University of Applied Science

Social Network Approach for the Management of Dispersed Multinational Teams in a Global IT Service Enterprise - Requirements, Challenges and Solutions for the Intercultural Collaboration

Masterarbeit

zur Erlangung des akademischen Grades
Master of Arts

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1. Juli 2009

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Müller, Jeannett:
Social Network Approach for the Management of Dispersed Multinational Teams in a Global IT Service Enterprise - Requirements, Challenges and Solutions for the Intercultural Collaboration
Masterarbeit, Fachhochschule Brandenburg, 1. Juli 2009.

Selbstständigkeitserklärung

Hiermit erkläre ich, dass ich die vorliegende Masterarbeit mit dem Titel "Social Network Approach for the Management of Dispersed Multinational Teams in a Global IT Service Enterprise" selbstständig angefertigt, andere als die von mir angegebenen Hilfsmittel und Quellen nicht benutzt und die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen als solche kenntlich gemacht habe.

Brandenburg, den 1. Juli 2009

Jeannett Müller

Preface

There are three main causes that resulted in this present study. Firstly, I decided on the postgraduate study course Technology and Innovation Management at Brandenburg University of Applied Sciences. My course consists of Latin and South Americans, Europeans, Asians, and one German namely me. This unique opportunity gave me the chance to get to know so many different nationalities, languages and cultures at once. The first idea for this thesis came up during a team work for a business plan project. Generally, a team consists of different characters, but especially a multinational team is a convergence of different cultures and different educational backgrounds. In the beginning of the project, there was a lively discussion about different points of view and prospects. Due to a high level of communication and interaction among the team members a common consensus was reached including a successful result in the end.

Secondly, while studying technology management the social network analysis was introduced to examine relation data. The data belong to group processes in technology and innovation management. The processing of data shows that some actors have a certain position and role within their network. These actors play a key role, for example, as motivator or enabler of innovation processes in order to adapt and diffuse new technologies. My idea is to combine this methodology with the intercultural management to find out requirements, challenges, and solutions.

Finally, through cooperation with a global IT service provider I had the opportunity to exemplary test my idea. During the observation I got insights into practical challenges of intercultural collaboration. This helps me to set up the multidimensional framework and develop the social network approach.

Acknowledgment

The development of this master thesis took place in three phases and involved three institutions. First of all, thanks go to my advisors Prof. Dr. Bettina Burger-Menzel and Dr. Wolfgang Fuhr who assist me in any case of questions and gave me valuable input.

Next, I got the opportunity to participate in an education exchange program between my university and the Universidad Autónoma Metropolitana in Mexico City. From September to November 2008 I was at the department of economic production. Therefore, my thanks go to all researchers and staff. Special thanks for supporting my thesis and hospitality deserves Juan Manuel Corona Alcántar, Gabriela Dutrenit Bielous, and Manuel Soria López.

Last not least, I especially thank all people who contribute this thesis in form of support, help with the correction, and fruitful discussions. Thanks go to all service and development team members and leaders for their input through interviews and discussions. Additionally, my thanks go to Lars van der Bijl and Olliver Schwabe for their expertise.

I dedicate the study to my family and my boy friend and say thanks for moral support and understanding.

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List of Abbreviations

i	Sending Actor
j	Receiving Actor
x	Value for Sending or Receiving Actor
GDP	Gross Domestic Product
E-I Index	Group-External and Group-Internal Index
HR	Human Resources
IBM	International Business Machines Corporation
IT	Information Technology
KPMG	Klynveld, Peat, Marwick and Goerdeler
MNC	Multinational Company
MNE	Multinational Enterprise
OECD	Organisation for Economic Co-operation and Development
SECI	Socialization, Externalization, Combination, and Internalization
SNA	Social Network Analysis
US	United States

Chapter 1

Introduction and Thesis Approach

International business relationships cross national borders and lead to a new kind of network structures between and within companies. Declining prices for transport costs, tariffs, energy costs, and communication costs pushes the economic globalization. As one of the driving forces in the globalization process the multinational enterprise is identified, but the consequences of a globalized world have a positive and a negative character.

Further, the growing amount of knowledge leads to a progressive specialization by experts inside and outside the company. Through the collaboration of dispersed multinational team members complex and distributed knowledge can be used, and help to manage the international competition more effectively. However, social interactions of geographically distributed and intercultural experts causes special requirements for the organization and the management of a multinational enterprise.

In the following sections, the concept of the social network approach as main thesis will be enlarged upon. In the beginning, the traditional approach is exemplify by an illustration of possible weaknesses in a global IT service enterprise. A multidimensional approach for the management of dispersed multinational teams develop the social network related thesis. Therefore, supported sub-theories in regard to organization, knowledge management, and intercultural management will be introduced. Finally, last section of this chapter illustrates the structure of the work. Goal is to give a general overview of concerned topic and to explain the conceptual approach.

1.1 Traditional Approach of Global IT Services

In the center of this work a multinational IT service enterprise is anonymously described. This multinational IT service enterprise belongs to a holding organization. This holding organization consists of three subgroups, two service companies, and further subsidiaries. One of these service companies shares a variety of business segments, like integrated services for human resources processes and related information technology systems. Within this integrated service segment the multinational IT service enterprise is located. Main business concept is the consulting and support for human resources processes and software-based applications. This multinational enterprise consists of geographically distributed business units which are legally independent. This case gives main direction for the research in management of dispersed multinational teams.

The multinational enterprise implemented a global human resource administration IT system, based on software. This system store all personal data from members of staff that belong to the holding organization. This increases the efficiency of a global human resource administration by replacement of various human resource IT systems and their individual support structures. Mostly all human resource processes within the worldwide holding structure have to be adjusted to fulfill the needs of intra-organizational standardization, national regulations and laws. The legal entities of that multinational enterprise are situated in certain countries and worldwide regions.

Local closeness to globally spread business areas related to the holding organization is essential for a multinational service enterprise. Their geographically distributed entities are legally independent, but control is taken up by the head quarter organization. In that way, global advantages are used without loose of local closeness to regional customers. Connection of locations is arranged by mediators, called hubs. They are persons who are responsible for a certain region of the world, and connect among legal entities and head quarter. Therefore, head quarter and entities use the same information channels.

The organizational structures within the legal entities are mostly simplified. Organizational charts and naming of positions are adapted by several international business units. Tasks of Planning, Building, and Running of global IT system, as well as administration of customers are distributed to project groups, dispersed multinational

teams, and international operating departments. Their level of collaboration depends on the intensity of social interactions. For example, a dispersed multinational team is formed by intercultural employees, who have a common goal, and they are geographically distributed. Formation of such team members is done by local organization. That means, they are selected by their hierarchical responsible person, for example, a local supervisor. The hierarchy structure changes for a dispersed multinational team member. There is a linearly responsible person (e.g., regional supervisor), and additionally a virtually or matrix organized responsible person (e.g., global manager), who have the responsibility for the international project or team. These organizational and resourced-based views are explained in detail in chaper 3.1 with the figures 3.1 and 3.2 as graphical illustrations.

Within the multinational enterprise there are certain dispersed multinational teams responsible for IT service support of the global human resource system. Besides standardization and harmonization of human resource processes, additionally, IT service support processes are simplified. Therefore, an international standard setting has taken place to organize the global IT service structures. This is comparable to line work in the industry. Advantages lie in cost efficiency through replacement of various systems and processes. Moreover, constant quality through service level definitions, and time savings through fewer frictions allow international collaboration.

In the service organization dispersed multinational team members follow standardized process routines, and have fewer face-to-face contacts due to their geographical distribution. Social interactions take place increasing virtual through electronic information and communication technologies. Various mechanisms for support of communication exist. For example, messenger, email, group calendar, IT support ticket tools, conference calls with video transfer, voice mail, voice over Internet protocol (VoIP), also face-to-face meetings occasional. The exchange and storage of information is organized through databases with intelligent search functions, like key wording.

All in all, the traditional approach contains a description of observed multinational IT service enterprise. The organizational structure follows a global strategy and enable simplification of international business units. Mainly hierarchical structures depend the selection of international team members. Further, intercultural training takes place through language courses, intercultural workshops, or some face-to-face meetings. Electronic communication infrastructures give possibility for efficient and fast social interactions.

Finally, process standardization, a common knowledge base, as well as guidelines and framework settings support mainly intercultural collaboration of dispersed multinational teams in that company.

1.2 Weaknesses of Traditional Approach

The process of economic globalization and thus diffusion of multinational enterprises create new conditions for intercultural and geographically distributed workforce. Global organizational structures, management of diversified cultures within one company, and transfer of knowledge across borders have more or less test status in the experimental ground of multinational enterprises. The following section state possible weaknesses in the traditional approach. [Podsiadlowski 2002], [Holtbrügge and Welge 2003], [Bergemann 2003], [Baumer 2004], [Köppel 2007], [Baumueller 2007]

The importance of this topic is supported by growing amount of dispersed multinational teams. Formerly, started as international project organization or teams, nowadays, their durable appearance is increasing. For that reason, an organizational structure should include requirements concerning exchange of experience and intercultural collaboration. [Bergemann 2003, p. 181.], [Köppel 2007, p. 1.]

> "Many companies claiming to be global are in fact international, with operations located in several countries but the seat of control and the definition of the corporate culture entirely in the head office. [Ibbott 2007, p. 1.]

Most global companies focus on leadership and management style to handle the consequences of intercultural collaboration. That can be only one aspect of various. Due to the geographically distribution of multinational team members, a global manager can visit only a certain legal entity at one time. Additionally, electronic communication is hindered through different time zones. The term *Virtual Team* describes such working structures of geographically distributed employees with electronic communication support. [Lipnack and Stamps 1997, p. 10.]

> "Culture is the result of a complex group learning process that is only partially influenced by leader behaviour." [Schein 2004, p. 16.]

Unlike virtual teams, additionally, a dispersed multinational team consists of various intercultural team members. For that reason, a same acceptance of electronic communication instruments, a same understanding of values and beliefs, as well as a same style of leadership can not be expected. These arguments show the challenges that must be taken up by a global leader, and also by a global team member. [Bergemann 2003, p. 182.]

Due to high costs for exchange and high risk of failure less employees are permanently delegated to foreign countries. Intercultural collaboration depends on decreasing transaction costs, like transport costs, information and communication costs. Efficient communication infrastructures are build up to increasingly replace face-to-face interaction. However, trust building depends on personal contact. Besides geographical distance, there is also a personal distance that affects efficient collaboration. For example, mistrust through personal distance, misunderstandings through different languages, and problems of intercultural acceptance decrease efficiency within dispersed multinational teams. [Beier 2006, p. 7.]

> "Further, Handy suggests that it is unwise to trust people whom you do not know well, whom you have not observed in action over time, and who are not committed to the same goals." [Handy 1995, p. 15.]

Undoubtedly, trust is an essential element for a successful business team, like a dispersed multinational team in a global IT service structure. But compared with an academic team or a research team goal setting and motivation for collaboration, intensity of interactions, and exchange of knowledge vary. Therefore, time and cost savings through modern electronic information and communication instruments is a huge advantage for a multinational enterprise. Important point is the effective use of these mechanisms to create business opportunities and values.

> "What we must remember is that this new information technology is only the pipeline and storage system for knowledge exchange. It does not create knowledge and cannot guarantee or even promote knowledge generation or

> knowledge sharing in a corporate culture that doesn't favor those activities." [Davenport and Prusak 2000, p. 18f.]

The more a multinational enterprise grow and the more countries are involved in this process, the more things become complex. An organization has to bear risks that results from international collaboration. Following the statement of Lipnack and Stamps (1993) in such an organization one employee can have more than one leader. In the case of a dispersed multinational team member this argument becomes true.

> "Lipnack and Stamps coined a term, *TeamNet*, to describe *Networks* of *Teams* that cross conventional boundaries to improve horizontal organizational relationships while complementing or coexisting with the traditional prescriptions of vertical hierarchy; they cross boundaries and have less bosses and more leaders." [Lipnack and Stamps 1993, p. 10.]

Summing up, there are certain challenges and risks for management of dispersed multinational teams within a global IT service enterprise. Firstly, cultural aspects have impacts on building up and successful team working. Secondly, embarrassments in management goes back to complex organizational structure, like overlapping of horizontal relationships and vertical hierarchy. Thirdly, mistrust and misunderstanding affect the relationship building, and therefore, decrease efficiency of collaboration. As a knowledge based company the global IT service enterprise depends on sharing of knowledge as an important resource for their value creation. Finally, social interactions within dispersed multinational teams give impulses for need of supporting activities, like reorganization, trust building, and knowledge sharing. The question is about: How to identify, measure, and value social relationships among geographically distributed and intercultural employees? One possible answer is the social network analysis that is introduced in the next paragraph.

1.3 Multidimensional Approach and Hypothesis

To lay the basis for the development of this master thesis, I explore the relationship among concepts of organization, knowledge, and culture. I do so by looking at how these

concepts affect intercultural collaboration in a multinational IT service enterprise. These concepts are then used as building blocks to develop the social network analysis as main thesis and methodology. The following figure 1.1 gives an overview of the relationships of each concept with the main theory.

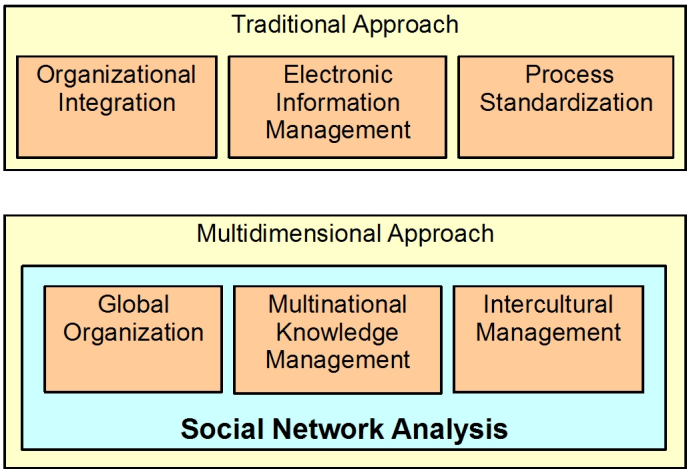

Figure 1.1: Multidimensional Approach (own development)

Below, the theoretical framework will be explained by three sub-theories and a main thesis. Firstly, organization theory described by Frese (1991) and Hoyos (1999) build the basis on this term. Additionally, Bartlett and Ghoshal (1990) enlarge upon this view point further with the trans-national organization.

Secondly, knowledge management theory invented by Polanyi (1985) and further developed by Nonaka and Takeuchi (1997) gives a general understanding of knowledge. Besides this east-oriented view, there exists a west-oriented view represented by Probst (1997), Davenport and Prusak (2000), and North (2002).

Thirdly, the complex concept of culture first-time defined by Kroeber and Kluckhohn (1952) build the basis on this term. Further, studies from Hofstede (1980) differentiate kinds and give suggestions for characterization of various cultures within international companies. Synergies and conflicts within intercultural teams are assumed and analyzed by Podsiadlowski (2002) and Köppel (2007).

Finally, social network analysis Wasserman and Faust (1994), and Hanneman and Riddle (2005) give a basic definition on that term. Additionally, Krebs (2000) and Allee (2002)

give impulses for the importance of social interactions for the success of organizations and companies. Also, formal and informal structures analyzed by Rank (2003) introduce the importance of social interactions within complex organizations.

The social network analysis responds to relations between individuals. It measures strengths of social interactions. Unlike standardization and harmonization focus on processes, the social network analysis focuses on people and their certain position within a network of social interactions. Due to their position they are process enablers and mediators, because they have access to needed resources, like experience in form of shared knowledge and skilled persons. Analysis of data helps to find right people at a certain place for a special task. Compared to the actual selection of employees by their hierarchical position, this new approach demands motivation and engagement from employee side to convince team members to share experience and set up common goals.

Summing up, the general working hypothesis is: In order to identify the relationships between dispersed multinational team members it is necessary to measure their social interactions within their closed structures. The strength or weakness of interactions may affect the relationships within a team. Usage of this methodology supports organization, knowledge management, and intercultural management of dispersed multinational team work. Due to limited processing time of this master thesis, no extensive empirical study is carried out. However, procedure of such analysis and possibilities of this method will be illustrated by examples and first findings.

1.4 Structure of Thesis

This study is made up of five chapters and one appendix. The content presented in chapters flows in such a way to introduce readers to fundamental ideas, to describe and develop three sub-theories and one main thesis. Finally, to offer some advice to the multinational enterprise on how to implement them. Chapter 1 and 2 are more introductory in nature. Chapter 3 lay the basis through the theoretical framework. Remaining chapter 4 is the main part of thesis and builds on a previous observation by the author. Chapter 5 gives a summary and perspective on this thesis. The appendix contains the interview guideline and network data of the observed multinational team.

Chapter 2

Globalization and Intercultural Collaboration

Since the 1980s the international trade grows more than the global production. That means, international coordination and cooperation between companies have increased. Rising exchange of information among companies leads to more collaboration between and within companies. Besides strategic cooperation, companies focus on operational collaboration with fewer formalization through contracts. [Holtbrügge and Welge 2003, p. 52.]

The second chapter focuses on economic globalization that causes and affects intercultural collaboration. Globalization factors, like progress in transportation and telecommunication technologies, enhance intercultural collaboration. The influences of globalization on the focused global IT service enterprises and the dispersed multinational team are worked out. Goal is to set up a clear filter for the observed situations and conditions of intercultural collaboration in the dispersed multinational team.

2.1 Globalization of Companies and Team Work

Globalization affects social, economic, and environmental systems. For that reason, impacts of globalization strongly vary. For example, beginning from different living

standards, over global warming effects, to the liberalization of global markets. The following sections focus on economic globalization as enabler of intercultural collaboration. The connection of globalization, multinational enterprise, and intercultural team work will be explained.

2.1.1 The Definition of Globalization

Globalization explains an empirical process of worldwide integration from economic and social activities. This continuing spatial expansion of economic and social relationships influence the human behavior, the economic and political activities to become supraregional or worldwide ones. [Scherer 2003, p. 1f., 62f.]

> "Globalization can be a particularly far-reaching form or strong form of internationalization. In other words, internationalization include globalization." [Kutschker and Schmid 2002, p. 160.]

Finally, the sociologist Anthony Giddins, has stressed the worldwide interdependence. He defined globalization as the intensification of worldwide social relations. These relations link distant places in such a way that events at one place are characterized by processes that happened many kilometers away, and vice versa. [Giddens 1995, p. 149.]

Following these insights the next paragraph concentrates on economic globalization. As driving force in this globalization process the multinational enterprise will be identified.

2.1.2 The Economic Globalization and Multinational Enterprise

Multinational enterprises are considered as one of the driving forces in the globalization process. They are both the product of globalization and one of its principal drivers. The globalization process can be illustrated by different indicators. These indicators measure the global economic activities.

Firstly, typical indicator for economic globalization is the amount of international trade in form of exports and the foreign direct investment. That is growing economic relationship between countries, and among companies. Secondly, an increasing number of multinational companies and their employees show a tendency towards globalization. A growing amount of enterprises have business units and employees abroad. In table 2.1 main indicators and their temporal development are illustrated. [Kutschker and Schmid 2002, p. 147ff.], [Zentes 2003, p. 279ff.], [Lasserre 2007, p. 12.]

Table 2.1: Economic Globalization [UNCTAD 2007, p. 12.]

	1982	1990	2005	Multiplier 2005/1982
World GDP (billion US dollar)	11,760	21,670	44,674	3.8
Trade (Exports: billion US dollar)	2,250	4,260	12,641	5.6
Foreign Direct Investment Stocks (billion US dollar)	630	1,770	10,130	16
Number of MNCs[a]	-	37,000	77,000	-
Employment of foreign affiliates of MNCs (1000)	19,600	24,500	62,095	3.2

[a]Multinational companies are defined as firms having more than 50 percent equity in wholly owned enterprises abroad or at least 10 percent equity in joint ventures.

In 2005 international trade amounted at 12,641 billion US dollar and gross domestic product represented 44,674 billion US dollar. That means, more than one third of worldwide production were exports. Further, foreign direct investment constituted at 630 billion US dollar in year 1982. In year 2005 this amount was multiplied by 16 and amounted at 10,130 billion US dollar. Between 1990 and 2005 the number of multinational companies doubled to 77,000. In 2005, the number of employees in foreign affiliates represented over 62 million people which is three times more compared with 1982. [UNCTAD 2007, p. 12.]

These indicators reflect the great share of international business taken up by multinational enterprises and their working staff. In that way, the proceeding economic globalization favor intercultural business relationships which occurs between and within multinational enterprises.

2.1.3 The Economic Globalization and Multinational Team

In general, there are three tendencies that support economic globalization. First, decreasing tariffs of industrial and developing countries lead to an increasing liberalization of international markets. Next, especially between 1980 and 1998 declining prices for energy rapidly promoted exports and imports. Energy costs depend on the price of crude oil which is necessary for international trade. Last, declining prices for transportation and communication costs favor the globalization process. Reduced communication costs advance intercultural collaboration, because spatial distances between employees are overcome. [Kutschker and Schmid 2002, p. 147ff.], [Zentes 2003, p. 279ff.]

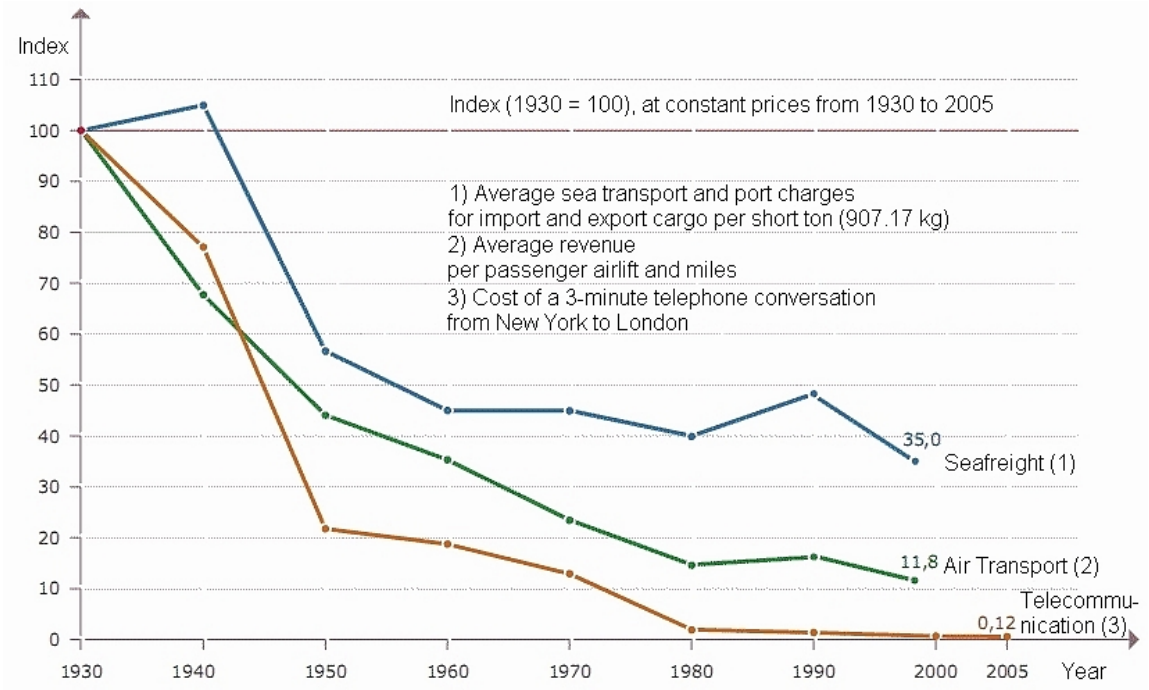

Figure 2.1: Globalization Tendencies [Busse 2006, p. 1.]

The figure 2.1 illustrates the declining prices for transportation and telecommunications costs in the period between 1930 to 2005. A dramatic retracement around 1950 and the constant fall in prices up to now lead to new business relationships and favor social interactions within multinational enterprises. In the following section, the term multinational enterprise will be explained. Further, the requirements under regional and sectoral focus will be discussed. [Busse 2006, p. 1.]

2.2 Multinational Enterprise and Global IT Services

This chapter characterizes the global IT service enterprise and its special conditions. Beginning with a basic definition of the multinational enterprise, then the view point of a regional focus, and ending with some aspects about the IT service sector. The goal is to describe the global strategy of a multinational enterprise in the IT service sector.

2.2.1 The Definition of Multinational Enterprise

The Organisation for Economic Cooperation and Development (OECD) is a non-business organization which brings together democratic countries and the market economy. In addition to their supporting activities for a sustainable economic growth, the OECD published a guideline about multinational enterprises. Besides certain listed aspects, the intention of a multinational enterprise is characterized by the following statement:

> "These usually comprise companies or other entities established in more than one country and so linked that they may co-ordinate their operations in various ways. While one or more of these entities may be able to exercise a significant influence over the activities of others, their degree of autonomy within the enterprise may vary widely from one multinational enterprise to another. Ownership may be private, state or mixed." [OECD 2008, p. 12.]

This very common definition supposed that there exist enormous varieties in the activities of international corporations. For example, a company becomes international even by ordering goods from a foreign supplier. A multinational enterprise can have a subsidiary or a corporation abroad, like a research and development center. However, in the sense of the global IT service structure this interpretation goes not far enough. Due to this definition gap there is a need for precise distinctive between the international activities of companies. Aspects like turnover or number of employees are less applicable to characterize a multinational enterprise. [Iten 2000, p. 11.]

In the center of this study the focus is on a multinational enterprise that owns worldwide business units with different nationalities. These units are interwoven with each other

legally and their activities are supported by common resources, like labor, capital, and technology. The value creation of the company depends on business activities in more than one country. In other words, the units build one economic unity whereas each individual unit keeps its legal entity. The economic interdependence is reflected by globally distributed customers, employees, and knowledge.

Further, there is a separation of companies by their increasing international activities. Following the categorization of Bartlett and Ghoshal (1990) who distinguish between the extent of country-specific differentiation and global integration. For that reason, there is an evolution of an enterprise in four steps: [Bartlett and Ghoshal 1990, p. 32.]

1. International (Use of knowledge and capabilities of the headquarters through worldwide diffusion and adaptation.),
2. Multinational (Building strong local presence by taking into account national differences.),
3. Global (Build cost advantages through centralized, but world-oriented activities.),
4. Trans-national (Constantly self-adaptive re-organization as competitive and flexible network structure.).

While adapting this evolutionary concept on the observed enterprise it is hard to get a complete correlation with one level. First, the global IT service targets on worldwide orientation. The goal is to deliver global services by dispersed multinational IT service teams. Second, while interacting increasingly international the coordination of activities, organization structure, and team work become more and more complex. To stay competitive and use the advantages of the international collaboration there is a need for a flexible network structure as given in the trans-national model.

Due to the lack of clear definitions and sharp determination the terms multinational and global are often and mistakenly used synonymously. In this study the term multinational or global will be used to describe the interactions of geographically distributed and intercultural teams within a multinational enterprise. In that way, the transition process of the described IT service enterprise will be underlined.

2.2.2 Regional Focus: MNEs in Developing and Industrialized Countries

After the clarification of the main terms concerning a multinational enterprise (MNE), now the regional focus will be introduced. The goal is to raise awareness of the diverse conditions in different economically developed countries. In that way, positive and negative consequences among a global IT enterprise will be pointed out.

Nowadays, the economy in developing countries is emerging in a way that new markets come into being. Multinational enterprises will have to enter these markets where a rapidly developing consumer base are the untapped customers of the future. Therefore, the competitive advantages lie in the use of favorable local conditions, as well as the growing market opportunities. [Adekola and Sergi 2007, p. 59]

Besides these positive consequences on both sides, for industrialized and developing countries, the negative consequences are visible through uneven development, standards of living, and technological advance or compatibility. Additionally, multinational enterprises have to be reluctant while transferring their knowledge to countries having the reputation of not enforcing intellectual property rights. [Adekola and Sergi 2007, p. 58ff]

The disparity in diverse conditions means certain risks for the international collaboration. Industrial countries have to move up the value chain when they face competition. To keep their position new types of services, innovations in working processes, and management expertise are essential. [Spulber 2007, p. 11.]

For emerging countries the foreign direct investments mean a great share of their gross domestic product. With changing local conditions, for example, increasing wages or costs, they will lose their attractiveness for foreign investors. However, the use of foreign markets increases transaction costs. Novel management concepts help to decrease these costs, for example, through an effective and efficient intercultural collaboration of a dispersed multinational team.

2.2.3 Sectoral Focus: MNEs in IT Service Sector

The importance of the service sector in the global economy in regard to its growing share of the worldwide trade. Besides financial services, software services aimed at quality, costs, and time advantages. And they are basing on information technology infrastructures. International collaboration enables the entrance to new markets, resources, and know-how. [Zentes 2003, p. 279.]

> "Collaboration enables people to find solutions for new and unforeseen problems, as well as to create and transfer knowledge and insights - in other words, it enables people to learn." [Van Looy 2003, p. 215.]

The particularly easy adaptation of services and the need for closeness to international customers increase the number of possible strategies for global IT service companies; to both globalize and localize. A great issue in this aspect is the handling of dispersed experience and knowledge which is generated locally and diffused worldwide. The special interest in the handling of knowledge within IT service enterprises is stated by Davenport (2000) below:

> "Software companies sell products that are essentially ideas - intellectual property - embodied in lines of code. We can classify software as a service: a set of functions delivered in digital form. The software business is a new kind of knowledge-based industry." [Davenport and Prusak 2000, p. 14.]

The distributed business units create scattered knowledge because of customization for the local requirements of customers. Therefore, a global utilization of knowledge is only partially possible. The creating of multinational teams become fundamental to effectively use the distributed resources in the form of skilled employees and already developed solutions within the multinational company. However, the culturally influenced perceptions of employees and customers become a critical component in a global IT service enterprise. The next section will focus on that issue while explaining the conditions of dispersed multinational teams.

2.3 Dispersed Multinational Team and Global IT Services

Until now, the causes and preconditions of globalization which enhance the intercultural collaboration within a global IT service enterprise are clearyfied. These aspects set the framework for the observed geographically distributed and intercultural team members. This section concentrates on the description of the dispersed multinational team and its conditions. Therefore, general definitions will be given with a focus on an IT service structure. The goal is to describe the certain dimensions of complexity that lead to a multidimentional approach.

2.3.1 The Definition of Dispersed Multinational Team

For the reason of substantial restructuring of organizations in multinational companies, there is an increase of working groups and teams since the 1990s. Decontrol of hierarchies lead to more flexibility in organization and structure of work. In that way, combination of mono-, bi- or multicultural employees leads to working results that can not be reached by isolated working individuals. There are certain names for such working groups, like international, multinational or trans-national teams. [Podsiadlowski 2002, p. 15f.]

Mostly, the term group and team are used synonymously, but they have different meanings in the sense of a common goal, the cohesiveness of team members, and the accomplishment of certain tasks. The following statement point out the differences of group and team:

> "A team is a formal work group consisting of people who work together to achieve a common goal. The word team is not synonymous with group. A group is a collection of people who work together but aren't necessarily working collectively toward the same goal. [...] A group becomes a team when members demonstrate a commitment to each other and to the end goal toward which they are working. A team has a higher degree of cohesiveness and accomplishment than a group." [De Janasz 2009, p. 201.]

These important characteristics of a team are especially apparent by involvement of

various nationalities. Besides individual responsibility of group members who are centrally leaded, a team is somehow self-managed through a sharp goal and task setting with a higher degree of interdependence and interaction of its members. [Podsiadlowski 2002, p. 73.]

With focus on the global IT service enterprise and team work there are two essential aspects. First, the geographical distribution of the team members. This is expressed by working of members at various places, in different time zones, and their working time is less overlapping. Due to the high dependence on information and communication technology these teams are defined as virtual teams.

> "Unlike conventional teams, a virtual team works across space, time, and organizational boundaries (to include interorganizational) with links strengthened by webs of communication technologies." [Ibbott 2007]

Next, the intercultural aspect means that members belong to various nationalities, and different organizational structures with uneven differentiation of hierarchical structures and tasks. Due to these aspects and the worldwide character of such teams, they are determined as global teams.

> "Global teams are defined here as work teams that are virtual, culturally diverse, structurally dynamic, and whose members collaborate on a global task using ICTs." [Stahl 2006, p. 347.]

Because of the smooth transition between virtual and global teams, the terms often used synonymously. In this thesis a combination of both definitions is necessary to define exactly the term dispersed multinational team with all included points. Taking this clear understanding to the next section, the complexity of such teams will be illustrated by different parameters. These parameters are focusing on the task as service team in the multinational enterprise.

2.3.2 The Multinational Team in a Global IT Service Enterprise

The last paragraph gave some basic definitions on the term dispersed multinational team. Now, getting closer to the certain task of such team the focus is on IT services. Duarte and Snyder (2006) gave definitions on different types of virtually collaborating teams. The definition that matches best the requirements of the observed dispersed multinational team work is summarized by a *Service Team*:

> "Service and technical help teams are now usually distributed across distance and time. Network and technical support are usually continuous operations, with technicians and call center personnel located around the world taking turns dealing with network problems and upgrades. The staff follow the sun and are situated so that one team is operational at all times. Each team works during its member's daylight hours and transitions work and problems to the next designated time zone at the end of the day." [Duarte and Snyder 2006, p. 7.]

The described global IT service enterprise operate globally. Therefore, the multinational teams exist in different time zones around the world. Due to the legal regulations and national law there is a need for local specialization of staff. Therefore, the tasks and functions of dispersed multinational team members vary. The complexity of such a team is illustrated by various parameters in the figure 2.2.

The picture shows the complexity of one observed dispersed multinational team in the global IT service enterprise. This team has a lower complexity due to the involvement of two nationalities with equal information technology. The numbers inside the diagram explain the correlation of the conditions among these team members. For example, a low working hours overlap at 1.5 means that the geographically distributed team members have nearly half working day to communicate simultaneously.

Additionally, the multiple role of the members is determined by their connection to the working team, organizational structure, and home country. Besides differences among individuals, departments, professions and business processes, cultures in multinational

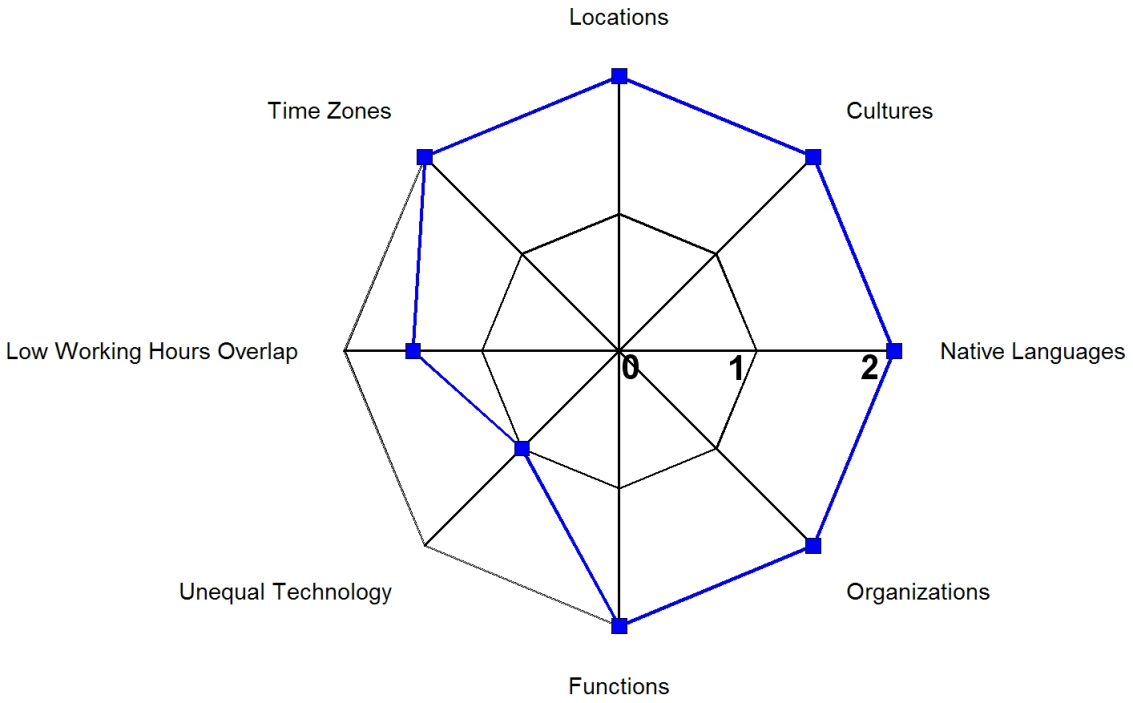

Figure 2.2: Multinational Team Complexity (own development)

working teams are relevant and must be coordinated. Further, the necessary division of work within that intercultural team means an even higher co-ordination effort. Therefore, a new approach for the management of dispersed multinational teams in global IT service structures will be introduced in the next section.

2.3.3 The Management of Dispersed Multinational Teams

In general, their are certain relevant aspects for the management of a dispersed multinational team in a business environment. Due to the possible high complexity of such teams there are two mechanisms which are influencing the efficiency. On the one hand, the close structural or task-related coupling of intercultural team members. This formal connection of dispersed skilled employees increases the usage of scattered knowledge and a diversity potential. On the other hand, the loose institutional or communication linkages of team members support the social interactions within a team. Building up of relationships among the members of teams may increase trust building

which is important for the willingness of collaboration. [Bachmann 2008, p. 151ff.] The cooperation of formal organization and informal communication linkages is related to the systemic team approach. An explanation is given below and illustrated in figure 2.3.

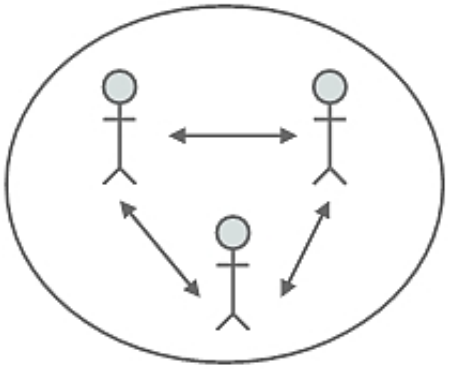

Figure 2.3: Systemic Team Approach (own development)

The two mechanisms belong to the systemic approach of a team. That means, a dispersed multinational team will be seen as a system. First, inside the system are team members which are characterized as entities. Second, these entities are connected through relations named social interactions. [Bachmann 2008, p. 151.] For the reason of a clear assignment, the team members have to be pointed out. Usually, the organization set up a clear formal structure. In that way, team members know their tasks and responsibilities. In case of a global and virtual assignment of employees there is a need for a close task-related coupling. For example, main goal of this distributed team is formulated and divided in several sub goals. In that way, the team members express their affiliation to the team and cohesion to its members.

This systemic approach requires the concept of organization theory as close coupling mechanism. In regard to this issue is the experience exchange within a formal or task-related structure lead to the concept of knowledge management. Here, focusing on knowledge creation and diffusion which can be favored by group structures and processes. Further, the concept of intercultural management is related to loose social coupling and informal communication. Finally, all these concepts are combined and lead to the social network approach. This methodology addresses to the social interactions among individuals by characterizing quantity and effects of their relations. For example, knowledge diffusion within a certain network.

Before the social network approach and the relating concepts will be introduced, there is a summary of the second chapter given in the next paragraph. The results will be summarized with concentrating on a settlement on the study content.

2.4 Summing up: Globalization Effects for Multinational Teams

The second chapter explains in an evolutionary way why a dispersed multinational team come into being. There are certain preconditions, like the progress in telecommunication and transportation, which enable the process of globalization. These globalization factors have a growing impact on intercultural collaboration. Therefore, the global availability of IT services creates a need for dispersed multinational teams through cost efficiency. However, there are less statistics concerning the quality and quantity of usage of such communication and transportation. Further, an increasing foreign direct investment says nothing about the building up of social intercultural relationships within and between multinational enterprises.

Next, the multinational enterprise was indicated as one of the driving force in the globalization process. This statement is related to the increasing amount of companies and their labor. Also globalization effects are described by an international business between and within multinational enterprises. The observed global IT service enterprise go abroad to gain business opportunities. Important reasons are the closeness to the worldwide distributed customer, and costs savings through differencies in labor costs. In that way, there are mainly economic reasons identified for the existence of dispersed multinational team work in that observed global IT service enterprise.

In addition, these enabling criterias have also an impact on the working situation of such team members. Business opportunities and costs savings mainly goes back to different working conditions and different standards of living in various countries. Well, these preconditions can not be changed through intercultural collaboration. The question is not about equal conditions that enable team work. In a dispersed multinational team the question belongs to equal chances by the same level of knowledge and understanding. Also

integration, assignment, and commitment of team members are essential aspects. These are examples of key terms which have to be take in advance for a successful multinational team.

Besides an academic or development team, the existence of the observed multinational team goes back to an economic reason. Therefore, the goal setting, the motivation, and the assignment of the team members vary. Due to the conceptual character of this work it is necessary to point out such preconditions which have an impact on the dispersed multinational team. In that way, a sharp distinction on the focused global IT service enterprise help to point out the strengths and weaknesses. This helps to get a broader but not a completely picture of the described team.

Therefore, the next chapter 3 evaluate the state of the art and the academic progress in this field. The concepts of organization theory, knowledge management theory, intercultural management, and social network analysis will be discussed. The goal is to find the starting point and approaches which support the building up and the management of dispersed multinational teams.

Chapter 3

Theoretical Insights into Global IT Service Teams

Chapter 3 refers to the theoretical framework of the thesis. It discusses the supporting theories belonging to organization theory and resource allocation, knowledge management and intercultural management. Therefore, it is important to clarify these concepts with a filter of dispersed multinational teams in a global IT service enterprise. The multidimensional approach draws a broader picture of challenges which have to be taken up by intercultural collaboration. The goal is to develop the social network approach as support for the management of dispersed multinational teams.

3.1 Dimension of Global Organization and Local Resource Allocation

Mostly, multinational organizations face a conflict between localization and globalization. The described global IT service enterprise has different business units worldwide. The standardization and harmonization of business processes enable synergy potential. That means, to increase the value creation of the enterprise through combination of common activities. To make use of this potential the global organization has to achieve a balance between autonomy and integration. Subsidiaries need a certain degree of autonomy in

order to adapt to their local environment. But the business as a whole needs integration to implement a global strategy.

> "A fundamental issue in an international firm's strategy is how to balance and combine advantages of global integration with the need for sensitivity and responsiveness to the conditions in the different localities where it operates and for which it produces goods and services." [Child 2005, p. 16.]

A possible solution for the contradictory situation is building up of an interdependent relationship structure. This organizational structure should achieve advantages of localization and globalization simultaneously. Identification, connection, and common usage of global human resources is a key aspect of such a multinational organization.

3.1.1 The Organization of Dispersed Multinational Teams

In this section the concentration is on the term organization as a building activity and supporting structure for dispersed multinational teams. The organization theory is a wide field with very many different concepts. Therefore, a sharp distinction belonging to the micro level as work organization within a multinational enterprise is needed. The goal is to define the term organization with concentration on a supporting concept for dispersed multinational teams.

a) The Definition of Organization

In general, an enterprise needs an organization to structure its work among the employees. Therefore, task-related functions and responsibilities have to be clarified. A brief definition is given by Frese (1991) who points out the relationships among people.

> "Organizations are intangible: that means, they do not exist by a physical presence but as a set of relationships among people." [Frese 1991, p. 6.] (own translation)

Following this statement an organization is described as a social system that processes input into output. Belonging to the team focus it is necessary to distinguish between

different levels and aspects of an organization. Table 3.1 gives an overview of the various perspectives of an organization.

Table 3.1: Organizational Levels [Child 2005, p. 6.]

Organizational Level	Organizational Facet	Example
Macro Level	Boundary-Defining	Outsourcing, Alliances
Meso Level	Structural	Hierarchy, Specialization
Micro Level	Process-related	Integration, Coordination, Control

An organization contains of different levels as shown in table 3.1. Due to the focus on dispersed multinational teams the meso and micro level have to be explained. On the one hand, the meso level of an organization describes its formal structure. An organization is a group of individuals that focuses on a common goal. Every individual has its own objectives which, in general, do not match with those of remaining group members. Furthermore, each individual has to make certain decisions. The decision framework is partly restricted by the external environment, and partly by decisions of other group members. Not all information on internal group activities and on the external environment are exchanged between the members. [Arrow 1978, p. 24.]

> "Organization structure defines how tasks to be allocated, areas of responsibility and authority, who reports to whom, and the formal coordinating mechanisms and interaction patterns that will be followed." [Robbins and Barnwell 2002, p. 7.]

The structure explains in a formal way how to build up an organization by responsibilities and their interactions. An organizational structure consists at least of three components: [Robbins and Barnwell 2002, p. 7.]

- Complexity,
- Formalization,
- Centralization.

Firstly, complexity of an organization refers to its horizontal, vertical, and spatial differentiation. Horizontal means the degree of specialization of labor. Vertical considers depth of the organizational hierarchy. And spatial encompasses the growing number of geographically distributed organizational units. These points are similar to the complexity belonging to a team. [Robbins and Barnwell 2002, p. 95.]

Secondly, formalization based on job standardization that affects the behaviour of an employee. A high degree of formalization assumed more rules and procedures. That induces standardization which leads to bureaucratic processes. [Robbins and Barnwell 2002, p. 129.]

Finally, authority for decision-making is described by centralization. An increasing centralization over the full decision-making process leads to higher degree of control of fewer individuals, or at least one individual. Reduction of responsibility provides significant effectiveness through faster decision making. However, decentralization reduces the probability of information overload and can increase the quality of the decision. [Robbins and Barnwell 2002, p. 129.]

On the other hand, the micro level tends to coordinate interactions among people or groups. The interaction patterns in an organization must be balanced and harmonized to minimize duplication. Operational structuring of an organization ensures that critical tasks are completed. An increasing efficiency is supported by process standardization. This helps to optimize the formal working process, because the work is done always in the same way. Therefore, a certain goal has to be reached at its maximum by a minimum input of scarce resources. [Hoyos 1999, p. 29.]

b) The Organization Theory and System-theoretical Approach

The approaches of organizational theory are very diverse. Different points of view exist in specific cultural areas. On the one hand, in the German-speaking area there is an understanding of an instrumental organization. The term instrumental organization describes that a company has an organization. An organization includes all activities that focus on the achievement of goals. Therefore, the organization structures all activity of its members as a social system. In addition, it arranges the use of resources and processing of information. [Hoyos 1999, p. 30.]

On the other hand, the Anglo American lesson interpret the term as institutional organization. This denotes that a company represents an organization. An organization is a social construct with a common goal. The organization has a formal structure which focuses the activities of the members on the targeted objectives. These can be for example, a regular job distribution or coordination. [Hoyos 1999, p. 30.]

The institutional perspective of an organization supports the social network approach. This perspective offers organizational insights concerning virtuality and geographical distribution of team members. The social network method analyzes, for example, certain positions and roles of employee's networks. Or explained in another way, the emerging relationships among employees can form an organization. This finding is pointed out by Baumueller (2007) and the organizational building up through teams.

> "It has become a basic tenet of organizational theory that organizations as collections of individuals engaged in purposive, goal-seeking activities emerge when the output produced by individuals working together as a team is greater than the sum of the outputs that each individual member of the team could produce separately." [Baumueller 2007, p. 31.]

Further, the institutional perspective develops the system-theoretical approach of the organization theory. Generally, a system consists at least of a system border which can be described as goal setting or related task. Within this differentiated system entities exist that are connected through relations. [Krallmann et al. 1999, p. 21.] A combination of this simple model and the organization leads to the systemic-theoretical approach. Key message is that social systems have the ability of self-organization until a certain degree, where rules of conduct emerge and create structures.

In addition, the systemic-theoretical approach corresponds well with the view of multinational enterprises as an interdependent network. The system theory leads to a holistic consideration of a globally distributed organization. That means, specifically the coordination of interdependent decisions and global work processes. [Meckl 2000, p. 5.]

> "A system is a set of interrelated and interdependent parts arranged in a manner that produces a unified whole. Societies are systems, and so too

> are cars, plants and human bodies. They take inputs, transform them and produce an output. [...] Every system, therefore, requires differentiation to identify its subparts and integration to ensure that the system does not break down into separate elements." [Robbins and Barnwell 2002, p. 10.]

The goal is to create that organizational structure for dispersed multinational team members which gets the most benefit out of the complexity. This benefit can be measurable through concret cost efficiency. Another positive aspect can be fewer friction in worldwide processes through increasing quality and higher customer satisfaction. These aspects belong to the transaction cost theory.

Transaction costs are intrinsic to business organization and scope of firm. These are costs to use markets for instance communication costs. Domestic transaction costs are high, but transaction costs between countries are likely to be much higher because translation costs are necessary. The business that is able to create innovative transactions that reduce these costs can find major untapped business opportunities. The social network approach forces to gain competitive advantage by lowering cross-border transaction costs. [Spulber 2007, p. 17ff.]

c) The Organization of the Global IT Service Enterprise

The global IT service enterprise is a service provider for the holding. Due to the worldwide distribution of the holding, there is a need for local availability of IT services. Therefore, it consists of geographically distributed business units. The relationship between the headquarters situated in Germany and the worldwide distributed legal entities have mainly an ethnocentric character. There are some tendencies towards the polycentric model. An overview concerning these two models is given in table 3.2.

This classification of polycentric and ethnocentric goes along with the definition of multinational and global enterprise. Polycentric is comparable with multinational and ethnocentric with global. Therefore, the transition process of the IT service enterprise will be continuously discussed. The relationship between business units and headquarters illustrates low advantages of localization. However, the advantages of globalization are growing through standardization. [Zentes 2003, p. 923.]

The objective of an ethnocentric relation is to provide a consistent corporate culture

Table 3.2: Strategy Aspects [Heenan and Perlmutter 1979, p. 274.]

Aspects	Complexity	Authority	Control	Information flow
Ethnocentric	Complex in home country, simple in subsidiaries	High in Headquarters	Home standards applied for persons and performance	Unilateral flow of information from headquarters to foreign subsidiaries
Polycentric	Varied and independend	Shared with subsidiaries	Determined locally	Little to and from Headquarters; little among subsidiaries

which underlines the values from the home country of the headquarters. Due to the high control and decision making taken up by the headquarters there is fewer initiative from the subsidiaries. A polycentric strategy assumes that there is no universal strategy, but that the international organization should adapt to the local situations. The particular situation may be better analyzed and effectively implemented by a foreign company compared with the head office. [Podsiadlowski 2002, p. 27f.]

Table 3.3: Strategy Advantages and Disadvantages [Hoyos 1999, p. 170.]

Strategy	Advantages	Disadvantages
Ethnocentric	Faster enforceability of corporate philosophy, Better communication between headquarters and subsidiary, Faster transfer of knowledge	Complex information and decision-making routes, Fewer career opportunities lead to more dissatisfaction and increased turnover
Polycentric	Continuity in management, Avoidance of language barriers, Lower personnel costs	Estrangement between home and host country, Misunderstanding of cultural differences

The classification of Heenan and Perlmutters (1979) helps to clarify what is going on in a multinational company and its impact on the organization. Their conceptual work bases on research and interviews with a high focus on the management point of view. [Kutschker and Schmid 2002, p. 310.] Further, there are certain challenges and risks for the organization. The table 3.3 sums up some advantages and disadvantages belonging

to the ethnocentric and polycentric relation. The global model has the highest degree of centralization. The weight is clearly in the center to realize the global standardization and maximize the costs and synergy benefits. [Meckl 2000, p. 66f.]

In the observed business area of the global IT service enterprise work nearly 300 IT consultants, developers, supporters, and additional administrative and management staff. The employees are linearly organized and separated into departments and downstream functional teams. These departments and teams build the hierarchical and functional organization as illustrated in the figure 3.1 below.

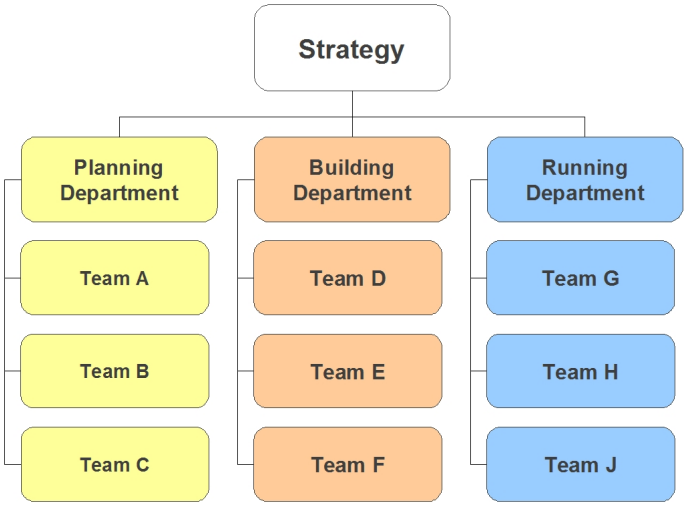

Figure 3.1: Global IT Service Organization (own development)

The linear organization separates the primary processes in a hierarchical structure; *Planning*, *Building*, and *Running*. It is comparable to the production in a manufacturing company, because it describes how the IT service is produced. Firstly, the Planning department treats new and additional customer inquiries. Next, the implementation and development of such customer needs is taken up by the Building department. Finally, customers services are handled by customization and support services in the Running department. Due to a clear separation there is a high level of specialization in the different departments and functional teams. Furthermore, there are service processes which belong to the global human resource IT systems. These are also primary processes and create as IT service processes the task and product of this business area within the global IT service structure. These functional processes cross departments and functional teams

and follow a matrix organization. For that reason, the process organization, as well as the project organization is structured in a horizontal way over the vertically linearly or hierarchical organization.

The identification of human resources in a global organization becomes an important aspect to build up and enable dispersed multinational team work. Therefore, the next section concentrates on the resource allocation in a global distributed team.

3.1.2 The Resource Management in the Multinational Enterprise

This section concentrates on the resource allocation and coordination within the global IT service enterprise. Resources are instruments which support and enable value creation activities, for example, the manufacturing of goods and services. Another focus for this topic is on globally distributed skilled employees as resources. The goal is to explain the network-oriented approach in favor of local resource allocation for a dispersed multinational team.

a) The Resource Allocation and Network Approach

From a general economic point of view, there are three factors of production such as labor, location, and capital. In concentrating on dispersed multinational teams the labor factor has to be pointed out. Besides the other two factors, the optimal allocation of this resource is needed for a company's value creation. The model of Porter (2004) differentiates between primary and secondary activities of the value chain. Primary activities include the manufacture, sale and customer service. Further, secondary or supportive activities are required resources for the exercise of the primary activities, like goods, technologies, staff, management and information systems. [Porter 2004, p. 36ff.]

In that way, the allocation of human resources belongs to secondary activities. This activity supports the strategy of the enterprise. In a global context allocation of resources has deep impact at the company's success because the combination of dispersed multinational teams depends on that. Different theoretical concepts exist for cooperation between and within companies through coordination of resources. At this point I focus

on *Network-oriented Approach* because multinational team members need the ability to build up relationships across national and organizational boundaries.

The network-oriented approach explains the social relations between actors. In the beginning, cooperation in form of a strategic network often arises from relatively minor operations; initially requiring neither high investments nor mutual trust. Nevertheless, these cooperative relationships are the most important resource of a company, whose maintenance is often a significant investment. The strategic possibilities of a company are affected by the position in the network. [Zentes 2003, p. 58.]

Furthermore, the network-oriented approach is favored by Kogut (1989) who points out the advantage of increasing operational flexibility in a multinational enterprise. To reach this advantage the centralized and hierarchical organizational model has to be replaced by a multinational network. [Bergemann 2003, p. 5.]

The ideal of an integrated network is characterized by the fact that the parent company is no longer the center of the steering and control mechanism. Rather it is limited to the control of decentralized decision-making. The foreign subsidiaries are no longer an appendage of the parent company. They will be active and empowered subsidiaries which have a strategic role and differential involvement in the development and implementation of the trans-national strategy. [Bergemann 2003, p. 9.] Figure 3.2 illustrates such an integrated network as trans-national model.

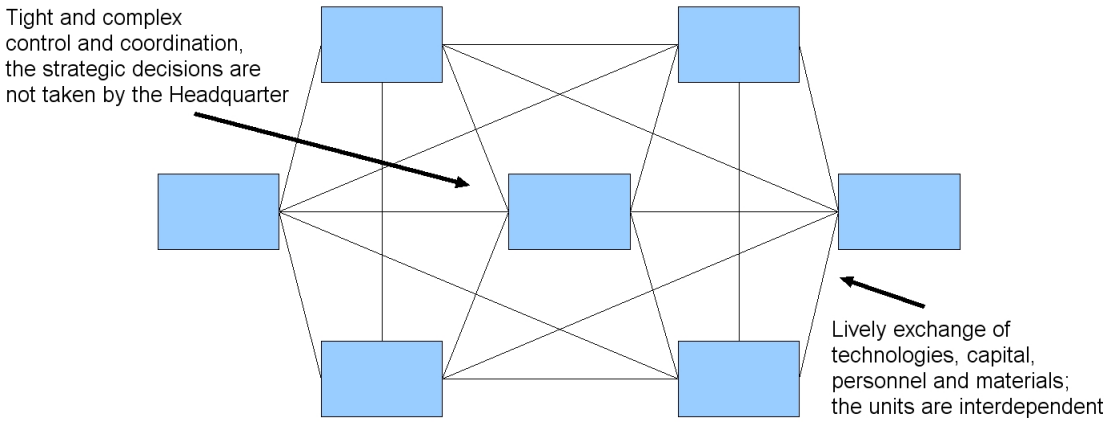

Figure 3.2: Network Model [Welge and Holtbrügge 2003, p. 9.]

Summing up, the international resource allocation is favored by an integrated and trans-

national model. Following this model the coordination and handling of human resources in a global context will be explained. Mainly the relationship between headquarters and subsidiary have an impact on the resource allocation in a global structure.

b) The International Human Resource Management

In general, the staffing within multinational enterprises referred to by Heenan and Perlmutter (1979) follow three options: [Neises 2005, p. 33.]

- Ethnocentric Option,
- Polycentric Option,
- Geocentric Option.

Firstly, the ethnocentric option recruits all key positions by employees from headquarters. Leadership positions in the foreign branch or subsidiary are filled by expatriates. The corporate culture is the only nationally oriented. [Neises 2005, p. 33.]

Next, in a polycentric staffing strategy, the professional and managerial positions exclusively go to indigenous people of the host country. In that way, the foreign branch or subsidiary is conducted by local managers. The corporate culture is dominated by the culture of the host country. [Neises 2005, p. 33.]

Finally, the geocentric option is characterized by a selection of employees solely based on their qualifications. For that reason, the filling of vacant positions does not depend on the nationality or cultural background. [Neises 2005, p. 56.] This geocentric model fits best to the integrated network or trans-national model. Therefore, the table 3.4 illustrates advantages and disadvantages of this option.

Table 3.4: Geocentric Model Advantages and Disadvantages [Neises 2005, p. 57.]

Advantages	Disadvantages
Construction international management team, Promote unified corporate culture, Lower risk of pursuit national interests	Costs by extensive cross-border labor, Acceptance problems in the companies

Further, Bergemann (2003) analyzes the benefits of culturally diverse teams. He recommends groups with different values, personality characteristics and cultural influences. These groups are superior to homogeneous composite groups in new and unstructured tasks. Empirical studies show usually creative and innovative solutions in intercultural teams. Another advantage is by broadening the range of values new ideas and conformity barriers can be removed. [Bergemann 2003, p. 4.]

In the following paragraph, the handling of resource allocation in the observed multinational enterprise will be described with a focus on a global resource pool for flexible and globally distributed team work.

c) The Resource Allocation in Dispersed Multinational Teams

The global IT service enterprise has a mix of all three options: ethnocentric, polycentric, and geocentric. The management level consists of expatriates in certain regions, as well as indigenous managers in some host countries. On the operational level there is a tendency towards the geocentric model. For that reason, employees hierarchically belong to a certain group within a department, but their tasks vary among multinational teams or project groups.

Due to the global resource pool of geographically distributed workers the organization is more flexible. In turn the members of a dispersed multinational team belong to their local department and group, as well as to a certain project team. The capacity of an employee is task-related shared among the legal entities. The assignment depends on belonging to a vertical functional group, a horizontal process-related team, or a matrix organized project team.

Furthermore, through the process standardization different roles are defined. These roles describe the tasks that have to be done by skilled employees. The qualification of employees depends on training activities and working experience. Especially, transformation and customization of process related knowledge requires certain know-how and experience. These activities and processes belong to the planning and building phases of the IT production. In addition, this know-how is partly needed for IT service support, because the supporter understands the upstream activities of the development. Therefore, each step itself and the connection of process phases help to decrease the expenditure of time

and increase the quality through fewer friction between the different steps.

The interaction between global organization and local resource allocation has an impact on intercultural collaboration. The question is how the global organization integrates the local resources. There are certain issues touched in that matter for instance the hierarchical position of global responsibilities, the professional composition of dispersed multinational teams, also the horizontal connection of process phases towards local groups and global teams. Therefore, the next paragraph summarizes the important points concerning organization and resources in regard of chances and risks.

3.1.3 The Chances and Risks of Global IT Service Organization

The global IT service enterprise faces chances and risks concerning their organizational structure and their resource allocation. The table 3.5 gives an overview.

Table 3.5: Global Organization Chances and Risks

Aspect	Chances	Risks
Organization	Higher Flexibility through Integration of Foreign Units, Faster Decision-Making through Centralization, Higher Quality through Specialization, Cost Efficiency through Formalization	Fewer Localization Advantages, Loose of Transparency, Lower Decision Quality and Information Overload, Loose of Process Overview, Increase of Bureaucracy
Resource	Higher Availability through Reduced Overlap, Higher Capacity Utilization of Employees, Flexible Global Resource Allocation	Increasing Complexity, Variing Goals, Prioritization of Tasks, Integration of Distributed Team Members, Qualification of Staff

This summary highlights particular chances and risks for a dispersed multinational team in a global IT service enterprise. Until now the influence of knowledge and intercultural management has not been discussed. In the following chapter, the knowledge creation and diffusion through an intercultural communication will be explained.

3.2 Dimension of Global Knowledge and Intercultural Communication

In this section, the concepts of knowledge management and intercultural management. Intercultural collaboration depends on interactions of dispersed multinational team members to work on a common purpose, solve problems, and improve their communication and knowledge base. Therefore, a basic understanding of knowledge generation is needed. Further, the diffusion of knowledge across national and organizational boundaries leads to challenges of intercultural collaboration. In addition, intercultural management explain the different aspects of culture. First, there is the national culture of each team member. And second, the organization itself produces and supports a corporate or organizational culture. The goal is to develop strengths and weaknesses of these theories in regard to the dispersed multinational team.

3.2.1 The Multinational Knowledge Creation and Diffusion

Knowledge management itself is a huge academic field with many different approaches and models. This paragraph focuses on the individual and the creation and sharing of knowledge among team members. Therefore, information management through tools and IT databases will not be discussed. In the center of reflection is the multinational team member who creates and shares knowledge. Therefore, the problem and task-related generation and transformation of knowledge is pointed out. The goal is to describe the creation of knowledge and possible ways to use it through collaboration.

a) The Definition of Knowledge

In modern business life, the understanding of knowledge is different. People confuse the concepts of *Data*, *Information* and *Knowledge* quite often as if they were synonymous. For example, people speak often about information overflow in relation to their email account, which is full of emails. In fact, they are speaking about data, which can be measured in megabytes. On the one hand the modern communication and information technologies enable global collaboration. But on the other hand, the produced masses of data have to be handled to create knowledge and therefore synergies out of the data

flows. For example, to avoid duplicated knowledge creation. [Kock 2005, p. 71.]

The term knowledge consists of various elements. The basic elements signs, data, information, and knowledge as illustrated in figure 3.3 which create a common base of understanding. First, a sign is identified as mark, letter, number, or special character. Characters are supported by syntax rules to data which in a certain context are interpreted as information. Organized data lead to information when it is used in a certain issue or context. The networking of information enables its use in a particular activity, known as knowledge. Knowledge is not only the knowing of different information, but includes their interpretation and understanding of mutual relationship to each other. [Probst 1997, p. 34f.], [Awad and Ghaziri 2004, p. 36.], [Kock 2005, p. 70f.]

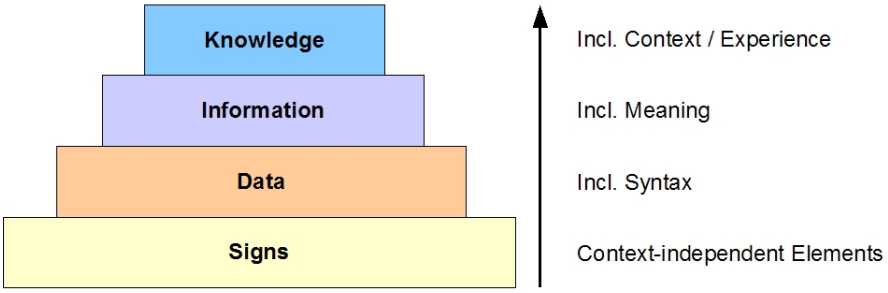

Figure 3.3: Knowledge Pyramid [Cakir 2008, p. 5.]

Knowledge is the entirety of proficiency and skills that individuals adopt to solve problems. This includes both theoretical cognitions and practical everyday rules and instructions. Knowledge is based on data and information and is always bounded to persons. It is designed by individuals and represents their expectations about cause-effect relationships. [Probst 1997, p. 44f.] The term knowledge is summarized by the statement below:

> "It is Know-how or familiarity with how to do something that enables a person to perform a specialized task." [Awad and Ghaziri 2004, p. 33.]

Due to these explanations the term knowledge is somehow clear, but it shows also the difficulty in using knowledge. Using knowledge means to transfer it from one person to another. The difficulty lies in the transformation and interpretation. The theorist Polanyi (1966) firstly discovers two different kinds of knowledge: the implicit or tacit knowledge and the explicit knowledge. Summarized by the following statement:

> "We can know more than we can tell." [Polanyi 1985, p. 16.]

Implicit knowledge is difficult to both communicate and formalize. It can only incompletely be expressed in words, but expresses itself in concrete actions of individuals. For that reason, implicit knowledge is also called procedural or cognitive knowledge, because it enables people to do something. [Iten 2000, p. 122.] The problem with implicit knowledge is that it is built up mostly through experience and is difficult to articulate. People need a private place where they can communicate and exchange their knowledge. For example, a self managed team where various professionals work on a common purpose. [Nonaka and Takeuchi 1997, p. 101.]

Additionally, explicit knowledge is transferable into formal and systematic language, as well as being possible to document. The individual is aware of it and it can be to expressed. The knowledge can be captured through written words or can be tracked by computer programs. For that reason, the processing, transmission, storage, and use of explicit knowledge is easier than tacit knowledge. Explicit knowledge is also defined as declarative knowledge based on facts and rules what the employees know. [Iten 2000, p. 122.], [Schreyögg and Geiger 2003, p. 11.]

> "An alternative way of creating knowledge is through team work." [Awad and Ghaziri 2004, p. 93.]

Summing up, the differentiation of knowledge shows the importance of the human being in the process of knowledge creation and diffusion. Knowledge is not object-related; it depends and belongs to the knowledge worker. Therefore, knowledge is acquired and developed by learning and through interaction between individuals. [Nonaka and Takeuchi 1997, p. 143f.], [Mühlethaler 2005, p. 5.]

b) The Identification and Transformation of Knowledge

Knowledge management can be used to improve the company's ability to generate, apply, and transfer knowledge. The goal of knowledge management for a company is to improve the product or service and its production to increase customer satisfaction. It focuses on the company's human resources in relation to the customers. [Meckl et al. 2003, p. 1.]

Knowledge management is subdivided into different columns and process steps. The three columns of knowledge management are stated as the human, organization, and technology. Besides information management, knowledge management concentrates on the social interaction of human resources within the organization. With concentration only on technical solutions leads only to information management. [Mühlethaler 2005, p. 4f.]

The process steps from knowledge creation to its transformation can be summarized by: identification of knowledge type, methods and instruments to capture this knowledge, and its transformation and interpretation through a model. [Probst 1997, p. 56.], [Nonaka and Takeuchi 1997, p. 99f.], [Gupta et al. 2004, p. 8, 283.], [Awad and Ghaziri 2004, p. 93.]

Table 3.6: Seven Knowledge Levels [Gupta et al. 2004, p. 4.]

Level	Key Activities
Customer Knowledge	Developing Knowledge-sharing Relationships, Understanding/ Articulating Customers Needs, Identifying Opportunities
Stakeholder Relationships	Improving Knowledge Flows (Supplier, Employee, Shareholder, Community), Using Knowledge for Key Strategies
Business Environment Insights	Systematic Environmental Scanning including political, economic, technology, social and environmental Trends; Competitor Analysis; Market Intelligence Systems
Organizational Memory	Knowledge Sharing, Best Practice Database, Expertise Directories, Oline Documents, Procedures/ Discussion Forums, Intranets
Knowledge in Processes	Embedding Knowledge into Business Processes and Management, Decision-making
Knowledge in Products and Services	Knowledge embedded in Products, Surround Products with Knowledge, e.g., User Guides, Knowledge-intensive Services
Knowledge in People	Knowledge-sharing Fairs, Innovation Workshops, Expert/ Learning Networks, Communities of Knowledge Practice

Firstly, knowledge in a company has certain complexities because there exists different kinds of knowledge in different areas of a company. To help understand these complexity, Gupta (2004) distinguishes between seven levels of knowledge as table 3.6 shows. The

last four levels have to be underlined, because of their influences on operational team work. Secondly, key activities in table 3.6 give examples of possible instruments and methods. These instruments can be used to capture knowledge. [Probst 1997, p. 30.], [Davenport and Prusak 2000, p. XXii.], [Gupta et al. 2004, p. 4.]

The third step is to transform identified knowledge into usable knowledge for value creation. Knowledge can be used and transferred to a broader circle of users. This step is supported by different models. In the literature different models to transform knowledge into information for storage in an IT system exist. However, with the transformation of knowledge into information it is not for sure that the same meaning is interpreted. [Nonaka and Takeuchi 1997, p. 100ff.], [Probst 1997, p. 56ff.], [Iten 2000, p. 121.]

The most commonly cited model is described by Nonaka und Takeuchi (1997) as the *SECI-Model*. The abbreviation SECI means *Socialization*, *Externalization*, *Combination*, and *Internalization*. Mainly, the SECI-Model describes the transformation of implicit knowledge into explicit knowledge and vice versa. Knowledge creation and transformation is an endless spiral. Figure 3.4 illustrates this continuous approach. [Nonaka and Takeuchi 1997, p. 100ff.], [Awad and Ghaziri 2004, p. 93.], [Mühlethaler 2005, p. 37.]

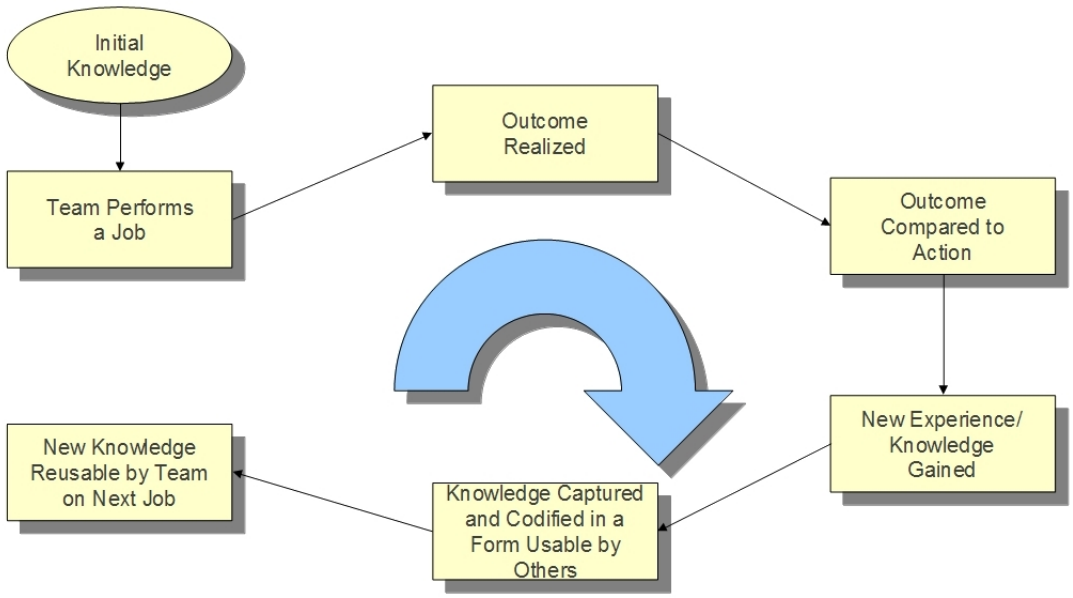

Figure 3.4: Knowledge Spiral [Awad and Ghaziri 2004, p. 93.]

The illustrated team members transform experience into knowledge. Through their continuous work they carry out a series of tasks in a specific procedure. The team starts at the beginning with some initial knowledge which can be gained through processing tasks. A comparison of input and output helps to identify the implemented knowledge. Therefore, it is necessary to measure if the job result is either successful or disappointing. It is possible to transform knowledge while correcting steps, modifying actions, finding common standards and rules. [Awad and Ghaziri 2004, p. 93]

This transformation process helps to enable knowledge regardless of personal owners and to prevent knowledge losses. Further, it is pointed out that knowledge is communicated most effectively through a convincing narrative. The team members have a common interest, exchange stories about problems and possible solutions, and learn from successful and disappointing results. [Kluge 1999, p. 79ff.], [Davenport and Prusak 2000, p. 81ff.], [North 2004]

c) Challenges of Multinational Knowledge Management

The described ideal model of knowledge creation and diffusion is affected by certain challenges in a global context. A study of the Telekom in 1997 shows an exponential rise of the global volume of available information. At this time media doubles in less than 5 years. However, this result clarify the structure of knowledge environments in which companies have to operate. Today, this situation is far more complex than even a decade ago. [Probst 1997, p. 21.], [Iten 2000, p. 1.]

There is an increasing amount of knowledge which creates a broader knowledge base and can improve decision making. However, companies have to handle this amount in order to identify the needed resources. Further, companies deal with the ambiguity of knowledge which requires engagement with contextual relevance. The problem is the more knowledge is generated, the more specialization and fragmentation occurs which affect business processes, productivity and quality. Global distribution and fragmentation of knowledge leads to an increasing specialization of workers who have to exchange their knowledge. [Probst and Büchel 1998, p. 6.],[Iten 2000, p. 119.], [Kock 2005, p. 4f], [Cakir 2008, p. 1, 27f.]

"The management community has come to realize that what an organization

> and its employees know is at the heart of how the organization functions. Knowledge itself is worthy of attention because it tells firms how to do things and how they might do them better." [Davenport and Prusak 2000, p. XiX.]

Following a study of Grossmann in 2006 more than 81% of leading North American and European enterprises practice a certain form of knowledge management. A study of the KPMG, one of the leading worldwide consulting companies shows that most knowledge management practitioners concentrate on partial solutions and less on holistic and strategic approaches. Besides time constraints and uncertainty about actual success of knowledge management, most enterprises referred to the lack of tools and concepts. Electronic information and communication tools are only one aspect of the knowledge management concept. These tools support information flow in organizations, knowledge specialization, and geographical distribution of expertise. [Iten 2000, p. 130.], [Schreyögg and Geiger 2003, p. 27.], [Bergemann 2003, p. 11.], [Mühlethaler 2005, p. 43.], [Cakir 2008, p. 1.]

> "The proverbial phrase "if we build it, they will come" does not apply to information technology. The availability of Lotus Notes does not change a knowledge-hoarding culture into a knowledge-sharing one." [Davenport and Prusak 2000, p. 18f.]

Therefore, the complexity of multinational companies depends on the number of employees and their diversity. Potential synergies can be reached, for example, through use of regionally distributed and heterogeneous cultural knowledge. Employees become an important resource and competitive advantage in handling this complexity. Especially, IT service enterprises belong to knowledge-based companies. For that reason, knowledge management helps to reduce costs through reuse of knowledge, access to knowledge carriers, and avoidance of redundant knowledge creation. [Probst and Büchel 1998, p. 6.],[Iten 2000, p. 119.], [Meckl et al. 2003, p. 1f.], [Kock 2005, p. 4f], [Ibbott 2007, p. 18.], [Cakir 2008, p. 1, 22ff.]

Summing up, knowledge creation is provided by comparisons, consequences, and conservation of data and information. Knowledge is achieved individually and relies on

interaction between individuals. Interaction and exploration of interaction processes is a central topic within the field of sociology. It is easier to determine less effective processes from more effective ones. The difficulty is that companies must ensure that employees who come from different cultures and different organizational affiliation have to communicate with each other in such a way that knowledge is continuously shared. A central basis of the competitive strength of many companies in future will be the ability to develop, secure, and transfer knowledge in a global network. [North 2002, p. 22.], [Bergemann 2003, p. 4.], [Awad and Ghaziri 2004, p. 10, 23.], [Kock 2005, p. 117-118.], [Kratzer and van Veen 2005]

The challenges of connecting employees from different nationalities to a multinational team relie not only on the ability to transfer and share knowledge. Cultural aspects affect the collaboration for instance through varying rules, understanding, and languages. The next section 3.2.2 focuses on this problems and explains important concepts related to the term culture.

3.2.2 The Intercultural Management and Multinational Team

This section deals with the changing working conditions that go hand in hand with intercultural collaboration. Globalization factors, such as progress in information and communication infrastructure mentioned in 2.1.3 favor collaboration across countries and time zones. For that reason, complex task settings can be handle in shorter time which decrease costs, and raise quality. There is a need for understanding different national cultures within multinational enterprises and teams. Intercultural management focuses on building up of intercultural competences and improvement of intercultural collaboration. The goal is to find important aspects of intercultural management to increase synergies and handle conflicts in dispersed multinational teams.

a) The Definition of Culture

The term culture and related clustering of countries go back to an evolutionary process. The variety of concepts and representative works can not be completely discussed in this study. Their core dimensions are overlap and cover human nature and activity, relations of human beings, and their environment, as well as dimensions of time and space. In this

study the focus is on the interpretation of Kroeber and Kluckhohn (1952), as well as Hofstede (1980/1991) which are often cited. [Baumueller 2007, p. 115.]

By 1952 Kroeber and Kluckhohn collected 164 definitions of the term culture. Essence of that collection is the following statement:

> "Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached value; culture systems may, on the one hand, be considered as products of action, on the other as conditioning elements of further action." [Kroeber and Kluckhohn 1952, p. 20.]

This very compressed definition shows the complexity of the term culture. It explains how people acquire knowledge to interpret experience and generate social behavior. The basis of culture are values and attitudes that influence both individual and group behavior. Culture belongs to groups of people, for example, in an organization or in society. It is passed from one generation to another and undergoes changes on the way. [Hodgetts and Hegar 2005, p. 405.]

The group relation of culture is worked out by Hofstede (1980) who analyzed 117,000 IBM employees. His study was based on a survey across 50 countries and lasted 4 years. His definition is given in the following statement:

> "Culture is defined as collective programming of the mind which distinguishes the members of one human group from another." [Hofstede 1980, p. 25.]

In concentrating on the topic and relation to a multinational team it is necessary to explain the impacts of culture. That means, how team members realize and react to different cultures. This phenomenon is described as intercultural competence. Intercultural competence leads in situations of intercultural contact to reasonable and effective behavior. In this sense, reasonable means to meet relationship and requirements of interaction partner. An effective behavior achieves the desired result. General components of intercultural

competence are identified as *Cognitive*, *Affective* and *Conative (Behavioral)* dimension. Figure 3.5 sketches the way for obtaining intercultural competence. [Köppel 2007, p. 119.]

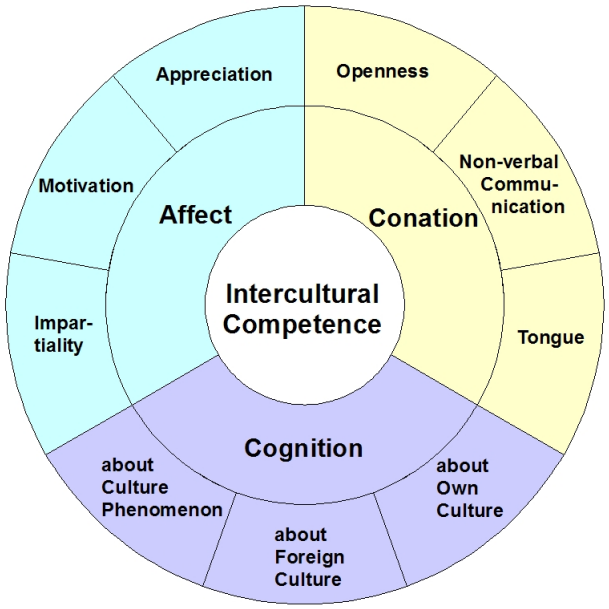

Figure 3.5: Intercultural Competence Model [Köppel 2007, p. 119.]

First, cognitive dimension explains the ability of a person to comprehend another culture. This includes knowledge and information about the other culture, as well as the own culture. It is possible to compare and to refer between various cultures. Next, affective dimension describes the capability to accept and to respect people from different cultures. This dimension goes along with motivation and emotional readiness for new experiences. Last, conative dimension contains the competency to act in a different culture. Therefore, the actor must speak the language and has to adopt non-verbal behavior. [Köppel 2007, p. 119f.]

These general insights about facets of culture lead in the next step to impacts on intercultural collaboration. First, it is necessary to clarify different levels of cultures. Next, cultural influences are described by Hofstede (1980) dimensions of culture. Cultural levels and dimensions will be discussed in the paragraph below.

b) The Cultural Impacts on Dispersed Multinational Teams

The definitions above point out a group related interpretation of culture. The phenomenons of culture is not only based on nationality. Besides national cultures of dispersed multinational team members, cultures related to business also exist, occupational, and organizational level. Table 3.7 gives a differentiation of cultural levels with main characteristics: [Cullen and Parboteeah 2005, p. 46ff.]

> "Strong organizational cultures develop shared norms, values, beliefs, and traditions among workers." [Cullen and Parboteeah 2005, p. 280.]

Table 3.7: Cultural Levels [Cullen and Parboteeah 2005, p. 46ff.]

Level	Characteristics
National Culture	Dominant Culture within Political Boundaries of Nationstate; Culture of People with Greatest Population, Political or Economic Power; Include Formal Education, Business Transactions
Business Culture	Acceptable Way to Conduct Business; Guides Everyday Business Interactions; Proper Business Etiquette; National Cultures produce Own Business Culture
Occupational Culture	Different Occupational Groups have Distinct Cultures (e.g., physicians, lawyers, accountants); Norms, Values, Beliefs, and Expected Ways of Behaving; Regardless of Organizational Employer; People with Similar Jobs have Similar Values
Corporate/ Organizational Culture	Common Understanding of Community Members; Organizations have not only one Culture; Organizational Subunits develop Distinct Subcultures; Culture is Behavior Result and Orientation System

The overview shows different cultural levels which have direct or indirect impact on intercultural collaboration. Culture is a huge academic field that is supported by different disciplines, like anthropology, sociology, and psychology. It would be an enormous work to discuss all levels of culture at this point. Also there is a risk of loosing the multinational focus of this study. The national culture constitutes the highest level which also has an influence on the following cultural levels. The business, occupational, and organizational culture can not be separated from other parts of the society. [Hofstede and Hofstede 2006, p. 25.]

Moreover, the first half of the twentieth century social anthropology developed the thesis that all societies face same basic problems and only the answers are different. In relation to this statement Hofstede (1980) analyzed employees of one multinational enterprise in 50 different countries. His study carries out the empirical evidence that five basic dimensions of culture are in common, but are treated nationally in different ways. Peculiarity of his study lies in the composition of people, because they resembled each other in all respects except nationality. Essence lies in the handling of following cultural dimensions by different nationalities; *Power Distance*, *Individualism versus Collectivism*, *Uncertainty Avoidance*, *Masculinity versus Femininity*, and *Long-term versus Short-term Orientation*. Table 3.8 illustrates these dimensions and related social values and norms. In that way, both extremes are contrasted. [Hofstede and Hofstede 2006, p. 25f.]

Table 3.8: Cultural Dimension [Hofstede and Hofstede 2006, p. 51ff.]

High Power Distance	Low Power Distance
Acceptance Different Prestige, Power, Wealth; Authority Norm	Cooperative Norm, Interdependence/ Solidarity/ Membership
Individualism	Collectivism
Egotism, Individual Performance/ Behavior, Low Loyalty, Lose Interpersonal Relationships, Idividual Decision Making	Altruism, Solidarity, Group Performance/ Behavior, High Loyalty, Independent/ Cooperative Interaction, Close Interpersonal Relationships
High Uncertainty Avoidance	Low Uncertainty Avoidance
Structure Requirements/ Formal Rules, Determination in Human Behavior, Compromise Standard, Institutions/ Experts Faith	High Tolerance of Deviation from Norm, Unpredictability Human Behavior, Conflict Norm, Weak Faith in Institutions/ Experts
Masculinity	Femininity
Appreciation Individual Success, Confrontation Standard, Independent Thinking/ Action	Solidarity/ Care Standards, Cooperative/ Social Norm, Moral Obligations
Long-term Orientation	Short-term Orientation
Fostering of Virtues for Future Success; Patience and Sparingness	Fostering Virtues of Past and Present; Tradition Respect, Face Preservation

First point, high power distance is in countries with unequally distributed power, like Asian and Latin American countries. In contrast, the United States, Canada, and European countries have low power distance. Further, individualism is the tendency of people to look after them selves. Examples of individualistic societies are economically advanced countries. Collectivistic countries like Ecuador, Guatemala, Pakistan, and Indonesia place importance on group decision making. The next point, high uncertainty avoidance is the attempt to reduce risks and to develop systems and methods to structure organizational activities. The dependence on rules is given in Greece, Uruguay, Guatemala, Portugal, Japan, and Korea. In contrast, Singapore, Sweden, Great Britain, the United States, and Canada have weak uncertainty avoidance. Next, masculinity is based on dominant values, for example, success, money, and material things. These are mostly represented in countries like Japan, Austria, Venezuela, and Mexico. On the contrary, Norway, Sweden, Denmark, and the Netherlands focus on caring for others and on the quality of life. The final point, mostly Asian countries face long-term orientation for future success. Countries like Spain, Canada, United Kingdom, or the United States are more short-term oriented. [Hodgetts and Hegar 2005, p. 407ff.], [Hofstede and Hofstede 2006, p. 51ff.]

Impacts of culture on intercultural collaboration are manifold and can be only superficially treated. Different levels and dimensions of culture give a basic understanding of various aspects. To summarize, the last paragraph treats the culture shock model and describes the challenges of intercultural management. Learning and understanding of a different culture takes time and needs the ability and motivation of people.

c) The Challenges of Intercultural Management

Understanding culture means understanding the individual and national society. Most cultural values and assumptions are learned in childhood and influence our thinking, feeling, and acting throughout life. Intercultural contacts and collaboration require a new and relearning of fixed beliefs. This process of cultural learning is shown in figure 3.6 as *Culture Shock Model*. [Hofstede and Hofstede 2006, p. 25f.], [Köppel 2007, p. 122.]

Intercultural experience can be broken down into four phases. In the beginning, a person experiences the foreign country and people as exciting and feel *Euphoria*. In *Culture Shock* phase the person rejects the foreign culture's values, thinking and behavior. Next,

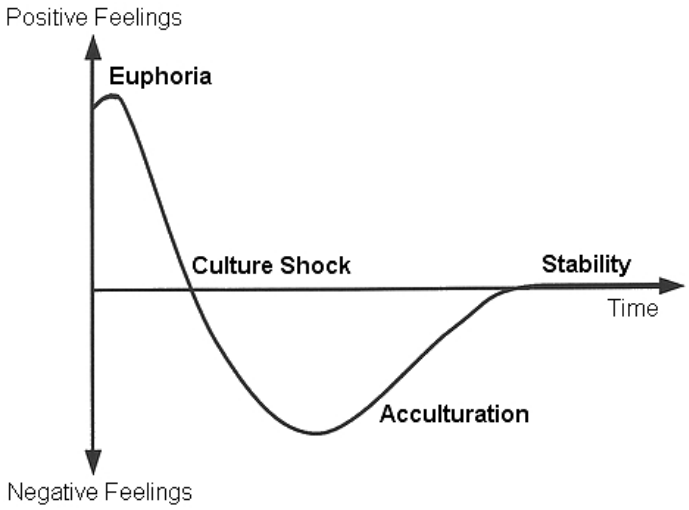

Figure 3.6: Cultural Shock Model [Hofstede 1991, p. 209.]

Acculturation phase requires cognitive and emotional understanding of foreign culture. That means, a tolerant attitude towards the difference between own and foreign culture. Finally, the model expects a *Stability* where the person interacts successfully in their own and foreign culture. Mostly, this model is criticized because of clear separation of phases. Further, a timescale for adopting of intercultural attitudes is missed. The understanding and adaptation of intercultural attitudes depends on each individual's capability to deal with aspects of intercultural competence. [Deresky 2006, p. 363f.], [Köppel 2007, p. 121.]

Further, intercultural competence includes ordinary and menial things in life. For example, greeting, eating, showing of feelings, keeping physical distance, making love, or maintaining body hygiene. All of these things are learned and programmed in our minds and are more difficult to unlearn than to learn new. Therefore the experience of cultural shock belongs to intercultural contacts like water to practicing swimming. [Hofstede and Hofstede 2005, p. 2f.], [Deresky 2006, p. 363.]

There is a particular need for qualified employees who work for subsidiaries or branches of head offices and also abroad. These executives have a key role in the success of multinational team work and therefore for the enterprise. Various studies about foreign delegation of expatriates argue about cultural differences which lead to failure and

discontinuation of foreign activities. For instance, Breidenbach and Zukrigel in 2000 allege increasing rates between 30 to 85 percent for failure and discontinuation. In contrast, deployment in developing countries has higher discontinuation rates compared with European countries which have a maximum at 5 percent. However, not all cases of discontinuation are automatically failures, as well as continuation is not automatically success. [Bergemann 2003, p. 181f.], [Beier 2006, p. 7.]

On the one hand, the characteristics of foreign employee must be stressed. A lack of adaptability of family and other private problems are decisive. There are various occupational and private reasons for failure of such activities. Further, negative consequencescan arise in case of re-entry. Importance of reintegration is still undervalued, but according to a study by Black and Gregersen (1991) about 25 percent of employees leave the company after their return. [Iten 2000, p. 68.], [Bergemann 2003, p. 182f.], [Neises 2005, p. 1.]

On the other hand, lack of adaptability leads to increasing costs for the company. The sending company bears, for example, costs for relocation, compensation of living costs, special premiums, language courses, preparatory trips, and intercultural training. These costs are quantified at approximately three to four times of the annual salary of the employee concerned. Difficult to quantify are costs that arise from those employees who stay abroad until the end, but due to lack of adjustment the expected performance will not be reached. Additionally, possible damage of company's image has to be taken into consideration. Finally, reintegration failures cause loss of skills, knowledge, and experience of employee that can be not or only inadequately be replaced. [Iten 2000, p. 68.], [Bergemann 2003, p. 182f.], [Neises 2005, p. 1.]

Summing up, intercultural management should raise awareness of cultural conflicts and synergies. It strengthens and builds up competence and tolerance among team members. Intercultural training includes all activities aimed at people to enable constructive adaptation, proper decisions, and to act effectively in intercultural environments and situations. Importance of intercultural competence for success of foreign activities of employees is in practice widely recognized. Besides theoretical knowledge, there are massive deficiencies in practical application, like measurement of intercultural competence and development activities. Possible examples are assessment center, psychological test, culture-specific training, and intercultural preparation activities. A large proportion of

expatriates are send abroad without prior examination. Primarily, only language courses are offered as preparatory activities. [Meckl 2000, p. 48.], [Neises 2005, p. 76f.]

3.2.3 The Chances and Risks of Intercultural Collaboration

Dispersed multinational teams face chances and risks concerning knowledge management and intercultural management. Table 3.9 gives a summarized overview.

Table 3.9: Cultural Management Chances and Risks

Aspect	Chances	Risks
Knowledge	Institutionalization/ Standardization/ Formalization/ Centralization, Usefulness of Knowledge, Application Capability, Knowledge-sharing Incentives, Absorption Readiness	Limited Transfer of Tacit Knowledge, Interpretation of Information, Distribution of Knowledge/ Intransparency, Gap between Knowledge Levels, Job Rotation, Scarce Resources, Specialization
Culture	Trans-national Organization, Foreign Assignments of Specialists/ Executives, Participation Decision Process, Common Technical Language, Language Skills	Communication Skills, Social Interaction Ability, Low Trust/ Reciprocity/ Reputation, Boundedly Rational/ Opportunistic Behavior, Resistance, Predominant Orientation

This summary highlights particular chances and risks for dispersed multinational teams. At present, the observed global IT service enterprise has started to install an information exchange platform. The multinational knowledge management should be supported through intercultural collaboration. The goal of this platform is to collect common rules and standards for IT development and service support. At the same time, team building activities and language courses support intercultural collaboration. Generally, the focus is on communication skills which are facilitate by video conferencing tools.

The next section introduces the social network analysis as supporting instrument for intercultural collaboration. Concluding, the elaborated theories with this methodology are identified. Therefore, definitions and characteristics will be discussed below.

3.3 Dimension of Social Network Analysis as Supporting Methodology

In this chapter, the social network analysis as a supporting instrument for the management of dispersed multinational teams will be discussed. The previous sections dealt with the formal structure and organization of such teams. The network approach was introduced starting with global organization and local resource allocation. Due to increasing complexity of a globally distributed and collaborating workforce traditional hierarchical structures and leading instruments do not go far enough. Considering the challenges of intercultural collaboration there is a need for the trans-national model. [Rank 2003, p.31ff.]

The network approach developed by Bartlett and Goshal (1990) is mostly criticized because of its normative and ideal character which disregards the historic heritage of an organization. Nevertheless, this organizational model addresses the integrated strategy of intercultural collaboration. An empirical study of Perlitz, Dreger and Schrank in 1996 document about 40 globally operating enterprises which installed the trans-national organizational model. They find out that personal resistance against restructuring and reduction of hierarchy the hierarchical control and monitoring systems stay the same. Rising coordination costs often prohibit multinational enterprises from decentralizing decision making. Following the studies of Welge, Böttcher and Paul in 1998, as well as Welge and Holtbrügge in 2000 formal hierarchical structures affect intercultural collaboration. That means, the coordination between holding and business units is increasingly executed through informal communication. For example, decentralization of decision making is important for voluntary exchange of know how within multinational teams. Therefore, participation of business units in key decisions increase the effectiveness of the organization. [Welge and Holtbrügge 2002, p. 194ff.], [Bergemann 2003, p. 15.], [Morschett 2007, p. 64ff.]

Multinational enterprises have to focus on connecting dispersed team members. The global organization goes further than organizational charts, functional descriptions, or process standardization. Verna Allee (2002) views an organization as living system and points out the evaluation of value creating activities. An effective organization focuses

on identification and connection of necessary resources like employees. [Allee 2002, p. 2ff.] Furthermore, this social network approach is favored by Valdis Krebs (2000) who describes the social capital theory by the following statement:

> "The ability to find, utilize and combine the skills, knowledge and experience of others." [Krebs 2000, p. 89.]

The importance of the employee is related to various skills, experiences from different organizations, functions, and cultures. These capabilities go back to the social network of employees. This network contains connections to other local colleagues, advisors, contact partners in other functional areas, local decision makers, customers, business partners, or suppliers. Bridging employees from various locations expands the network and thus the possibilities for intercultural collaboration to build up dispersed multinational teams. [Krebs 2000, p. 89.], [Köppel 2007, p. 166.]

3.3.1 The Definition of Social Network Analysis

Research in networks is still a fairly young field of methodological issues. Increasing practical problems with a growing focus on the individual and its relations to other actors demand new approaches. The *Social Network Analysis* gains increasing importance in scientific and management disciplines. It helps to visualize connections between individuals and shows the way people work together and exchange information. [Nooy et al. 2005, p. 24.], [Hennig 2006, p. 7.], [Knoke and Yang 2008, p. 1.]

> "Statistical analysis of interconnected groups - of computers, animals, or people - yields important clues about how they function and even offers predictions of their future behavior." [Newman 2008, p. 33.]

The social network analysis was developed among the academic fields of sociology, social psychology, and anthropology. In 1908, Georg Simmel referenced the interactions of individuals in different relationship networks. He recognized that individuals react in different ways depending on their geometry of social relationships. The kind of relationship

can be characterized as informal, like friendship, or formal, like business transaction. Therefore, the differentiation of social networks is performed by temporal, functional, and spatial dependencies. Social network analysis combines the disciplines of social theory, statistical mathematics, and social network analysis software (e.g., UCINET). [Wasserman and Faust 1994, p. 10.], [Rank 2003, p. 28f.], [Hennig 2006, p. 7f.]

> "Social network analysis focuses on ties among, for example, people, groups of people, organizations, and countries." [Nooy et al. 2005, p. 1.]

The social network methodology conceptualizes a model of interpersonal ties among social entities. Examination of social relations focuses on transmitted behavior, attitudes, information, and goods among these actors. These activities are aimed at finding patterns in the relations among units. On the one hand, the influence of structures on the functioning of a group are studied. On the other hand, it means to experience possible impacts on the social entities within the group. In that way, the social network analysis tries to find out structural theories expressed by relational concepts and processes. The following list gives examples of such network concepts: [Wasserman and Faust 1994, p. 4.], [Nooy et al. 2005, p. 3.]

- Actors and their Actions are viewed as Interdependent rather than Independent,
- Relational Ties between Actors are Channels for Transfer or Flow of Resources,
- Structural Network Environment is Opportunity or Constraint on Individual Action,
- Lasting Patterns of Relations among Actors (e.g., Social, Economic, Political Structures).

The basis for a social network analysis is the determination and the collection of data. Empirical network data determine three important issues as the following items provide: [Knoke and Yang 2008, p. 15.]

1. Specification of Boundary,
2. Network Sampling,

3. Measurement of Relations.

Firstly, it must be ensured that the investigated structures and networks are covered and essential parts of the structure are not forgotten by false distinctions. Otherwise, a distinction problem arises. Possible boundary setting characteristics are, for example, organizational and group boundaries (e.g., department, school class), geographical borders, participation in events, characteristics of actors, or relations between actors. This first point is essential for the following steps. The second point focuses on how the data is collected. The most important procedures provide surveys, interviews, or monitoring of actors, as well as documents in text form or statistics to represent relationship networks. The longitudinal data collection shows change over time in groups. Thirdly, attention has to be paid on the measurement because of critical aspects arise, like validity, reliability, accuracy, and error. [Wasserman and Faust 1994, p. 45ff.], [Rank 2003, p. 60.], [Jansen 2006, p. 69ff.], [Knoke and Yang 2008, p. 15ff.]

Next, the social network data is relational. A structural variable exists that characterizes relationships between observed actors. It consists of one or more measured relations. For example, analyzing the relations of an event like a conference. This event includes a subset of participants which are actors. The actors are investigated after their quantification of relations, like directional versus non-directional, or dichotomous versus valued. These kinds of relations are described by the network's visualization methods. [Wasserman and Faust 1994, p. 28ff, 43.], [Rank 2003, p. 59f.]

Finally, presentation and visualization of social network data is managed by mathematical methods of the *Graph Theory*, also called as *Sociogram* or *Sociomatrix*. First, a graph consists of actors called *Nodes* and relations called *Ties*. The ties of a graph can be *Valued*, for example, by intensity of contacts. A *Dichotomous* relation simply describes if there is a connection between actors or not. Additionally, ties can be directional and called *Arcs* or non-directional and called *Edge*. A mutual relation between coworkers is an edge. In the past, the arrangement of points in sociograms were not covered by rules. Due to the progress of information technology, the possibility of visualization have increased. Therefore, social network analysis software enables combination of important network properties with distance and layout of graphs. [Nooy et al. 2005, p. 6.], [Jansen 2006, p. 91ff.], [Knoke and Yang 2008, p. 46.]

Table 3.10: Network Terms [Wasserman and Faust 1994, p. 17ff.]

Term	Description	Comment
Actor	Social Entities as Discrete Individual, Corporate, Collective Social Units	e.g., People in Group, Departments in Corporation, Public Service Agencies in City, Nation-States in World System
Tie	Linkages among Social Entities, Actors are linked by Social Ties	e.g., Talking/ Messages; Expressed Friendship; Authority; Kinship; Business Transactions; Club Membership; Migration; Road/ Bridge
Dyad	Pairs of Actors and Associated Ties	e.g., Couples
Triad	Triples of Actors and Associated Ties	Transitive (Positive agreement between Actors), Balanced (Positive or Negative Agreement between Actors)
Subgroup	any Subset of Actors, and all Ties among them	e.g., Bundle of Institutions, Cliques
Group	Consists of Finite Set of Actors	Specification of Network Boundaries, Sampling, and Definition of Group
Relation	Collection of Specific Ties among Pairs of Actors	e.g., Set of Friendships, Set of Formal Diplomatic Ties
Social Network	Consists of Finite Set/s of Actors and Relation/s defined on them	Presence of relational Information is Critical and Defining Feature

Second, the sociomatrix is the basis for visualizing social networks and presenting their relational data. Sociomatrice consist of two dimensions, rows and columns. These dimensions illustrate the relationship between a sending actor i and a receiving actor j. Rows present the sending actors and columns the addressed receiver. A sociomatrix is generally quadratic because both dimensions have the same actors. This finding is mathematically expressed by $x_{ij} = x_{ji}$. Generally, the principal diagonal of the matrix stays empty because an actor has no relation to itself. The mathematical expression for the empty diagonal is $x_{ii} = 0$. A special form of a matrix is the adjacency matrix which provides dichotomous relationship. For that reason, these binary matrices contain just the variables 0 and 1 to express if a relation exists between the actors. The advantage of the

sociomatrix is that the illustration of bigger networks where the graph presentation would be too complex. Further, for the usage of social network analysis software there is a need for the sociomatrix. This software uses the relational data within the matrices to calculate relationship measures and gives out a sociogram. [Wasserman and Faust 1994, p. 77.], [Rank 2003, p. 63f.], [Nooy et al. 2005, p. 4.], [Knoke and Yang 2008, p. 49ff.]

This paragraph performs a basic insight into properties, concepts, and theories of the social network analysis. A complete overview of the various aspects would be enormous due to different approaches and goal settings of social network evaluations. Therefore, table 3.10 gives a general overview of the central terms in this matter. This vocabulary provides needed terms for discussing social networks, their data, and captures briefly this huge academic field. [Wasserman and Faust 1994, p. 17ff.]

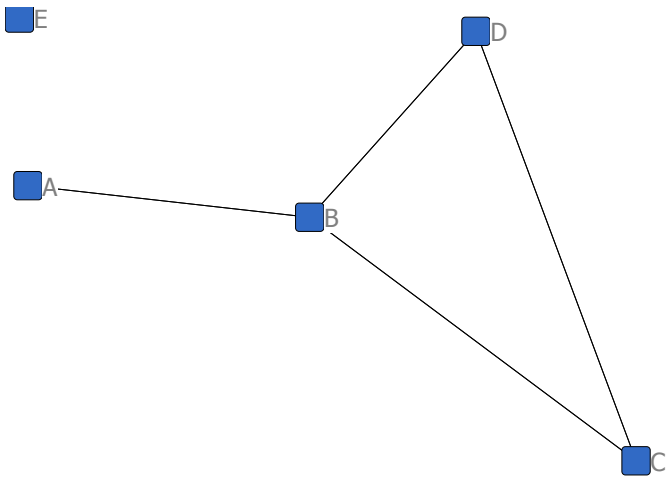

Figure 3.7: Non-directed Graph Example [Holzer 2006, p. 35.]

An example of a sociogram or graph is given in figure 3.7. This graph illustrates a non-directed relationship among five actors (A-E) because the ties between the actors have no arrowhead. For example, this can be a mutual relationship between coworkers. In case of a directional relation the arrowhead would show in the direction of the receiving actor. Further, the sociogram depicts the structure of ties within a group. It shows which actors are more popular. That is more centered than others, as well as what actors are chosen by popular actors. A sociogram reveals that fact, whereas a simple count of choices does not. [Nooy et al. 2005, p. 4.], [Holzer 2006, p. 35.], [Knoke and Yang 2008, p. 46.]

The table 3.11 presents the sociomatrix belonging to the pictured graph 3.7. It is a table listing up the nodes and their relations. Every relation or tie is symbolized in the matrix with the number 1. The symmetrical relationship is illustrated through the mirror effect, because all values are mirrored along the main diagonal. That means, A works together with B and vice versa. In the asymmetric way the value would be different between A to B, and B to A. [Holzer 2006, p. 35.])

Table 3.11: Sociomatrix Example [Holzer 2006, p. 35.]

	A	B	C	D	E
A	-	1	0	0	0
B	1	-	1	1	0
C	0	1	-	1	0
D	0	1	1	-	0
E	0	0	0	0	-

Both the graph and matrix describe the same content. However, analytical networking data and measurement is often better represented by a graph. Matrices facilitate sophisticated mathematical and computer analyses of social network data, but are less user-friendly through the use of mathematical algebraic representations. [Jansen 2006, p. 94.], [Knoke and Yang 2008, p. 45.] Until now the relationship measures, like centralization, cohesiveness, or segmentation have not be discussed. These measures concerning the investigation on groups will be done in the corresponding phases. The introduction of the social network analysis in business practice is partly reached. Therefore, the next section describes a possible use and the procedure of this analysis. It gives an example for the evaluation of social networks within organizations.

3.3.2 The Social Network Analysis as Methodology

One of the famous social networks experiments comes from Stanley Milgram in 1967 called *Small World Phenomenon*. He probed the distribution of path lengths while passing a massage from person to person to reach a designated target individual. The result was that the received message passed an average of six people. The involved participants where connected over six degrees of separation. [Newman 2003, p. 175.] This case

shows one of the diverse applications which social network analysis covers along social, organizational, as well as economic systems. For example, information about imports and exports among nations tells network analysts something about the position of a certain nation in the world economic system. Economic growth rates are longitudinally evaluated. Additionally, this kind of network analysis is used to measure the process of change within groups over time. [Wasserman and Faust 1994, p. 9f.]

One of the most famous articles concerning the social network analysis is given by Sosa, Eppinger and Rowles (2004). They discovered that there is misalignment between organizational structure and product development within a company. Their investigation took place at Pratt & Whitney for the design period of the development of a large commercial aircraft engine. Generally, knowledge about a product is embedded in established interaction patterns of an organization. Therefore, product development is enabled, but at the same time new or complex product development is hindered. For that reason, established communicational channels and indirect interactions of team members overweight new organizational design interfaces. As a consequence, organizations have to manage the embedded knowledge within established information processing procedures. [Sosa et al. 2004, p. 1674.]

The social capital theory was scrutinized by Krebs in 2000. His article "Managing the 21st Century Organization" explains the importance of connections among individuals, teams, communities, systems, and other business assets. These actors participate in a social network which can be seen as economic web. The goal of this network is to connect all individual actors and their knowledge to increase the productivity and outcome of the whole connected system. [Krebs 2007, p. 2.]

In the article of Krebs (2007), the social network analysis examines the organizational structure of an IT department in two ways. First, the linearly hierarchy is dissect where all employees are linked with a level above boss. The employees which have the same boss belong to a certain group. From the formal point of view there are no direct connections between the groups. Only a common boss on a higher level connects different groups. Figure 3.8 demonstrates the traditional hierarchy structure of an anonymous IT department. [Krebs 2007, p. 2.] On the top is the department head in violet color beneath are the group leader in green, and blue colored are the employees.

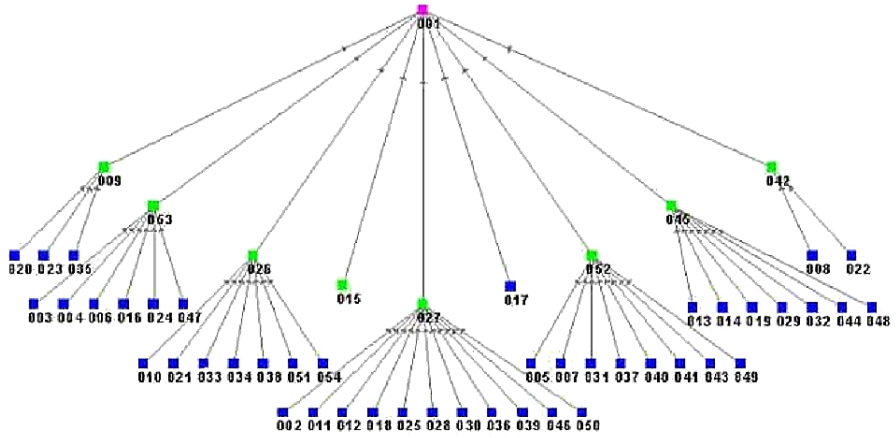

Figure 3.8: Traditional Hierarchy Structure [Krebs 2007, p. 2.]

Second, there is an additional informal structure besides the formal authority view of this IT department. This informal view illustrates the information flow and knowledge sharing within the department through interactions between groups. Both sociograms show the same organization and their authority structure with functional responsibilities. Different is in figure 3.9 the representation of the real work situation. This graph is based on a survey that gathered data from the leaders and employees. These actors were asked about with whom they work together and share information and knowledge to fulfill their job and the goal of the organization. The result is an illustrated network structure where leaders and employees are linked together referring to their tasks and goals. [Krebs 2007, p. 2f.]

These findings go along with the management research since the late 1980s. At this time, positive effects on accomplishing objectives in regard to relationships among managers and employees were finded out. The focus is on human resources which work together and create productivity and innovation. This tendency is continuously increasing because the workforce of today is affected by demographic change. A growing amount of experienced workers go to retirement and knowledge transfer is limited. Because the embedded knowledge depends not only on what the worker knows, but more importantly on who the worker knows. The result of the social network analysis is a sociogram which shows the ties among actors. This kind of network map symbolizes relationships, information flows, and transactions. It is a visual help for tracking ties and adapt connections. On

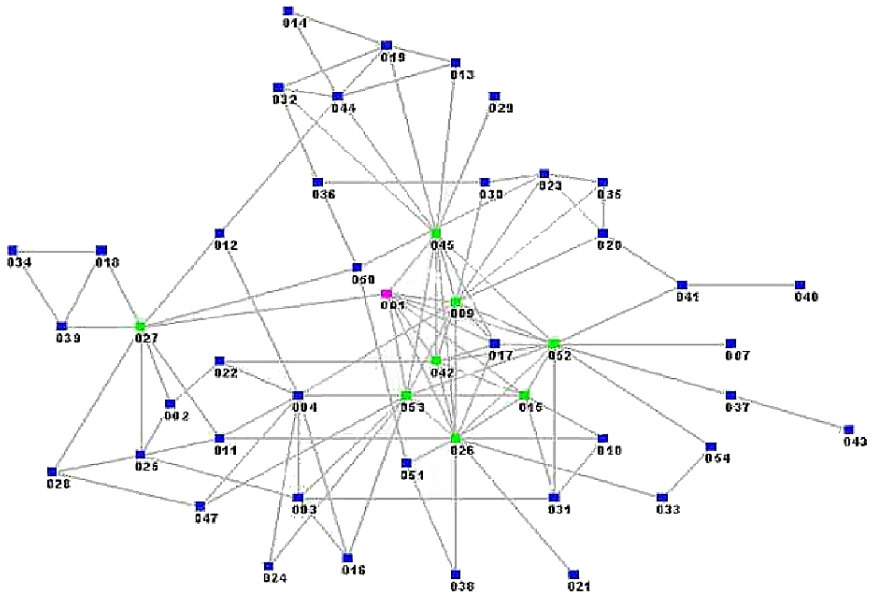

Figure 3.9: Employees Working Connections [Krebs 2007, p. 2.]

the basis of network maps, organizational design concepts and strategies can be worked out or may be better understood. [Krebs and Holley 2006, p. 2.], [Krebs 2007, p. 3.]

3.3.3 The Chances and Risks of Social Network Analysis

Using the methodology of social network analysis entails certain chances and risks. Concerning the support for the management of dispersed multinational teams various aspects were discussed. Table 3.12 gives a summarized overview.

This summary highlights particular chances and risks for adoption and possible use of the social network analysis. At present, there is a lack of knowledge for using this methodology in business practice. The observed global IT service enterprise concentrates on traditional managerial actions and operating figures for measuring and comparing of time and costs savings. Further, global team building activities, as well as knowledge transfer, and trainings have just started. Therefore, evaluation of efficiency of dispersed multinational teams is still pending.

Table 3.12: Social Network Approach Chances and Risks

Aspect	Chances	Risks
Social Network Analysis	Visualization of Relations among Individuals; Selective Links as Transfer Channels for Resources and Information; Structural Position of Actors affects Perceptions, Attitudes, and Actions; Organizational Transparency; Rising Access to relevant Information and Resources; Individual Connection instead of Organizational Standardization; Easier Implementation/ Integration by Key Persons; Consideration of temporal Team Development	Collection of relational Data; Boundary Setting; Investigation Time and Costs; Lack of Familiarity with Terms/ Concepts; Selection of appropriate connecting Activities; Rules/ Behavior depends on Person/ Group; Problems of Inaccuracy, Subjectivity, Sample Size

The final section of chapter 3 is summary of elaborated theories concerning intercultural collaboration of dispersed multinational teams. The eclectic multidimensional approach will be exploited in favor of the social network analysis.

3.4 Summing up: Theoretical Insights in favor of Social Network Approach

The conceptual character of this work is expanded in chapter 3. In a systematical way theories and concepts concerning the management of dispersed multinational teams were evaluated. Consideration of these theories is narrowed by focusing on team work in a global IT service enterprise. This focus helps to consider the concepts target-oriented and systematically. The result is an overview of related topics and their academic progress. Beginning with state of art definitions there is a continuous evaluation that resulted in challenges and risks. This helped in two ways to summarize and to focus on the objectives. The third chapter developed in a structural way the multidimensional concept that reveal to the social network approach. In the following paragraphs, important aspects of each

individual area are summarized in order to conclude the multidimensional approach.

First, the global organization faces conflicts through localization or globalization strategy. Both strategies have advantages and disadvantages. Focusing on a dispersed multinational team the globalization strategy is recommended. That means, to centralize the organization while integrating the foreign business units. Further, formalization and standardization take place in order to organize the work processes and build up interdependent relationships. Complexity is increasing through rising hierarchical levels that organize the communication linkages and social interactions among team members. Additionally, the organizational structures in foreign business units will not completely disappear, as well as personal resistance against restructuring of local organizations is growing. The system-theoretical approach addresses the negative consequences of a globalization strategy. Focus is on benefits out of the complexity through process-related input and output concentration. This concept goes along with the flexible resource allocation in a trans-national network model.

Second, the trans-national model belongs to the social network approach. With concentration on local resource allocation for a dispersed multinational team the geocentric strategy was identified. This strategy describes a worldwide selection of skilled employees based on their qualification. Contrary to a centralized or decentralized strategy this model aimed at a flexible resource allocation and planning. However, the global IT service enterprise face conflicts through resistance of local authority and responsibilities. This phenomenon is described by multiple leaders of a multinational team member. The setting of task-related priorities is needed in order to avoid such conflict situations. Otherwise, the optimal assignment of a skilled employee is hindered.

Next, an optimal assignment belongs also to the knowledge base of the individual, as well as to knowledge sharing and transfer with the global organization and team. The various kinds of knowledge have to distinguish that address the value creation, like organizational, process-related, service, and personal knowledge. On the one hand, knowledge is embedded in organizational structures, like documents or documentations. On the other hand, transformed knowledge is stored in form of information which has to be connected and interpreted. In that way, the multinational team member should be able to find and create effective solutions by reusing knowledge, identifying knowledge carriers, and avoid redundant knowledge creation. Focusing on global IT service there is a need for

knowledge sharing, because intercultural collaboration is limited by cultural differences, less overlapping working hours, additional burden for transformation, interpretation and explanation. Common rules and standards build a basis, but cultural understanding and trust building is generally limited.

Fourth, intercultural management aimed at the build up of intercultural competence of the individual, as well as improvement of intercultural collaboration among team members. These goals concentrate on the individual and their ability and motivation to get to know and handle the different culture. Dispersed multinational team members have a synergy potential through their diversity which also creates conflicts. Intercultural training build the basis, but intercultural experience is necessary for awareness and acceptance of cultural differences. Therefore, in the beginning, face-to-face meetings are essential to get to know and build up trust among the team members. Intercultural collaboration depends on relationships across national and organizational boundaries. For the most part, social interactions and communications take place virtually which limit the exchange of information, effective working together and trust building.

Finally, the methodology of social network analysis supports the visualization of relationships between individuals. It helps to identify famous or key persons in a social network. These individuals have a special position and role due to their connections to other team members. The central position in a network has the individual with the most connections to other members. This finding helps to understand how the network operates and which role the people have to enable collaboration among work processes. Most important is not only what the members know, but who they know. In this way, it is important to use a sociocultural method for a business problem. Further, the individual is in the center of the mentioned above theories. Intercultural collaboration depends on the involvement of each individual to the support the task and goal of the team.

A multidimensional approach addresses the organization theory, knowledge management, and intercultural management. The different theories are analyzed in favor of a social network approach. Each theory has different approaches, for example, organization theory contains also classical process-oriented or production-oriented approaches. These approaches concentrate on clarifying the input of a process and forecast a certain output. Therefore, adjustments are only made based on input or output deviations. The resource allocation and planning complements this approach by an optimal provision of needed

resources. Further, knowledge management in enterprises concentrates on process and administration related knowledge. For example, Enterprise Resource Planning systems or Data Ware House imitate the ability to connect information to create knowledge. These systems are based on a formalization and standardization of work processes. In addition, intercultural management focuses on intercultural training and competence building. The goal is to increase synergies and decrease conflicts in dispersed multinational team.

The social network approach is aimed at the connection of formal organization and production process. These include global availability of national resources, multinational knowledge management, and intercultural management. It is a supporting concept instead of a substitute. Dispersed multinational team members are embedded in their national organization of a business unit or headquarters. An integration of foreign members in a global team is limited by organizational and national boundaries, as well as formal regulations. For example, hierarchical responsibility is incumbent on the linearly national department leader whereas task-related or functional responsibility is incumbent on a foreign team leader. The organizational structure describes the formal network of such a team member, because authorities and responsibilities are defined. Additionally, through the functional assignment the member belongs to another formal network where tasks and goals are reached. This describes work processes and communication linkages or simple how the work is done. Both organizational structures leave space for informal structures which will not be discussed in this work. In fact, the social network approach focuses in particular on interorganizational relations, intercultural collaboration, and geographical distribution of IT service teams. It shows the starting point that address the individual as team member. Therefore, the social network analysis as control instrument is identified to support the management of dispersed multinational team work. In the next chapter, this assumption is exemplary tested.

Chapter 4

Integrating Theory into Social Network Methodology

The global IT service enterprise and their dispersed multinational teams face certain challenges through intercultural collaboration. The strengths and weaknesses of intercultural collaboration were systematically developed and examined theoretically in the previous chapters. The fourth chapter presents the practical part of the study. Here, the theoretically well-founded social network approach is tested for its practical implementation. The basis for this is a three-month observation period between July and September 2008. In addition to data collection for the social network analysis, several personal interviews with multinational team members and leaders took place.

This observation period provides the basis for proceeding in the fourth chapter. In the beginning the status of intercultural collaboration will be enlarged upon. This is necessary to find out the starting point for the use of the social network methodology. Further, it helps to develop structured activities for data collection and analysis. Secondly, the data collected will be analyzed to showcase the methodology. In that way, first findings will be presented and illustrated by examples. Next, the third section set up requirements, challenges, and solutions which result from the practical observation and theoretical approach. This helps to illustrate the utility of the method for a practical implementation. Finally, chances and risks will be summarized. The goal is to provide examples to examine theoretical assumptions and show benefits of the methodology.

4.1 Adapting Methodology to Case Reality

Before beginning with the analysis of social interaction data, there is an explanation regarding the process of observation. What is special about this social network analysis is that data is collected from documentation of working processes. Therefore, it is necessary to clarify organizational and process-related issues. Most of this information was taken from observations and interviews. Therefore, the first section 4.1.1 gives a general overview of the current status of intercultural collaboration in the global IT service enterprise. Observations and interviews with team leaders and team members help to find out the specialties and challenges in global IT services. Next, sections 4.1.2 and 4.1.3 explain the linkages of social network analysis with the global organization and the IT support process.

4.1.1 The Starting Point of Observation

The observation period is merely a part of the development of intercultural collaboration within the global IT service enterprise. This organization has been dealing with these issues for several years. A definitive starting point is hard to set, but increased international interactions began to emerge approximately 10 years ago. At this point, an earlier common IT software system for the administration of human resources was implemented. This addressed the necessity of common activities and interactions, for example, creating reports of personal data from different regions and countries. Therefore, social interactions and building up of relationships across national and organizational boundaries have already started.

An increasing intensity of interactions was provided by the implementation of the current global IT software system. As a result, a formalization and standardization of service processes for the human resource administration took place. The standardization of working processes for the IT service support and combination of dispersed multinational teams lead to increasing intercultural collaboration. From this point, adjustments in local processes are limited in order to the integration of business units to the central headquarters.

These adaptations may be follow the strategy of the global IT service enterprise; because a majority of around 80 percent of the IT service business is created in the home country of headquarters. Therefore, centralized authority and responsibility focus on fast decision-making which follows the business strategy. Integration of foreign business units and their labor generate cost efficiency. Further, the globally distributed resource allocation favor a flexible capacity planning.

However, the organizational integration was characterized by partly imposing the headquarter's structure on the foreign business units. In some cases, locally existing organizational structures and work processes were ignored and disbanded to the detriment of the interaction. For that reason, acceptance and implementation of standardized processes are limited because of personal resistance and rejection by the foreign and headquarter's staff. These disadvantages lead to a longer implementation phase, because additional time-consuming adjustments and reengineering were necessary.

The observation and interview phase took place during such an organizational adjustment and standardization of IT support processes. Therefore, the next two sections enlarge upon the organizational and process-related view points in order to identify linkages to the methodology of social network analysis. The results from the observation and interview phase give the starting point for the proceeding of social network methodology.

4.1.2 The Methodology Linkages to Global IT Service Organization

The observation and interviews involved all hierarchical levels of the global IT service organization. The perspectives of dispersed multinational team members, the team leaders, and the global department managers were observed. The interviews aimed at two points: to elicit the handling and management of dispersed multinational teams and to create awareness of the social network approach. The interviews deliver strengths and weaknesses of the current situation in the direction of social network. For that reason, the observation and interviews offer the starting point for the social network analysis to support intercultural collaboration.

The narrative style of the interviews carried out did not inhibit response options. This

kind of interview is less adequate for empirical study because of the variety of answer options. The goal of the interviews was to find out the best practices of intercultural collaboration, as well as negative examples. The content of the interviews is in line with the multidimensional approach concerning organization, resource allocation, knowledge management, intercultural management, and social networks. The following table 4.1 gives a summarized overview of the strengths and weaknesses of intercultural collaboration in the observed global IT organization which were mentioned.

Table 4.1: Intercultural Collaboration Strengths and Weaknesses

Aspect	Strengths	Weaknesses
Organization	Faster Central Decision-Making, Clustering of Tasks and Service Processes	Increasing Complexity through Authority Distribution, Lower Decision Quality through Information Overload, Know-how Loss through Restructuring, Horizontal Process View
Resource	Global Resource Allocation, Increasing Availability and Capacity Utilization	Virtual Integration of Distributed Team Members, Tasks Prioritization through various Team Memberships, Less Flexible Resource Planning, High Share External Resources
Knowledge	Growing Knowledge Base of Team, Knowledge and Information Tools	Different Qualification Levels in one Team, Expertise distributed over different Teams, Reduction broader Knowledge Base of Persons, Increasing Training Costs, Limited Knowledge Transfer/ Sharing through different Places/ Time Zones/ Working Hours/ External Status
Culture	Temporary Employment Abroad, Face-to-Face Meetings, Videoconference Tools	Trust Building, Communication and Language Skills, Intercultural Management Competence, Traveling
Social Network	Build up Key Persons/ Hubs to connect Teams	Rotation of Team Members, Lack of Information Exchange

The result of this interview phase showed few examples of best practices or positive examples of intercultural collaboration. Actually, these resulting points are less surprising because for the largest proportion of respondents, the organizational restructuring had

not been entirely completed. Also their intercultural experience was limited because most respondents answered that the largest percentage (approximately 60 to 80 percent) of their work was done locally . All in all, from 8 interviewed teams only one team responded with an example of best practice. This team consists of people of two nationalities and they have worked together for several years. This includes regular face-to-face meetings, trust building, and continuous knowledge sharing and transfer. Due to the intensity of their interactions and the broad knowledge base, this team has increased their availability from a normal working day up to 14 hours. That means they have overcome the challenge of working interculturally in different time zones and places.

Generally, all respondents had a positive attitude towards working in a dispersed multinational team although the experience level among the team members and leaders varied. Therefore, training and team building activities are necessary. Expatriates and certain foreign team members are considered as interaction partners to connect the dispersed multinational team members. Critical in that matter is the organizational adjustment which destroyed certain social network structures through job rotation and changes in the team combination.

The target of most criticism was the authority model which is split up into three responsibilities. A dispersed multinational team member has different leaders. For example, the team leader is responsible for task-related issues, the foreign department leader has the administrative responsibility, and the capacity planning belongs to a regional supervisor. This model expects high interactions between all three leaders. Problems arise when the leaders achieve different goals. Further, complexity increases in case a team member belongs to more than one team. Therefore, priority setting suffers should a team member belong less than 50 percent to a multinational team. A lack of communication linkages among the team members and team leaders increases the weaknesses of intercultural collaboration. The result is an unclear goal setting for the team that affects information exchange and social interactions.

These strengths and weaknesses underline the importance of social interactions and communicational linkages to build up and to manage a dispersed multinational team. Where traditional management methods end, the social network analysis linkages are found to be a supporting measurement and controlling instrument. This starting point will be continued in the next paragraph 4.1.3 with a process-related reflection.

4.1.3 The Methodology Linkages to Global IT Service Processes

In general, IT services are mostly immaterial and virtual. There is less physical contact between customer and supporter. The kind of customer varies between physical and virtual. For example, a physical customer is involved and participates in the planning and development of an IT application to structure and coordinate processes. Examples of such human resources processes are the time and attendance records, or payroll. These service processes run as different IT applications on the global human resource administration IT system. Besides the physical customer, there is a virtual customer who uses these IT applications. If the user has a problem or question concerning the application there is an IT service support. The IT support deals with incidents or complaints from the user. The unitized handling of incidents is guaranteed by a standardized IT service support. All complaints or incidents are executed in the same way which may increase the efficiency and quality of support for a higher customer satisfaction. This standardization is necessary in order for work to be globally distributed.

Furthermore, the production of such applications or IT service processes is split up into three steps: Planning, Building, and Running. These steps characterize the linear organization of the global IT service enterprise. Unlike the linearly functional description, the IT processes run in linear, horizontal, and diagonal ways. Therefore, the IT processes follow a matrix organization. There are certain communication linkages between different departments and teams. For example, the Planning department communicates with the Building department in order to develop and implement the IT application following the requirements of the customer. There is also communication between the Building department and Running department in order to support the developed application. In a nutshell, all three departments including their teams deliver expert knowledge to create and complete a common IT service.

The linear structure of the headquarters organization supports the matrix oriented IT processes less. Organizational weaknesses can be described by growing communication across departments, as well as friction between process steps as a result of a lack of communication. Additionally, the presence of customers and users leads to a different service understanding and goal setting within the departments and teams. This complexity

is increasing through the involvement of different nationalities and countries. For that reason, a dispersed multinational team has to overcome organizational and national boundaries.

Furthermore, there is a documentation concerning all steps of creation of an IT application. Beginning with the planning phase where a process map is drawn to illustrate how the application has to be developed and implemented. Next, the development of the application is documented in order to support the IT service. Depending on the different steps, different documentations of the IT system are used. Focusing on the IT service support, an IT ticket system is used to create and forward an incident or problem description. Such an IT system creates a ticket which contains all the necessary information concerning the complaint or incident. That means in detail: the staff involved, the relevant IT application, and a description of the problem. The ticket helps the IT service supporter to identify, analyze, repair, or coordinate the resolution. An IT ticket system delivers data on how work processes run and team members work together to solve problems. Such IT systems are used as the starting point for the social network analysis as process-related linkages. An exemple analysis is described in the following section 4.2 which focuses on one observed dispersed multinational team.

4.2 Example of Social Network Analysis

The methodology of social network analysis is used in very many ways to investigate relations among individuals and institutions. This section concentrates on supporting the management of a dispersed multinational team through the use of the social network method. The observed IT service support team has been collaborating for approximately two years. The goal of the analysis is to find out the social network structure of this team in order to examine their intercultural collaboration. Therefore, different concepts of group measures regarding cohesiveness and centralization are evaluated. This investigation addresses the formal working relationships. Network data were collected through the formally used communication instrument, an IT ticket system.

The analysis is divided into three steps. In the first step, the boundary definition and data collection will be described. The next step provides the evaluation of data using the

network software Ucinet including NetDraw. In the final step, examples of first findings will be discussed.

4.2.1 First Step: Defining and Collecting of Data

The observed IT service support team consists of six members who work as developer and supporter. Two of the members belong to a foreign business unit in the United States. The remaining four team members are in the German headquarters of the global IT service enterprise. What is special about this case is that this team came into being while planning and implementing a customer relationship management IT system. Since the project phase in 2006 the team members have been responsible for the planning, implementation, and support of this software application. The application is used for the human resources administration in two service centers located in Germany and the United States. Therefore, the IT developers work together with responsible persons and users from the human resources administration. In case there are any problems or incidents, a user creates a ticket as problem description for the IT supporter. The IT based ticket application is used for the communication and forwarding of tickets.

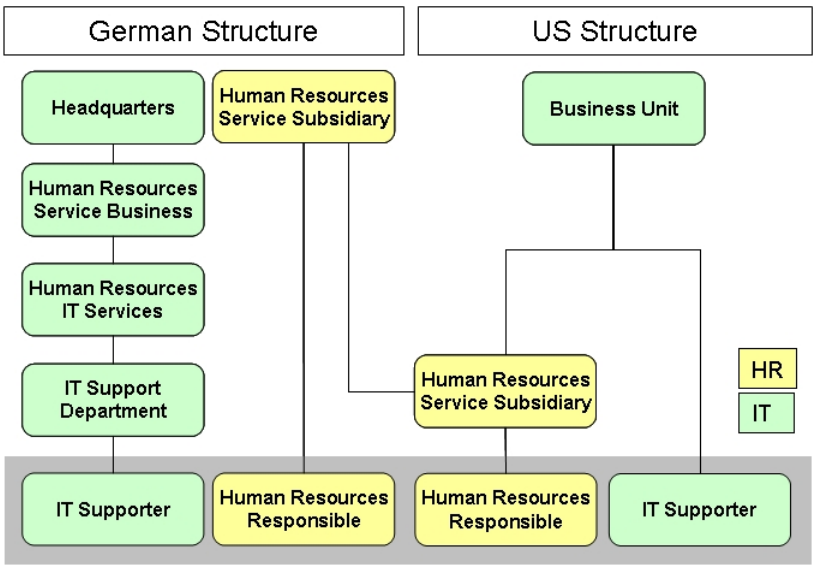

Figure 4.1: IT Service Team Structure (own development)

Figure 4.1 illustrates the organizational structure of the global IT service enterprise

and its related subsidiaries and business unit. Besides the national differences within the IT support team, there are certain organizational boundaries. For example, the organization of the headquarters is more diversified in comparison with the foreign unit structure. This difference may affect the communication between application user and among IT supporters because of additional hierarchical levels. Therefore, communication and information channels may be longer because of the authorities involved.

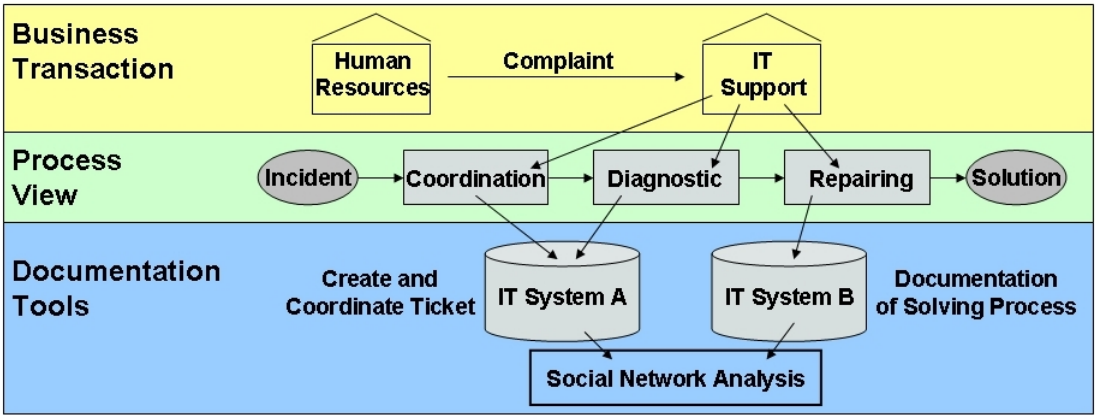

Figure 4.2: IT Service Process Structure (own development)

Furthermore, figure 4.2 shows the different activities during the IT service process. There are three layers which illustrate the process of the observation and collection of data within this team: the business transaction, process view, and technical documentation. First, the subsidiaries are considered as customers and users within the cooperation between human resources administration and IT service support. The formal request for an IT service is the complaint of the user or person responsible for human resources. Secondly, the starting point for the IT service process is an incident or problem declaration from the user. This description of problem is forwarded by an IT ticket tool which is used by the human resources staff and supporter. Besides weekly meetings, email communication, and telephone conferences, this IT ticket system is the formal interaction IT based platform for the exchange of information between user and supporter. The final layer is explaining the process of resolution and its documentation. Besides the repairing of the IT application through customizing or developing, there is an interaction between supporter and user to test the final result.

Concentrating on the second layer, there are certain steps formulated regarding how a user's complaint has to be handled. After receiving a problem description in form of a ticket the supporter starts to find out what is wrong with the application. Before this process step comes the coordination of tickets. The formal coordination is done by a team member himself or the team coordinator. Responsibilities and competencies are regulated during the coordination phase. This step guarantees the carrying out of results and the information flow among the team members. The final step is the repairing or fixing of the IT problem. Finding a solution for the incident depends on its causes. Therefore, this step is documented in another IT system which organizes the fixing, development, and terminal release of the support. Mainly, four roles are defined in an IT service ticket, as well as in a documentation report:

- Requester or Creator of the Ticket,
- Responsible Supporter or Developer of the Ticket,
- Input Deliverer for the Ticket,
- and Tester of the Solution.

These four roles deliver the social network data for the analysis. The social interactions and relations among the persons involved are evaluated. In the next paragraph 4.2.2 the processing of data, the creation of sociomatrice, and the illustration of social network graphs will be explained.

4.2.2 Second Step: Analysis of Data

In this section three matrice will be examined and the resulting graphs will be generated. The order of investigation is related to the process description and its roles. Therefore, the first analysis evaluates the relations between users named as requester and addressed supporters named as responsible. The second analysis scrutinizes the relations within the IT support team. That means, only among responsible supporters and input deliverers. Finally, the relations between responsible developers and testers of the solution will be evaluated.

Generally, all roles have certain attributes in common. The actors are indicated as IT workers or as human resources staff. Also the nationality is figured out by German and US American. Table 4.2 gives a short overview of dichotomized attributes only for the observed IT support team. Dichotomized means that the variable 1 indicates the attribute as positive and the variable 0 indicates the attribute as negative. In appendix A.2 the table A.1 gives a complete overview of all involved actors named as IT supporter and developer, also HR responsible and solution tester.

Table 4.2: Selective Social Network Attributes (own development)

Actor	IT Supporter	HR Responsible	German	US
IT1	1	0	0	1
IT2	1	0	0	1
IT3	1	0	1	0
IT4	1	0	1	0
IT5	1	0	1	0
IT6	1	0	1	0

The setting of attributes is necessary to distinguish between actors and how they are embedded in a certain network structure. In the observed team the differentiation between occupations is important to distinguish the IT support team from the users. Further, the nationality points out intercultural collaboration because it visualizes cross-border relations among the team members.

a) Analysis of Relation between Requesting User and Responsible Supporter

In the period January to August 2008 approximately 300 service requests were made. Already 250 of these had been processed and were therefore usable for the social network analysis. For the reason of completeness, only completed tickets were used for the investigation because these tickets contain all involved actors. Furthermore, for the need of boundary setting the number of usable tickets resulted at 206 tickets. This was necessary to focus on the observed IT support team and its six members. In order to avoid influences which result from staff changes because of vocation, illness, and mistakes in using the IT ticket system. The resulting matrix A.2 lists up the counted tickets as strenghts of relations between requesting user and responsible supporter and is given in appendix A.2.

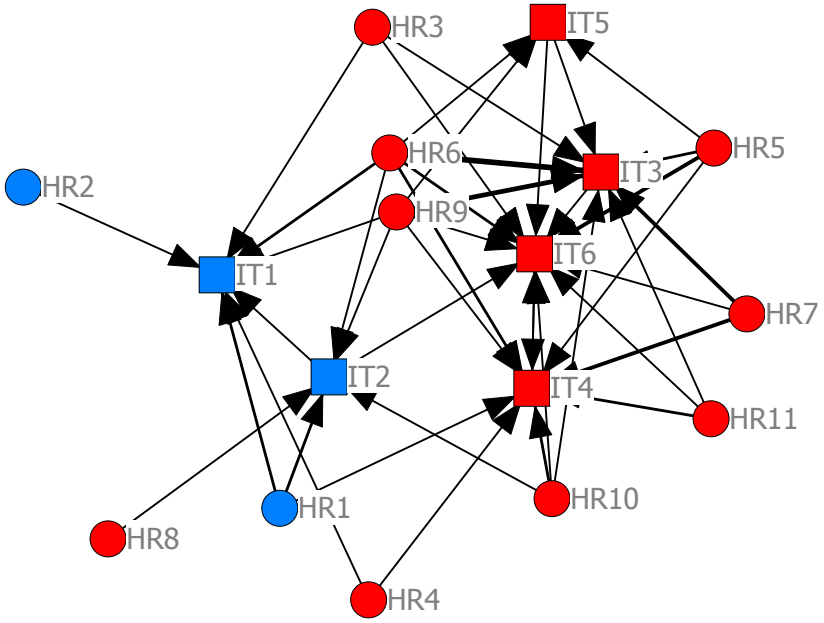

Figure 4.3: Requester and Responsible Valued Relations (drawn with NetDraw)

At this point, the first consideration of the illustrated graph in figure 4.3 starts. This graph shows the social network with valued relations between service requester and responsible IT supporter. The different occupations are expressed by circles for human resources staff and squares for IT supporters. Furthermore, the attribute showing the nationality is demonstrated using different colors. The red color labeled the German team members and blue labeled the US American members. Additionally, the relations or lines between the actors signify direction. It is originates with a source actor and reaches a target actor. This is identified by the arrow heads which show the direction of communication. Therefore, the relations are named as arcs. Strong and weak relations are expressed by thick and thin arcs. In that way, the graph and relations within are valued by the intensity of interactions. Also the actors were given labels to distinguish the different roles and for comparison with other networks.

The first consideration of such a graphic gives the starting point for further mathematical examination. Obviously, the IT supporters are more centered than the requesting users. This situation results from their role as supporters because they are requested by different users. Not all supporters are located in the same position in the network. Some

supporters are more centered than others. Further, the separation between German and US supporters is visible. There are some relations among the German supporters, but no direct connection from a German supporter to an US supporter. In contrast, certain German requesters address a US supporter. This point results from the fact that the requesters are the active component in this network. The process step is the coordination of service requests.

Table 4.3: Requester and Responsible Dichotomized Out-degree (calculated with Ucinet)

	Mean	Sum	Variance
HR1	0.188	3.000	0.152
HR2	0.063	1.000	0.059
IT1	0.000	0.000	0.000
IT2	0.125	2.000	0.109
IT3	0.063	1.000	0.059
IT4	0.063	1.000	0.059
IT5	0.125	2.000	0.109
IT6	0.063	1.000	0.059
HR3	0.188	3.000	0.152
HR4	0.125	2.000	0.109
HR5	0.250	4.000	0.188
HR6	0.375	6.000	0.234
HR7	0.188	3.000	0.152
HR8	0.063	1.000	0.059
HR9	0.375	6.000	0.234
HR10	0.250	4.000	0.188
HR11	0.188	3.000	0.152

Besides graphical options of social network analysis, there is a variety of descriptive statistics which characterize the distribution of measures. In the first example there are two possibilities of examination. On the one hand, the valued measures added up in matrix A.2 point out the strengths of certain relations. The horizontal accumulation of the rows shows the importance of the ticket creator. For instance, the actor HR6 has with 59 created tickets an important role as information sender. In contrast, the vertical accumulation of the columns presents the prestigious receivers of tickets. With 83 tickets

actor IT3 is most prestigious. These proportions calculated as a percentage share means that HR6 created nearly 30 percent of the tickets and IT3 is the receiver of around 40 percent of the tickets.

On the other hand, network analysis focuses on how many nodes an actor reaches. Therefore, the size of a network depends on the number of actors and on the amount of connections. For the reason of simplification, the sociomatrix is dichotomized to count the number of reached actors. The values of relations are replaced by variables. Variable 1 indicates that there is a relation and 0 there is no relation. In the first example, only directed arcs between actors are counted. This measure is represented through the rows of the sociomatrix. How many connections an actor has is called *Out-degree* and depends on the general statistical measures of the network software Ucinet. Measuring the sum of outbound connections shows the importance and influential role of a sending actor. An example for the out-degree statistics is given in the table 4.3 with the figures *Mean*, *Sum*, and *Variance*. [Hanneman and Riddle 2005]

The second column sum in table 4.3 expresses the number of relations and assigns them to the creator. For example, actor IT1 has not created a service request therefore the value is zero. Actors HR6 and HR9 have the highest score with 6 reached actors from 16 possible connections because a relation to themselves is excluded. Furthermore, the first column mean represents the average value of reached actors. For instance, a mean value results out of dividing the sum value by the number of possible connections. That is $6/16 = 0.375$. Therefore, actor HR6 sends out ties to 37.5 percent of the remaining actors. The mean is calculated to express the sum of connections between network participants as a proportion. Further, the calculation of variance expresses the deviation from the mean. Variance is calculated to predict the behavior of actors. For instance, actors who are connected to almost all nodes or no nodes are more predictable. [Hanneman and Riddle 2005]

The opposite of out-degree is the calculation of *In-degree* which focuses on the evaluation of columns. The focus is on the observed IT support team members, because they are the receivers of the tickets. In appendix A.2 the table A.3 gives an overview of the calculated figures of mean, sum, and variance. Actor IT6 who is connected with 11 nodes has the highest sum. He receives 68.8 percent of possible relations. Actors that receive arcs from many nodes are more prestigious compared with those actors who have fewer connections. Additionally, prestigious actors may be more powerful because they receive more infor-

mation. However, actors who receive a lot of information from different sources suffer from information overload. The mean or average value increases, the more connections an actor has and the related variance decreases. [Hanneman and Riddle 2005]

Descriptive statistics are used to describe network data through the properties of distribution of relations. The calculation of proportion and the probability of connections help to compare networks with different values. These first considerations concentrate on the allocation of relations and strengths in the observed social network. In the following, the relations within the IT support team will be scrutinized.

b) Analysis of Relation between Responsible Supporter and Input Deliverer

In concentrating on the relations among the team members a further boundary setting is needed. Therefore, from 250 completed tickets 105 were left which contain the IT supporter in the evaluated roles. This process step belongs to the coordination phase too, but shows only the perspective of the IT supporters. In this step the service request is taken up by a supporter who is responsible and an additional supporter who delivers and receives further information. Therefore, the internal team coordination will be examined and the related matrix A.4 is given in appendix A.2.

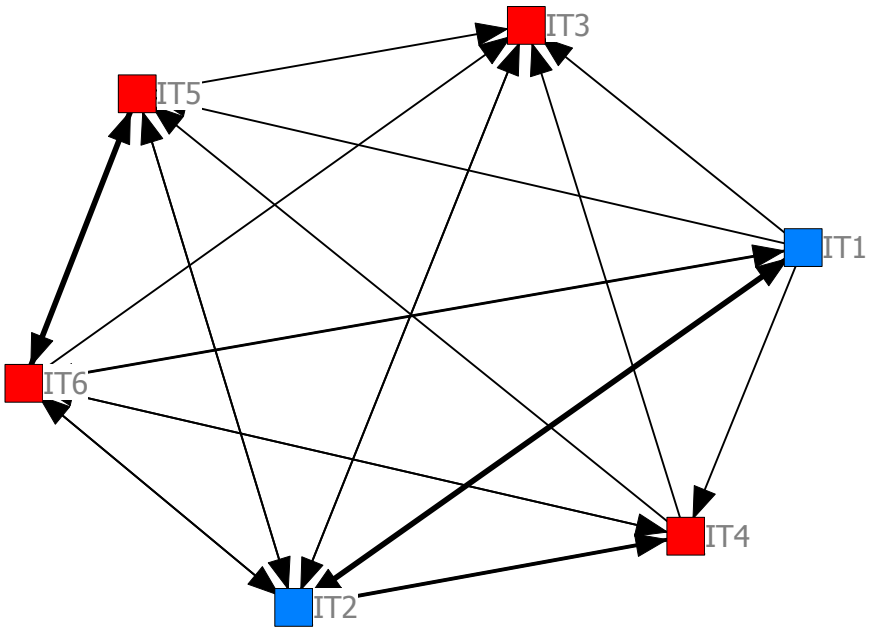

Figure 4.4: Responsible and Input Valued Relations (drawn with NetDraw)

While considering the illustration 4.4 the actors in the social network seem to be well connected with each other. The ties have balanced strengths and various connections are bidirectional. In that way, the actors are senders and receivers of arcs. Although, the amount of tickets present only 40 percent of the processed overall amount this network is used to calculate certain group measures related to *Cohesiveness* and *Centrality*.

The concept of cohesiveness is characterized by the importance and frequency of interactions among group members compared with the contact to non-members. A group is defined by fostering common attitudes which result through the frequent interactions of its members. [Kratzer 2001, p. 30], [Nooy et al. 2005, p. 59.] Typically, measures for cohesiveness are, for example, *Density* and *Reciprocity* of a social network. Beginning with density these measures will be described and evaluated for the second example.

The matrix A.4 contains 6 actors which means that there are 30 possible relations. This value belongs to the dichotomized relations. A maximum density will be reached when all relations are present. Therefore, density expresses the proportion of the maximum possible ties. The dichotomized density for the matrix is calculated as 0.7667 using Ucinet. That is 76.6 percent of all the possible ties are present. The calculation of density may give insights about how information diffuses among actors. Moreover, this measurement explains to what extent actors are embedded in their network. [Hanneman and Riddle 2005]

Additionally, reciprocity addresses the evaluation of ties that are responded to. Reciprocity aimed at pairs which have a reciprocated connection. In the observed example of directed ties there are four possible options between two actors:

1. Both Actors are Connected (e.g., IT1 and IT2, and IT6),
2. One Actor is Sender (e.g., IT1 to IT3, IT4, and IT5),
3. One Actor is Receiver (e.g., IT3, IT4, and IT5 from IT1),
4. Both Actors are not connected (not the case in the example).

There are two options to calculate reciprocity. First, the *Hybrid Reciprocity* that scrutinizes the reciprocated connections among pairs. For the dichotomized network the value is 0.5333. That means, 53.33 percent of the pairs respond to the received ties. Second,

another option is the *Arc-Based Reciprocity* that has a calculated measure of 0.6957. In the example, 69.57 percent of all relations are reciprocated. A predominance of directed asymmetric connections may be indicated as hierarchical relations which are more unstable. Whereas, reciprocated symmetric relations indicate a more stable or equal network. [Hanneman and Riddle 2005]

Furthermore, the concept of centralization focuses on the source and distribution of power in a network. The phenomenon of power in groups is very complex and therefore difficult to describe. Generally, there are three basic measures: the *Degree Centrality*, *Closeness Centrality*, and *Betweeness Centrality*. These network measures suggest that power of individual actors arises from their position and relations with others. [Hanneman and Riddle 2005]

Firstly, the measurement of degree centrality emphasizes the number of relations an actor has. The more relations an actor has the more options and independence this actor has. Such an actor has a advantaged position in a network. The degree measure is elaborated to evaluate the *In-ties* as receiving and *Out-ties* as sending arcs of each actor. The goal is to examine the equal or unequal distribution of centrality. For the observed example it is a balanced measure of in-ties and out-ties, because for both the sum is 23 dichotomized relations. Therefore, the network centralization for in-degree and out-degree is 28.0 percent. This value expresses that the network is less centralized, because the maximum would be 100 percent. For instance, 100 percent would be reached in the case of one actor having relations to all nodes and conversely each node is only connected with this actor. [Hanneman and Riddle 2005]

Next, the closeness centrality concentrates on the reachability of actors. That means the more central an actor is, the shorter the path lengths to the other network participants. In the same way as the degree centrality, the amount of *In-farness* as receiving and *Out-farness* as sending values are counted. This is comparable with receiving and sending arcs. Due to the fact that not all connections are bidirectional there is a total amount of 37 dichotomized path lengths for in-farness and out-farness to connect all network participants. However, the in-centralization is with 44.73 percent slightly higher than the out-centralization with 40.36 percent. That is the received arcs are slightly more unequally distributed than sent arcs. These values indicate a low centralization for this network too. [Hanneman and Riddle 2005]

Finally, betweeness centrality specifies certain actors as bridges in a network. These actors may control the flow of information among the nodes and have therefore a central and powerful position. Due to the fact that the actors are well connected in this example, there are fewer intermediaries. Therefore, the network centralization index of 26.0 percent is relatively low. [Hanneman and Riddle 2005]

Obviously, the network of the second example seems to be less centralized. The dichotomized consideration calculates the existence of relations among the IT support team members and not the valued relations. All three calculations indicate low centralization related to the group measures. However, all three methods indentify actor IT2 as most centralized in the network. This results from the equal distribution of received and sent arcs.

c) Analysis of Relation between Responsible Developer and Solution Tester

The final example focuses on the testing of the produced solution. Therefore, the responsible developer contacts a tester for the solution. Testers are human resources staff who use the supported IT application. Not all incidents or problems lead to changes which have to be tested. In case of a change, the user tests and confirms or refuses the produced solution.

The corresponding sociomatrix is represented in matrix A.5 in appendix A.2. In this matrix further users are identified who test the solution of the developing supporter. The six IT developers are the same as in the two above mentioned examples. According to the matrix, the graph is shown in figure 4.5 to illustrate the valued relations between testing user and supporting developer.

The colors are used in the same way as in the two examples before. Also the arrow heads indicate directed relations from developer to tester. In considering the graph, a demonstrative separation of nationalities is visible. A local development is tested by a local user. There are fewer weak ties between the nationalities. This fact may result from a prescribed test procedure or specifically local development. Synergy effects through time savings are less used in that way.

One of a possible statistical measurement to calculate the relations between members of different groups is the *E-I Index* in Ucinet which means *Group-External* and *Group-*

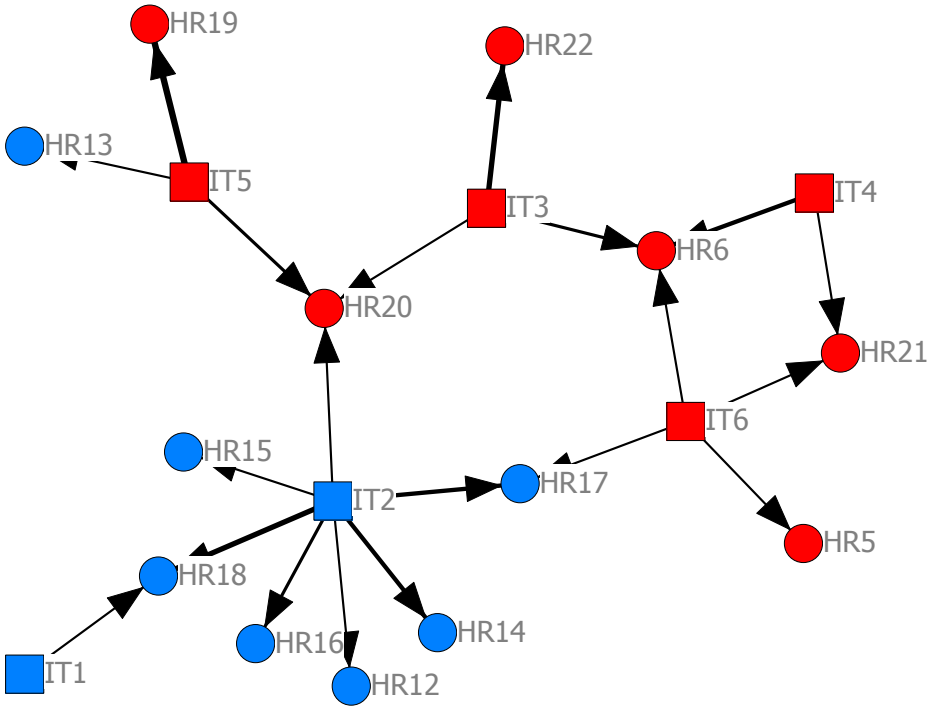

Figure 4.5: Responsible and Tester Valued Relations (drawn with NetDraw)

Internal index. Therefore, the German and US group members are clustered by their nationality. All relations among the German group are seen as internal whereas the remaining relations are external. The resulting E-I index ranges from minimum -1 to a maximum of 1. These variables express a correlation which means at the minimum all ties of a member are internal and at the maximum all ties of a member are external to the group. [Hanneman and Riddle 2005]

The calculated table A.6 represented in appendix A.2 with the indices for all members of the third example. The index ignores the directions of relations. In case of an arc the relations will be reciprocated. This relates to a total amount of dichotomized 40 ties summed up by 17 US connections and 23 German connections. As illustrated in the graph, the separation is mathematically proven, because the German team members have 73.9 percent internal connections and the US team member have 64.7 percent US group related connections. [Hanneman and Riddle 2005]

4.2.3 Third Step: Summary of Findings

In the observed example the social network analysis was used to connect the formal organization with the process structure. The method is a useful addition to illustrate processes and collaboration among members. In fact, the social interactions were represented in various service process steps. Thus, the intensity of contacts was expressed by sociomatrice. The evaluation demonstrates the strengths or weaknesses in communication within the team and to the users. The direction of interactions is related to the activities of the service process. The differentiation of nationalities clarifies the relations among dispersed multinational team members and their intercultural collaboration.

The goal is to present the handling of the social network analysis. Beginning with defining and collecting of data, the first step of the process was explained. Besides national differentiation of team members, there are also occupational differences between supporters and users. These differences are presented by the organizational structure, as well as through the process-related description. Therefore, four roles are defined and characterized by two variables: the nationality and occupation. These definitions are needed for the visual and statistical evaluation. The collection of data is supported by a ticket application. Due to a clear boundary setting and concentrating on the six team members only a part of the possible tickets could be used for the analysis.

The first analysis discussed the coordination between user and supporter. Through the direction and frequency of communication certain users and supporters were identified as central persons. Nearly 80 percent of the ticket were handled on the German side. This supports the statement of team members that most of their work is local.

The second analysis describes the relations within the IT support team. This analysis is based on 105 out of 250 possible tickets because mostly the input role is less customized in the support tickets. However, the remaining tickets indentify less centralization and higher reciprocity which indicates equal distribution of relations and communications.

Finally, the third analysis deals with the contact between supporter and tester. In this case a national separation of actors was graphically and mathematically visible and proven. For that reason, testing takes mostly locally place and synergy effects through time savings are less used.

Although, these findings do not review established evidence, they give some insights into the service procedure and intercultural collaboration. The next section set up requirements, challenges, and solutions for possible uses of social network analysis.

4.3 The Social Network Management of Dispersed Multinational Teams

Generally, the implementation of the social network approach requires theoretical insights, as well as practical concepts. In chapter 3 the social network approach was theoretically developed. This builds the basis for the practical observation as described in the sections 4.1 and 4.2 of the current chapter. The integration of theoretical insights into the social network methodology is exemplary described. Furthermore, the practical implementation of the social network approach requires the development of further activities. Recommendations regarding requirements, challenges, and solutions will be briefly summarized in the following paragraphs.

4.3.1 The Requirements for Social Network Management

The use of a sociological method of analysis in business practice requires special preliminary consideration. This is needed to distinguish certain operational areas among intercultural collaboration. There may be benefits through the network analysis regarding organizational or process structure, as well as knowledge and cultural management. Therefore, the requirements have to be clarified. The list below gives a structured overview. The first and second points concentrate on strategic orientation to achieve the implementation of the social network approach. The third point deals with operational issues.

- Starting Point for Implementation,
- Goal Settings for Improvement,
- Preconditions for Statistical Measurement.

Statistical instruments are primarily used in order to generate ratios from measurements. The calculated figures are used to evaluate current situations or to predict future trends. In that way, forecasting aimed at comparing a certain target with the actual status. With concentration on dispersed multinational teams, there is a need for identifying problems, weaknesses, and inefficiency. These weaknesses deliver the starting point for the use of the social network analysis. The starting point for this study bases on assumptions concerning the intercultural collaboration of dispersed multinational IT service teams.

Next, the identification of weaknesses in intercultural collaboration involves various areas of the business environment. Therefore, a clear goal setting in regard to the improvement of organizational, cultural, or knowledge based aspects is needed. These areas were identified through the theoretically developed social network approach. The requirements concerning the implementation of the social network approach address the work out of concrete goals based on identified gaps.

Third, the operational implementation focuses on requirements concerning technical conditions and practical handling of the social network method. In concentrating on data collection, there is a need for formalization of data creation and processing. This helps to standardize formats which are necessary to provide the sociomatrice. The collection of data focuses on two points. Firstly, the definition of boundaries for a separated consideration of multinational teams. Secondly, the quality of analysis depends on the availability of relational data. The exemple of analysis shows the possible use of relational data generated by workflow IT systems.

The described facts give a brief insight into the necessary requirements of the social network management. In the following paragraph, the arising challenges in using the social network method and developing activities will be discussed.

4.3.2 The Challenges of Social Network Management

The social network approach investigates the intensity, direction, and differentiation of various actors belonging to one team. Due to these examinations there can declarations about the functioning of network structures be given. The challenges concerning the preparation and execution of the social network analysis are listed up below.

- Adaption of Instruments and Tools,
- Use of Social Network Method.

In a global context the multiple assignments of dispersed multinational team members results in complex network structures. Therefore, the boundary setting depends on organizational structures and processes. The use of the methodology demands capacities for collecting and processing of data. A long-term analysis increases the quality of the collected data, but requires long-term resources.

Secondly, the execution of the social network analysis can be taken up by internal or external persons. However, the integration of concepts and activities belong to internal resources. Fewer involvement and participation of internal resources may bear the risk of personal resistance against developed improvement activities. In addition, the handling of statistical data demands experience with social network instruments like network software. Further, knowledge about the structure and functioning of social networks may help examining and interpreting of data.

Monitoring the progress in network structures helps to find out supporting activities. Therefore, the next paragraph focuses on finding solutions for the social network management.

4.3.3 The Solutions of Social Network Management

The success of the social network approach depends on the connection of strategically management and operational integration. For the reason of organizational adjustments, there are influences on processing of services, social interactions, communication linkages, or knowledge sharing and transfer. The possible uses and benefits of the social network management are listed up and discussed below.

- Possibilities of Evaluation,
- Activities for Improvement.

The possibilities of evaluation meet the primarily descriptive and exploratory character of social network method. The visualization of social interactions and relationships delivers insights into group functioning. This kind of graphical illustration provides a far more effective insight in dispersed multinational team structures. The aspects of virtual and geographical distribution become important. Furthermore, social networks increase transparency through identifying information channels and communication linkages. These activities are aimed at the representation of common or famous positions and roles of individuals. Further, the knowledge distribution and exchange can be scrutinized. These findings help to evaluate the efficiency of internal and external relationships.

Second, development of improving activities is related to the goal specifying including starting point. A starting point is, for example, the comparison of input and output to identify inefficiencies of a certain process. The social network analysis helps to identify weaknesses in social structures of inefficient processes by preparating and interpreting of statistical data. The evaluated data can be used in order to develop activities for improving the intercultural collaboration. Furthermore, the improvement of social networks depends mainly on the activity and commitment of its members. There are certain individuals which create connections between team members. These actors are needed to build up functioning networks, because spontaneous connections between dispersed multinational members may emerge very slowly. Therefore, key persons need support to overcome the separation of group members. The social network analysis can give insight and direction for taking action to improve the organization's efficiency. This is aimed at decreasing the organization's dependence, for example through cross-department interactions and teams, increasing individual delegation, or empowering decisions on managerial level.

After the discussion of requirements, challenges, and solutions, there is a concluding summary in the next paragraph. Main aspects and facts will be presented.

4.4 Summing up: Chances and Risks for Management Support

The fourth chapter discusses the integration of the social network methodology in the business practice. A structured overview in regard to the observed situation, described example, and supporting management aspects are given in table 4.4.

Table 4.4: Social Network Procedure Chances and Risks

Phase	Description	Chances	Risks
Identification	Evaluation of Weaknesses (e.g., Input-Output Comparison, Risk Analysis)	Findings of Interconnections, Multiple Linkages, Weaknesses	Mapping of Information and Knowledge Transfer, Vulnerabilities
Goal Setting	Improvement of Efficiency (e.g., Organizational Adjustment)	Measuring, Controlling, Connectivity Benefits	Boundary Setting
Methodology	Social Network Analysis (e.g., Data Collection, Processing)	Uncovering of Structural and Process-related Relations, Discovering Weaknesses through Transparency	Interpretation, Comparability of Investigation
Activities	Development of effective Concepts (e.g., Organization, Knowledge, Culture)	Networking Enhancement; Support Resource Allocation; Training Planning; Tacit Knowledge Sharing	Integration of Concepts, Evaluation of Effectiveness

This summary points out the findings and recommendations and closes the current chapter. The last chapter 5 gives the concluding summary over all chapters. This includes a perspective of future developments and trends.

Chapter 5

Summary and Perspective

The study deals with two opposing characters. On the one hand, the theoretical framework provides the social network approach. The assumptions of possible weaknesses of dispersed multinational teams give the starting point for the processing of study. Theoretical investigation addresses the evaluation of network data to carry out empirical evidence for the functioning of team structures. On the other hand, the practical adaptation of network instruments as support for the intercultural collaboration in the business practice. The most practical concepts are aimed at increase of cost efficiency through decreasing of input and increasing of output.

The result of the study is to combine both the theoretical approach and its practical integration. The focus on dispersed multinational teams describes increasing complexity including various locations, time zones, and cultures. Intercultural collaboration uses the advantages of complexity like increasing availability of IT service supporter through less overlapping working hours, or cost efficiency through lower labor costs.

In addition, intercultural collaboration faces challenges of complexity like the integration of foreign organizations, different functional and knowledge levels, or cultural and language difficulties. The resulting inefficiencies may be only partly discovered by questionnaires and interviews of multinational team members. The adaptation of network instruments provides information about the functioning of structures and processes. In that way, the social network data scrutinizes the direction, intensity, and differentiation to

discover weaknesses in organizational and process-related structures. The social network method treats relational data including the dimensions of complexity through setting of intercultural attributes. For that reason, the improvement activities can be more concrete developed, monitored, and controlled by network instruments.

The starting statement points out the concept and result of the study. Below, there is a summary of each chapter's content. Finally, the perspective discusses future development and completes the conclusion of study.

Summary

The chapter 1 offers an introduction and motivation for the thesis. It introduces several topics that are discussed in more detail in the later chapters. In order to assume weaknesses of intercultural collaboration there is a confrontation of the traditional and multidimensional approach. The observed multinational enterprise delivers insights into the traditional handling of global IT services. In that way, certain starting point is identified to develop the multidimensional approach in favor of social network analysis as supporting instrument.

Continuing, the chapter 2 concentrates on the influences of globalization on the IT service enterprises and dispersed multinational teams. There are tendencies towards an increasing amount of multinational enterprises and decreasing communication costs which favor intercultural collaboration. In addition, IT services are characterized as knowledge-based business that benefits from the identification and usage of scattered knowledge. Furthermore, the complexity of the observed multinational team is described to set up a focus for further considering of theoretically concepts in the third chapter.

The chapter 3 discusses the dimensions of related theories, as organization theory and resource allocation, as well as the theory of knowledge and intercultural management. Although, these theories are treated individually, at this point, they support the main thesis as sub-theories. Therefore, the theoretical concepts are developed in regard to point out the chances for the social network approach including the focus on the observed team. In the context of this new approach the social network analysis is described as

supporting instrument for the intercultural management. This approach is exemplary tested and discussed in the fourth chapter.

The chapter 4 provides an extensive discussion about the preparation and execution of the social network analysis. Most part of the chapter is about the new approach in connecting procedure of data collection and first exemplary findings. This leads to further considerations about the development of improving activities related to statistical findings. Emphasis is on requirements, challenges, and solutions of the method.

Perspective

The conceptual character of the study enables the theoretical framework with focus on practical integration. The observed example delivers starting points for the development of further activities. The description and implementation of such activities would be the next step in adapting the social network approach to the business practice. The determination and implementation of certain network measures would be necessary as supporting instruments. There is a need for the creation of awareness and understanding of the importance of social networks for the improvement of intercultural collaboration. Besides gaining of competitive advantages through intercultural collaboration, there arising challenges which have to be handled. There are different actions possible to improve the collaboration among dispersed multinational team members. These activities belong to the improvement of communication and social interactions. The electronic information and communication infrastructure is only one aspect. The trust and relationship building bases on communication, social interaction, commitment to common goals, and team assignment. The adaptation of network methods belongs to the attendance for a management culture of openness, transparency, and cooperation. In that way, the historical heritage of the organization including hierarchical structures has to be overcome. The theoretical knowledge regarding network-oriented approaches is available since the late 1980s. There is fewer lack of social network concepts while increasing the number of practical pilots and use of method. This is supported by an increasing importance of network methods to handle complex situations.

Appendix A

A.1 Interview Guideline for Dispersed Multinational Teams

"Storytelling as Sharing of Experience in Dispersed Multinational Teams"

The interview guideline was designed to structure the discussions with multinational team members, team leaders, and department heads. Therefore, the questions are understandable as general categories which are adjusted to fulfill the certain conditions. The goal is to capture the different points of view of intercultural collaboration. The focus is on the social network approach and embraces the concepts of organization, knowledge, and culture. Also the concentration on storytelling points out the social relationships among multinational team members.

Part 1 - Sharing of Experience within a Multinational Organization

Question 1.1 There are various challenges in working across national and organizational boundaries for a dispersed multinational team. For example, the different business units have different goals and different customers. What are the strengths and weaknesses in the development and dissemination of experiences within your organizational unit (e.g., team, group, or department)?

Question 1.2 Misunderstanding and personal resistance affect intercultural collaboration and may belong to different national and organizational cultures. What problems arise in the dissemination of experience within your organizational unit (e.g., team, group, or department)?

Question 1.3 Language difficulties and working in different places with less overlapping working hours affect the multinational team work. What problems occur in relation to the communication with a foreign organizational unit (e.g., team, group, or department)?

Part 2 - Motivation and Social Networking within a Multinational Team

Question 2.1 Intercultural collaboration builds on trust and mutual help among the team members. What incentives stimulate the exchange of experience within your organizational unit (e.g., team, group, or department)?

Question 2.2 Collaboration requires an organizational structure, as well as connections and social interaction. What platforms are used for the exchange of experience within your organizational unit (e.g., team, group, or department)?

Part 3 - Multinational Organization for Sharing of Knowledge

Question 3.1 Knowledge is created in different places and also in different types. What types of knowledge are differentiated within your organizational unit (e.g., team, group, or department)?

Question 3.2 The creation and sharing of knowledge is mostly related to individuals and their interactions. Where is the knowledge created within your organizational unit (e.g., team, group, or department)? And how is the sharing among the team members supported?

Question 3.3 Storytelling as sharing of knowledge and experience meets different tasks. For instance, enable processes, find solutions, educate colleagues, or create a common understanding. What is the significance of the knowledge transfer and sharing within your organizational unit (e.g., team, group, or department)?

A.2 Matrices and Lists of Social Network Analysis

Table A.1: Social Network Data Attributes (own development)

Actor	IT Supporter	HR Responsible	German	US
HR1	0	1	0	1
HR2	0	1	0	1
HR12	0	1	0	1
HR13	0	1	0	1
HR14	0	1	0	1
HR15	0	1	0	1
HR16	0	1	0	1
HR17	0	1	0	1
HR18	0	1	0	1
IT1	1	0	0	1
IT2	1	0	0	1
IT3	1	0	1	0
IT4	1	0	1	0
IT5	1	0	1	0
IT6	1	0	1	0
HR3	0	1	1	0
HR4	0	1	1	0
HR5	0	1	1	0
HR6	0	1	1	0
HR7	0	1	1	0
HR8	0	1	1	0
HR9	0	1	1	0
HR10	0	1	1	0
HR11	0	1	1	0
HR19	0	1	1	0
HR20	0	1	1	0
HR21	0	1	1	0
HR22	0	1	1	0

Table A.2: Requester and Responsible Valued Relations Matrix (own development)

	HR1	HR2	IT1	IT2	IT3	IT4	IT5	IT6	HR3	HR4	HR5	HR6	HR7	HR8	HR9	HR10	HR11	$\sum$
HR1	0	0	11	9	0	1	0	0	0	0	0	0	0	0	0	0	0	21
HR2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
IT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IT2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
IT3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
IT4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
IT5	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	3
IT6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
HR3	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3
HR4	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
HR5	0	0	0	0	9	2	1	13	0	0	0	0	0	0	0	0	0	25
HR6	0	0	7	3	29	9	1	10	0	0	0	0	0	0	0	0	0	59
HR7	0	0	0	0	17	15	0	3	0	0	0	0	0	0	0	0	0	35
HR8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HR9	0	0	1	1	21	3	1	2	0	0	0	0	0	0	0	0	0	29
HR10	0	0	0	1	3	5	0	1	0	0	0	0	0	0	0	0	0	10
HR11	0	0	0	0	2	5	0	2	0	0	0	0	0	0	0	0	0	9
$\sum$	0	0	25	15	83	42	3	38	0	0	0	0	0	0	0	0	0	206

Table A.3: Requester and Responsible Dichotomized In-Degree (calculated with Ucinet)

	HR1	HR2	IT1	IT2	IT3	IT4	IT5	IT6	HR3	HR4	HR5	HR6	HR7	HR8	HR9	HR10	HR11
Mean	0.000	0.000	0.438	0.313	0.500	0.563	0.188	0.688	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sum	0.000	0.000	7.000	5.000	8.000	9.000	3.000	11.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Variance	0.000	0.000	0.246	0.215	0.250	0.246	0.152	0.215	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A.4: Responsible and Input Valued Relations Matrix (own development)

	IT1	IT2	IT3	IT4	IT5	IT6	$\sum$
IT1	0	18	2	3	2	6	31
IT2	10	0	3	9	1	3	26
IT3	0	2	0	0	0	0	2
IT4	0	7	3	0	1	2	13
IT5	0	2	1	0	0	18	21
IT6	2	3	1	3	3	0	12
$\sum$	12	32	10	15	7	29	105

Table A.5: Responsible and Tester Valued Relations Matrix (own development)

	HR12	HR13	HR14	HR15	HR16	HR17	HR18	IT1	IT2	IT3	IT4	IT5	IT6	HR5	HR6	HR19	HR20	HR21	HR22	Σ
HR12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IT1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
IT2	1	0	3	1	2	3	4	0	0	0	0	0	0	0	0	0	1	0	0	15
IT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	4	7
IT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	4
IT5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	8
IT6	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	4
HR5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Σ	1	1	3	1	2	4	5	0	0	0	0	0	0	1	6	5	4	2	4	39

Table A.6: Responsible and Tester Dichotomized E-I Index (calculated with Ucinet)

	Intern	Extern	Total	E-I Index
HR12	0.000	1.000	1.000	1.000
HR13	1.000	0.000	1.000	-1.000
HR14	0.000	1.000	1.000	1.000
HR15	0.000	1.000	1.000	1.000
HR16	0.000	1.000	1.000	1.000
HR17	1.000	1.000	2.000	0.000
HR18	0.000	2.000	2.000	1.000
IT1	0.000	1.000	1.000	1.000
IT2	1.000	6.000	7.000	0.714
$\sum$US	3.000	14.000	17.000	0.647
IT3	3.000	0.000	3.000	-1.000
IT4	2.000	0.000	2.000	-1.000
IT5	2.000	1.000	3.000	-0.333
IT6	3.000	1.000	4.000	-0.500
HR5	1.000	0.000	0.000	-1.000
HR6	3.000	0.000	3.000	-1.000
HR19	1.000	0.000	1.000	-1.000
HR20	2.000	1.000	3.000	-0.333
HR21	2.000	0.000	2.000	-1.000
HR22	1.000	0.000	1.000	-1.000
$\sum$German	20.000	3.000	23.000	-0.739

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