# Project Management
# Social Network Analysis
# and
# Process Maturity

Analyzing Social Interactions and Maturity of Project Management Teams, and Their Correlations

by

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# EXECUTIVE SUMMARY

Project management is a key part of most businesses and this environment is robust and high paced. Using best practices and researched methodologies in project management, businesses may gain a competitive advantage in completing projects correctly, on schedule, within budget, and according to specifications. One element of project management, which is integral to success but usually overlooked, is the human factor. People are part of all business processes and therefore this project will focus on analyzing the relationships, interactions, and knowledge flow between project management team members. This will be done using the social network analysis methodology. Social network analysis is a means to understand the way that information flow, general work instructions, and knowledge transfer operates through the interactions between participating employees. Also, the teams' process maturity level, which indicates how mature a project management team is according to a maturity framework, will be obtained and analysis will be performed to determine correlations between social network analysis and process maturity.

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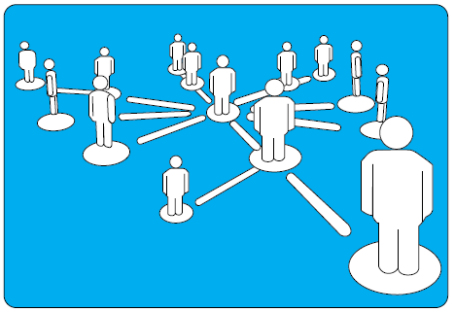
# CHAPTER 1: INTRODUCTION AND BACKGROUND

## 1.1. INTRODUCTION AND BACKGROUND

Gary S. Becker, Nobel-Prize winning economist said: "the basic resource in any company is the people". Employees add value to business through knowledge, skills, innovations, and tasks. Olivier Serrat (2009) stated that the new era of technology and information development has resulted in growth of economies and structuring of ways to manage flow of data, information, and knowledge. Similarly social networks have grown to be integral points of study in management of human activity. Olivier Serrat (2009) defined social networks as: "nodes of individuals, groups, organizations, and related systems that tie in one or more types of interdependencies: these include shared values, visions, and ideas; social contacts; kinship; conflict; financial exchanges; trade; joint membership in organizations; and group participation in events, among numerous other aspects of human relationships." The analysis of human interactions is beneficial to an organization because it identifies individuals, teams, and units who have essential responsibilities and through social network analysis metrics various valuable studies may be done to understand an organization's social dynamics.



Another technique used to assist businesses in assessing and improving their current performance is process maturity. Specifically project management teams, who work with numerous project types, need to have stable processes in place to ensure outcomes that are on time, safe, accurate, and as the customer requires. Project management process maturity "integrates previous PM practices, processes, and maturity models to improve PM effectiveness in the organization": (Kwak & Ibbs, 2002). Measurement of a project team's maturity level will give an organization insight into improvement opportunities and current performance in terms of project management process maturity.

Correlations between social network analysis and process maturity may be found and used to better understand the social aspect of a business. An engineering company* is the object of this project's analysis. This company wishes to remain anonymous and therefore will be referred to as "the company" further in this report. Five departments were identified within the company and one project management team within every department was asked to participate in surveys to gather data concerning social behavior and process maturity. The departments are Manufacturing, Consulting, Sales and Marketing, Finances, and Research and Development.

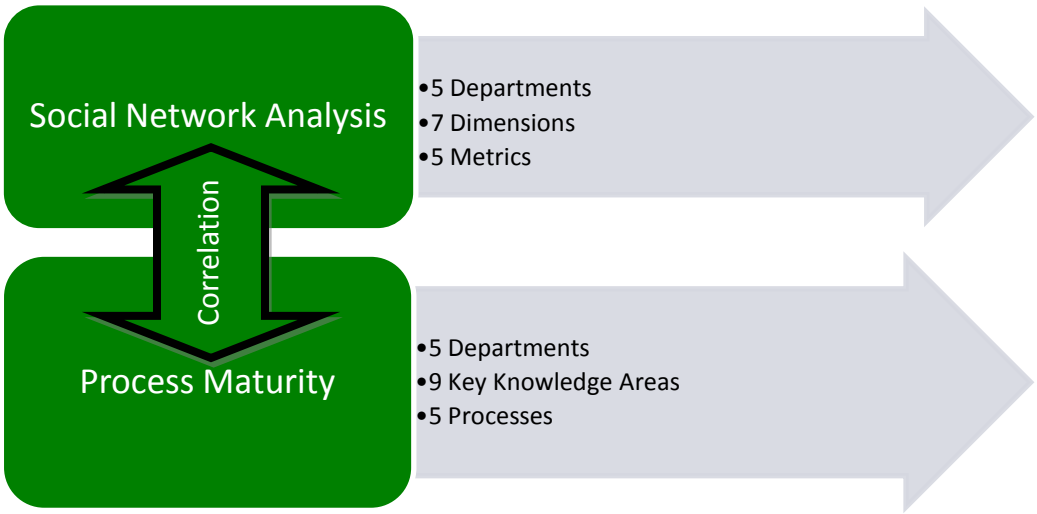
*The company has reserved the right to remain anonymous and all information is strictly confidential. This includes the name of the company, the names of all participants, and the distribution of this report.

## 1.2. PROJECT AIM

The aim of this project is analyze social networks in the project management environment to understand information flow, relationships, and knowledge sharing between project management team members. Also, a framework to analyze a project management team's maturity in processing projects is to be built to portray the maturity levels and indicate improvement possibilities. Correlations between the relevant factors of social network analysis and project management process maturity will be analyzed to determine a holistic view of the social dynamic.

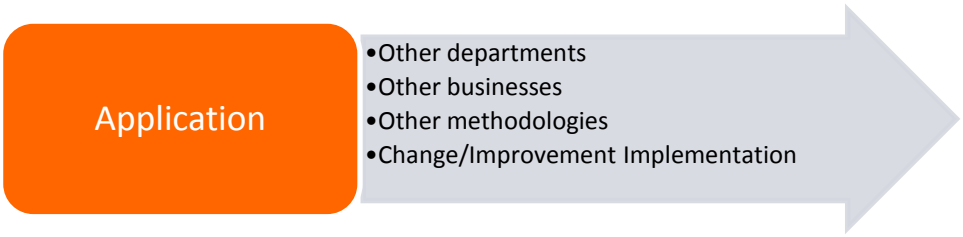
## 1.3. PROJECT SCOPE

### 1.3.1. IN SCOPE




Five departments will be used to gain a holistic understanding of the company's social networks and corresponding process maturity within each project management team. The departments are Manufacturing, Consulting, Sales and Marketing, Finances, and Research and Development. Social network analysis will be performed using The Advisory Board Company (1996) framework which includes seven dimensions and five metrics to be analyzed to gain a complete understanding of the project management social environment. Process maturity is to be measured according to Kwak & Ibbs's (2002) project management process maturity methodology which includes key knowledge areas and processes that are assessed. Key knowledge areas include project integration, scope, time, cost, quality, human resources, communications, risk, and procurement management. Project management processes include initiating, planning, executing, controlling, and closing. Departments will be compared to each other and correlations between social network analysis and process maturity will be sought.

### 1.3.2. OUT OF SCOPE




All other departments in the company are deemed out of scope as the selected five departments are comprehensive enough. Only one company was used in this project's analysis due to a time constraint, however the analysis is generic to all types of project management areas and therefore other businesses may be analyzed in a similar manner. Other methodologies of social network analysis and process maturity are not used in this project because it would create conflicts in terminology and interpretation of information, and the methodologies used in this project are comprehensive enough. No changes or improvements will be made in the company because of results found in this study.

# CHAPTER 2: LITERATURE REVIEW

## 2.1. OVERVIEW

A literature review was done to study the meaning of concepts, what has been done in related fields, and why these concepts are important to this project. This study shows how social network analysis and process maturity fit into business architecture as a whole. These techniques are also discussed to create a comprehensive understanding for the reader. First a holistic view of business architecture will be described, then business modeling which is part of business architecture, then where people fit into business modeling, and then techniques used in this report to analyze people.

## 2.2. BUSINESS ARCHITECTURE

Architecture is defined by The Open Group Architecture Framework (TOGAF) as the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution. More specifically, TOGAF states that business architecture defines the business strategy, governance, organization, and key business processes (TOGAF, 2007). Business modeling is a technique used to understand key processes in business architecture and also the integration between inputs, controls, mechanisms, and outputs that facilitate business processes.

### 2.2.1. BUSINESS MODEL AND PROCESS

Business process modeling is a vital technique in business architecture that uses modeling languages to understand business processes. TOGAF (2007) states that business models describe the functions associated with the enterprise's business activities, the data and/or information exchanged between activities (internal exchanges), and the data and/or information exchanged with other activities that are outside the scope of the model (external exchanges). To gain a holistic

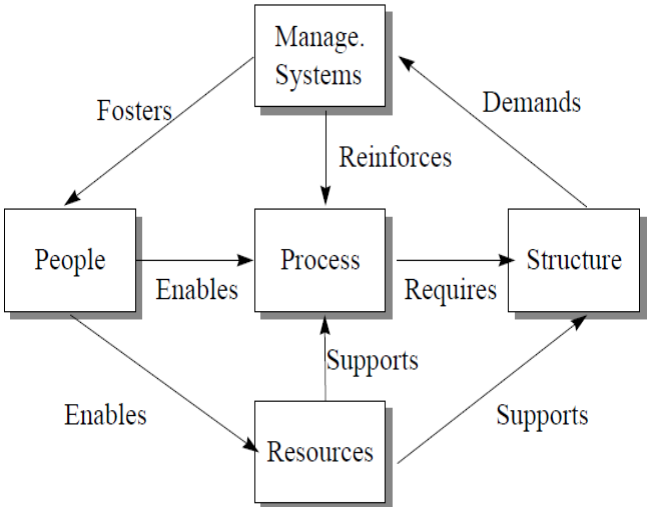



Figure 1: Business Model

Reference: Van Rensburg (2009), *Business Process Engineering Procedure*

understanding of business's architecture the business model in Figure 1: Business Model is depicted:

Various entities are associated with managing, supporting, creating, or closing a business process in business architecture. These entities include management systems, people, resources, and structure. According to Figure 1: Business Model (Van Rensburg, 2009) people, management systems, resources, and structure have influences on business processes. Business processes include all products, services, supply chain procedures, work flow procedures etc. that exist in a business and integrate to achieve business objectives successfully i.e. satisfying customer. People enable business processes and resources, and their actions and performance is driven by their attitudes, values, principles and beliefs. People may include individuals, teams, whole organizations etc. Management systems are responsible for planning, monitoring, reporting, control, and other management business functions. Resources include all structures, financial capital, assets, and sources that are required to achieve success in supporting business processes. Structure refers to the jobs, roles, responsibilities, skills, and knowledge that people have when performing work instructions. Also it describes the organization structure, levels of management, and how the other entities in the business model integrate.

### 2.2.2. PEOPLE AS HUMAN CAPITAL AND INTANGIBLE ASSETS

People are valuable assets in a business. They form part of a business's intangible assets, which include "intellectual capital (patent formulas, product designs and process technology, i.e., the methods that delineate the steps in a process), goodwill and human capital": Weatherly (2003). An intangible asset is an object of value to a business that can't be physically touched or quantified. Businesses are increasingly discovering the value and potential that personnel can have in organizations and according to Brocaglia (2006) refer to them as human capital which addresses the financial value that employees offer because of their knowledge, skills, experience, ethics, etc. The value of an employee is not quantifiable (intangible) but according to Shamim (2009) "It goes without saying the human asset is the key intangible asset for any organization". It is known that if an employee leaves a business, the knowledge, skills, and experience that also leaves is difficult to replace and it takes time and resources to replace the "gap" in the dynamic structure of the business. All these factors emphasize the importance of people in a business and their value to business processes.

Businesses are realizing evermore the importance of utilizing employees more effectively, therefore techniques are used to analyze and improve the social network and level of management maturity in a business. Social network analysis within a business is a technique used to determine and understand how the business's employees interact and relate to enable

business processes. In conjunction with the social network analysis, the maturity of business processes may be measured to compare a business, project management team, or other social networks to competitors or a benchmark maturity level.

## 2.3. SOCIAL NETWORK ANALYSIS

### 2.3.1. INTERACTIONS BETWEEN PEOPLE

J. Clyde Mitchell (1969) has defined social network analysis as: "A specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved." Social network analysis is aimed at understanding formal and casual human relationships, interactions, and interdependencies in the work environment as stated by Olivier Serrat (2009). These relationships between employees are the baseline to understanding how information, data, work instructions, skills, advice etc. are shared and distributed between colleagues and other levels of management.

### 2.3.2. PAST STUDIES

Social network analysis has been used to study various social environments such as friendship or community structure (Kumar et al., 2006; Wallman, 1984) and communication patterns (Koehly et al., 2003; Zack and McKenney, 1995). It has been used to explore the spreading of diseases (Klovdahl, 1985) and diffusion of innovation (Abrahamson & Rosenkopf, 1997; Valente, 1996). In organizational studies and strategic management, corporate interlocking directorships have been determined (Robins & Alexander, 2004; Scott, 1986) and network influences on select firms' performance (e.g., Ahuja et al., 2009; Burkhardt & Brass, 1990; Gulati, 1999; Jensen, 2003; Rowley et al., 2005; Stam and Elfring, 2008; Uzzi, 1997). Ellram et al. (2006) acknowledged social network analysis as a useful technique to study impact on supply chains. Social network analysis was used to determine the pattern of interlocked directorates in electronic commerce firms (Everard & Henry, 2002).

SNA applications in business architecture have also been studied in recent years. The study of business dynamics has shown knowledge sharing as a key part of business and requires social interactions and processes because of the tacit nature of knowledge (Granovetter, 1985; Gulati, 1995). Nonaka and Takeuchi (1995) stated that a certain level of co-presence, social affinity, and socialization is required to allow effective sharing of knowledge that is difficult to measure. Björkman and Kock (1995) stated: "The individuals connected through social relationships are part of a social network, which is a sub-network within a business network." This originates from their study on "Social Relationships and Business Networks: the Case of Western

Companies in China" where the role of social relationships in a business network is discussed. The importance of personal relationships was found to be a prerequisite for most information and business exchanges.

## 2.3.3. CONCEPTS

### 2.3.3.1. GENERAL

Concepts concerning social network analysis have been defined by many researchers and found to be inherently similar. Stanley Wasserman, Katherine Faust (1994) defined an actor/node as: "discreet individual, corporate, or collective social units". Actors/nodes are the social entities in a social network. Also they defined a relation/tie/connection as: "a linkage between a pair of actors." Nodes are connected through a link that represents flow of information/relationship. A main node set represents the attributes of nodes in social networks and is used to perform meaningful analysis of the network (Cyram Netminer v3 Help, 2008). A sub-node set/sub graph is defined as: "A graph $G_s$ is a sub graph of G if the set of nodes of $G_s$ is a subset of the set of nodes of G, and the set of lines of $G_s$ is a subset of the set of lines of G." : Wasserman & Faust (1994). This is shown in Figure 3. They also stated that a dyad represents a pair (two) of actors and the possible connection between them, and that a triad (see Figure 2) represents three actors and the possible connections between them.

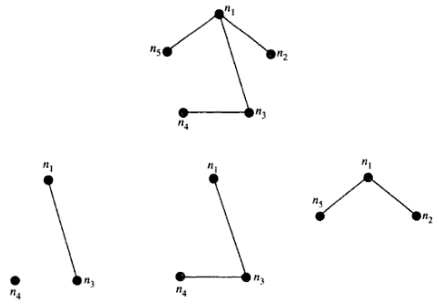


Figure 3: Subgraphs (below) of main graph (top


Figure 2: Four possible triadic states

A 1-Mode node set represents interactions between the same nodes, whereas a 2-Mode node set represents interactions between two different sets of nodes (Cyram Netminer v3 Help, 2008). Degrees are defined as the number of direct connections a node has by Shneiderman, & Smith (2009). In-Degree refers to the number of direct connections to a node and Out-Degree to the number of direct connections from a node. Network Genie User's Manual (2008) has classified networks as ego-centered, complete, or hybrid as seen in Figure 4. "An ego-centered, or local, network consists of a focal person or respondent (ego), a set of alters who have ties to ego, and measurements on the ties from ego to alters and on the ties between alters."

Complete (socio-centric) networks are explained as: "When all members of the network to be examined are defined in advance, the network type is complete or socio-centric". Hybrid (snowball) networks are explained as: "These networks start as complete networks and then expand based on the addition of alters as egos complete surveys".

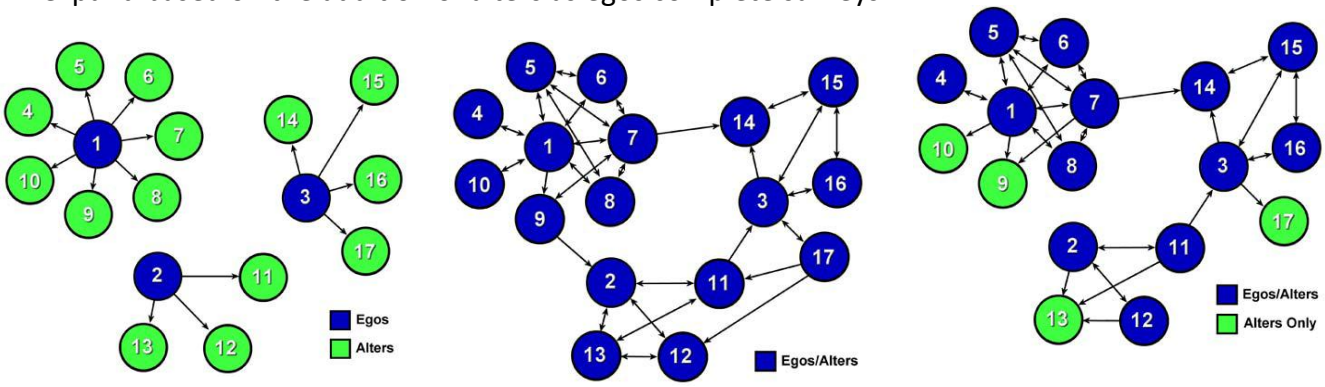



Figure 4: Network types: ego-centered (left); complete (middle); hybrid (right)

### 2.3.3.2. INTERACTION DIMENSIONS AND METRICS

The Advisory Board Company (1996) has defined interaction dimensions and metrics whereby to analyze social network behavior. The interaction dimensions are described as follows:

- **Strategy:** The interactions between team members when discussing the team's vision, strategy and what is important and valued in the organization.
- **General Work Instructions:** The interactions between team members when doing their everyday job that is exchange information, documents or other resources.
- **Grapevine:** The interactions between team members when discussing what is going on at work, and who is doing what in the team.
- **Decision Making:** The interactions between team members when seeking inputs, suggestions and feedback when making a decision.
- **Innovation:** The interactions between team members when discussing ideas, innovations, and better ways of getting things done.
- **Expertise:** The interactions between team members when expert advice is needed in doing their work.
- **Customer Knowledge:** The interactions between team members when discussing customer needs or market demands.

The metrics are described as follows:

- **Activity:** Measurement of how active a person is in the network.
- **Control:** Measurement of how much control a person has over the flow of information.
- **Reach:** Measurement of how much potential influence a person wields.

- **Access:** Measurement of how easily a person can get the resources he or she needs to be successful in the organization.
- **Power:** Measurement of how much power a person has to "get things done".

### 2.3.4. ANALYSIS TECHNIQUES

In social network analysis there exist various techniques whereby the social network may be analyzed. The following techniques have been deemed appropriate to this project scope and are used to get a holistic view of the respective networks.

#### 2.3.4.1. DEGREE CENTRALITY

The network is measured based on the number of degrees (connections) adjacent to a node. In-degree centrality and out-degree centrality may be analyzed to gain more specific insight into the network's dynamic. Marsden (2002) stated that degree centrality is measured simply as the number of direct ties that involve a given node. Freeman (1979) gives a conceptual interpretation for this measure that degree reflects the direct relational activity of a node. For example, in Figure 5, nodes 3 and 12 have the highest degree centralities as they have the most connections to or from them.

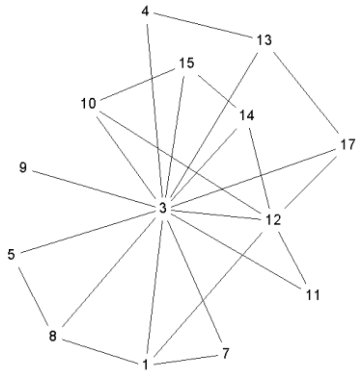



Figure 5: Degree Centrality

#### 2.3.4.2. BETWEENNESS CENTRALITY

This technique shows the extent to which a node conveys information to others, by being the link between communicative parties, as stated by Shneiderman & Smith (2009). A node having a low degree centrality (few connections) may have a high betweenness centrality because it acts as a link for various nodes. Marsden (2002) explained centrality measures based on betweenness reflect the intermediary location of a node along indirect relationships linking other nodes. Freeman (1979) gives a conceptual interpretation for betweenness measures in coordination/control terms: a node with high betweenness has a capacity to facilitate or limit interaction between the nodes it links. For example in Figure 6, node B is a "bridge" between nodes C and D, and node A, therefore node B has a higher betweenness centrality than its neighbours. Node betweenness and link betweenness may be analyzed separately.

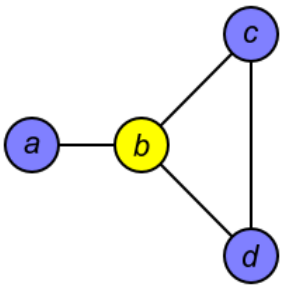



Figure 6: Betweenness Centrality

#### 2.3.4.3. CLOSENESS CENTRALITY

Shneiderman and Smith (2009) stated that closeness centrality is a measure of the average shortest distance between nodes showing the number of steps that a node needs to take to come into contact with another desired node. A key node centrality measure in networks is closeness centrality (Freeman, 1978; Opsahl et al., 2010; Wasserman and Faust, 1994). It is defined as the inverse of farness, which in turn, is the sum of distances to all other nodes. As the distance between nodes in disconnected components of a network is infinite, this measure cannot be applied to networks with disconnected components (Opsahl et al., 2010; Wasserman and Faust, 1994).

#### 2.3.4.4. EIGENVECTOR CENTRALITY

This technique bases the importance of a node on the weight (frequency) of degrees, as stated by Shneiderman & Smith (2009). A node's eigenvector centrality is measured according to how connected it is to other nodes, how many groups it bridges, or how long it takes to reach the rest of the network.

#### 2.3.4.5. POWER CENTRALITY

The power centrality measures how much authority a node has in the network. Cyram Netminer v3 Help (2008) describes it as follows: "There are total, immediate, and mediative effect centralities. A node's total effect centrality is the measure for the effect strength from the given node to other nodes through every walks between them. It is similar to Katz, Hubbell Status and Power Centrality. Immediate effect centrality is the measure how immediate one's effect to others, whose concept is similar to the closeness centrality. Mediative effect centrality is the measure the degree of mediation, whose notion is analogous to the betweenness centrality."

## 2.4. PROCESS MATURITY

### 2.4.1. THE LEVEL OF MATURITY

Webster (1988) defines maturity as: "being ripe or having reached the state of full natural or maximum development". Maturity is the quality or state of being developed. If we apply the concept of maturity to a business it refers to a state where the business is in a perfect condition to achieve its objectives. Project management maturity therefore indicates that the organization is perfectly conditioned to deal with its projects.

Typically maturity levels are defined as follows (Demir & Kocabaş, 2010):

- Level 1 - getting started/awareness/initial
- Level 2 - developing/focusing/repeatable/knowledge
- Level 3 - complying/practising/competence/defined
- Level 4 - sustaining/exploiting/managed/excellence
- Level 5 - advocating/transforming/optimized

### 2.4.2. PAST STUDIES

Research on project management maturity has been done to assist organizations in optimizing their project management processes. Andersen and Jessen (2002) developed the hypothesis that project maturity develops through a maturity ladder where the ladder steps are proposed to be project management, program management, and portfolio management. Maturity itself is measured along three dimensions. They are knowledge (capability to carry out different tasks), attitudes (willingness to carry them out), and actions (actually doing them).

Demir and Kocabaş (2010) developed a Project Management Maturity Model (PMMM) for application in educational organizations. This model contains five levels of maturity, e.g. Common Language (Initial Process), Common Processes (Repeatable Process), Singular Methodology (Defined Process), Benchmarking (Managed Process), Continuous Improvement (Optimized Process), as shown in Figure 7.

| | | | | |
|---|---|---|---|---|
| **Level 5** | | | | |
| Continuous Improvement | **Level 4** | | | |
| | Benchmarking | **Level 3** | | |
| **Process Improvement** | | Singular Methodology | **Level 2** | |
| | **Process Control** | | Common Processes | **Level 1** |
| | | **Process Definition** | | Common Language |
| | | | **Basic Knowledge** | |

Figure 7: Levels of Maturity by Demir & Kocabas (2010)

### 2.4.3. MEASURING THE LEVEL OF MATURITY

The following project management knowledge areas descriptions are defined by Kwak & Ibbs (2002). These knowledge areas are used to determine the project team's maturity level in conjunction with project management processes. The knowledge areas cover all aspects of project management, and therefore by measuring each maturity level respectively, the total maturity level may be estimated. Every knowledge area contains five possible levels from which the respondent may choose. Figure 8 shows the organizational characteristics concerning the five levels of maturity.

Major Organizational Characteristics of $(PM)^2$ Model

| Maturity level | Major organizational characteristics |
|---|---|
| Level 5 | Project-driven organization |
| | Dynamic, energetic, and fluid organization |
| | Continuous improvement of PM processes and practices |
| Level 4 | Strong teamwork |
| | Formal PM training for project team |
| Level 3 | Team oriented (medium) |
| | Informal training of PM skills and practices |
| Level 2 | Team oriented (weak) |
| | Organizations possess strengths in doing similar work |
| Level 1 | Functionally isolated |
| | Lack of senior management support |
| | Project success depends on individual efforts |

Figure 8: Levels of Maturity

#### 2.4.3.1. KNOWLEDGE AREAS

- **Project integration management** ensures that all elements of a project are working together to achieve a common goal.
- **Project scope management** ensures all factors and variables for defining and controlling the project are taken into account.
- **Project time management** ensures meeting project and milestone deadlines, and overall timely completion.
- **Project cost management** ensures that the project does not exceed the approved budget.
- **Project quality management** ensures that the project will attain a prescribed level of quality to outcomes.
- **Project human resource management** ensures effective use of people involved in the project.
- **Project communications management** ensures timely and appropriate generation, collection, dissemination, storage, and disposition of project information.
- **Project risk Management** identifies, analyzes, and responds to project risk.
- **Project procurement management** ensures that goods and services outside the respective organization are acquired.

#### 2.4.3.2. PROJECT PROCESSES

The following project management process descriptions are defined by Kwak & Ibbs (2002). These processes describe the different phases of a project and the maturity of a project team may be measured in handling these processes.

- **Initiating process** indicates the beginning of a project or phase.
- **Planning process** entails the development and maintenance of an executable design to achieve the project goals.
- **Executing process** involves coordinating the organization and other relevant resources to perform the functions of the project successfully.
- **Controlling process** ensures that project objectives are in line with actual performance and takes corrective action when necessary.
- **Closing process** ensures a formal phase-out of the project or phase, and acceptance of the project to bring it to an end.

#### 2.4.3.3. LEVEL DESCRIPTION

Each of the categories is rated on a level of 1 (low) to 5 (high) indicating the maturity of the specific categories concerning project management. The consolidated ratings then give an overall rating for the process maturity. Characteristics of the respective maturity levels are described as follows:

**Level 1:**

- No PM processes or practices are consistently available
- No PM data are consistently collected or analyzed
- Functionally isolated
- Lack of senior management support
- Project success depends on individual efforts
- Understand and establish basic PM processes

**Level 2:**

- Informal PM processes are defined
- Informal PM problems are identified
- Informal PM data are collected
- Weak team orientation
- Organizations possess strengths in doing similar work
- Individual project planning

**Level 3:**

- Formal project planning and control systems are managed
- Formal PM data are managed
- Medium team orientation
- Informal training of PM skills and practices
- Systematic and structured project planning and control for individual project

**Level 4:**

- Multiple PM (program management)
- PM data and processes are integrated
- PM processes data are quantitatively analyzed, measured, and stored
- Strong teamwork
- Formal PM training for project team
- Planning and controlling multiple projects in a professional matter

**Level 5:**

- PM processes are continuously improved
- PM processes are fully understood
- PM data are optimized and sustained
- Project-driven organization
- Dynamic, energetic, and fluid organization
- Continuous improvement of PM processes and practices
- Innovative ideas to improve PM processes and practices

## 2.5. CONCLUSION

The literature review has described how and why people fit into business architecture. Social network analysis is used to analyze the employee relationships in order to improve information flow, knowledge sharing, and completion of tasks such as enabling business processes. Process maturity is a benchmark of the sophistication of a project management team.

# CHAPTER 3: DESIGN AND DEVELOPMENT

## 3.1. OVERVIEW

Design and development entails the design of survey methodology and then extraction of information from the surveys to create useable information. A social network analysis survey and a process maturity survey were created to capture information in the project management environment. The surveys were created in the Survey Monkey (2009) survey building tool and tailored to every department's specific attributes to ensure that relevant information was received.

The project management team in each department receives the same two surveys. The first survey is the social network analysis survey and the second is the process maturity survey.

## 3.2. PROCEDURE

'Information in equals information out' is a common phrase but very true in this project when capturing information to portray social networks. The following procedure was used to capture data and analyze social behavior in the project management environment (Olivier Serrat, 2009).

Step 1: Identify the network of individuals, teams, and units to be analyzed.
Step 2: Gather background information to understand specific needs and issues.
Step 3: Define the objective and clarify the scope of the analysis.
Step 4: Formulate hypotheses and questions.
Step 5: Develop the survey methodology
Step 6: Design the questionnaire.
Step 7: Survey the individuals, teams, and units in the network to identify the relationships and knowledge flows between them.
Step 8: Use a social network analysis tool to visually map out the network.
Step 9: Review the map and the problems and opportunities highlighted.
Step 10: Design and implement actions to bring about desired changes.
Step 11: Map the network again after a suitable period of time. (Social network analysis can also serve as an evaluation tool).

Steps 10 and 11 are not included in this project as change implementation is out of this project's scope. Change implementation refers to proposed changes that are supported by the analysis to be implemented in the organization.

This procedure was followed to systematically gain insight into the work environment and to ensure that correct, updated, meaningful information was captured. Similar methodology was used to create the process maturity survey and survey the same individuals to establish the maturity level of the different project management teams.

## 3.3. DEMOGRAPHIC INFORMATION

Demographic information is used to understand the environment of the respondents. Both surveys are anonymous and personal information is kept confidential to protect the respondent. The demographic information section of the surveys consists of information concerning the respondent and its environment. The surveys are populated with the names of all respondents and other relevant information before they receive the survey to create an easier, quicker, and more user-friendly questionnaire.

Within each department several project management roles have been identified and are described as follows:

- Project Manager: The person with the overall responsibility for the successful planning and execution of projects.
- Programme Manager: The person responsible for managing many related projects and having an overview goal of improving the whole business's performance.
- Project Administrator: The person in charge of all administrative activities relating to the projects' lifecycle.
- Project Team Leader: The person responsible for a specific project management team when working on a specific project.
- Project Team Member: This includes all the different specialists, labour workers etc. who are part of the team.
- Consultant: An external person who gives advice and expert service to projects when asked. The consultant is part of the team for specific projects, as required, but normally not part of the basic project management team.

The project management team in each department each receives the same surveys (same questions), except for the different respondent names that are inserted beforehand. The demographic information questions are alike in both surveys and are as follows:

- What is your role in the team?
- In which age category do you fall?
- Gender?
- In which department do you work?

The demographic information is used to make sure that information received is credible and in line with the survey goals. Also it is used to create attributes in the social network analysis as discussed in Chapter 4.


Figure 9: Demographic Information

## 3.4. SOCIAL NETWORK ANALYSIS SURVEY

In order to portray a social network as accurately as possible and to resemble true reality, certain interaction dimensions have been defined by The Advisory Board Company (1996) as discussed in section 3.4.1. and this is used to understand the environment of the respondents. The entire survey may be viewed in Appendix A.

### 3.4.1. INTERACTION DIMENSIONS

The Advisory Board Company (1996) has defined seven interaction dimensions whereby the social network of a business may be analyzed. Table 1: Interaction shows these categories and the respective survey questions. Included in every interaction dimension is the question to identify relationships (section 3.4.1. Interaction) and then elaborate on those relationships (section 3.4.2. Elaboration).

| Interaction Category | Survey Question |
|---|---|
| Strategy | With whom do you discuss the business's vision, strategy and what is important and valued in the business? |
| General Work Instructions | With whom do you work to get your job done that is exchange information, documents or other resources? |
| Grapevine | With whom do you discuss what is going on at work, and who is doing what in your organization? |
| Decision Making | From whom do you seek inputs, suggestions and feedback when making a decision? |
| Innovation | With whom do you discuss ideas, innovations, and better ways of getting things done? |
| Expertise | To whom do you go for expert advice in doing your work? |
| Customer Knowledge | With whom do you discuss customer needs and market demands? |

Table 1: Interaction Dimensions

The strategy dimension describes the social network that exists when employees discuss the business or project management team's vision, strategies, and objectives. It is typically associated with higher management. The general work instructions dimension describes the social network caused by everyday interaction between employees when doing their job on a daily basis. The grapevine dimension includes relationships that exist from "keeping in the loop" or discussing what is going on at work, and who is doing what in the team. The decision making dimension facilitates a social network from relationships when making decisions – to whom does the respondent go to receive inputs, suggestions, or feedback when making decisions. The innovation dimension creates a social network from discussing ideas and brainstorming for new innovations in the team. The expertise dimension maps the social network of respondents who go to each other for expert advice in doing their work or receiving inputs. The customer knowledge dimension describes the social network in which employees discuss customer needs and market demands.

Figure 10 shows how respondents may enter their relationships in the strategy interaction dimension. This is similar to all other interaction dimensions. Due to the confidentiality of the company no actual names can be mentioned in the report thus Figure 10 shows "Name" as the options.

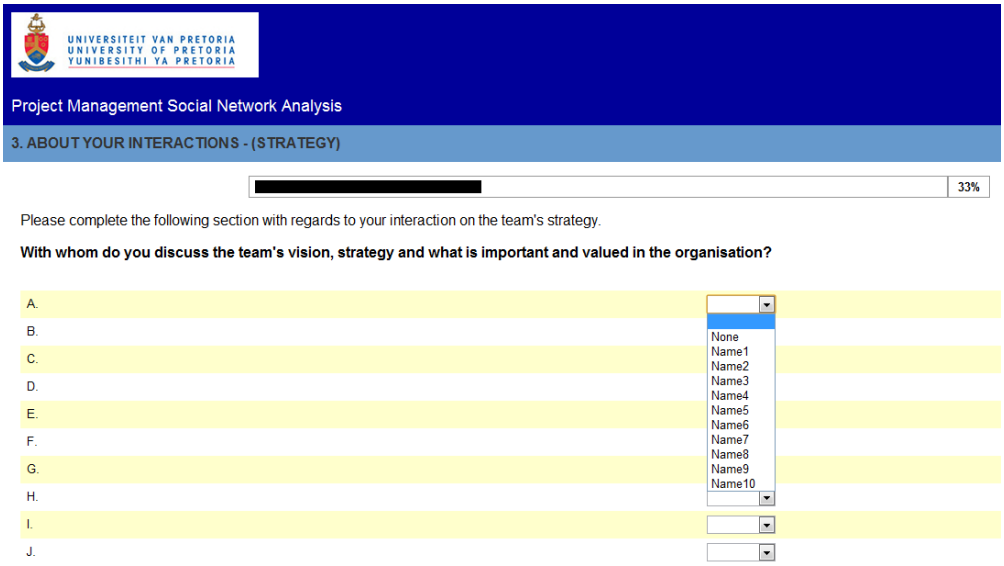



**Figure 10: Survey Interaction Input**

## 3.4.2. ELABORATION

For every name that the respondent enters as an interaction in a specific interaction dimension, it is also required to enter some elaboration on this interaction. The elaboration includes frequency of contact, department, mode of contact, and level. Each of these elaborations is discussed further.

- Frequency of contact: This indicates how often this interaction takes place. The respondent may choose from none, yearly, quarterly, monthly, weekly, and daily or more.
- Department: This indicates in which department the employee being interacted with by the respondent, is.
- Mode of contact: This indicates how the respondent interacts with the employee. The choices are none, face to face, telephonic calls, email, SMS, and other.
- Level: Indicates the role or rank of the employee in the team.

Figure 11 shows the elaboration input screen. This is the same for every interaction dimension.

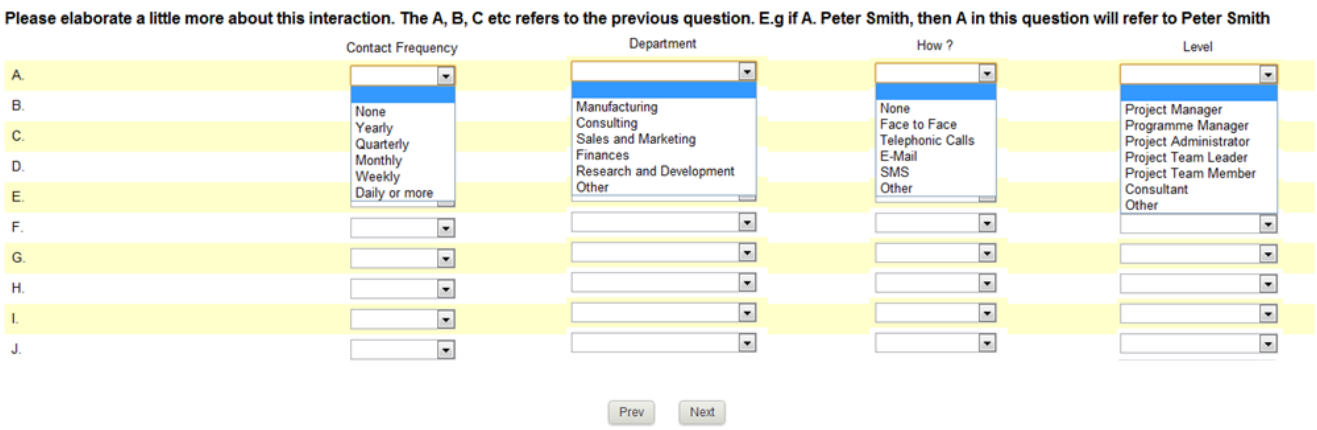



Figure 11: Survey Elaboration Input

## 3.5. PROCESS MATURITY SURVEY

Kwak & Ibbs's (2002) project management process maturity model evaluates an organization's project management process maturity level by identifying nine key project management knowledge areas and five project management processes. The project management knowledge areas are integration, scope, time, cost, quality, communication, human resources, risk, and procurement and the project management processes are initiating, planning, executing, controlling, and closing. The whole project management process maturity survey may be viewed in Appendix B.

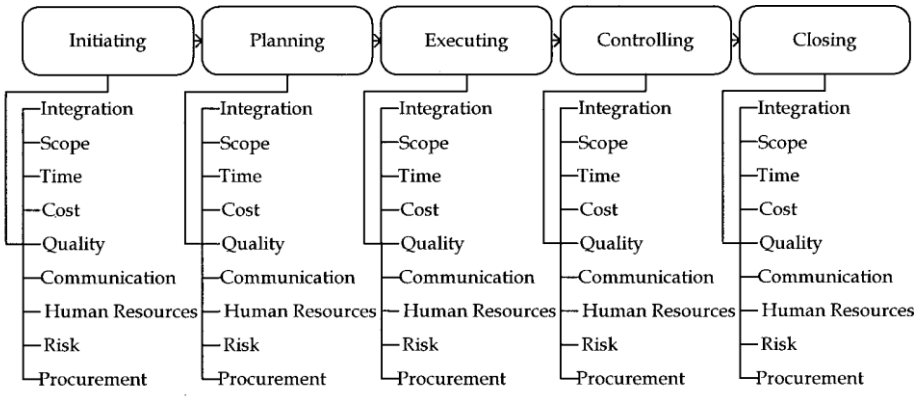



Figure 12: Integration of project management knowledge areas and processes

As shown in Figure 13 these factors integrate to evaluate an organization's level of maturity in all areas.

Every knowledge area and project process is assessed by the respondent on a scale of 1 to 5. Level 1 indicates a basic project management process that is ad-hoc, level 2 indicates individual project planning, level 3 indicates systematic project planning and control, level 4 indicates integrated multi-project planning and control, and level 5 indicates continuous project management process improvement.

The respondent is asked to assess every knowledge area and project process as may be viewed in Appendix B.

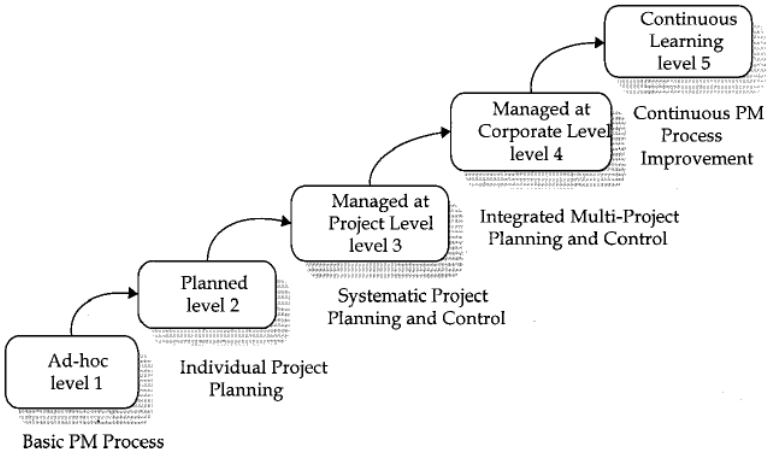



Figure 13: Maturity Level Attributes

## 3.6. INFORMATION EXTRACTED FROM SURVEYS

Now that information has been received from the survey questions it needs to be converted into useable information. This section discusses how the raw data from the surveys is transformed into information that could be analyzed and measured, and is useable by the relevant software. All data used may be viewed in Appendix C.

### 3.6.1. SOCIAL NETWORK ANALYSIS

#### 3.6.1.1. ABOUT THE SOFTWARE

The social network analysis survey information is analyzed using Cyram NetMiner 3 (2008) software. Cyram NetMiner 3 is a tool that maps and analyzes social networks through various metrics and methodologies. There are three possible input modes that can be used to import data into the software: edge list, matrix, and linked list. These all represent the same information/relationships to the software, only in an alternative layout. The matrix mode was used in this project. It consists of one column of nodes representing the origin of interaction,

one row of nodes representing the destination of interaction, and a matrix of weighted interaction values. NetMiner uses certain entities to perform social network analysis and these include a main node set and 1-mode node sets.

### 3.6.1.2. MAIN NODE SET

NetMiner uses a main node set to classify all nodes according to certain attributes. These attributes may be used to divide the social network into clusters that represent groups of employees who share the same answers in an attribute. As an example the Manufacturing department's main node set is shown in Table 2 and the respective attributes are shown as the respondents have answered.

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Consultant | Age Group >60 | Male | Manufacturing |
| Project Administrator | Age Group >30<40 | Female | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Member | Age Group >50<60 | Male | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Leader | Age Group >40<50 | Male | Manufacturing |
| Project Team Member | Age Group >20<30 | Male | Manufacturing |
| Project Team Member | Age Group >50<60 | Female | Manufacturing |
| Project Team Member | Age Group >50<60 | Male | Manufacturing |
| Consultant | Age Group >60 | Male | Manufacturing |
| Project Team Member | Age Group >30<40 | Male | Manufacturing |
| Project Team Member | Age Group >30<40 | Female | Manufacturing |
| Project Manager | Age Group >50<60 | Male | Manufacturing |
| Consultant | Age Group >50<60 | Male | Manufacturing |
| Programme Manager | Age Group >60 | Male | Manufacturing |

**Table 2: Main Node Set**

### 3.6.1.3. 1-MODE NODE SET

A 1-mode node set contains the exact same nodes as origin (column) and destination (row) in the matrix headings. Also NetMiner uses 1-mode node sets as the key interaction matrices from which social network analysis is conducted. This means that the interaction weight values and the position of these values (from whom to whom is there interaction) in a 1-mode node set matrix are what drives the outcome of the metrics.

To create the 1-mode node sets, a relational weight frequency methodology was adopted as will now be explained.

As in the Manufacturing department the project management roles were used as the nodes because in a 1-mode node set both origin node set and destination node set needs to be identical but the survey is anonymous and therefore origin names are unknown. The links/interactions between project management levels have certain weight/magnitude that is obtained from the frequency of contact. The frequency of contact describes how many times an employee interacts in some manner with another employee to establish a relationship in a certain interaction dimension, and this is illustrated in Figure 14 according to a rating scale of one to five. This is multiplied with the respective number of employees who interacted with the same node at the same frequency of contact to calculate the total interaction of a specific frequency. All the total interaction values for a specific frequency are then added to calculate the total relational weight that represents the total magnitude of interaction for all frequency rates between nodes.

| Frequency | Rating |
|---|---|
| None | 0 |
| Yearly | 1 |
| Quarterly | 2 |
| Monthly | 3 |
| Weekly | 4 |
| Daily or More | 5 |

Figure 14: Frequency Rating

$$\text{Total Relational Weight (TRW)} = \Sigma(\text{Frequencies})$$

The above equation is used to calculate the total relationship between project management roles. For example, project team leaders would contact project managers to discuss strategy related topics, and the respective frequencies associated to their interaction would be used to calculate the total interaction e.g. in Table 3 three project team members have contacted project managers daily or more, five project team members have contacted project managers monthly, and one project team member contacted project managers yearly.

$$TRW = (3 \times 5) + (5 \times 3) + (1 \times 1) = 31$$

These weighted ratings are critical to the social network analysis metrics being accurate and meaningful.

| Manufacturing Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | | | | 5 | |
| Project Team Member | | 7 | 3 | 2 | 31 | 7 |
| Project Team Leader | | | 8 | | 5 | |
| Programme Manager | | | 10 | 4 | 9 | |
| Project Manager | | | 2 | 6 | | 5 |
| Consultant | | | | | 5 | |

Table 3: 1-Mode Node Set

## 3.7. PROCESS MATURITY

The respondents' answers to the maturity level of the nine key knowledge areas and five project processes are used to calculate an average maturity level. The overall maturity level of every project management team is rounded down because if all knowledge areas and project processes are not e.g. level 5 then improvement is still needed in some areas. All respondents' answers may be viewed in Appendix C.

## 3.8. SUMMARY

It is evident that the information received may not be stable because of numerous factors such as respondents that are part of the social network don't complete the survey, respondents enter incorrect details etc. The surveys are therefore designed to enable easy, quick, and correct data capturing as far as possible. The surveys also make use of demographic information to understand the respondent's environment. Extracting data from surveys is done to create node sets that NetMiner may use to visually map the social networks. The weight of relationships within the node sets are subject to the number of respondents and the frequency at which they interact. Once the information is ready to be imported into NetMiner, analysis can start.

# CHAPTER 4: ANALYSIS

## 4.1. OVERVIEW

The analysis chapter will focus on analyzing the different social networks on a low and high level to gain insight into the various social network patterns. The interaction dimensions and metrics are used to perform social network analysis. The process maturity of each project management team is assessed and this is then compared to the social network analysis to determine whether there is a correlation.

## 4.2. ASSUMPTIONS

Due to the anonymity of the surveys it is not possible to verify which project team members have not completed the survey and due to time constraints all of these responses are disregarded in the analysis. It is therefore assumed that all respondents included in the analysis and their respective responses portray their whole project management team. An estimated 56 respondents from the various departments form part of this study.

## 4.3. SOCIAL NETWORK LOW LEVEL ANALYSIS

The low level analysis of the social networks focuses on every individual in every department. Key players and idle roles are identified to gain understanding of which roles are important to which interaction dimensions. Observations are made on the various interaction dimensions. All social networks referred to may be viewed in Appendix D.

### 4.3.1. KEY PLAYERS

The social networks created by the seven interaction dimensions may be viewed in Appendix D. These dimensions are assessed using degree centrality and the node size is based on in-degree centrality weight. To gain insight into each network the key player of each network is identified. The key player is the role that gives and receives the most interaction to and from other roles, and also acts as the most common role between other roles. The key players in each department's project management team are shown in Table 4 according to each interaction dimension, and this corresponds with the social networks in Appendix D.

| Key Players | Consulting | Finances | Manufacturing | Research and Development | Sales and Marketing |
|---|---|---|---|---|---|
| Strategy | Project Team Leader | Project Team Leader | Project Manager | Project Manager | Project Manager |
| General Work Instructions | Project Team Leader | Project Administrator | Project Administrator | Project Team Leader | Project Manager |
| Grapevine | Project Team Leader | Project Team Leader | Project Team Member | Project Manager | Project Manager |
| Decision Making | Project Team Leader | Project Team Leader | Consultant | Project Manager | Project Manager |
| Innovation | Project Manager | Project Team Leader | Programme Manager | None | Project Manager |
| Expertise | Project Team Leader | Project Team Leader | Project Team Member | Project Manager | Project Manager |
| Customer Knowledge | Project Team Leader | Project Team Leader | Project Team Leader | Project Manager | Project Manager |

Table 4: Key Players

In the Consulting and Finances departments the project team leader is the dominantly most important role of the team. The project manager is key to the Research and Development, and Sales and Marketing departments. The Manufacturing department does not have a dominantly key player. Having a key player is not necessarily good for communication and information flow between roles because if the key player is removed from the network, it will collapse and communication will cease. Therefore the Manufacturing department is deemed the most versatile department where it has different key players in each interaction dimension, and this will enable the project management team to continue communication even if the key player of one dimension is removed from the social network.

### 4.3.2. IDLE ROLES

As seen in Table 5 the manufacturing department has no idle roles, which indicates a social environment where everyone is included and part of the different interaction dimensions. The consultant is the idlest role throughout all departments. A consultant is someone who is external to the normal structure of the project management team and gives advice or expert service. Therefore a consultant is not a project team member but an external role, and this may explain the results shown in Table 5. The programme manager is absent from the Research and Development, and Sales and Marketing departments and this indicates a lack of leadership where all leadership responsibility is left to the project manager and team leader. In the Consulting department the project administrator is idle in many dimensions and this is cause for improvement.

| Idle Roles | Consulting | Finances | Manufacturing | Research and Development | Sales and Marketing |
|---|---|---|---|---|---|
| Strategy | Project Administrator/ Consultant | Consultant | None | Consultant/ Programme Manager | Programme Manager |
| General Work Instructions | Consultant | Consultant | None | Consultant/ Programme Manager | Consultant/ Programme Manager |
| Grapevine | Consultant | Consultant | None | Consultant/ Programme Manager | Consultant/ Programme Manager |
| Decision Making | Programme Manager | Consultant | None | Consultant/ Programme Manager | Programme Manager |
| Innovation | Project Administrator/ Consultant | Consultant | None | Consultant/ Programme Manager | Consultant/ Programme Manager |
| Expertise | Project Team Member/ Project Administrator | Project Administrator/ Consultant | None | Consultant/ Programme Manager | Project Team Member/ Programme Manager |
| Customer Knowledge | Project Administrator/ Consultant | Consultant | None | Consultant/ Programme Manager | Consultant/ Programme Manager |

Table 5: Idle Roles

### 4.3.3. STRATEGY OBSERVATIONS

The Manufacturing department has the most roles in communication, of all departments, when discussing strategic topics. In all departments except Sales and Marketing the project administrator is either idle or loosely connected to the central network. This shows that project administrators are not very important in discussing strategic topics. There is central and direct interaction in all departments between the project manager and project team leader which shows these roles as crucial to the strategy dimension.

### 4.3.4. GENERAL WORK INSTRUCTIONS OBSERVATIONS

The Manufacturing department is very well connected through all roles with shows a central intertwined social network. In the Consulting department the project team leader acts as the main link to other roles. This is representative of a very poor social network and needs to be addressed by integrating all team members when discussing general work instructions. In the

Sales and Marketing department the project team member is excluded from the central network and this must be improved to enable better everyday work alignment.

### 4.3.5. GRAPEVINE OBSERVATIONS

The Consulting, Finance, and Sales and Marketing departments are not integrated as they use one role to dominantly convey information to other roles. If the central node were to be removed the whole network would collapse. The Manufacturing department is well connected when discussing grapevine topics, however the consultant is slightly excluded from the central network and only receives information.

### 4.3.6. DECISION MAKING OBSERVATIONS

The project team leader acts as the main role that conveys information in the Consulting and Finance departments. This is also true for the project manager in the Research and Development department. When making decisions, it is critical that all relevant team members be included in an integrated manner and therefore these departments will lack good decision making processes. The consultant is the key player in the Manufacturing department which may not be healthy for the team because a consultant is an external team member and decision making needs to revolve around the project manager and programme manager.

### 4.3.7. INNOVATION OBSERVATIONS

In the Finance department the project administrator acts as the only link between the project manager and project team leader, which is also the only link to the rest of the network. In the Consulting and Sales and Marketing departments the project manager acts as only link to the programme manager and project team member respectively. The Research and Development department is disjointed where there is a gap in communication. When discussing innovative ideas it is important to include all project team members as they may have input to give and experience in the field.

### 4.3.8. EXPERTISE OBSERVATIONS

The project team relies solely on one role to convey information in the Consulting, Finance, Research and Development, and Sales and Marketing departments. This shows a great lack of communication between team members when giving and receiving expert advice. In the Manufacturing department the project team member is most central as this role is generally more inexperienced and in need of expertise help.

### 4.3.9. CUSTOMER KNOWLEDGE OBSERVATIONS

The Manufacturing department is very well integrated when discussing customer requirements and needs. The Consulting and Sales and Marketing departments are dependent on a single role to convey information, which shows a discrepancy in the social network dynamic. The Finance department is relatively well connected and the Research and Development department is fairly connected however the project team leader is somewhat excluded from the central network.

## 4.4. SOCIAL NETWORK HIGH LEVEL ANALYSIS

The interaction dimensions are mapped to understand how each department's social network operates and are compared to each other. Also, five metrics are used to quantify a social network's dynamics and these metrics are Activity, Control, Reach, Access, and Power. The social network diagrams may be viewed in Appendix D.

### 4.4.1. INTERACTION DIMENSION COMPARISON

Degree centrality is a technique that shows how central a node is to the whole network based on the weight of its interactions. This technique is used to measure each interaction dimension and the results are shown in Table 6. The degree centrality values are based on an average between in- and out degree centrality as computed by Netminer.

| | Strategy | General Work Instructions | Grapevine | Decision Making | Innovation | Expertise | Customer Knowledge |
|---|---|---|---|---|---|---|---|
| Consulting | 2.10 | 1.93 | 0.63 | 1.07 | 0.87 | 0.77 | 0.67 |
| Finances | 1.67 | 2.20 | 0.93 | 1.10 | 0.97 | 0.40 | 0.77 |
| Manufacturing | 3.00 | 7.70 | 3.13 | 2.87 | 2.10 | 2.03 | 2.17 |
| Research and Development | 0.73 | 2.13 | 0.70 | 0.60 | 0.27 | 0.30 | 0.70 |
| Sales and Marketing | 1.83 | 3.03 | 2.47 | 1.63 | 1.30 | 0.83 | 0.97 |
| | | | | | | | |
| **Average** | 1.87 | 3.40 | 1.57 | 1.45 | 1.10 | 0.87 | 1.05 |
| **Standard Deviation** | 0.82 | 2.44 | 1.15 | 0.87 | 0.67 | 0.69 | 0.63 |

Table 6: Interaction Dimension Comparison

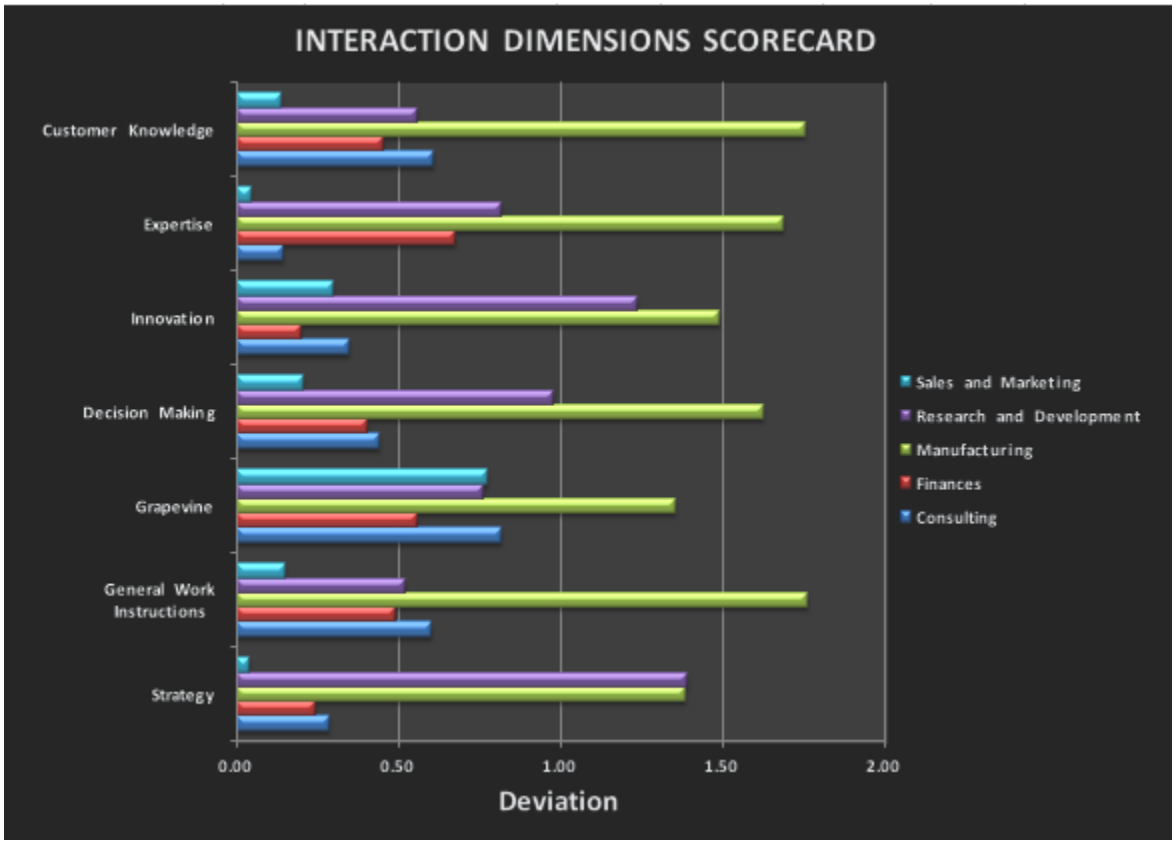
To compare the different interaction dimensions to each other a common baseline needs to be created. Therefore each dimension's average and standard deviation of all departments is calculated as shown in Table 6. These values are used to create the score card Table 7 through the following formula:

**Score Card Value** = ABS(Degree Centrality value – Interaction Dimension Average)/Interaction Dimension Standard Deviation

| SCORECARD | Strategy | General Work Instructions | Grapevine | Decision Making | Innovation | Expertise | Customer Knowledge |
|---|---|---|---|---|---|---|---|
| Consulting | 0.29 | 0.60 | 0.82 | 0.44 | 0.35 | 0.14 | 0.61 |
| Finances | 0.24 | 0.49 | 0.56 | 0.41 | 0.20 | 0.68 | 0.45 |
| Manufacturing | 1.39 | 1.76 | 1.36 | 1.62 | 1.49 | 1.69 | 1.76 |
| Research and Development | 1.39 | 0.52 | 0.76 | 0.98 | 1.24 | 0.82 | 0.56 |
| Sales and Marketing | 0.04 | 0.15 | 0.78 | 0.21 | 0.30 | 0.05 | 0.14 |

Table 7: Interaction Dimension Scorecard

This score card shows how far a department deviates from the average of all departments' centrality with respect to each interaction dimension. It is evident in Table 7 that the Manufacturing department deviates the most and this is as a result of it having a larger project management team than the other departments. Also this indicates a greater centrality in the Manufacturing department which shows a strong social network. The Research and Development department shows a second greatest deviation from the general average except for the general work instructions and grapevine dimensions. This indicates that the Research and Development department is not strong in those two dimensions but is centrally connected in all other dimensions. The Consulting department has a good overall centrality when it comes to customer knowledge, grapevine, and general work instructions. The Finances department is very centrally connected in the expertise dimension and fairly connected in all other dimensions in comparison. The Sales and Marketing department is very centrally connected in the grapevine dimension but poorly connected in all other dimensions in comparison.



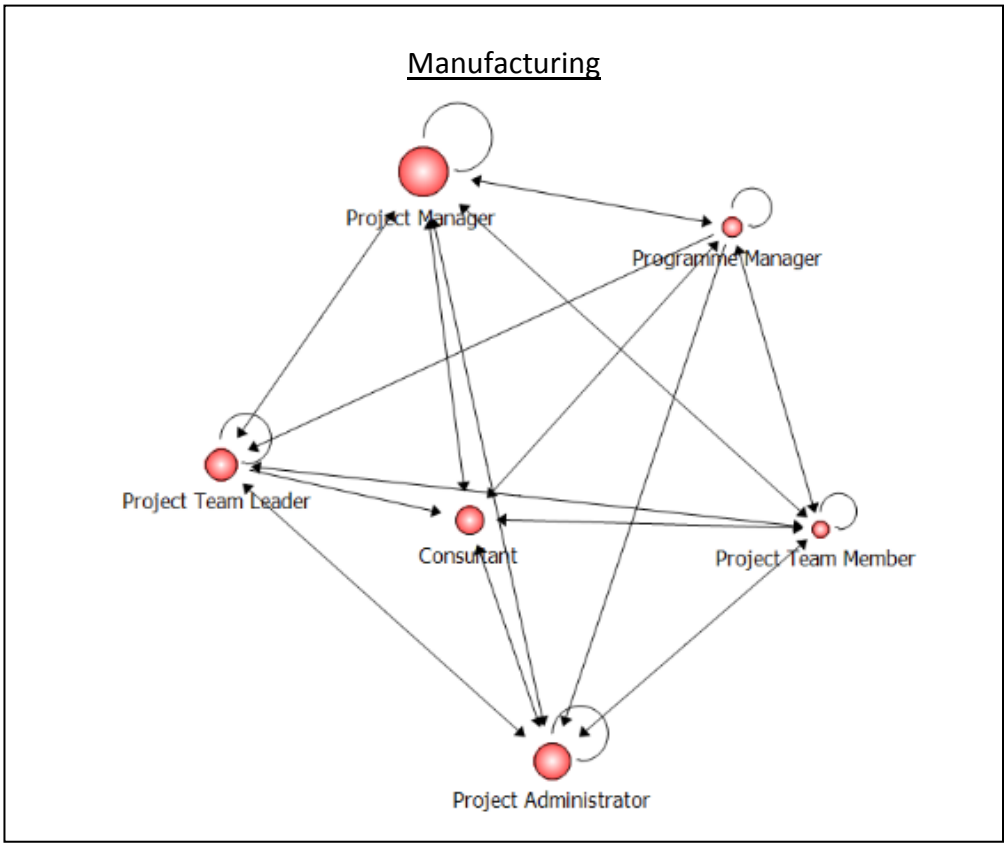

### 4.4.2. METRICS

The Advisory Board (1996) defined five metrics with which to analyze a social network. These metrics are Activity, Control, Reach, Access, and Power. Activity is measured using the degree centrality technique, Control is measured using the eigenvector centrality technique, Reach is measured using the node betweenness centrality technique, Access is measured using the closeness centrality technique, and Power is measured using the power centrality technique. Metrics are analyzed in a holistic manner by summating all interaction dimensions' respective values and constructing one social network of each department.

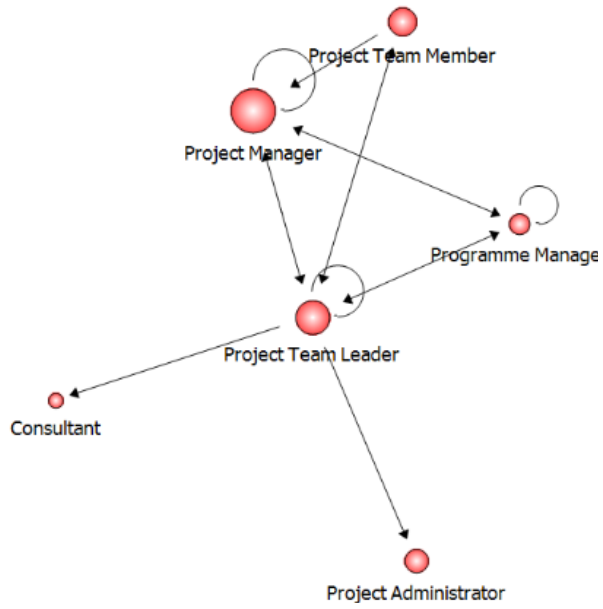
#### 4.4.2.1. ACTIVITY

Activity is measured using the average degree centrality of the social network and indicates how active a role is in the network. The idle roles are deemed the roles with the least activity in the social network as they are completely excluded.

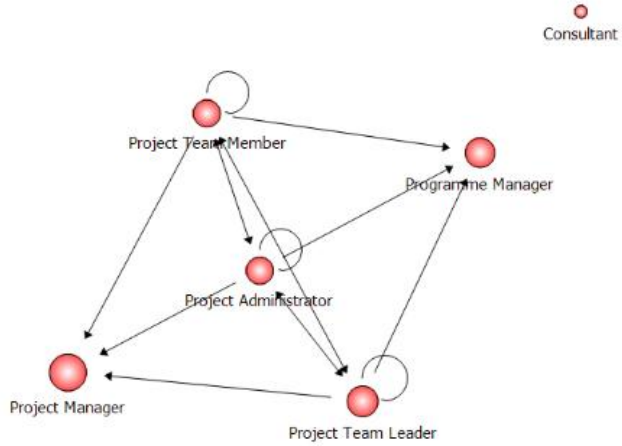
The Manufacturing department is the most active of all departments. The project manager is the most active person in all networks and this indicates strong leadership because this is a management role.



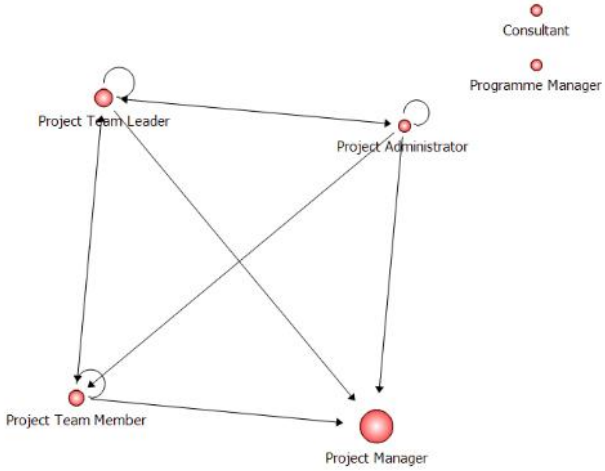
## Consulting



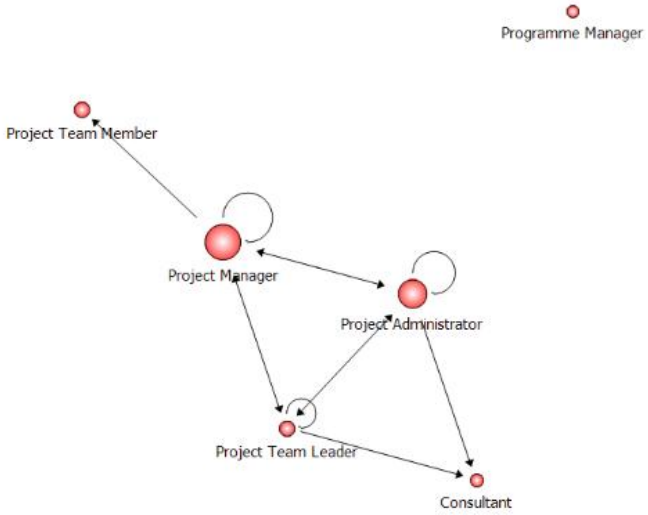

## Finances




## Research and Development

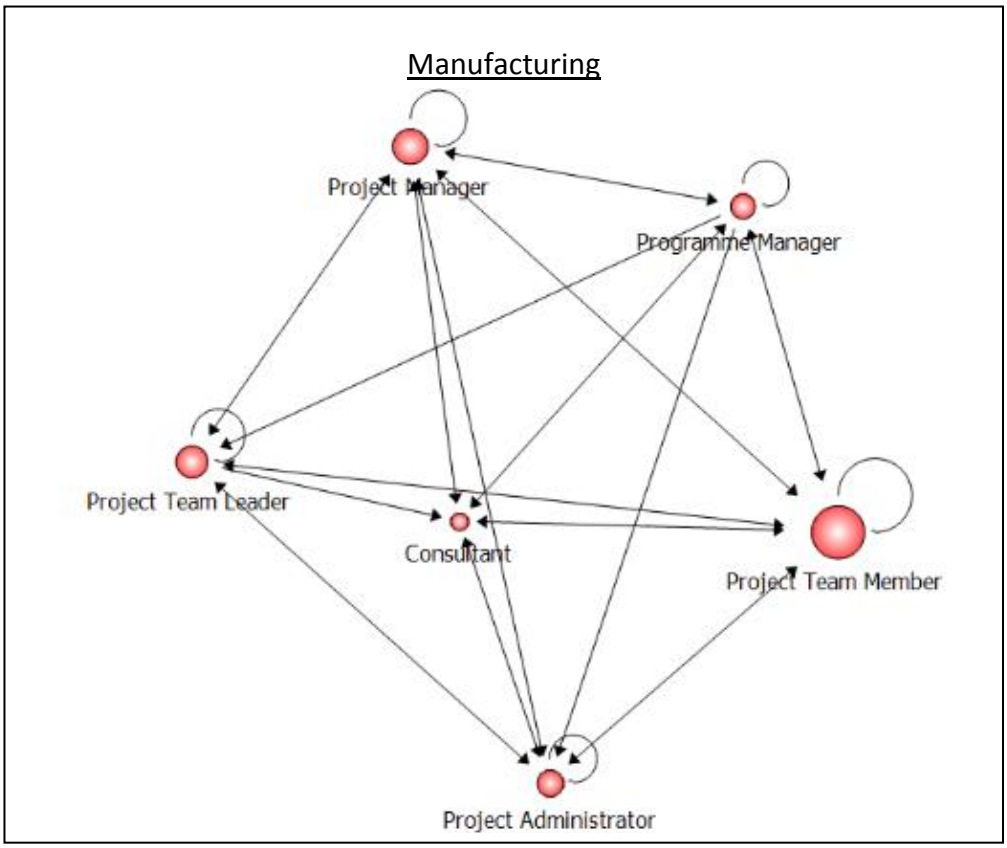



## Sales and Marketing

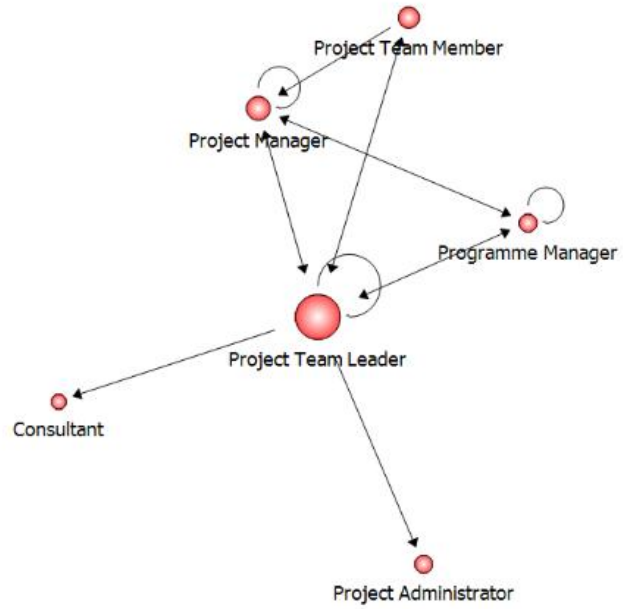


#### 4.4.2.2. CONTROL

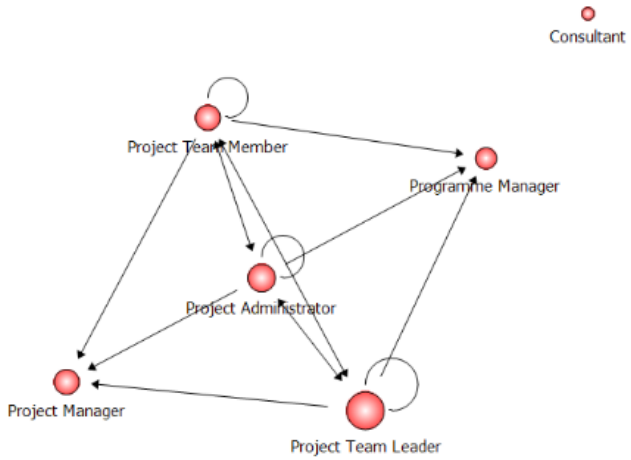
Control is measured using the average eigenvector centrality of a social network and indicates how much control a role has over the flow of information. In the Manufacturing department the project team member has the most control and all roles are in communication with each other. In the Consulting department the project team leader has the most control and the consultant and project administrator are not in control of information flow. The project team leader is also the role with the most control in the Finance and Research and Development departments. In Sales and Marketing the project team leader and project administrator are both equally in control of information flow. All idle roles are not in control of information flow.



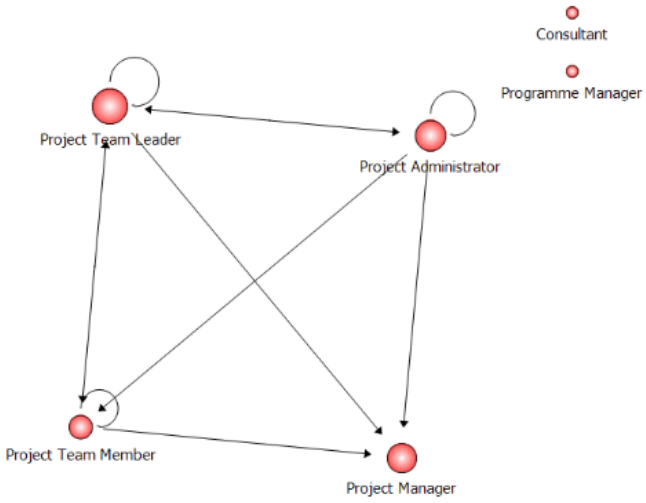
## Consulting



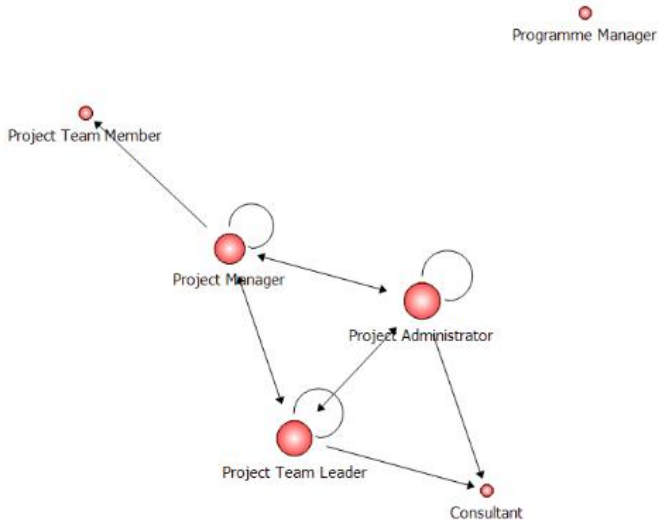

## Finances




## Research and Development

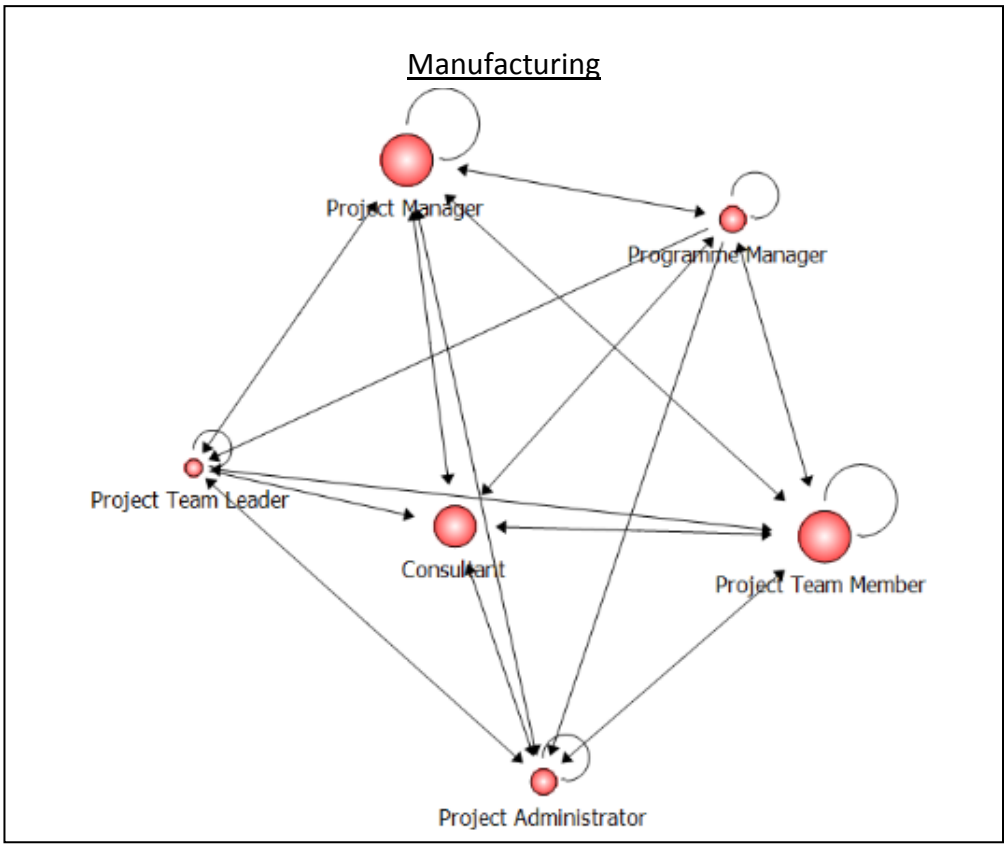


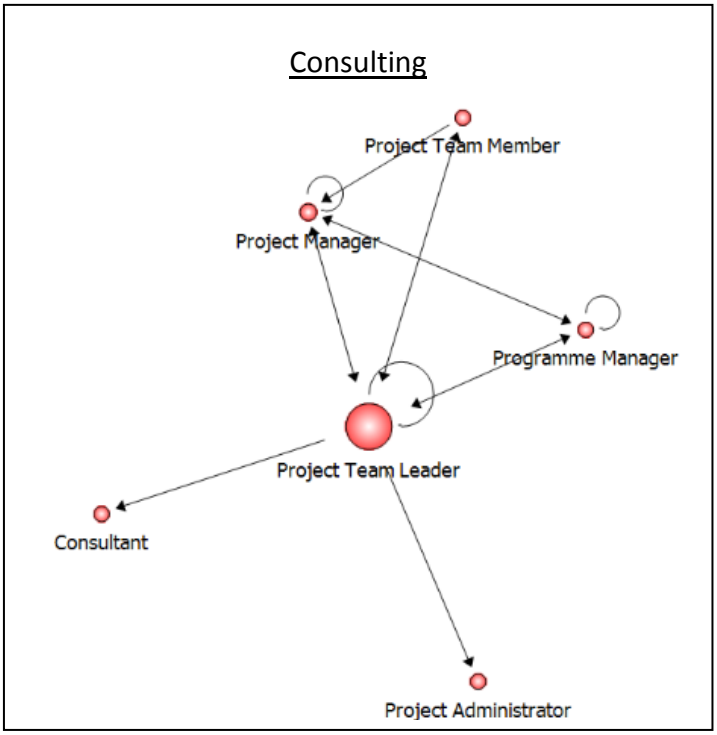

## Sales and Marketing

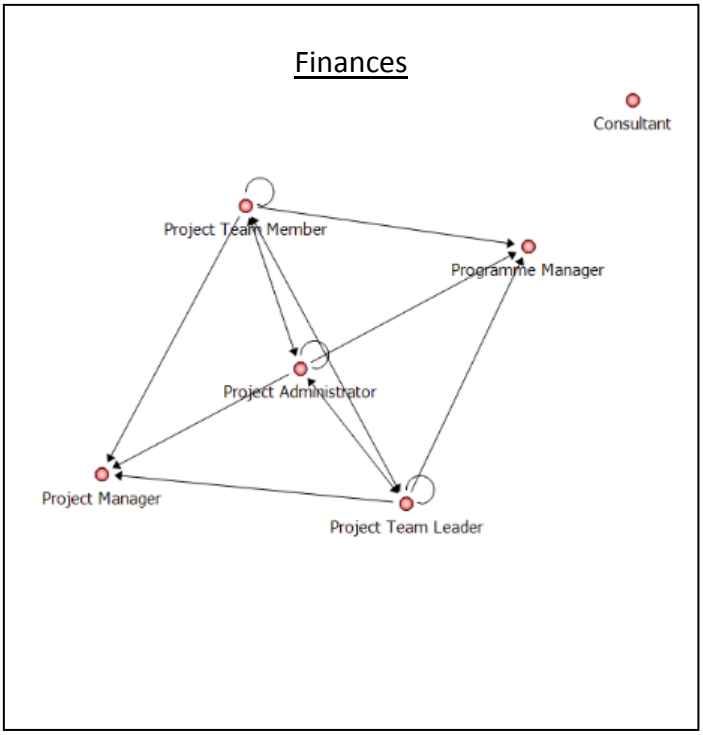


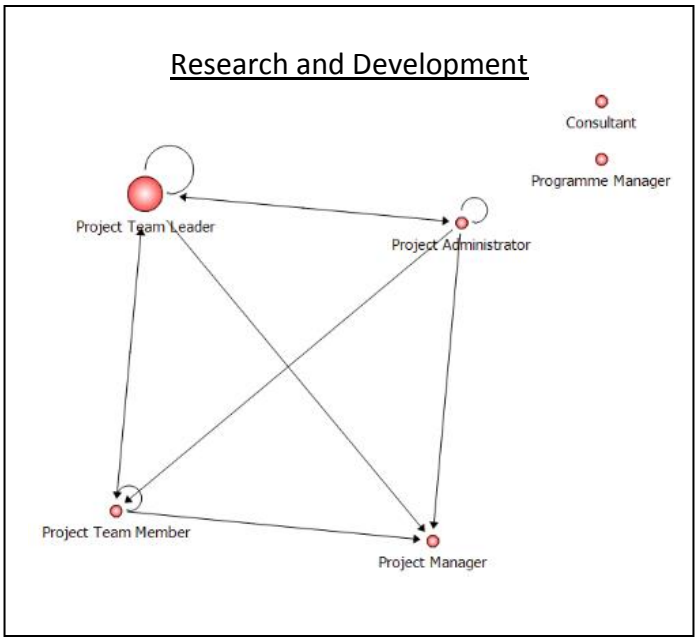
#### 4.4.2.3. REACH

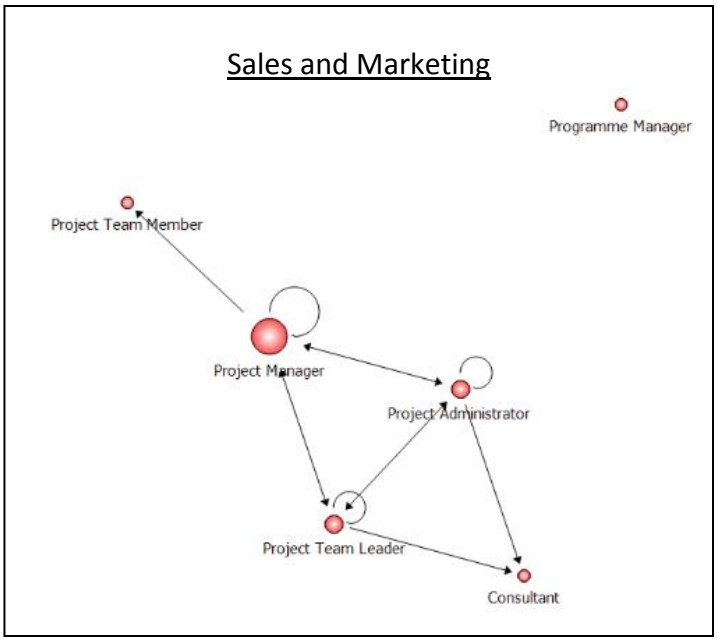
Reach is measured using node betweenness centrality and indicates how much potential influence a role yields. In the Manufacturing department the project manager and project team member have the greatest reach and the project team leader has the poorest reach. In the Consulting department the project team leader has the greatest reach and all other roles are equally reachable. In Finances all roles are equally reachable except for the consultant who is not reachable. The project team leader has the greatest reach in the Research and Development department and the project manager has the greatest reach in the Sales and Marketing department.




Consulting
Project Team Member
Project Manager
Programme Manager
Project Team Leader
Consultant
Project Administrator

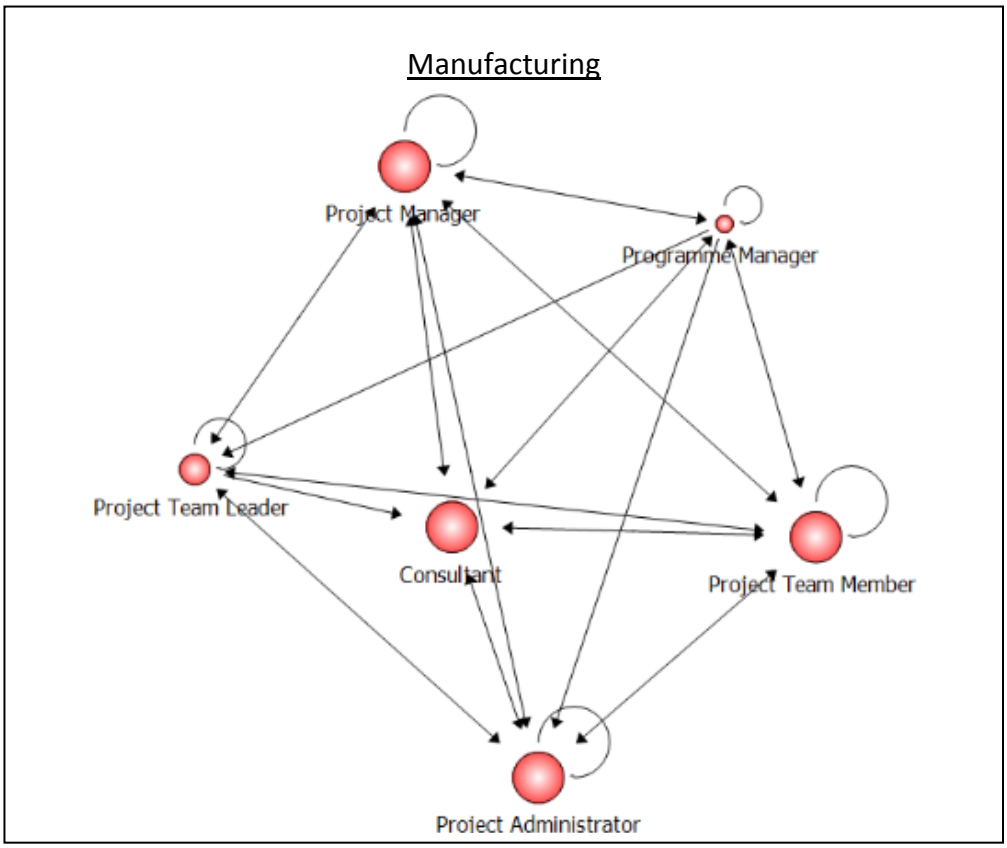

Finances
Consultant
Project Team Member
Programme Manager
Project Administrator
Project Manager
Project Team Leader

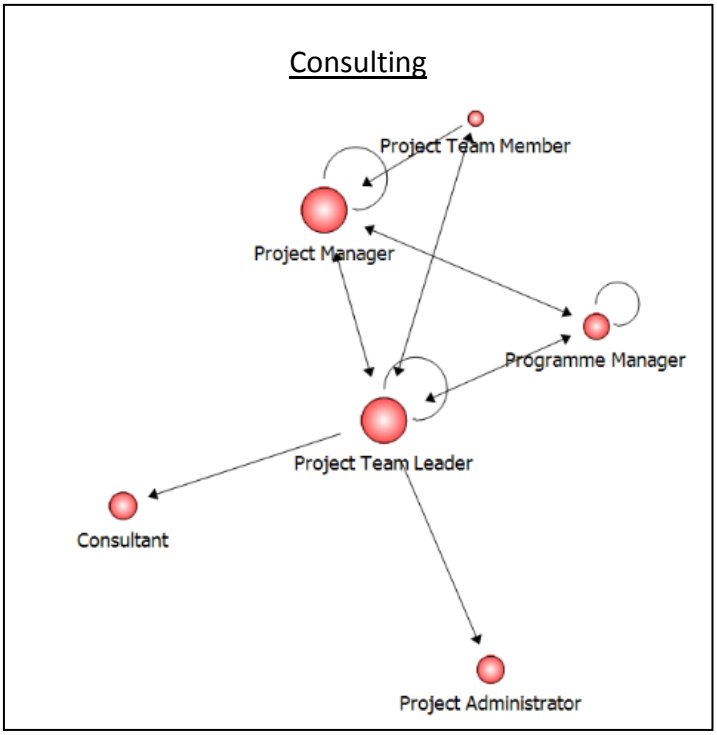

Research and Development
Consultant
Programme Manager
Project Team Leader
Project Administrator
Project Team Member
Project Manager

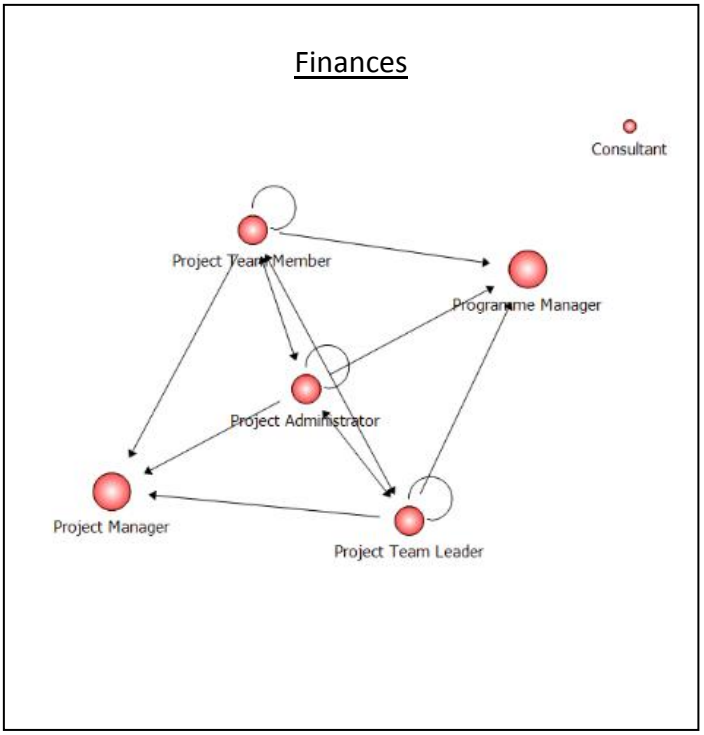

Sales and Marketing
Programme Manager
Project Team Member
Project Manager
Project Administrator
Project Team Leader
Consultant

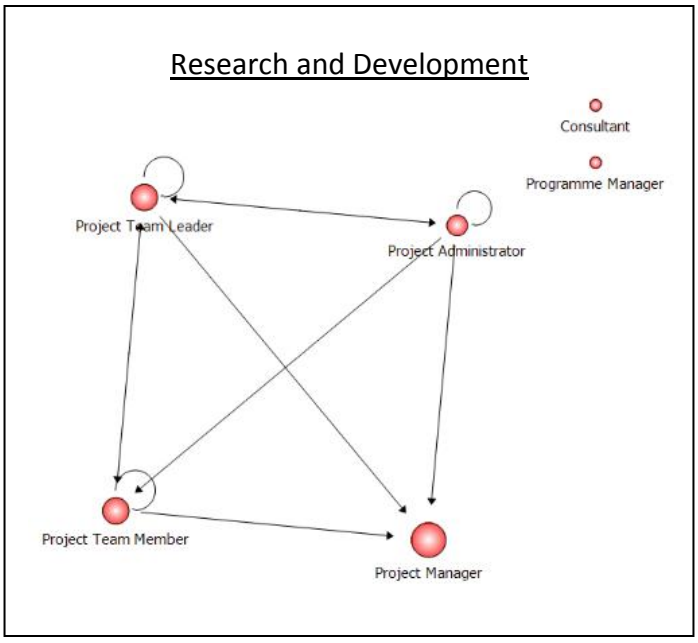
#### 4.4.2.4. ACCESS

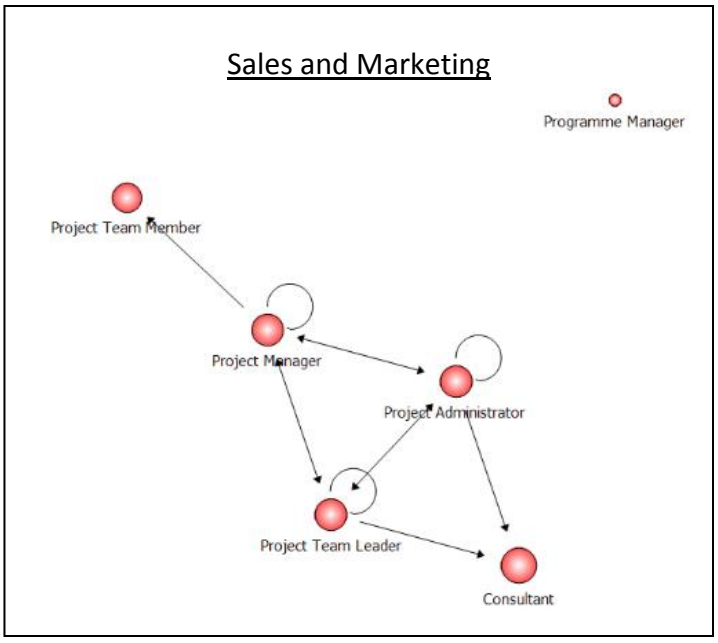
Access is measured using closeness centrality and indicates how easily a role can get required resources to be successful in the project. In the Manufacturing department all roles are equally accessible except for the project team leader and programme manager who are less accessible. In Consulting the project team member and project manager are most accessible. In Finance the project manager and programme manager are most accessible and the consultant is not accessible. In Research and Development the project manager is slightly more accessible than the other roles, and in Sales and Marketing all roles are equally accessible except for the programme manager who is idle.




Consulting
Project Team Member
Project Manager
Programme Manager
Project Team Leader
Consultant
Project Administrator

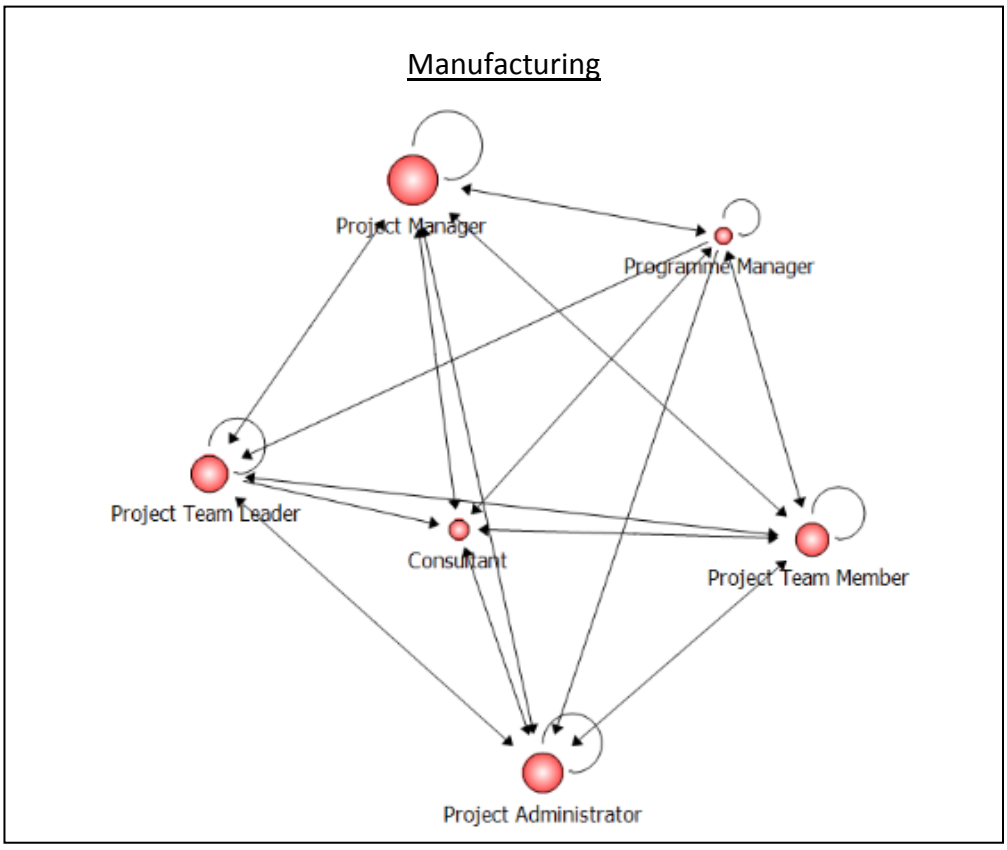

Finances
Consultant
Project Team Member
Programme Manager
Project Administrator
Project Manager
Project Team Leader


Research and Development
Consultant
Programme Manager
Project Team Leader
Project Administrator
Project Team Member
Project Manager

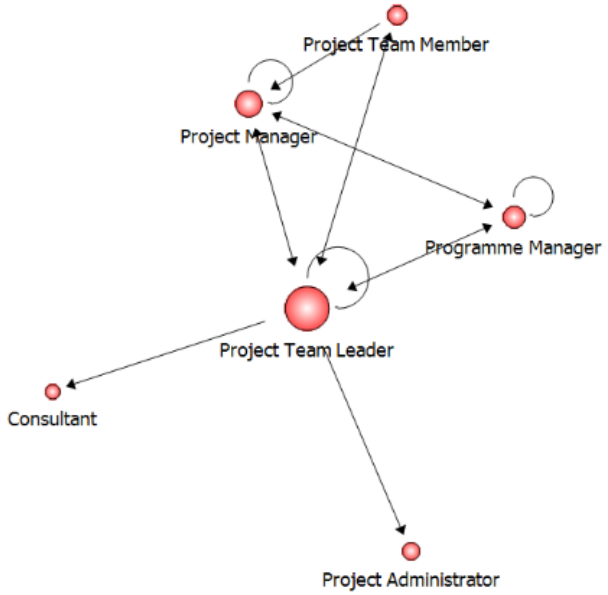

Sales and Marketing
Programme Manager
Project Team Member
Project Manager
Project Administrator
Project Team Leader
Consultant

#### 4.4.2.5. POWER

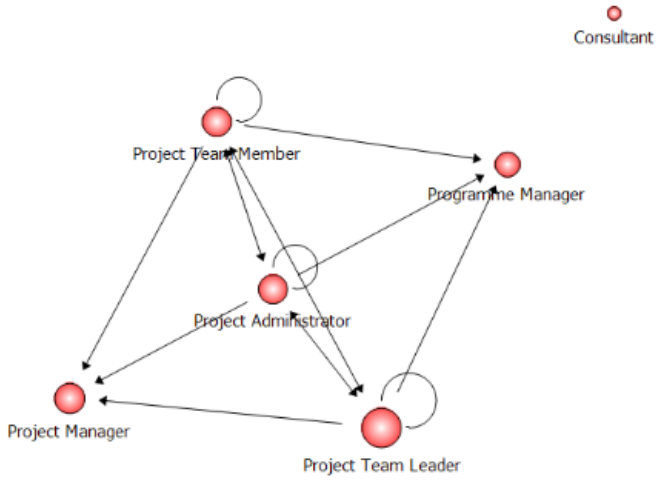
Power is measured using power centrality and indicates how much ability a role has to get things done. In the Manufacturing department the project manager has the most power to make things happen in the team. In Consulting the project team leader is the most powerful and the consultant and project administrator is least powerful. In Finance the project team leader has the most power and the consultant is idle and therefore is not powerful. In Research and Development the project manager has power to get things done and this is also the case for the project administrator in the Sales and Marketing department.



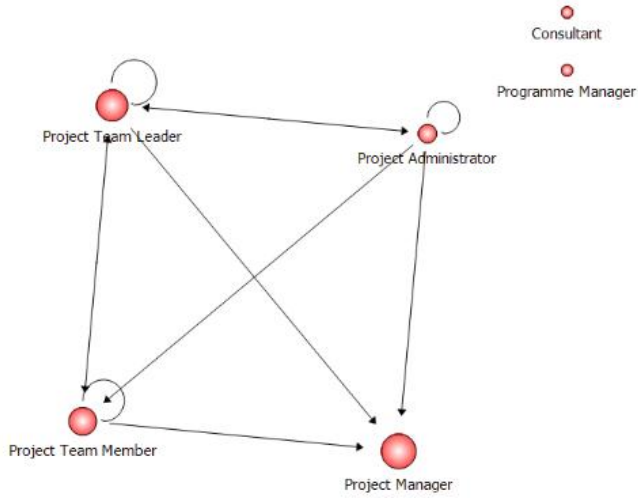
## Consulting



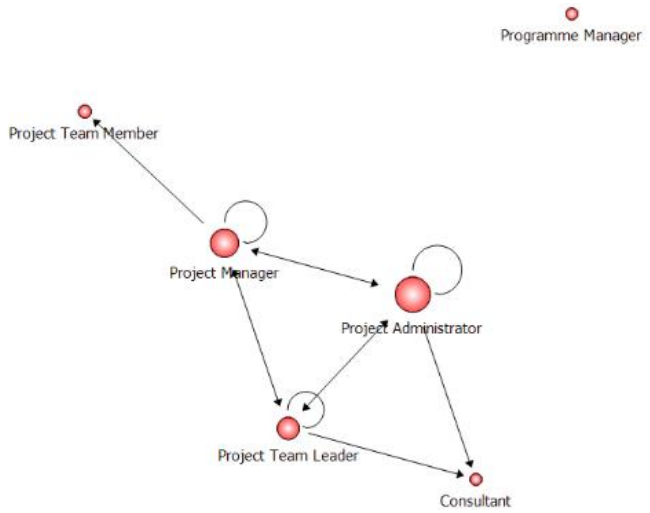

## Finances




## Research and Development




## Sales and Marketing



### 4.4.3. METRIC COMPARISON

| | Activity | Control | Reach | Access | Power |
|---|---|---|---|---|---|
| Consulting | 8.033 | 0.298 | 0.075 | 0.483 | 0.663 |
| Finances | 8.033 | 0.35 | 0 | 0.4 | 0.776 |
| Manufacturing | 23 | 0.385 | 0.025 | 0.921 | 0.908 |
| Research and Development | 5.433 | 0.325 | 0.008 | 0.2765 | 0.7335 |
| Sales and Marketing | 12.067 | 0.297 | 0.025 | 0.3275 | 0.6945 |
| | | | | | |
| **Average** | 11.31 | 0.33 | 0.03 | 0.48 | 0.76 |
| **Standard Deviation** | 6.95 | 0.04 | 0.03 | 0.26 | 0.10 |

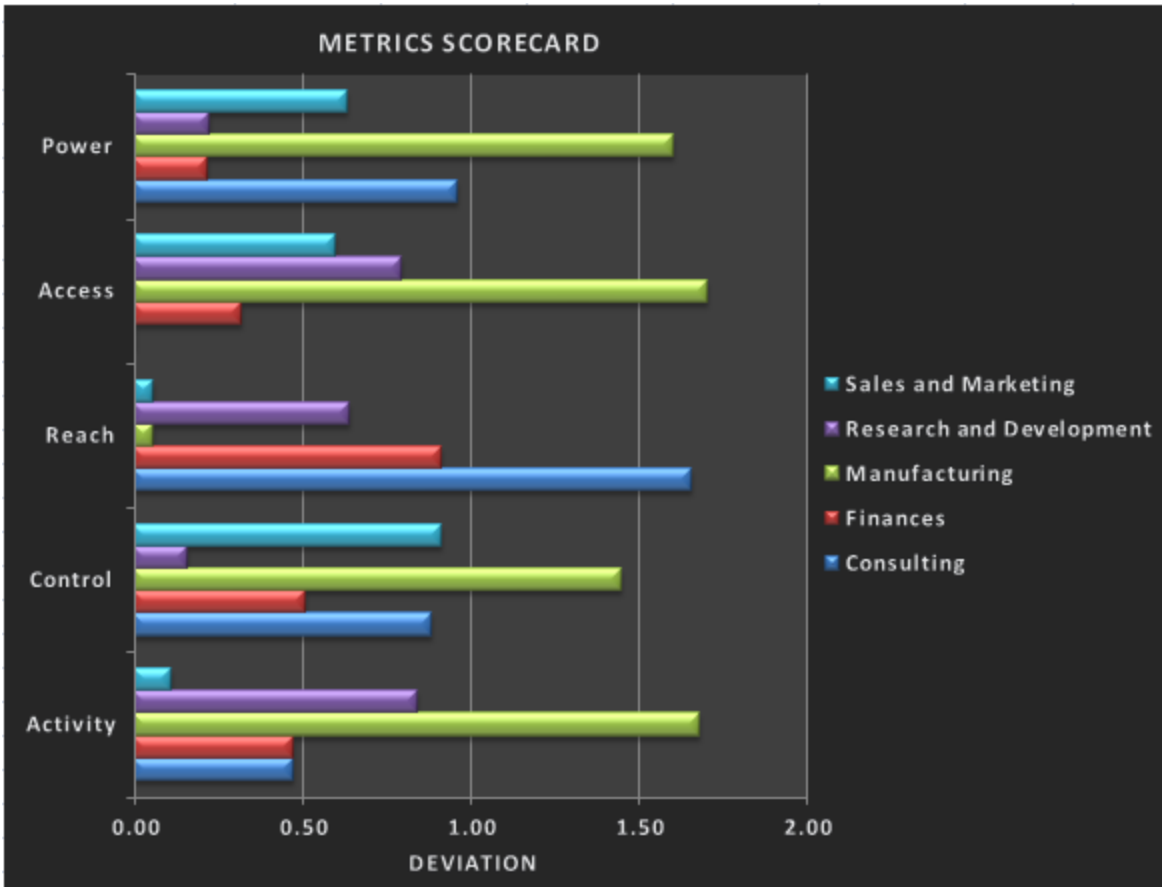
Table 8: Metric Comparison

A score card is created in the same manner as Section 4.4.1. and the results are depicted in Table 9.

| SCORECARD | Activity | Control | Reach | Access | Power |
|---|---|---|---|---|---|
| Consulting | 0.47 | 0.89 | 1.66 | 0.01 | 0.96 |
| Finances | 0.47 | 0.51 | 0.91 | 0.32 | 0.22 |
| Manufacturing | 1.68 | 1.45 | 0.05 | 1.71 | 1.60 |
| Research and Development | 0.85 | 0.16 | 0.64 | 0.80 | 0.23 |
| Sales and Marketing | 0.11 | 0.91 | 0.05 | 0.60 | 0.63 |

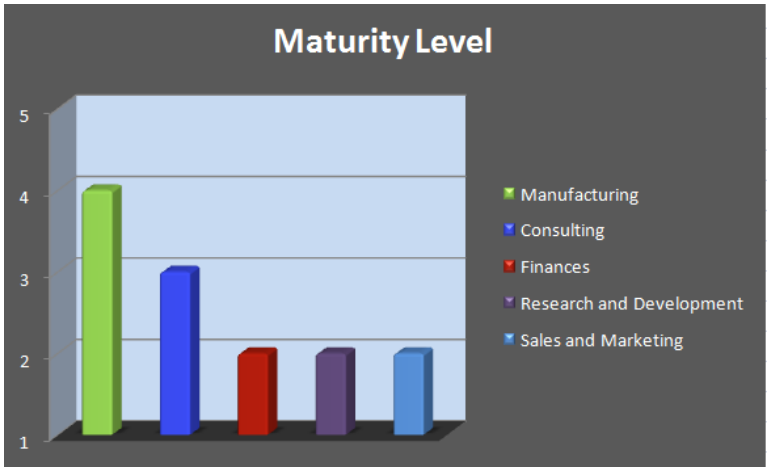
Table 9: Metric Scorecard

The Manufacturing department shows the greatest overall deviance because it is far better connected than the other departments. It is the most active in the network (Activity), has the most control over the network (Control), can get needed resources easily (Access), practices the most power to get things done (Power). The Consulting department yields the most potential influence (Reach). The Sales and Marketing department practice great control throughout the project management team. The Research and Development department is quite active and enables easy access to team members. The Finance department shows great Reach which indicates potential influence of a team member.


METRICS SCORECARD
Power
Access
Reach
Control
Activity
0.00
0.50
1.00
1.50
2.00
DEVIATION
Sales and Marketing
Research and Development
Manufacturing
Finances
Consulting

## 4.5. PROCESS MATURITY

The results of the process maturity survey are shown in Appendix C. Summarized, the results are as follows:




| Department | Maturity Level | Maturity Description |
|---|---|---|
| Manufacturing | 4 | Integrated Multi-Project Planning and Control |
| Consulting | 3 | Systematic Project Planning and Control |
| Finances | 2 | Individual Project Planning |
| Research and Development | 2 | Individual Project Planning |
| Sales and Marketing | 2 | Individual Project Planning |

Table 10: Maturity Results

All maturity levels were calculated and an average of every key knowledge area and project process was determined. Then the department's maturity level is given as an average of these average values, rounded down to the lowest integer i.e. if the average maturity level is 4.8 then the maturity level is assessed as level 4 because level 5 has not been achieved in full. The Manufacturing department has a process maturity level of 4 which is highest of all departments. This indicates that the department has the following attributes:

- Multiple project management
- Project management data and processes are integrated
- Project management processes data are quantitatively analyzed, measured, and stored
- Strong teamwork
- Formal project management training for project team
- Planning and controlling multiple projects in a professional manner

Improvement should be encouraged to reach a level 5 process maturity. The Consulting department has a process maturity level of 3 which indicates the following attributes:

- Formal project planning and control systems are managed
- Formal project management data is managed
- Team oriented - medium
- Informal training of project management skills and practices
- Systematic and structured project planning and control for individual project

Improvement should be encouraged to reach a level 4 process maturity. The Research and Development, Finance, and Sales and Marketing departments all have a process maturity level of 2 which indicates the following attributes:

- Informal project management processes are defined
- Informal project management problems are identified
- Informal project management data is collected
- Team oriented - weak
- Organizations possess strengths in doing similar work
- Individual project planning

Improvement should be encouraged to reach a level 3 process maturity.

Continual improvement is critical to competitive success and therefore project management teams should always strive to improve their processes and social collaboration. Level 5 process maturity should be the goal of all project management teams and when reached the goal should be to remain at level 5.

## 4.6. CORRELATIONS

From the values in Table 9 the departments may be ranked on a scale from 1 to 5 as shown in Table 11, where 1 represents the least central network and 5 represents the most central network in a specific metric. Ranking is used because each metric is measured by a different centrality technique. The average of all metrics' rankings is calculated for every department.

| Ranking | Activity | Control | Reach | Access | Power | Average |
|---|---|---|---|---|---|---|
| Consulting | 3 | 3 | 5 | 1 | 4 | **3.2** |
| Finances | 3 | 2 | 4 | 2 | 1 | **2.4** |
| Manufacturing | 5 | 5 | 2 | 5 | 5 | **4.4** |
| Research and Development | 4 | 1 | 3 | 4 | 2 | **2.8** |
| Sales and Marketing | 1 | 4 | 2 | 3 | 3 | **2.6** |

Table 11: Ranking

It is evident from Table 12 that there is a correlation between the centrality of a social network and the process maturity of that project management team. As the process maturity level of the department increases, the overall centrality ranking will increase.

| Department | Maturity Level | Average Centrality Ranking |
|---|---|---|
| Manufacturing | 4 | 4.4 |
| Consulting | 3 | 3.2 |
| Finances | 2 | 2.4 |
| Research and Development | 2 | 2.8 |
| Sales and Marketing | 2 | 2.6 |

Table 12: Correlation

The centrality rating of a social network is dependent on the amount of information flow between team members and also which team members are included. Therefore there is a correlation between the process maturity level of a project management team and the team member roles associated with the different interaction dimensions. The more communication there is between roles, the higher the team's process maturity is likely to become.

## 4.7. CONCLUSION

Conclusively the Manufacturing department shows the best social network because of strong relationships and frequent communication between relevant roles. The Consulting department shows a regular social network where fairly frequent communication occurs and some roles are excluded from several interaction dimensions. The Research and Development, Finances, and Sales and Marketing departments show a poor social network where many roles are disjointed from the normal structure of the network and communication is limited.

There is a definite correlation between the social network of a project management team and its level of process maturity. The Manufacturing department has a maturity level of 4, Consulting is at level 3, and the other departments have a level 2 process maturity. Continual improvement is crucial to every department and the maturity level shows how well the project management processes are managed as a benchmark to competitors.

# CHAPTER 5: CONCLUSION

The value of employees in the work environment is fundamental to the success of business. Analyzing the social structure of a business is the first step to understanding and utilizing social networks. Social network analysis is a tool used to map the social structure within a business and give management valuable insight into the dynamic of information flow, knowledge sharing and intangible exchanges between employees. Another tool is the process maturity of a team which may be measured to benchmark against other teams and understand which areas need to be improved on and which areas are sufficient. Together, social network analysis and process maturity, allows a business to know how and why its people interact and this is a powerful advantage in harnessing people to perform their utmost best and streamline information flow.

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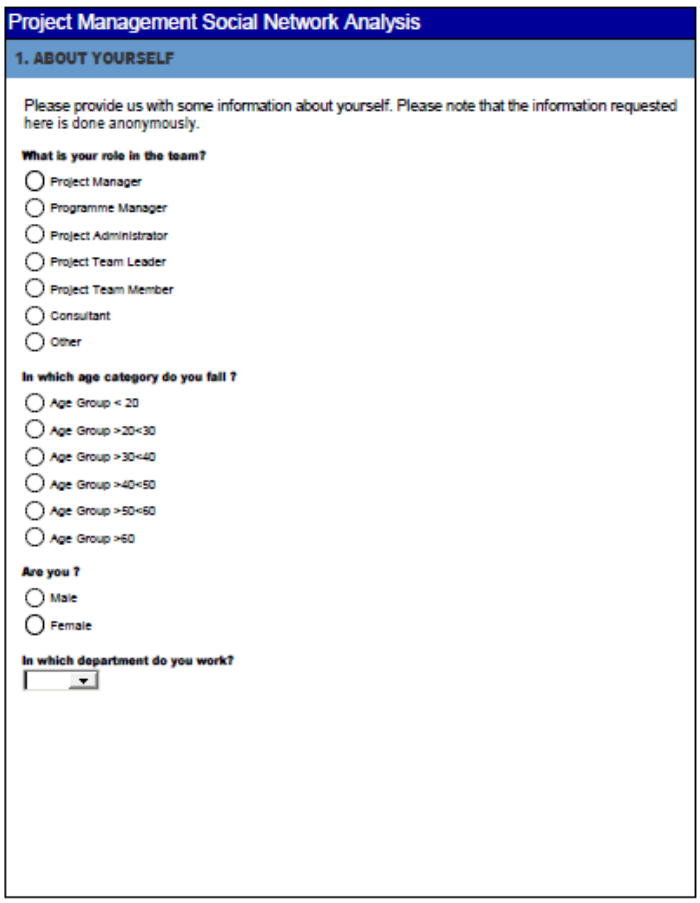
# APPENDICES

## APPENDIX A: PROJECT MANAGEMENT SOCIAL NETWORK ANALYSIS SURVEY



**Project Management Social Network Analysis**

**1. ABOUT YOURSELF**

Please provide us with some information about yourself. Please note that the information requested here is done anonymously.

**What is your role in the team?**

- ◯ Project Manager
- ◯ Programme Manager
- ◯ Project Administrator
- ◯ Project Team Leader
- ◯ Project Team Member
- ◯ Consultant
- ◯ Other

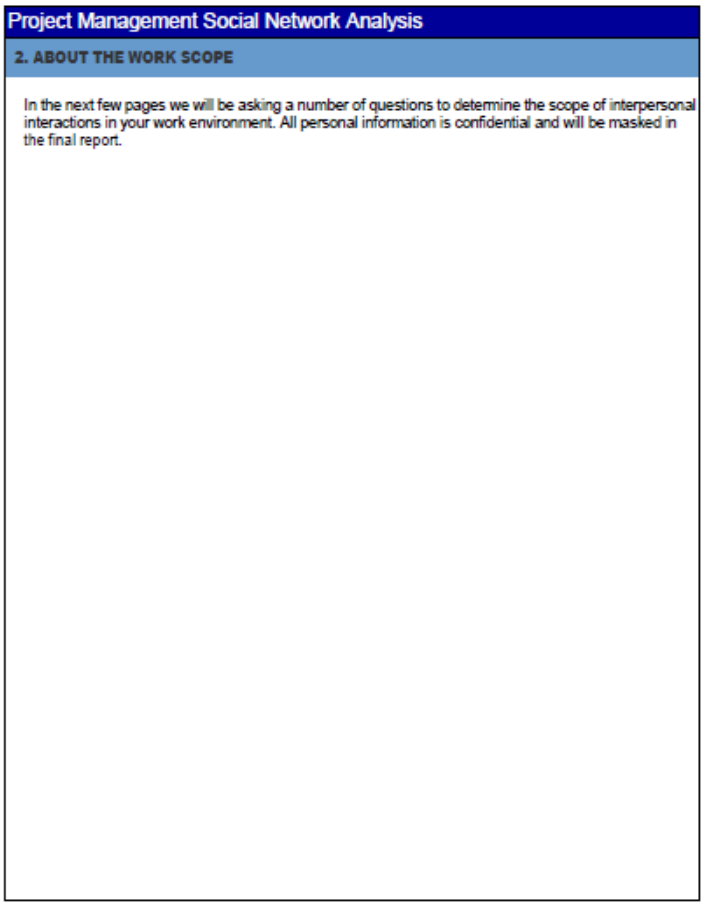
**In which age category do you fall ?**

- ◯ Age Group < 20
- ◯ Age Group >20<30
- ◯ Age Group >30<40
- ◯ Age Group >40<50
- ◯ Age Group >50<60
- ◯ Age Group >60

**Are you ?**

- ◯ Male
- ◯ Female

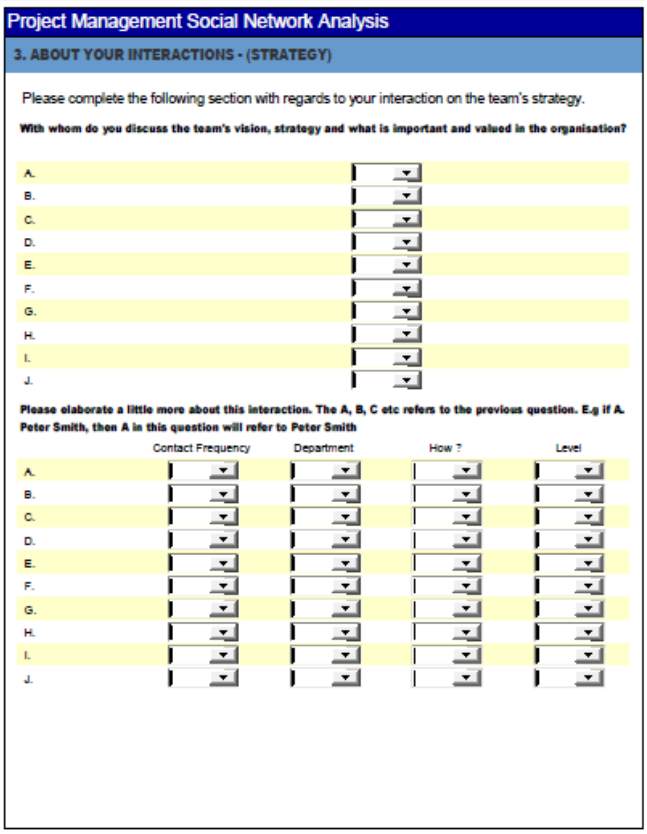
**In which department do you work?**



**Project Management Social Network Analysis**

**2. ABOUT THE WORK SCOPE**

In the next few pages we will be asking a number of questions to determine the scope of interpersonal interactions in your work environment. All personal information is confidential and will be masked in the final report.



**Project Management Social Network Analysis**

**3. ABOUT YOUR INTERACTIONS - (STRATEGY)**

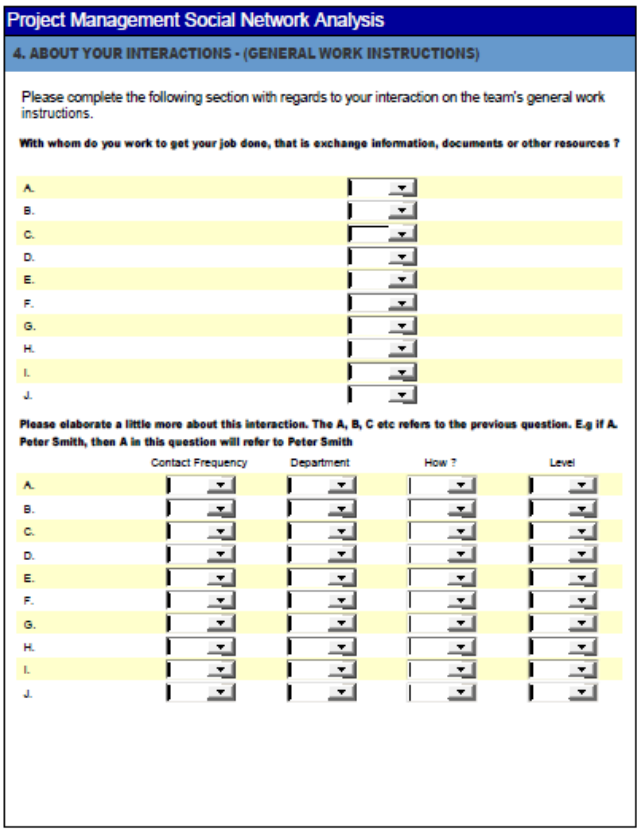
Please complete the following section with regards to your interaction on the team's strategy.

**With whom do you discuss the team's vision, strategy and what is important and valued in the organisation?**

A.
B.
C.
D.
E.
F.
G.
H.
I.
J.

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



**Project Management Social Network Analysis**

**4. ABOUT YOUR INTERACTIONS - (GENERAL WORK INSTRUCTIONS)**

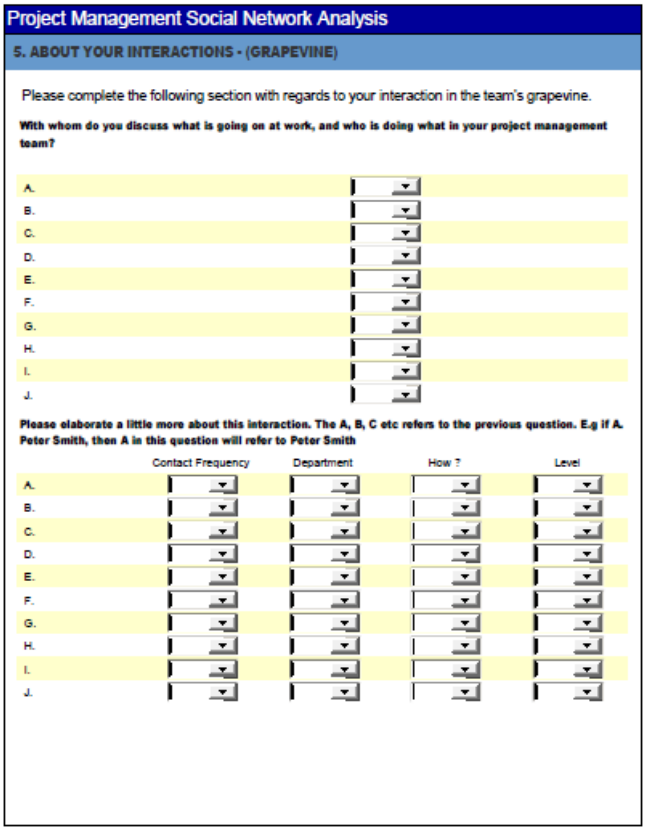
Please complete the following section with regards to your interaction on the team's general work instructions.

**With whom do you work to get your job done, that is exchange information, documents or other resources ?**

A.
B.
C.
D.
E.
F.
G.
H.
I.
J.

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



**Project Management Social Network Analysis**

**5. ABOUT YOUR INTERACTIONS - (GRAPEVINE)**

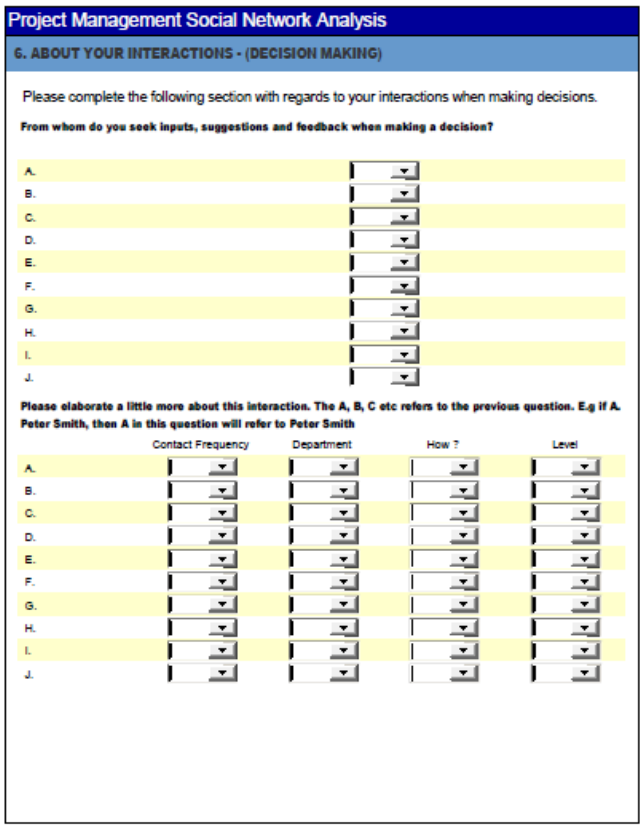
Please complete the following section with regards to your interaction in the team's grapevine.

**With whom do you discuss what is going on at work, and who is doing what in your project management team?**

A.
B.
C.
D.
E.
F.
G.
H.
I.
J.

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



**Project Management Social Network Analysis**

**6. ABOUT YOUR INTERACTIONS - (DECISION MAKING)**

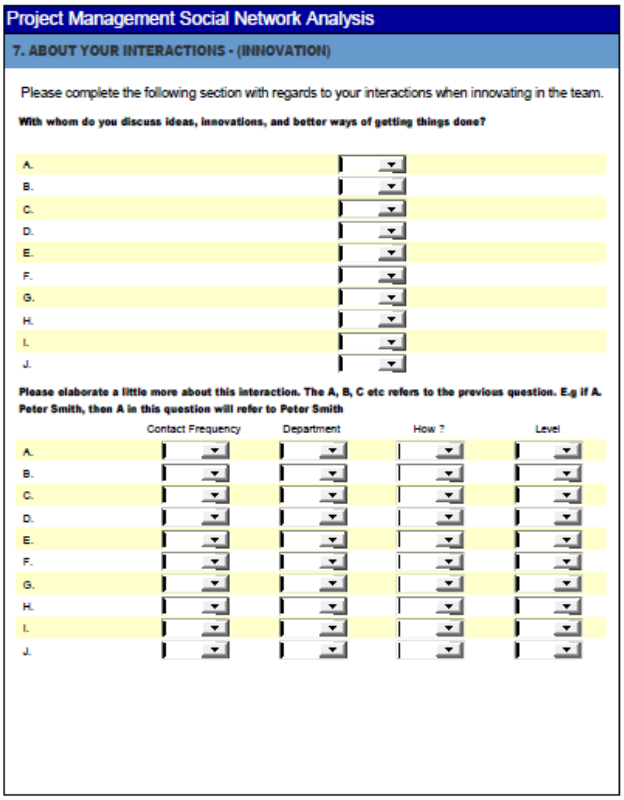
Please complete the following section with regards to your interactions when making decisions.

**From whom do you seek inputs, suggestions and feedback when making a decision?**

A.
B.
C.
D.
E.
F.
G.
H.
I.
J.

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



Project Management Social Network Analysis

7. ABOUT YOUR INTERACTIONS - (INNOVATION)

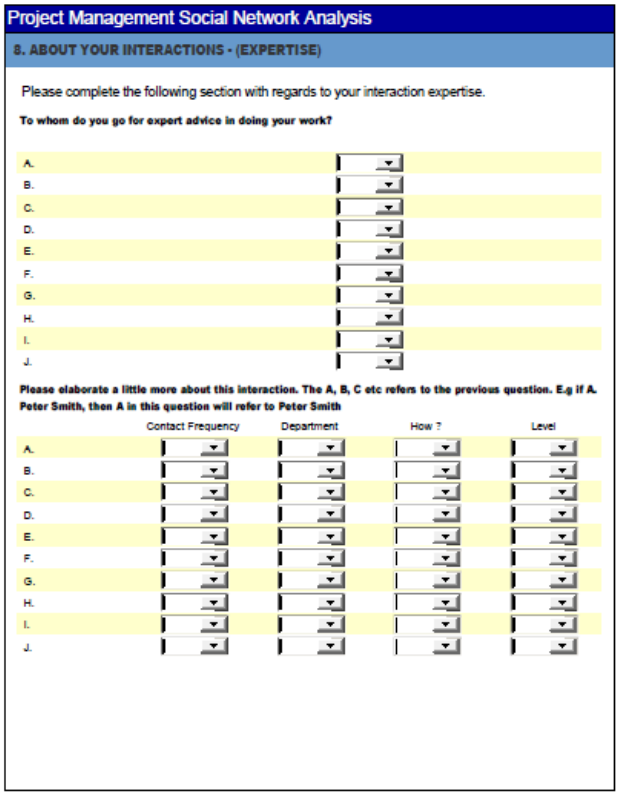
Please complete the following section with regards to your interactions when innovating in the team.

**With whom do you discuss ideas, innovations, and better ways of getting things done?**

| | |
|---|---|
| A. | |
| B. | |
| C. | |
| D. | |
| E. | |
| F. | |
| G. | |
| H. | |
| I. | |
| J. | |

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



Project Management Social Network Analysis

8. ABOUT YOUR INTERACTIONS - (EXPERTISE)

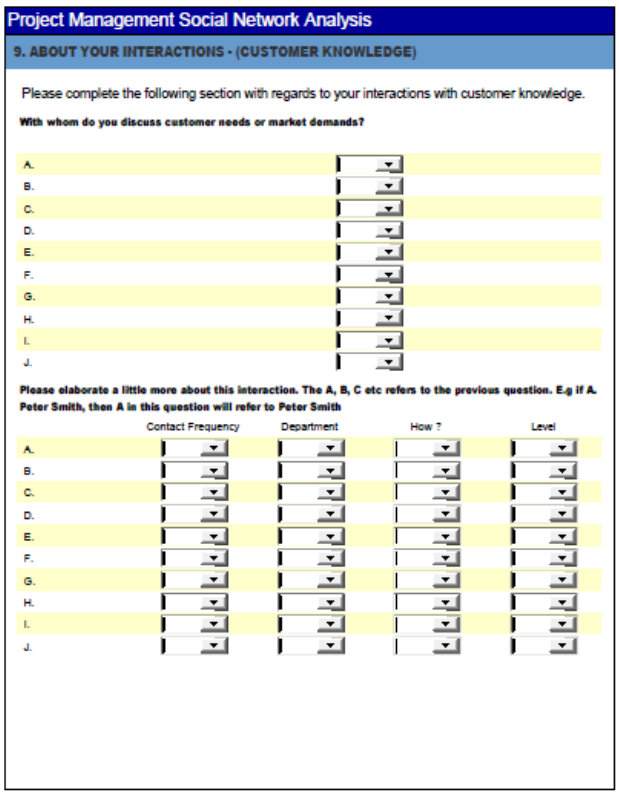
Please complete the following section with regards to your interaction expertise.

**To whom do you go for expert advice in doing your work?**

| | |
|---|---|
| A. | |
| B. | |
| C. | |
| D. | |
| E. | |
| F. | |
| G. | |
| H. | |
| I. | |
| J. | |

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |



Project Management Social Network Analysis

9. ABOUT YOUR INTERACTIONS - (CUSTOMER KNOWLEDGE)

Please complete the following section with regards to your interactions with customer knowledge.

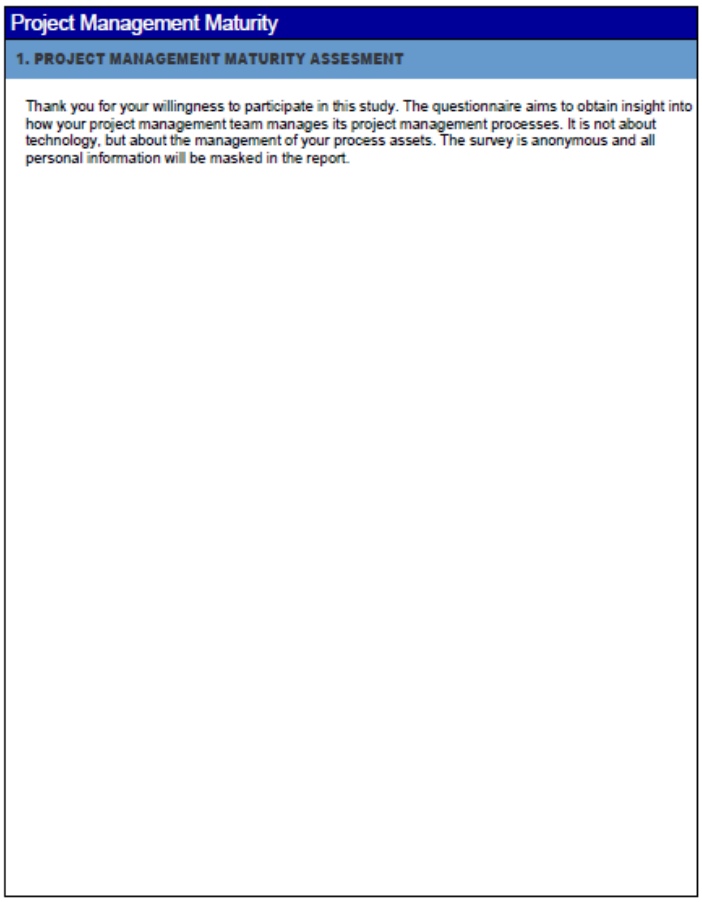
**With whom do you discuss customer needs or market demands?**

| | |
|---|---|
| A. | |
| B. | |
| C. | |
| D. | |
| E. | |
| F. | |
| G. | |
| H. | |
| I. | |
| J. | |

**Please elaborate a little more about this interaction. The A, B, C etc refers to the previous question. E.g if A. Peter Smith, then A in this question will refer to Peter Smith**

| | Contact Frequency | Department | How ? | Level |
|---|---|---|---|---|
| A. | | | | |
| B. | | | | |
| C. | | | | |
| D. | | | | |
| E. | | | | |
| F. | | | | |
| G. | | | | |
| H. | | | | |
| I. | | | | |
| J. | | | | |

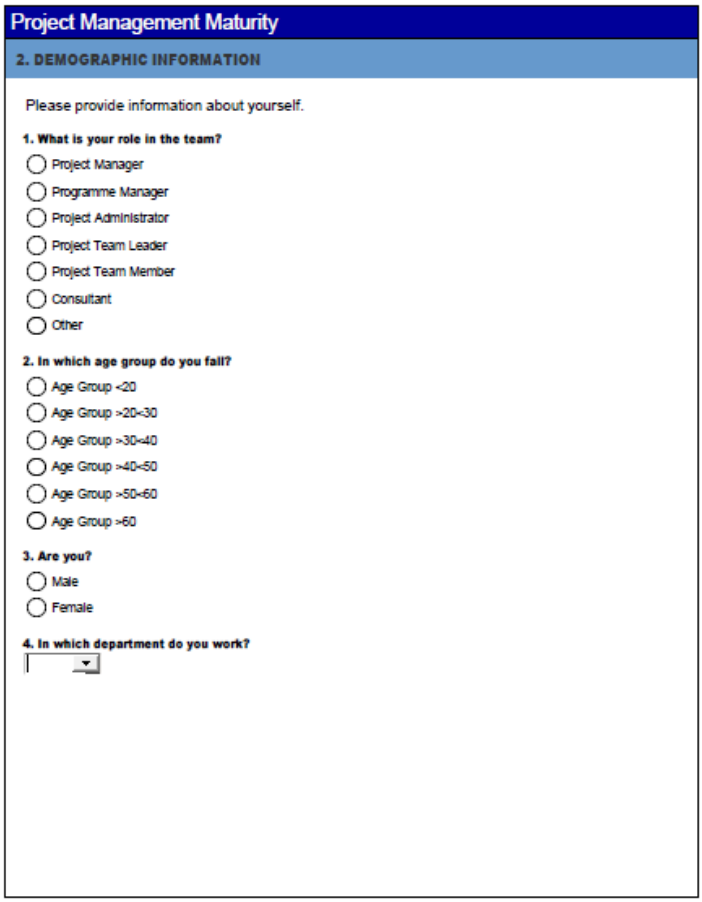
# APPENDIX B: PROJECT MANAGEMENT PROCESS MATURITY SURVEY



**Project Management Maturity**

**1. PROJECT MANAGEMENT MATURITY ASSESMENT**

Thank you for your willingness to participate in this study. The questionnaire aims to obtain insight into how your project management team manages its project management processes. It is not about technology, but about the management of your process assets. The survey is anonymous and all personal information will be masked in the report.



**Project Management Maturity**

**2. DEMOGRAPHIC INFORMATION**

Please provide information about yourself.

**1. What is your role in the team?**

- ◯ Project Manager
- ◯ Programme Manager
- ◯ Project Administrator
- ◯ Project Team Leader
- ◯ Project Team Member
- ◯ Consultant
- ◯ Other

**2. In which age group do you fall?**

- ◯ Age Group <20
- ◯ Age Group >20<30
- ◯ Age Group >30<40
- ◯ Age Group >40<50
- ◯ Age Group >50<60
- ◯ Age Group >60

**3. Are you?**

- ◯ Male
- ◯ Female

**4. In which department do you work?**

**Project Management Maturity**

**3. ENTERPRISE PROJECT MANAGEMENT MATURITY**

The maturity of your projects are measured according to the project management knowledge areas, as well as project management processes. Please first assess your project management knowledge areas, and then project processes.

**Project Management Maturity**

**4. PM KNOWLEDGE AREAS**

Project knowledge areas cover the following:
a) Project integration management
b) Project scope management
c) Project time management
d) Project cost management
e) Project quality management
f) Project human resource management
g) Project communications management
h) Project Risk Management
i) Project procurement management

## Project Management Maturity

### 5. PROJECT INTEGRATION MANAGEMENT

***5. Please select most appropriate statement.**

◯ Project plans are not prepared in a structured format and no project management information system is available.

◯ Informal project management tools and practices including basic project plan and project organizational structure are defined.

◯ Formal project management methodology is established and managed. Also, a project management information system is managed to collect, review, and distribute necessary project management data.

◯ The organization has project control processes that are integrated and coordinated across different knowledge areas and across the projects. Multiple project managers and the supervisor of project managers integrate the project management information system for multiple projects. Project control processes are also integrated to minimize the risk of scope, cost, schedule, and quality management.

◯ The entire process of integration management is planned, optimized, and sustained for continuous project management process improvement.

## Project Management Maturity

### 6. PROJECT SCOPE MANAGEMENT

***6. Please select most appropriate statement.**

◯ Project managers are assigned on an ad-hoc basis and there is no methodology to initiate and control the project.

◯ Informal work breakdown structures and scope-change-control processes are defined and available. Also, the project management team agrees to initiate the project informally.

◯ Formal project charter and project manager roles are established. Also, scope planning, definition, and verification processes are managed.

◯ The product and scope management are integrated to ensure project success. Also, scope-change-control and verification processes are documented and integrated.

◯ The entire process of scope management is planned, optimized, and sustained for continuous project management process improvement.

## Project Management Maturity

### 7. PROJECT TIME MANAGEMENT

***7. Please select most appropriate statement.**

◯ There are no standard templates for project schedules. The process of schedule development is unrealistic and out of sequence.

◯ An organization is able to develop informal schedules for planning and tracking. Also, activity lists and work breakdown structure templates are defined.

◯ A variety of scheduling tools and techniques are available for effective schedule control.

◯ Formal schedule control processes and practices are integrated

◯ Formal project time management tools are optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 8. PROJECT COST MANAGEMENT

***8. Please select most appropriate statement.**

◯ There is no cost estimating process available because the results would be poor and would most likely exceed the original budget.

◯ Informal cost estimating tools and techniques are available. Cost baseline, resource requirements, and work breakdown structures are defined.

◯ Resource planning and cost estimating are well coordinated and life-cycle costing is used and managed.

◯ Formal resource planning, cost estimating, and budgeting processes are integrated. Also, project stakeholders have wide perspectives of different project cost metrics.

◯ The organization has formal cost estimating tools and techniques that are optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 9. PROJECT QUALITY MANAGEMENT

***9. Please select most appropriate statement.**

◯ Project overruns and reworks are common and expected. There are no quality audits, quality assurances, or quality control processes. Only on-site inspection is conducted for quality checkup.

◯ The organization has an informal quality management system. Noncompliance issues are addressed through inspection and audits only if it is mandatory by project contract.

◯ Formal quality policies and standards are established. Quality planning and assurance activities are managed and conducted to find quality problems.

◯ The objectives to achieve high quality project management processes and project quality are integrated. Also, project progresses toward accomplishing project quality are quantified, implemented, and integrated.

◯ The quality management system is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 10. PROJECT HUMAN RESOURCE MANAGEMENT

***10. Please select most appropriate statement.**

◯ The organization struggles with the concept of project driven organization resulting in conflicts between functional project managers.

◯ An informal organizational chart and staffing management plan is defined.

◯ Customers and suppliers are often included as members of the project to receive team building activities and training together.

◯ Improvements in both individual skills and team capabilities are integrated to perform effectively. The organization is rewarded and recognized by project-oriented teams.

◯ The human resource management system is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 11. PROJECT COMMUNICATIONS MANAGEMENT

***11. Please select most appropriate statement.**

◯ The organization has no formal project performance reporting systems. The project performance review is often limited to basic status reporting. A project review is only held if requested by a contract.

◯ An information retrieval and distribution system is defined and informal performance reports and reviews are conducted.

◯ Project data is maintained in a structured format and project performance data is regularly analyzed, reviewed, and revised for project assessment.

◯ Information on scope, schedule, cost, risk, quality, human resource, and procurement are integrated in project performance reporting. Also, communication management processes and techniques are integrated with an organizational structure.

◯ The organization has a systematic communications management system that is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 12. PROJECT RISK MANAGEMENT

***12. Please select most appropriate statement.**

◯ The organization does not have processes for project risk identification. Risks are identified after the event rather than before. No formal risk management plan is available.

◯ Project risks are informally identified and analyzed.

◯ The organization has formal risk management tools and techniques. Risk management becomes a continuous task throughout the project lifecycle.

◯ The organization uses lessons-learned-information for risk identification, response, and control. Potential risk sources are prepared and reviewed for use of other project management knowledge areas. Also, risk identification, quantification, and response plans are integrated across multiple projects to minimize the risk.

◯ The risk management system is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 13. PROJECT PROCUREMENT MANAGEMENT

***13. Please select the most appropriate statement.**

◯ Procurement or solicitation plans are not prepared in conjunction with a market condition analysis.

◯ Informal communications are available for various vendors and suppliers, and informal project procurement management process is defined.

◯ Formal procurement management tools and techniques are managed and procurement data are analyzed and documented. Project managers work in partnership with multiple suppliers.

◯ Procurement audits are integrated with the entire procurement process so that buyer and supplier relationships exist at multiple levels as well as each phase of the project. Also, long-term relationships are established between owners and suppliers for delivering consistent project quality.

◯ A procurement management system is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 14. PROJECT MANAGEMENT PROCESSES

Project processes cover the following:
a) "Initiating" process
b) "Planning" process
c) "Executing" process
d) "Controlling" process
e) "Closing" Process

## Project Management Maturity

### 15. INITIATING PROCESS

***14. Please select the most appropriate statement.**

◯ There are no initiating plans or processes available to develop a project proposal. As a result, proposal commitment and approval are not received from the participating organization.

◯ Informal project proposal plans are defined and evaluated for approval from the participating organization

◯ Project proposals are formally reviewed and evaluated for approval.

◯ The project proposal development processes are integrated to manage multiple projects.

◯ The initiating process is optimized and sustained for continuous project management process improvement in the organization.

## Project Management Maturity

### 16. PLANNING PROCESS

***15. Please select the most appropriate statement.**

◯ No formal planning session is conducted. Scope, schedule, cost, quality, human resource, communications, risk, and procurement plan is oftentimes not available.

◯ An informal schedule is developed and the cost estimating process is defined. The organization is informally trained to develop and plan key project management practice areas.

◯ Planning is managed by using formal project management tools and techniques. Project teams are actively engaged to provide reviews and input to the planning process.

◯ Key project management knowledge areas are integrated into the planning process

◯ The planning process is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 17. EXECUTING PROCESS

***16. Please select the most appropriate statement.**

◯ A project plan execution process is unavailable. Project scope is not verified and the project team is not developed and organized

◯ The organization has a process where informal project execution plans are defined. Also, the contract administration and information distribution processes are informally defined.

◯ A quality assurance process manages project execution. Project teams are actively engaged to provide reviews and input to the execution process.

◯ The project plan, scope verification, team development, quality assurance information distribution, and contract administration processes are integrated into the execution process.

◯ The executing process is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 18. CONTROLLING PROCESS

**17. Please select the most appropriate statement.**

◯ The project controlling process is not defined or established. A change-control system is not available, and as a result, project progress status is not collected or updated.

◯ An informal project-change-controlling process is defined. Variances are informally identified to determine the cause and the impact of the overall project performance.

◯ Project plans and adaptive actions control the project performance data. Project teams participate actively to provide actions and corrections to the controlling process.

◯ Project performance data collection, variance analysis, and status updates are integrated. Project status communication of each key project management knowledge area is integrated.

◯ The controlling process is optimized and sustained for continuous project management process improvement.

## Project Management Maturity

### 19. CLOSING PROCESS

***18. Please select the most appropriate statement.**

◯ The organization has no formal closing processes that close all deliverables and contracts. Project file records are not consolidated, classified, or stored.

◯ An informal closing process is defined. Key technical learning and quality of overall project management process is informally reviewed.

◯ All closing activities are completed and the project files are stored and managed. Project team members actively participate to suggest and document best project management practices.

◯ Contract close out, administrative closure, and documentation of project files are integrated.

◯ The organization has a closing process that is optimized and sustained for continuous project management process improvement.

# APPENDIX C: DATA

## MANUFACTURING DEPARTMENT

### MAIN NODE SET

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Consultant | Age Group >60 | Male | Manufacturing |
| Project Administrator | Age Group >30<40 | Female | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Member | Age Group >50<60 | Male | Manufacturing |
| Project Team Member | Age Group >20<30 | Female | Manufacturing |
| Project Team Leader | Age Group >40<50 | Male | Manufacturing |
| Project Team Member | Age Group >20<30 | Male | Manufacturing |
| Project Team Member | Age Group >50<60 | Female | Manufacturing |
| Project Team Member | Age Group >50<60 | Male | Manufacturing |
| Consultant | Age Group >60 | Male | Manufacturing |
| Project Team Member | Age Group >30<40 | Male | Manufacturing |
| Project Team Member | Age Group >30<40 | Female | Manufacturing |
| Project Manager | Age Group >50<60 | Male | Manufacturing |
| Consultant | Age Group >50<60 | Male | Manufacturing |
| Programme Manager | Age Group >60 | Male | Manufacturing |

### 1 MODE NODE SETS

| Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | | | | 5 | |
| Project Team Member | | 7 | 3 | 2 | 31 | 7 |
| Project Team Leader | | | 8 | | 5 | |
| Programme Manager | | | 10 | 4 | 9 | |
| Project Manager | | | 2 | 6 | | 5 |
| Consultant | | | | | 5 | |

| General Work Instructions | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 5 | 12 | | 9 | 5 |
| Project Team Member | 23 | 24 | 21 | 10 | 13 | 4 |
| Project Team Leader | 17 | | 7 | | 6 | 3 |
| Programme Manager | 9 | 3 | 3 | 3 | 5 | 4 |
| Project Manager | 10 | 25 | 15 | 10 | 15 | 5 |
| Consultant | 9 | 5 | | | | |

| Grapevine | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 3 | 3 | | | | |
| Project Team Member | 16 | 34 | 6 | 3 | 9 | |
| Project Team Leader | 16 | 4 | 5 | | 2 | |
| Programme Manager | 3 | | | 3 | 4 | 3 |
| Project Manager | | | 11 | 6 | | 3 |
| Consultant | | | | | 5 | |

| Decision Making | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 5 | | | | 5 |
| Project Team Member | 1 | | 7 | 9 | 12 | 4 |
| Project Team Leader | 6 | | 7 | | 3 | 9 |
| Programme Manager | | | | 3 | 4 | 2 |
| Project Manager | | | | 6 | | 5 |
| Consultant | | | | 3 | 5 | |

| Innovation | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 5 | | | | 5 |
| Project Team Member | 8 | 7 | | 3 | 6 | 3 |
| Project Team Leader | 2 | | 4 | | 2 | |
| Programme Manager | 2 | | 9 | 2 | 4 | 3 |
| Project Manager | | | | 6 | | 5 |
| Consultant | | | | | | |

| Expertise | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 4 | | | | 5 |
| Project Team Member | | 2 | 8 | 8 | 16 | 4 |
| Project Team Leader | 2 | | 5 | | | 6 |
| Programme Manager | | | | 2 | 3 | |
| Project Manager | | | | | | 5 |
| Consultant | | | | | | |

| Customer Knowledge | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 4 | 4 | | | | |
| Project Team Member | 3 | 12 | 3 | 2 | 8 | 3 |
| Project Team Leader | 5 | | 4 | | 6 | 3 |
| Programme Manager | 3 | | 11 | 2 | 4 | 4 |
| Project Manager | | | | 6 | | |
| Consultant | | | | | | |

# CONSULTING DEPARTMENT

## MAIN NODE SET

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Project Team Leader | Age Group >20<30 | Female | Consulting |
| Project Team Member | Age Group >30<40 | Male | Consulting |
| Project Team Member | Age Group >20<30 | Male | Consulting |
| Project Administrator | Age Group >20<30 | Female | Consulting |
| Project Team Member | Age Group >40<50 | Female | Consulting |
| Project Team Member | Age Group >40<50 | Female | Consulting |
| Consultant | Age Group >40<50 | Female | Consulting |
| Project Manager | Age Group >50<60 | Female | Consulting |
| Programme Manager | Age Group >50<60 | Male | Consulting |

## 1 MODE NODE SETS

| General Work Instructions | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 8 | | | |
| Project Team Leader | 21 | 14 | 30 | | 8 | |
| Programme Manager | | | 3 | 4 | 4 | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 4 | | 3 | |
| Project Team Leader | | 6 | 27 | 7 | 9 | |
| Programme Manager | | | 5 | 11 | 4 | |
| Project Manager | | | 20 | 5 | 5 | |
| Consultant | | | | | | |

| Grapevine | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 4 | | | |
| Project Team Leader | 5 | 4 | 30 | 5 | 1 | |
| Programme Manager | | | | 9 | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Decision Making | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 3 | | 3 | |
| Project Team Leader | 5 | 5 | 18 | | 12 | 4 |
| Programme Manager | | | | 4 | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Innovation | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 7 | | 2 | |
| Project Team Leader | | 4 | 10 | | 10 | |
| Programme Manager | | | | | 3 | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Expertise | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | | | | |
| Project Team Leader | | | 18 | 6 | 10 | 3 |
| Programme Manager | | | | 8 | 4 | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Customer Knowledge | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | | | | |
| Project Team Leader | | 9 | | | 7 | |
| Programme Manager | | | 4 | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

# FINANCE DEPARTMENT

## MAIN NODE SET

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Consultant | Age Group >30<40 | Female | Finances |
| Project Administrator | Age Group >50<60 | Female | Finances |
| Project Team Member | Age Group >50<60 | Female | Finances |
| Project Team Member | Age Group >50<60 | Male | Finances |
| Project Manager | Age Group >50<60 | Female | Finances |
| Project Team Member | Age Group >30<40 | Male | Finances |
| Programme Manager | Age Group >60 | Male | Finances |
| Project Team Leader | Age Group >30<40 | Male | Finances |
| Project Team Member | Age Group >20<30 | Female | Finances |

## 1 MODE NODE SETS

| Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | 4 | 10 | | |
| Project Team Member | 4 | 3 | 13 | 2 | 2 | |
| Project Team Leader | 4 | | 13 | 3 | 8 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| General Work Instructions | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 6 | 11 | 7 | 5 | 7 | |
| Project Team Member | 13 | 8 | | | 3 | |
| Project Team Leader | 7 | 4 | 6 | 3 | 6 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Grapevine | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 4 | | 4 | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | 4 | 9 | 12 | 3 | 4 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Decision Making | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 4 | | 4 | | 5 | |
| Project Team Member | | 6 | 5 | | | |
| Project Team Leader | 3 | 4 | 4 | 6 | 6 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Innovation | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 4 | | 4 | | 4 | |
| Project Team Member | | 3 | 3 | 2 | | |
| Project Team Leader | 2 | 7 | 8 | 3 | 4 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Expertise | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | | |
| Project Team Member | | | 2 | | | |
| Project Team Leader | | | 4 | 5 | 5 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Customer Knowledge | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | 3 | | 3 | |
| Project Team Member | 1 | | 2 | 2 | | |
| Project Team Leader | 3 | 4 | | 2 | 3 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

# RESEARCH AND DEVELOPMENT DEPARTMENT

## MAIN NODE SET

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Project Manager | Age Group >40<50 | Male | Research and Development |
| Consultant | Age Group >30<40 | Male | Research and Development |
| Programme Manager | Age Group >40<50 | Male | Research and Development |
| Project Team Member | Age Group >30<40 | Male | Research and Development |
| Project Team Leader | Age Group >40<50 | Male | Research and Development |
| Project Team Member | Age Group >50<60 | Female | Research and Development |
| Project Team Member | Age Group >20<30 | Male | Research and Development |
| Project Administrator | Age Group >30<40 | Female | Research and Development |

## 1 MODE NODE SETS

| Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | | | | 5 | |
| Project Team Member | | 9 | | | 7 | |
| Project Team Leader | | 4 | 13 | | 6 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| General Work Instructions | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 4 | 18 | | 17 | |
| Project Team Member | | 8 | 6 | | | |
| Project Team Leader | | 7 | 13 | | 12 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Grapevine | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | 5 | |
| Project Team Member | | 7 | | | 1 | |
| Project Team Leader | 8 | 3 | 4 | | 4 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Decision Making | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | | | | 5 | |
| Project Team Member | | 9 | | | 1 | |
| Project Team Leader | | | 7 | | 12 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Innovation | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | | | | 5 | |
| Project Team Member | | 16 | 3 | | | |
| Project Team Leader | | | 12 | | | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Expertise | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | 5 | |
| Project Team Member | | | | | 1 | |
| Project Team Leader | | | 3 | | 3 | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

| Customer Knowledge | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 5 | 5 | 5 | | 10 | |
| Project Team Member | | 2 | | | 1 | |
| Project Team Leader | | | 3 | | | |
| Programme Manager | | | | | | |
| Project Manager | | | | | | |
| Consultant | | | | | | |

## SALES AND MARKETING DEPARTMENT

### MAIN NODE SET

| Team Role | Age | Gender | Department |
|---|---|---|---|
| Project Administrator | Age Group >40<50 | Female | Sales and Marketing |
| Project Administrator | Age Group >30<40 | Female | Sales and Marketing |
| Consultant | Age Group >40<50 | Female | Sales and Marketing |
| Project Team Leader | Age Group >30<40 | Male | Sales and Marketing |
| Project Team Member | Age Group >40<50 | Male | Sales and Marketing |
| Project Team Member | Age Group >40<50 | Female | Sales and Marketing |
| Project Team Member | Age Group >50<60 | Male | Sales and Marketing |
| Consultant | Age Group >60 | Male | Sales and Marketing |
| Project Manager | Age Group >50<60 | Male | Sales and Marketing |
| Programme Manager | Age Group >50<60 | Male | Sales and Marketing |
| Project Team Member | Age Group >50<60 | Male | Sales and Marketing |
| Project Team Member | Age Group >20<30 | Female | Sales and Marketing |
| Project Team Member | Age Group >30<40 | Male | Sales and Marketing |

## 1 MODE NODE SETS

| Strategy | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 27 | | 15 | | 10 | 3 |
| Project Team Member | | | | | | |
| Project Team Leader | | | 14 | | 17 | |
| Programme Manager | | | | | | |
| Project Manager | | 7 | 3 | | 26 | |
| Consultant | | | | | | |

| General Work Instructions | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 37 | | 2 | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | 28 | | 24 | | 14 | |
| Programme Manager | | | | | | |
| Project Manager | 39 | 4 | | | 5 | |
| Consultant | | | | | | |

| Grapevine | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 42 | | 8 | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | 22 | | 19 | | 30 | |
| Programme Manager | | | | | | |
| Project Manager | 6 | 4 | | | 2 | |
| Consultant | | | | | | |

| Decision Making | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 35 | | 4 | | 8 | |
| Project Team Member | | | | | | |
| Project Team Leader | | | 23 | | 24 | 4 |
| Programme Manager | | | | | | |
| Project Manager | 5 | 4 | | | 7 | |
| Consultant | | | | | | |

| Innovation | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 29 | | | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | 11 | | 14 | | 17 | |
| Programme Manager | | | | | | |
| Project Manager | 4 | 3 | | | 7 | |
| Consultant | | | | | | |

| Expertise | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | 16 | | | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | | | 10 | | 19 | 2 |
| Programme Manager | | | | | | |
| Project Manager | | | | | 6 | |
| Consultant | | | | | | |

| Customer Knowledge | Project Administrator | Project Team Member | Project Team Leader | Programme Manager | Project Manager | Consultant |
|---|---|---|---|---|---|---|
| Project Administrator | | | | | 4 | |
| Project Team Member | | | | | | |
| Project Team Leader | 4 | | 19 | | 11 | |
| Programme Manager | | | | | | |
| Project Manager | 6 | 4 | | | 1 | |
| Consultant | | | | | | |

## MATURITY

| Manufacturing | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge Areas | | | | | | | | | Processes | | | | |
| | Integration | Scope | Time | Cost | Quality | HR | Communications | Risk | Procurement | Initiate | Plan | Execute | Control | Close |
| Project Team Member | 5 | 4 | 5 | 5 | 4 | 5 | 3 | 4 | 5 | 5 | 4 | 5 | 4 | 5 |
| Consultant | 5 | 5 | 4 | 5 | 3 | 4 | 5 | 3 | 4 | 3 | 4 | 5 | 3 | 5 |
| Project Administrator | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 4 |
| Project Team Member | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 |
| Project Team Member | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| Project Team Member | 5 | 3 | 5 | 3 | 5 | 3 | 5 | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| Project Team Member | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 |
| Project Team Member | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 |
| Project Team Member | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Project Team Member | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 |
| Project Team Member | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 |
| Consultant | 5 | 3 | 3 | 5 | 5 | 3 | 5 | 3 | 5 | 5 | 3 | 3 | 5 | 5 |
| Project Team Member | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Project Team Member | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 |
| Project Manager | 5 | 4 | 3 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 5 |
| Consultant | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 |
| Programme Manager | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 5 |
| | | | | | | | | | | | | | | |
| Average | 4.58823529 | 4.411765 | 4.529412 | 4.647059 | 4.529412 | 4.588235 | 4.411764706 | 4.647059 | 4.529411765 | 4.588235 | 4.411765 | 4.705882 | 4.588235 | 4.764706 |
| **Maturity Level** | | | | | | | | | | | | | | |
| **4** | | | | | | | | | | | | | | |

| Sales and Marketing | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge Areas | | | | | | | | | Processes | | | | |
| | Integration | Scope | Time | Cost | Quality | HR | Communications | Risk | Procurement | Initiate | Plan | Execute | Control | Close |
| Project Administrator | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 |
| Project Administrator | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Consultant | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| Project Team Leader | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 |
| Project Team Member | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| Project Team Member | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Project Team Member | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 |
| Consultant | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Project Manager | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 |
| Programme Manager | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Project Team Member | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| Project Team Member | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| Project Team Member | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| Average | 2.61538462 | 2.153846 | 2.307692 | 2.384615 | 2.307692 | 2.307692 | 2.307692308 | 2.230769 | 2.307692308 | 2.461538 | 2.307692 | 2.076923 | 2.384615 | 2.307692 |
| **Maturity Level** | | | | | | | | | | | | | | |
| **2** | | | | | | | | | | | | | | |

| Research and Development | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge Areas | | | | | | | | | Processes | | | | |
| | Integration | Scope | Time | Cost | Quality | HR | Communications | Risk | Procurement | Initiate | Plan | Execute | Control | Close |
| Project Manager | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |
| Consultant | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 |
| Programme Manager | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Project Team Member | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Project Team Leader | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 |
| Project Team Member | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Project Team Member | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 |
| Project Administrator | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 |
| Average | 3 | 2.5 | 2.625 | 2.5 | 2.875 | 2.625 | 2.375 | 2.75 | 2.5 | 2.625 | 2.625 | 2.75 | 2.625 | 2.5 |
| **Maturity Level** | | | | | | | | | | | | | | |
| **2** | | | | | | | | | | | | | | |

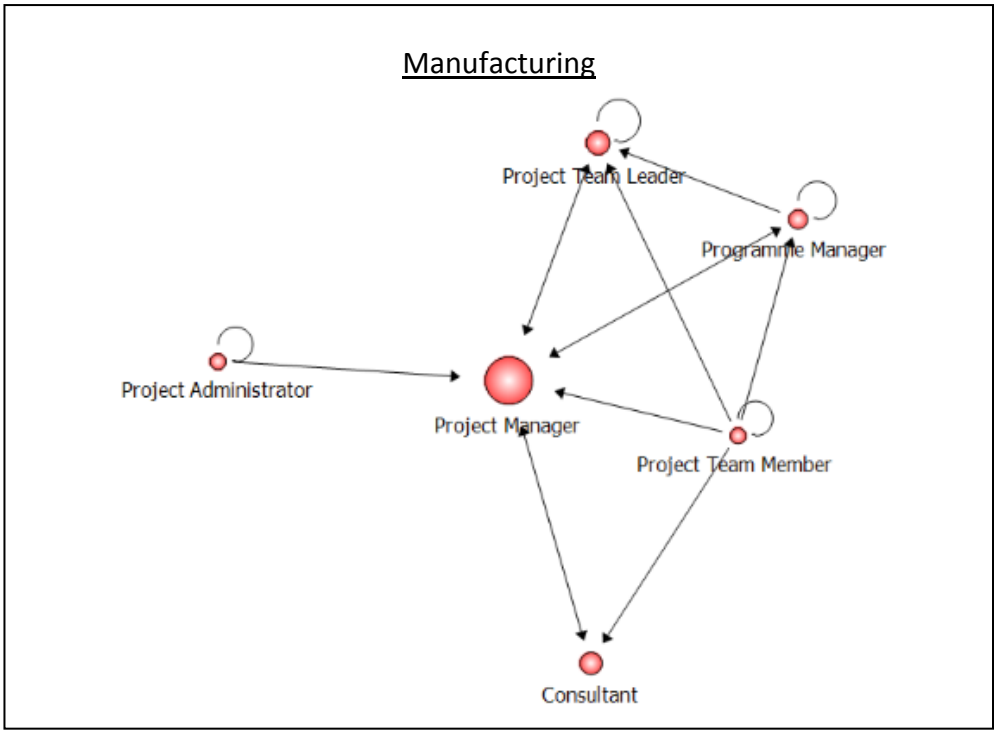
| Finances | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge Areas | | | | | | | | | Processes | | | | |
| | Integration | Scope | Time | Cost | Quality | HR | Communications | Risk | Procurement | Initiate | Plan | Execute | Control | Close |
| Consultant | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 |
| Project Administrator | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 |
| Project Team Member | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| Project Team Member | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 |
| Project Manager | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 |
| Project Team Member | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 |
| Programme Manager | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 |
| Project Team Leader | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 |
| Project Team Member | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 |
| **Average** | 2.66666667 | 2.555556 | 2.111111 | 2.444444 | 2.333333 | 2.555556 | 2.333333333 | 2.333333 | 2.444444444 | 2.444444 | 2.444444 | 2.555556 | 2.222222 | 2.555556 |
| **Maturity Level** | | | | | | | | | | | | | | |
| **2** | | | | | | | | | | | | | | |

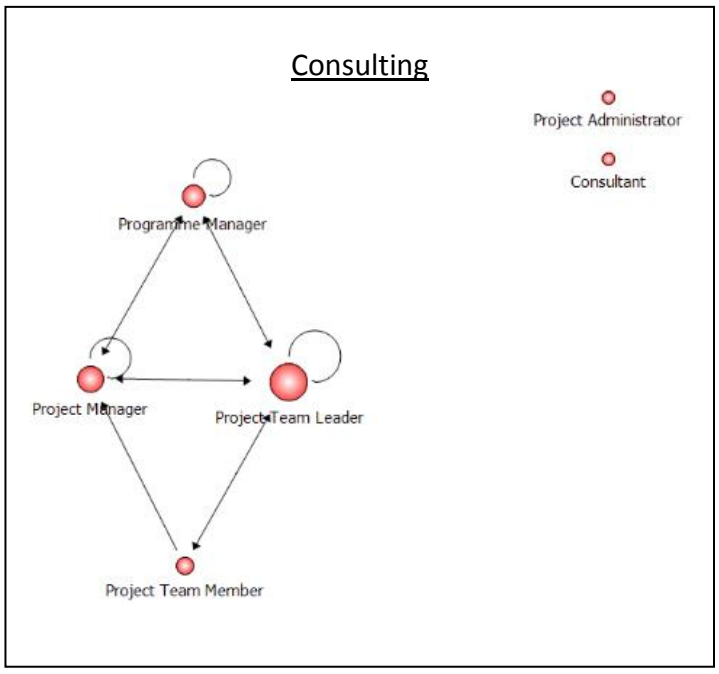
| Consulting | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge Areas | | | | | | | | | Processes | | | | |
| | Integration | Scope | Time | Cost | Quality | HR | Communications | Risk | Procurement | Initiate | Plan | Execute | Control | Close |
| Project Team Leader | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| Project Team Member | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 |
| Project Team Member | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Project Administrator | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 |
| Project Team Member | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 |
| Project Team Member | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| Consultant | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 |
| Project Manager | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| Programme Manager | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| **Average** | 3.44444444 | 3.555556 | 3.555556 | 3.777778 | 3.555556 | 3.888889 | 3.333333333 | 4 | 3.666666667 | 3.666667 | 3.888889 | 3.777778 | 3.555556 | 3.666667 |
| **Maturity Level** | | | | | | | | | | | | | | |
| **3** | | | | | | | | | | | | | | |

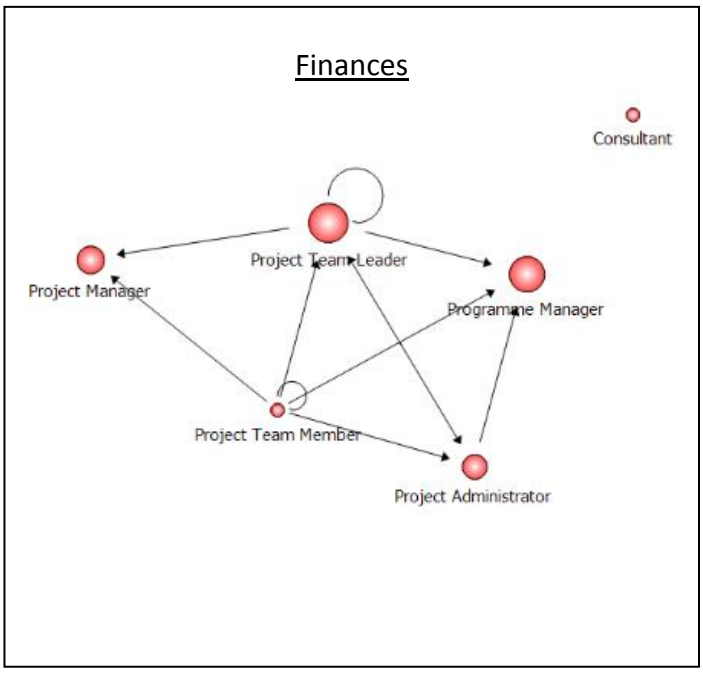
# APPENDIX D: SOCIAL NETWORKS

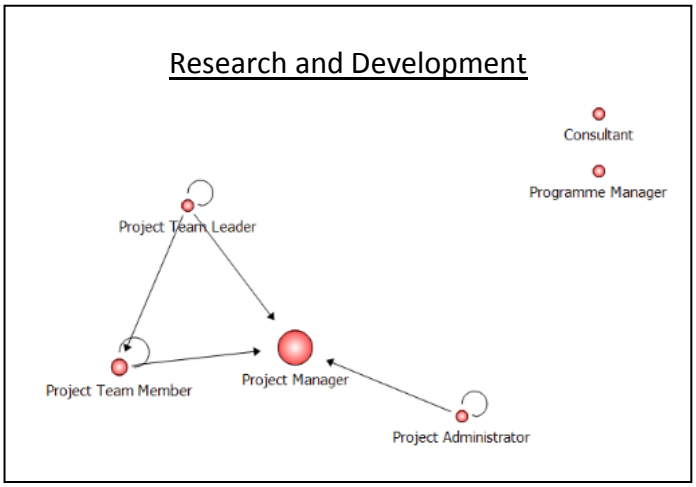
## INTERACTION DIMENSIONS

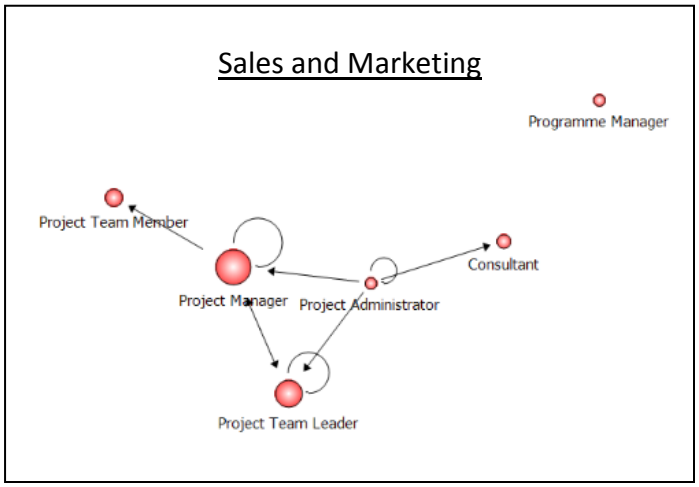
### STRATEGY



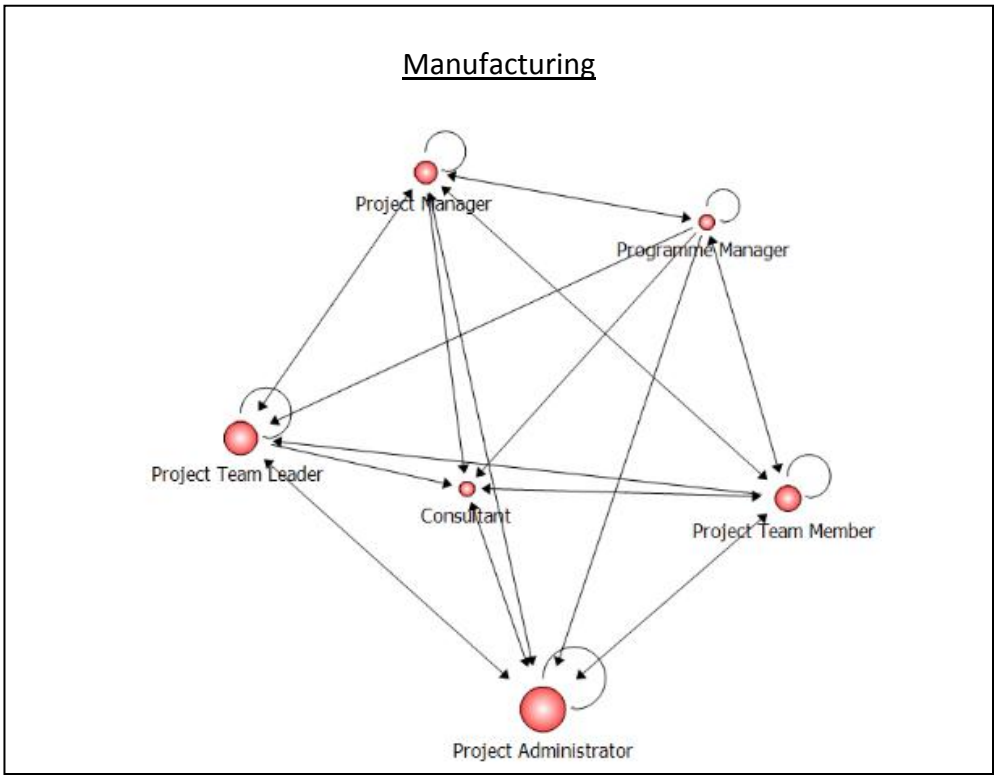



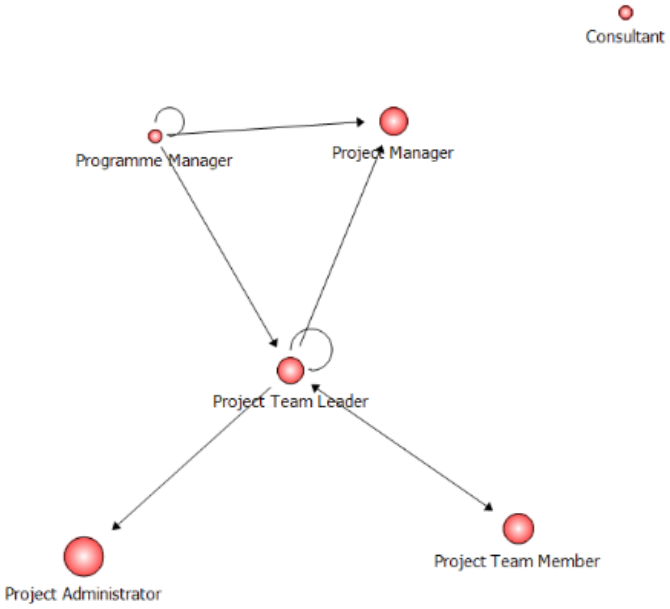


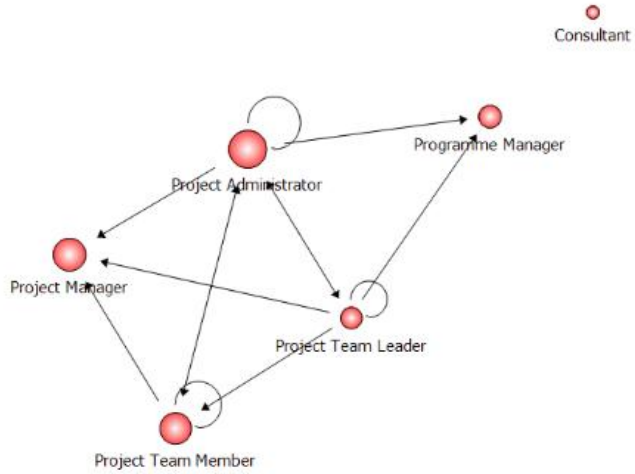

## GENERAL WORK INSTRUCTIONS



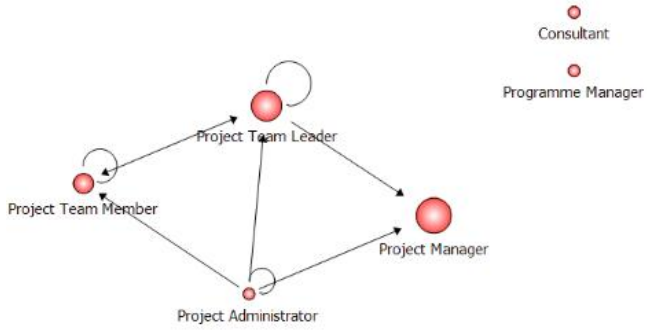
## Consulting



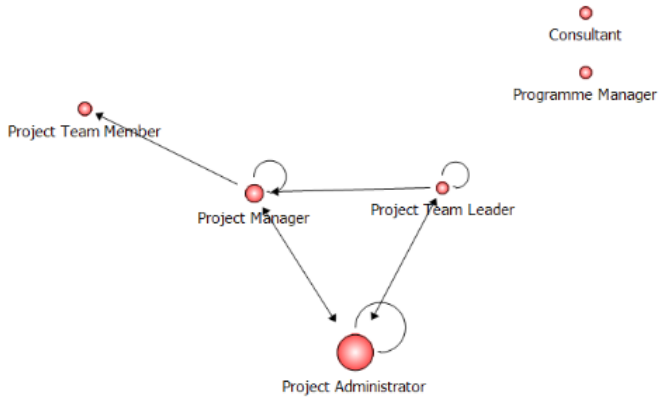

## Finances



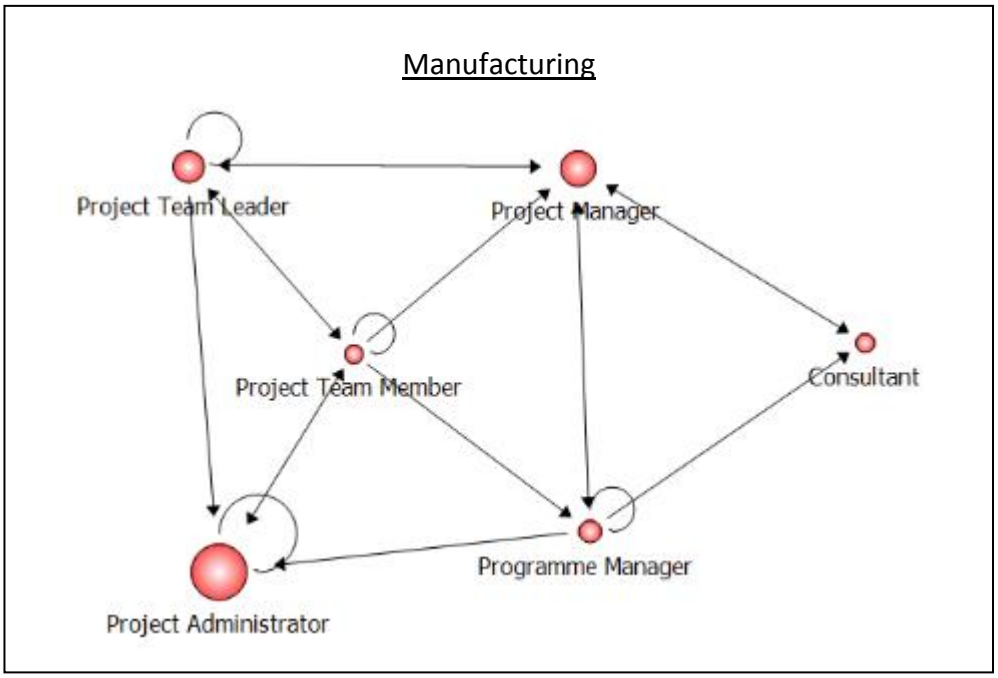

## Research and Development

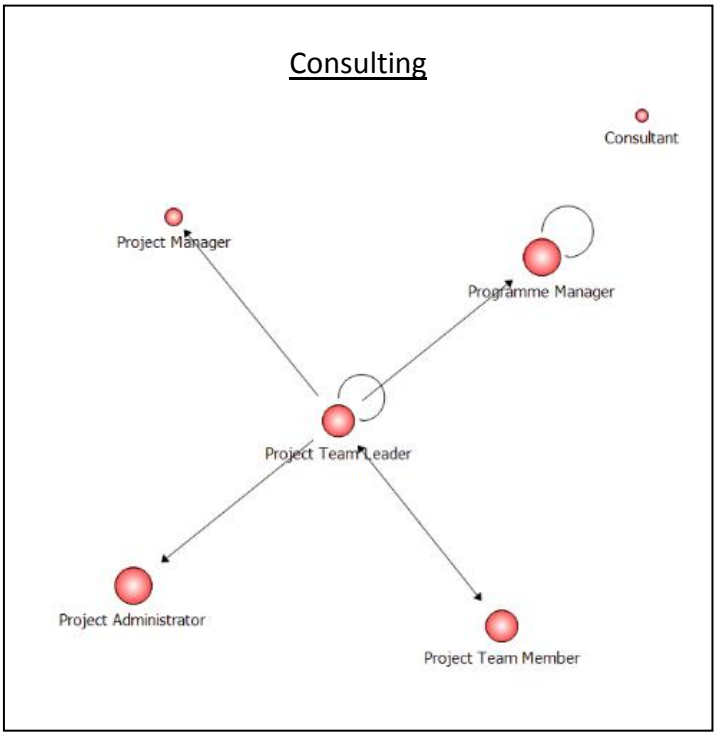


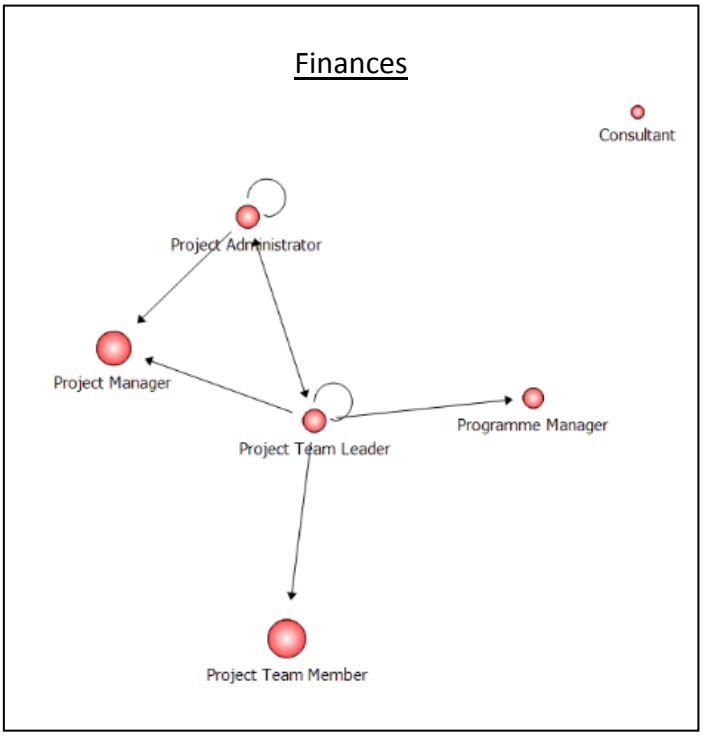

## Sales and Marketing

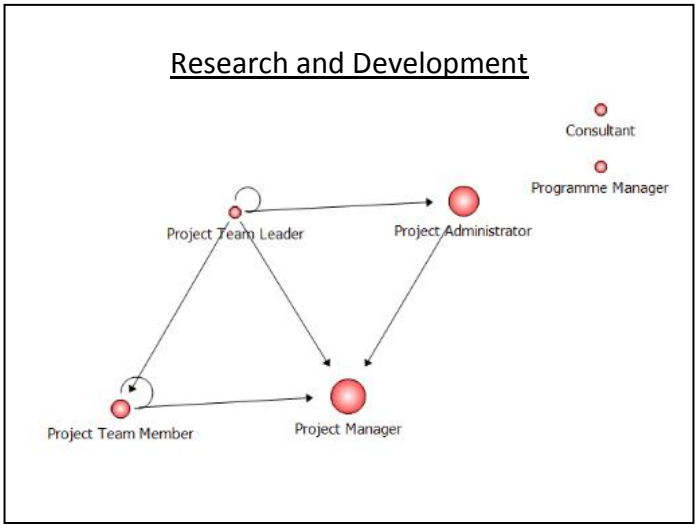


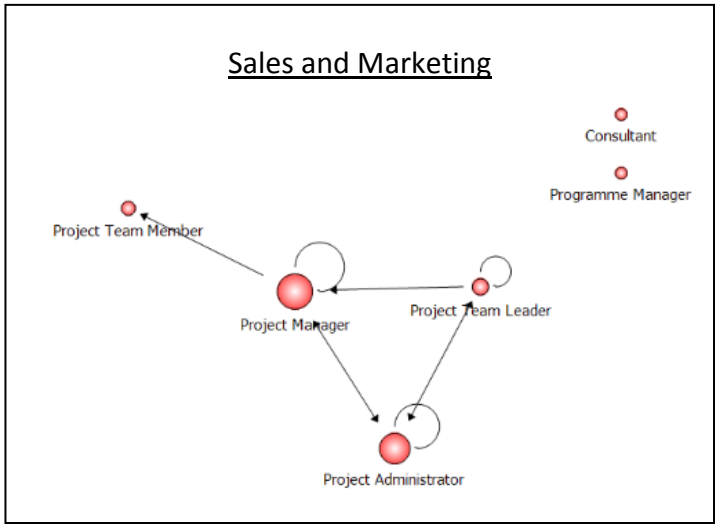
## GRAPEVINE


Manufacturing
Project Team Leader
Project Manager
Project Team Member
Consultant
Programme Manager
Project Administrator

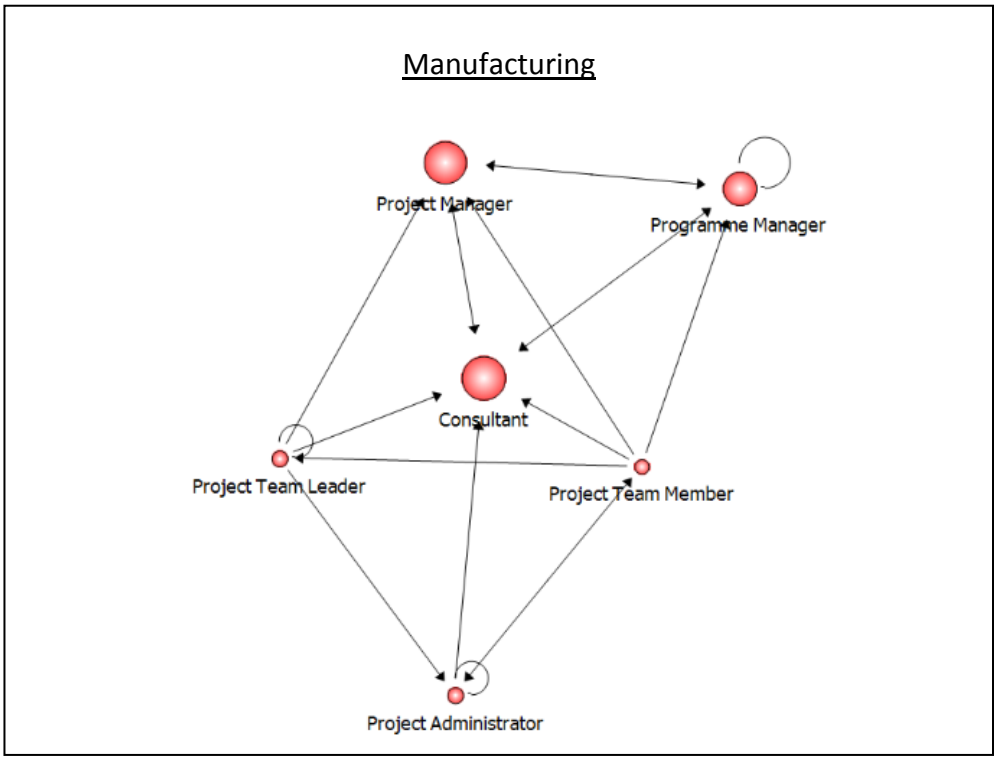

Consulting
Consultant
Project Manager
Programme Manager
Project Team Leader
Project Administrator
Project Team Member

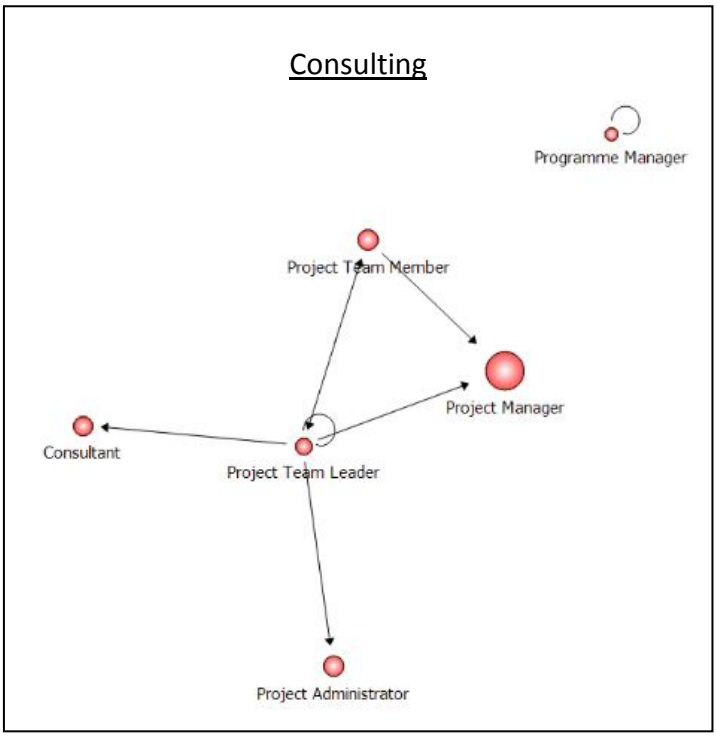

Finances
Consultant
Project Administrator
Project Manager
Programme Manager
Project Team Leader
Project Team Member

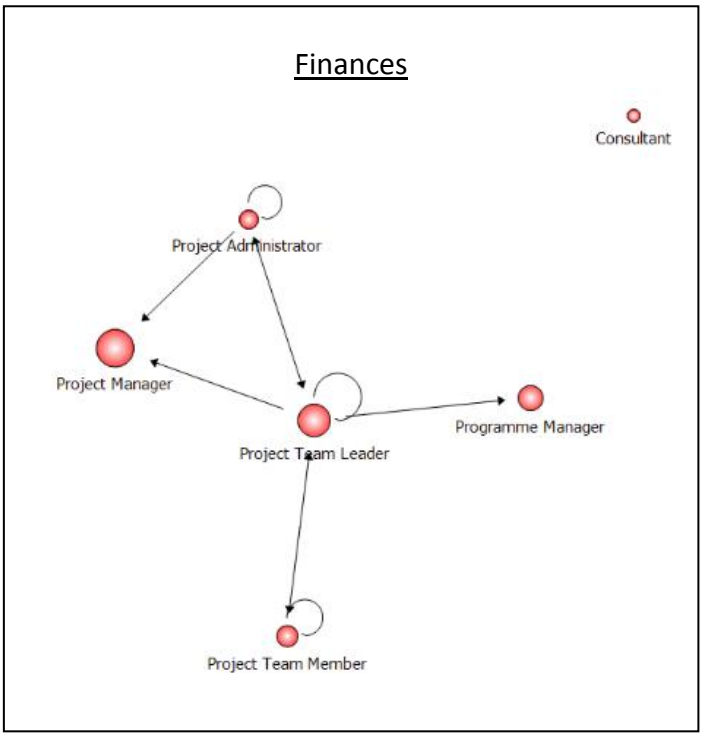


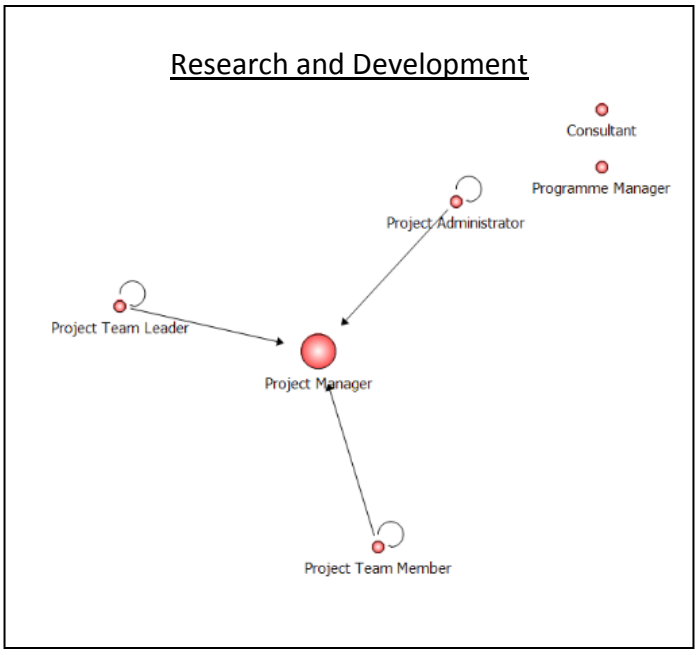




## DECISION MAKING




Consulting
Programme Manager
Project Team Member
Project Manager
Consultant
Project Team Leader
Project Administrator


Finances
Consultant
Project Administrator
Project Manager
Programme Manager
Project Team Leader
Project Team Member


Research and Development
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Project Administrator
Project Team Leader
Project Manager
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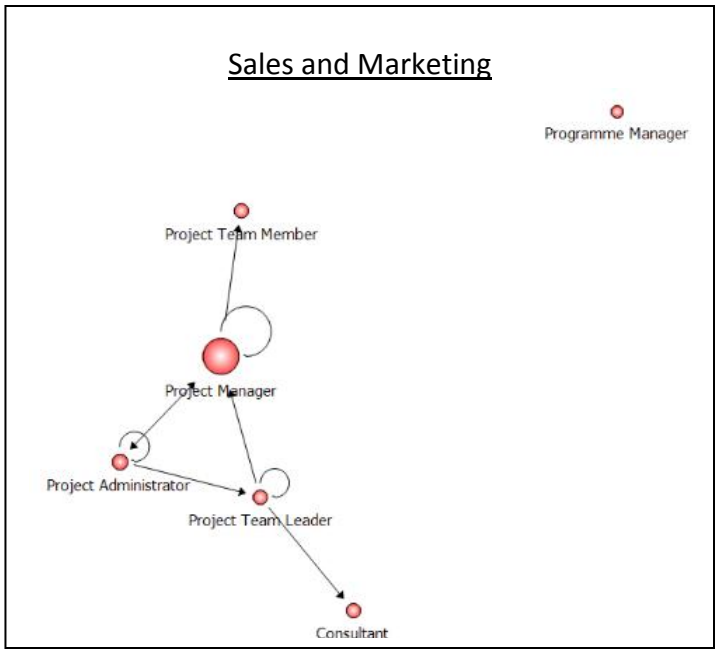
Sales and Marketing
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Project Manager
Project Administrator
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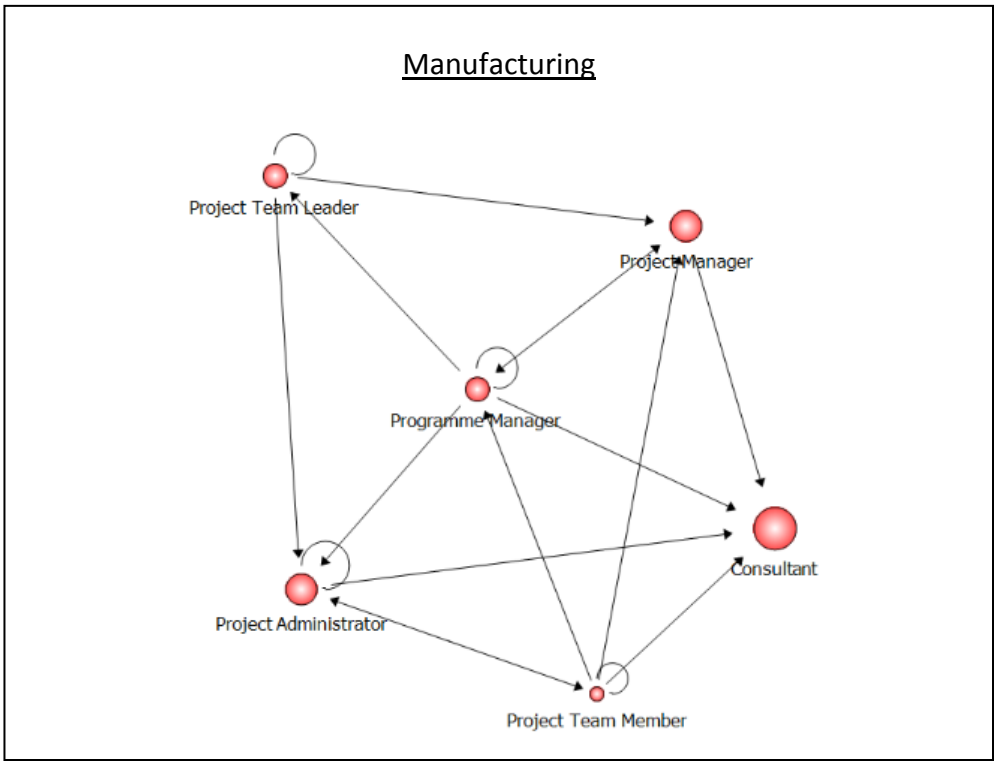
Consultant

## INNOVATION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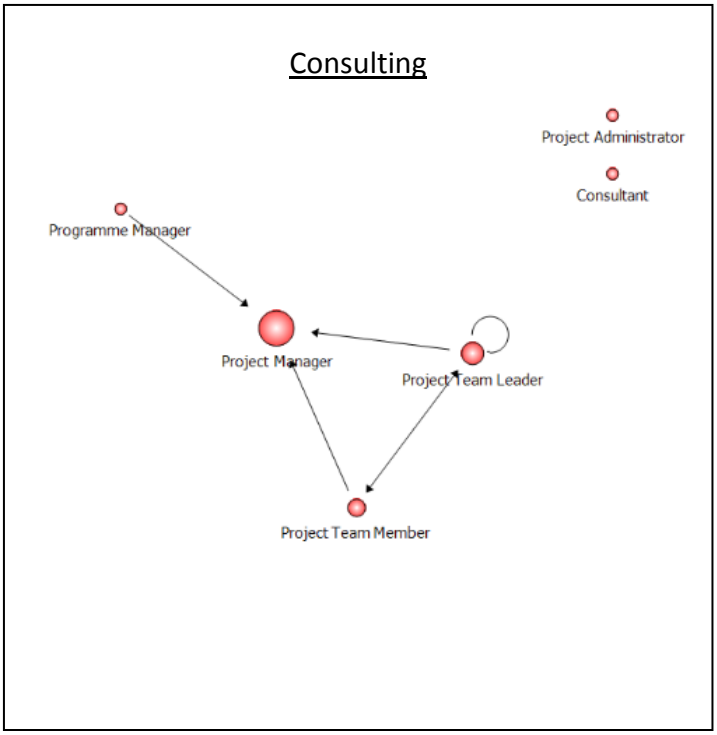
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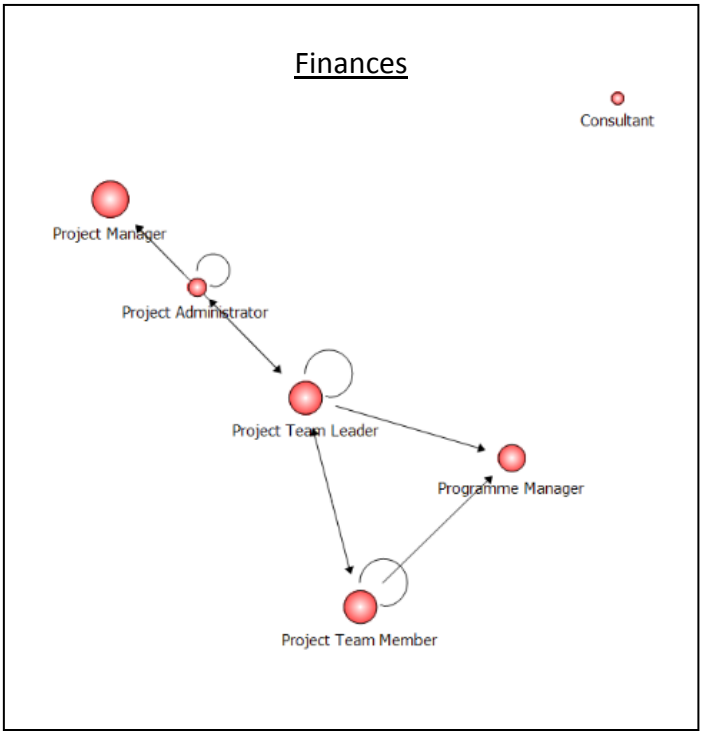
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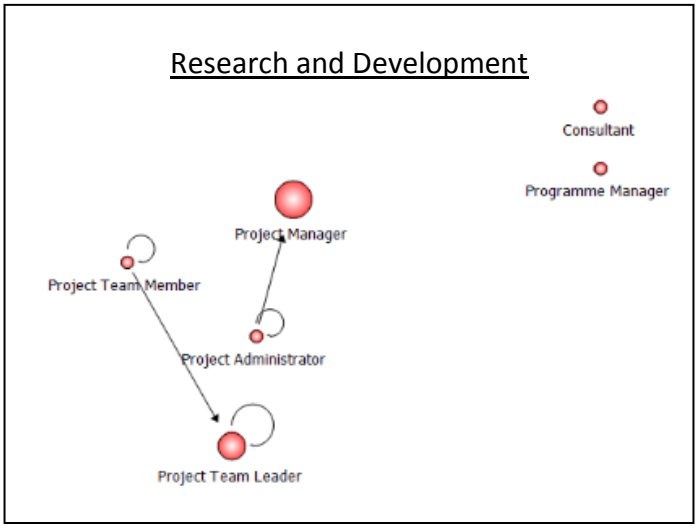
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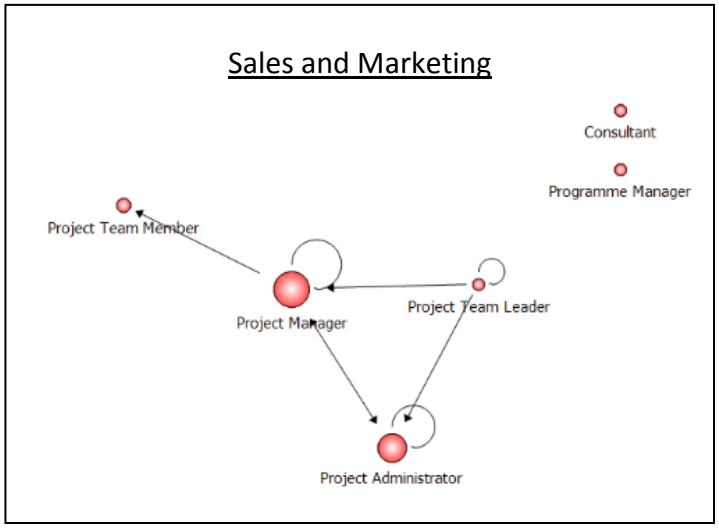
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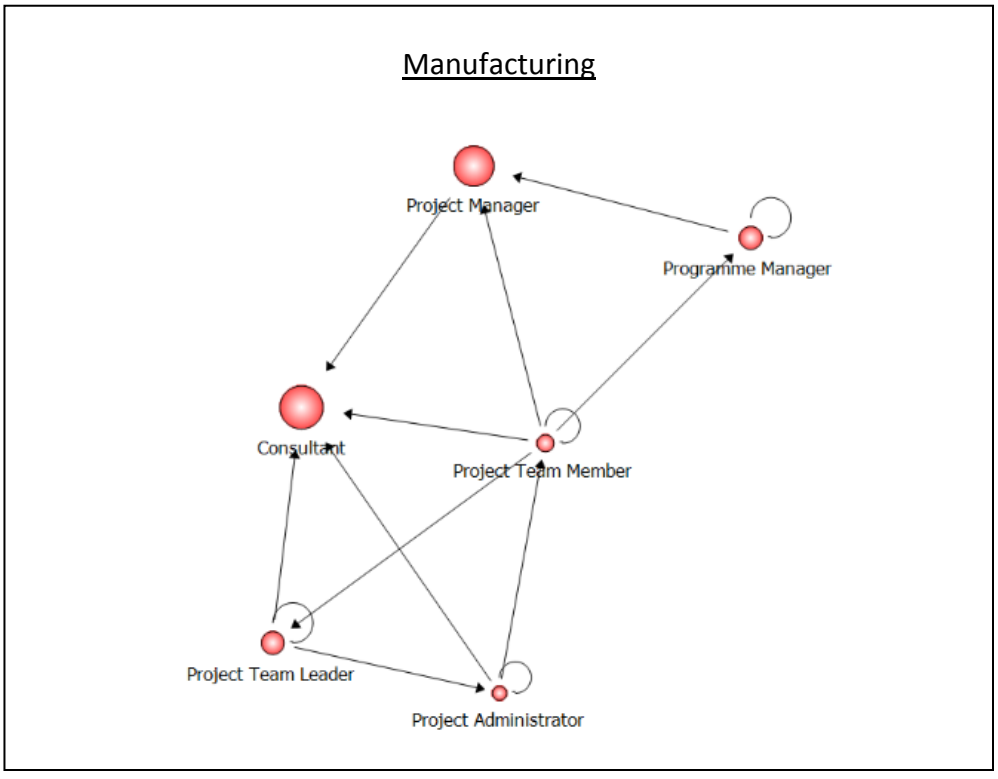
## EXPERTISE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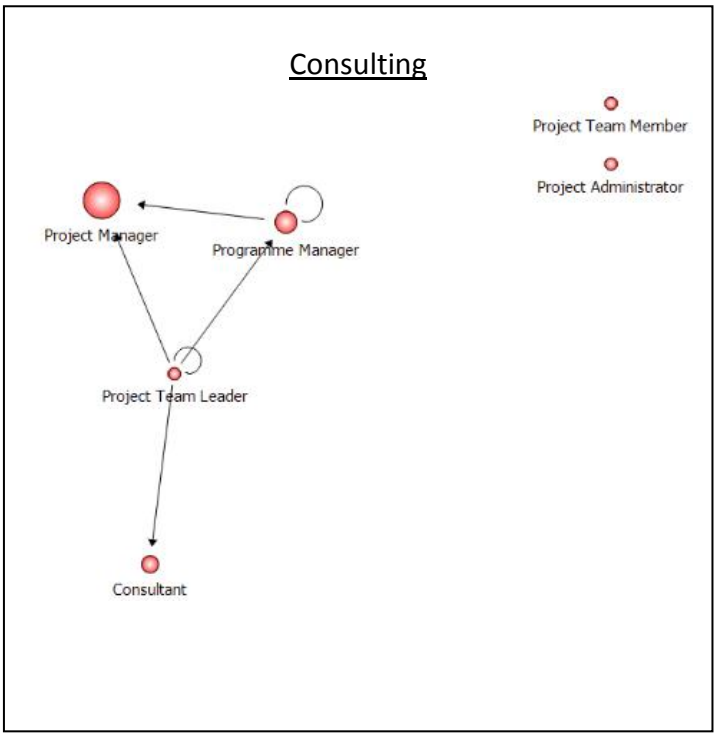
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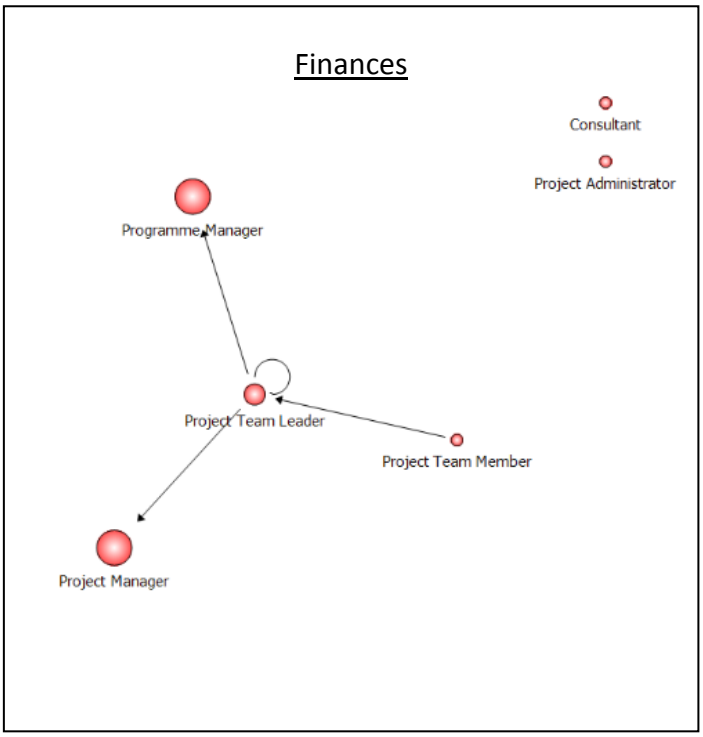
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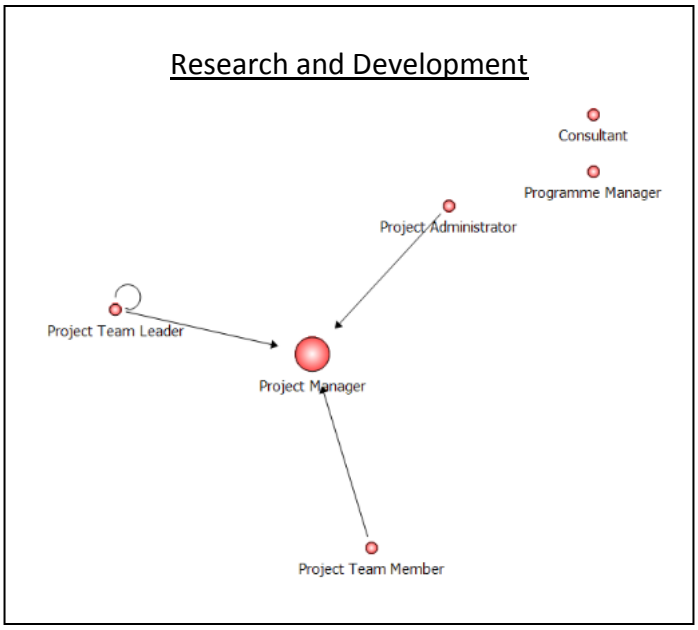
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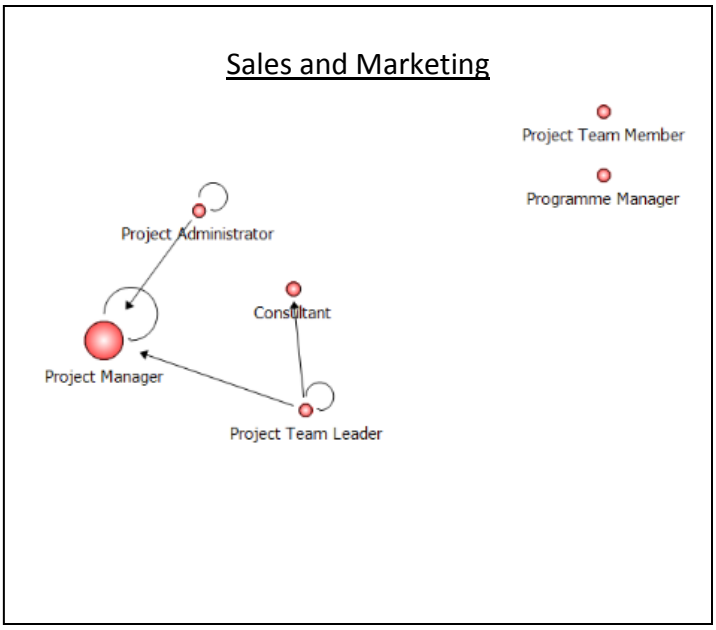
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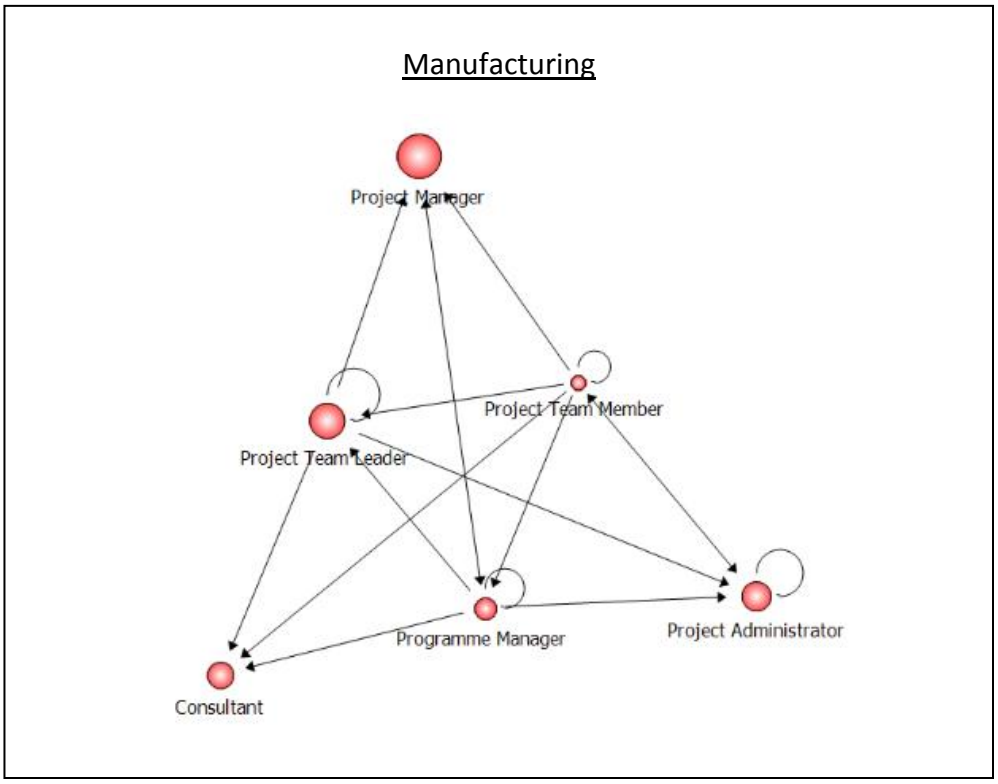
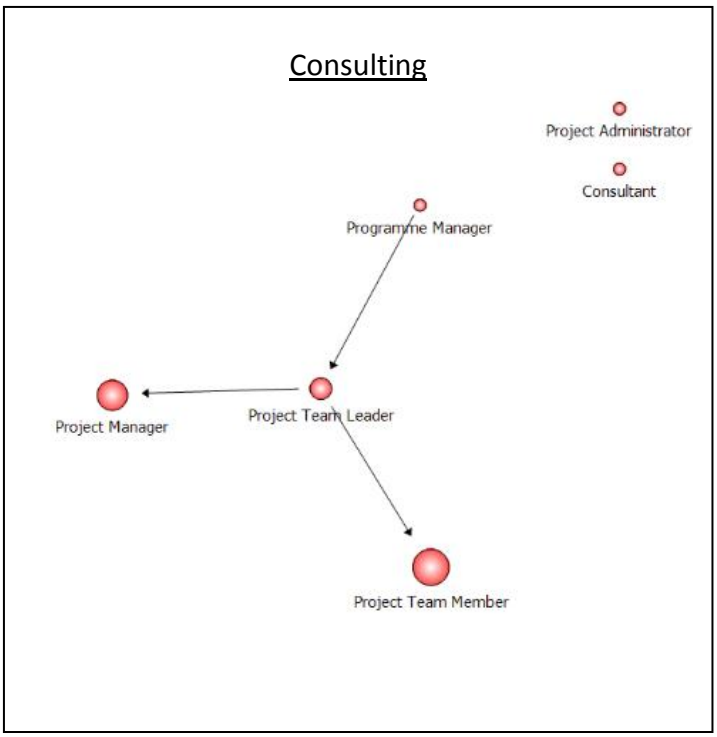
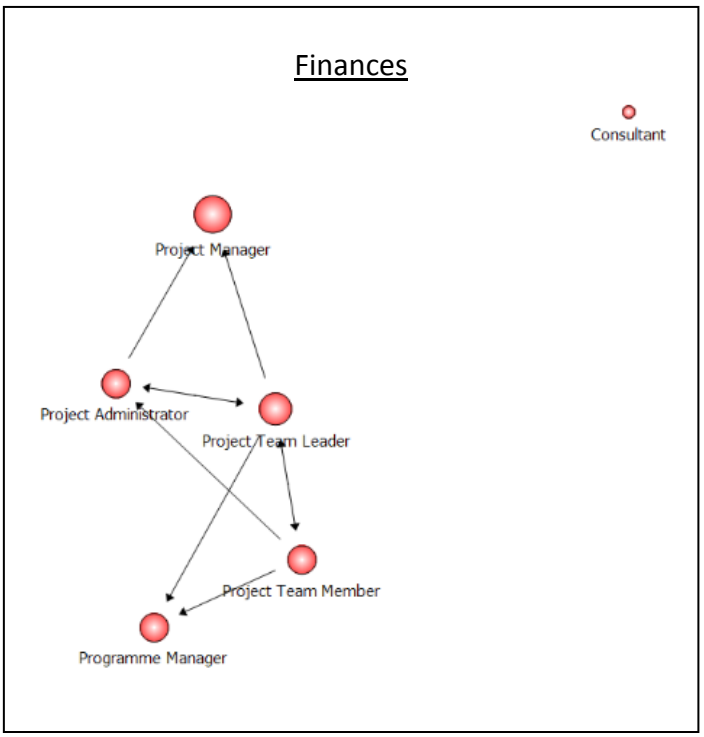
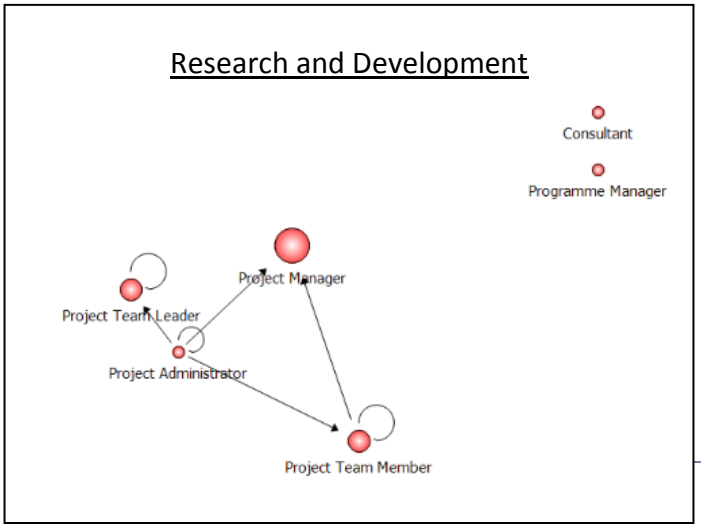
## CUSTOMER KNOWLEDGE

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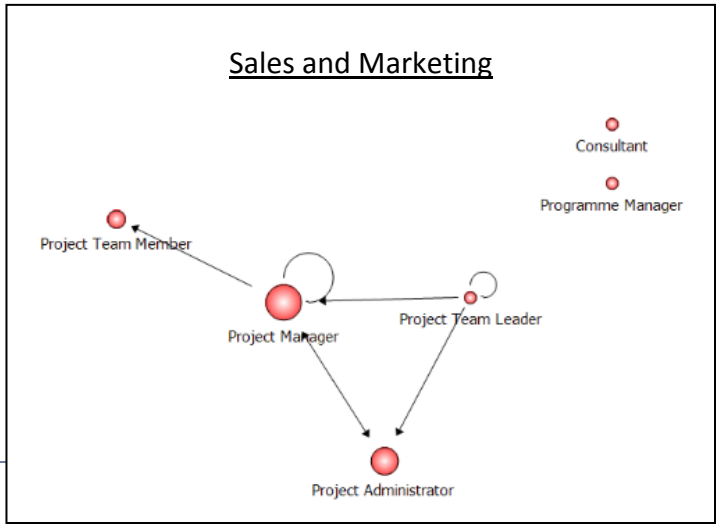
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