cohesion, leadership, relationships' intensity, brokerage and network cognition. The interpretative dimensions which emerged more from the following analysis of the qualitative data were: the use and conception of time, the dimension of interdisciplinarity, the dimension of task interdependence and the geographical dimension.

6.2 Interview

As it has been already explained in the chapter about methods, the interview was divided into three main parts: a first quite free part, where the actors could give a short description about the way they entered the project and the initial conditions of their collaboration; a second part, where the respondents were asked to draw their EGO net-map (Schiffer & Hauck 2010; Schiffer et al. 2013) and a third part, where using the methodology of the Visual Network Scales (Mehra et al. 2014), they could reconstruct some changes that occurred in their networks during the time span of the project. The first part was more thought to be an introduction, explaining the main purposes of the research in trying to motivate the respondents to actively collaborate. The second part was thought to be a first look inside the cognitive picture of their network, guiding them to draw their EGO net-map and reflecting together about the picture. The third part was the most structured, since after drawing the network and the relationships (both EGO-ALTER and ALTER-ALTER) they were asked to reflect about the changes that occurred in their network during the project. The pictures of their net-maps were very interesting and in most of the cases very accurate. The first idea was to utilize them also for the quantitative analysis, but some

limitations regarding the net-map methodology for this design of the research has led to adopt instead the questionnaire. The most important reason for adopting the questionnaire was that not all the relevant actors in the projects were interviewed, only after a first analysis of all net-maps for each project was possible to understand who were really relevant (mentioned at least from three other partners) and to delimit the whole network of each project. Furthermore, since all net-maps have to be understood as EGO networks, the whole network was missing. On the other hand, the unstructured way of depicting the network through the net-maps was very useful to let the respondents reflect on their network immediately during the interview (Hogan et al. 2007; Schoenhuth et al. 2013; Ryan et al. 2014; Herz et al. 2015; Altissimo 2016). The further integration of the two approaches of the net-map and the visual network scales gave the respondents motivation through the intensive use of pictures, which helped them a lot in the reconstructing phase. After all these considerations, it was opted for a mix-methods research design (Hollstein 2011; Dominguez & Hollstein 2014), which allowed to get two different types of data, that at the end could be integrated and could therefore explain complimentary aspects of the same networks in regard to social reflexivity. The interpretative dimensions that emerged from both analyses will be at the end integrated in the final chapter of this dissertation in order to allow a triangulation of the data, to better understand how social reflexivity emerged and what its role was in enhancing a better performance of these specific innovation projects.

6.3 Organisation of the data

Once all collected interviews were written, they were organised in a structured schema recurring for all interviews as already explained in the chapter about methods and reported in the protocol of the interview (Appendix A) at the end of this dissertation.

A first quick analysis of the answers to the six questions aided by the visual network scales approach has allowed to have a first insight in the differences between the projects regarding the perceptions of structural change in the networks, which will be summarised at the beginning when presenting the results for each project as a starting point for the analysis and at the end after the content analysis in order to summarise the main findings regarding structural change. The family of codes “structural change” referred to all codes, which reported a perception of structural change in the interviews, given that in the four paths to change of Donati the occurrence of structural change is very important in distinguishing if a network has produced social reflexivity, it was decided to start the analysis in presenting the main perceptions of structural change reported by the partners and to finish the analysis coming back again to a more

comprehending interpretation about what happened in the network regarding structural change and performance.

6.4 Structural change in the NL_Reflexivity project: an overview

Regarding the NL_Reflexivity project it can be said that in answer to the first question about the overall structure of the network (see protocol of the interview, appendix A) and its changes during the time span of the project, there was agreement between the respondents in perceiving changes during the project, but not substantial changes in the structure at the beginning and at the end of the project. The figures that were mostly indicated as depicting the network at the end of the project were figures 1 and 2. The figure 1 depicts a network with some actors, who are more central and some others who are at the periphery. Figure 2 depicts a network where there are some interconnected cohesive subgroups. **The project leader**, for example, has chosen figure 1 for the end and for the beginning of the project, perceiving a structural change from a structure with more central connections (in the middle of the project) to a final structure where also the more peripheral actors were more connected among themselves than at the beginning. In giving an explanation about this structural change from T1 to T2-T3 and from T2-T3 to T4 **the project leader** mentioned the organisation of the project in work packages and teams and his leadership style. He is also here explaining the main reason why the structure at the end of the project returned to be the same structure as it was at the beginning in his view:

> "At the busiest period (*T2-T3*) were lots of…many more people involved. I did (talk) with all the people here. There is also colleagues from here, from the university, from the other institutes. So there it was more like this (*figure 4*) in some stages.
>
> I think (how I create) the projects when most work packages were active, so in between groups there was also a lot of interaction, which did not necessarily have had to go by me.
>
> (*T4*)….Because many work packages have finished, projects are there, so deliverables are met and we can use them for the final stage of the project. So not everybody is involved anymore."

A similar view about the changes of the structure of the network was that of the **researcher from the university**, she has chosen figure 2 (subgroups) to depict the final network but without the lines that connect the subgroups. She perceived structural change from a structure coordinated from the centre at the beginning and during the project to a structure with separate

groups and no centre at the end of the project. This interpretation is in accordance with the rise of autonomy of the singular teams at the end of the project perceived by the project leader.

Another similar view is that of the **business developer 1 of the firm 1**, who has chosen figure 1 for the initial stage and during the project and figure 2 for the end of the project, where each subgroup is more seen as hospital, research and companies.

> "Yeah. So I think that the…the change is…the structure changes in intensity in relationship on what's on the programme at the time, and we are in the last part in terms of our aim is getting to the market. And every contact we do is…is towards getting the results out the project and then translating them into communication."

The dimensions of relationships' intensity and task interdependence start here to emerge, it seems that structural change is mainly due to the need of fulfilling a given task, as for example in this case the translation of the results into communication. This interpretation would be in line with the literature about "network churn" (Sasovova et al. 2010), which will be introduced in the last interpretative chapter, when triangulating the results. For now, it can be said that Sasovova et al. (2010:642) conceptualised the network churn as "in terms of the volume or number of ties added over time," a close notion is also that of "volatility" introduced by Burt et al. (2013). These notions consider more changes in the social structure occurring in the short-term and for this reason can be applied to interpret structural change in innovation projects, which are de facto time-bounded projects.

The PhD student was also perceiving a change in the structure of the network from a structure with closed subgroups (figure 2) to a more open one during the work packages phase (figure 1). At the end (T4) it comes back to closed subgroups (figure 2):

> "Applies the most because you have like spokesmen for each partner and they also own team. Yeah, but it also it goes to the team and now we are …it's more kind of going to the end of the project and it goes more from the … the overall project team, and with all the package leaders and then they will just mention it within their own companies how is developing."

Other two actors (**nutritionist and communication leader**) reported not substantial changes in the structure of the project from T1 to T4 only a perception of more intensity in the contacts in some parts of the project.

A completely different view was that of the **business developer of the firm 4**, who has chosen figure 4 (all connected with all) for the beginning and the end of the project and figure 3 (sparse groups) during the project, arguing that during the project there was a specific one to one relationship between researchers and companies. This view is not completely different from all other views, since he recognised some structural change only during the project and he also recognised the fact that actually the network was very dense even at the end of the project, as it turned out from the analysis of the structural data. Here is the dimension of relationships' intensity starting to emerge. For some actors, it seems that there was more intensity in the relationships at given times of the project, rather than a real structural change of the overall structure.

In conclusion, regarding this point, we can summarise that the people interviewed agreed about the structure (mostly between figures 1 and 2) and the perception of change during the project, to come at the end back to its initial structure. This means that despite the social reflexivity in this network emerging during the project, there was not a significant structural change at the end of the project. The network stabilised itself at a certain point (T2-T3), producing a new structural form, but came back then to the initial structure simply because the project was finished (T4): "the time horizon of project teams is often fixed (Kriener 1996). Their life span may or may not be known at the time of creation, yet project teams are deliberately designed in order to be disbanded once they have accomplished their goals." (Quintane et al. 2013:8).

Another interesting aspect was in regard to the perception of change in the density during the time span of the project (question 2). Partners from the side of the university/hospital/research centres have had the perception of a higher network density than partners from the side of the firms, who have chosen low/moderate network density. In general, there was the perception of change in the density from a lower density at the beginning of the project to a higher density in the middle and to a lower again at the end of the project. This confirms the perception of change in the intensity of the relationships discussed above.

Another interesting point that confirms the results of the quantitative analysis is that most of them (4) perceived themselves to be central actors in all phases of the project (question 3). One person perceived himself mostly peripheral in all the phases of the project. The remaining two actors perceived a change in their position from peripheral to central and vice versa during the project.

The dimension of a distributed leadership versus a traditional one starts to emerge here in confirming that not only the project leader but also other actors had the perception to be central

in the project, as emerged also from the quantitative data about this project. This dimension has to be linked to the recent literature about leadership and networks (Mehra et al. 2006), which will be further introduced in the interpretative chapter in order to understand if leadership (distributed) could be a constitutive characteristic of networks, which develop social reflexivity and why.

In the question 4 most of them reported a pattern of increasing closeness (20) referring to their relationship to the other partners, other relevant patterns were instant bond (6), roller coaster (7) and survived a rough patch (6). These answers give us an idea about what happened in the network during the time and will be treated more in-depth later. For the moment it can be said that even if there were some problems and conflicts, the partners recognised that they were increasingly closer during the project. The dimension of the use and conception of time starts here to emerge, this dimension has to be linked to recent literature about the role of the time in teams (Arrow et al. 2004; Quintane et al. 2013).

A very interesting aspect that also confirms the data about the brokerage in the quantitative analysis is that in the question 5 most of them (5) reported to feel as a mediator between two groups/organisations. Most of them (6) also reported to have acted as mediator between two persons during the project and brought some examples. The high number of brokers is also confirmed by the brokerage analysis.

This means that they really were aware about their mediation role in the project. Here is the dimension of brokerage gaining confirmation, given that in both quantitative and qualitative data analyses emerged a high number of brokers in this network, especially in the typology of the liaison brokerage (connecting partners from different organisations). This dimension will be further linked to recent literature about brokerage and especially its role in teams (Burt 1992; Fernandez and Gould 1994; Sasovova et al. 2010; Long Lingo & O'Mahony 2010, Yin et al. 2012).

6.5 Content analysis of the NL_Reflexivity project

After this first overview about the answers to the six questions aided with the methodology of the visual network scales, some data from the content analysis conducted on this project will be presented. The structure of the ten families of codes will be followed and the already mentioned dimensions of analysis will be further explained.

6.5.1 Starting conditions

There are different narrations from the actors about how the project started and how they were involved. A good start point to understand the initial conditions in which this project was formulated and then developed can be that of the **communication coordinator of the hospital**:

> "Actually we started ... I think the first documents date from maybe October 2009, and I think in 2010 … early 2010 we got a first indication also from EFRO or the ... the bureau in between. They said, 'Oh is quite an interesting concept. So in 2010, we had several meetings building up the working packages, but also we spoke to, well quite a lot of companies - smaller, bigger companies, really multi-nationals and really small companies - just to read our partners suggested. And I think summer 2011, we were almost there and then, of course, we went to the final stage and really building up the final budgets, all the preparation to get it submitted to EFRO. And I think it was September/October and then we heard in December that we could start. So it was two years."

This project started in the context of a pre-existing regional network, where a specific research centre of the university and the hospital were encouraged to present a project about food, which could be financed by the EFRO funds.

> "And actually, together with the University - now called the (*name of the university*) … - we ... we got the idea of building up the project. And then we went looking for other companies trying to ... to share with them our ideas, our visions, our issues and how we could ... yeah, find each other in a ... in the program.
>
> And it was difficult to get them in when I had this two years building period to get them connected to it and committed."

The communication coordinator of the hospital describes here the networking work that was already in place in the preparatory phase of the project. It was very important for her to explain this preparatory phase of the project, which required a lot of work in contacting the firms and in understanding if they could enter a project in which to share ideas, visions and issues. Once the firms were involved it was difficult for her to get them connected to the project and committed.

The researcher from the university stated that the collaboration has been started from the university and that to get funds firms also had to be involved. She also was pointing out the restrictions at the beginning due to the obligation of choosing the collaborating firms from the regional area, in order to get the funds:

> "The companies that could be asked to take part, there were restrictions to that because they had to come from the area, from a regional area.
>
> And that's ... that could be a ... a problem because sometimes you want companies, bigger companies that are from outside the area."

Another interesting point from the side of the university has to do with the reasons entering the project. The researcher was speaking about her need to have someone involved as a PhD in the project, her main interest was to have someone who could really carry out the project with her supervision and have an active role in the project. The main reason entering the project was her interest in the topic of the project in which her division specialised. **The PhD student** was actually involved six months after the beginning of the project and during the interview she was speaking about her commitment and enthusiasm for the project:

> "I like to work on things that are also ... or they deliver something also to the society. So not that ... that I'm only conducting research, writing articles, and this is my thesis and then it's just put away in the … in the drawer. And I ... I really like the combination of the ... the new product development within this project and the research on the population."

The project leader was also addressing the fact that the companies should come from the regional area and he was also pointing out the interesting combination in the consortia of very small with even multinational firms. **The project leader** was actually asked to take over the role of the previous project leader and for this reason was not involved from the beginning in the project (for example in the preparatory phase), he was speaking about how he entered this project and about the importance of leading this project for his institute:

> "And they were looking for another coordinator, and then I continued this project also because I thought this was a very important project for this institute dealing with food and health combining fundamental research with very applied research, and it's exactly where we should be as an institute."

Another partner, who was not already present in the project in its preparatory phase, was the **nutritionist of the research institute 1**. Actually, in both projects in the Netherlands, it had been observed the presence of a high turnover, in both projects the people writing the proposal were not all the same carrying out later the project.

> "That's not very easy for me because I came in the project after it had started. So my predecessor here at the institute was involved in setting up the projects, and I ... before I started here I just met with him once and he told me what was going on in the project."

The people involved in the project from the research institute 1 were two: the nutritionist, who took part in the interview and a product development researcher. As the nutritionist stated during the interview, the main reason entering the project from the side of the research institute 1 was their recognised expertise in the field of the research of the project.

We are now going to consider the motivations and preconditions for the collaboration from the side of two companies involved. One is a very small company and another one a very big multinational. Starting with the multinational, **the business developer of the firm 4** took part to the interview and stated how the project started and how they entered:

> "It's organised by the (Food) Organisation, and it's from the university and the hospital. As I was part of the hospital in catering, the firm wanted to do ... to ... to be involved in it."

This firm was already collaborating with the hospital before the project and he also entered quite early in the preparatory phase. It was different for the small Firm 1, as explained by the **business developer 1 firm 1**:

> The ... I got into the subject of nutrition, basically, accidentally as I had a ... a ... a consultancy in innovation management in food and one of the projects, we entered upon the ... the world of hospitals which I'm absolutely not familiar with and then dieticians said we need better products for people who have to recover.
>
> So the ... we did a feasibility study together with the ... the principle of this ... this assignment. And it appears to me that there was a rich demand, there was no market, and there was a real necessity to have those products developed.

The motivation entering the project from the side of the firm 1 was mainly to enter a new market and to have the opportunity to get funds to develop a new product. The firm 1 was actually formed by two start-ups, which merged into one label in order to get together on the market. They entered both the project as two independent start-ups and merged into one label as they realised the difficulty to get by themselves to the market:

> "They also started to recognise that they are facing a similar sort of problem: we do have products, but how to get to the market? And initially when you started this project you think that you'll find a strong partner in, or maybe sell it, or maybe whatever, somebody else is going to get to the market. But they figured out that's not going to happen this way, and the whole world, in terms of finance is totally completely changed. Both we have to go to the market ourselves."

From this passage, can be understood the need of these two small start-ups to find in the context of the project a stronger partner or some sort of funding to get to the market. At the end this was not the case for them, for this reason they decided to merge in one single label.

Considering these starting conditions some considerations can be summarised here in order to allow later some comparisons with the other projects regarding the pre-conditions in which the projects have started to exist:

1. First, in this project, an important role has been played by a regional network for food that enhanced and stimulated the hospital and the university to develop an idea and to apply later for regional funds.
2. In the preparatory phase, which took two years, the idea has been refined from a broad general project about nutrition in a given population to a more specific project.
3. The firms were selected in the regional area on the basis of a previously collaboration in one case and as a completely new partnership in the other three cases.
4. The firms involved are very different regarding their size, from a very small firm (formed by two start-ups) to one large national firm and two multinationals.
5. There was a high turnover in the organisations of the people working on this project, or people who started later to collaborate (as the PhD student).
6. There were different reasons and interests in entering the project: from the side of the university there was a high expectation towards the products developed by the companies; the small company was trying to enter a new market and to get funds; the research institutes wanted to be there because of their expertise in the field and felt to be legitimated to take part. The hospital was trying to connect and motivate the partners.

6.5.2 Organisation of the project

This project was organised on disciplinary teams working together on different work packages. The structure of the project consisted of overall project team meetings, a steering group, and dedicated project teams —either nutrition and food, or logistics, or care market. The steering group has met once or twice a year. The overall project team was organised by the project

leader every 8 weeks. The development teams were dedicated teams organised thematically. Partners from different organisations, who were specialists on the topics, took part to the different dedicated teams. The separate teams were responsible for developing the work packages. Every work package had a leader leading the team, which was scheduled every two months. Another peculiarity was that one partner/organisation could take part to more than one team as stated by **the business developer of the firm 1**:

> "There were dedicated task forces and the one I was heavily involved was in communication and care marketing, and in the nutrition team I had a consultant, which I hired and he was in this nutrition team and I had another one in the product team. So basically, I try to manage some of the teams myself and ... and those people who are specialists in the area in those teams."

A hypothesis that I advance here is that to have the same partners in different teams could have improved reflexivity and communications in-between the teams, the dimension of interdisciplinarity seems to be quite relevant here; it seems that the organisation of the project allowed communication between different teams.

I am now going to analyse data referring to the feelings and needs, which emerged during the project and were reported in the interviews. I am here not considering the two families of codes, collaboration and roles, since the codes were almost equally distributed among the partners in this project and were assigned only to count how much the respondents were speaking about their collaboration with all other partners. The same for the family of codes expected roles, whose codes were assigned in order to count how much the respondents were speaking about specific roles of all other partners. There were not groups which have had more "preferences" than other regarding these two families of codes in this project.

6.5.3 Feelings and needs

Regarding the feelings that emerged in the NL_Reflexivity project, it can be said that considering those feelings can help in getting closer to "what happened in this network," in order to better understand the dynamic of the network. It can be considered misleading, but the feeling that mostly emerged from the interviews was that of disappointment. This can be read as a sign of failure of the project in a way, but in going on to understand what happened in this network, I will argue that, at the end, it is a feeling which can emerge in very ambitious projects and if the

people understand the causes of their disappointment they can better redirect their objectives in a more realistic way.

If we consider for example the **PhD Student**, she had at the beginning of the project very high expectations about the characteristics the products developed by the firms should have, she had to realise that not all what was planned at the beginning was then delivered by the firms, for different reasons:

> "I look at one really big industry partner (*firm 3*) that they didn't deliver that much at the end, while at the beginning they thought of like, "Okay, we can do all this kind of things. We can do work on packages, different food groups, and name it and we can make it."

The same feeling was confirmed by the **researcher,** who supervised her:

> "So they ... they couldn't offer us as much as they promised us in the beginning. So well, and then it became a bit better after that.
>
> But then their company had to reorganize, a lot of people had been … they were fired at *firm 3*. Also the people that we have contact with, so that was really a problem for the project because we had less products and less services."

The researcher was recognising that one firm (firm 3) was disappointing for her because it was not delivering what was promised in the initial stage of the project. Then the researcher explains the reasons why this problem occurred and the negative effects on the project. Similar feelings of disappointment came out also from the side of the industry, especially from the small firm, which also considered the fact that the changes occurred in the project brought at the end an advantage for them.

It is quite a common situation in a project, when changes are occurring due to some unexpected problems, to feel disappointed and to need to think of alternatives or to set lower goals, which can be realistically reached in the time frame of the project. Here again the dimension of the use of the time can be relevant to interpret how the project was adapting to unexpected changes.

Close to the feelings are the needs, which emerged also during the interviews. In the interviews of the NL_Reflexivity project more was spoken about the needs of the firms and the needs of the university researchers. To understand the needs of the other partners is a sign of

relational competence and the first step in trying to cope with the problems. Here the dimension of task interdependence between the partners will be introduced.

For example, in these following passages from the interview with the **PhD student**, we can see how she can clearly identify her needs as researcher and the needs of the companies from her point of view. She stressed the fact that some of the producers (firm 2 in this case) were not willing to make substantial changes to their products. This aspect will be further analysed in the next part devoted to the problems.

> "I thought like, "Okay, we're first going to investigate what is ... what are demands from the ... the users, the end users. So what would they like and what does the user need, so what is ... what is the perfect combination and then the companies will develop this. That ... that was what I thought. But then the companies probably already had a … a very hard structure so to say or like a goal. They already decided themselves like, "Okay, I want to make this product and I just need a researcher to test it." So sometimes I thought like okay, I would have liked different products within the ... the project because I think it would be more bene- ... beneficial for producers and the patients, but some of the producers were not open to these ideas. So they already set like a goal for themselves or they ... they ... they decided, okay, I'm going to make this and it should fit into what you're doing as researcher."

Another point of view from the side of the university was that of her supervisor, who also stated her requirements and needs in order to conduct the research. She also emphasised the interdependence between her work as researcher and what was provided by the industry in terms of facilities and infrastructures:

> "As scientists, we have certain requirements for foods and those can be really different from the especially financial requirements of the industry. And if you cannot come to a good s- … cannot come to a good solution then you cannot collaborate.
>
> In order to get our studies done because my ... my emphasis is on doing the research, I needed these people to do that because they provided the facilities, the infrastructure. So there was some interaction on how to fine tune the product but not much more."

A more positive relationship was built with the small firm (formed of two start-ups), in these passages the **PhD student** recognised their motivation and the need for them to search for funding (new project) and to get to the market:

> "And we have two industry partners that are really active and they are really pushing and I think their motivation is really good.

> So they are really still ... involved in new product development and they are looking ahead to also get another project starting after this project.
>
> They really found like a gap in the market and they ... and jumping in it and expanding promptly."

The business developer 1 of the firm 1 was also recognising his needs and expectations in the project and also stating that the need for budget and the fact to be at the end the ones, who deliver, has motivated them. He is also differentiating among his small firm interests (commercial benefit) and the interests of the two large firms, which at the end did not deliver the products (communicational benefit).

> "Yeah. Those that remained or something like that. So that's the one part of it. Secondly, there is a sort of "What's in it for me discussion," and we are the ones who have the highest stake in the project. We are getting to the market: it's our assortment.
>
> And those two (*firm 2 and firm 3*) are in the alliance and they want to have the communicational benefit and we want to have the commercial benefit."

In this part devoted to the feelings and the needs that emerged during the interviews we can grasp some degree of reflexivity since the respondents are recognising their needs and purposes in the project, but they are also reflecting on those of the other partners. Before to enter the part regarding the real problems encountered during the project it is needed here to summarise also for this part some important findings that at the end can be compared to the findings in the other projects:

1. The emerging feeling of disappointment was reported by many respondents, who were mainly disappointed regarding the fact that some companies were not delivering what they promised at the beginning (*firm 3*) or were not willing to change their products (*firm 2*);
2. Both respondents from industry and university were disappointed regarding this first point;
3. Firm 1 had some advantages regarding the fact that the two other firms (one large national firm and a multinational) were pulling back.
4. Many respondents recognised the motivation and the financial needs of the small firm.

6.5.4 Problems

Some of the problems, which were encountered by the partners during the project, were already introduced in the last part about feeling and needs. Actually, we can say that this project presents three kinds of problems, which are closely interrelated: problems due to budget, problems due to different views science/industry and problems due to the product. Regarding the problem for budget, that was a problem especially experienced by the small firm 1 in the phase to get to the market, as stated by the **business developer 1 of the firm 1**. Given the problems of financing and to find a way to get to the market firm 1 was pushing the relationship with the university as it was also reported by the **project leader**:

> "Yes. It was not a conflict ... it was not a conflict in a way that companies were thinking of leaving the project, but well the financial problems or thinking that the project did not move fast enough. Too smaller companies also problems on their own ... financial problems ...
>
> In my opinion she (*university researcher*) was doing exactly the right thing. But I also could understand him (*business developer 1 firm 1*) because he ... he had good ideas but maybe too quick. They're thinking in weeks and months. This is the researcher, she's thinking in years."

The problem of the different time views in the relationship science/industry and to push one side to do more and quicker is well known in the literature about innovation. The fact is that it can lead to an un-balanced relationship. On the other side the requirements asked from the **university researcher** takes time for improvements:

> "It was difficult to change that product for the study. They (*firm 1*) didn't always listen well to our suggestions for that, and they were very eager to get information from us."

This un-balanced relationship, where one person feels pushed and the other one would like to make it faster, is not a good precondition for collaboration. In the course of the time, because of the presence of social reflexivity in the network, the relationship has improved and both university and small firm reached their specific objectives, recognising their interdependence.

Other problems, which the partners had to solve during the project, arose because of the characteristics of some products from one side (firm 2) and process of reorganisation of the firm

3 on the other side. These two problems have challenged a lot in the project and have substantially changed the importance and the role of these two partners, who pulled back allowing other partners to become more "central" and it has changed the relationships (and the structure) inside the network. As we have seen from the previous parts, the university had very high expectations especially versus the firm 3 (*big multinational*) regarding the products, that this firm could deliver. At the end, the university had to concentrate better on the relationship with the small firm, which started not so well, simply because of the fact that the small firm was the only one that delivered the products to be tested in the study.

With the firm 2 the problem was more regarding their unwillingness to introduce some changes to their current products in order to fulfil the requirement of the project, as stated by the **researcher from the university:**

> "And their position in the project was quite stubborn because we wanted to have enriched foods and they didn't want to change anything about their products.
>
> So they said this is our portfolio of products and this is what we do it with. So there was no innovation. It ... it was just these are our products and they are superior to others and we didn't get … we ... well it's ... it's not ... it's just not true. It's not superior to others. So they were in the project, but I'd rather not have them in the project."

The main problems that have brought new challenges and changes into the project were the pulling back of two firms given an internal process of reorganisation in the case of the firm 3 and the unwillingness to make some changes to their current products in the case of the firm 2. This process has led firm 1 to play a more active role in the project and the university had to reconsider their relationship to firm 1 in order to get the products to be tested. The problems between the small firm and the university were more regarding their different conception of the time and how quick should the project be developed. The university wanted to have more high-quality products from the firm, which required more time in developing the products, while the firm wanted to be quicker in order to overcome some financial problems and to go faster to the market. This has brought an un-balanced relationship between the firm 1 and the university, where one partner felt pushed and the other one wanted to move faster.

6.5.5 Competences

The way the project has dealt with the problems considered above was detected in the family of codes called "competences," in which it has been coded all the passages in the

interviews, where the respondents have spoken about their capacities to solve those problems through the use of their communicative competence, relational competence, organisational competence, research competence and team competence. In the following table 6.1, it can be seen how many passages were reported in the four projects about these different kinds of competences.

As it can be seen from table 6.1, the NL_Reflexivity project has the highest number of passages coded as communicative competence, where partners used direct communication among themselves to solve the problems or to make some advances in the project.

Table 6.1: Competences in the four projects

Competences	NL_Reflexivity	NL_Control	DE_Reflexivity	DE_Control	Total
biological competence	0	0	10	0	10
communicative competence	23	14	9	6	52
logistical competence	1	0	0	0	1
relational competence	45	40	42	8	135
research competence	12	5	7	4	28
technical competence	0	0	20	33	53
total "competences" quotations	81	59	88	51	279
total all quotations in all interviews	765	678	477	449	2369

The two projects in the Netherlands are more characterised by higher use of communicative and relational competences rather than the two projects in Germany, where technical and research competences are more important. Only in the relational competence code is the project DE_Reflexivity displaying a very high number of passages.

Regarding the NL_reflexivity project, it can be said that the highest number of passages describing communicative and relational competences show how this project was making a good use of the relationships inside the network not only to solve problems but also to improve coordination inside the network. These data can also be confirmed by the structural data about the number of the brokerage positions considered in the previous chapter.

I am now going to report some examples of passages about communicative and relational competences regarding this project.

6.5.5.1 Communicative and relational competences

One person in the network using a lot of communications and relationships in trying to solve problems and imbalances was the **business developer of the firm 4** (multinational), who

also defined himself as “the oilman,” because he took part to all teams and was trying to translate the theoretical view of the university in the practice of the hospital:

> “And people of ... of universities are mostly very theoretically. So I was in every group - and that's why they call me the oilman - and I put everywhere a little bit of oil when this is work anymore. And I was always the one who said, "Okay. Theoretically you're right, but how do we translate that into practice?"

Another actor, who was very active in the field of communication with the other partners was the **coordinator of communications from the hospital**:

> “Actually, when we started, then ... we call this in Holland like frogs and you have to get there in one box. So I tried to arrange, to meet these people but also the other people involved to discuss how to proceed and what are the ... what is the project objective and individual objective and how can we match. I think I've not ... I think we tried to see each other quite equal how we are in the project, we did not either group one or the other. And indeed, we tried to bring them together and to... to make the project moving.
>
> So the way we really have to really connect producers, the hospital, the logistics - I think even there, there had also these issues between partners - yeah, I think we really managed quite well.”

Of course, in this case it is difficult to distinguish what is more communicative competence and what is relational competence, because for example in this case, it can be both of them. It is communicative when the partner tries to speak or discuss with the other partners and it is relational when the partner reports about his/her acting taking into account the others’ view.

The **coordinator of the communication from the hospital** has also had the role to “prepare” the care market and to bring outside the results of the project to the public. During the interview, she was reflecting about her mediating role between the partners regarding what has to be communicated outside:

> “And there's partners who say, first we want to have the knowledge ourselves, be ... to have a ... advantage over the competitors. So some said I have a communication team and some said to you, you can't communicate anything. And others said, you have to communicate everything. And then we really have to - in detail - to weigh out are their things and talk to other partners, because it's always finding the commitment of all of them to find processes in which we could increase

> communication and especially prepare the care market on the ... the things we are doing."

In doing this job she clearly shows a relational competence in trying to mediate between the different interests and positions of the partners and she stresses the importance of increasing communications outside to prepare the care market. She was also showing relational competence in connecting with the university researcher for the presentation of the results of the project:

> "Because she (*university researcher*) was really coaching the students and setting up a research, but now she is also presenting data so even went together to a conference to share knowledge and she presented scientific approach and I presented more the application in a hospital approach."

The **PhD student** is also showing a relational competence in connecting with the hospital and the dieticians:

> "She's like the ... the manager ... care manager of a couple of departments in the hospital. So we ... she's manager of the dietitian group but also from geriatrics. And she knows a lot of people so she's also very helpful in organizing things in the hospital and thinking of ways how to do research."

She was feeling as a mediator between the world of the firms and that of the dieticians/hospital and she could comprehend the barriers seen from the side of the dieticians:

> "Ah, well, as a researcher you want to ... you want to get the ... the … the products from the industry because you also work with them to develop them. And I really believe in these products, that they can help the patients. But I also see the practical issues or the ... the ... the ... the barriers the ... the dietitians see."

The **researcher from the university** was also showing relational competence in the relationship with the industries, even if, at the end, she was not completely satisfied about the portfolio of the products the firms offered, she was indeed trying to find a mediation between the wishes of the university and the wishes of the firms in order to fulfil the study:

> "I think that I was able to express what this team needed to that team. So that they would adjust their products, yes and I think mediator, when mediator you try to …

> you try to promote both wishes. You ... you try to incorporate their wishes and their wishes, but I think we have to be more pushy to demand our wishes from them. And that was partly successful, not completely because we didn't end up with ... well, the ... the portfolio of products we had in the study, could have been much better. Yes."

The **project leader** was also showing a high degree of relational competence, first in managing conflicts inside the network and then allowing other partners to have an increasingly autonomy and space of action inside the project:

> "Maybe we need conflicts. I don't like them but if they're there, I want to solve them. I think it's more like, well we didn't know each other so well, there were strangers within the group, and it went to ... and more or less like this (*increasing closeness*). So yes, with some ups and downs, and we gained knowledge together and saw that we all have the same goal and that this ... this goal was, if we would chase this goal it would be beneficial for all of us."

In the following passage of test, the project leader is speaking about the business developer of the firm 1, who was very active and motivated during the project. So the project leader allowed him to have more space in order to avoid that he could feel blocked or not encouraged and to let the project benefit from his ideas.

> "And he *(business developer 1 firm 1*) was ... he's one of the most (innovative) people in the project so he comes ... he has the most ideas on what to do and when, so it can be very ... he can be very pushy first do this and this, but at the same time he ... he has very good ideas. So I allow him to have more time, more contact, because he has a good influence on the direction of the project."

I would like to summarise here some findings regarding the competences showed during the project by the participants, in order to allow later some comparison between the project. Here are the dimensions of leadership style and brokerage; those that can interpret the results in confirming what already emerged by the analysis of the quantitative data:

1. NL_Reflexivity project shows high degrees of relational and communicative competences;
2. Almost all the partners, who were interviewed, reported how they were acting in the relationships to the others, taking care of the others' views and interests in trying to combine general with individual interests;
3. Some of the respondents reported that they felt to act as mediators between other

actors/organisations; this result is confirmed by the brokerage analysis in which there are many actors, who act as bridges between two unconnected partners from different organisations (liaison type of brokerage). The liaison typology of brokerage is also present in the other three projects, but it seems that the people in those projects are less aware to have such a role in the network.

4. A lot of importance is given to increasing communications. For this reason there are communications between the teams and in general it is thought that a good communication in itself plays an important role in better preparing the care market and in reporting outside the results of the project.

6.5.6 Opportunities and evaluation

Before considering again the perceived structural changes in the network, we are going here to analyse the answers the respondents have given to the questions about evaluation and perceived opportunities. Given that all the four projects differ, although not consistent, considering their very specific purposes, budget and length, but are quite similar regarding sector and involvement of different organisations and that, at the end, each project is irreducibly unique it has been decided to consider the subjective perceptions of success and satisfaction of the interviewed partners for measuring the performance rather than considering objective results of the projects in terms of publications, products developed, commercialisation, etc. In the last part of the interview the respondents were asked to broadly express their concerns about the results of the project and their willingness to collaborate in the future with the same partners. Together with the results, it was decided to consider here also the family of codes of the opportunities, since the emergence of opportunities can be also considered as a kind of result.

Coming back to the NL_Reflexivity project it can be said that there were many passages reporting that both overall goal and specific goals were met. Now we are going to analyse such passages. One person in the network, who has given a clear evaluation about the overall goal was the **coordinator of the communications from the hospital**. She sees this first project as the beginning and expressed her feelings about the opportunity to continue with another project:

> "I think we managed to keep the overall objective while we want to change this market and find innovative concepts.
>
> …Because I know that they want to continue a new project and they also discussed involved with me but also with the project leader about how to continue the market."

Another person quite satisfied about the project was the **PhD student**, who expressed satisfaction both regarding her personal achievements in the project and the achievements in general:

> "I think it's still quite an achievement, what we did.
>
> Yeah ... yeah ... yeah. I have my data now, and I think in the beginning PhDs and their supervisors are very optimistic and also always think of many more articles to write, but I ... I think I will have five papers after this project is done."

Another positive view about general and specific results was that of the **business developer of the firm 4** in particular when stressing the success of the university in presenting the project:

> "Yeah. But I think the ... the university is very - how you ca- ... how you call it? - looking forward and they have a lot of success with these readings and presentations, and ... and the knowledge of ... of the people. They see the project as a very co- ... professional group.
>
> Yeah. It brought the result I wanted it, and then I ... I mean... and we ... we ... we speak to each other, we like each other. Tha ... the- ... that's not ... not a problem with me."

The same view has also been expressed by the **business developer 1 of the firm 1**, he also stressed the fact that the results from the scientific side are very good:

> "Yeah. We ... we had some ... we also had some serious problems in ... in the project by itself, all those changes, and we ourselves getting ... getting together. And ... and this uplifting also (because) we are getting results, the university as well. So the results of the ... of the scientific studies are very, very positive - very, very positive. This means that ... that we are now basically surfing on the same wave."

He also experienced a high degree of personal satisfaction for his firm and the achievements of his personal goals, and he was very much satisfied about the opportunities of funding he could get in taking part to this consortium:

> "I'm very positive. I'm positive starting with our own, we are ... we couldn't have reached these results without the consortium.
>
> Without, there is absolutely no way, all the studies, everything which has been done.

> So for us it really is ... it's the path to grow, it's ... it's a (viable), it's what we are, it's how we are ... we are very glad that all results are positive. We did a lot of effort to get there. Yeah? As a consortium this construction with also the ... the commitments towards (society) is vital to get there anyhow. So by itself, I believe in consortia and I do not believe in the loose cooperation."

A person who was partly satisfied about the project's results was the **researcher from the university**:

> "I don't think we have mapped the ... the overall goal in really having a daily menu with enriched products that are very good to taste, very easy to use, well-packaged. No we're not there yet. Yeah.
>
> We had enough products of satisfactory quality to run the study."

In considering the success of the project the fact to be on schedule and on track regarding the use of the funding was very important for the **project leader**.

In general, there is agreement between the partners in considering the project successful but not yet at its end. A second project would be needed to continue in the development of new products in order to arrive at the final objective to have a full daily menu with enriched products. The main opportunities that the partners perceived during the project were those regarding mutual learning and new knowledge and to have access to funds/market. The dimension of the shared learning behaviours starts to play here a role, as conceptualised by Argote, Gruenfeld and Naquin (2001:370) with the following words: "activities through which individuals acquire, share and combine knowledge through experience with one another."

The opportunities to meet new potential partners or to start a new project emerged much less rather than in the other three projects. Interestingly not all partners are willing to cooperate in the future with some of the partners, maybe given to the fact that there were some problems due to the pulling back of two partners. It is important to consider here that this is the only project in which we have already a first commercialisation of some of the products developed.

This is also the project where we have the best match between satisfaction for the results reached in general and the results reached by the persons/organisations involved.

6.5.7 Structural change and four paths to change

This last part about structural change has the aim to conclude the presentation about the content analysis for this project and to come back to some structural characteristics of the network

perceived by the respondents in answering the six questions aided with the methodology of the visual network scales. As it has been already explained, in the overview at the beginning of this part devoted to the NL_Reflexivity project, in this network there is a high perception of change. The number of times the respondents were speaking about a structural change in the interviews was coded and it can be seen for all four projects in the following table 6.2:

Table 6.2: Structural change

Structural change	NL_Reflexivity	NL_Control	DE_Reflexivity	DE_Control	Total
perceived brokerage position no	3	1	4	4	12
perceived brokerage position yes	22	8	1	2	33
perceived change in the position	7	2	2	0	11
perceived position at the centre	14	7	2	2	25
perceived position at the periphery	5	4	2	5	16
structural change no	5	9	8	11	33
structural change yes	56	39	25	19	139
total "structural change" coded quotations	112	70	44	43	279
total of coded quotations in all interviews	765	678	477	449	2369

This table has the only aim to report how many times the codes of the family “structural change” occurred in the test of the interviews. It can give an idea about the perception of change in the four projects, but it is not meant as a numerical classification between the projects, since the number of the respondents varies between the projects and one code can be used many times in the same interview, when the person repeats him/herself in explaining his/her arguments. About structural change in the project NL_Reflexivity it can be said that many respondents reported a perception of structural change inside the network in the three different phases of the project: at the beginning, during the project and at the end of the project. There is also perception of change in their position (7), which does not occur so much in the other projects. In this family of codes are reported also those codes referring to the perception of the position centre/periphery and brokerage position. There are in the NL_Reflexivity a lot of partners, who perceived themselves to be always at the centre of the project and also a lot of partners, who had the feeling to act as a broker between two different organisations/two persons. This perception has found a strong confirmation in the structural data about centrality and brokerage presented in the previous chapter. Now we are going to analyse some of the passages coded in order to better understand the perceptions of the respondents regarding structural change in the network. For example, the **business developer of the firm 4** perceived himself as a broker in different situations when he tried to solve the problem with the firm 2 and to keep them inside the project:

> "In this ... in this specific case the project leader asked me, "solve the problem, please."
>
> My goal was to ... to ... to keep them together because it was already very small, and they had ... So my goal was always to keep people together. But that was ... that was the ... the ... the assignment of the project leader. I organized to keep them in the project, and to do a survey in the old people house with other projects of other products than only *type of meat* but also minced meat, things like that. And that went very good."

But very interestingly, he perceived himself always in a peripheral position in the network. He was considered to be one of the most central people in the project as we can see from the structural data about the network, at least during the last six months of the project.

Another person, who turned out to be a broker was the **PhD student**. She had the perception to have this role mainly inside her group of students and research assistants, but also between dieticians and companies:

> "I only had this with ... I think with my ... one of my students and my research assistant. Yeah. I tried to make it work. I think it was this one in the middle. And I also had this a couple of times with the research assis- ... or the dieticians, that they found themselves on the other side of ... against the ... the companies. I think I'm in the middle because I needed to get the study going on there so also had to mediate a bit.
>
> So as a researcher you try to get them on one line or try to make them see both for ... for each partner the ... the benefits they could gain out of it instead of all the problems that are in that."

She also experienced a change in her position from the middle to a more peripheral one towards the end of the project:

> "I think it's if you look ... if I look at my own position, I think from the beginning until the end of the second year or something, we had a lot of meetings and I was also involved in all of those meetings. And then it became clear what we were going to do in the study, so I was more focused on my own team members over here, and running the study. And w- ... what I needed from the ... the project partners were the products they developed so they ... they ... they bring them to me. But there was not really a lot of anymore ... relation about it anymore."

Most of the respondents reported a perception of change in the overall structure of the project from T1 to T2 and from T3 to T4. Many of them had the feeling that the structure at the time 1 and at the time 4 was the same, because after collaborating together to develop the project

the network came back to its initial conditions simply because the project has finished. Despite there were many changes in their interconnections during the project, it cannot be said that at the end there was a kind of structural stabilisation of a new structural form. In strictly keeping with the theory of Donati this network would not be classified to be a creative one, where the structural form at the end of the morphogenetic process should differ completely from that one at its initial stage. But we should keep in mind also that innovation projects are temporary projects, where actors enter a partnership which is strongly influenced by the time and that is not supposed to have a structural stabilisation after the project is finished. As stated by the **business developer of the firm 4**:

> "Yeah. In ... in ... in ... in the first half year we had to fight each other, and ... and to ... to organize what, how ... how does it work, what do we ha- ... already have, what do we need to have, and what's nice to have. And this was it, and to get used to each other. And then every group did more or less, or separated more between ... the cooperation between industry and research was very intense because they ... they had specialized budget."

Innovation projects are strongly influenced by the timeframe in which they have to develop. In this project, we can recognise an initial phase where it has to be decided how to proceed and what can be realistically developed, then an interaction phase, where the project has to be done and a final stage, where the actors realise what they have reached together and eventually decide to continue the project or to leave. In this case, there is some interest in continuing the project, but maybe involving new partners. It is clear that some degree of social reflexivity was developed inside this network even if at the end the project is going to dissolve or eventually to be continued in another structural form (new actors, new initial conditions, new challenges) because the actors who stay and will continue the project having developed a kind of "capital" in working in such temporary conditions being able to use relationships in a creative way, as in this case. For these reasons, I do not see this project as a pure developmental network, where there is a kind of adaptation to the internal and external environment, nor a as mere reproductive network, because a lot of change occurred in this network and a good relationality between the partners helped them to fulfill the project almost in time (efficiency partly met) and to reach some of the objectives they wanted to reach at the beginning (in part effective).

6.6 Structural change in the NL_Control project: an overview

In the NL_Control project we also have perceptions from most of the respondents to the first question of the interview (Overall structure), of a change in the overall structure from T1 to T2-T3 as in the NL_Reflexivity project, and from T1 to T4. The **project leader from the firm 2** (multinational), for example, perceived a change from the figure 1 at the beginning of the project to a mixture between figure 1 and 2 during the project (T2-T3) and at the end of the project (T4).

> "At the beginning, it's modest ... so you always have this ... this really trying to interact with everybody, and ... and you have some bi- ... a bilateral contract text, and you have that more combined contacts. When we started we had ideas of being like that (*figure 4, all in contact with all*) in- ... interlined and doing everything, of course, and we're all ready looking more like that (*figure 1, centre/periphery*)."

For him the network has changed from a structure where there were some actors at the centre and some others at the periphery (figure 1) to a structure where there was a kind of mixture with some subgroups during the project (in between figure 1 and 2), in which he has a central coordinating position.

> "I think it's a mixture between that one and that one (figure 1 and 2). I think we have some - how do you call that? - some groups that work much together, like you see here they ... they are connected, but I am always in the middle. But during the end ... towards the end, everybody's agenda becomes more clear to each other, so we have more groups like that..."

During the project (T2-T3) he also introduced an animal study in which all partners had to collaborate, but even in this case, this mix between a structure with subgroups and a structure centre/periphery remained the same in his perception because of the prevailing of sub groups and personal interests.

A perception of change in the overall structure was also reported by the **researcher 1 of the university 3**, who has chosen figure 3 (sparse) for the beginning of the project and figure 2 (subgroups) during the project, to arrive at the end of the project to a mixture between figures 2 (subgroups) and 3 (sparse).

> "Because there was one relation between research institute 1 and ... and ... and ... and university 3, there was a relation between firm 2 and university 1, there was a relation between firm 1 and ... and our university 3. So th- ... this is really ... and were some individual like firm 1 and university 2 maybe. So I think this is ... this is a right and good re- ... yeah, yeah quite representative for the situation as it was when we started (*figure 3, sparse network*).

He perceived a change from a sparse network structure where there are some bilateral connections between the organisations/partners to a structure where some subgroups were created but still the connections between them were lacking.

> "Yeah? Then ... then I would rather say well he had those structures and then ... but the interconnection were ... were still lacking. So that is what I mean between the situation ... between this (*figure 3*) and this (*figure 2*) so it's an improvement of this situation (*figure 2*). There were more ... more groupi- ... groups but what I lacked ... what lack- ... was lacking was actually these connections {these connection} Yeah, we were ... {between groups} between groups, yeah."

Another person, who perceived change in the overall structure of the project was the **researcher of the university 1**. For her, at the beginning of the project, the structure was more like in the figure 2 (subgroups) with a central coordination role played by the project leader, then, since interactions increased during the project, the structure also was changing between figure 1 and 2 and at the end was more like figure 1, centre/periphery.

She explained how the network was changing during the time span of the project, from a structure more based on subgroups to a structure where there are some actors more central and others more peripheral:

> "There the animal and the human part were really like separated, so we had the plenary meetings and there were some discussions with ... yeah. Normally we just did our own things, and in the end, we did like a joint experiment, and then we all went to work together. Becau- ... normally, yeah, I did this together with university 2 ... with university 2 and firm 2, and then firm 1 did it together with university 3 and the research centre."

There were not significant changes in the overall structure of the network for the **researcher of the firm 1** (multinational), who entered the project one year later. She has chosen figure 2 (subgroups) as the main structural form of the network since she entered the project until its end.

There was not a significant change in the overall structure also for the **PhD student of the university 2**, who has chosen figure 2 (subgroups) with the project leader in the middle.

Regarding the second question about the density of the network, most of the respondents were reporting a perception of a low network density. **The researcher 1 of the university 3** differentiated between meetings and study/analysis in stating that for meetings the density was moderate at T1 and high at T4 and for study/analysis was very low at T1 and low at T4.

Regarding their perceptions about their position in the network and its changes (question 3), three of them perceived a change from central to peripheral position and vice versa. In answering the question 4 about the pattern of collaboration with all the other partners, most of them experienced an increasing closeness (6), but also instant bond (2) and cooling off (2).

Three of them had the perception to have acted in the role of a mediator between different organisations/persons (questions 5 and 6).

6.7 Content analysis of the NL_Control project

We are now going to analyse more in-depth, as for the NL_Reflexivity, the content of the interviews using the schema of the families of codes and introducing the interpretative dimensions that will be more in-depth explained in the next interpretative chapter.

6.7.1 Starting conditions

Here the **project leader** is reporting how he was involved from his company in this project:

> "So the ... the ... I only entered the company in 2012, and basically, the idea was by getting me immunology by … immunologist by training to get a more multi-disciplinary team, we have a lot of people here that are involved in … in animal nutrition, of course, because we're an animal feed company, but also physiology of animals, but also microbiology, toxicology. But they didn't have an immunologist yet so I was added for that reason. Plus this project, they just had funding for them that started in 2012."

Actually, the project leader entered the project after its preparatory phase, so he was not involved in the setting up of the project. He was also explaining some preconditions, which led to ask at the end a prolongation of the project, in order to complete the studies within the timeframe of the funding scheme. He argued that this is a usual problem because at the beginning

it takes times before the project can start and the PhD researchers also have to get their positions at the universities before to start:

> "There was some extension asked, and this is because it often happens in long projects like these. It's a big project and people ... you ... actually before you start it … it doesn't take ... it takes a lot before you hear that you can start the project, before you have the confirmation. And then people from the universities have to start getting the PhDs to really perform. And the time window that you have for that is often a bit too short, so the PhDs didn't start at the start of the project."

Another partner, who took over this project from another person and entered later, was the **researcher of the university 1**. The same for another partner, who joined later the project and had to "catch up" was the **researcher of the firm 1** (multinational). The project was initiated by a colleague of her, who later had to move to another area of research:

> "Yes ... yes ... yes. But then she requested that she can focus on another area of research, which was not as closely related to the ... to the platform, to the cooperation. So my manager asked whether... it's okay for me to take over. And also for me as a ... as an in boarding or on boarding and ... and ... and learning how this collaboration with different partners is handled."

She could confirm then that two of the partners were already familiar for previous projects to her firm. **The researcher 1 of the university 3** entered later into the project and was not already involved in the setting up of the project. The university 3 entered the project because there were already some bilateral projects with the firm 1:

> "Yeah. Well, obviously, I ... I've taken over this laboratory, this whole group in September 2012 and then the project was awarded just, well I think a few months before. So it was actually my predecessor who ... who initiated this, so I took over from him. So that's the simple answer ...
>
> …. I think it's mainly through contacts with firm 1 (multinational), so we also have separate from this project we also have bilateral projects."

The last respondent was the **PhD Student of the university 2**, who joined the project after becoming a PhD position. She was already working at the department of the university 2 as a research assistant and then she was informed that there was this position open and she applied. Here are summarised some reflections about the starting conditions for the project NL_Control:

1. All the respondents to the interview, even the project leader, entered the project later and were not involved in the setting up of the project.
2. There are two big multinational firms in this project, which already had experience in running innovation projects. Some of the partners were already known because of previous bilateral collaborations.
3. There were some time problems that lead to a prolongation of the project, mainly because PhD students got later their positions.

6.7.2 Organisation of the project

The project was mainly organised through plenary meetings, where all the partners were present and two broad subgroups. One group was formed by the specialists coming from the "animal side" and the other one was more grouping those of the "human side."

Here the **project leader** is explaining how he was organising the project and coordinating the collaboration between the partners that he defined "content driven," for this reason the two groups were considered quite independent and worked more or less separately:

> "Yeah. We have regular meetings with all the partners. I organise them every half ... every half year we have a plenary meeting with all the partners, at least one representative. I … I demand of ea- ... each partner to have one representative at least present, so we can update each other on what is going on at the partners' sites, plus have over- ...overall discussions on … on issues that are running.
>
> And then we have in between, also, meetings. We call them workshops basically on themes or topics that are of interest in this project, and … and then people can decide whether they want to participate or not in the middle, depending on the topic.
>
> Because sometimes it's more aimed at, for instance, the in vitro analysis that we did. Sometimes it's more aimed at the specific goals of a part of the … the infant nutrition or the animal nutrition. So it's not of the strongest interest for everybody, so it's a bit less ... full to be present, although usually most people were present."

In this first passage, it emerges already the willingness to keep the two main areas of research, animal side and human side, separated. The workshops were mainly organised on themes or topics of interests and the partners were free to decide to which workshops to take part. Here is not present the dimension of transdisciplinarity and of task interdependencies between partners seem to be much less than in the NL_Reflexivity project.

The project leader was further explaining how he intended his double role as coordinator of the project and researcher in a big multinational firm:

> " (...) but of course, I have my own agenda because I'm at ... at an animal feed company. So that means that I'm always more towards this part of the study content-wise (*animal*).
>
> So I am with them (*university 1 and 2*) because of the ... yeah, common objectives of ... of our company and ... and their interests. So then content-wise, I'm sometimes a bit more on one side (*animal*)."

He also stated that his connections to the partners of the animal side were stronger, easier and freer than those with the human part but also, he tried to keep personal connections with some of the partners from the human side, but the separation between the two parts is quite evident.

I would like to summarise here some reflections about how the project was organised:

1. First it seems that the role of the project leader is predominant in coordinating and organising the collaboration between the partners.
2. There are two main groups of partners, who are quite separated because of their different research background and expertise.
3. Some of the partners would have common interests, but the structure seems that to connect with a partner from the other side without going through the relationship with the project leader can be difficult.
4. The leadership type of the project leader seems to be quite traditional in trying to coordinate from the centre all the connections between the subgroups and leaving not so much space for free collaboration between the two parts.
5. The organisation of the workshops on topics, which were very specific was keeping this separation between the two areas of research.
6. There were some attempts to bring the partners more together from the side of the project leader, but it seems that at the end still the personal agenda and interests prevailed.

6.7.3 Collaboration

In this next section, the data about the family of codes "collaboration" will be analysed, that can give an idea about how many times in the interviews, was spoken about "the counterpart" – the other partner who collaborated with the respondent. As it has been already explained for other tables that I presented in the previous part about the NL_Reflexivity project, this kind of numerical tables is only a tool to better understand the frequency one or more arguments were spoken from the respondents in the interviews. It is not to be understood as a kind of classification

between the projects, but it helps to introduce a family of codes and to understand its relevance in each project in comparison to the others.

In the next table 6.3, when considering the NL_Control project, it can be grasped a strong relevance (also in the project DE_Control) of the codes “collaboration with the firms” and “collaboration with the University/PhD/Researcher” and this is mainly due to the fact that in the project NL_Control there are 3 universities involved and 2 firms plus a private research centre. But when considering the codes “collaboration within the firms” and “within the universities” it can be grasped that there was also a kind of intra-collaboration within the organisations, which for example was not so relevant in the NL_Reflexivity. The same can be said for the relevance of the last two codes of the table 6.3: the respondents reported to have had with some partners more interaction than with others.

If we put together all this information we can say that the respondents of the NL_Control were speaking mainly about their collaboration with firms and universities, but they were also speaking about their collaboration within their own organisation or university and about the fact that they had with some partners more interaction than with others. If we look at the structural data analysed in the previous chapter, keeping in mind that they referred only to the last six months of the project, we can find some parallels:

Table 6.3: Collaboration and interaction

Collaboration with whom?	NL_Reflexivity	NL_Control	DE_Reflexivity	DE_Control	Total
collaboration outside the consortium	9	7	3	2	21
collaboration with the firms	37	22	16	27	102
collaboration with the project leader	14	11	3	6	34
collaboration with the research institutes	13	11	15	0	39
collaboration with the University/PhD/Researcher	21	37	17	27	102
collaboration within the firms	2	9	3	5	19
collaboration within the universities	3	13	1	2	19
some partners less interaction	2	13	14	33	62
some partners more interaction	2	10	13	24	49
total "collaboration with whom" coded quotations	103	133	85	126	447
total of coded quotations in all interviews	765	678	477	449	2369

1. In both projects in the Netherlands there were more cliques than in the two other projects in Germany.
2. The project leader was the main broker between different organisations, but there were other brokers’ positions like the gatekeeper and the representative, which acted inside their own organisations. So we could make the hypothesis that there were some internal sub-groups in the different organisations.

3. The project leader was also considered to be the most central person and mediator in the network, which show his propensity to coordinate the project in having control on all the relationships.

It seems that in this project there were some relevant subgroups not only between partners but also between partners and other collaborators from their own firm/university. It can be also observed that because of this separation between the two fields of research, the partners had the feeling to interact more with other partners from the same field and less with partners from the other field. Here for example the **project leader** explains why he had less connection with firm 1. The tendency of some partners to have an own focus in the project, in his view, led the partners to have more contacts with some partners than with others:

> "Then we have firm 1, that's the other company. They are actually, also, in the same. They're also more in the infant nutrition focus, so they are less on ... on our side in terms of animal nutrition. But also within the project they ... they tend to find their own focus.
>
> And so …because we- ...within the project we worked together with different people from the partners, so for some partners we have only one or two contacts, other partners we have more contacts."

The researcher 1 from the university 3 also explains why he is collaborating more with some partners than with others. He is also reporting, during the interview, that actually in the last six months of the project there was more contact because of the animal study in which all were included:

> "We have ... so with them we have, for example, pretty publications and even (a book). Intense were and with them we don't have anything, yes. So what I mean is ... is that in the last few months, yes, there was quite some contact, we did this huge study together using a lot of very interesting animal studies we did together; also with university 2 but for university 2 the same ... the same holds true - to be honest - and that's ol- ... also the reason, actually I can keep it very simple. Those that are in the inner circle I will draw a solid line. So with them, I will draw solid lines. But with the ones that I put in the second circle. The reason that I put them there is because there was less intense con- ... contact."

But despite this big animal study that involved everybody, he put the partners with whom he intensely cooperated in the very inner circle of his net-map and the other with whom he had a less intense relationship in the second circle. He made an interesting distinction between

collaboration during the meetings and collaboration in the project stating that during the meetings the partners were quite well connected:

> "And it is I think a consequence of the meetings. I think of course the meetings were quite good, because you always see when the meetings are good then this is also improving. Because during the meetings you explain what you do, and it's "Oh, that's interesting, and can I ... can you send me those samples, or can you send me those methods or those protocols and then can I ..." And so the meetings are always good too, so ... so you shouldn't meet too frequently, but you should also meet ..."

Here it seems that the dimension of relationships' intensity has played a role for the researcher 1 from the university 3. The intensity of the relationships was higher for him when meeting at the overall meetings rather than in doing the project. He also stated the fact that to meet and to update each other has improved the project.

6.7.4 Feelings and needs

Regarding the feelings reported in the interviews there were some perceptions of high expectation and disappointment. Especially the **project leader** was speaking about his willingness to do more and had to reconsider, during the time, his own objectives:

> "And eventually, of course, everybody's agenda becomes more clear, and then ... and then certain things are going to be said, "Okay. That's im- ... that's just impossible." Of course, because you have too high ambitions.

The same was also perceived by the **researcher 1 of the university 3** regarding the role of the project leader:

> "And so there was some errors, a lot of un- ... unclarity, there was a lot of confusion about what exactly should be done, and then he (*project leader*) was also contacting people from other departments so within the other to also be involved. And he was trying to involve the whole world and trying to do the whole work."

This enthusiastic view of the project leader was mitigated by the **researcher 1 of the university 3**, who tried to bring the objectives of the project to more defined and reachable results:

> "And then, I ... I had so together with a person in University 2 said, let's sit down together and write down what exact ... what questions do we want to answer with this particular study, and bring it down and back to, you know, normal perspectives. And ... and so I had a kind of mediating role in between the project leader who was very enthusiastic and the others who were more realistic."

This need to reframe the objectives is maybe due to the fact that the people running the project were not the same who have written the proposal, as it was suggested by **the researcher 1 of the university 3**, who also recognised that after this "reframing" the collaboration went better.

Another person, who entered later and had quite high expectations towards the project was the **researcher of the firm 1**, who was feeling she had to "catch up" in the project because of her different background, and the fact that she entered later the project. She expected more sharing of information and networking:

> "Of course, when I see this then I need to compare it with, but I would say - answering the question based on, maybe, expectations from the organisation, of course - that it would be more intense networking and sharing of information. But it's not as ... yeah, highly ex- ... as expected, yeah... yes, the company's expectation or at least the way it was described to me when I took over."

In this passage, it is possible to recognise the importance for this partner to be more intensely connected with the other partners in the project. Regarding the different needs of the partners it can be said that there was in the project recognition about others' needs especially regarding the needs of the researchers/university/PhD and the needs of the firms. For example, the **researcher of the university 1** was recognising the needs of the firm 1:

> "Because being here in firm 1 is the company so by the end of the project they would like to have a product and we (*university 1*) do the testing."

The researcher of the firm 1, on the other side, was more focused on her firm needs for priority because of the shorter benefit for the industry:

> "That is a very good question because we ... we ask this question ourselves. I mean we ... we know ... at least we know, okay, they're good at it but; of course, it's not ... being good is not the only criteria to work together in the future. There's also good intention and ... and, of course, yeah, priority. And sometimes the interest ... because

for industry, of course ... of course, the benefit is probably more shorter."

Another partner, who was clearly recognising the needs of the industrial partner, was the **PhD Student of the university 2**. She explained that the industry wanted to have some feed tested but the university 2 has instead preferred to do some experiments about the development of menu systems, so she thinks that the industry wanted something else from her university:

> "Because they wanted us to test feed supplement but we haven't done this. Because we were … we have … my professor and my supervisor, they didn't agree that much to this and apart from food we rather wanted to look regarding the development of … of menu systems. This actually went quite well though I think that the industry wanted something different than what we've done at the end."[6]

The same as for the NL_Reflexivity project, also this project had to redefine its main objectives in more realistic terms in order to fulfil them in time. In analysing the passages about feelings and needs it seems that also in this project there is relational competence in reporting others' needs, but less willingness to really make some changes that can improve the relationship or communication with the others.

6.7.5 Problems

Now here are considered the main problems encountered during the project by the different partners. One problem that was strongly reported by many respondents was regarding the very different interests of research and agenda of the partners. The other problem, which was also reported by the partners, was regarding their different views and expectations in the project. In part, this last problem had been already considered when reporting about feelings and needs.

Starting with problems due to different backgrounds and interests, as already explained the main reason for the emerging of those problems was the separation between the two main areas of research in two subgroups: partners from the "animal side" and partners from the "human side."

[6] Original quotation in German: "Weil die gerne wollten, dass wir Futterzusätze testen, und das haben wir nicht gemacht. Weil wir waren ... wir haben, mein Professor und mein Betreuer, die waren dann nicht so dafür, und wir woll- ... wir wollten mehr gucken nach der Entwicklung von ... von Menüsystemen, unabhängig jetzt vom Futter. Das lief eigentlich ganz gut, nur glaube ich, dass die Industrie 'was anderes wollte als wir schlussendlich gemacht haben."

This separation was clearly explained here by the **researcher 1 from the university 3**, who sees "the subject" as the main problem for a better collaboration:

> "Because of the interests. This is, for example, the animals, this is the human, this is food, this is feed. Yeah? So it definitely had different subgroups. And there was ... yeah. It ... it is really because of the subjects. It's not because we were, so they were all very friendly people, there was no dominant group, there was not ... there were no social aspects that ... that hampered us from collaborating: it was rather the subject."

From this passage, we can also deduce that there were not significant conflicts inside the projects, but rather different interests, which sometimes were difficult to bring together. The main problem, in the view of the **researcher 1 from the university 3**, was to find a common interest during the project given the huge diversity between the working fields of the partners. He also recognises the richness and the diversity in the consortia and its uniqueness, but at the same time the difficulty to find a common interest:

> "I do very much because you have very interesting discussions you really think out the box because you have to be because there are from the problem kind of different world. So it's a very good point, very positive. But sometime it can be ... you can be too separated, so when you're really far apart you ... you ... you need at least a common interest."

The same problem was experienced by the **researcher of the firm 1** when she stated that she had "to catch up" because of her different research background:

> "Well, sometimes when ... when I ... it's more about different backgrounds. You know when you attend a conference and it's totally not your area.
>
> Yeah ... yeah. So I ... I don't have much immune ... immune ... immunology background.
>
> So at the beginning I have to catch up with a lot of reading because I entered in the middle, and these people are ... mostly are immunologists so they speak a different language to me."

It seems that this problem remained and became even more evident during the project and at its end, despite the action of the project leader who tried to motivate the partners in bringing them together in one big animal study. The separation between the two fields in sub-groups and the fact that there were not connections in between sub-groups could have led to this

situation, where the only actor in mediating between the partners was the project leader and the only context for bringing them together were the plenary meetings.

Another problem that could have had a role in building some distance between the partners were some experiments led by the only research centre involved in the project, which were considered to be quite distant from the goal of the project. In order to lead one of these experiments the research centre involved the intensive care unit of the university 3, as explained by **the researcher 1 of the university 3**:

> "Well, the idea was to develop an ... an experimental rhino virus infection model. So, in which young adults where experimentally infected with rhino virus because it can only cause common cold so no- ... nothing severe so it's a very mild infection. And actually, what the research centre and intensive care unit, they wanted to develop this model to test ingredients, to see whether certain ingredients will improve your resistance or your ... your health, your immune ... immune defence against this virus infection."

This experiment was seen for example by the **PhD Student of the university 2** quite far from the general objectives of the project:

> "… nothing to do with ... with the ... with yes, the immune system of babies. And there we had indeed ... it actually divided a little bit because one couldn't think about such concepts like how the immune systems evolves, what's the difference between man and animals where one possibly can collaborate because they've just worked with adults."[7]

She thinks that to introduce some experiments, which involved adults rather than children, have led to a bigger separation between the two fields of interests, immune systems of young animals and babies, so that there was no more common ground to share their very specialized knowledge and to collaborate together.

Another experiment, led by the research centre that has also stressed this separation between the fields was a very specific experiment which involved anyone of the partners, as

[7] Original quotation in German:"… nichts zu tun mit ... mit den ... mit ... ja, dem Immunsystem von Babys. Und da hatten wir dann schon ... hat es sich eigentlich auch so ein bisschen so geteilt, weil man dann auch gar nicht zusammen über so Konzepte nachdenken konnte, wie sich's Immunsystem entwickelt, was da der Unterschied ist zwischen Mensch und den Tieren, wo man ... wo man vielleicht zusammenarbeiten kann, weil sie einfach mit erwachsenen Leuten... gearbeitet haben."

explained by the **researcher 1 of the university 3**:

> "... full right ... full right also to work on that (*experiment*), so there's no problem with that. However, there was not connection, any connection with any of the other partners. There was really no need really to ... you know so they (*research centre*) discussed their results, they presented their results, but there was not really. No one else was working on this."

The problems regarding the separation of the two fields of research is strongly interconnected with the problems regarding the different views and expectations and how to deal with them during the project. The **researcher 1 of the university 3** stressed this point very clear in saying that actually there were not problems but rather differences in expectations and way of working.

The researcher 1 of the university 3 was explaining how, in his view, in the Netherlands in such situations people try to find a consensus:

> "That's typical Dutch politics for someone or Dutch organizations. And here in the Netherlands we're always trying to please the whole world, and trying to consent ... get to a consensus.
>
> Which again is not always good because the consensus is ... is not good for that person of the ... not the perfect situation for that person, not the perfect situation for the other person."

Another partner, who had the feeling that, at the end, all organisations were more working separately but trying to show that they could collaborate together, was the **PHD student of the university 2**. She referred here about the last experiment, where all the partners had to collaborate together:

> "This was a bit ... a bit an elongated final project, because one still had to do something quickly where on the … so that then they collaborated."[8]

Another type of problem which arose was related to the time extension of the project and the need to use all funds before the ultimate deadline, as explained by the **project leader**:

[8] Original quotation in German: "Das war da ein bisschen ... ein bisschen so gezogenes Endprojekt. Weil man noch schnell 'was machen musste, wo über die ... wo man dann zusammenarbeitet."

> "It's … it's … it's a final stage. We have some studies that we have performed that were quite recently ended, so we're still together analysing all the data that's coming from there, and … and … deciding together what to do in terms of analysis. So it's really ending in … in a way. Actually, before the end of this year we have to finish because finance has stopped. This is very simple and very strict."

As for the NL_Reflexivity project here will be summarised some reflections about the problems in the NL_Control project:

1. It seems that there is a strong separation between the two areas of research involved in the project.
2. There are two main subgroups, in which each organisation works in a separate way.
3. Given the very different background of the partners is quite difficult to find a common interest.
4. Each organisation has its own priorities and interests and the only person who mediates between organisations (liaison type of brokerage) is the project leader. This result has found confirmation in the brokerage analysis done in the previous chapter.
5. The project leader tries to have all connections under his control, inhibiting others to contact more, he also tries to keep all the organisations satisfied and to achieve consensus and avoid conflicts.
6. There were some experiments, which were perceived to be far from the general goal of the project.

It seems that some of the already explained dimensions for the interpretation play a role here. There is a different organisation of the project mainly based on subgroups, which reflect the separation between the two main areas of research. In contrast with the previous NL_Reflexivity project, this project shows to have some difficulties in integrating the two main fields of research, so the dimension of interdisciplinarity is here not fully present and could be one of the explaining dimension in understanding how team develop social reflexivity. Here also the dimension of intensity of relationships seems to be less present. Some partners wanted to have more opportunities of sharing and meetings during the project, which was the case only during the plenary meetings that were evaluated to be good for improving the performance of the project.

The use of the time seems also to have been not optimal during the project, since one big study was performed at the very end of the project. The leadership style and role of brokers are

also important dimensions here in explaining that a very traditional style of leadership may impede a better coordination of the project in valorising other emerging "leaders," who were present in this project.

6.7.6 Competences

In this part, the competences of this project will be introduced; how the partners were dealing with problems and trying to fulfil the project.

As already seen in the table 6.1, about the different competences displayed by the four projects, the two projects in the Netherlands have both a high number of passages in the test of the interviews, where the respondents speak about their communicative (14) and relational (40) competences.

6.7.6.1 Communicative and relational competences

As already explained for the NL_Reflexivity project, it is meant under communicative competence when the actor tries to speak with another partner in order to solve problems or to have contact for the project and relational competence when the actor is acting in the network taking into account other partners' views. In this project, there was some consciousness about the problems from the side of the actors and the project leader, and some of them tried to solve the imbalances and to improve the relationship in order to better fulfil the project. Here the **project leader**, for example, sees himself as the main contact person:

> "The overall role that I have, because of the communication as a project leader, I ... I … I do a lot of communication in ... into mails and ... and telephone calls with the other partners as well."

The project leader had also a role in trying to mediate between the two sub-groups and motivate them to collaborate for the project:

> "Several people had this objective, "Okay, we can do this together." And then there were people from both sides who, "Well, are we going to do that?" So we had to convince them that they're ... that it was good for us, for the project, and for them to really be able to get up."

Another person, who had the feeling to communicate more with partners from the same

sub-group and with her internal colleagues, was **the researcher of the firm 1**:

> "So why I co- ... co- ... communicate much about ... with these three persons, because we ha- ... we have new data and we need to decide what to do with the data and, yeah, get better understanding of the interpretation or the results, whether we want to publish or we want to do more work, yeah.
>
> And then ... yeah, this is my manager and this is my direct colleague. And ... and through ... I'm usually having the contacts with all the other partners, so they have through me contacts."

But she was also trying to connect more with the others during the meetings:

> "Yeah. Because I think I ... at least during the plenary active meetings we have every three months, I try to ... yeah, ask questions and understand the situation in each of the partners and ... but outside that then I don't have much update."

Another partner, who was very active in communicating/relating both with the partners and internal with his own group of research was the **researcher 1 of the university 3**.

He perceived to have had a mediating role in organising the study between the different organisations during the last big "animal study":

> "(...) the animal study where we had some different ingredients. I was one of the imitators and said, "Well let's do this together, let's divide the work: you will do this, you will do that, you will do that, and then we can really come up with nice results, and very soon we will discuss all the results, put everything together."

Some relational competence was shown by the **researcher of the university 1** in trying to mediate between the firm 2 and the university 3 during the last animal experiment, which involved more partners as usual. She could mediate between different positions because of her human background:

> "Yeah. Not really, the only thing was with the animal project. It was a really ... with the last animal experiment. It was a big experiment and then firm 2 did the experiment and University 3 wanted to have the service earlier. But that was not possible from a practical point of view because ... yeah, a lot of animals were involved and a big ... big supply. And then I could have like solutions saying, "First I'd like the first half in the morning and then the second half in the afternoon." That's the only time when I was in the middle, but that's also because I have like a human background so I used to work in the hospital and I now work with chicken so I really

know how it is when you do like big animal experiments that it takes time. So I could really see like both their points and I could also see where they miscommunicated at it."

I would like to pick up some reflections about competences in NL_Control:

1. It seems that there are partners, who display some degree of reflexivity and relational competence and have tried to mediate between other partners and within their own organisations. This point finds a confirmation in the structural data about brokerage in NL_Control, where we see that there are some actors acting in the positions of the gatekeeper and representative. The main actors acting in the position of the liaison were the project leader and his collaborator, who was more collaborating with all the other partners for the financial issues of the project.
2. It seems that there are some teamwork competences and communication competence, since the actors are working mainly in teams in their own organisations.
3. The project leader held his role as coordinator of all communications, giving not so much space to other actors, with relational and communicational competences, who could have also played this role in connecting more the sub-groups.
4. There were some attempts from the project leader to motivate and promote collaboration between the partners (the animal study), where partners had the opportunity to collaborate more, but only at the very end of the project.

6.7.7 Opportunities and evaluation

We are now going to consider the answers the respondents have given to the questions about evaluation and willingness to cooperate in the future. From reading passages that were coded, where the respondents have spoken about their satisfaction about the results of the project it seems that the respondents were less satisfied about the results of the project, both individual and general, in comparison to the NL_Reflexivity project.

First of all, nobody was fully satisfied about the results of the project in general, rather partly satisfied. The project leader, for example, was more speaking about meeting the efficiency criteria (to finish on time), rather than about concrete results. This also because they were at the end of the project more in an analysis phase. Another partner, who was not completely satisfied about the final results of the project was the **researcher 1 of the university 3**:

> "Judging on this project, whether I'm positive; I'm moderately positive. It ...it could have been better. I think we could have harvested more at the end, in case we would have started ... in ... in a ... in a good manner, in a good ... especially in a good way of working and collaborating in the beginning. I think it took a while before ... before it took off."

Some degree of satisfaction was expressed by the **researcher of the firm 1**, at least she was satisfied about some opportunities the firm has had in taking advantage of the subsidy and in learning the way other organisations work and moving forward in the innovation they are interested in. She was less satisfied about quality and different priorities of the partners:

> "We benefit a lot from the collaborations. Not just to learn about the other organizations' way of operating but also ... yeah, to promote in a way our own program and to take advantage of the subsidy, of course, and to move forward with this particular innovation, thi- ... these particular ingredients that ... that we want to study. The down side is that some of the ... some of the progress is not as quickly as we expect to be but that's ... that's research maybe. Yeah, so ... and the quality itself can be ... I don't know, it's ... sometimes I feel that it's not always a priority to some of our partners. So then the quality of the work is not always what we have seen in their ... let's say in their publication so ... but maybe it's the same with us. But because we ... we don't do our own lab expe- ... experiments in house."

A good result for her was to have had opportunities to learn within this consortium. Another opportunity that emerged during the project was that to meet new potential partners, as explained the **researcher 1 of the university 3**:

> "Well to be very ... to be very specific, very concrete, there will be an ... an internship is organized now, and the person (*researcher university 2*) will work on a subject that has our both our interest so our work. He will work here this person, but I will also discuss with him our results and we will really collaborate and that's really separate from ... from this particular project. So that really help me to get in contact and to know what he is able to do, and how we could collaborate and work on particular type of research related to infectious diseases in ... in ... in ... in nutrients, etc. and in immune defences with him."

These networking opportunities were possible because of the plenary meetings, where the different partners had the opportunity to know each other better:

> "(...) during our meetings, we learned a lot about each other's interests and each other's expertise, and therefore we finally ... so for example, especially with the group in university 2, I am pretty sure that - and that there will be maybe one of your other

questions - after the project will be stopped or will be finalized, then I'll certainly continue to work with ... with University 2."

For this reason, this project was very useful for the **researcher 1 of the university 3**, because otherwise he would not have had the opportunity to meet this person. At the same time, there were some partners who were not satisfied about the collaboration with other partners and stated that they would not further collaborate with them in the future, other were interested in collaborating again only with few of them.

In summarising some points from these passages, it can be said that there was more satisfaction for some opportunities that emerged during the project (learning, to meet new potential partners and for the subsidy), than for the general results of the projects. The explanation is maybe that the results were not already there, given that the last studies were performed at the end of project and the partners were in the phase of analysing the data.

Most of the respondents were partly satisfied about the results for different reasons, such as quality of the work, problems due to different priorities of the organisations, need to use all funds before the end of the project. It seems that the results are partly met in the timeframe of the project (efficiency criteria partly met), and that there were not yet finished products or a first commercialisation of the products (effectiveness not met).

6.7.8 Structural change and four paths to change

The last part about structural change wants to come back to "how much" perception of change has been experienced by the respondents in the NL_Control project. If we consider the table 6.2, we can see that there are less passages coded about structural change in the interviews of NL_Control project than in those of the NL_Reflexivity project; few partners experienced a change in their position in the network from the periphery to the centre and vice versa; some of them, as already reported above, considered themselves as a broker, or considered others in the role of the broker (the project leader). We are now going to consider structural change in order to be able to classify this network in the four paths to change of Donati.

Regarding the perception about change in the overall structure of the network, there are similar views among the respondents. Most of them perceived a change from a structure (sparse, centre/periphery) at the beginning of the project to a structure more based on subgroups during the project, to arrive to a mixture between two structures (subgroups, centre/periphery) at the end. It seems that in this network there was a kind of development/adaptation rather than a real

change and it is maybe more evident because most of the partners perceived “the last animal study” as a challenge, because they had to collaborate more than before, even if the structure has not been changed significantly in their perception. Though it was maybe more intense the collaboration, but still the work had been done in independent subgroups. For these reasons, it can be said that this network gets closer to a developmental network in which there is a kind of adaptation to the internal and the external feedback among the agents, but not a real engagement in a change that can improve the relationship. This last experiment was a kind of last attempt to bring them together from the side of the project leader and in part it was successful, but it was still not enough to find a common goal that could be more important than the single interests of each organisation. There were some actors in the network shown to have some relational and communicational competences that could have helped in creating social reflexivity in the network if the connections between the subgroups would have been reinforced through multidisciplinary meetings and workshops. The strong separation between the two areas of research has restricted even more the common ground on which to construe some common interests in the project. Some actors could have had a key-role in this process but the need of control from the side of the project leader about all the connections has blocked some personal initiatives.

On the other side, the actors had some opportunities to meet and to know each other better during the meetings, but the benefits of this social reflexivity will be used for their further projects and not that much for this current project. There is in this network the perception to have learned and to have had the opportunity to meet new potential partners but less satisfaction about the general results.

6.8 Resume about the two projects in the Netherlands

From a first look, between the two networks in the Netherlands, about the qualitative analyses presented here, it is possible to summarise some similarities and differences both projects present. Starting with similarities we have here two projects which are very similar in their objectives, to develop new food with the aim of solving some health problems in different populations (patients, babies, animals). Another aspect that was present in both projects was a high turn-over of the people working on these projects in their different organisations, which has brought to the situation that the most of the persons doing the projects were not the same, who have written and proposed these projects. Regarding the organisation of the projects in both of them, teamwork has been used. In the NL_Reflexivity project we have different disciplinary

teams which interact among themselves, in the NL_Control project we have two main sub-groups formed by internal teams from the different organisations involved, in those subgroups partners interact more with other partners from the same subgroup and much less with those of the other subgroup. In both projects, the respondents reported the same feelings to be disappointed and to have had too big expectations/ambitions regarding the projects. The projects are also very similar regarding their main competences, relational and communicational competences, which can be a result of the organisation of the project in teams. In both projects, the respondents had perceived there were some changes during the project. Most of the respondents of the two projects perceived themselves as brokers in mediating between different organisations (liaison).

Regarding the differences between the projects it is here reported that the two projects started in different conditions, given that the NL_Reflexivity project had the support of a regional network, which helped the initiators during the preparatory phase in finding other partners in the region. On the other side, in the NL_Control project, there were some partners who already knew each other from previous bilateral collaborations. Regarding the problems the partners had to solve during the projects, we have different kinds of problems: for NL_Reflexivity project there were reported some problems about the pulling back of two partners, budget problems from the side of the small firm and different views regarding the use of time between university and firms. This last problem was also in part reported by some respondents of the NL_Control. Another problem for them, especially for the project leader, was the difficulty to overcome the individual interests and agendas of the partners and to find a common objective. The very different backgrounds and the separation in two main areas of research was also perceived as a limitation for some respondents. The two projects differ in the way they tried to solve problems: in the NL_Reflexivity project there were more conflicts and discussions among the partners, which led to a reframe of the objectives and the roles of the partners. On the other side in the NL_Control, there was a more predominant role of the project leader, who tried to control all the connections and to please all the organisation through consensus. The role and the type of leadership of the project leader seem to be also very different in the two projects: in the NL_Reflexivity we have a leader, who tries to delegate to others some of the problems and let the partners be free in their interactions among teams, in the NL_Control the project leader has a more traditional style in trying to control from above all the connections and in strongly separating the work in two quite independent sub-groups, which communicate mostly only during the plenary meetings. We have in both projects different evaluations regarding their success and the willingness to cooperate in the future with the same partners. For the NL_Reflexivity project we have the best match between personal and general objectives, which for the most of the partners are partly met (effectiveness

criteria partly met) in time and within the budget (efficiency criteria partly met). Most of the partners are willing to cooperate again in the future with the same partners. On the other side in the NL_Control project, the respondents were not fully satisfied about the general results (effectiveness not met) that were only in part reached within the time frame and the budget (efficiency partly met). Some of the partners were not willing to cooperate with some other partners anymore, there was more satisfaction about some opportunities which emerged during the project (learning, to meet new potential partners) rather than for the results.

6.9 Structural change in the DE_Reflexivity project: an overview

Here it will be presented the analysis of the two remaining projects in Germany starting with the project, which was supposed to produce the social reflexivity property: the DE_Reflexivity project. As for the two projects in the Netherlands, we are going to introduce here an overview about the answers to the six questions aided with the methodology of the Visual Networks Scales (Mehra et al. 2014) and later the content analysis done on the interviews. This overview aims at grasping the perceptions about structural change in the project in order to classify the network in one of the four paths to change proposed by Donati (2011). The main interpretative dimensions already mentioned in the two previous projects will be also here introduced in some parts of the analysis.

In the DE_Reflexivity project we have a high perception of change during the project from the answers of the respondents, especially between the two main phases of the project: the first phase, where the partners were working together more intensively in order to construct "the machine" (die Anlage in German) and the second phase, in which the cooperation was more organised in clusters. For example, as reported by the **project leader from the firm 2** in answering the first question about the perception of change in the overall structure:

> "Yes, this was different. At the beginning I would say there was ... at the very beginning of the project so 2011 when part 1 started ... This was also a different project, of course, there was … had yet to be developed much more because we had developed the machine. In this case I would say there we can ... yes, here is that all are connected together. In this case we're talking about something like this (*figure 4, all connected with all*). I would say in II (*part*) it was more like clustered. Hence, rather this one. (*figure 2, subgroups*)."[9]

[9] Original quotation in German: „Ja, da war es anders. Da war am Anfang, würde ich sagen ... ganz am Anfang des Projektes, also 2011, als Teil 1 angefangen hat. Das war auch ein anderes Projekt, da war natürlich ... musste viel mehr noch entwickelt werden, weil wir die Anlagen entwickelt haben. Da würde ich sagen, da können wir ... ja, also

Here the project leader is explaining how the overall structure, in her perception, has changed from a structure in which the cooperation had been very intensive between all the partners, who were almost all connected with all, as depicted in the figure 4 of the Visual Network Scales during the first phase of the project, in which the partners were developing together a machine, to a structure in which, there were more clusters (subgroups) between the partners, as depicted in the figure 2 during the second phase of the project. The project leader is also perceiving a change from the very beginning of the project (T1), where she chose figure 1 (network with some partners at the centre and other at the periphery) to a structure where the partners are working in clusters (figure 2) at the end of the project (T4).

Another partner, who expressed a perception of change in the overall structure was the **AG Coordinator of the research centre 1,** who perceived a change from a structure where there were some sparse connections between some of the partners (figure 3), at the beginning of the project (T1), to a structure in which there were two main subgroups that worked together, during and at the end of the project (T2-T3; T4).

> "So in the beginning there was a bit … so one didn't know, not yet exactly who was collaborating with whom and so on. It already has started with the placing and then it turns more to such a structure (*figure 2, subgroups*), because the focus is on the two collaborating main groups there."[10]

He stressed the point that at the beginning it was not so clear who is going to do what with whom and only after a while it had become clearer the emergence of the overall structure in two defined subgroups, which cooperated together.

A partner who did not perceive a substantial change in the overall structure was the **PhD Student 2 of the research institute 2.** He chose figure 1 (centre/periphery) for the whole project, arguing that the partners working "around the machine" were collaborating more intensely among themselves than the others working on singular work packages:

> "We already had in the first part a very strong consortium around the maschine as well, everything around the maschine. And then we still had several partners around

da ist alle miteinander verbunden. Also da reden wirklich über sowas (*figure 4, all connected with all*). Ich würde sagen, in der II (*Teil*) haben sich schon eher Custer gebildet. Also dann doch eher das. (*figure 2, subgroups*)."

[10] Original quotation in German: „Also am Anfang hat so ein bisschen … so wusste man auch nicht ... noch nicht so genau, wer was mit wem macht und so. Es gab schon bei der Vergabe … mit anfing, und dann geht da mehr in so eine Struktur rum (*figure 2, subgroups*), was ich da mehr so ein Fokus bildet von zwei Hauptgruppen, die da zusammenarbeiten."

this who then assisted with work packages but with them was less collaboration ..."[11]

This kind of structure centre/periphery was already in the first phase of the project in place and for him there have not been substantial changes in the second phase of the project. It was more the intensity of the relationships, which was higher in the group of partners working "around the machine" rather than in the group of partners working more on singular working packages. The same was reported by the second **project leader from the University 2,** who also did not perceive a change in the structure but a higher intensity of the relationships between the partners working "around" the machine and the other partners. He had chosen the figure 2 (*subgroups*), arguing that the organisation of the project was built on more or less interdependent subgroups.

Here we have the emergence of the two dimensions of the intensity of relationships and interdisciplinarity.

Another partner arguing that the change was more in the intensity of the relationships rather than in the overall structure of the network was the **Project Coordinator of the firm 1,** who had chosen figure 2 (subgroups) to depict the overall structure of the project. He differentiated between two different subgroups collaborating during the two different phases of the project: in the first phase his firm (firm 1) was more collaborating with the research centre 2 and in the second phase the collaboration between firm 2 and the research centre 2 was more intensive. The density of the collaboration relationships was low for him in the first phase of the project and even lower during and at the end of the project.

In this network, it seems that for the most of the respondents to the interviews, there was a change in the intensity of the relationships among the partners rather than a substantial change of the overall structure of the network. The project leader from the firm 1 is also confirming this perception in stating that the cooperation in general was more intense between the partners in the first phase of the project and less in the second phase. She also confirmed the very intensive cooperation between her firm and the research centre 2 in the second phase of the project.

Another interesting aspect of this network is the perception of centrality reported by the partners. Two of them experienced a change in their position from peripheral to central and vice versa, other two of them reported to have had the feeling to be always central and another partner

[11] Original quotation in German: „Wir hatten schon im ersten Teil auch ein sehr starkes Konsortium um die Anlage herum, alles, was mit Anlage zu tun hat, und dann hatten wir noch drum rum einige Partner, die dann Arbeitspakete zugearbeitet haben, wo die Kooperation aber weniger ... „

(**project leader from the university 2**) gave a very interesting answer that deserves to be reported here:

> "Of course, a dot. Everybody ... each institution here is a dot, so each person involved is certainly a dot. But I wouldn't position anybody in the middle because like I said for me it's a ... a cluster project. A cluster of actually equitable partners that, of course, not always manages the same amount or percentage of [...] work, though basically everybody is important and equitable. And I wouldn't say that they had a key person pulling all the strings."[12]

Here the **project leader from the university 2** explains why for him nobody has to be considered "central" in the project. He says that any actor or institution has to be in the middle because the project is a partnership between equal partners and that each partner has to be considered equally important despite the different participation in the project. There was for him no central person, who coordinated the project. Because of this reason, it was difficult for him to recognise himself as a central actor in the project, despite of his role as a second project leader.

In answering to the question 4 of the Visual Network Scales approach, about the pattern of collaboration with the other partners, most of them reported to have experienced an increasing closeness to their partners (5) followed by instant bond (3) and cooling off (2). There were not significant conflicts or problems in this project apparently, nevertheless it was reported a different way of working and using the time, as pointed out by the **PhD student of the research institute 2:**

> "Generally speaking it is rather the case that from my feelings I would say they have a different mentality in biology. After all, it's very structured with us *(engineers),* even when we had this delay within the project, it was rather structured. And from the biology side it is ... the structure is less existent."[13]

Given that the main cooperation was between engineers and biologists, the main difficulty reported from the PhD student from the research institute 2 (engineer) was the different

[12] Original quotation in German: "Natürlich, ein Punkt. Jeder ... jede Institution ist hier ein Punkt, also jede Person, die beteiligt ist, ist sicherlich ein Punkt. Aber ich würde niemanden in die Mitte platzieren, denn wie gesagt, für mich gibt es ja ... es ist ein ... ein Verbundprojekt. Ein Verbund aus ei- ... eigentlich gleichberechtigten Partnern, die natürlich nicht immer dieselbe Anzahl oder prozentualen Anteil an ... an ... an ... an ... an ... an ... Arbeit bewältigen, aber im Wesentlichen ist doch jeder wichtig und gleichgestellt. Und ich würde nicht sagen, dass man da jetzt eine zentrale Person hat, bei der alle Fäden zusammenlaufen."

[13] Original quotation in German: „Generell ist es eher so, also vom Gefühl her würde ich sagen, die Uhren ticken anders in der Biologie. Es ist dann doch schon sehr strukturiert bei uns (*Ingenieure*), auch wenn wir diesen Delay im Projekt hatten, ist es eher strukturiert, und von der biologischen Seite ist es ... ist die Struktur weniger da."

conception of time between biologists and engineers, in arguing that the engineers are more structured in dealing with delays in the project rather than the biologists. He summarised his view with the expression "the clocks are ticking differently for biologists."

The same feeling about some "time" related problems as reported by the **project leader from the firm 1** (biologist), who stated that it was not an open conflict situation but more a problem of some delays in the project. Here is the dimension about the use and conception of time starting to emerge. In the following questions regarding the perception to act as a broker between organisations/persons, most of them did not perceive themselves as a broker neither between different organisations nor between persons in theirs or other organisations. Only the PhD Student of the research institute 2 was feeling to be sometimes "in between" his own organisation and the firm 1.

Next will be introduced the content analysis done on the interviews in order to better comprehend what happened in this network during the time and to understand "how much" change has been experienced in this network to be able to classify the network in one of the four paths to change of Donati (2011).

6.10 Content analysis of the DE_Reflexivity project

In the content analysis about the interviews of the DE_Reflexivity project, we are going to analyse the most recurring codes and families of codes in the interviews, as for the two previously analysed projects in the Netherlands. The aim is to better comprehend what caused "change" in the network, in order to understand under which conditions this network has developed the property of the social reflexivity. At the end, we will come back to the main dimension of structural change and we will have all the elements to classify the network in one of the four paths to change developed by Donati (2011).

6.10.1 Starting conditions

Also this network, as the NL_Reflexivity network, started in the context of an already existing regional network about cell research.

The project leader explained that in the region North Rhine-Westphalia (NRW) there is a network where already a lot of partners, who are in the project, take part and this network organises meetings every year. For this reason she thinks they could profit from the presence of this regional network especially in the initial phase when choosing their partners in the project:

> "That's right. It may have been different than with other consortia. I mean this was just … this was just the Call – it was an NRW Call – the requirement just was to participate only with partners from NRW and of course, this facilitates it also by the proximity to find partners there as well. But one must say particularly it is a special situation, also for NRW and also given by the network of excellence one in turn has good contacts once more."[14]

First, she is pointing out that in order to take part to the ERDF regional call for funds, the partners should come from the same region and second, she sees this "limitation" as an opportunity given that in the region there is already a high specialization in the field and this excellence network, which is regional based, has a role in making contacts between the potential partners.

The project leader was also reporting that the partners knew each other before the project also because of previous cooperation in other projects, same publications and participation to congresses, and that this had facilitated the beginning of the project, which as she reported had gone "straightforward" because the people already knew each other.

The same was reported by the **AG Coordinator from the research institute 1**, who also stressed the fact that being all in this excellence network has helped in constructing a community in the region where everyone knows what the others are doing in the different cities and this helped to build the consortium:

> "Well, as a matter of fact we knew all researchers in Aachen, Bonn, Cologne, Dusseldorf, Essen, Bielefeld, Bochum, Dortmund, Münster quite well personally, just by means of these meetings which happened independently from this and hence it was relatively easy to assemble a consortium with this group."[15]

Some of the partners were not already present at the beginning of the first phase of the project, as the **PhD Student of the research institute 2**, who entered at the end of the first phase

[14] Original quotation in German: „Genau, das lief anders vielleicht als bei anderen Konsortien, ich meine, das war halt ... das war halt auch der Call - das war ein NRW-Call - das war halt Voraussetzung, dass nur Partner aus NRW dran zu beteiligen, und das macht es natürlich dann auch durch die Nähe einfacher, da auch Partner zu finden, aber insbesondere muss man sagen, es ist eine Sondersituation, auch in NRW, und auch gegeben durch das Kompetenznetzwerk, hat man wieder gute Kontakte".

[15] Original quotation in German: „Also wir kennen alle Forscher in Aachen, Bonn, Köln, Düsseldorf, Essen, Bielefeld, Bochum, Dortmund, Münster eigentlich persönlich schon sehr gut, einfach durch diese Treffen, die schon unabhängig davon stattgefunden haben, und damit war es im Prinzip relativ einfach mit dieser Gruppe dann auch zusammen so ein Konsortium zu machen."

in the project. He knows that his institution wanted to make research about this kind of machine (die Anlage) and presented a proposal together with firm 2 in order to get the funds.

6.10.2 Organisation of the project

As already explained, the project DE_Reflexivity started at the end of 2010 with the first phase of the project, where the machine was developed and entered a second shorter phase lasting 18 months, where mainly technologies were developed. In this dissertation, it has been decided to consider the two projects as a whole given that the two phases were strictly linked as reported by the **project leader from the firm 2**.

The first phase of the project was financed by the NRW-ERDF call and the second one was financed by the Land North Rhine-Westphalia through another call.

The project was structured in a way that two main subgroups emerged, because of the geographical proximity: one group based in the city 1 and the second group in the city 2, but the two groups cooperated together in different work packages.

All the partners were participating in the general meetings every six months and then collaborating more closely with partners with whom they were sharing one or more work packages, as reported. For example, by the **PhD Student of the research institute 2**, who was based in city 2, he differentiated among partners, with whom he is cooperating more directly and informal, and other partners, who he has met rarely at the general meetings in which the results were reported.

The partners, who are more based in the city 2 have had a meeting once a month during the project, as reported by the **project leader of the university 2**.

A way of communication used to communicate between the two groups based in the city 1 and 2 was the teleconference, which was held every week. The teleconference was organised by the partners based in the city 2, who are organising it, in the project leader's view, very well, so that the partners based in the city 1 were updated about what the other decided and about their agenda.

The use of the teleconference was also confirmed by the **PhD Student 2 of the research institute 2**, who stated how useful it was for saving time and travel costs, and for updating about what should be done and the stand of the singular work packages with the other partners based in city 1. Here some new dimensions for further analysis and triangulation of the data emerged: the use of technology and the role of a less formalised organisation. In comparison to the other

projects this project seems to be more embedded in a regional well-running network about cell research. Most of the partners already knew each other because of this network and of previous collaborations.

6.10.3 Collaboration

The aim is now to go more in-depth in understanding the way of collaborating between the partners based in the two cities and to understand who collaborated with whom. It seems that in this project there were partners with whom the collaboration was more intense and other partners with whom the collaboration was less intensive because of the organisation of the project in singular work packages shared by different partners. The geographical distance between the two cities is not seen as an obstacle or impediment to collaborate more intensively given the use of technologies, such as the video conference.

For the **PhD Student of the research institute 2** the cooperation was more intensive with all those partners working around the machine (Anlage), regardless neither their geographical position nor their different specializations (biologists versus engineers), and less intensive with those partners not working on the machine.

The art of cooperation "around the machine" was also explained by the **project leader of the university 2**:

> "I'd say only this three, so *research institute 2* (*city 2*); even now they must … or have cooperated strongly with … with *firm 2* (*city 1*) because the maschine is in *city 1*, and *research institute 2* maintains the maschine and owns – basically owns it in the end – and, of course, they maintain it. Same as the maschine's maintenance by *firm 1 (city 2)* is always in collaboration with *research institute 2* and, of course, with the colleagues from *city 1*."[16]

From this passage, it becomes clear that the geographical distance between the two cities makes no difference in the intensity of the collaboration, but it is more the work that has to be done around the machine to decide with whom the collaboration is more intense (task-oriented). Here the project leader of the university 2 is saying that the cooperation between firm 2 (based

[16] Original quotation in German: Diese drei würde ich jetzt nur sagen, also *research institute 2* (*city 2*) selbst jetzt müssen natürlich mit ... oder haben sehr stark mit ... mit *firm 2* (*city 1*) kooperiert, weil die Anlage in *city 1* steht, und die Anlage betreut und gehört - im Prinzip auch gehört letzten Endes - dem *research institute 2* und wird davon natürlich technisch betreut. Genauso die technische Betreuung seitens *firm 1 (city 2)* an der Anlage natürlich auch immer in Zusammenarbeit mit *research institute 2* und natürlich dann mit den Kollegen aus *city 1*."

in city 1) and the research institute 2 (based in city 2) is very intense because the machine is located in city 1 but the firm 2 needs from the research institute 2 and the firm 1 the technical control on the machine, also because the research institute 2 will be, at the end, the owner of the machine.

It becomes even more clear, at this point, the different interdependencies between the partners: firm 2 (located in city 1, biologists) needs the technical competences of the research institute 2 and firm 1 (both located in city 2, engineers) in order to make the machine run. The partners located in city 2 (mostly engineers but also experts in bio-medicine) need the know-how of the biologists located in city 1 for creating the technologies that will work on the machine. Here emerge the dimensions of interdisciplinarity and task interdependencies between the partners quite strongly.

The same logic can be applied to understand why with some other partners there was less cooperation, as reported by the **project leader of the firm 2**. For example, there was from her side less cooperation with the research centre 1 located in city 3 because of the different themes that emerged during the work packages. It emerged that these themes that they were working on together in the packages were distant among themselves, so also the interaction was less.

The peripheral position of the research institute 1 was also confirmed by the **PhD student of the research institute 2**, in stating that he had less communication with the AG coordinator of the research institute 1, because it was not so necessary and perceived to be far.

Another dimension emerging here is the intensity of the relationships, which seems to be strongly interrelated with the specific task that has to be fulfilled.

6.10.4 Feelings and Needs

The most feeling reported during the interviews by the respondents was the high interdependence between the partners.

The **AG Coordinator of the research institute 1** recognised this high interdependence between the other partners in the project, in explaining that it was due to the construction of the machine, for which the research institute 2 had to cooperate closely with firm 2 located in city 1. This was also because the prototype of the machine was located in city 1, where the singular elements of the machine were delivered. So for example also firm 1 located in city 2 has to cooperate with firm 2 because they need those elements. He also explains that his institution is

less dependent on the machine because they only had a production process, which is running on the machine:

> "Yes well, in this case it was about [...] setting up the machine so the [...] quick implementation. Therefore *research institute 2* ought to work relatively closely with *firm 2* in *city 1*. In *city 1* stands […] the prototype of the machine, and specific elements of the machine are always delivered there from here. And *firm 1* they require elements of the machine. Whereas we have only a production process - from strict setting up - that runs on the machine."[17]

This feeling of interdependence and the recognising of different needs seem to be strictly linked to the art of work that has to be done on the machine. This was more happening in the first phase of the project, in which the partners had to develop the machine, as it was reported by the **project leader from the firm 2**.

This interdependence was further explained by the project leader from the firm 2 in explaining that, in her view, it is important from the beginning of the project, in the preparatory phase, to think about how to structure the collaboration so that the partners can develop this feeling of interdependence, in particular regarding the results. So that the partners need the collaboration because they need the other's results in order to proceed:

> "I think that one always has to look that one links with one another at least such things, links causally with one another that the results one generates are needed imperatively and that he doesn't write any reports – my foot, it didn't work – but it must [...] and not quite apart from the workaround because otherwise the other one can't continue, in order to keep it together. I think on one hand this depends on the way the work is structured right from the beginning, even from application. In case one doesn't pay attention that the partners are networking well."[18]

[17] Original quotation in German: „Ja gut, da ging es ja um die ... um die ... um die ... Aufsetzung der Maschine, also die schell- ... schnelle Umsetzung. Von daher müsste die *research institute 2* relativ eng mit den *firm 2* zusammenarbeiten in *city 1*. In *city 1* steht die ... steht der Prototyp der Maschine, und hier werden einzelne Elemente der Maschine immer rein geliefert von hier aus. Und *firm 1* sie brauchen Elemente der Maschine. Während wir im Prinzip nur einen Produktionsprozess haben vom strikten Aufbauen, der dann auf der Maschine läuft."

[18] Original quotation in German: "Man muss immer gucken, glaube ich, dass man dann wenigstens solche Sachen so miteinander verknüpft, kausal miteinander verknüpft, dass die Ergebnisse, die der eine generiert, zwingend benötigt werden, und dass der nicht irgendwelche Reportschreiben macht – so ein Quatsch, hat nicht geklappt - sondern das muss od- ... und jetzt nicht gerade los von dem Workaround, weil der andere sonst nicht weitermachen kann. Um ... um das zusammenzuhalten. Und das liegt einmal in der Art, wie man die Arbeiten strukturiert von Anfang an, denke ich, von der Antragsstellung schon. Wenn man da nicht drauf achtet, dass eine gute Vernetzung der Partner da ist."

She had the feeling that in the second phase of the project, this interdependence was less because of the organisation of the work in singular work packages, which can impede the emergence of this feeling of interdependence and need of collaboration between the partners. For her it was a failure of the project to have had singular work packages in the second phase, in which there is not so much interaction between the partners and where it is not necessary to collaborate in a given place or there is not a kind of interdependence between the partners that can lead to a more closer cooperation:

> "[…] this may be deficiency of the project […] if there is too little interaction within specific work packages not based on on-site interaction or on dependencies where one says if you won't give me this, I can't go on here and if you don't do this and return it to me, I'll be stuck."[19]

I think in this passage it is quite interesting to observe that the project leader, but it was expressed also by other respondents, gives to this interdependence a positive meaning, as it would be something that can boost the cooperation instead of bringing some problems or conflicts.

Another partner, who was aware of this interdependence between the different specialisations in the project was the **PhD Student of the research institute 2**, who was arguing how important this interdependence was between biologists and engineers in order to make a practical application of the machine. Otherwise the machine without any input from the biologists' side would be nice but not useful. They feel also to depend on this input from the side of the biologists is to be able to go further even in their own field:

> "Because the partners in general ... I'd say here it is that way that we are strongly placed regarding technology, but the application comes from the biology-side meaning we are dependent on the biologists. Without the biologists the machine admittedly is nice, but somehow the application is lacking on it. And in order to progress there in this field as well, we are indeed dependent on the biologists' input."[20]

[19] Original quotation in German: „(…) das ist vielleicht auch ein Fehler von dem Projekt, wenn man ... wenn man zu wenig Interaktion in einzelnen Arbeitspaketen hat, die nicht wirklich auch auf Vor-Ort-Interaktion beruht oder auf Abhängigkeiten, wo man sagt, wenn du mir das nicht gibst, dann kann ich hier nicht weitermachen, und wenn du das nicht machst und mir das dann wieder zurückgibst, dann komme ich nicht weiter."

[20] Original quotation in German: „Weil die Partner generell ... ich sage mal, bei uns ist es so, wir sind ja von der technologischen Seite sehr stark aufgestellt, aber die Applikation, die wird von der biologischen Seite, d. h. wir sind auf die Biologen angewiesen. Ohne die Biologen ist die Anlage zwar schön, aber irgendwo fehlt da die Applikation drauf, und daher sind wir schon auf den Input der Biologie angewiesen, um dort auch in diesem Feld voranzukommen."

He was also recognising the same dependence from the side of the biologists, in saying that they are also dependent from the results of the engineers in order to test on the machine their biology. If the machine does not work, the biologist cannot test. This recognising of the needs of both sides so clearly show a high degree of reflexivity in understanding what the other partner needs from me and what I need from him/her in the project. This aspect can lead to some conflicts but in the case of this project it seems more that it was seen as a kind of precondition in order to structure the work that has to be done.

This feeling of interdependence was also positively expressed by the **project leader from the university 2**, in stating that if the partners are in the same work package there is more need to communicate and to cooperate, and this has more to do with the tasks that each partner has in the project:

> "From my view, right? – So very naturally, others may see this differently of course, but it just correlates to the tasks and to the work packages one is collaborating jointly then. Of course there is always a very high ... a high demand as coop- ... communication high side- ... basically [one] doesn't collaborate with the other, of course, there is no need that they keep in touch so intensely."[21]

Here the project leader from the university 2 confirms what was previously stated by the project leader of the firm 2, that the interdependence was more in place when there were more partners in the same work packages, as in the case of the first phase.

6.10.5 Problems

In this part of the chapter we are going to introduce some of the problems, which were experienced by the respondents regarding the project. The problems reported were more regarding two interrelated aspects: the use of the time and the different interests, background and agenda of the partners.

As already explained in the previous part about feelings and needs, there were some delays in the project due to the fact that a new technology had to be developed from the engineers and the biologists had to wait until the new technology was delivered. So the engineers had to

[21] Original quotation in German: „Von mir aus gesehen sicherlich - ja? - so ganz natürlich, kann von den anderen natürlich anders gesehen werden, aber das hängt einfach mit den Aufgabenstellungen zusammen und mit dem, wo man eben miteinander an ein ... einem Arbeitspaket arbeitet, ist es natürlich immer eine sehr hohe ... ein hoher Bedarf als Koop- ... Kommunikation und hoher neben- ... im Wesentlichen nicht mit dem anderen wird zusammengearbeitet, es ist die Notwendigkeit natürlich nicht da, dass man so intensiven Kontakt pflegt."

rush a bit because of the needs of the biologists, as explained by the **PhD Student 2 of the research institute 2**:

> "And one has to add that we had a delay within the project regarding technology, because we had to entirely remake the software and of course this affected a bit the biological partners which just waited for the technology to arrive. In other words it just was that way that the partners were dependent on us and we had to hurry a bit in this case."[22]

Another aspect, partly linked to the problem of the use of the time, was reported by the **project leader from the firm 2**, in arguing that during the project some interests emerged due to the results that were reached. The problem emerged when the actors were asking themselves how may I use my results in the future. So, in her view a kind of separatist thinking was emerging, that led also to a separation between the partners, in looking more on the use that each partner could do in the future of the results:

> "It is the project itself started well I'd say, interests developed during the project as well also in consequence of the results we obtained. I don't know, my feeling is that a bit of this [...] ... it's more of a spirit, isn't it? It is more a spirit maybe really happening in leadership because there they look as well of course on how they can further and carry on results. Yes, and that this [...] … there started a bit a separate mindset, right? And of course, that's something what in the end perhaps separates people. That they look, okay we have obtained this and this within the last six years, or four and a half years, nearly five years: What will we do with it? And then one looks, well, I could bring in this and ... but then the others aren't involved any longer."[23]

This aspect of the use of the results and the opening of new opportunities and partnerships will be treated later in the part about evaluation and opportunities. Some of the partners confirmed

[22] Original quotation in German: "Und man muss dazu sagen, wir hatten einen Verzug im Projekt, was die Technologie angeht, weil wir dort die Software komplett neu machen mussten, und das wirkte natürlich schon so ein bisschen auf die biologischen Partner, die da halt gewartet haben, bis die Technologie da ist. Und d. h. da war das schon so, dass die Partner auf uns angewiesen waren, und wir mussten halt uns da ein bisschen beeilen."

[23] Original quotation in German: „Es ist, das Projekt an sich ist auch weiter gut angefangen, ich würde sagen, es ... es haben sich auch während des Projektes Interessenlagen entwickelt, aufgrund auch der Ergebnisse, die erzielt wurden. Weiß ich nicht, ich habe auch das Gefühl, dass ein bisschen 'was von dieser Sch- ... das ist ja eher eine Stimmung. Ne? Es ist ja eher eine Stimmung, vielleicht auch wirklich auf den Führungsetagen passiert ist, weil ja natürlich auch da geguckt wird, wie kann ich meine Ergebnisse weiter weiterbringen und weitertragen. Ja, und dass das ... das ... da fing so ein bisschen separatistisches Denken an. Ne? Und das ist dann natürlich etwas, was dann am Ende vielleicht die Leute so ein bisschen auseinanderbringt. Dass da halt geguckt wird, okay, wir haben jetzt das und das erreicht in den letzten sechs Jahren oder viereinhalb Jahre, fast fünf Jahre: Was wollen wir damit machen? Und dann guckt man halt, och, das könnte ich ja gut da einbringen, und ... aber die anderen sind dann nicht mehr dabei."

this feeling of the project leader that the project had changed during the time in a way that for some of the partners was perceived to be far from their core interests. As explained by the **AG Coordinator of the research institute 1,** when speaking about an eventual third phase of the project, he pointed out that his institution would not participate anymore as an active partner, because the general objectives of a third project will be too far from the base research that his institute was pursuing as a research institute.

In summarising about the main problems encountered by the partners during the project, it can be said that there were not significant conflicts during the project and that the main difficulties, which emerged, were linked to different conceptions about the use of the time at disposal and the emergence, towards the end of the project, of some interests about the use of the results for future projects with other partners.

6.10.6 Competences

In the process of coding the interviews many passages regarded the code of the relational competence, as in the two projects in the Netherlands. But we can find here the codes of technical, biological and research competences also very relevant. It seems that the actors were using both kind of competences (technical and relational) in order to solve problems and imbalances in the project. We are going here to analyse the emergence in this project of these two different kinds of competences and how they integrate each other.

6.10.6.1 Relational competences

Starting with relational competence, it deserves to explain once again that this analytical dimension was developed in order to understand if the respondents have reported in the interviews some explanation about their acting taking into consideration others' views. The scope of this dimension is to be able to understand if the partners were using their relational competences in the project to better collaborate with their partners. This dimension was very relevant in the content analysis of the two projects in the Netherlands, but it was quite relevant also in this project in Germany. For example, when analysing the interview of the **project leader of the firm 2**, we can find some passages about how the cooperation with other partners was, where she clearly recognised that her partners were acting taking into account her views and needs. She is reporting the example of a group leader of the university 1, who is currently not so much involved in the project, but she always has had a very good cooperation with this person in exchanging technologies. A second example is when speaking about her relationship to the

firm 1 located in the city 2, which was very promptly to help her and give her advice about the use of a technology on the machine, both at the telephone but also coming to city 1 to help her directly.

Many other examples could be reported here considering the other respondents, because in this project many of them were coded, but I evaluated to be more interesting to understand how this relational competence could work together with the technical competence, which was also very relevant in this project. For technical competence, it has to be meant here how the partners made use of their specific technical competences (biological, engineering, strictly technical) in order to solve some problems or imbalances in the project. The two codes were also mostly occurring together (co-occurring codes) in the interviews of this project.

6.10.6.2 Technical competences

In the following passage, we can find a combination of technical and relational competences, the **project leader from the firm 2** is reporting both about the art of the relationship in saying that the engineers of the research institute 2 are every week at her firm to give instructions about how to work on the machine and at the same time she is pointing out their technical competence. She is differentiating between the fact that the partners are not only competent in their work but also open to be contacted and to help:

> "Very close with these here who one sees at *research institute 2*, these are the engineers. They are even here once a week, are overall ... we have constructed a maschine together, meaning we collaborate on-site with them. They come here, we can call them, and we have like a dedicated Line with them, right? And they are here on-site as well. Same applies to the department head that is like supervising them. I can always get in immediate contact with him if anything comes up and they've been extreme helpful."[24]

The same has found a confirmation in this next passage from the interview of the **PhD student of the research institute 2**, in explaining how they collaborate with firm 2:

[24] Original quotation in German: „Also ganz eng mit ihnen hier, die man hier sieht beim *research institute 2*, das sind die Ingenieure. Die sind einmal die Woche sogar hier, sind insgesamt … wir haben ja hier eine Anlage gebaut, d. h. mit denen arbeiten wir vor Ort zusammen. Die kommen hier hin, die können wir anrufen, mit denen haben wir eine Standleitung quasi. Ne? Und die sind auch hier vor Ort. Das Gleiche gilt auch für den Abteilungsleiter, der die quasi überblickt. Mit dem kann ich immer sofort Kontakt aufnehmen, wenn etwas ist, und die sind extrem hilfsbereit."

> "Same applies for the software at the moment, *Project Manager firm 2* is testing there as well, and basically it's that way that he tells us about certain things which don't perform well and then we rework and adjust it so that he retests it again and successively ... so an interactive process in order to achieve an ideal condition. And this works (excellently)."[25]

We can understand here this interactive process between technical competences and relational competences when he says that first the project manager of the firm 2 is testing the software he delivered and communicating to him the problems (relational competence), so that he can do the changes (technical competence) in order to solve the problems, and the project manager of the firm 2 can test again the software so as to reach an optimal status. This interactive process would not be possible when only the technical competence would be used. It is necessary to translate the competence in communication that can be understood by the partner with the use of feedback. Here it has played an important role the dimension of the team learning behaviours.

6.10.7 Evaluation and opportunities

We are now entering the field of the evaluation of the project and the opportunities, which have emerged for the partners during the project. The respondents expressed in general satisfaction with the results of the project, differentiating in some cases about the first and the second phase, as for example the **project leader of the firm 2**: she was pointing out that the project was very successful, but the second phase was less successful because of the shorter time at disposal (18 months).

She explained how the relationships with the partners had changed between the first and the second phase of the project, saying that in the first phase it was more like a family and in the second one more like relatives. She perceived a change from a more connected structure, where almost all were connected with all in the first phase of the project, to a structure where there have been emerging subgroups because of the different interests of the partners regarding the use of the results for future projects. Regarding the emergence of new opportunities for the partners, she was explaining that it has to be considered a natural development at the end of a successful

[25] Original quotation in German: "Das Gleiche ist im Moment für die Software, auch da ist *Project Manager firm 2* am Testen, und generell ist es so, dass er uns dann bestimmte Sachen, die nicht gut funktionieren, sagt, und wir arbeiten dann nach und bringen das dann in Ordnung, sodass er das dann wieder testet und nach und nach … also ein interaktiver Prozess, um diese *Maschine* dann in einen optimalen Zustand zu bringen. Und das klappt (vorzüglich)."

project, to ask themselves about the use of the results applied to new fields and to start new projects:

> "But I think it is a quite normal development for a successful project as well that one achieves a result for you. Everybody achieves for himself as well which they had and a realization that also addresses new fields and with what one can address new projects as well, right?"[26]

She also expressed a positive evaluation about her willingness to cooperate in the future with the same partners again.

Another partner, who expressed satisfaction about the results of the project in general, was the **project leader of the university 2**, who stated that it was at the end a bit different from the project that it was imagined at the beginning, but these kinds of changes are natural in his view, because not everything can be predicted at the beginning of a project. He also said that the objectives of the project were reached, but maybe for the first commercialisation phase it will take more time, also because the industry side was not fully present in this project.

He expressed a very positive evaluation of the project also regarding the fact that it had opened new cooperation opportunities outside of the project itself. The fact to be part of a network and to know each other so well from the beginning was perceived to be an advantage. He stressed particularly the point that the network functioned very well between different disciplines (engineering and biology) and that all partners will be committed to maintain such a network for the future. He recognised that the engineers have interests to enter in the field of life sciences, so that they will be less dependent from the automobile industry in the future and also for this reason there will be many opportunities for cooperation in the future:

> "In my opinion, the project was very successful, it lead to many cooperations beyond the project I think. So the [...] networking idea continues beyond the project. Like I've already said, one got to know each other very well. And the nice thing is when one got to know each other so well if one is looking for partners for another project ... In so far it is also a success of the project that the networking [...] of these different disciplines worked actually very well and shall be retained as well in future. So the engineers as well try increasingly to actually get into this area, into the life sciences, so that they aren't so much dependent from automobile I'd say, and hence of course

[26] Original quotation in German: "Ist aber, glaube ich, eine ganz natürliche Entwicklung bei einem auch erfolgreichen Projekt, dass man Ihnen dann Ergebnisse erzielt, auch jeder für sich Ergebnisse erzielt, die man dann hatte, und Verwertung, die dann auch neue Felder adressiert, und womit man neue auch Projekte adressieren kann. Ne?"

this [...] results in many attractive perspectives of collaboration."[27]

Another partner, who was partly satisfied about the project, was the **AG coordinator of the research institute 1**, who stated that the goals were partly reached because not all the objectives, which were written in the proposal, were reached. He said that some objectives were reached and others not, but in his view, this is common in such research projects. He also pointed out that it is likely in the future there will be some commercialisation of the results.

Another partner, who was partly satisfied about the results of the project, was the **PhD Student 2 of the research institute 2**:

> "… would have achieved this earlier then we were definitely further. And I think the partners from biology see this in the same way because they had to be enabled to validate the processes on the maschine and there is simply lacking the time. In other words I would say at the end of the day if we could restart at zero we will most certainly do this faster and better. Apart from that, regarding communication among partners this actually has always been quite good."[28]

He stressed the fact that not all the objectives were reached within the time span of the project, also because some delays occurred during the project and at the end there was less time left for validation of processes on the machine. He thinks that if they would have the opportunity to start again from the beginning they will be faster and better. He evaluated very positive the communication between the partners and he saw some opportunities for a future project with at least the more central partners (around the machine), with other more peripheral actors only in the case that their work packages will be appropriate for the new project. Otherwise in a process of transparent communication between the partners, all have to discuss together about new ideas and when these ideas can be appropriate for a new call:

[27] Original quotation in German: „Ansonsten fand ich das Projekt sehr erfolgreich, hat zu vielen Kooperationen geführt außerhalb des Projektes, finde ich. Also der ... der Netzwerkgedanke setzt sich auch über das Projekt hinfort, man hat sich eben, wie ich ja auch gesagt habe, schon sehr gut kennengelernt. Und das Schöne ist natürlich, wenn man sich so gut kennengelernt hat, wenn man dann Partner für ein anderes Projekt sucht ... Insofern ist das auch ein Erfolg des Projekts, dass die Vernetzung ... dass die Vernetzung eben dieser unterschiedlichen Disziplinen eigentlich sehr gut funktioniert hat und von allen Seiten ja auch für die Zukunft beibehalten werden soll. Also auch die Ingenieure versuchen immer stärker, in diesen Bereich eigentlich hineinzukommen, in die Lebenswissenschaften, damit sie nicht so von den Automobilen abhängig sind, sage ich jetzt mal, und dadurch ergeben sich ... ergeben sich natürlich viele reizvolle Perspektiven der Zusammenarbeit."

[28] Original quotation in German: "... schon früher das erreicht worden wäre, dann wären wir jetzt mit Sicherheit weiter. Und ich denke mal, das sehen die biologischen Partner genauso, weil die letztendlich auch befähigt werden mussten, auf der Anlage die Prozesse zu validieren, und da fehlt einfach die Zeit. D. h. unterm Strich würde ich sagen, wenn wir jetzt noch mal starten könnten bei null, würden wir das mit Sicherheit schneller und besser machen. Ansonsten, zur Kommunikation zwischen den Partnern, die war eigentlich immer ganz gut."

> "Exactly, correct. And in general the heart will always remain. This is what always appears and around it, one chooses the partners which match better or worse to the new orders. Of course, thus one has to ... so communication is transparent, i.e., the partners that are on board [...] basically run the chance to engage themselves with work packages, but if it won't match it doesn't match. Then one has certainly to sit together at [...] next idea which one would like to again run into the research project and has to consider whether it matches. With the core it normally always matches."[29]

In summarising about the evaluation and the opportunities perceived by the partners during the project, it can be said that there is satisfaction in general about the results that were reached (effectiveness criteria fully met) and less satisfaction about what had been reached in the time at disposal (efficiency criteria partly met). All the partners expressed their willingness to collaborate in the future with the same partners and recognised the value of the network for the success of the project. Other opportunities that emerged during the project were more linked to the further use of the results in new projects both with the same partners and with other new partners.

6.10.8 Structural change and four paths to change

In this network, there was perception of change mainly regarding the density of the network in different phases of the project, rather than in the overall structure in itself. Two partners perceived a change in the intensity of the relationships during the two phases of the project. There is also agreement in recognising that the partners, who are more central (working around the machine), collaborated more tightly among themselves than those at the periphery. Most of the partners perceived an increasing closeness during the project with their partners. No one of the respondents perceived him/herself as a broker in connecting other partners from different organisations. Even the two project leaders were not acting in this role. It seems to be a very horizontal network, where all partners have both their autonomy and the advantages to be connected through a network. This network had to face some changes and problems regarding delays, but in general there were no substantial conflicts or changes in the structure of the network. There is a high integration of the different competences in the network and the use of both technical and relational competences from the side of the actors. This network produced

[29] Original quotation in German: "Genau, richtig. Und generell der Kern bleibt immer bestehen, das ist so das, was sich halt zeigt, und drum herum pickt man sich dann die Partner raus, die jetzt für die neuen Anträge besser passen oder schlechter passen. Da muss man natürlich auch dementsprechend ... also die Kommunikation ist transparent, d. h. auch die Partner, die jetzt da sind, ver- ...haben prinzipiell die Möglichkeit, sich mit Arbeitspaketen zu beteiligen, aber wenn es halt nicht passt, dann passt es halt nicht. Dann muss man halt beim nächst- ... bei der nächsten Idee, die man wiederum in ein Forschungsprojekt reinlaufen lassen möchte, zusammensitzen und immer wieder aufs Neue überlegen, ob es passt. Beim Kern passt es im Normalfall immer."

social reflexivity, which can be in part a result of previous collaborations between the partners and in part due to a good relationality developed during the current project. Thus, the presence of social reflexivity cannot be only reconducted to structural change in this network. The structure seems to remain the same during the project and at the end of the project, despite the presence of social reflexivity. The only structural change observed in this network is about the intensity of the relationships. Despite the organisation of the project into two different subgroups based in two different cities of the same region, it seems that partners collaborated more with other partners in the same work packages rather than with partners based in the same location. The geographical distance, and the different specialisations of the partners were playing no role in the collaboration pattern. It seems to be a very well organised regional multi-disciplinary network, in which partners from different organisations, backgrounds and locations collaborate together on an equal basis. I would classify also this network in the typology of the creative network, because the partners were finding relational ways of solving complex problems and making use of their relationality to convey their technical competences into the project. But, as for the NL_Reflexivity project, there has not been observed here a strong perception of structural change from the beginning of the project to its end.

6.11 Structural change in the DE_Control project: an overview

We are now going to introduce the content analysis done on the interviews regarding the last project in Germany: the DE_Control project. As already explained in the previous chapter about the analysis of the quantitative data, the qualitative analysis is particularly needed for this project, because of the low respondents' rate registered for this project in answering the questionnaire. It is particularly needed to understand what happened in this network in order to have enough information to classify it in one of the four paths to change developed by Donati (2011), as for the previous three networks. Starting with a short overview about the answers to the six questions aided by the Visual Network Scales Approach, we are going to discover "how much" perception of change was reported in the interviews. First, there is an actor in this network, **the director of the firm 5**, who participated to the interview at the beginning, but resulted to be very peripheral (not cited from at least other three respondents). For his position, he was not considered in the whole network and thus he did not receive the questionnaire. I decided to consider anyway the content of his interview, despite his very peripheral position. In this project, we have two partners who reported some perception of change in the overall structure from the beginning to the end of the project. **The director of the firm 5** for example, had chosen figure 3

(sparse network) for the beginning of the project (T1) and figure 1 (centre/periphery) for the middle (T2-T3) and the end of the project (T4). Another actor, who reported a perception of change in the network, was the **coordinator of the firm 4,** who perceived a change from a structure of different subgroups (figure 2) at the beginning of the project (T1) to a structure, which is a mix between figure 1 and 2 (centre/periphery and subgroups) in the middle of the project (T2-T3) to a structure centre/periphery (figure 1) at the end of the project (T4). The other three actors, who took part in the interview, perceived no change at all in the overall structure from the beginning until the end of the project. Two of them have chosen figure 1 to depict the all project (centre/periphery) and another partner has chosen figure 2 (subgroups). Regarding the changes in the density of the network during the project, there is agreement between the partners in reporting a perception of very low density/low/moderate and no perception of change in the intensity of the relationships during the project. Regarding the perceptions about the position in the network, two of them reported to feel to have been almost always central, the other three perceived to have been always peripheral, no one perceived a change in his position during the project. Regarding the question about the pattern of relationship with the other partners most of them reported the instant bond (6). No one was feeling to act as a broker between people/organisations, but two of them reported that other partners were perceived to be in that role (especially the project leader from the university and the post-doc researcher from the university).

6.12 Content analysis of the DE_Control project

It seems that there was not so much a perception of change in this network when analysing the answers to the six answers of the visual network scales approach. We are now going to introduce the content analysis of the interviews in order to understand what happened in this network.

6.12.1 Starting conditions

This project started in the context of a regional call for ERDF Funds (the same call as for the DE_Reflexivity project) for which **the project leader from the university** wrote a proposal. He considered as cooperation partners mostly those partners with whom he already has had, or at that time had, other cooperation projects in place and he directly asked them if they wanted to enter the project. The role of the project leader in starting and coordinating the project was recognised by the other partners taking part in the project, as **the researcher of the firm 5**, who

stated that the entire project was coordinated by the project leader of the university, who asked his chief if he wanted to take part.

A partner, who was for the first time in a project with partners, who usually are considered as clients more than partners, was the firm 4, which is a big national pharmaceutical firm. **The coordinator from the firm 4,** explained during the interview, how his firm entered this project.

At the time they entered the project, they wanted (firm 4) to develop further products for the general market. But then he explained how the strategy of the firm 4 had changed after they entered the project:

> "How did we come into this? This was at a time when we had said, yes we have excellent product ideas and we'd like to further develop these products for the overall market. Along the way there already had happen a [...] huge change, but since our directions namely to not produce our products for the external market *firm 4* didn't want to be noticed as technology supplier - or this was one of the backgrounds at that time - didn't want to be noticed as technology supplier, but *firm 4* is a supplier of active agents – right? For life science, you know it: Science for a better life. And with this [...] well, with this big picture technology actually doesn't match. And the perception of […] *firm 4* as a supplier of […] materials I'd say also annoyed me. We've already noticed during the project duration of *Project* that it's this way. Our products which we developed to date were under close internal scrutiny and they put many products into question with this. Yes. So this is a bit of the background. An entire different [...] strategy which is behind this."[30]

He was explaining the big change that occurred in his firm at the time he was involved in the project, in trying to change from a firm, which is perceived as a technology supplier to a firm, which would like being perceived as active agents (drugs/antibiotics) supplier for life sciences. He explained that the technology products, that they at that time produced, were controlled and questioned for this reason, so the project started in this situation, where the firm 4 was undergoing a big strategy change from technology producer for the external market to an agents' supplier.

[30] Original quotation in German: "Wie sind wir reingekommen? Das war zu einer Zeit, als wir gesagt haben, ja, wir haben sehr gute Produktideen, und wir würden gerne diese Produkte weiterentwickeln für den allgemeinen Markt. Auf dem Weg dorthin gab es schon einen ... einen gro- ... einen sehr großen Wandel, aber da im ... in unserer Ausrichtung, nämlich nicht mehr eigene Produkte zu erzeugen für den externen Markt, *firm 4* möchte nicht wahrgenommen werden als Technologie-Lieferant, oder das war damals einer der Hintergründe, nicht wahrgenommen werden als Technologie-Lieferant, sondern *firm 4* ist ein Wirkstoff-Lieferant - ja? Für Live Science, kennen Sie, Science for a better life - und da passt Technologie eigentlich nicht gut rein, in diese ... in diese ... in diese ... na, in diesen Gesamtzusammenhang. Und die Wahrnehmung von … von *firm 4* als Lieferant von ... von Werkstoffen, der hat mich auch, sagen wir mal, gestört. Das haben wir schon auch noch zur Projektlaufzeit vom *Projekt* zur Kenntnis genommen, dass das so ist. Unsere Produkte, die wir bis dato entwickelt haben, sind hier intern auch auf den Prüfstand gestellt worden, und da sind auch vergleichsweise viele Produkte damit infrage gestellt worden. Ja. Also das ist so ein bisschen der Hintergrund. Eine ganz andere ... eine ganz andere Strategie, die sich dann dahinter gestellt hat."

During the time of these internal changes in the firm 4 he entered the collaboration with the project leader of the university and it was the first time for him to cooperate in such a project with partners, who usually are seen from firm 4 as clients.

Another partner involved in the project was the **researcher from the firm 1**, who explained how his firm entered in the collaboration project. He explained that his firm has already had a lot of collaborations with the university and that the firm 1 is very pleased to collaborate with the project leader from the university and with this university in itself. Firm 1 already collaborated with firm 2 too, and he also knew from some meetings the researcher of the firm 5. He did not know so well firm 3 and the director of firm 3, which is located in the same city of the university. He also stated that the general project meetings were pleasant.

It seems that this project started entirely from the side of the university, which involved then partners who already cooperated with the university in the past and new partners, as firm 3 and firm 4. In this network, it seems that the regional excellence network for cell research has had no role in connecting the partners as for the DE_Reflexivity project, but the cooperation is more based on previous projects and bilateral cooperation among partners.

6.12.2 Organisation of the project

Regarding the organisation of this project it can be said that all partners were meeting at the general project meetings organised by the project leader by the university every six months. As explained by the **researcher of the firm 5**, other ways for collaboration and communication were email exchanges and telephone. More interactions, apart from the general meetings, were reported with those partners, who were located around the university:

> "Then it was … well, it was for these roughly biannual meetings where one met and discussed one or the other thing, otherwise via email and via phone. That we really met there explicitly doesn't come ... apart from these *Uni* and *firm 3* which are here in this town then actually not, no."[31]

The **project leader** explained during the interview that in the last six months of the project, there was a more intensive relationship with the firm 4, because the firm had delivered a

[31] Original quotation in German: "Es war dann... gut, es war mal für diese Meetings alle halbe Jahre ungefähr, wo man sich getroffen hat und dann das ein oder andere abgesprochen hat, ansonsten per E-Mail und per Telefon. Dass wir uns da wirklich noch mal explizit getroffen haben, fällt mir jetzt nicht ... außerhalb mit denen, *Uni* und *firm 3*, die ja hier vor Ort sind, dann eigentlich nicht, nein."

machine to the university:

> "There was a close contact here with […] these three persons (*firm 4*) within the last six months. They developed a [...] prototype for a machine, installed this machine here, we operated it. At that time they also came more frequently, for installation a few days, in the meantime several times and then again for dismounting. So there were more frequent meetings."[32]

He explained that the firm 4 developed a prototype for a machine and then they installed the machine at the university. The researchers of the university were using this machine, so the researchers from the firm 4 were often by the university: two days for installing the machine, then a couple of times and at the end again to remove the machine.

This exchange was confirmed by the **coordinator of the firm 4** in explaining that the firm 4 had delivered its technology to the university and the university had used together with other partners this technology (machine) to test biology assets. He stressed the role of the university in coordinating actively these operations from the different partners on the machine:

> "So more or less we delivered our technology to *University*. *University* then used also technology from partners onsite, fermented again with our technology. The partners then added their biological assets and this way *University* ensured that it was a bit concentrated and was also focused."[33]

Apart from this collaboration, the project was more organised in singular work packages and the collaboration between the partners seems to be very much influenced by the content of these work packages, as explained by the **researcher from the firm 5** in stating that the project was organised in different parts, in which they (firm 5) were not in all involved and they (firm 5) could not understand the specific content of all of them.

[32] Original quotation in German: „Es hat in den letzten sechs Monaten intensiver Kontakt gegeben hier mit ... mit den dreien (*firm 4*). Die haben einen ... einen Prototyp für eine Anlage entwickelt, haben die dann hier installiert, wir haben die betrieben. Da waren die auch häufiger hier, zum Aufbau ein paar Tage, zwischendurch noch ein paar Mal und dann zum Abbau wieder. Also da gab es auch häufigere Treffen."

[33] Original quotation in German: "Also wir haben mehr oder weniger unsere Technologie an *University* geliefert, *University* hat dort dann von Partnern Technologie dann auch vor Ort eingesetzt, hat fermentiert, wieder mit unserer Technologie. Die Partner haben dann ihre biologischen Assets mit dazu gestellt, und auf diese Art und Weise hat *University* dafür gesorgt, dass das so ein bisschen konzentriert war und auch gebündelt wurde."

These different parts were brought together in organising the project in temporal sequences, where one partner receives something from another partner, then works about it and after that sends it to another partner to be further elaborated, like in a chain system:

> "Because there were sections within this project here we had nothing to do with and neither understood these. It was that way. So we've […] got delivered somewhere something from […] him from *university* here, processed and then sent it to *firm 2*, to these employees."[34]

This kind of organisation was already in the project proposal very clearly structured by the **project leader**, who explained why he wanted to organise the project in singular, quite close work packages:

> "So in our project it was deliberately structured that way that we said […] … or it was that way: when I signed the application I thought it was like from behind at first and considered when I – because we have many industrial partners therein and we were the only an academic institution – when I want to win companies for such a project, then I must explain to these companies what's your benefit from the project? What will you have as a product later on as service from the project? And this way I actually structured it already in the application so that everybody's work package not only in the sense of everybody contributes to [...] insights but from each work package derives its own product or at least its own service which the company will offer later on."[35]

He stated that, given the fact that, in the project there were more industrial partners and only one university, he wanted to attract those companies in entering such a project, making clear what they could have gained as a benefit at the end of the project. For each partner, there was a work package to work on, so that, at the end, all partners could have developed a product or

[34] Original quotation in German: „Weil es einfach hier in diesem Projekt Teilbereiche gab, mit denen wir nichts zu tun hatten, die auch nicht mal verstanden habe. So war das. Also wir haben ... wir haben von ... von ... von ihm hier, von der *Uni*, hatten wir irgendwo und irgendwas geli- ... geliefert gekriegt, haben das bearbeitet und haben das dann an *firm 2* geschickt, an diese Mitarbeiter."

[35] Original quotation in German: „Also bei unserem Projekt war das ganz bewusst eben so angelegt, dass wir gesagt haben, al- ... oder war es ja so: Als ich den Antrag geschrieben habe, da habe ich quasi das von hinten erst mal gedacht und habe überlegt, wenn ich - weil wir ja viele Industriepartner drin haben, und wir die einzige akademische Einrichtung waren - wenn ich Firmen gewinnen möchte für solch ein Projekt, dann muss ich den Firmen klarmachen, was ist euer Benefit vom Projekt, was habt ihr später als Produkt, als Dienstleistung von dem Projekt. Und so habe ich es eigentlich beim Antrag schon strukturiert, dass also jeder sein Arbeitspaket nicht nur im Sinne, wir tragen alle zu einer ... zu einem Erkenntnisgenügen bei, sondern aus jedem Arbeitspaket kommt ein eigenes Produkt oder zumindest eine eigene Dienstleistung, die das Unternehmen später anbietet."

service to eventually be put on the market. In the case of this project the desired results were defined for each partner already in the project proposal.

This kind of organisation in singular work packages was confirmed by **the researcher from the firm 1** in stating that every partner, at the end, had his own focus. The different ways of working and interests were already focused on every firm:

> "Yes well one has to see it that way that everybody obviously has his […] focus package at the end of the day.
>
> Because basically it's certainly that way that the various work processes and focus areas were certainly [...] like a bit focused on each company. And in this sense actually everybody was relatively independent within the project. Of course, there were like overlaps that for example we generated trials for *firm 2* on which they based their analyses."[36]

This kind of organisation explains in a way why there was not so much interaction between the partners during the project, who for **the researcher from the firm 1** were working more in an autarchic way in the project and only in some cases, where there were some interdependencies in the work packages, collaborating with other partners. Here it seems that dimensions like interdisciplinarity and interdependencies between the partners have not emerged and the intensity of the relationships have also resulted to be very low.

In summarising about the organisation of this project, it seems that every partner has had his own work package to develop in the project, in order to have at least, at the end of the project, for each partner a product or a service developed. The interaction between the partners seems to be quite low and focused on the possible interdependencies that can emerge when one partner supplies his part of work to another partner in order to be further elaborated like in a chain system.

6.12.3 Collaboration

Regarding the pattern of collaboration between the partners, it was mostly reported by the partners that they cooperated more with some partners and less with others depending on different factors, as reported by the **researcher from the firm 5** in explaining that there were

[36] Original quotation in German: „Ja, gut, das muss man natürlich auch immer so sehen, jeder hat natürlich sein ... sein ... seinen Schwerpunktpaket letztendlich. Weil grundsätzlich ist es natürlich so, die verschiedenen Arbeitsprozesse und die Schwerpunkte, die waren natürlich schon auf ... wie auf jede Firma so ein bisschen fokussiert. Und insofern war eigentlich jeder relativ autark in dem Projekt. Es gab natürlich irgendwie Überschneidungen, dass wir zum Beispiel für *firm 2* Proben generiert haben, mit denen die dann ihre Analytiken etabliert haben."

some partners more in contact with some other partners and some others, who were more staying in a peripheral position. He pointed also out that each of the six partners had a coordinator, who had already more contacts to the others also because of the financial issues regarding the project and that in each group (organisation) there were internal people, who were in a farther position with regard to the project.

Another partner, who pointed out to have had less cooperation with some partners and more with others is **the coordinator of the firm 4**, in the following passage he is explaining why there was less cooperation with the firm 2, as an example:

> „*Firm 2*, right? That was very, very analytical. Right? And as we de facto haven't fermented but in case of fermenting the fermentation came via U*niversity* there was relative little need to get straightaway in contact with [...] the other partners."[37]

He pointed out the different background and the fact that the fermentation process was done through the university, so he and his group had no need to have contact with the firm 2. The same can be said for the firm 3. In the next passage **the coordinator of the firm 4** is saying that they had also no need to be in contact with firm 3, but they knew that firm 3 was successful in the developing of media instruments. Another factor that could have had a role in the different intensity of the relationships between the partners was the geographical proximity, as explained by the **project leader from the university**, in reporting about the relationship between firm 3 and firm 5, both located in the same area of the university:

> „So these two *(city)* companies, they certainly coordinated quite intensely and ... because [...] of the short distances, so *firm 3* is sitting here down the hallway, four doors over. *Firm 5* is located here and we [...] *(university)* are just here. This was let's say, almost on a daily basis."[38]

Being the two firms located in the university campus (both were actually start-ups of the university), there were more contacts because of the proximity on an everyday basis, as reported

[37] Original quotation in German: "*Firm 2*, ne? Das ... das war sehr, sehr analytisch. Ne? Und da wir ja de facto auch nicht fermentiert haben, sondern wenn fermentiert wurde, die Fermentation ja auch über *University* gelaufen ist, gab es für uns an der Stelle relativ wenig Zwangsläufigkeit, da mit dem ... mit den ... mit den anderen Partnern direkt in Kontakt zu treten."

[38] Original quotation in German: „Also die beiden (*city*) Unternehmen, die haben sich natürlich ziemlich intensiv abgestimmt und … weil ... weil da die Wege natürlich auch kurz sind, also *firm 3* sitzt hier den Flur runter, vier Türen weiter. *Firm 5* sitzt da und wir ... wir (*university*) halt hier. Das war, sagen wir mal fast ... fast auf einer täglichen Basis."

by the project leader from the university. Here is the dimension of geographical proximity playing a role regarding the interaction pattern.

Another peculiarity of this project was the presence of some internal subgroups within the university and some of the firms involved. The project leader, for example, has had his own research group which worked on the project, formed by one post-doc, one researcher from the university and two PhD Students. The same holds true for the coordinator of the firm 4 and the researcher from the firm 1.

6.12.4 Problems

The main problems reported in the interviews about this project were regarding some changes that occurred in the project, the use of the time and the different background of the partners. In the following passage, the **researcher from the firm 5** explained why at a certain point of the project, were introduced some changes:

> "This one was also somehow male, more likely 50 or 60 years old (*coordinator of the firm 4*). With him we still dealt mediocrely because he wanted to establish things from our trials, wanted to do analyses, same [...] as *firm 2* did. But this floundered relative quickly because they just weren't able to manage the instruments. It was just impossible to realize it appropriately in a reasonable manner with their technical means. In this sense there was contact in the beginning until one had just worked out everything – who can do this, who will do that – but then it actually floundered again in the middle of the project."[39]

The researcher from the firm 5 explains here why with the coordinator of the firm 4 there was less contact, at a certain point of the project. The same as firm 2, firm 4 wanted to establish some analytics using some samples produced by the firm 5, for this reason there was contact between the two firms, at the beginning of the project, in order to decide how to proceed. But because of some limitations in the technology of the firm 4, it was not possible to proceed.

This problem has brought some changes in the project as explained by **the researcher from the firm 1:**

[39] Original quotation in German: „Der war auch irgendwie männlich, wahrscheinlich eher fünfzig bis sechzig (*coordinator of the firm 4*). Mit dem hatten wir noch so mittelmäßig auch zu tun, weil der, genauso wie ... wie *firm 2* halt aus unseren Proben Sachen etablieren wollte, Analytik etablieren wollte. Das hat sich dann aber relativ schnell zerschlagen, weil die es apparativ einfach nicht hingekriegt haben. Es war einfach nicht möglich, mit deren technischen Möglichkeiten das entsprechend umzusetzen, dass es auch sinnvoll war. Insofern gab es am Anfang den Kontakt, bis man das halt alles so raus gearbeitet hatte - wer kann das, wer macht das - hat sich dann aber Mitte des Projektes eigentlich auch wieder zerschlagen."

> "If things aren't [...] realisable at all one will talk about it and then somehow is a discussion which [...] ... so when for the subproject at least project plans were rewritten. Of course this must also be communicated to the fund's promotor and so on. And yes, then the problem will solve so that is [...] professional working."[40]

He explains that actually, in his view, there was not a kind of conflict because of these changes, it was clear that some of the objectives, which were written in the proposal, were not reachable and for this reason it was decided to make some changes, that were communicated and accepted by the fund's promotor. The same was confirmed by the **coordinator of the firm 4**, who stated that actually this problem happened at the beginning of the project and they could understand quite soon that it was not reachable what they planned to do with this specific problem, that I am not going to explain here in detail. Another kind of problem that was encountered by the partners during the project was regarding their different disciplinary backgrounds, as reported for example, by the **director of the firm 5:**

> „It was […] so far away also scientifically from that what we do that […] it may have been interesting to listen to this. However, it was impossible at that moment to cooperate and do with the people because it was too far away from this what [...] interests us, what we do."[41]

He pointed out how far some partners were perceived to be from what he and his firm were doing, and for this reason it was interesting to hear the results from the others, but it was not possible to really have a closer cooperation, because of the too different research backgrounds. This separation between different expertise and competences was also reported by the **researcher from the firm 1**:

> "Within collective because it has main expertise there and thus [...] each partner itself has the knowhow of course. Accordingly often however it is that way that one doesn't exchange much about this because I don't advise [advise] firm 3 on how they have to compose/make their media and vice versa."[42]

[40] Original quotation in German: „Wenn Sachen gar nicht durchfüh- ... -führbar sind, dann bespricht man das, und dann ist irgendwie eine Besprechung, die ... die … also wenn zumindest für das Unterprojekt die Projektpläne umgeschrieben wird. Das muss natürlich auch zum Projektträger kommuniziert werden usw. Und ja, dann löst sich das Problem, also das ist ... das ist ... das ist ja ... das ist ein professionelles Arbeiten."

[41] Original quotation in German: "Es war ... es war so weit ab, auch wissenschaftlich von dem, was wir machen, dass ... dass es vielleicht interessant war, das sich anzuhören, aber es war jetzt nicht möglich, super da mit den Leuten zu kooperieren und zu machen, weil war einfach viel zu weit weg von dem, was ... was uns interessiert, was wir machen."

[42] Original quotation in German: „Im Kollektiv drin, weil sie da die Hauptexpertise hat und dementsprechend liegt das Knowhow natürlich jetzt da bei den ... bei jedem Partner selber. Dementsprechend viel ist es natürlich auch so,

He is stressing the point that each partner has in the project his own specialisation and know how, and for this reason, he feels to be not competent in giving advice to firm 3, which is working on media development, and vice versa he would not expect that firm 3 will give to him advice how to do his own work. The last problem that emerged during the project was regarding the use of the time, as reported by **the director of the firm 5**:

> "For example this one here, *firm 1*, actually everybody was dependent on them. Because at the beginning of the project they were ... they had to do something as a basis for everybody else and they didn't get one's act together. Well, what should one do in this case? That was certainly cruddy. Right? Yes, and lead to real stress and annoyance and fuss."[43]

In this passage, the **director of the firm 5** is reporting that being firm 1 at the beginning of the project (*and of the chain*), all the others were waiting for their supply in order to proceed with the project and it was not so easy to push them. This kind of dependence was not good for the project, because it had caused some stress and resentment. This problem with the use of the time was also reported by the **coordinator of the firm 4**, who stated that actually in this kind of project, the problem of the time is always a difficult problem, given that at the end the project has to come to an end. There were some delays in the project-deliverables (firm 4 had to extend the project for one year) but at the end they could finish the project. Here, as for the other control projects, it emerged that the interdependencies between the partners were seen as a problem and therefore minimized. The **dimension of interdisciplinarity** is much less present than in the projects presenting the property of social reflexivity. The use and conception of the time is also a dimension of importance in showing that the team was not able to make the best use of the time at disposal.

6.12.5 Competences

Regarding the different competences that emerged in the interviews in this project, the codes of the relational and communicative competences were coded much less in these interviews

dass man darüber nicht mehr groß mehr Austausch hat, weil ich berate berate jetzt nicht *firm 3*, wie sie ihre Medien zusammenzusetzen/zu machen hat und genau andersrum."

[43] Original quotation in German: „Z. B. diese jetzt, *firm 1*, von denen waren eigentlich alle abhängig. Weil die waren am Anfang des Projekts ... mussten die irgendwas machen, auf dem alle anderen aufsetzten, und die kamen einfach nicht in die puschen. Ja, was soll man da machen? Das war natürlich blöd. Ne? Ja, und das gab natürlich schon richtig Stress und Ärger und Theater."

as in the other three projects. On the other side, the relevance of the code about the technical competence was occurring mostly in this project rather than in the other three.

6.12.5.1 Relational and communicative competences

One partner, who seemed to make use of relational competences in organising the project, was the **project leader from the university**. He stated that in order to improve the general coordination, he always tried to bring the partners together, so that they could speak without going through him and this in particular in order to avoid, as a project leader, to be busy all the time in sharing information between the partners.

For the same reason, i.e., improving coordination, he also displayed a communicational and organisational competence in trying to find from the beginning of the project, at the kick-off meeting, for each partner a person, who could have the role of transmitting information into his/her different organisations and internal teams and answer questions regarding results and the state of the art of the project:

> „It had to emerge now at the beginning who is the reference person now. Meaning we've then already said [...] at the first meeting. So basically at the kickoff meeting 'okay, please come all and then it is defined who has which task, also with the partners whom to speak to in order to share results in case of somebody's questions so that one knows do I speak ... it doesn't matter which one of the three persons I speak to. The contact basically is with one person. This we made clear at the first meeting."[44]

The relational competence of the project leader was further confirmed by the **coordinator of the firm 4**, in saying that the project leader was always prompt to discuss and they have often had lunch together when he was at the university.

Apart from a few passages like the ones reported here, and some others about some organisational and team competences, there were not so many passages in the interviews coded regarding relational and communicational competences. A lot more were coded for the technical competence, which was not co-occurring with the relational one.

[44] Original quotation in German: "Es musste sich am Anfang eben jetzt rauskristallisieren, wer ist denn jetzt der Ansprechpartner. Das heißt, wir haben dann bei den ... bei dem ersten Treffen also im Prinzip bei dem Kickoff Meeting schon dann gesagt, 'okay, bitte alle kommen und dann wird definiert, wer hat im Projekt auch bei den Partnern welche Aufgabe, wen spricht man an, um Ergebnisse auszutauschen, wenn man Fragen hat, damit man eben weiß, spreche ich ... ist es egal, wen ich von den dreien anspreche, oder läuft die Ansprache im Wesentlichen über eine Person. Das haben wir beim ersten Meeting geklärt."

6.12.5.2 Technical competences

In context of this project, the different technical competences of the partners seem to be broadly used in order to integrate the singular work packages and to let the project go further, the aspect of the relationship is much less relevant. For example, from this passage, we can understand that the cooperation was mainly built on these technical competences and on some feedback between the partners, which were also strictly technical, rather than relational, as reported by the **researcher from the firm 5**:

> „But … but it was a very short period in which we always have done something with them. They've sent us samples which we processed and then again re-consigned the samples to another cooperation partner.“[45]

Here it is reported that firm 5 cooperated with another partner for a short time and the relationship is explained as the following: “They have sent us samples, we have worked on them and then we have sent them to the next cooperation partner.” There is no explanation about the art of the cooperation, or if they shared their feelings and were learning from each other.

The fact that the collaboration was more based on distinct technical competences was reported also by the **researcher from the firm 5** when describing his relationship to the post-doc researcher from the university. Even in this case, where the cooperation was more intense, he is mainly describing what the other partner has done: "he has made the cultivation, we have then worked on it."

In many passages, emerged this differentiation between the roles and the technical competences of the partners in the project.

This strong use of the technical competence was not supported by the capacity to integrate technical competences with relational ones, an example is reported in the following passage, where **the coordinator of the firm 4** explains that the product, that they produced as firm 4 during the project, they did not want to commercialise it by themselves, maybe because of the changes that occurred in the general strategy of the firm 4. So they asked their partners if they were interested in bringing this product on the market and there was no one who was interested in the commercialisation of this product:

[45] Original quotation in German: „Aber ... aber es war ein sehr kurzer Zeitraum, wo wir halt mit denen immer etwas zusammen gemacht haben. Die haben uns Proben geschickt, die wir aufgearbeitet haben und dann die Proben wieder an einen anderen Kooperationspartner weitergeschickt haben.“

> „On top of that was the fact that we wanted for this *(product)* which we ... with which we ... for which we wanted to build a cooperation because we certainly didn't want to sort of launch this to market ourselves. But so we addressed cooperation partners in order to let's say, to promote marketing there and there was a backing off as well. One has to say."[46]

The fact that the project was organised in more or less close work packages and each partner had to develop his own product/service has led to a problem in trying to pursue the general objective of the project, to integrate all the singular results from each partner in a kind of platform, as explained by the **coordinator of the firm 4**:

> " But it appeared during the project – this all actually should be integrated, this should become one platform – but it appeared during the project that this ... that the measurement of this *(name)* protein in comparison was quite complex and that it isn't also that easily manageable in the lab."[47]

The general objective of the project was to construe a kind of platform of cell-related technologies, in which to integrate all the singular results reached by the partners, but because of some changes occurred at the beginning and during the project, when the partners have understood that it was not possible to measure a specific kind of protein in which they were interested in, this final integration had not been further pursued by the partners.

6.12.6 Evaluation and opportunities

We are now going to introduce the part of the evaluation of the results and the opportunities experienced by the partners during the project. As already explained in other parts of this analysis, this project was organised from the beginning in singular work packages so that at the end of the project each partner could have their own product or service to be put on the market. As the project started, the general objective was to have also a final integration of all the singular results on a platform, but given some changes that occurred in the project, this general

[46] Original quotation in German: „Hinzukam, dass wir für diesen (*Produkt*), den wir ... mit dem wir ... für den wir auch Kooperationen hatten aufbauen wollen, denn wir wollten das natürlich auch nicht selber sozusagen im Markt platzieren, sondern wir haben uns also an Kooperationspartner gewendet, um, sagen wir mal, die Vermarktung dort voranzutreiben, und da gab es auch ein Zurückweichen. Muss man sagen."

[47] Original quotation in German: „Es hat sich aber im Laufe des Projektes herausgestellt - das sollte eigentlich alles integriert werden, das sollte alles eine Plattform werden - hat sich aber im Laufe des Projektes rausgestellt, dass diese ... dass die Messung der (*Name*) Proteine vergleichsweise aufwändig ist, und dass es auch nicht so leicht handhabbar ist im Labor."

objective was not reached. On the other side, most of the partners expressed satisfaction regarding their singular results and the results reached by the other partners, as for example the **coordinator of the firm 4**:

> "But it was – I don't know whether this is an exception, whether it's always that way. It is my first, but so far also single project of this kind – it was always dominated by a real high level of cooperativeness and ... and based on the desire to indeed make this ... this subject a success. Especially *University* did also clearly more in this context and since one so ... so the *Post-doc researcher from the university*, very, very, very strongly motivated, very strongly spurred did more than he actually wanted to do initially and the results he obtained as well they were very, very good."[48]

In this passage, the **coordinator of the firm 4** explains that for him it was the first experience in such a project and that the project was always based on a declared art of cooperation and the desire to bring the project to have success. Then he states that especially the university was doing most of the job and that the results pursued by the university and especially by the post-doc of the university were at the end very good. On the other side, as previously explained, he was not satisfied with the missed opportunity to go on the market:

> "And therefore, because the producers realized that there might be a problem with market acceptance of these kind of *products* from our side, we later didn't have this ... this strain that we also hadn't to [produce] our own ... we hadn't to do this ourselves, then wanting to distribute it to market, right? The cooperation partners didn't feel like, we didn't want to do for these reasons – right? – and ... yes and hence so to speak is a big part of this chain ... so to speak lost its chance for commercialisation."[49]

[48] Original quotation in German: „Sondern es war - ich weiß nicht, ob das eine Ausnahme war, ob das immer so ist, es ist mein erstes, aber bisher auch einziges Projekt gewesen in dieser Form - es war immer geprägt von ausgesprochen großer Kooperativität und ... und auf dem Wunsch getragen, tatsächlich diese ... dieses Thema zum Erfolg zu bringen. Gerade auch die *University* in dem Zusammenhang hat auch noch deutlich mehr gemacht, und da man also ... also gerade der *Post-doc researcher from the university*, ganz, ganz, ganz stark motiviert, sehr stark angespornt, mehr gemacht, als er eigentlich ursprünglich hat machen wollen und die Ergebnisse, die er da auch erwirtschaftet hat, die waren auch sehr, sehr gut."

[49] Original quotation in German: "Und deswegen, weil die Hersteller gesehen haben, dass es möglicherweise da ein Marktakzeptanzproblem gibt mit dieser Art der *Produkte*, gab es von unserer Seite nachher auch nicht mehr so diesen ... diesen Druck, das unbedingt auch nicht weiter selber ... das hätten wir ja dann selber machen müssen, dann im Markt vertreiben zu wollen. Ne? Die Kooperationspartner hatten keine Lust, wir hätten das nicht machen wollen aus den Gründen - ne? - und ... ja, und damit ist sozusagen ein großer Teil dieser Kette auch ... hat sozusagen einfach die Vermarktungschancen verloren."

He is explaining again that the product that the firm 4 had developed during the project was later not commercialised because of some problems regarding: first the unwillingness from the side of the firm 4 to put the product on the market by themselves, and second because the other cooperation partners in the project did not want to go further on the market with this specific product. So, in his view, at the end, the chance of the commercialisation has been lost.

From the side of the **project leader from the university,** there were some objectives which were not reached, as it is usual in such projects, but the most of the objectives were reached as planned.

Another partner, who was at the end satisfied with the results reached was **the researcher from the firm 5**, who stated that his firm had concluded the project within the timeframe, while other partners had to extend the project.

The **director of the firm 5** was also satisfied about the results reached being part of this project, though he had another opinion before the end of the project. He was thinking that the project was not successful because all the partners had done something, but the project in general was not so good. Then at the end, during the final meeting, he could see that actually there was some progresses and that the partners reached their singular objectives and he changed his view about the final results:

> "Well others will see this … this differently but basically … basically the project wasn't really … everybody did something there and ... but it wasn't very super-duper. And this [turned out] not until [...] the end in the … actually in last big meeting, there […] changed my in- ... my view there regarding this project because I noted that after all it had a benefit that ... that each project partner basically did something and hence project goals were met after all."[50]

Another partner, who was satisfied about the results he and his firm could reach inside this project, was the **researcher from the firm 1**, who was saying that what they wanted to reach on the plan they have got at the end.

During the project there emerged some opportunities for the partners, which emerged mainly because of the geographical proximity, as for example explained the **researcher from the firm 1**. He explains that the fact that his firm was not so far from the university had helped

[50] Original quotation in German: „Na, das ... das werden andere ganz anders sehen, aber im Grunde ... im Grunde war das Projekt nicht wirklich ... jeder hat da irgendwas gemacht und ... aber so richtig dolle war es nicht. Und das ist erst am ... am ... am Ende bei der ... eigentlich bei der letzten großen Besprechung, da ha- ... hat sich meine Ein- ... meine Sicht da auf dieses Projekt verändert, weil ich festgestellt habe, dass doch etwas bei rumgekommen ist, dass ... dass jeder Projektpartner im Grunde irgendwas gemacht hat und die Projektziele dann doch erreicht wurden."

in the cooperation; they could, for example, have a bachelor degree candidate working on the project. He also recognised that firm 4 was quite far from the university and maybe for this reason there was less cooperation with them. Another actor, who has seen some opportunities emerging during the project, was the **director of the firm 5**, who appreciated having had the opportunity to know other's firms not only working in his geographical proximity, but also other small firms' ways of working for possible further collaborations in other projects:

> „No. To my mind the idea is certainly by this project ... so *firm 1* for example I came to truly know it in this way. And now, after the project [...] when I meet them then yes, hallo and ... so before there was a distance; and with *firm 2* similar. *Firm 2* used to be some company but now, by the project, one got to know each other and does ... when I meet them one talks together. So of course, this became closer, much closer and perhaps there will be a chance to collaborate again on something. That has very clearly increased by this. But the smaller companies - *firm 1, firm 2, firm 3* – as a result of collaborating in this project, one certainly knows how they [...] ... how they work and this is definitely positive, very positive."[51]

In summarising about the results of the project and the opportunities experienced by the partners taking part in it, it can be said that all the partners are satisfied with the results they reached in their singular work packages and less satisfied with the general objective of the project (effectiveness partly reached). There were some delays in ending the final reports of the project and some of the partners were extending the project for one more year (efficiency partly reached). All the partners expressed their willingness to collaborate again in the future with the same partners. The main opportunities, which emerged during the project, were regarding the geographical proximity, which had helped the cooperation at least between those partners working in the campus of the university (firms 3 and 5) or not so far from the university (firm 1 and 2) and the opportunity to know new partners for eventual new cooperation in the future.

[51] Original quotation in German: Nein. Also meiner Meinung nach ist natürlich durch dieses Projekt die Idee ... also *firm 1* z. B. habe ich dadurch erst richtig kennengelernt. Und jetzt nach dem Projekt, wenn ich da ... wenn ich die treffe, dann ja, hallo und ... also vorher war das ein Abstand. Und mit *firm 2* ähnlich. *firm 2* war mal irgendeine Firma, aber jetzt durch das Projekt hat man sich kennengelernt und macht ... wenn man sich trifft, unterhält man sich. Also natürlich ist das enger geworden, viel enger und gibt vielleicht die Möglichkeit, noch mal etwas zu machen. Das ist ganz klar dadurch gewachsen. Aber die kleineren Firmen – *firm 1, firm 2, firm 3* - dadurch, dass man in diesem Projekt zusammengearbeitet hat, kennt man da natürlich, wie die t- ... wie die drauf sind und das ... das ist sicher positiv, sehr positiv."

6.12.7 Structural change and four paths to change

The perception of change reported by the respondents to the interview about this network was the lowest among all four projects. Most of the partners perceived no change in the structure of the overall network from the beginning until the end of the project; most of the partners perceived no change in the network density during the project; most of the respondents perceived themselves as peripheral or close to the centre, but never central, even the project leader. Most of the partners reported a pattern of instant bond in their relationship with the others during the project. Nobody sees himself as a mediator between organisations/people. For these reasons, I would classify this project in the path of the morphostasis, the network was simply reproducing at the end of the project its initial structure, despite of some changes that occurred in the project. But it did not bring to a substantial change either the general structure nor the density of the relationships in place. A predominant role was acted by the university and the project leader, who turned out to be perceived as the main broker between the different organisations involved. The role of the firms is quite passive, despite the fact that five firms of different dimensions and locations were involved in the project. The organisation of the project in singular work packages for each partner could have inhibited the emergence of social reflexivity in this network, which seems to be almost completely absent. There are some actors, who have shown to have relational and communicational competences, but in the interviews the different technical competences of the partners were mostly reported. On the other hand, it seems that for some partners, there emerged some opportunities for further cooperation in knowing better the other participating partners. This can be recognised as a sign that at least at the end of the project, some social reflexivity emerged, which can be used in other projects in the future. The geographical proximity seems to influence here the cooperation much more than in the other three projects. There is also an agreement between the partners about the quite low intensity of their relationships during the project: they were mainly meeting each other during the general meetings organised every six months; in between the contact was more email and telephone, but not face to face. In this project, it seems to have had a role in the collaboration, a kind of hierarchy between the partners: each partner had a coordinator, who was responsible for transmitting all the information to his more internal colleagues and subordinates.

6.13 Resume about the two projects in Germany

In comparing similarities and differences between these two projects in Germany, we start in introducing some similarities: the two projects have a similar object, they both wanted to

integrate some cell-related technologies. The DE_Reflexivity project was more successful in the integration phase rather than the DE_Control project, in which occurred some changes that have made this integration at the end not more possible. The two projects also faced similar problems, as for example, the role of the time in the project and the emergence of particular interests from the side of the actors. The way they have tried to cope with these problems is different: the DE_Reflexivity project was giving to interdependencies between the partners a positive meaning and was trying to reinforce it through the sharing of the same work packages between the partners, while the DE_Control project was more focused on separate the partners and let them work in more or less closed work packages, in order to avoid interdependencies. In both the projects the respondents reported to be willing to cooperate again in the future with the same partners and they were satisfied about the results. In the DE_Reflexivity project there was satisfaction in general about the results that were reached (effectiveness criteria fully met) and less satisfaction about what had been reached in the time at disposal (efficiency criteria partly met), in the DE_Control project less satisfaction had been experienced regarding the general objective of the project (effectiveness partly met), but all were satisfied about their singular objectives, and less satisfaction about the reaching of the objectives in time (efficiency partly met). In both projects there emerged new opportunities regarding new partnerships for the future.

The main differences between the two projects were mainly regarding the organisation of the project in shared versus closed work packages and the role of the project leaders. In the DE_Reflexivity project we have even two project leaders, who have any particular role in connecting all the others because in the network almost all the people are well connected among each other. In the DE_Control we have a dominant project leader, who despite trying to delegate to others some of the control (role of the coordinator for each partner), was perceived very central in coordinating the project and in connecting the partners from different organisations. Another difference between the two projects was regarding the initial conditions, in which the two projects started. The DE_Reflexivity project made extensive use of the pre-existing regional excellence network about cell research, especially in the phase of the selection of the partners. In the DE_Control project the partners were more selected on the basis of previous collaborations and bilateral projects. Very different were also the feelings that emerged in the two projects. In the DE_Reflexivity project we have a lot of passages coded as feelings of interdependence, in the DE_Control there were only few passages. Very different were also the kinds of competences displayed by the two projects when coping with the problems and issues regarding the project. DE_Reflexivity project respondents made a large use of relational and communicational competences integrated by technical competences. The DE_Control project respondents were

more speaking in terms of their technical competences but lacking relational and communicational ones. The partners of the DE_Reflexivity project were mostly collaborating on a horizontal basis (less hierarchical) among themselves, with professors and PhD students of different organisations collaborating on a horizontal basis, while in the DE_Control project we can see a more hierarchical organisation based on the distinct roles and competences of the partners. Furthermore, the extensive use of technology like call-conferences seems to have had a role in the DE_Reflexivity project in reducing regional distances between the different cities where the partners were located.

6.14 Conclusions

The aim of this chapter was to contextualise each project in presenting the content analysis done on the more narrative parts of the interviews and to describe "what happened in the project" in terms of structural change in order to be able to classify the networks in one of the four paths to change developed by Donati. All four projects' content analyses were presented following the schema of the ten families of codes and when emerging, the main dimensions for the next interpretation and triangulation of data (see next chapter) were introduced. At the end, a brief summary and a comparison between the two projects (control and reflexivity) in each country were reported.

7 INTERPRETATION OF THE RESULTS

7.1 Introduction

This chapter serves as bringing together the results of the two previous chapters about the analyses of the quantitative and qualitative data, in order to understand which kinds of structural characteristics possess teams with higher degrees of social reflexivity. The first part will be devoted to a triangulation and interpretation of the data at a local level, considering the results in the context of the two countries. The second one will be more a comparison between all four networks in order to verify the thesis and hypothesis previously advanced, about the role of social reflexivity in outperforming innovation projects and the role of the local context in enhancing reflexive networks. Some policies, implications and recommendations will conclude the chapter.

7.2 Integrated interpretation of the results on a local level

The main idea is to summarise the results for each country referring to the main dimensions, which emerged during the analysis of the data.

The main dimensions for interpretation emerged in both analyses with a different intensity in the two countries. In the two projects in the Netherlands, for example, the data have to be more interpreted referring to literature about leadership and brokerage, given the high number of brokerage positions detected in the two networks and the special role of the project leaders in coordinating the projects. It is here argued that in the NL_Reflexivity project social reflexivity emerged because of these particular structural characteristics of the network: a distributed-coordinated leadership structure (Mehra et al. 2006) and a high number of brokerage positions of the liaison type (Gould & Fernandez 1989) distributed among different partners, in contrast to a more centralised network around the project leader, who was also the main holder of all the brokerage positions of the liaison type in the control network.

In the two projects in Germany, the main dimensions, which emerged from the analysis of the data were those referring to the tasks interdependence and need for interdisciplinarity between partners, furthermore the geographical distance between the partners have had here a particular role. The DE_Reflexivity project was characterised by constructing the project around this need for integration and interaction between the partners, who were giving a positive meaning to interdependence, in strong contrast to the DE_Control project, where the actors were from the beginning working in a separated way (like a chain) and trying to avoid as much as possible interdependencies and interactions among themselves. It is here argued that this need

for interaction and integration in the DE_Reflexivity project has started reflexive processes in the network, which allowed the emergence of social reflexivity in this network. This is particularly evident when considering the type of feedback (relational) used by the partners of the DE_Reflexivity project, which were, as in the Relational Theory of the Society of Donati very reciprocal and indicative of the presence of a social relation. The other dimension, which seems to have had a role in enhancing reflexive processes in the DE_Reflexivity project and thus in turn social reflexivity, is the geographical dimension, which was not seen as a barrier to cooperation, in contrast to the DE_Control project. The extensive use of technologies like video-call conferences have allowed a constant interaction between partners located in different, quite distant, cities in the region (North Rhine-Westphalia). This aspect of the distance was not perceived problematic at all in the Netherlands, where the partners were located much closer in different cities of the same province (Gelderland).

7.2.1 The two cases in the Netherlands

Regarding the two cases in the Netherlands, as explained above, the two main structural characteristics that emerged in these networks and differentiated them were those regarding the role of the project leader and the brokerage type (Gould & Fernandez 1989). From the analysis of the structural data regarding these networks in the last six months of the projects emerged that, though both of the projects were organised as cooperation between different disciplinary-based team-groups, the NL_Reflexivity project was showing a kind of structure which suggested that in this network there were many partners perceived as central (less centralised network), and that in most of the cases the same partners perceived as central were also those holding a relevant number of brokerage positions of the liaison type (connecting other partners from different organisations). These two aspects, detected on a structural level, suggested that a network which possesses a shared leadership, intended as a "dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organisational goals or both (Pearce & Conger 2003:1)" (Wang et al. 2017:2), are more likely to stimulate reflexive processes inside the network rather than a traditional type of leadership; where only one person has the role of guiding the group to fulfil the objectives of the project. In many passages from the interviews, as reported in the previous chapter, emerged the consciousness from the side of the partners to have acted as brokers in connecting mostly different organisations. In the NL_Control, it was interesting to note that despite there were other partners perceived to be quite central, in this case, only the project leader and his collaborator

were holding the most of the brokerage positions of the liaison type. The other partners were in some cases occupying brokerage positions of the representative or gatekeeper type, in connecting someone other from their own organisation to another one from another organisation in sending or receiving a message from outside their organisation to the inside and vice versa. This could be explained considering the style of the project leader, who wanted to be the only reference for connections between organisations rather than allowing more free-based interactions between the different subgroups, as in the NL_Reflexivity project. From the analysis of the qualitative data there is a confirmation about the leadership style of the project leader and the desire expressed from other actors to act as brokers between different organisations, which was inhibited from the project leader in failing recognising the emergent informal leadership of other actors in the network (Mehra et al. 2006; Kilduff & Krackhardt 2008). The recognising, on a cognitive level first, of the emergent leadership of other actors in the network, can in turn have an effect in promoting team effectiveness "by providing teams with intangible, relational resources that facilitate sharing information, expressing diverse opinions, and coordinating member actions in the face of uncertain and ambiguous situations (Carson et al. 2007)" (Wang et al. 2017:2). This is particularly the case of the NL_Reflexivity project, where the project leader was clearly recognising the leadership and relational competences of other partners and was giving them space and autonomy inside the network for allowing a better coordination. The fact that emergent informal leaders were also brokers can also have had a role in better diffusing information and improving coordination occupying structural holes: brokerage in this sense focuses on joining previously unconnected parties to facilitate coordination, collaboration, and pursuit of common goals (Obstfeld 2005). This would be in line with those studies, which are more oriented toward an interpretation of the broker as someone, who connects others for joining a common good (*tertius iungens*) rather than someone who uses his/her position in the network for maximizing his/her own interests (*tertius gaudens*) (Simmel 1950; Burt 1992, 2004; Ibarra, Kilduff & Tsai 2005; Obstfeld 2005; Long Lingo & O'Mahony 2010). It is argued here that networks with these specific characteristics produce more likely reflexive processes, because of the increased amount of interactions and the relational quality of these interactions, which are more oriented to construct a common understanding of the project in sharing information and distributing coordination tasks and stimulating reflexive processes inside the network. This interpretation would be in line with the Theory of Donati, when he says that relational feedback is the main regulative mechanisms of networks, which are reflexive. "Relational feedback consists in reciprocal actions between agents/actors that does not opt for the automatic negation or amplification of variations, but manages them as options that are always open and negotiable

in a network having relationality in common between agents/actors, but not necessarily the same values, habits, and intervention style" (Donati 2014:78). The use of relational feedback in a network gives rise to a relational kind of steering in the network "which consists in sharing the relationality of the network as a common good (relational good) among subjects that intend to accomplish a project open to new opportunities" (Donati 2014:79).

It seems that this network has put a lot of effort in constructing a kind of structure, which allowed a better coordination and circulation of innovative ideas in adapting creatively to some external/internal challenges experienced during the time span of the project and recognising the informal emergent leadership of some of the partners, brokerage in this sense could have played a central role in all these processes. This would in turn foster team performance which is more likely to occur as some "meta-analytic evidence suggests that groups are most effective when their leaders occupy central positions in dense internal instrumental and expressive networks(Balkundi & Harrison 2006)" (Carter et al. 2015:9).

The importance of the leadership style and brokerage type has been observed in the two cases in Germany too, but it was not as relevant as in the two projects in the Netherlands, where emerged both strongly in the two types of data (quanti/quali). In the projects in Germany, it was observed the same dynamics at the level of the structural data (questionnaire), but in the interviews other dimensions were more thematised as central from the side of the respondents.

7.2.2 The two cases in Germany

As already introduced above, other dimensions seemed to be more relevant in the process of starting and fostering social reflexivity, or conversely inhibiting and impeding its emergence, in the other two projects in Germany. These dimensions are mostly referring to task interdependence and interdisciplinarity. In the teamwork literature task interdependence is defined as "the degree to which team members' tasks require them to coordinate activities and exchange information with each other in order to accomplish their goals" (Hu & Liden 2015: 1107). Task interdependence, as further explained by Hu and Liden, "can be high so that team members need to coordinate closely with each other to accomplish tasks, whereas when task interdependence is low, individual members work more independently from each other (Van der Vegt & Janssen 2003)" (Hu & Liden 2015:1107). This dimension of task interdependence was occurring very oft during the analysis of the interviews together with the dimension of interdisciplinarity. This because usually partners enter such projects because they need an integration of their competences with other competences owned by other partners. The success

of this integration process can be in turn very relevant for the performance of the project because as previous literature already investigated "members in groups characterised by low task interdependence face unique obstacles. Specifically, team members under low task interdependence conditions may find it more difficult to produce quality output, help others, and make suggestions to improve team functioning because of a lack of task driven cooperation causes them to obtain insufficient knowledge of other team members' work." (Hu and Liden 2015:1120). This was very much the case of the DE_Control project, where task interdependence and interdisciplinarity were limited so that there were some partners, who stated, they could not even understand some parts of the project from a scientific point of view, because of the too different background of the partners. This was also very relevant in the control project in the Netherlands, actually. My thesis here is that the need for interdependence (tasks and discipline) has allowed the emergence of social reflexivity in the DE_Reflexivity project. As the project leader very clearly explained during the interview, she tried from the beginning to organise the work in a way that could foster interdisciplinarity and task-interdependence. This has brought to a very dense and interconnected network structure, as it is possible to grasp from the structural data about this network, though the partners were maintaining at the same time their autonomy and independence. From the analysis of the structural data about the DE_Reflexivity project it is possible to observe that this was the network, that displayed the highest degree of cohesion, reciprocity and transitivity, and at the same time it was very much decentralised and the partners were quite equal in their position in the network. This was also reported in the interviews when speaking about need of integration, but at the same time, the equal importance of each partner in the project. This calls back the "networked individualisms" idea of Wellmann (2002). In this kind of organisation of the work "individuals have to form and maintain relationships with those they need to learn from and coordinate with." (Halgin et al. 2015:458). This is particularly difficult when partners are far apart from each other, "work together while apart" (Dimitrova & Wellmann 2015). In this project the extensive use of technologies, such as the video conferences, has helped partners to maintain the intensity of their relationships during the time.

Another peculiarity of this project, that confirms the presence of social reflexivity, is in their way of collaborating, i.e., working together, making an extensive use of relational feedback, like in the previous NL_Reflexivity project. In their description of the collaboration during the interviews, they make very clear this interactive process when collaborating with each other. This dimension of "team learning behaviours" was conceptualised by Argote, Gruenfeld and Naquin (2001:370) with the following words: "activities through which individuals aquire, share and combine knowledge through experience with one another" including challenging assumptions,

reflecting on past performance, and providing high quality feedback (Edmondson, Winslow, Bohmer & Pisano 2003). It seems that the kind of knowledge sharing and the managing of the geographical distances have fostered the emergence of social reflexivity in the DE_Reflexivity project. Their need to really integrate their knowledge to go further with the project has stimulated the interactions and their intensity, and has given rise to a very cohesive group of interdependent partners. This has in turn reduced the importance of the geographical distance for the interaction "since it is not much where the actors are located in relation to each other that matters as what efforts it takes for them to actually interact" (Moodysson & Jonsson 2007:118). Their need to integrate tacit (Polanyi 1967) and very specialised kinds of knowledge owned by the different partners has required a kind of sharing based on a "close dialogue with immediate loops of linguistic as well as visual – and sometimes even physical – feedback (Moodysson & Jonsson 2007:121)" (Daft & Lengel 1986; Storper & Venables 2004). As it is well known in the innovation literature and in the economic geography, when integration of tacit knowledge is required, the geographical distance can play an impeding role and thus there is the need of geographical proximity mainly organised in clusters of firms (Malmberg & Maskell 1999). Here, in the case of these two projects in Germany, it seems that even their regional dimension is for them too broad, because the cities where the partners are located can be even more than 400 kilometers apart. My thesis here is that because of the different art of knowledge required, partners located in distant places among themselves can be more or less motivated to mobilise to reach the other partners. If the art of knowledge is more codified and more easily transferrable and coded, it does not need interaction and physical contact among the partners. This seems to be the case of the DE_Control project, where each partner has his own specialisation, but an integration of this very specific knowledge is not required. What is required here, is to supply closed "parts" of the project to the next partner in the chain, so that the partner can work on these parts and adds his/her specific knowledge and then when the parts are completed he/she can supply them to the next partner and so on. Of course, this chain system generates interdependencies, which are not due to integration of knowledge, but to the coordination of the passages between the different partners. If in the DE_Reflexivity project interdependencies were seen even in a positive way as a booster for the cooperation, in the DE_Control project they generated stress and negative feelings, as it was reported by the respondents in the interviews.

7.3 Integrated interpretation of the results as comparison between networks

In the next part of the interpretative chapter, dimensions which occurred in both countries in all four networks will be introduced. These dimensions emerged both from the analyses of the

qualitative and quantitative data and are thought to be peculiar of projects that were able (or not in the control cases) to produce the property of social reflexivity. These dimensions were referring to the cohesion of the networks, intensity of relationships in the networks, to the network cognition owned by the partners and to the use of the time during the projects in order to reach a stabilisation of the network and a first degree of institutionalisation.

7.3.1 The dimension of cohesion

Regarding cohesion of the network it can be said that the two projects that are supposed to produce the property of social reflexivity showed a higher degree of cohesion of the networks in contrast to the two control networks. Data referred to the last six months of the projects, but found confirmation in the qualitative data too (question 2 about density), where respondents of the two reflexivity projects were reporting to have had the perception of a quite high density of the network during the projects. Furthermore, the respondents of these reflexivity projects reported in many cases the perception of a change in the density of the network during the project rather than of the overall structure in itself (question 1 about overall structure). In the NL_Reflexivity project, for example, most of the respondents reported a change between a low/moderate network density at the beginning of the project (T1) to a relatively high/high network density in the middle of the project (T2-T3) to come back to a moderate network density at the end of the project (T4). It seems that this network was very dense in the middle of the project and then less towards the end of the project. The same can be held for the DE_Reflexivity project, where in the first phase of the project the collaboration was reported to be perceived as more intense, because the actors had to work together "around the machine" and then less in the second phase of the project (last 18 months). In this network, most of the respondents differentiated between a low network density with some partners and a relatively high network density with other partners, especially those partners working around the machine, as it can also be seen from the visualisation of the network.

In the case of the two control groups, cohesion of the network was quite high in the NL_Control project at the end of the project (0.6667, matrix average) because the partners have started a last big experiment in the last six months of the project and as it can be grasped from the qualitative data about this project less dense at the beginning and in the middle of the project. Most of the respondents reported here a perception of a low network density. Most of them perceived a change from a low network density at the beginning of the project to a moderate network density in the middle of the project and again to a low network density at the end of the

project. The DE_Control project shows a very low degree of density of the network at the end of the project (0.1758, matrix average) and from the analysis of the qualitative data seems that there was no variation in the perception of the density from the beginning until the end of the project. Most of the respondents perceived no change in the network density in the three phases of the project reporting a perception between low network density and moderate network density. Another important indicator of cohesiveness was reciprocity, which was calculated as mismatch between matrixes (see chapter five). Here the two projects that are supposed to produce the property of social reflexivity reported less mismatch when confronting the two matrixes; for example, about when A confirmed about his/her relationship with B and vice versa. It was impressive to see that in the DE_Reflexivity there was no mismatch between the two confirmations at all. All respondents confirmed the relationships among themselves. The mismatch was much higher in the two control cases, were circa 7% and 24% of all possible combinations of relationships were not confirmed by one of the two involved actors. Another measurement for cohesiveness was transitivity, where the two projects with social reflexivity showed the highest values. All this structural data about density, reciprocity and transitivity (cohesion) have found strong confirmation in the qualitative data too, where respondents were speaking about their perceptions about their way of connecting with the others and the intensity of their relationships too. In the NL_Reflexivity project respondents to the interviews confirmed the fact that most of the interactions were taking place at the beginning and in the middle of the project, in order to understand what each partner is going to do later in the project and to construe a common understanding of the project objectives and a match with the specific objectives of each organisation involved. The same can be said for DE_Reflexivity project, where the partners were collaborating more tightly together in the first phase of the project, when "the machine" had to be built, and less in the second part of the project, when more particular interests started to emerge about the use of the results; in contrast to the two control projects, where the partners have more or less collaborated in a more separate way from the beginning. The dimension of cohesion is here of importance because my thesis is that more cohesive teams (but less centralised) are more likely to produce social reflexivity and in turn to be more performative because of their capacity to maintain interpersonal relationships over time and thus to achieve a kind of stability in the network that allows the fulfillment of the project's objectives (Sparrowe et al. 2001; Cummings & Cross 2003; Balkundi & Harrison 2006; Casey-Campbell & Martens 2009). Especially in the context of time-bounded innovation projects, which usually last between three and four years, it is considered to be very important to achieve a kind of stability in the short-term in order to be able to bring the project to a successful end. It is here supposed that

social reflexivity could be more likely a product of cohesive teams, which through extensive interactions allow the emergence of reflexive processes in the networks. Cohesion is furthermore here important because is oft associated with positive performance (Casey-Campbell & Martens 2009; Mathieu et al. 2008). Especially important here is to consider the results of other empirical research that "shows that members of cohesive groups tend to work harder and longer to solve group problems, in large part because team members perform their work as a group rather than as a collection of individuals (Shaw & Shaw 1962). Working as a group facilitates the coordination of tasks, and the transfer of information and knowledge (van der Vegt et al. 2010). Furthermore, relationship stability that sustains cohesiveness allows for team members to become familiar with each other, which implies the development of trust and facilitates coordination and the emergence of teambuilding behaviours." (Quintane et al. 2013:10). This seems to be in particular the case of the two cases with the property of social reflexivity. Qualitative data here confirms they are acting and perceiving themselves as a group rather than a collection of individuals, as in the two control teams, where actors were much more focused on their own very specific objectives/interests rather than to a common objective. This aspect was very relevant in both control projects' interviews.

7.3.2 The dimension of intensity of relationships

Closely related to the cohesion dimension is that of strength of ties (Granovetter 1973), that was measured for each network as a mean of the relationships' intensity ratings given by the respondents in the questionnaire (see chapter 5). As defined by Granovetter "the strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterise the tie." (Granovetter 2003: 1361). The relationships in the last six months of the project were more intense (on average) in the two projects with social reflexivity rather than in the control projects. The dimension of the intensity of relationships was also emerging in the interviews. It seems that, especially in the two projects with social reflexivity, there was the perception of a change in the intensity of the relationships during the time, "activating" ties mainly for tasks driven purposes. This has brought to the interpretation that actually, more than a real structural change, these two networks were reaching a kind of stability and then were activating/dissolving their collaboration ties only when they needed. This would explain the perception of change they had in the density of the network during the time span of the project. Of course, given that there is only one cross-sectional measurement of the structure of the networks at the end of each project, it is not possible to assert

that a given structural change has taken place, but the perceptions about changes collected through the interviews can inform about some dynamics perceived by the actors of the networks. From the analysis of the interviews it seems that, once the network has more or less stabilised itself (mainly in the first phase of the project) through an intensive interaction among the partners, later in the project the partners connected with other partners only when they needed to for a given task. For this reason, there can be a kind of change in the short-term on a structural level (network churn, Sasovova et al. 2010), in some phases of the project. The emergence of this pattern can thus inform about the capacity of a network to adapt quickly to some changes activating or dissolving ties. This aspect of the capacity to adapt to change in time-bounded innovation projects will be further introduced in the dimension about time and stability. It is important to outline here that these perceived changes in the intensity of the relationships are indicative of the fact that networks with the property of social reflexivity not only displayed the highest ratings in the relationships' intensity, but respondents reported also the existence of some adjustments/changes in their ties during the time span of the projects, and so were supposed to be more dynamic internally as the control networks. What is interesting to note from the visualisation of the DE_Reflexivity network, for example, is the existence of both strong and weak ties in connecting with more peripheral actors. The same can be held for the NL_Reflexivity project. In regard to social reflexivity my thesis here is that intensity of relationships can be important in achieving reflexive processes in the network, but given the fact that these are innovation projects, also the presence of weak ties to more peripheral actors can be relevant in this context, in order to be able to connect to more peripheral actors, which can be a source of new information and can avoid a kind of closure to innovation in too cohesive groups (Granovetter 1973).

7.3.3 The dimension of network cognition

The next dimension, which was emerging in both projects with the property of social reflexivity, was the degree of network cognition displayed by the partners of the two projects. The measurement of network cognition was also the main indicator of social reflexivity comprehending the first and the second orders of relationships. Furthermore, this dimension was also emerging from the interviews and helped in grasping the third level of relationships explained in the theoretical chapter. As we can see from the analysis reported in chapter five about network cognition in the two selected projects, which at the beginning were supposed to have probably produced the property of social reflexivity (for selection criteria see chapters about

selection and methods), a consistent number of partners were able to reconstruct the whole network. In the literature about network cognition, it is often outlined as the importance for performance of the capacity of the project leader to have a precise cognitive picture of the social network (Krackhardt 1990; Kilduff & Tsai 2003; Balkundi & Kilduff 2006; Kilduff & Krackhardt 2008).

In the two projects with social reflexivity, other actors in the network have displayed this capacity to reflect about the existence of collaboration relationships of the first (EGO-ALTER) and the second orders (ALTER-ALTER). The capacity to reconstruct the whole network seemed to be highly affected by the position of the actors in the networks; more central actors' slices were significantly correlating with the matrix of the whole network. This argument confirms the hypothesis that more decentralised networks could display higher levels of social reflexivity. This can be plausible on an intuitive level too, when thinking that if information, communication and important decisions are shared between more partners, it is highly probable that reflexive processes take place. In order to understand if these both networks also displayed social reflexivity at the third level of relationships (reflexivity of relationships about relationships), some passages in the interviews were identified where this dimension was emerging. A passage, which is indicative of emerging of social reflexivity at a third level, is the following by the project leader of the NL_Reflexivity:

> "Maybe we need conflicts. I don't like them but if they're there, I want to solve them. I think it's more like, well we didn't know each other so well, there were strangers within the group, and it went to ... and more or less like this (*increasing closeness*). So yes, with some ups and downs, and we gained knowledge together and saw that we all have the same goal and that this ... this goal was, if we would chase this goal it would be beneficial for all of us."

It was decided to report again this passage here to focus on some elements which are indicative of social reflexivity in the Theory of Donati. First it seems that after a while there was a kind of emergence of a consciousness to be a group and to have the same goals, so the same orientation versus an entity (collaboration) that "cannot be reduced to the sum of the properties and powers of the elements (*single partners*) that have been combined with each other." (Donati 2014:65).

This collaboration relationship has to be understood here as an emergent relational good, which was generated by the partners during the project. This is "the third," the output of the relationships toward which the partners orientate themselves in their acting. Here the reflexivity

is neither about the relationship about myself as project leader and another partner (first order), nor about the relationship between other two partners in my network (second order) but about our relationality in the networks, i.e., between our relationships. Here the project leader says that what binds this network is the same orientation of the partners to the relational good the network has created (to have gained knowledge together and to have the same goals). The fact that in this network there was conflict is also indicative of the fact that relational feedback was used to solve the problems and to adapt creatively to changes.

Regarding the other project, which produced social reflexivity, the DE_Reflexivity in the passages of the interviews we found a lot of reflexivity about relationships of the first and the second order like for the NL_Reflexivity project. One passage, where the reflexivity about the third level of relationships was reported was the following by the project leader of the university 2:

> „In my opinion, the project was very successful, it lead to many cooperation's beyond the project I think. So the [...] networking idea continues beyond the project. Like I've already said, one got to know each other very well. And the nice thing is when one got to know each other so well if one is looking for partners for another project ... In so far it is also a success of the project that the networking [...] of these different disciplines worked actually very well and shall be retained as well in future. So the engineers as well try increasingly to actually get into this area, into the life sciences, so that they aren't so much dependent from automobile I'd say, and hence of course this [...] results in many attractive perspectives of collaboration."[52]

Here is very clear outlined the importance of the relationality (Vernetzung) as a third. This relationality seems to be a product not only of the current project, but more from the fact that the partners knew each other before the project because they already collaborated together in other projects and/or were members of the regional excellence network for cell research. What seems to be the product of this specific project in terms of relationality is the capacity to work in network between different disciplines (engineers and biologists).

[52] Original quotation in German: "Ansonsten fand ich das Projekt sehr erfolgreich, hat zu vielen Kooperationen geführt außerhalb des Projektes, finde ich. Also der ... der Netzwerkgedanke setzt sich auch über das Projekt hinfort, man hat sich eben, wie ich ja auch gesagt habe, schon sehr gut kennengelernt. Und das Schöne ist natürlich, wenn man sich so gut kennengelernt hat, wenn man dann Partner für ein anderes Projekt sucht ... Insofern ist das auch ein Erfolg des Projekts, dass die Vernetzung ... dass die Vernetzung eben dieser unterschiedlichen Disziplinen eigentlich sehr gut funktioniert hat und von allen Seiten ja auch für die Zukunft beibehalten werden soll. Also auch die Ingenieure versuchen immer stärker, in diesen Bereich eigentlich hineinzukommen, in die Lebenswissenschaften, damit sie nicht so von den Automobilen abhängig sind, sage ich jetzt mal, und dadurch ergeben sich ... ergeben sich natürlich viele reizvolle Perspektiven der Zusammenarbeit."

The relationality produced from this network is for them worth it to be preserved in order to enter new fields of work. This recognising and reflecting on the value (not value) of the relationships on a third level was found in the interviews of the two control projects too. There were some actors, who were able to be reflexive on the level of the second order of relationships, mostly of them, especially in the DE_Control project were able to be reflexive exclusively at the first level of relationships. One actor, who was able to be reflexive on a third level of relationships in the NL_Control, was the researcher 1 of the university 3 with the following words:

> "Because of the interests. This is, for example, the animals, this is the human, this is food, this is feed. Yeah? So it definitely had different subgroups. And there was ... yeah. It ... it is really because of the subjects. It's not because we were, so they were all very friendly people, there was no dominant group, there was not ... there were no social aspects that ... that hampered us from collaborating: it was rather the subject."

Here it seems that the product of the relationality was more a relational "bad" rather than a relational good. The separation between the scientific fields was too broad and hampered the whole team in the ability to construe a successful collaborative relationship. In the DE_Control project we can observe few passages about the relationality developed in the network, which are indicative of the fact that social reflexivity was not occurring in this network, but the whole project was more a collection of individual contributes, as in the words of the director of the firm 5:

> "Well others will see this … this differently but basically … basically the project wasn't really … everybody did something there and ... but it wasn't very super-duper. And this [turned out] not until [...] the end in the … actually in last big meeting, there […] changed my in- ... my view there regarding this project because I noted that after all it had a benefit that ... that each project partner basically did something and hence project goals were met after all."[53]

Here is particularly clear that in the view of the director of the firm 5 the focus is on every singular contribution from the partners in the project. Considering the project from this point of view the singular objectives of each partner were reached at the end. But this seems not to be

[53] Original quotation in German: "Na, das ... das werden andere ganz anders sehen, aber im Grunde ... im Grunde war das Projekt nicht wirklich ... jeder hat da irgendwas gemacht und ... aber so richtig dolle war es nicht. Und das ist erst am ... am ... am Ende bei der ... eigentlich bei der letzten großen Besprechung, da ha- ... hat sich meine Ein- ... meine Sicht da auf dieses Projekt verändert, weil ich festgestellt habe, dass doch etwas bei rumgekommen ist, dass ... dass jeder Projektpartner im Grunde irgendwas gemacht hat und die Projektziele dann doch erreicht wurden."

dependent by the relationality developed inside the network. It seems that until the end, he did not know about what the others have done and that was not considered to be a problem at all, given that this project was not thought to be a real integration of different competences but from the beginning each partner had a precise task to develop in the project, which did not require a strong collaboration with the other partners. The fact that the project failed in the final integration of each contribution on a general platform can be indicative of the importance to develop social reflexivity when integration is needed.

7.3.4 Time and stabilisation

The last dimension refers to use and concept of the time at disposal for the project and processes of stabilisation inside the networks with social reflexivity. This dimension emerged exclusively from the analysis of the qualitative data, given that there was only one cross-sectional structural analysis at the end of each project, which cannot inform about the role of time in the dynamics of these networks. On the other side, the qualitative data referred to perception of changes in the networks during the time span of the projects and for these reasons present many limitations. The main limitation is the difficulty to call back past events from the side of the respondents, so they were asked through the extensive use of pictures (visual network scale) to reconstruct changes occurred in their networks in very general terms (see protocol of the interview, appendix A).

The aim was to understand if in the networks, which were supposed to produce the property of social reflexivity, a particular dynamic emerged, and to classify each network in one of the four paths to change developed by Donati: the creative network, the adaptive/developmental network, the reproductive network and the interactive network. Given that for Donati the network that is able to produce social reflexivity is only the creative one, where a stabilisation of a new structural form takes place at the end of the morphogenetic process (T4), which differs from the structural form at the beginning of the morphogenetic process (T1), this network implies change at a certain point of the morphogenetic process after the interaction phase is concluded (T2-T3).

The main idea was to apply the analytic model of the morphogenetic process (as explained in the theoretical chapter) to the whole length of the project. This meant to consider as T1 the beginning of the project, as T2-T3 the middle of the project and as T4 the end of the project but this approach has proved to be misleading in the context of innovation projects. The main problem is that innovation projects are time bounded projects from the beginning, they

develop in the three/four years they have at a disposal with their own dynamics, which are strictly conditioned by the time and most important they are not supposed to maintain a kind of stabilisation after the project has finished.

This does not mean in my view that these projects cannot produce social reflexivity and stability in the short time before to dissolve or to be replaced by other networks with new actors, new initial conditions and new challenges. In the two projects with the property of social reflexivity, from the analysis of the qualitative data, it is possible to recognise perceptions of change on a structural level and a stabilisation, even for short time of a new structural form. In the NL_Reflexivity project, for example, most of the respondents agreed in recognising a change from a structure centre/periphery to a structure based on subgroups. Most of them perceived a change in the intensity of the collaboration during the time, altering the density of the networks in different phases of the project, some of them experienced a change in their position from the periphery to the centre and vice versa.

There was agreement between the partners in recognising a lot of change in the central phase of the project, but a coming back to the initial structure at the end of the project and this can be simply explained by the fact that the project finished. The same can be held for the DE_Reflexivity project, where actors were also experiencing structural change from the first phase of the project, which was more depicted as a centre/periphery network, to the second phase of the project, where the network was more depicted as formed by subgroups.

Also in this network density was perceived to change during the time span of the project because the intensity of the collaboration changed over the time. All these “small” perceived changes can be indicative of a network churn dynamic (Sasovova et al. 2010) in the short time, this means adding/dissolving/bridging ties in relation to some tasks driven collaboration, for example. This can be seen as a kind of volatility (Burt et al. 2013) of the network, which can be seen as a kind of noise or problem when investigating stability of the network in the long-term, but if the frame of time becomes shorter they can have a completely different interpretation (Quintane et al. 2013). Thus, my thesis is here that both networks with social reflexivity were able to stabilise for a short time a new structural form, which later at the end of the project dissolved because of the time contingency of the project.

In the control networks, it is possible to grasp other kinds of dynamic; first much less perception of change was reported by the actors during the interviews, especially for the DE_Control, and second, the tendency to see the change of the overall structure of the network more as a slow development from one structure to another one. For example, in the NL_Control

project, the most of the respondents were not able to identify a clear structure between the four pictures presented in the first question (overall structure), but they always indicated a mixture of figures (1 and 2 for example or 2 and 3) for depicting the overall network, both at the beginning, in the middle and at the end. It was more perceived as a smooth passage from a mixture between figure 1 and 2, at the beginning and in the middle to a structure more like figure 2 at the end, suggesting that during the time there was more an adaptation process rather than a real structural change, a slow improvement in direction figure 2 but not a completely new structural form.

In the DE_Control project most of the respondents perceived no change in the overall structure from the beginning until the end of the project, most of the respondents perceived no change during the time of the density of the network and nobody experienced a shift of position from centre to periphery and vice versa. This network was supposed to have reproduced its same initial conditions.

7.4 Coming back to hypothesis and thesis, verification of the thesis

This dissertation aimed at verifying the role of social reflexivity in enhancing outperforming of EU-funded innovation projects. Coming back to the formulation of thesis and hypotheses in the theoretical chapter it is possible now to evaluate the role of social reflexivity in the four analysed projects. Of course, the design of this research does not allow to generalise the results to all EU-funded projects of Germany and Netherlands, but to better understand under which conditions social reflexivity can emerge and how it can be used for better performance.

Regarding the two projects, which were supposed from the beginning to have produced social reflexivity, they were showing, on the basis of the subjective evaluations from the side of the respondents, to perform better in the dimension of effectiveness than the two other control projects. Regarding the dimension of efficiency, it seems that time was perceived as being problematic in all four projects, as it will be further explained.

As it is possible to grasp from the table 7.1, the dependent variable of performance that has been evaluated to vary only regarding the dimension of effectiveness, i.e., that the way of working during the process was optimal for the fulfillment of intermediate/final goals of expected quality. Regarding the efficiency criteria, i.e., that final goals are fulfilled within budget and on time, all four projects had some difficulties regarding deadlines of the funding scheme.

All four projects had in a way to extend or to enter a second project, for one year or longer in order to complete the project, but all projects, even despite of this prolongation, cannot be

considered at their end. For DE_Reflexivity and NL_Reflexivity projects there would be space for continuing the projects with new partners and a new funding scheme.

Table 7.1: Results about performance in the two dimensions effectiveness and efficiency

	NL_Reflexivity	NL_Control	DE_Reflexivity	DE_Control
Independent variables				
Path to change, emergence of social reflexivity	Creative morphogenesis, social reflexivity	Adaptive morphogenesis No social reflexivity	Creative morphogenesis, social reflexivity	Reproductive morphostasis No social reflexivity
Regional Innovation Context	Extensive use of the regional excellence network in the preparatory phase.	No use of the regional excellence network in the preparatory phase.	Extensive use of the regional excellence network in the preparatory phase.	No use of the regional excellence network in the preparatory phase.
Interplay	yes	no	yes	no
Dependent variables				
Effectiveness	Partly met	Not met	Fully met	Partly met
Efficiency	Partly met	Partly met	Partly met	Partly met

For DE_Control and NL_Control projects the situation is quite different, because they were not able to fully meet the objectives of their projects during the time at disposal, but they do not plan to continue the projects in order to reach those objectives in another project with new partners and a new funding scheme. Regarding effectiveness we have two projects, DE_Reflexivity and NL_Reflexivity, where already intermediate/final goals were reached. The other two control projects were not reaching with their way of working intermediate/final goals, because NL_Control started a last experiment in the last six months of the project and was not able to bring on the market any product/technology at the end of project, on the other side the DE_Control project was successful in reaching individual objectives of the singular participating partners, but not successful in the final integration and marketisation of the singular results on a platform. The DE_Reflexivity project was evaluated to have fully reached the objectives of the two phases of the project, despite the fact that they will maybe enter a third phase, they reached intermediate and final goals they wanted to reach in each of the two phases of the project. For the NL_Reflexivity, the final goals were not fully reached, but they were able to put on the market the first developed products. It seems that social reflexivity could have had a role only regarding effectiveness more than efficiency, this would be in line with the results of other studies about team reflexivity, which detected a positive effect of team reflexivity on effectiveness but found

no evidence for a positive effect of team reflexivity on efficiency (Hammedi, van Riel & Sasovova 2011), despite the conceptualisation of team reflexivity is quite different in these studies from the conceptualisation of social reflexivity from Donati used in this dissertation.

Both projects, which produced social reflexivity, were able to stabilise the network in the short term, and so to allow a common understanding and perception of the network. More structural change was perceived in these networks in their intermediate phase (T2-T3), more small adjustments and dynamics were reported from the respondents rather than the other two control groups. The hypothesis about the importance of social reflexivity in enhancing a better final performance of the project can be here confirmed for both countries. What is not confirmed is the hypothesis that the two different innovation policies on the level of the regions may have had a role in enhancing outperformance of innovation projects. Despite the implementation of the ERDF funds in the two countries is different, more on a national basis in the Netherlands and on a regional basis in Germany, there are in both countries a more regional or local view in implementing these policies, i.e., a lot of different local actors are involved in the implementation phase. This "regionalisation" of innovation policies is although very present also in the Netherlands, although the governance is centralised, i.e., the central government controls the RTDI policy and the local authorities and local agencies have the role of implementing those policies. In Germany, there is an even more regionalised type of governance, here regional governments are responsible both for regulation and implementation of the RTDI policies on a regional level. This means that both national and regional levels of government have their specific competences for RTDI policies for both regulation and implementation according to their national laws. On an implementation level, there is not a huge difference, since in both countries there are different local actors actively collaborating and participating in the efficient implementation of these policies. For example, both respondents from the two social reflexivity projects reported the role of a regional network, which was very helpful in helping them in finding the appropriate partners in the preparatory phase of the project.

These would elucidate the importance of co-occurring of social reflexivity, as a more internal team variable, and a well-functioning implementation system at a local level, in enhancing outperforming of innovation projects, since only respondents from the two reflexivity projects reported the importance of the local system of innovation. My interpretation here is that a well-functioning and supporting local system of innovation can already enhance and boost reflexive processes inside the teams from the beginning of the project. The two control projects have made no extensive use of the already existing networks of excellence in the regions for finding partners or to have more support in the preparatory phase, relying more on their own

contacts and previous collaborations, which can be also important, but also limiting the opportunities that are available on a regional level.

7.5 Policies implications and recommendations

Given the importance of social reflexivity for outperforming of EU-funded innovation projects it is suggested here to consider it in the future formulation and evaluation of EU innovation policies. Furthermore, given the arising of social reflexivity in both countries as a more internal variable, which has more to do with team dynamics, it can be applied in many other regional innovation systems, not only in already well performing countries such as Germany and the Netherlands. But how it is possible to start reflexive processes at the level of networks? Is it enough to introduce from above some "reflexive" work sessions and shared practices to start a process of change? As previous literature suggested, it can be that "team reflexivity" alone not supported by team learning is not enough to start a process of change. In the conceptualisation of Donati social reflexivity, as reflexivity expressed by the networks, is a more complex and articulated process, which involve reflexivity on the three orders of relationship: between EGO and ALTER, between EGO about ALTERS' relationships and on a more abstract level between the general relationality that the network is able to produce. This means that there are more levels of intervention for policies to improve and foster reflexive processes in the networks.

From results of this research it is important for future policies to consider some characteristics of the networks that seemed here to have started the process of emerging of social reflexivity, such as the role of the project leader, the importance of brokerage between organisations, the cohesiveness of the network and the positive role of interdependencies, the need of an intensive interaction between the partners, especially at the beginning of the project, in order to be able to construe a common understanding and a kind of stabilisation that allows the network to solve unexpected problems and to go further with the project. Both projects, which showed to have produced the property of social reflexivity in their networks, were able to use in a creative way this reflexive potential. More external or spot interventions, which are not respectful toward the uniqueness of each project in the process of building its own relationality, can be even misleading. What the policy can do in this sense is try to achieve a local system of innovation around the projects, which already tries to foster reflexive processes, networks and offers continuous support for learning what other organisations in the regions are doing. An aspect that deserves particular attention in formulating future policies for innovation is that of the time, which in all four projects resulted to be problematic.

From the results of this research, it seems that if the networks are able to stabilise themselves in the short term then it is more likely that they will do a better use of the time at disposal and will probably perform better at the end of the project. For Donati, only a network that possesses social reflexivity will give rise to a kind of stabilisation at the end of the morphogenetic process (creative morphogenesis), through the use of relational feedback and the emerging of a relational steering (governance) in the network. For this reason, it is suggested here, that in the future formulation and evaluation of innovation EU-policies more attention should be paid to social reflexivity as a complex process, which involves the importance of the relationality developed by the network and the positive effect that social reflexivity can have on the effectiveness of the projects. It remains to explore better the effect of social reflexivity on efficiency, which from the results of this research, has not been proved to vary in any of the four selected projects.

7.6 Conclusions

This chapter was aimed at discussing the main results and their interpretation in light of the current literature. Coming back to the original formulation of thesis and hypothesis of this dissertation, the specific role of social reflexivity in outperforming of EU-funded innovation projects was described and the main thesis of this dissertation found evidence in the collected data. The second hypothesis about the role of a more external variable, the implementation of the policy at a regional level, found no confirmation in the data collected. A third hypothesis about the role of the interplay of both these variables about performance found confirmation in the collected data. The main characteristics of networks, which showed to have produced social reflexivity, were here explained and referred to literature. The chapter concludes with some practical implications and recommendations for future formulation and evaluation of EU innovation policies. In the next concluding chapter, the main results of this dissertation will be summarised differentiating between results, which added value to current research about social reflexivity and innovation and results, which referred more to EU innovation policy literature. The main research limitations and future directions for research will conclude the next chapter.

8 GENERAL CONCLUSIONS AND ADDED VALUE TO THE RESEARCH

8.1 Introduction

In this last part of the dissertation the aim is to summarise the main research results and to outline what was the specific contribution of this dissertation firstly to current research and literature about (social) reflexivity and innovation and secondly about EU innovation policies. This last chapter will conclude in outlining the main research limitations and future perspectives.

8.1.1 Results regarding social reflexivity literature

Two main results are here relevant for discussion about social reflexivity, the first refers to the problem of stabilisation of networks of EU-funded innovation projects, the second has more to do with the conceptualisation of social reflexivity from Donati that was chosen for this dissertation, in comparison with the more widely used conceptualisation of team reflexivity of West (1996) in the innovation literature. It will be here explained, building upon the results of this dissertation, what a more complex conceptualisation of social reflexivity can offer in explaining the link between (team) reflexivity and performance.

As previously explained in the theoretical chapter of this dissertation, in order to grasp the process of emerging of social reflexivity in each network, a morphogenetic approach was applied, establishing that the beginning of the project will be identified with the T1, the length of the project with the T2-T3 and the end of the project with T4 of the morphogenetic process. The main aim was to detect at the end of this morphogenetic process and thus of the projects, if the projects were able to produce and stabilise a new structure and in particular, a completely new structure from the beginning of the project, which can inform about the emergence or not of social reflexivity in the network. As already explained in the theoretical chapter, for Donati there are four paths to change, which may occur at the end of the morphogenetic process, but only the path of the creative morphogenesis is considered to be indicative of a network that was able to let emerge a completely new structure and to stabilise itself through the use of social reflexivity, i.e., relational feedback and steering. The two networks, which were supposed to have produced the property of social reflexivity, showed a creative morphogenesis in their ability to let emerge a new structure at a certain point of the project (T2-T3) and to have stabilised it but this stabilisation was not coincident with the end of the project (T4) but occurring before. At the end of the projects, respondents had more the perceptions that the structure was “coming back” to the structural characteristics of the original one (T1), just because the project was finished. This is

mainly due to the fact that innovation projects are time bounded projects, which last three/four years and for this reason, the relationships between the partners are not supposed to be maintained after the end of the project. The strictly application of the morphogenetic process to the time length of each project was misleading in the interpretation of the data, because these two projects displayed in fact change and social reflexivity during the project and at a certain point they were able to stabilise the network. This stabilisation has to be interpreted more in a short-term perspective, as a signal of a creative morphogenesis that at the end of the project is going to be dissolved or replaced by another network with new partners, new structural conditions and a new project. This aspect of the stabilisation of networks in innovation projects would deserve further attention in the research. Some literature is already pointing out the role of time in innovation projects (Sasovova 2010, Quintane 2013), the results of this dissertation are in line with this literature especially regarding the need to recognise and interpret change and network's dynamics in a more shorter time perspective. The second result regarding social reflexivity that can be here discussed is the use in this dissertation of a different conceptualisation of reflexivity at a team level. In the current innovation literature, when detecting the link between reflexivity at a group level and performance, the "team reflexivity" conceptualisation of West is widely used (West 1996; Klueger & DeNisi 1996; West, Garrod & Carletta 1997; Hoegl & Parbooteah 2006; Hammedi, van Riel & Sasovova 2011; Moreland & McMinn 2010; Schippers et al. 2013). The conceptualisation of West was operationalised in specific actions of the group as reflecting on the past, planning, questioning, reviewing past events with self-awareness, learning at a meta level, etc. (West 1996) but was lacking regarding more cognitive aspects, which cannot be easily subsumed by some collective behaviors. The link between "team reflexivity" in this terms and change was also questioned in the research (Wilson, Goodman & Cronin 2007), because it seems that team reflexivity has to be mediated by team learning in order to produce a change. The conceptualisation of West is lacking also regarding different levels of reflexivity that can occur in a team, treating reflexivity as something that can be more or less introduced from outside if it is needed, through some planned interventions. The conceptualisation of Donati sees social reflexivity as a property that pertains to the network and as a process that can be cognitively fostered on three orders of relationships: between EGO and ALTER, between EGO about ALTERS' relationships and on a more abstract level between the general relationality that the network is able to produce. This conceptualisation of social reflexivity, which is in fact more cognitive based, when properly fostered, can emerge in the network and can orientate action in order to fulfil the objectives of the project. Results from this dissertation showed that social reflexivity, in the conceptualisation of Donati, let the effectiveness dimension of performance

vary, in the two selected cases, the variation of the efficiency dimension of performance was not observed in any of the four selected cases, which showed how problematic is "time" in such projects. More research would be needed in the future to understand how social reflexivity could have a positive impact on efficiency of EU-funded innovation project. Given that it is assumed that "reflexivity" is time and resources consuming, at least in the theorisation of West, as in other studies was already detected (Hammedi, van Riel & Sasovova, 2011), it is suggested here to introduce more cognitively-based tools in the networks in order to foster awareness about social reflexivity through the use of mapping techniques at different temporal times, but especially at the beginning. The effort to start reflexive processes from the beginning of the project and to let be partners more aware on a cognitive level about reflexive processes on a network level can help in developing the "real relationality," which is needed to fulfil the project with the expected quality (effectiveness) and in time and budget (efficiency). Another result that can be considered here for future research and for practice is that networks with social reflexivity displayed particular structural characteristics in the two countries/regions such as the role of the project leader, the importance of brokerage between organisations, the cohesiveness of the network, reciprocity, transitivity, etc. The qualitative analysis regarding these structural characteristics has allowed to understand for example, that a more distributed leadership can have a role in enhancing reflexive processes on a network level and how it can function. Higher degree of reciprocity and transitivity in cohesive networks are indicators of a "critical mass" needed for starting and boosting reflexive processes. A deeper look in the figure of the broker has allowed to understand that the presence of brokers in such projects can enhance a better circulation of the information/communication and coordination and in turn can start reflexive processes. All these characteristics of reflexive networks can be further confirmed or not in other studies in the future and they can also be considered in formulating future policies for innovation and their evaluation.

8.1.2 Results regarding implementation of innovation policies

As already explained, the second hypothesis of this dissertation about the role of different policies for innovation on a regional level on outperforming of EU-funded innovation projects has found no confirmation in the data collected. In both countries, on a regional level, there is a vivid local system of innovation that can offer support in the implementation of the policies. Both projects, supposed to have produced the property of social reflexivity inside their networks, reported the important role in the preparatory phase of excellence regional networks, which have had the role to bring together different partners working in the same field, research on food for

the Eastern Netherlands and research on cells for North Rhine-Westphalia. The presence of a well-working regional innovation system in both selected regions is also reported in the ex-post evaluation reports about the implementation of the ERDF funds in the two countries (European Commission 2016a, b). In the report about Germany not only the high administrative capacity of the managing authorities was reported but also the contribution of "intermediate bodies such as regional development agencies and Chambers of Commerce, which have contributed in accelerating the rate of absorption of funding and in supporting beneficiaries in developing and implementing projects." (European Commission 2016a:15). A good coordination system between local authorities, such as municipalities and the four managing authorities with central authorities such as the Ministry of Economic Affairs were reported in the ex post-evaluation report about the Netherlands as a good example of well-performing multi-level governance. It seems that the performance of the two countries in managing the structural funds for innovation has proved to have improved during the programming period 2007/2013. The existence of a well-functioning implementation system on a local level does not explain why only the two projects with the property of social reflexivity were able to profit more from the external context rather than the other two control projects. This dissertation has more focused on the role played by social reflexivity in outperforming of EU-funded innovation projects, in selecting two countries and regions, which presented quite similar characteristics in terms of economic development and higher education systems but were different in their innovation outputs. Actually, the role of the regional context for innovation emerged in both countries in the two projects, which showed social reflexivity, given the extensive use they have done of regional excellence networks already present in the regions for selecting the partners to participate in the project. The fact that the two control projects did not make use of the same regional resources in the preparatory phase can confirm the third hypothesis of this research that an interplay of regional context for innovation and social reflexivity was in place. From the analysis of the interviews it seems that the fact to be already involved in these networks of excellence on a regional level has facilitated later the emergence of social reflexivity in the project, but given that this thesis and its design was more thought to verify the thesis about social reflexivity and performance, it is not possible here to fully confirm this hypothesis, i.e., more research would be needed to understand if it is the external context that can foster the emergence of social reflexivity in the projects and how, or if it is rather the social reflexivity developed inside the projects that make actors more prone to profit from external resources. The two regional and national systems of innovation showed to have different strengths and weaknesses, and to have a significant gap among themselves regarding the twelve outputs indicators of the Regional Innovation Scoreboard 2012, although

both of them displayed an above average performance in comparison to other EU-27 countries. For example, Gelderland and, more in general, the Netherlands, showed to perform better in indicators like "population with tertiary education" and "public R&D expenditures" and in the so-called relational indicators, i.e., "collaborating with other firms" and in "co-publishing the results," while North Rhine-Westphalia and more in general, the western regions of Germany, performed better than Gelderland and the Netherlands in indicators about commercialisation and patenting. In fact, it seems that Netherlands and Germany have complementary systems of innovation on a local level. They have different strengths and weaknesses, but these differences have not impeded the emergence of social reflexivity in both countries in the two outperforming cases, giving not support to the hypothesis that these two countries have two very different innovation policies on a regional/local level and thus very different results in terms of performance.

8.2 Research limitations and future perspectives

Regarding the main research limitations there were some methodological problems already explained, which deserve here to be reported once again. The difficulty to enter directly in contact with the different partners of the projects required the intermediation of the project leader at the beginning of the collection of the interviews. In order to correct the sampling bias it was decided in a later phase to adopt a questionnaire, which involved all the partners, who were mentioned at least from other three respondents during the interviews. The adoption of the questionnaire has allowed to specify in more clear terms what was meant under "collaboration" and to detect more precisely the intensity of the relationship. Another limitation, which was partly solved through the adoption of the questionnaire, was that at the beginning, when using net-maps to collect data about the networks, the whole network was missing, given that net-maps are EGO-centred maps. The main limitation encountered was to have both data about structure at a given point of the projects (at the end) and more "longitudinal" kind of data about the whole process, in order to detect changes in the networks. Some compromises had to be done because of the fact that the projects were already mostly finished when collection started so that only a cross-sectional measurement of the network's structure was possible (at the end). Regarding change during the projects a retrospective perspective had to be adopted using some tools, which allowed respondents to call back perceptions of change during the time span of the project (visual network scales). Of course, to have collected perceptions of changes is not the same as to have done different network's structure measurements at different temporal times of the projects. On the

other hand, the use of the methodology of the visual network scales, during the semi-structured interview, has allowed to start a narration, which helped in understanding more in-depth what happened during the time in these projects and fostered reflexivity on the third orders of relationships. Another methodological problem encountered during the collection of the data was the low respondent's rate to the questionnaire of one of the four selected projects, the DE_Control project, where only the half of the partners answered the questionnaire and some problems arose in the reconstruction of the whole network regarding the missing respondents. In part, this problem was solved having the qualitative data at disposal, to better understand at least the dynamics in the time of this network. On the other side, the adopting of a conservative threshold for confirming/not confirming the existence of a relationship when missing respondents were involved (as suggested in the Krackhardt methodology) made it difficult to reconstruct the whole network, given that not all the respondents were able to answer the questions about the second order of relationships (ALTER-ALTER). For this reason, it can be that the whole network reconstructed for this project was a bit underestimating the "real" collaboration relationships in place in the last six months of the project, although qualitative data about this network would confirm that many partners were not more involved in the last phase of the project. Another problem regarding methodology was occurring in the analysis of the questionnaire's data. There were some problems of asymmetry in the data, given that each respondent had to answer twice for the same pairs of actors. For example, first was asked C to estimate how intense was the relationship between A and B and then later in the questionnaire was asked him/her the same for B and A. Not always the answer was the same between the four intensity options. For the purposes and aims of this dissertation it was evaluated that the problem could be solved in using a mean between the two values, but a closer look in the asymmetry could be interesting in a future research in understanding hierarchies' perceptions between the partners. Another limitation of the research, more on an analytical level, was the strictly application of the morphogenetic process to the whole length of the projects, which was misleading when interpreting the data about network's stabilisation. This is due to the very explorative use of the morphogenetic approach for studying social reflexivity in innovation projects, given that there were not previous research of the specific role of social reflexivity in time bounded EU-funded innovation projects. More research would be here needed about time, change and stabilisation processes of these peculiar innovation networks.

Some future perspectives for research will be here outlined. The design of the research preferred for comparison in this dissertation was a most similar case design, but in the future, given that social reflexivity is a more internal variable of teams, it could be interesting to evaluate

the role of social reflexivity in other EU and non-EU regional innovation systems. Especially in regions which report very different development conditions to further confirm the fact that social reflexivity is not country dependent, as resulted from the results of this dissertation. Especially interesting could be to further analyse the link between policies on a regional level and emergence of social reflexivity in teams, which in this dissertation was not fully investigated. For practitioners and local stakeholders it could be interesting to try to introduce some mapping techniques and reflexivity sessions already in the preparatory phase of the project and to let researchers collect data about networks' structure and changes during the different phases of the project, so to monitor and increase awareness about social reflexivity during the project. As results from this dissertation confirmed, the two projects with the property of social reflexivity were able to stabilise the structure of their networks quite soon in the project, the other two control projects were also producing a kind of reflexion about their networks but mainly at the end of the projects, when there was no more time left to intervene. Hopefully there will be in the future interest to further investigate the positive role that social reflexivity can have on effectiveness of innovation projects and to understand better which kinds of interventions are more appropriate, so that social reflexivity could also have a positive role on the efficiency variable of performance.

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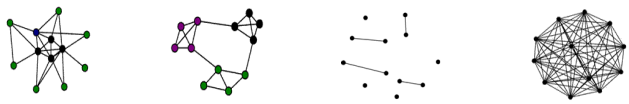
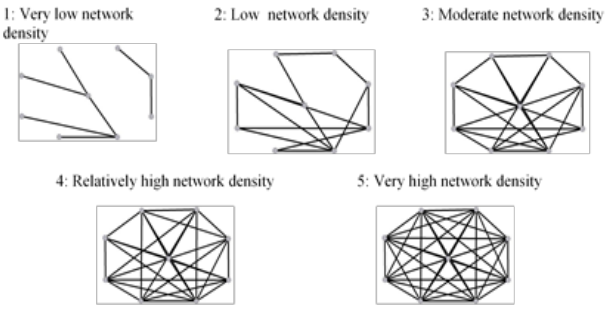
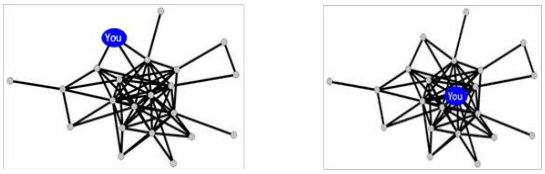
APPENDIX A. INTERVIEW PROTOCOL

PART 1: NET-MAP DRAWING	PART 2: VISUAL NETWORK SCALE QUESTIONS (Mehra et al. 2014)	PART 3: EVALUATION QUESTIONS
Start into the project: Incentives to participate into the project Starting conditions **Partners involved:** History of past collaborations in other projects and mutual respect. **Meetings:** How many meetings with the project's partners during the project? **Work modalities:** Type of work modality developed inside the group (mail, meetings, face to face, Skype conferences, teamwork) **Net-map drawing** **Name generator:** With whom did you collaborate in the last six months of the project? Collaboration it means here not ... or not only face-to-face encounters, but also per email, Skype, or some other types of contact.	**Question 1 (OVERALL STRUCTURE)**: If you consider figures like these ones, which one do you think would depict better the situation you have already drawn in your map and why? Would you choose the same figure for the beginning of the project or another one? Has been the situation changed from one figure to another one during the time span of the project? 1. Centre/periphery 2. Subgroups 3. Sparse 4. All with all  **Question 2 (DENSITY):** If you have a look on these figures, about how many times the partners met and shared something together ... so do you think that during the project - at the beginning, in the middle, at the end – one or more of these figures was/were the situation of the project? 1: Very low network density 2: Low network density 3: Moderate network density 4: Relatively high network density 5: Very high network density  **Question 3 (POSITION):** Then you are in your map in the middle. Do you think that during the project, at the beginning or at the end, have you been in another position? Do you have the perception you have always been in the middle? 	**Parts on evaluation and final questions:** Just to conclude, if you have to evaluate this project and if you in the future will have the opportunity to collaborate again with these organisations and partners, would you like to collaborate again or not? What is your evaluation about the whole project, about the general objectives of the project and from your perspective? Do you think that in general the objectives of the project were reached or not?

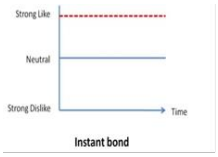
Relations EGO-ALTERS and ALTERS-ALTERS:

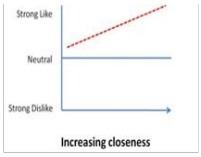
Now I am asking if you can draw a line between you and all these partners, and maybe you can differentiate with a straight line if you collaborated very much with them, and if less with a dotted line. Maybe you can explain me why have you collaborated with some more and with others less in the last six months of the project?

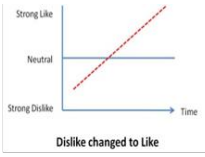
Now I am asking you if you know if all these partners were also connected among themselves in the last six months of the project. Can you connect them with a line?

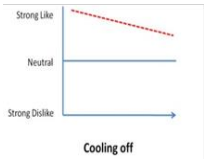
Question 4 (PATTERN OF RELATIONSHIP):

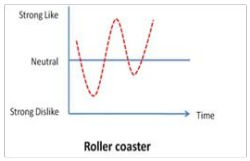
here, you can see there are different patterns of the collaboration between you and your partners. You can choose one general for all the partners or you can also put some partners in one and the other partners in another one.





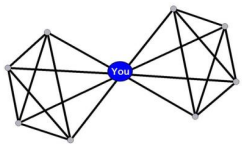






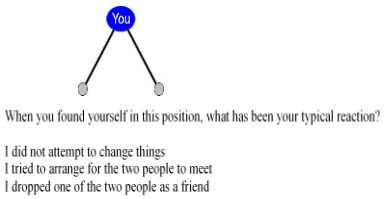
Question 5 (BROKERAGE 1):

have you ever been in the position that you are in the middle between two partners/two groups and you have to mediate in a conflict situation, or if there is a problem, or maybe they do not know so well each other and you have to bring them together during the project?



Question 6 (BROKERAGE 2):

when you find yourself in this position between two persons: they do not know each other, they do not like each other, or there are some problems. What is your personal attitude to them? Do you try to change the things, or that the two people meet or you drop one of the two people as a partner?



APPENDIX B. QUESTIONNAIRE

Introduction

Thank you for taking part in my short survey! The data collected here will be treated only in an aggregated way so that it will be impossible to recognize the name and organizational affiliation of the participant completing the survey in any data transcriptions or final report. I ask you to identify yourself only at the beginning of the survey for my confidential records. A number identifier will be used to record your survey answers throughout the remainder of the study to ensure your identity remains anonymous throughout the data collection process.

Definition of the detected relationship

This survey is designed to learn more about your work with project <NAME OF THE PROJECT> from June-December 2015. I am specifically interested in learning more about your collaboration with other partners in the field for the purposes of meeting the goals of your assigned project. I am defining collaboration in this context as one or more of the following activities: sharing knowledge related to the project with other partners, exchanging best practices with partners, and/or providing information or advice to other partners about the project's development. Collaboration in these situations may have taken the form of one or more of the following: face-to-face exchanges, email exchanges, Skype or phone calls, or discussion during group meetings or team activities.

Identification

As you will see, I have listed the most relevant partners to the <NAME OF THE PROJECT> below based on names, title role in the project, and organizational affiliation. Please indicate your identity below. As I explained earlier, your identity will be coded as a number for the remainder of the survey to ensure anonymity and confidentiality.

Questions

(Pages 2-11). Estimate how often each of the partners listed below collaborated with <NAME of PARTNER> for the <NAME OF THE PROJECT> in the period from June 2015-December 2015. Choose only one of the four possible boxes in each designated column (including the column that lists your identity). If you feel that the partner listed did not collaborate with other partners and/or you are not sure if they collaborated with other partners, leave the boxes in their designated column blank.

Conclusions

Thank You for completing my survey! Please include any additional comments/suggestions in the box below if you wish.

APPENDIX C. CHARACTERISTICS OF THE PROJECTS

PROJECTS	Sector	Total number and types of organisations	Budget (public co-financing)	Length of the Project
DE_CONTROL	Biotechnology	1 Public University 4 High-Tech SMEs 1 large company	Circa 2,500,000 Euro granted in total	10.2010 – 12.2013 (for some partners was extended until 12.2014)
DE_REFLEXIVITY	Biotechnology	2 small High-Tech firms 1 public university 1 public university/hospital (3 different departments involved) 2 research centres (public/private)	Circa 2,500,000 Euro granted in total	11.2010 – 04.2014 (second part of the project 06/2014 - 12/2015)
NL_CONTROL	Biotechnology applied to food	2 large firms both multinational 3 Public Universities 1 Research Centre (private)	Circa 2,700,000 Euro (granted in total ERDF contribution circa 900,000 Euro)	09/2011 – 12/2014 (extended until 12/2015)
NL_REFLEXIVITY	Biotechnology applied to food	1 Public University 2 Research Centres (public/private) 1 SME (formed by two start-ups which merged in one firm) 3 Large firms (two of them multinational) 1 Public Hospital	Circa 2500,000 Euro (granted in total ERDF contribution circa 800,000 Euro)	01/2012 – 06/2015 (extended until 12/2015)

APPENDIX D. OVERVIEW ABOUT DATA COLLECTED

PROJECTS	Total number and types of organisations involved in each project	Roles of the partners in each network	Respondents questionnaire	Respondents interview
DE_CONTROL	1 Public University 4 High-Tech SMEs 1 large company	Project Leader University Coordinator Firm 1 Researcher Firm 1 Coordinator Firm 2 Researcher Firm 2 Director Firm 3 Coordinator Firm 4 Researcher 1 Firm 4 Researcher 2 Firm 4 Researcher Firm 5 PhD Student 1 University PhD Student 2 University Post-doc University Researcher University	Project Leader University Researcher Firm 1 Director Firm 3 Coordinator Firm 4 Researcher Firm 5 Post-doc University Researcher University	Project Leader University Researcher Firm 1 Coordinator Firm 4 Researcher Firm 5 Director Firm 5
DE_REFLEXIVITY	2 small High-Tech firms 1 public university 1 public university/hospital 2 research centres	Project Leader Firm 2 Project Coordinator Firm 1 PhD Student 2 Research Institute 2 PhD Student 1 Research Institute 2 AG Coordinator Research Institute 1 Professor University/Klinikum 2 Scientist University 1 Project Leader University/Klinikum 2 Project Management Firm 2	Project Leader Firm 2 Project Coordinator Firm 1 PhD Student 2 Research Institute 2 PhD Student 1 Research Institute 2 AG Coordinator Research Institute 1 Scientist University 1 Project Management Firm 2	Project Leader Firm 2 Project Coordinator Firm 1 PhD Student 2 Research Institute 2 AG Coordinator Research Institute 1 Project Leader University/Klinikum 2
NL_CONTROL	2 large firms both 3 Public Universities 1 Research Centre	Project Leader Firm 2 Researcher Research Institute Finance/administration firm 2 Researcher Firm 1 Researcher University 1 PhD Student University 2 Researcher University 2 Researcher 1 University 3 Researcher 2 University 3 PhD Student University 3	Project Leader Firm 2 Finance/administration firm 2 Researcher Firm 1 PhD Student University 2 Researcher University 2 Researcher 1 University 3 Researcher 2 University 3 PhD Student University 3	Project Leader Firm 2 Researcher Firm 1 Researcher University 1 PhD Student University 2 Researcher 1 University 3
NL_REFLEXIVITY	1 Public University 2 Research Centres 1 SME (formed by two 3 Large firms (two of them 1 Public Hospital	Project Leader Research Institute 2 Researcher University Business Developer 1 Firm 1 Business Developer 2 Firm 1 Coordinator Communication Hospital Communication Firm 2 Business Developer Firm 4 Business Developer Firm 3 Product Development Researcher Research Institute 1 Nutritionist Research Institute 1 PhD University Head Dietician Hospital Business Developer Firm 2	Project Leader Research Institute 2 Researcher University Business Developer 1 Firm 1 Business Developer 2 Firm 1 Coordinator Communication Hospital Business Developer Firm 3 Nutritionist Research Institute 1 PhD University Business Developer Firm 2	Project Leader Research Institute 2 Researcher University Business Developer 1 Firm 1 Coordinator Communication Hospital Business Developer Firm 4 Nutritionist Research Institute 1 PhD University

APPENDIX E. Netherlands eligible areas – Cohesion policy 2007/2013[54]

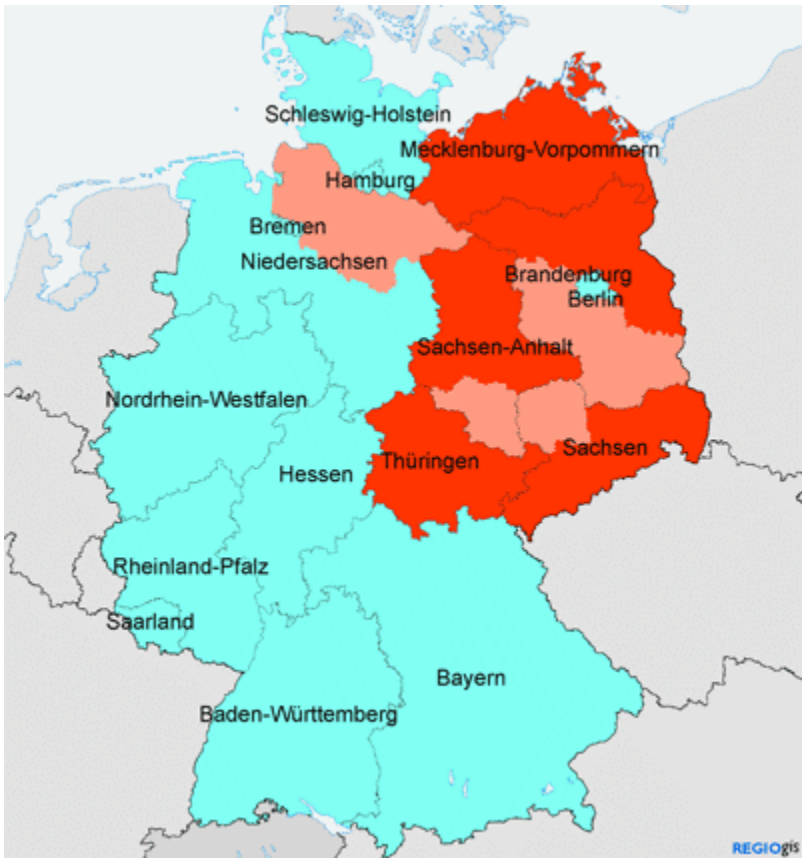
Netherlands eligible areas under the Convergence Objective and the Regional Competitiveness and Employment Objective – Cohesion policy 2007/2013

- **Convergence Regions**
- **Phasing-out Regions**
- **Phasing-in Regions**
- **Competitiveness and Employment Regions**

[54] http://ec.europa.eu/regional_policy/en/information/maps/#3

APPENDIX F. Germany eligible – Cohesion policy 2007-2013[55]

Germany eligible areas under the Convergence Objective and the Regional Competitiveness and Employment Objective – Cohesion policy 2007-2013



- **Convergence Regions**
- **Phasing-out Regions**
- **Phasing-in Regions**
- **Competitiveness and Employment Regions**

[55] http://ec.europa.eu/regional_policy/en/information/maps/#3

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This thesis is dedicated to Moritz and to the memory of my beloved father.

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