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Construction processes in hospitals

A comparative study of construction processes
in hospitals in Norway and the USA

Master's thesis in Real Estate Development and Facilities
Management

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<p>Ekstrakt:</p> <p>The goal of this thesis was to compare two construction processes at two hospitals and evaluate how the differences affected the construction process. To conduct this study the authors chose four factors to research; macro environmental-, financial-, organizational and process related factors.</p> <p>The two hospitals are used as cases in this thesis is Akershus University Hospital (Ahus) and New York Presbyterian Hospital.</p> <p>The thesis presents theories in facility management and project management that were found relevant to the problem definition.</p> <p>The study concludes that there are big differences in how the two hospitals is operated, and that this affects the construction process in several ways.</p>

Stikkord:

1. Construction Processes
2. Hospitals
3. Facility Management
4. Comparative Studies

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Foreword

This thesis is part of a Master of Science in Real Estate Development and Facility Management. The thesis was done at Norwegian University of Science and Technology (NTNU) in Trondheim, Norway.

The research performed in this thesis was carried out in the period from January 2014 to June 2014 and the final thesis represent 30 credits of the total 120 credits of our master program.

We hereby want to thank everyone who has helped and contributed to this thesis. We especially want to thank our supervisor Dr. Antje Junghans at NTNU and Matthias Ebinger at New York Presbyterian Hospital (NYP). Thanks Antje for your guidance and constructive feedback during the writing period.

Matthias, thank you for taking time out of your busy schedule to meet with us, for helping to arrange interviews, and for providing important documentation.

We'd also like to thank all the interviewees at Ahus and NYP who have provided detailed information that was essential to the completion of this study.

Working with this master thesis has given us great insight into the hospital sector and how construction projects are conducted in Norway and the USA. We are certain that we will have a great use of this knowledge in our future careers.

Summary

This thesis assesses the differences in the construction process at two hospitals, one in Norway and the other in the USA. The Norwegian health sector has received a lot of bad press regarding their internal processes and financial status in the later years, and the authors found it interesting to do a comparative study to take a closer look at the facility departments.

Construction projects are challenging to conduct, as it requires good internal processes while the project must adhere to internal and external factors. Therefore the authors chose to assess the construction projects step-by-step in the light of four factors; macro-, organizational-, financial-, and process related factors

The problem definition of this thesis is how the differences at Akershus Universitetsykehus and New York Presbyterian Hospital affect the construction project from idea to daily operation.

The thesis will give a basic presentation of facility management and project management, and a thorough presentation of the two hospitals and their construction process. The factors surrounding the process are assessed in detail for each of the cases.

The thesis is based on a case study, which has resulted in a large amount of data. To obtain good information about the construction process this study is based on interviews with key people in the construction process of the two hospitals.

The results of this study is that construction projects at Akershus Universitetsykehus and New York Presbyterian Hospital is conducted in almost the same way, but the external factors have a major influence on how the construction process are organized and conducted.

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1

INTRODUCTION

FM IN HOSPITALS

INTRODUCTION

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1. Introduction

Facility management is a term with different definitions around the world. Managing space is still a fairly young science, as buildings historically have been viewed as a necessity rather than a supporting factor to the core business. This view started to change in the late 80's and early 90's and today facility management is a key factor in most businesses that own their own facilities.

With the rising maturity of facility management, it is interesting to see how organizations in different countries have matured.

Hospitals are very complex organizations that have very high demands from their built environment. This force the facility teams to perform at a high level and deal with a lot of different tasks, and they should represent at an above average level for the given country. This thesis will assess the FM organizations at two hospitals, Akershus University Hospital in Akershus, Norway and New York Presbyterian hospital in NYC, USA. These hospitals are operated in different environments, economies, and under different political ideologies.

1.1 Authors Backgrounds

Both authors are students at Norway's University of Science and Technology (NTNU) and are taking a two-year master degree in Real Estate Development and Facility Management. They both have a bachelor degree from BI Norwegian Business School. Ole has a bachelor degree in economy and administration, while Jesper has a bachelor degree in entrepreneurship and economy.

The interest in facility management blossomed through subjects taught in the master's program at NTNU that detailed a rising complexity in this field of study. Recently, as buildings have become more technical, the demand for more specialized knowledge has increased dramatically. This combined with rising costs of space and labor, has made buildings a rising share of companies' fixed costs. Therefore, the importance of well-managed facilities has increased as well.

In the process of choosing a topic for this thesis, the authors wanted to combine their economic and administrative backgrounds with facility management processes.

1.2 Theme, goals and approach

The goal with this master thesis is to get a deeper understanding of the various factors that influence a construction project and study how the two hospitals conduct construction projects. The aim is to address how the construction project is affected by different factors surrounding it.

This thesis will not give an answer to what is best practice, since the two hospitals are so different from each other, especially when it comes to ownership, size and annual budgets. But this thesis will give a good insight in what the main differences are in construction projects at the two hospitals, and how facility management in hospitals work and organize themselves to solve the challenges they face.

The approach of this thesis is to conduct a study of the two hospitals using literature studies and interviews as methods.

1.3 Problem definition

For the authors, the main interest in studying facility management in hospitals from different countries was the curiosity about what was different. To be able to uncover differences the authors chose to look at a generic construction process at both hospitals. By following the life cycle of a construction process from idea to daily operation of finished facilities, one has a framework that is believed to be quite similar across the world.

As a result of this thought process the thesis will seek answer the following problem definition:

“How do the differences in Ahus and New York Presbyterian Hospital affect the construction process from idea to daily operation?”

To be able to answer this problem definition the authors will have to uncover the main differences in and around the construction processes. To do this in a similar way at both hospitals the authors chose to look at the following factors:

1.4 State of the art

The factors that are to be assessed in this thesis, regarding construction projects, are listed in this section.

Macro factors

Construction projects in hospitals are affected by factors that are outside the organizations control. Examples of factors that affect the construction processes is; political climate, economic climate, and laws. According to this, this thesis will describe how the hospitals are founded and give an insight in how public authorities are involved in constructing a new facility.

Organizational factors

Organizational factors have an important impact in how a construction project is implemented. The thesis will take a closer look on the ownership of the hospitals and how they have organized their real estate departments. In addition the thesis will describe the evaluation process of which construction projects that shall be conducted and not.

Financial factors

How Ahus and New York Presbyterian Hospital are financed affects how much they have to invest in construction projects. The thesis will describe how the two hospitals are funded, in addition to how the two hospitals finance their construction projects.

Process related factors

The thesis will describe how Ahus and New York Presbyterian Hospital conduct a construction project step-by-step and what the most important work tasks are in the different steps. The thesis will also describe the interaction between the project manager and the facility management department during the process, which procurement policy the project has

to follow, and how the hospital focus on evaluating their construction projects after completion.

1.5 Choice of the hospitals in the study

In recent years, the Norwegian hospital sector has received a lot of criticism for the way several of the hospitals have been run. Studies done by Commonwealth Fund in 2013, shows that the Norwegian Hospital sector scores lower compared to many other countries. Some of the reasons for this are attributed to staff capacity and latency for patients. (Thomson et al., 2013)

Ahus is one of the Norwegian hospitals that have received criticism from the media. The hospital has had large deficits over the last couple years. In 2012, the hospital had a negative operating result of around \$1,15M (Davidsen, 2012). They have also undergone some major changes in management, which has led to much negative media attention in Norway. For example, CEO, Hulda Gunnlaugsdottir, made headlines when she resigned in 2013 due to differences with the hospital board about what measures should be used to solve the operational challenges the hospital faced (Vedeler, 2013).

Ahus has also been criticized for some of the purchases they have made. For example, the hospital bought a map service for \$600 000, which they had no use for.(Haakas et al.). Additionally, Ahus has had some problems with unstable computer systems (IKT) that have threatened patient safety. In 2013, out of about 840 incidents, 37 of these incidents were considered to be very serious (Davidsen, 2013).

Due to several challenges within various areas of hospital operations over the past few years,, the authors thought it would interesting to study if their real estate department was as chaotic as rest of the hospital appeared. Politicians have even been in the media claiming that the hospitals are not fit to handle their own facilities(NRK, 2013).

The main reason why the authors chose to study New York Presbyterian Hospital is because of the organizational changes the hospital has gone through recently. In 2006, after many years of problems, they started a new project to reconfigure the facilities planning, development and management model. This process was led by our contact at NYP, Matthias Ebinger, and has been very successful (Archibus, 2011). Another reason to study New York Presbyterian Hospital is because the authors had good access to inside information, this

enabled them to interview key people within the organization and obtain relevant documentation.

1.6 Structure

Part 2 is a methodology chapter where the choice of research design is discussed. The theory and models used in the research is also explained.

Part 3 is a theory chapter that will give the reader a theoretical understanding of facility management by explaining models, theory and literature.

Part 4 case study: This chapter gives an introduction of Ahus and New York Presbyterian Hospital. This chapter will describe how these two hospitals conduct a regular construction process and how the processes are affected by organizational-, macro environmental-, financial- and process related factors. It will explain the construction process for Ahus and NYP Hospital separately.

Part 5 Discussion: This chapter will compare the information obtained in the case studies and discuss the findings.

Part 6 Conclusion: This chapter will sum up the findings in the study and give suggestions for further research.

1.7 Abbreviations

Ahus	Akershus Universitetssykehus
BIM	Building Information Modeling
BMS	Building Management System
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CON	Certificate of Need
COO	Chief Operating Officer
Dir.FS	Director of Facility Systems
DOH	Department of Health
FM	Facility Management
NYP	New York Presbyterian Hospital
OECD	Organization for Economic Co-operation and Development
O&M	Operation and Maintenance
ORPPD	Office regulatory planning and policy development
PM	Project Manager
SENPHA	South-Eastern Norway Regional Health Authority
SVP	Senior Vice President
VP	Vice President

2

METHODOLOGY

METHODOLOGY USED IN THIS THESIS

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2 Methodology

This chapter describes the choice of research design and methodology, how the data is obtained and the limitations of this study. The reason why one should give a description of the methodological foundations lies in the desire of verifiability and the possibility of continuing the work (Olsson, 2011)

2.1 Research design and research methods

A research design involves a description of how the research process will be conducted to solve a problem definition. Before deciding which research design to use, it is important to know what kind of data is needed, how this data should be obtained and how the data will be analyzed (Gripsrud et al., 2004). The choice of research design also depends on how much knowledge the researcher already has about the subject and his/hers ambitions to analyze and explain connections.

In order to choose research design, one need to classify the study into two dimensions: (1) if the study examines in depth (intensive design) or in width (extensive design), and (2) if the study is descriptive or explorative (Jacobsen, 2000). According to Sayer (1992) intensive research design often is concerned with causal processes and how it works out in a certain number of cases. Theories by Jacobsen (2000) says that intensive design focuses on in-depth examinations to reveal as many details and nuances of the problem as possible.

In extensive research design, the study often uses a wide data selection for the purpose of generalizing the results. In intensive research design, the analyst uses descriptive and inferential statistics along with numerical analysis as input in the study.

In the first classification, the authors chose to use intensive design, because this design is based on researching few units in depth. By using intensive design, the results cannot be generalized to larger populations.

In the second classification, it was decided to use explorative design. The reason for this is because explorative design is used when individuals conducting examinations have little knowledge of the subject, and the main goal of this study is to explore the topic more deeply. A descriptive design will not suit this study, since descriptive design is used when the analyst has a basic understanding of the problem area. In addition to this, descriptive design is often

used to illustrate the situation in a particular area. It may be the level of a single variable or the relationship (correlation) between two or more variables (Gripsrud et al., 2004).

The two most common methods for collecting data are by qualitative or quantitative methods. Qualitative methods are used in intensive research designs and it's characterized by the data is in text and not numerical values. Qualitative methods usually contain data by in-depth interviews or focus groups. This method is often interpretive and theory evolving, and strives for to an understanding of the subject. The data is usually collected over time and based on small samples (Askheim and Grenness, 2008).

Quantitative methods are used in extensive design. This method has three characteristics: (1) it is theory-driven, (2) it's developed by hypothesis testing and (3) it aims to generalize (Peshkin, 1993). Quantitative methods are usually based on numerical values from a larger sample that is representative of a population (Askheim and Grenness, 2008).

To solve the problem definition it was decided to use qualitative methods. This is because there is a need for detailed information about how a construction project is carried out. To get this information the authors has to interview key persons involved in the construction process. It is likely that Ahus and New York Presbyterian Hospital have different ways of structuring the process. Therefore, it will be difficult to generalize the results.

2.2 Choice of methodology

The choice of methodology is based on the problem definition:

“How do the differences in Ahus and New York Presbyterian Hospital affect the construction process from idea to daily operation?”

Choosing the correct research strategy is important for avoiding disadvantages in the research. Even though this thesis uses an exploratory design, most research strategies could be applied. To get the best results, it is important to choose a style that does not limit the outcome of the research. The boundaries between different strategies are not always distinct, as large areas overlap between them. In this thesis the authors were predisposed to doing case studies, as this seemed to be the most effective method. To find out if case studies were the most fitting,

they chose to apply Yin (1994) model for when to use five major strategies.

Yin presents three conditions for determining which strategy to use:

- The type of research question posed (who, what, where, how, why)
- The extent of control an investigator has over actual behavioural events
- The degree of focus on contemporary as opposed to historical events

Given the research question, how and why questions are explanatory are likely lead to the use of case studies, histories or experiments. These questions deal with operational links that need to be traced over time, rather than analysing existing data or one incidence (Yin, 1994).

Yin (1994) describes control over independent variables as the extent the investigator can control and access actual behavioural events. Case studies are preferred when examining contemporary events, but only when the relevant behaviours cannot be manipulated. (Yin, 1994)

In this thesis, there is no control over the independent variables.

Yin (1994) Claims case studies have a distinct advantage when a how or why question is being asked about a contemporary set of events which the investigator has little or no control. This is very fitting for our study, but one could claim that some of the investigation has a survey approach. As previously mentioned, there is a lot of overlap between the different styles, so case studies seem to be the correct approach for this thesis.

Style / Strategy	Research questions	Control over independent variables	Focus on events
Survey	Who, what, where, how many, how much?	Not required	Contemporary
Experimental/Quasi-experiment	How, Why?	Required	Contemporary
Archival analysis	Who, what, where, how many, how much?	Not required	Contemporary/past?
History	How, why?	Not required	Past
Case study	How, why?	Not required	Contemporary

Figure 1: When to use different research strategies (Yin, 1994).

2.2.1 Case studies

Case studies are typical when researching organizations and usually have a research design that is aimed towards collecting a lot of information about a few different cases (Askheim and Grenness, 2008).

Yin (1994) defines case studies as studies where phenomenon is examined in their real-life context, where the research relies on multiple sources of evidence.

The five components of case studies

According to Yin (1994) the case design has five important components:

1. A study's questions
2. It's propositions, if any
3. It's unit of analysis
4. The logic linking the data to the propositions
5. The criteria for interpreting the findings

1. The first component is the *research question(s)* for the study, typical questions for a case study are in the form of “how” and “why” questions.

2. *Study propositions*. These are theoretical assumptions - as this study is the subject of exploration, we do not have any. Instead the authors choose to focus on the purpose of the thesis, which is to get an understanding of how the different organizations conduct construction project and how the different factors affect said process.

3. *Unit of analysis*. This component is related to defining what the case is. In this study the cases are defined as the two hospitals and the underlying process of construction. This limits the thesis' scope and sets boundaries for the research.

4. *Linking data to propositions, and data for interpreting the findings*. The purpose of this step is to match the collected data with the set propositions in step 2. For this thesis this will be to answer the problem definition.

5. *Criteria for interpreting the findings*. It is important to interpret the findings in the light of the four previous steps on the basis of existing theories. In this thesis it is difficult to interpret the data in a way that challenges or changes existing theories. The main criteria for interpreting the findings are to see what differences exist between the different countries and to compare the practices at the two hospitals.

2.3 Literature studies

The literature study is mainly based on books, booklets, compendium and articles about facility management, real estate development and project management. Some of the literature was introduced to the authors in previous courses in our master program, while other literature has been recommended from our supervisor and some of the interviewees.

Some of the literature is found through literature searches from both Norwegian and English databases. Search words have been used: Facility management, hospitals, KPI, Ahus, New York Presbyterian, Hospital, FM, organization, Southern and Eastern Norway Regional

Health Authority, buildings, development and built environment. The words have been used in various orders and compositions.

2.4 Primary and secondary data

This thesis is based on primary and secondary data. Primary data is data collected by the authors through people or groups of people. In this thesis primary data is collected through in-depth interviews. Secondary data is data that has already been collected (Gripsrud et al., 2004). Secondary data is used in multiple areas of the thesis, for example for key figures, financial factors, guidelines and empirical studies conducted by various researches about the hospital business in Norway and USA. The thesis is mainly based on primary data collected from in-depth interviews, especially how the construction projects are carried out.

2.5 Validity and reliability

Validity and reliability are two terms that are often used to assess the quality of the results of examinations. The validity of a study refers to the relevance of the study. Theories distinguish between internal validity and external validity. Internal validity is whether we measure what we actually should measure. Internal validity determines if the causality in the survey is good enough, while external validity determines if the results of a study can be transmitted to similar surveys. For it to be a sufficient quality of the transferability of the findings, there is essential that the findings have to be representative of the context we want to transfer it to (Jacobsen, 2000)

Since this thesis is based on an intensive research design (chapter 2.1), the internal validity is going to be high (Jacobsen, 2000). It is difficult to say whether the external validity is going to be high or low, because it is hard to say anything about the transferability of the study.

Reliability (at a general level), determines if the results of a study are trustworthy and credible. This means that if someone else conducts the same survey by using the same method or with another method, they will get the same result. This means that the random errors that often occur in studies have to be as few as possible to make the study as reliable as possible (Jacobsen, 2000).

2.6 How the interviews are conducted

Every interview has been conducted as an open individual interview. The open individual interview is the most common collection method in qualitative methods. This method is very suitable when (1) few units shall be examined, (2) you are interested in what the individual says and (3) you are interested in how each interviewee interpret and think about a topic (Jacobsen, 2000). Every interview has been conducted face-to-face in an effort to establish a stronger relationship to the interviewee.

Before each interview, the interview guide was customized to the interviewee. The reason why different interview guides is used is because the interviewees have different roles, knowledge and experience. By adjusting the interview guides it was possible to obtain the same information from people with different roles. The same interview guides were used for interviewees with identical roles within their respective hospitals. This was done to make sure that the interviewees answered the same questions to ensure a high degree of internal validity. For example, the head of operations and maintenance at Ahus was asked the same questions as the head of operations and maintenance at Weill Cornell, New York Presbyterian Hospital.

During the interviews one person conducted the interview while the other acted as a scribe. The interview was taped with a recorder to be able to accurately recall the information. After each interview a summary was written with help from the tape recorder, to ensure maximum reliability in the study.

The interviews with the employees at New York Presbyterian Hospital were conducted in English and the interviews with the employees at Ahus in Norwegian.

In addition to the interviews, the authors were given two guided tours at New York Presbyterian Hospital. One of the tours was with the project manger (Carroll Baker) where he showed a bone transplant construction project at Columbia University Medical Center which he was managing. This bone transplant project was only a few weeks from completion. The project manager showed us what they had built, what the biggest challenges were in terms of construction, and what tasks remained to complete the project.

The authors also had a guided tour with the head of facility operations and the director of facility systems at the Weill Cornell Campus. They explained the technical systems in detail and how they work to operate and maintain it. They also gave us an introduction of the software programs they use to monitor the energy use of their buildings.

2.7 Time schedule and interviewees

This table shows when, where and who were interviewed in this study.

Month	Country	Interview	Role
January	Norway	Elvira Maric	Head of the Property Department (Ahus)
		Alf C.Jørgensen	Head of Facility Management (Ahus)
February	USA	Matthias Ebinger (x2)	Director of facility systems (NYPH)
March	USA	Matthias Ebinger	Director of facility systems (NYPH)
		Carol Baker	Project Manager For Construction (NYPH)
April	USA	Matthias Ebinger	Director of facility systems (NYPH)
		Marjorie Sobyak	Senior Interior Project Manager (NYPH)
		Ellie Dalton	Vice President Strategic Planning (NYPH)
		Dan Lilly	Head of Facilities Operation (NYPH)
May	Norway	Elvira Maric	Head of the Property Department (Ahus)
June	Norway		

Table 1: Time schedule for interviews

2.8 Input in the case study

Interviews:

Most of the input in this thesis is data that have been obtained through interviews with employees at Ahus and New York Presbyterian Hospital.

Documentation from interviewees:

During the interview process the authors received documentation from the interviewees, which were used in the study. Examples of documentation that has been used are guidelines for construction projects and organizational chart. Written the sources on all models used exist.

Literature:

Literature obtained in the literature study was used as a fundamental to get a better understanding of the processes and organizations at the hospitals.

2.9 Possible limitations of the thesis

The authors had very little knowledge about the hospital industry when starting this thesis, especially in the US. Considerable time have therefore been spent before and during this study, to read newspaper articles, research papers, statistics and other available materials in an effort to gain more knowledge about the hospital industry in both of the countries.

The thesis is written in English, in hopes that the New York Presbyterian Hospital can benefit from it as well. Since the authors native language is Norwegian, there has sometimes been problematic to express certain nuances to the full extent. The interviews with the employees at New York Presbyterian Hospital were conducted in English, which made the interpretation a little more complicated. The authors made an effort to avoid confusion by asking interviewees if anything was unclear during the interviews. In order to confirm the information obtained from the interviewees from New York Presbyterian Hospital, the authors conducted a final summary interview with the Director of facility service before they left the USA.

A confirmation meeting was also held with the head of real estate at Ahus.

3

THEORY

FM ORGANIZATIONS & PROJECT PLANNING

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3 Theory

This chapter presents relevant theory within facility management, organization structure and project planning.

3.1 The facility management model

In 2002, national facility management representatives from 15 countries started to develop a European definition of facility management. In 2006 all the countries in Europe agreed to use the same definition of facility management:

“The integration of processes within an organization to maintain and develop the agreed facility services which support and improve the effectiveness of its primary activities”

(EuroFM, 2013)

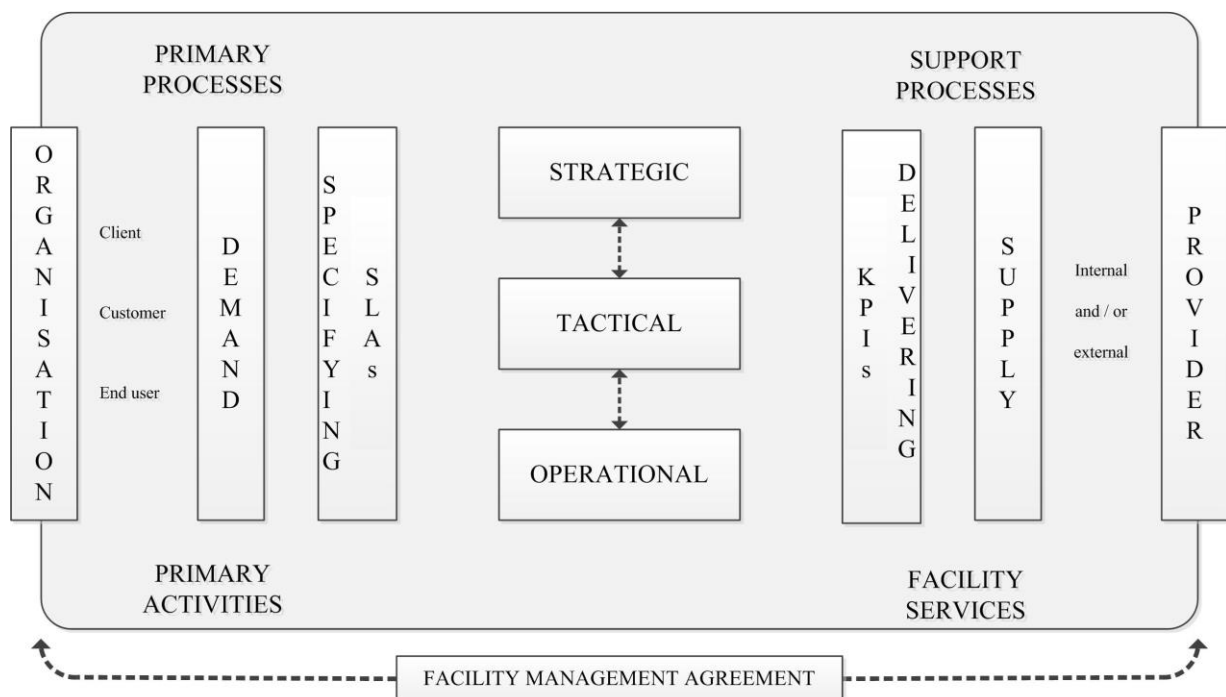


Figure 2: The facility management model (Standard-Norge, 2007)

The facility management model provides a good overview of the entire facility management process. The model describes how facility services support the primary activities in an organization.

Primary activity is also called core business and it is the company's main occupation. Atkin and Brooks (2009) define the primary activity as the distinctive and essential competencies of an organization set within the context of its value chain. If one use a hospital as an example, their core business is to treat sick and injured people

Facility services are support services that an organization produce internally and / or purchase from an external supplier to ensure their primary activity can be run as time and cost effectively as possible. Organizations determine for themselves the distinction between primary activity and support services and the distinction has to be reviewed continually. An external supplier that provides the client with estate-related and facility services, within the terms of the facility management agreement (SLA), are called facility service providers (Sæbøe and Blakstad, 2009). If one uses a hospital as an example again, typical support services are cleaning, food service and laundry service. It is important to understand that there is a difference between facilities and facility services. Facilities are the tangible and touchable assets that support the organization, like a building, computers, machinery or furniture (Atkin and Brooks, 2009).

Theories divide facility services into two different areas, *Space and infrastructure* and *people and organization*. Space and infrastructure includes the client demand for (work) space through services like space planning, technical infrastructure, operations, maintenance and cleaning. People and organization includes the demand for ICT, office supplies, document management and services related to health, safety and security (European Facility Management Network, 2014)

3.2 The three level management model

The facility management model (figure 2) shows that facility management takes place at three different management levels in an organization. At each level there are tasks related to construction and facility management. The three different levels are strategic level, tactical level and operational level.

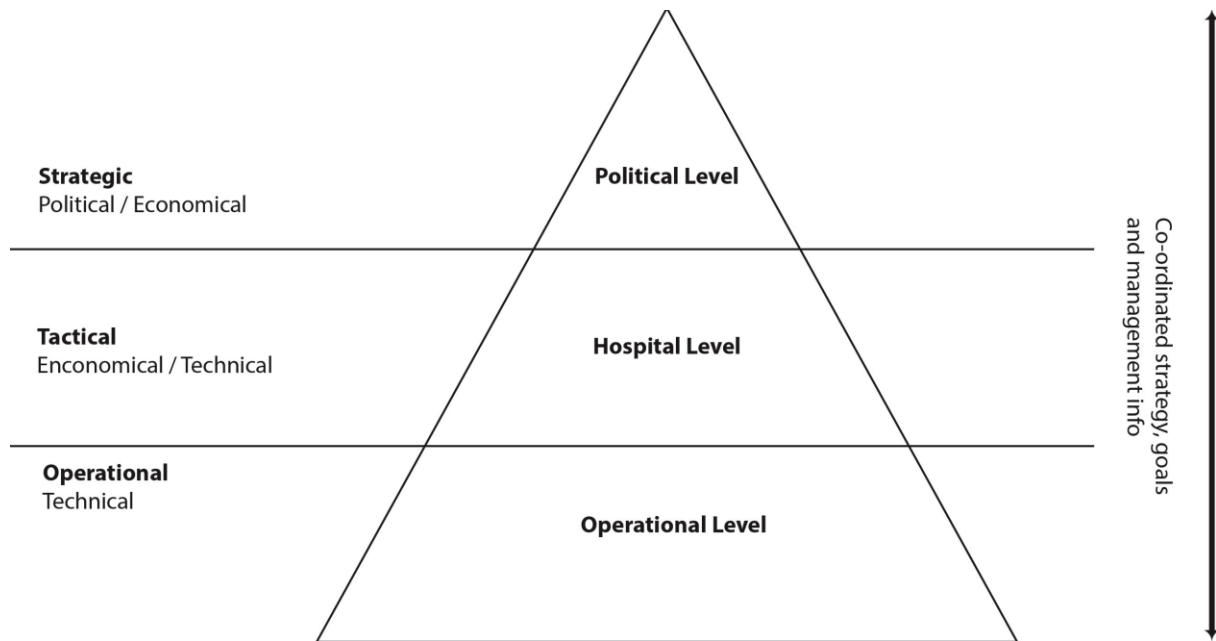


Figure 3: The three layers of management (Haugen, 1990)

3.2.1 Strategic level

The top management in an organization works at the strategic level. It is at this level that long-term decisions for an organization are taken. One of the most important tasks at strategic level is to ensure that the company can achieve good facility management for a long period of time. Therefore, it is important that the facility management strategy is in compliance with the organization's strategy. In this way, the facility management strategy is easier to implement because it can be identified with the focus of the rest of the organization.

Some typical work tasks at the strategic level include:

Work tasks at Strategic level
<ul style="list-style-type: none"> • Policymaking, elaborating guidelines for space, assets, processes and services
<ul style="list-style-type: none"> • Initiate service level agreements (SLAs) and monitoring key performance indicators (KPIs).
<ul style="list-style-type: none"> • Supervision of the Facility Management organization.
<ul style="list-style-type: none"> • Maintain relations with authorities, lessees and tenants, strategic partners and associations.

Table 2: Work tasks at strategic level (Standard-Norge, 2007)

3.2.2 Tactical level

The person who works at tactical level is the person who takes the decisions that affects the organization in the medium term.

Work tasks at Tactical level
<ul style="list-style-type: none"> • Implement and monitor guidelines for strategies.
<ul style="list-style-type: none"> • Develop business plans and budgets
<ul style="list-style-type: none"> • Define SLAs and KPIs (performance, quality, risk and value)
<ul style="list-style-type: none"> • Manage projects, processes and agreements
<ul style="list-style-type: none"> • Optimizing the use of recourses.
<ul style="list-style-type: none"> • Communication with internal or external service providers on a tactical level.

Table 3: Work tasks at tactical level (Standard-Norge, 2007)

3.2.3 Operational level

The decisions that are taken at the operational level are mostly day-to-day decisions. The most important work tasks that occur at the operational level are:

Work tasks at Operational level
<ul style="list-style-type: none"> • Deliver services in accordance with SLA (chapter)
<ul style="list-style-type: none"> • Monitor and check the service delivery processes
<ul style="list-style-type: none"> • Collect data for performance evaluations, feedback and demands from end users
<ul style="list-style-type: none"> • Report to tactical level
<ul style="list-style-type: none"> • Communicate with internal or external service providers on an operational level.

Table 4: Work tasks at operational level (Standard-Norge, 2007)

3.3 Centralized and decentralized organization

Different functions and activities of facility management can be managed and performed centralized and / or decentralized. Sometimes an organization has a mix between central and local functions. The choice of organization model depends on several variables. Often are the organizations character and scope, and geographical dispersion and distance the most crucial when it comes to choosing a model.

When an organization uses a centralized organization model, most of the strategic and tactical facility management functions are centralized and the operational tasks being managed and implemented are decentralized. This model can create synergies within some areas, such as switchboard / call center, alarm central, area planning and procedures for economy.

In decentralized organizational models the strategic functions are organized centrally, while the tactical and operational functions are decentralized. The centralized organization model is normal for facility management organizations that focus on operational activities (Sæbøe and Blakstad, 2009).

3.4 Internal and external produced services

There are several ways to organize the production and procurement of facility services. There are three widely used organizational structures:

- Internal facility management organization
- Internal profit center or independent facility management company in the organization
- Replace internal facility management with procurement of facility- management and services from one supplier (outsourcing).

3.4.1 Internal facility management

An internal facility management model when an organization chooses to produce the facility services for them. This model is best suited for organizations that are geographically close to each other and the characteristic of this model is that each department/organization has their

cost budget. Normally the cost budget gets incorporated into the total budget of the mother company. The internal facility management is widely used for many Norwegian municipalities and various public organizations in Norway (Sæbøe and Blakstad, 2009).

Over the past few years, the model has gone through some changes. What was once a clear internal facility management model has been developed into small competence groups that purchase external facility services. This is because the buildings has become more complex and high tech over the years, which has increased the need to buy facility services from external providers that have more knowledge and experience in special areas.

Some of the positive features with this model are that the facility department has good knowledge of the organizations core business, as there are internal communication lines and this model can improve the balance between fixes and variable costs.

Some of the negative characteristics of this model are that it is less suitable for large organizations that are geographic spread, the facility department must coordinate internal and external service resources and there are few incentives for cost consciousness and control.

3.4.2 Internal profit center or independent facility management company

Some organizations choose to separate out the facility management department as an own company. In those cases, the facility management company becomes an independent profit center with its own profit budget. A criterion for this model to work is that the company operates with internal invoicing when it comes to rent and the facility services the tenants / users purchase. This means that the income for the facility management company is the rent and internal sales of facility services. The cost is the production of facility services to the tenants / users.

The reason why some companies use this model is because the company wants a competitive internal production when it comes to prices and the quality of the facility services. Another possible benefit by this model is that the facility management department knows the business and their goals.

Some of the biggest weaknesses with this model are that it can develop a more distant relation to the owners of the core business and the owner (core business) carries a business risk with the company. In addition, it requires several internal procedures (invoicing etc.) for this model to work.

3.4.3 Replace internal facility management with purchase of facility management and facility services from one supplier (outsourcing)

This model is used when a company wants to buy all of the facility management and facility services from an external provider, which is called outsourcing. Outsourcing is defined in many different ways, but in this thesis it is defined as services that are outsourced to an external provider on both tactical and operative levels, only the strategic level of the service is left in the organization. Often this involves transferring employees to the external provider (Mørk et al., 2008).

The reason why some companies use this model is because they want less administration work or lower fix cost. Some other benefits with this model are that they get market competition on price and it saves the organization for competence development for non-core business.

Some of the negative characteristics of this model are that it requires a lot of communication between the client and suppliers. In addition, the model requires very resource-intensive decision-making and implementation principles.

3.5 Client, Customer and End user

Theories about facility management distinguish between client, customer and end user. The client acts on a strategic level and is the owner that pays for the facility services. According to Atkin and Brooks (2009), the client often specifies needs and procures restate-related and facility services by means of a facility management agreement. It's common that the client has a general and / or key function in all stages with the provider of the facility services.

The customer is the part of the organization that defines and receives facility services within the conditions of a facility management agreement. The customer acts on a tactical level.

The end user acts on an operational level and is the person who receiving the facility services on a permanent or temporary basis (Atkin and Brooks, 2009).

To distinguish between client, customer and end user, we can use the library at NTNU as an example. The library is an important support service for NTNU's core business, since the students need books and a place to study. In this example is NTNU the client, because they pay for the books and the salary for the employees at the library. The customer is the different faculty at NTNU, since they order and define what kind of books that has to be accessible for the end user. The end users are the students and teachers, as they are reading the books and studying in the library.

3.6 Different type of ownership

Different owners may have different purposes with their ownership and this is something that reflects the ownership of the building(s). According to Sæbøe and Blakstad (2009) is there three different type of ownership.

The first ownership is called Real Estate Management (REM). This is a financial ownership, where it is all about getting the highest possible return on invested capital in relation to risk. The return the organization gets for owning a building is being evaluated against other types of investments, such as shares and securities investments.

The second type of ownership is called Corporate Real Estate Management (CREM). Bon (1992 referred Lindholm (2008)) defines CREM as facility management of real estate in private or public organizations which does not have real estate as its core business.

In CREM the building is owned and used by an organization. There are several reasons why the organization wants to own its own buildings, such as specific needs for a factory, an investment for the corporation or it can be because of tradition.

The objective to CREM is related to the added value of the core business of the organization that utilizes the buildings, while REM have more focus on creating financial value for the owner.

The third type of ownership is called public ownership. In this type of ownership, the owner's motivation is to have a building for public needs that can benefit the society. This is a typical ownership of public buildings in many countries. Examples of public ownerships are hospitals, police stations, schools or other buildings that produce public services.

3.7 The Built Environment Management Model 2 (BEM 2)

A construction projects goes through many phases, from concept to completion. We will use the Built Environment Management Model 2 as a foundation for how a construction process takes place in Ahus and New York Presbyterian Hospital.

The Built Environment Management Model 2 was developed with the goal to be an industry neutral classification model for the management functions of the organizational built environment. The researchers wanted the model to (1) have a framework that reflect general practices in facility management and real estate in neutral terms, and (2) that the model should be taxonomically consistent and easy to understand.(Ebinger and Madritsch, 2011).

3.7.1 The four key process areas of the facility life cycle

The BEM2 model breaks the facility life cycle into four key process area (KPAs); (1) strategic planning, (2) facility planning, (3) project/transaction management and (4) operations, maintenance and services management. These four process areas are widely recognized in different life cycle models. This process sequence is very basic, and is the simplest representation of the built environment model. (Ebinger and Madritsch, 2011)

Key Process Area (KPA)	Description
KPA 1 Strategic planning	Definition of organizational goals and objectives
KPA 2 Facility planning	Translation of organizational strategy into real estate options, and the selection and financing of the best option
KPA 3 Project/transaction management	Acquisition/construction and commissioning of the physical facility
KPA 4 Operations, maintenance and services management	Operation, maintenance and servicing of existing facilities. Services include a wide range of support services, such as Lease Management, Space Management, Office Support Services, Technical Services or Food Services. In addition, this section includes a feedback function to inform the planning function on re-investment needs for existing facilities (Facilities Audit Function)

Table 5: The four key process areas of BEM2 (Ebinger and Madritsch, 2011)

By stretching out, the model shows the perspectives of the different stakeholders in the four different stages of the life cycle of a new construction.

KPA 1, Strategic planning

This process is often external to Facility Management and may or may not include senior facility management personnel.(Ebinger and Madritsch, 2011)

KPA 2, Facility planning

This is the facility departments response to the organization's strategy, balancing the need of new facilities and the need to renew existing facilities (Ebinger and Madritsch, 2011).

KPA 3, Project/transaction management

Executes the decisions made in KPA 2 by buying existing facilities or constructing new

facilities. After a new facility is acquired it gets over to the operations team, through a commissioning process (Ebinger and Madritsch, 2011).

KPA 4, Operations maintenance and services management

The operations team is responsible for operating, maintaining and servicing the facilities. A new life cycle starts in the facility-planning department when the facilities end its useful life and needs to be replaced. (Ebinger and Madritsch, 2011)

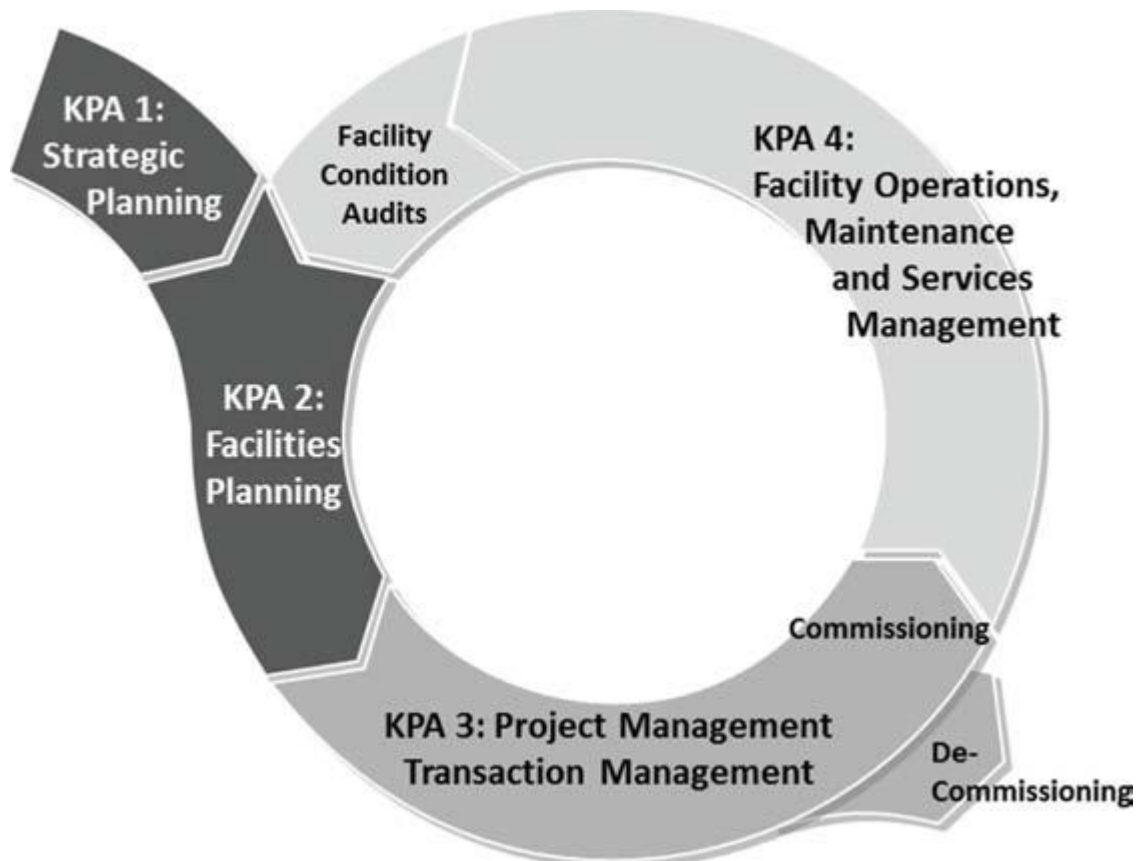


Figure 4: The four key process areas of the facilities life cycle model of BEM2 (Ebinger and Madritsch, 2011)

3.7.2 The “value stream” of the built environment

As seen in figure 5, the organizational layers are shown along the x-axis, while the values for the different levels are shown along the y-axis. The two dimensions BEM2 model shows value proposition of each of the four Key Process Areas.

KPA 1: According to the model is strategic planning the top of the “value stream”, since it is a core function of an organization.

KPA 2: Facilities planning is a tactical function. On a strategic level, the facility planning works to optimize the organizational investments, by deciding on the right investment vehicles. For example, if the organization should lease, buy or build facility assets. These decisions, regarding a mix of the facility portfolio, have an impact on an organization's balance sheet.

KPA 3: Capital project and transaction management is an operational function. It is their responsibility to deliver a specified project or transaction that is defined in the planning function. According to the researchers, can a single project solve a specified problem (operational perspective), while several projects, combined into a portfolio, requires a more tactical perspective. The reason why a combined portfolio requires a more tactical perspective is because the facilities planning needs to decide the resourcing and sequence of the multiple projects. If they manage to achieve a well-defined portfolio of projects, it will generate strategic value without having a big impact on the core business. And still can they deliver projects that support the core business's core objectives (strategic perspective).

KPA 4:

According to the researchers do services, operations and maintenance management, consists of a large number of operational functions. This Key Process area is similar to the project management (KPA 3) since all of the operational activities are rolled-up to a tactical function.

The tactical function monitors the work to ensure efficiency when it comes to operation and maintenance of the facilities and in the delivery of services. Well-run functions in KPA 4 will give the organization strategic benefits.

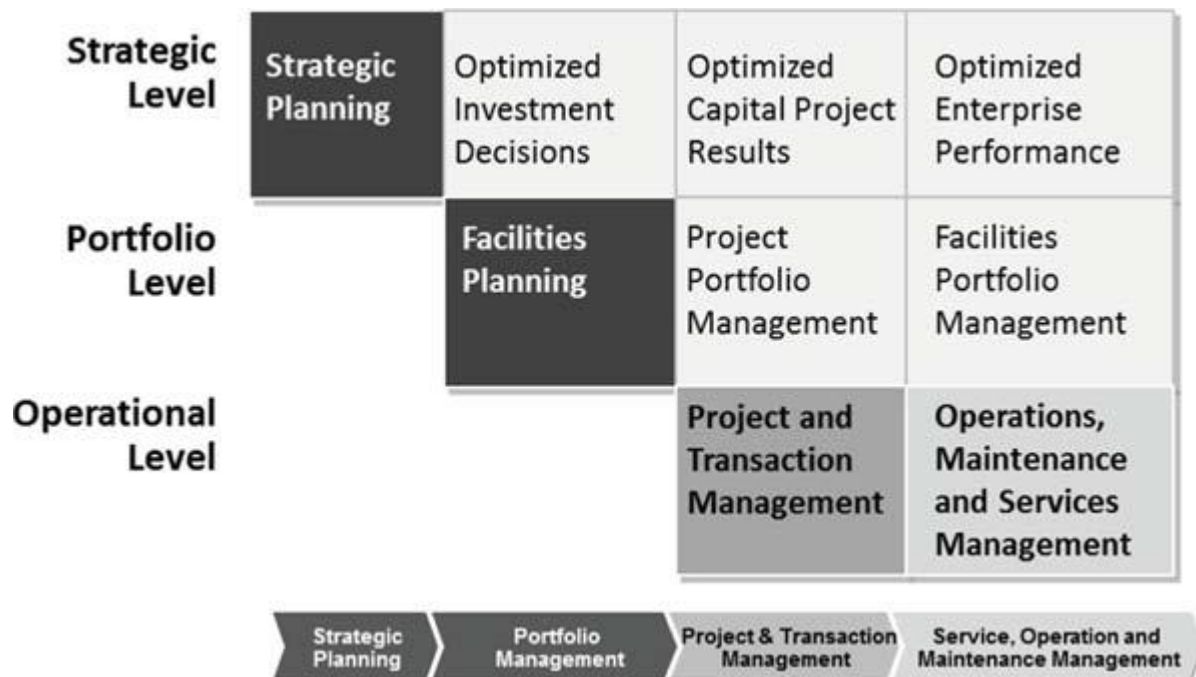


Figure 5: The two dimensions of BEM 2 (Ebinger and Madritsch, 2011)

3.8 Theory about project planning

Buchanan and Boddy (1992) defines a project as a unique venture with a beginning and end, conducted by people to meet established goals within parameters of cost, schedule and quality.

Although there are many different definitions of the term project, there is a difference between projects and organizational processes. According to theories of Gilbreath (1988) a process refers to ongoing, day-to-day activities in which an organization engages while producing goods or services. Projects, on the other hand, are activities that happen outside the normal, process-oriented world of the organization. Therefore are project management activities unique since it is work activities that are separate form routine and process driven work (Pinto, 2009).

3.8.1 What defines a project

Pinto (2009) believes that a project can be identified by a various number of elements. His theory states that projects are defined by (1) being complex and a one-time process, (2) limited by budget, schedule and resources, (3) developed to resolve a clear goal and (4) customer focused.

Projects are complex, one-time processes

A project in organizations often arises for a specific purpose or to meet / fulfill a stated goal. This means that projects are temporary, since when a project achieves its goal the project will be dissolved. Projects are often complex, because many projects require the coordinated inputs from several participants. For a construction project the participants may be different employees from the organization, external engineers or a construction company.

Projects are limited by budget, schedule and resources

In the majority of projects, the project members have to work with limited financial and human resources. In other words one can say that projects are resource-constrained activities.

Projects are developed to resolve a clear goal or set of goals

All project teams work towards a goal. The project goals, or deliverables, define the nature of the project. The most natural causes of projects are to achieve a tangible result, either as a new product or service. Whether the goal is to build a house or implement a new software program, the goal must be specific and the project organized to achieve the goal of the project.

Projects are customer focused

Pinto believes that organizations, previously, thought that a project was successful if it was completed in time and not over budget. But in recent time, more and more organization has understood that the primary goal of projects is to satisfy customer needs (Pinto, 2009).

Influence on costs in construction projects

According to Hendrickson and Au (1989), the later in a process you make changes, the higher is the cost. Good feasibility and design studies are therefore important, as late-cycle changes can get very costly.

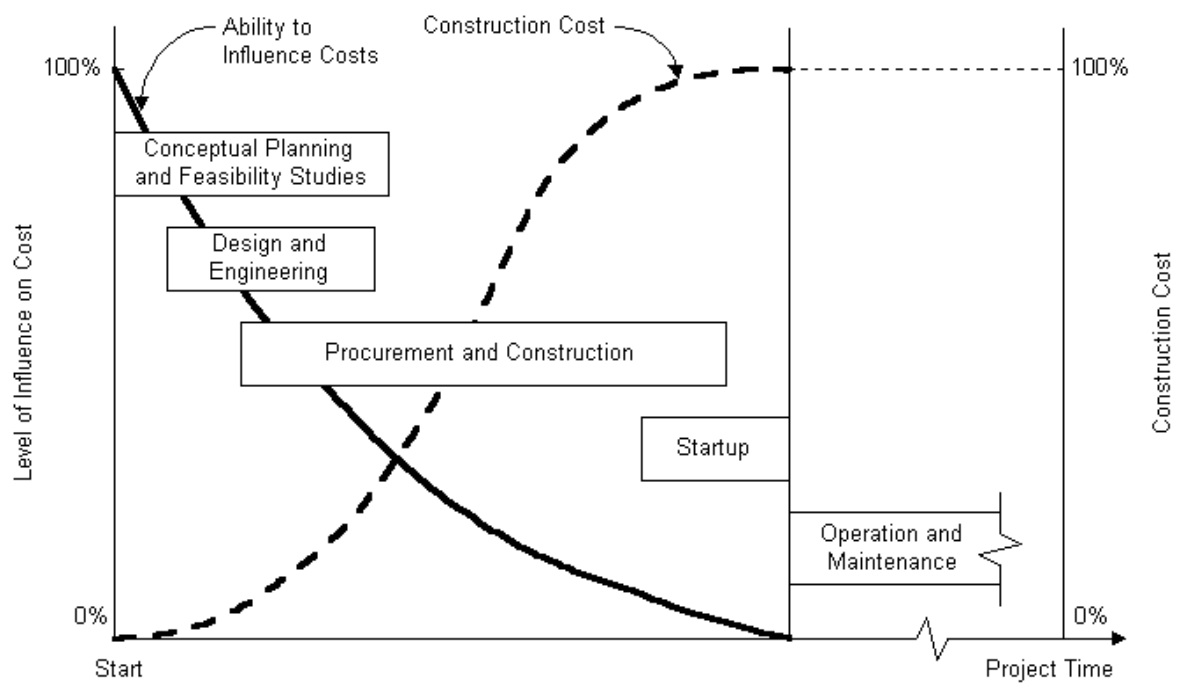


Figure 6: Ability to influence construction cost over time

4

CASE STUDIES

AHUS HOSPITAL & NEW YORK PRESBYTERIAN
HOSPITAL

INTRODUCTION

METHODOLOGY

THEORY

CASE STUDIES

DISCUSSION

CONCLUSION

4 Case study

This chapter will start by giving some key figures to show how much the two countries are spending on healthcare. Further on it will study each case separately by looking at what impact the set factors have on the construction process.

4.1 International key figures for health

According to reports by Organization for Economic Cooperation and Development (OECD), USA and Norway is the two OECD-countries that had most expenditure to health in 2011.

Number	Country	Health expenses per capita in USD	Money spent in relation to GDP	Life Expectancy
1	USA	8505	17,70 %	78,7
2	Norway	5669	9,30 %	81,4
3	Switzerland	5643	11,00 %	82,8
4	Netherland	5099	11,90 %	81,3
5	Luxemburg	4755	8,20 %	81,1
6	Austria	4546	10,80 %	81,1
7	Canada	4522	11,20 %	81,0
8	Denmark	4495	11,10 %	79,9
9	Germany	4495	11,30 %	80,8
10	France	4118	11,60 %	82,2

Table 6: International key figures for health expenses (OECD, 2013).

Table 7 shows the health expenses per capita in the different OECD countries in 2011. USA has the highest health expenses per capita with \$8505, while Norway came in second with \$5669 in 2011.

Country	Public expenditure on health / per capita USD	Health Expenditure/Public expenditure on health
Norway	4813	84,9 %
USA	4066	47,8 %
Netherlands	4054	85,6 %
Denmark	3795	85,3 %
Switzerland	3661	64,9 %
OEDC Average	4066	72,2 %

Table 7: Health expenses per capita (OECD, 2013).

This model shows how much of the total health expenses the government covers in the member countries of OECD in 2011. As we can see in table 7 the Norwegian government covers almost 85% of all health expenses. In table 6 one could see that USA had higher health expenses per capita than any other OCED country, but model 7 shows that the government in USA only covers 48% of the total health expenses. This is because the health industry in USA is characterized by private insurance.

4.2 Case 1 - Ahus



Figure 7: Main entrance Ahus Hospital (Ahus, 2014a).

Ahus has roots back to 1961 when the central hospital for Akershus County opened. This hospital went through a large expansion in 1978 and several smaller expansions after this. In the 1990's the hospital was lacking capacity and the buildings were degrading. It was then decided that there was a need for a new hospital. The new hospital was opened in October 2008, while some rehabilitation work on the old facilities continued on until 2012.(Ahus, 2014c)

Ahus Hospital is located 20 kilometers from Oslo and is one of 11 units that are a part of Southern and Eastern Norway Regional Health Authority (SENRHA). The hospital covers the municipalities in Follo (except Nes), Romerike, Rømskog in Østfold and three districts in Oslo; Alna, Grorud and Stovner. This corresponds approximately 490 000 people, which is around 10% of the population of Norway (Ahus, 2014d).

When Ahus was planned, the estimated population in its serving areas was estimated to be 360 000 people in 2015.(Sykehusprosjektene i Akershus, 2003) The big difference in planned

and actual population might be because of political changes regarding the areas the hospital is to cover. The hospital has around 1050 hospital beds, where most of them are to somatic and psychiatry. In 2012 the hospital had 9 062 employees and a total revenue of \$1,2 billion. The total gross floor area of Ahus is 137 000 square meters. (Ahus, 2014c)

Ahus is a university hospital and has cooperation with the medical faculty at Oslo University.



Figure 8: Map over Ahus (Ahus, 2014b).

4.2.1 Norwegian Health sector

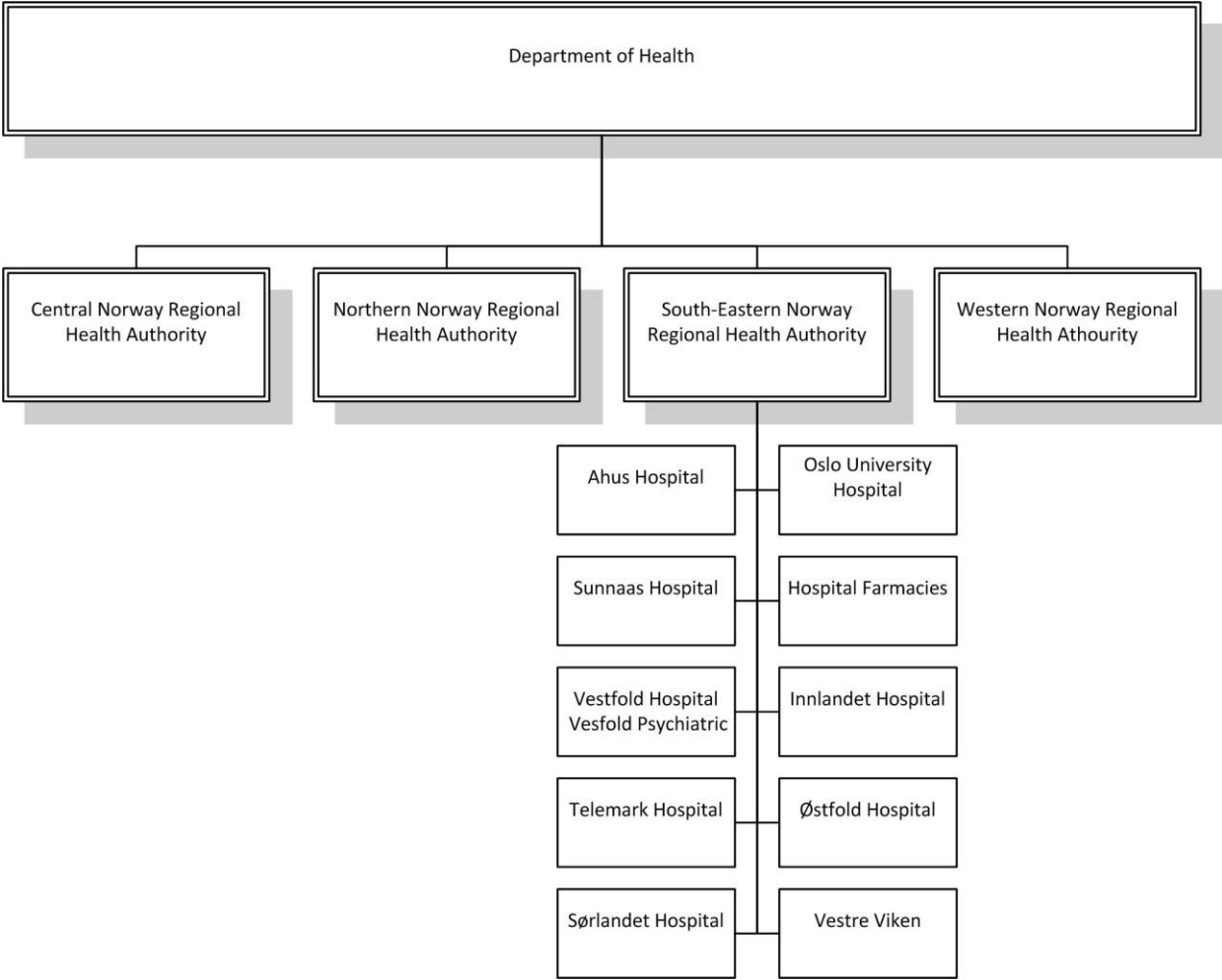


Figure 9: Organization of health authorities in Norway (Helse-sørøst, 2014).

The Ministry Of Health And Care Services owns the regional health authorities and has the overall responsibility for managing the national health policy objectives. As an owner, the Ministry Of Health And Care Services need to ensure that the values inherent in the buildings are safeguarded and developed in line with the national health policy and that it contributes to a good use of resources within the legal and financial framework.

The Ministry Of Health And Care Services has organized the health care sector in Norway into four different regional health authorities. These four regional health authorities are responsible for providing health care services to different geographical areas in Norway.

The different regional health authorities have the responsibility for various hospitals and pharmacies (health organizations). According to political statute, the regional health authorities are responsible for coordinating the activities of their underlying health organizations. This is to ensure an appropriate and rational use of resources. The continuous monitoring and management of the regional health authorities happens through mission documents, corporate meetings and annual reports.

The different health organizations are self-responsible of systematic maintenance and renovation of their facilities as well as constructing new facilities.

The Ministry Of Health And Care Services is responsible for ensuring that the health organization has developed adequate procedures for project management for their building projects. This means methods for quality control of construction projects. Meanwhile, the regional health authorities are responsible for the necessary quality of decision making and implementation of construction projects based on need and risk (Riksrevisjonen, 2011).

The report highlights the Ministry Of Health And Care Services that the regional health authorities are responsible for follow up the facility management in their underlying health organizations.

The funding of the regional health authorities is divided into two, which is basic funding and activity-based funding. The public funding that the regional health authorities receives, so the health organizations can investment, goes under the designation depreciation funds, which is a basic funding. According to the report (Riksrevisjonen, 2011) is it up to the different regional health authorities to distribute the allocated money between the various health organizations. The regional health authorities has different ways to allocated the basic funding, but this only affect how the total resources are distributed and not how funds are spent.

4.2.2 Organization of real estate department of Ahus

The hospitals in the SENRHA organize their own real estate department. They operate like separate entities and only involve the authorities in major construction projects, e.g. construction of new buildings.

Ahus has divided the internal services department into two divisions; one division that is responsible for the real estate, and one division that works with facility services.

The chief of internal services is the head and coordinator of both these divisions. This thesis will only focus on the real estate part of the organization.

The real estate division is divided into 3 subdivisions:

Operations and maintenance division

The O&M division is, as the name implies, responsible for operating and maintain all facilities at Ahus, and the division has 70 employees.

This department has professionals within most technical areas related to buildings, such as electrical, plumbing, energy, civil engineering and fire protection. In addition to this, they also have an operation and service center.

Real estate department

This department is responsible for all renovation and repurposing projects at Ahus. This department only has one permanent employee, which function as the project manager for all projects in this division.

Project division

The property division is responsible for the project management of the major construction projects at Ahus.

According to the head of the real estate department, the organizational structure has seen several smaller changes over the years. This is because the management of Ahus constantly seeks to optimize the operation of the hospital. One of the biggest organizational changes over the last years was when the service division was separated out. Before the separation, the

service division and the *facility management and project division* worked closer by having all their meetings together. By splitting the two divisions, the meetings in the real estate department are more effective and interesting. This is because the themes of the meetings in the different divisions now are closer to the participant's fields of expertise.

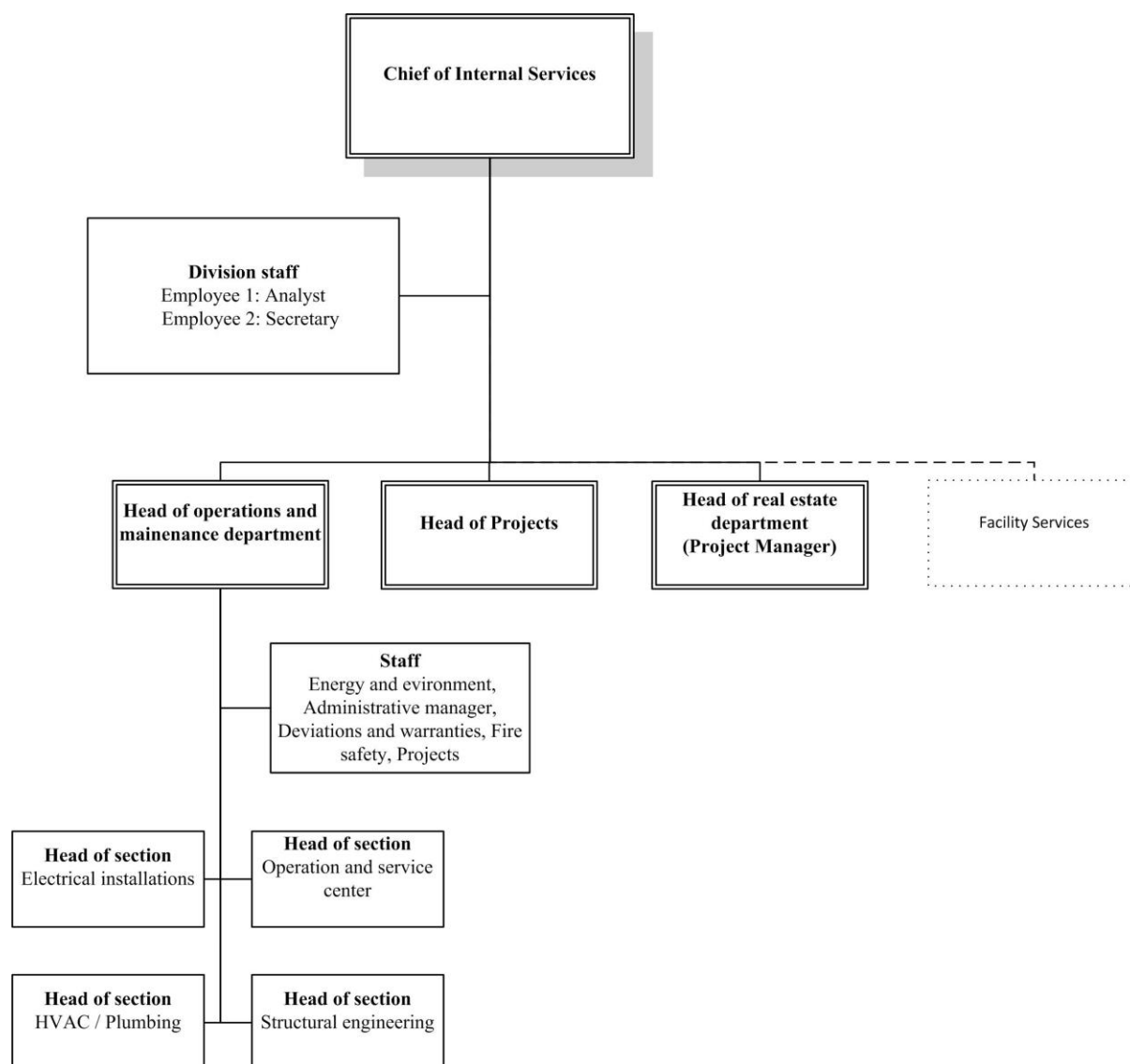


Figure 10: Organizational chart for the FM organization at (Ahus, 2014e)

4.2.3 Macro Environment

The Norwegian hospital sector is characterized by the fact that most hospitals are publicly owned. There are some privately owned hospitals, but these are often smaller and more specialized. As a result of most hospitals being publicly owned, all Norwegians have the right and the opportunity to free treatment, whether they are insured or not.

The Norwegian hospital sector is very politically regulated. This means that the different hospitals receive an annual amount of public funds that shall cover operation and development of the hospitals. The annual amount awarded by public funds puts restrictions on what hospitals can do, since they have no alternative sources of income, such as donation of money. If the hospital have deficit, public funds have to cover it (Interview with head of real estate department).

Even if the hospital is publicly owned, it still has to go through the same regulation processes as a private organization when constructing new buildings. This process is very time consuming, and it is not affected by the economic climate.

The hospitals can individually choose how the allocated money shall be distributed, but all purchases must be made in accordance with public procurement. Public procurement imposes strict requirements on the preparation, execution and completion of purchases, when it comes to extensive documentation, special announcements, deadlines and contracts.

The numbers of patients for the hospitals is politically regulated. The different hospitals are assigned an area that they must cover health and social services.

4.3 Financial factors

The main purpose for public institutions in Norway is to serve the society. For Ahus, their primary purpose is to provide health care to the Norwegian people, in other words is Ahus not a profit organization, although the hospital works toward financial requirements. Since Ahus is publicly owned, it is the SENRHA's responsibility to cover any deficits the organization may have. In those years the bottom line of Ahus is positive the real estate department gets more money, but this has not happened the last years.

Every year the SENRHA allocates funds for the real estate department of Ahus to finance all new construction projects and the costs related to operate and maintain the buildings.

According to the head of the real estate department (interview 15.05.14) and the head of operations and maintenance (interview 28.01.14) Ahus annually receives around \$12 million

to invest in facilities (new construction projects) and around \$18 million for operation and maintenance.

The real estate department at Ahus is free to distribute the allocated money as they please. Once a month, the finance department at Ahus gives financial reports to SENRHA. Ahus have no other sources of income than public funding, since they are not allowed to borrow money or receive donations (head of real estate department 15.05.14).

According to the head of the real estate department (interview 15.05.14) Ahus made a 5-year plan for their buildings that they recently have delivered to SENRHA. In this 5-year plan the real estate division has described possible new construction projects and how they are going to maintain the existing buildings.

4.3.1 Procurements

In Norway, all public organizations are under public procurement rules (Nærings- og fiskeridepartementet, 2007). This means that all procurements above a certain amount have to go through a competitive bidding process. Depending on the amount, the procurement need to undergo competitive bidding from at least more than one provider, and for really big procurements the bidding process has to be posted nationally. Higher amounts require more bidders, and the requirements are set by the government. As a result of this, procurements of goods and services in public sector is a more complicated and time consuming process compared to private organizations, but it is regarded as necessary to avoid corruption.

4.3.2 Investment committee and procurement restrictions

Investment Committee

According to the head of operations and maintenance (interview 28.01.14) Ahus has an Investment Committee that gives recommendations to the hospital management about which projects that should be implemented.

This Investment Committee consists of one representative from each division at Ahus (not necessarily the leader), senior safety representative, representatives from the real estate

department and the operation and maintenance department. In addition, the finance department is representative and the CFO is the leader for the Investment Committee.

The representative at each division is responsible to collect and make a priority list of needs (construction projects and equipment). This list needs an internal approval from the management level before they can send it. The Investment Committee collects the priority lists from each division and starts to evaluate the needs against each other.

According to the head of real estate department (interview 15.05.14) is the evaluation process very democratic, since all the divisions are represented and have the opportunity to give input. Finally, the Investment Committee makes a list of prioritized project, within the budget, and sends this to the hospital management for the final approval.

According to the head of real estate department (interview 15.05.14) is the Investment Committee now working with the investment budget for 2015, which is \$12,5 million. The first thing the Investment Committee must consider is which projects that are planned in the 5-year plan for 2015. If it is planned to invest \$1,5 million in one construction project and \$1 million in new equipment, the hospital only have \$10 million left. Ahus is not able to conduct all the need from every division because of financial constraints. In 2014 was it proposed projects for \$43 million and the budget was something near to the 2015 budget.

For project under \$16 000 must the division process these internally, since any amount under \$16 000 is seen as operation cost and not investment.

Most of the procurement of services goes through the framework agreements that Ahus is committed to.

All approval of procurement and orders follows the limitations in the authorizations booklet of Ahus. This authorizations booklet gives an overview of limits of purchasing and orders for the various management levels Ahus.

The leaders at level three, for example the head of the real estate department and the head of operations and maintenance, can only approve invoices up to \$85 0000. Level two leaders, which the chief of internal services belongs to, can approve invoices up to \$850 000. Every invoice over \$850 000 has to be approved by the CFO and if they are over \$1,6 million have to get approved by the board of SENRHA. In other words, Ahus has full authority to approve for projects and procurements up to \$1,6 million.

According to the head of real estate department (interview 13.01.14) all procurements has to be done through a procurement program from Oracle. This program makes every purchase and order traceable. By using Oracle can get information about who made the purchase or order and from which supplier. In addition, the supplier assured that your order is ok, because the supplier must have a reference number to invoice Ahus.

4.4 Project process – Life cycle

1 Request

When a department at Ahus has a need for more space, the first step in the process is to get an approval from their division management to start the projects. If the division gets an approval from the management level, the customer (department) can send in a request with their needs through an internal data system.

2: Feasibility study:

When the request is received by the real estate division, the project manager starts a feasibility study. The project manager will analyze if there is any available space and how the different departments use their space. The project manager spends a lot of time on space management, as Ahus is dependent on using their areas as effectively as possible, because of lack of space. Therefore, one of the most important tasks in the feasibility study is to control if the different departments at the hospital have the right space in relation to proper use.

According to the project manager (interview 13.01.2014, it is rarely any vacant space at Ahus, so situations where it is possible to just move a requesting division right in does not arise.

This means that when there is a need for more space, another department has to move.

The project manager states that the most important criteria in an evaluation of moving a department is the distance to the department's support services. For hospitals, an efficient operation is critical and therefore the departments have to be located close to their support services.

As soon as the project manager has found a possible location for the requesting department or clinic, she conducts a rough estimation of cost for the whole moving process.

3: Evaluation:

When cost calculation is done, the budget is sent to the requesting department or clinic. The director overlooks it and makes a decision whether to proceed with the project or not. If the director approves the project after evaluating the costs, the director of the requesting department sends the project to the investment committee.

The investment committee's task is to make a recommendation on the prioritization on reported projects. It is then up to the hospital management to decide, based on the advices from the investment committee, which projects that will be conducted and when.

The projects that get approved by the hospital management get a project number. It's first when a project gets it project number, the project can be considered as a real project.

Project number: If the project meets the management team's requirements when it comes to infrastructure and the technical demands, the project gets approved. As soon as the project is given a project number, the project manager gets the project back and makes more accurate cost estimates.

4: Design phase

As soon as the project gets a projects number the design phase starts. The project manager now has the overall responsibility for the project until it is handed over to the operation and maintenance division. In this phase, the project manager starts to collect information about the infrastructure to make sure that the project can be conducted.

When the project is deemed feasible, architects, consulting engineers and building commissioning are engaged.

The project manager also makes sure that technical consultants from the operation and maintenance division gets involved during the design phase. This is usually representatives from all technical disciplines.

These consultants conduct risk analysis of the different technical systems and then give recommendations on how the project should be carried out, on the basis of infrastructure, construction phase, and daily operation, In addition to this, they also set requirements for the project manager on deliverables that need to be met for their department to take over the facilities after construction. These requirements typically include technical specifications and documentation etc. If these requirements are not met, the operation and maintenance department will not accept the facilities in the handover process.

5: Starts the contracting process

When the necessary documentation is finished in the design phase, the project manager initiates the contracting process. In the contracting process the hospital has to follow laws for public procurement.

According to the head of real estate department (interview 13.01.14) has Ahus made arrangements to bypass the process of public procurements by having framework agreements. Ahus have today their own framework agreements when it comes to electrical, construction, plumbing (mostly focusing on ventilation, separate framework agreement for pipes and sprinklers), fire safety and consulting services within HVAC/plumbing. In addition to this, Ahus is now working to sign a framework agreement for signage.

Within each framework agreement, Ahus has signed three different suppliers. These three suppliers are ranked by number 1, 2 and 3, where number 1 always will be offered the job first. If not supplier number 1 has the capacity or for any other reason can't take the job, the job will be offered to supplier number 2. The same applies for number 3 if number 2 can't take the job. These framework agreements have duration of three years with an option for two more years.

Ahus has the possibility to use SENRHA's framework agreements in those areas that they don't have their own. Ahus especially uses SENRHA's framework agreements when it comes to broker services for sales and consultants for liquidation.

According to the head of real estate department (interview 13.01.14) procurement laws are not a barrier to make efficient procurements. This is because Ahus had good processes when they signed the different framework agreements. In the signing processes, Ahus focused on how the different suppliers could deliver, when it came to quality, time and price. As a result of this the head of real estate department thinks that the Internal Services Division can make procurements of goods and services in a fast and efficient manner, within the most important areas.

6 Construction

During the construction the project manager's main task is to oversee the process to ensure that the hospitals requirements for progression, budget and specifications are met. The project manager usually handles the project management alone and contracts consultants when needed.

7. Handover:

When the construction project is finished, the project manager and the head of the operations and maintenance division have a final inspection together. This is to make sure that everything is in order according to the requirements the facility management division had in the feasibility phase and to make sure there are no errors or deviations. If everything is in order, the project goes from the project division to the facility management division. When the facility management division takes over the projects, it's their responsibility to make sure that all necessary documentation is in place. In addition to this, the facility management division is also responsible for finding all the important drawings, quality control them, updated any deficiencies and then archive the drawings.

8. Operate and maintain

At Ahus, all of prevention work that is associated with operation and maintenance gets added into a software program called Plania. This program provides the technical operators an overview of when the different work tasks should be carried out and who that carried them.

SENRHA has no direct impact in the daily operation of any of the hospitals under them. The priority of financial and human resources therefor lies in the various hospitals.

In order to manage the budget in the best way possible, the department needs to work systematically with processes to ensure that the work tasks are done in a proper way and evaluate them later.

According to the head of O&M (interview 28.01.2014) it is challenging to operate hospitals compared to ordinary buildings. This is because hospitals have so many operation-critical systems. Ahus, for example, have operation critical systems like; Building management system (BMS), pneumatic tube systems and Automatic guided vehicle systems (AGVS). Since these systems are so critical for the operation of Ahus, the operating technicians constantly has to be hands on and have good knowledge about all the systems.

The O&M department went from a stone-age department to a very modern one when they moved into the new hospital, because of all the new systems. The operating cost for Ahus has actually increased from the old building. This is because the new hospital has so many advanced systems. According to the head of O&M the hospital saves resources in the clinics, but not costs.

At Ahus, all of prevention work that is associated with operation and maintenance gets added into a software program called Plania. This program provides the technical operators an overview of when the different work tasks should be carried out and who that carried them.

All operation work orders are categorized into:

- What is acute
- What is urgent
- What is normal
- What can wait

These work orders are standardized after how long each work task should take before the operators need to close them. The close out time is being measured and Ahus make statistics and reports to the management level at Ahus about how they are doing.

According to the head of O&M does Ahus work closer with SENRHA in terms of maintenance than operation. All the hospitals under SENRHA have in cooperation with SENRHA developed an overall strategy for how the hospitals shall work with maintenance.

Representative from the different hospitals sat together with SENRHA and developed guidelines for maintenance work. The head of O&M think it was a good decision from SENRHA to involve the different hospitals in this project, since what was determined were recognizable and therefor easy to adapt to the different hospitals.

But it is Ahus, and the other hospitals, which are responsible to integrate and follow the guidelines in their daily operation. In other words are the different hospitals responsible to integrate the overall strategy locally.

The head of O&M doesn't think that many of the other hospitals that belong to SENRHA, have gotten as far as Ahus when it comes to good systematics considering maintenance. This is based on what he is told by colleagues at other hospitals.

O&M do not report to SENRHA regarding maintenance, but they report once a year to the Working Environment Committee at Ahus. According to the head of O&M, Ahus has good systems to monitor maintenance work. For example they use a system that has the opportunity to go in to each level at every building to see when it was last done maintenance work.

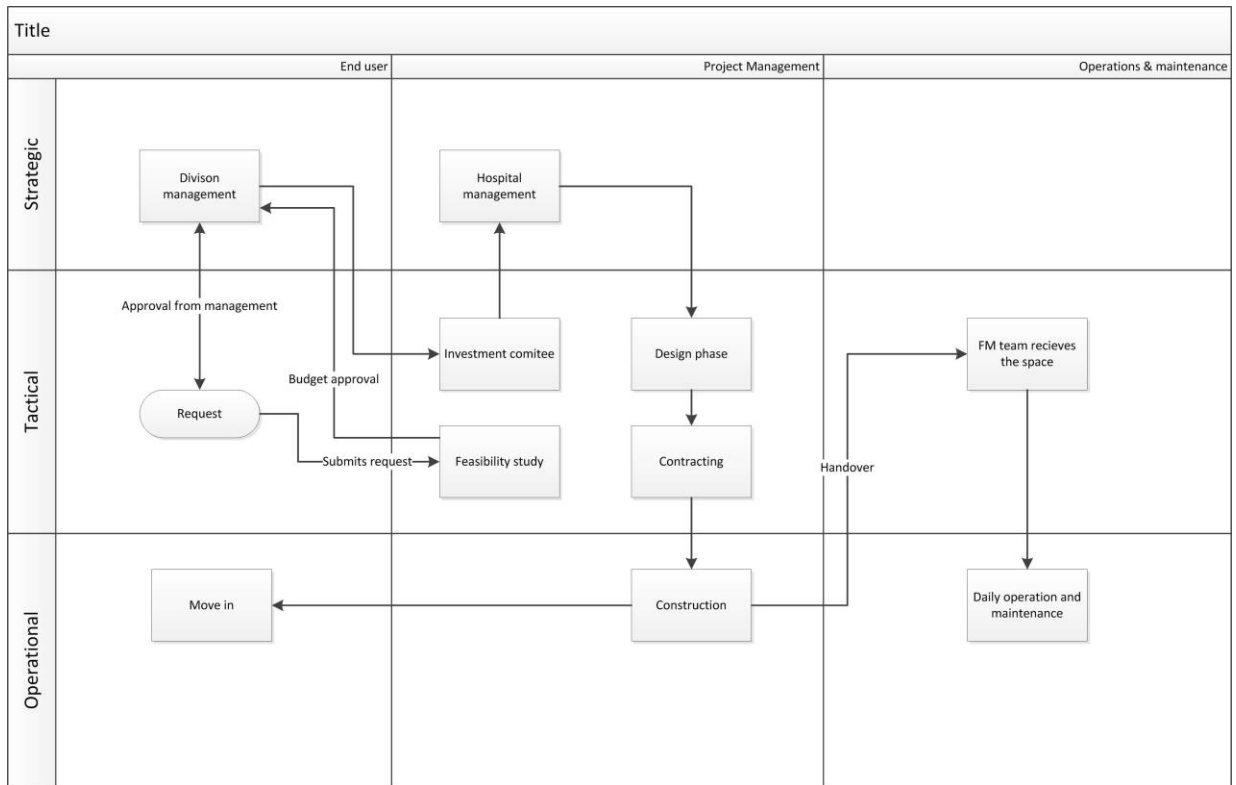


Figure 11: Process chart for construction process Ahus

Case 2 – NYP

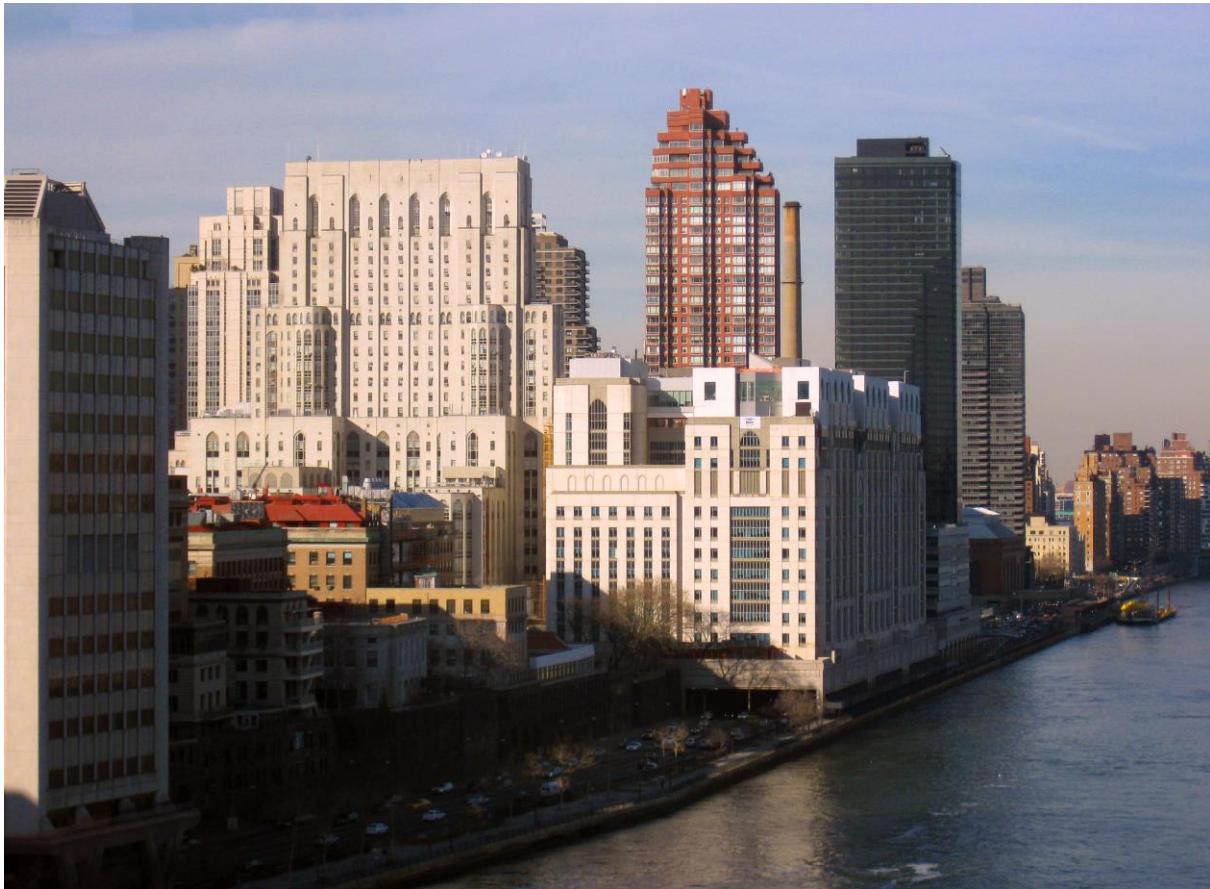


Figure 12: NYP, Weill Cornell Medical Center seen from the east river. (Picture: ©Julia Sørensen)

4.5 Case 2 – NYP

4.5.1 Hospital information – key figures

The New York Hospital was founded in 1771 by a royal charter granted by King Georg III of Great Britain and became associated with Weill Cornell Medical College. It was the second oldest hospital in United States after Pennsylvania Hospital (1751).

James Lenox, who was a philanthropist from New York, founded the Presbyterian Hospital in 1868. The Presbyterian Hospital was associated Columbia University College of Physicians and Surgeons. (NYP, 2014d)

In 1998, The New York Hospital merged with The Presbyterian Hospital to create New York Presbyterian Hospital. New York Presbyterian Hospital is today one of the largest hospitals in USA with almost 2 600 beds. In 2012 the hospital had over 2 million inpatient and outpatient visits, including 12 758 deliveries and 275 592 visits to its emergency departments. New York

Presbyterian Hospital provides medicine care in all areas of medicine at their six major centers (NYP, 2014a):

- NYP / The Allen Hospital
- NYP / Morgan Stanley Children's hospital
- NYP / Columbia University Medical Center
- NYP / Weill Cornell Medical Center
- NYP / Westchester Division
- NYP / Lower Manhattan Hospital

The New York Presbyterian Healthcare System serves residents of Manhattan, Brooklyn, Queens, the Bronx, Westchester, Long Island, New Jersey, Connecticut and several upstate New York counties. In 2012 NYP had a total revenue of \$3,9 billion and got \$80,9 in charity care (NYP, 2013a). In 2013 The New York Presbyterian Hospital was ranked as the 7th best hospital in USA by U.S News (U.S.News, 2014). The New York Presbyterian Hospital is still affiliated with the two Ivy League medical schools; Columbia University College of Physicians and Surgeons and Weill Cornell Medical College (NYP, 2014a).

NYP consists of a total of 33 buildings and around 800 000 square meters of hospital space. The two main branches of NYP is Colomбуia University Medical Center and Weil Cornell Medical Center. In the writing of this thesis these are the two campuses that are being focused on.

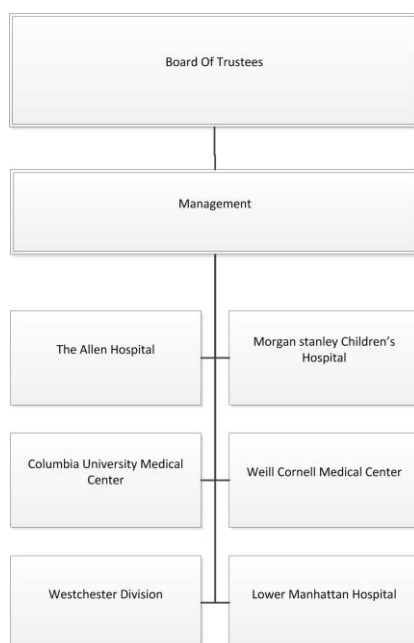


Figure 13: Overview NYP

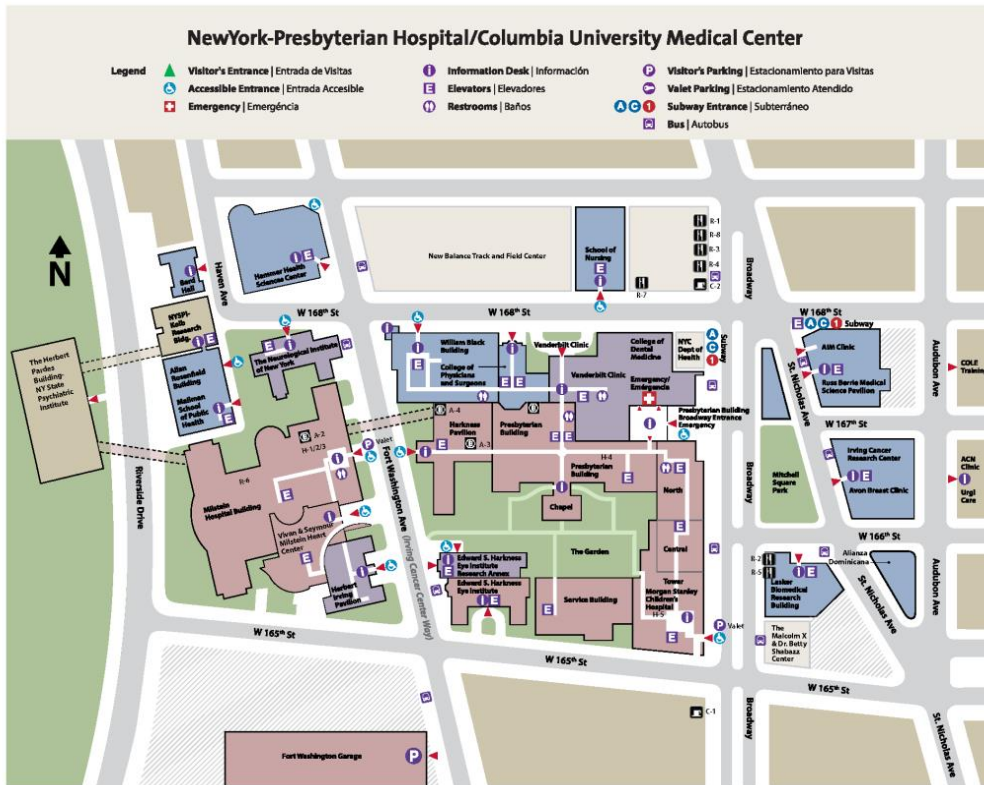


Figure 14: Map of Columbia medical (NYP, 2014a)

NewYork-Presbyterian Hospital/Weill Cornell Medical Center

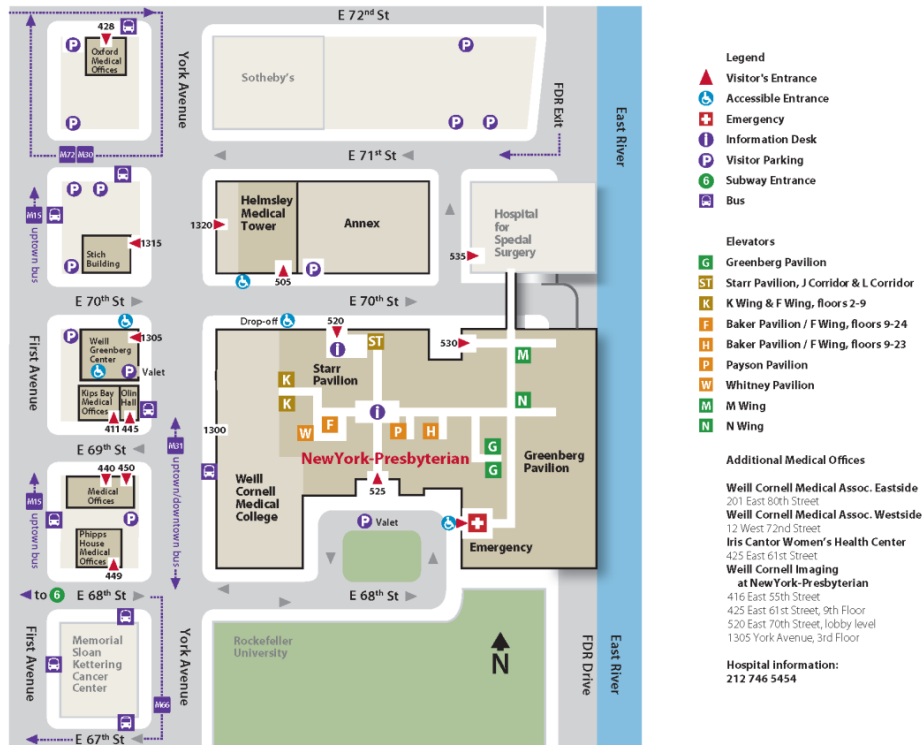


Figure 15: Map of Weill Cornell medical center (NYP, 2014a)

4.6 Organization of the facilities department

According to the director of facility (interview 23.04.2013) systems the real estate department and facilities department used to be one department, but they split up a few years ago. This department used to have almost 750 employees. Today, the facilities department has around 450 employees with diverse skills and backgrounds. There are among other architects, engineers, projects managers, carpenters, electricians, painters, plumbers, IT experts, energy managers, HR, finance, operations managers and project coordinators.

In 2013, the facilities department had a total budget of \$ 91 million. This budget included energy cost, so the total operating budget was \$ 75 million.

The facility department has five missions:

- Manage safe and compliant facilities
- Maintain appropriate space and infrastructure
- Manage project costs and schedules
- Manage the process to identify, prioritize and implement capital expenditures to best achieve the institutional mission
- Maintain financial and operational strength (interview with dir. FS 26.02.2014)

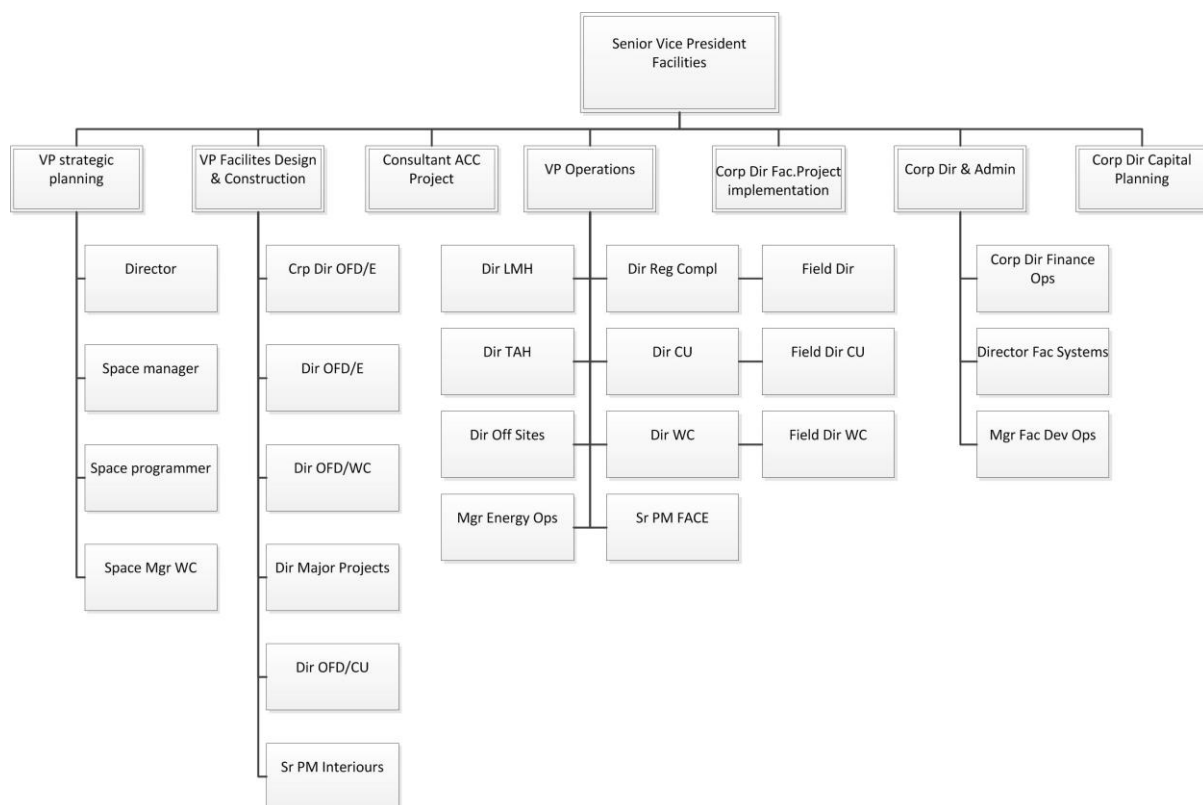


Figure 16: Organizational chart facilities department NYP

The facilities department is divided into 5 different divisions with various under divisions and two consulting positions. The five divisions are; *Strategic Planning, Design and Construction, Operations, Administration and Capital coordination & Major project implementation.*

Facilities – Strategic planning

This is a small division with only 6 employees. The strategic planning division is divided into *Capital Strategic & Budget Planning* and *Space Program Planning & Management.*

Function	Responsibilities
Capital Strategic & Budget Planning	<ul style="list-style-type: none"> ▪ Develop enterprise-wide strategic plans and programs ▪ Coordinate, review & prioritize capital needs with Senior Management ▪ Define, formulate and prioritize an implement financial assessments and related tools for proposed program/facility projects in the Capital Plan
Space Program Planning & Management	<ul style="list-style-type: none"> ▪ Determine scope & identify appropriate space for new/expanded programs ▪ Develop/maintain accurate floor plans and stacking diagrams

Table 8: Responsibilities Strategic Planning

Facilities Design and Construction

In 2013 this division completed 101 design/construction projects for \$ 303 million. The \$ 303 million was investment cost and is a separate budget than the \$ 91 million that the facility department spent in 2013.

Function	Responsibilities
Design & Construction Management	<ul style="list-style-type: none"> ▪ Develop and manage capital projects scope, budgets, schedules, contracts ▪ Interface with project clients/architects/engineers ▪ Manage roof, façade and window structures
Interior Standards Management	<ul style="list-style-type: none"> ▪ Develop and manage enterprise-wide standards for furniture, finishes, lighting ▪ Provide interiors design for capital projects ▪ Interface with project clients and vendors
Design & Construction Management- Engineering Projects	<ul style="list-style-type: none"> ▪ Develop and manage infrastructure projects scope, budgets, schedules, contracts ▪ Interface with project clients/architects/engineers, CMs, GCs ▪ Oversee building condition assessments and infrastructure project prioritization process

Table 9: Responsibilities Facilities Design and Construction

Facilities – Operations

This division is responsible for the daily operation of all the buildings at NYP. In 2013, the operation division completed 66,775 work orders, completed 259,871 square feet of FACE refurbishments, surveyed over 3.3 million square feet, updated 1,500 drawings and conducted 323 fire drills. NYP also received its 8th Energy Star Partner Award for Sustained Excellence in Energy Management and the 2013 Combined Heat and Power Award that year (NYP, 2014c).

Function	Responsibilities
Facilities Operations	<ul style="list-style-type: none"> Manage plant operations and infrastructure assets, including: preventive/corrective/reactive maintenance, inspections, work requests, in house construction projects
Energy Management	<ul style="list-style-type: none"> Manage energy contract purchasing, metering, conservation, consumption analysis, sustainability activities
FACE	<ul style="list-style-type: none"> Plan and implement aesthetic refurbishments of patient rooms and other NYP spaces
Regulatory Compliance	<ul style="list-style-type: none"> Oversee Facilities - Operations compliance with TJC, CMS, FDNY, DOH, OSHA other regulatory requirements

Table 10: Responsibilities Operations

Facilities – Administration

The finance division in the administration department has the responsibility to manage the operating budget.

Function	Responsibilities
HR/Staff Development	<ul style="list-style-type: none"> Administer, oversee Staff Development programs (training, succession planning, mentoring), HR processes and compliance Serve as key department interface with NYP Human Resources
Finance	<ul style="list-style-type: none"> Oversee, monitor and manage financial processes, reporting and compliance Oversee and manage internal audit activities/responses Serve as key departmental interface with NYP Finance
Facilities Systems	<ul style="list-style-type: none"> Oversee and manage Facilities Systems development, support and data security

Table 11: Responsibilities Administration

Facilities – Capital Coordination & Major Project Implementation

This department has the responsibility for coordinating capital according to the long term strategic plans for the department.

Function	Responsibilities
Capital Plan Coordination	<ul style="list-style-type: none"> ▪ Coordinate 8 Year Capital Plan execution ▪ Oversee annual prioritization of infrastructure allocation ▪ Issue periodic reports on Plan progress ▪ Monitor schedules and budgets for all projects ▪ Monitor contract compliance
Major Project Implementation	<ul style="list-style-type: none"> ▪ Oversee infrastructure design & construction for the ACC project; serve as point person for project commissioning and turnover

Table 12: Responsibilities Capital Coordination & Major Project Implementation

4.7 Macro Environment

U.S. health care is characterized by most of the hospitals being private owned, which means they are an organization that has to make money to be able to survive. Another hallmark of the hospital industry in the U.S. is that patients must be able to pay in order to be treated, and as a result of this most people need insurance to afford healthcare.

The VP of strategic planning (interview 17.04.14) claims that the interference from the local government has been lessening over the 35 years she has worked in the hospital business. The hospital sector used to be more regulated, as the local government was responsible for all levels of health care. Over the years the responsibility has shifted more over to the hospitals. The local government in NYC is still able to interfere in what the hospitals are building, and most construction projects has to be approved by the local authorities. The authorities are mainly concerned with what services the hospitals provide, but do also regulate on size.

The VP of strategic planning claims that the local government is adapting to the economic climate. For example, during the financial crisis in 2008, it was in the local government's interest to give construction projects approvals to ensure that construction projects were processed faster. This made sure that it was high construction activity during the recession and many people kept their jobs. In good economic times the process slows down and all construction projects must go through all the normal steps, which takes from 1-3 years.

All the NYP hospitals are located in Manhattan, with the advantages and disadvantages that entails.

A major advantage is that it is a huge market for patients, because of high population density and few other competing hospitals in Manhattan. Another advantage is the opportunities for getting donations, being located in one of the wealthiest neighborhoods in America.

A major disadvantage of being located on Manhattan is the cost of real estate, there is no unused land and the process of acquiring new land can be very long and costly.

4.8 Financial factors

The VP of strategic planning (interview 17.04.14) said that NYP is a not for profit organization. It means that whatever the amount the hospital makes at the bottom line (after paying all expenses) is put back in play, instead of being paid out as dividends as in traditional companies. According to the director of facility systems (interview 23.03.14), NYP has an average annual profit margin of around 2%. Although 2% is a low percentage, the bottom line constitutes a lot of money, since the hospital's has a high turnover. To put the 2% in context of the revenue, the bottom line is almost the same amount as NYP use yearly to operate the hospital (Maintenance, upgrades, equipment etc.).

Every 8 years NYP develops an 8-year plan for their buildings. This 8-year plan contains which building that needs development, how to maintain them and which construction projects that shall be conducted during this period.

In those cases NYP needs to build anything new or renovate a space, they have three different ways to finance the construction projects: (1) borrowing, (2) philanthropy and (3) bottom line. According to the VP of strategic planning NYP has the opportunity to borrow more money than they do, but the hospital is a risk-averse organization when it comes to borrowing. NYP usually borrows in times when the interest is low, so they can use the borrowed money to projects and invest the money from the bottom line to make an even bigger bottom line. They usually use a financial structure of 1/3 borrowed money, 1/3 equity and 1/3 donated money in construction projects.

According to the VP of strategic planning (interview 17.04.14) NYP is big when it comes to philanthropy. The hospital has a large pool of rich people who are patriots of NYP. For example the board is made up of around the 50 richest people in the country. Most of these board members run big organizations and they have a big network of other wealthy people who can help to finance different construction projects. The majority of the board members are users of NYP, so they want to bring in wealthy people to the table that can contribute with capital to make the hospital as best as possible.

In some cases, the donors want to give to specified projects, because something happened to them. When a potential donor shows interest in donating money, NYP tries to package a

project that can fit theirs and the donors need. But sometimes this does not correlate. In those situations do NYP conducts the projects that the donor want to donate to anyway, since the VP of strategic planning thinks that money is too good to throw away.

Some of the board members are more concerned to give to projects that NYP needs instead of projects that have a personal meaning to them. As an example of how important donating money is to finance construction projects, one can use the ambulatory center that NYP is building right now. The whole construction project costs \$1,1 billion. To finance the project has NYP received \$675 million in philanthropy and \$500 million is borrowed money. The leftover of \$75 million is money that is set aside for operation and maintenance.

The donation money often gets spread over several years. For example when David Koch donated \$100 million to a project in 2014(NYP, 2013b), the money will be spread over 10 years. In the meantime NYP spends borrowed money to finance the project, and as the donor money comes in will they pay back the borrowed money. When the project is completed, NYP doesn't owe anything and they can start the next plan without loan. In other words NYP uses the borrowed money to float the donors programs. For projects that still have loan after it is completed, NYP tries to sell them to potential donors for several years after it is finished.

Projects at NYP are divided in to express projects and regular projects. Express projects are smaller projects with a cost smaller than \$100,000. These projects are approved and paid for by a sponsor, which typically is a COO, CEO or SVP. As the name implies these projects are done on an ongoing basis does not need to go through the full approval process.

Regular projects are projects larger than \$100,000 or projects that don't have an identified funding source. A Capital and feasibility group and an Asset Strategy group are responsible for evaluating these projects, in the context of the annual capital budget cycle.

4.8.1 Capital and feasibility group

NYP has created a group that evaluate which construction projects that the hospital will implement and not. This group is called the capital and feasibility group and their job is to

collect all the needs and prioritize them. The projects that are being evaluated have already been prized out in the feasibility study.

According to the VP of strategic planning (interview 17.04.14) the evaluation process is a very democratic process. This is partly because the COO's from each of the campuses participates in the evaluation process. According to the VP of strategic planning there are positive and negative aspects of having all the COO's as participants in the process. The positive aspect is that they know what their campuses need since they work there. The negative aspect is that the evaluation process is very slow, since there are so many different opinions.

When NYP put an 8-year plan together, the capital and feasibility group start with creating a priority list of all potential projects. Then they calculate the cost of hold their exciting campuses together and what they need for renovations and new additions the next 8 years. According to the VP of strategic planning (interview 17.04.14) this is usually a bigger amount then what they want to take a risk on. What usually happen is that the group has to go a step back and re-work each priority. When the capital and feasibility group has made their final decisions, about which construction projects that shall be conducted and not, they present the plan to the board for an approval.

4.9 Project process – Life cycle

Description of processes and the parties involved. Apply life cycle model and create timeline for project.

NYP has developed an 11-step process guide for construction projects. This is meant to standardize the process and enable new and uninformed parties to understand the processes.

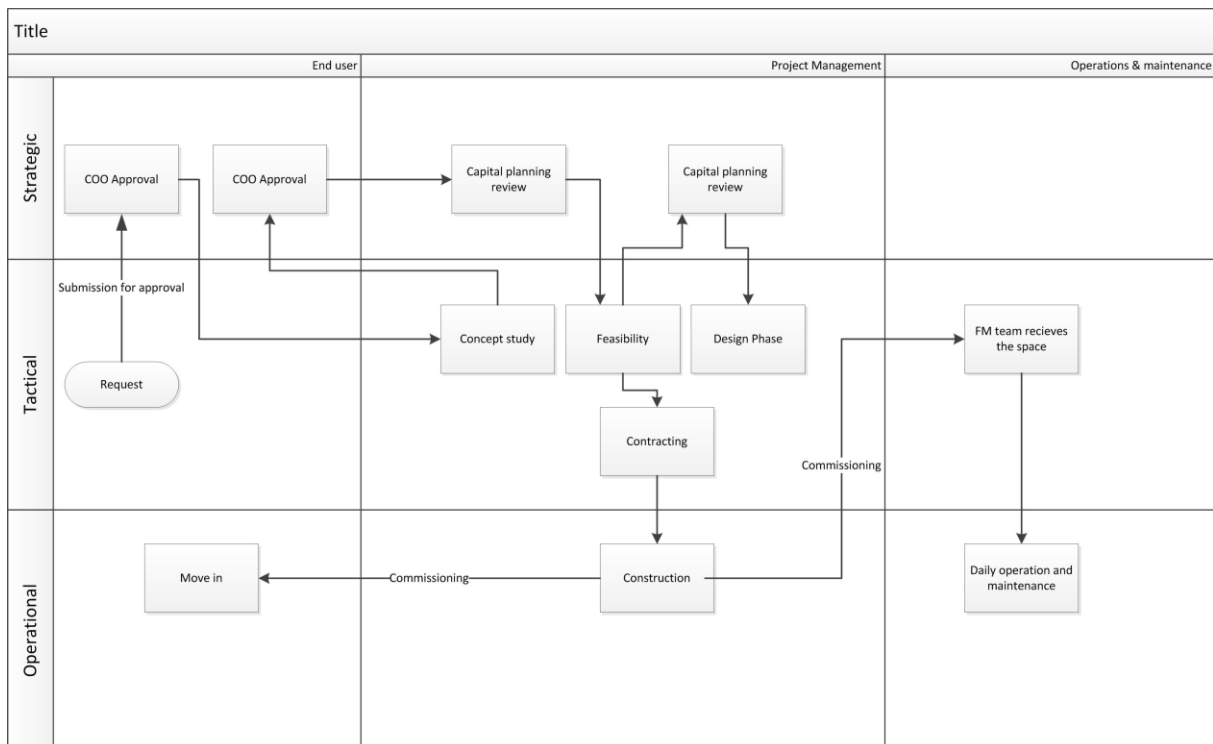


Figure 17: Step overview (NYP, 2014b)

Step 1 – Preliminary request

In this first step the purpose is to establish the need for a new project, to present the business case for implementation and to gain approval to proceed to step 2.

When the need for new space occurs, the customer submits a request form.

The preliminary request is then handed over to the strategic planning division for revision. When the request is approved it is forwarded to the COO who will approve/disapprove the request and assign a project administrator from the facilities- or service department. This project administrator has the responsibility to identify a funding source and provide review comments.

Step 2 – Concept study

In the concept study step, the purpose is to define the project scope and develop a concept estimate and -schedule.

Roles:

On the strategic level, the COO is responsible for confirming funding and to identify and confirm source of seed money to conduct a feasibility study. The source of seed funding can for example be senior management or a fund.

The project management is responsible for providing a concept budget and schedule, identifying decanting space and to keep client informed about design and construction issues in the project. The end user develops the program requirements.

The project administrator (PA) identifies and confirms project funding along with the COO. The PA in addition has the responsibility to keep the client informed about strategy, business plan and impact of the project.

An internal consultant team, consisting of people from different divisions involved in the project provides cost estimates and schedules for the project. According to the director of facilities operations (interview 18.04.2014), getting all the trades involved in what they are supposed to be involved in is tough. Especially when you have people who have been here a long time and are set in their ways, or typically if the project manager doesn't know who right person is, they won't always reach out for that person.

Step 3 – Feasibility study

The feasibility study is where the scope of the project is finalized, baseline schedule and budget is defined, and approval for funding is obtained. This step starts when seed money is obtained.(NYP, 2014b)

The project manager hires an architect and external consultants to look at the options for the space. The project manager is responsible for handing over all relevant information regarding the facilities. This includes drawings, system information, budgets, schedule and more.

Roles:

Project management:

In this step the Office of Facilities Development (OFD), and Capital Asset Planning and Development (CAPD) teams handle the project management. They act as the primary contact point for the project and handle the flow of information between the involved parties.

They schedule deliverables and assign responsibilities, and contracts external consultants.

The PM creates a budget for the project which is submitted to the EVP who approves the project and funding.(NYP, 2014b)

Client

The client has to provide program requirements to the OFD and to sign off on the scope, schedule, and drawings & program.

Consultants

Internal and external consultants provide scope, schedule and budget information. Typical consultants involved in a project are IT, security, food service, fire and safety, housekeeping and facility operations. They are responsible for providing the PM with the necessary information regarding their field of expertise.

Step 4 – Schematic design

The schematic design face has several purposes. The functional space program is to be validated. The project scope is aligned with regulatory requirements. Plans and systems narratives for client sign off and cost estimating is developed. Budgets and schedule are validated.

Documentation is submitted to the department of health (DOH) for approval, the purpose of CON's is for the state to survey construction projects, to ensure that the health services in the city are balanced and that available funds are not wasted.

Project management

According to the project manager (interview 21.03.2014) this is the step when the project really starts to get going. Many different parties get involved and the project is starting to form.

In this step the Office of Facilities Development (OFD) handles project management alone. Their main responsibility is to act as the main contact for the project, this means scheduling meetings, setting expectations for deliverables, validating budgets. Specifically for this step the project management has to initiate a kick off meeting and to begin dialogue regarding move in logistics (step 10 – move in). (NYP, 2014b)

According to the VP of facilities operation (interview 18.04.14) NYP has a lot of challenges with their campuses since they are built in different time ages.

Project administrator (PA)

Represents the client. Keeps the client updated and aligns user goals/design solutions with hospital goals. The PA is also responsible for approving submission of documents to the DOH.

Client

The clients attend weekly project meetings and provide spatial and functional requirements.

Consultant Teams:

Internal team:

The internal consultant team is responsible for aligning client goals with NYP standards. They are also responsible for providing and maintaining budget and schedule, value engineering options and recommendations, and system information and requirements to the external consultants.

External team

The external consultant team develops work plans, survey existing conditions, present design solutions, and options and prepares material submission to DOH.

Contractor

The contractor is responsible for providing constructability reviews and cost estimates. They also assist and value engineering and develop construction schedules. A construction manager is hired in this step to oversee the construction process.

Regulatory

The office of regulatory planning and policy development (ORPPD) is responsible for guiding the regulatory process and submitting approved documents for department of health (DOH) / certificate of need (CON) approvals.

Step 5 – Design development

In this step the purpose is to complete design drawings. This includes plans, elevations, sections, specifications, furniture, finishes, equipment, and building systems. Program, schedule and budget are monitored as well.

This step can be difficult to distinguish from step 4 as it is a natural continuance from the preceding phase (NYP, 2014b)

Step 6 – Construction documents

In this step the purpose is to finalize documents for competitive bidding. The process is managed by the office of facility development, which collects information and budgets from the involved parties. The construction documents are approved by the project administrator and end user, and then sent to DOH by the ORPPD. This is the final submission of documents and should now obtain all necessary approvals. (NYP, 2014b)

Step 7 – Bid & Award

The purpose of this step is to obtain competitive bids from contractors. The construction manager evaluates the bids. Construction services that are not under contract to the general contractor (GC), such as IT/AV/Telecom, are evaluated by the internal consultant team. According to the director of facility systems it is not unusual to have five or six different contractors on one project. (NYP, 2014b)

Step 8 – Construction

The purpose of this step is to complete the construction of the project, and to obtain regulatory approval to occupy the new space. The department of health and department of

buildings usually give these approvals, but there may be other approvals needed for special projects. (NYP, 2014b)

The project manager's main task in the construction process is to oversee that the project meets the hospitals requirements.

Step 9 – Commissioning

In this step the purpose is to ensure that all equipment is operational and that the staff is fully trained in the use of this equipment. This is also the step where operations and maintenance takes over the facilities from the project team. In this process all documentation is handed over and approved, facilities are inspected and O&M are now officially responsible for the facilities. According to the director of facility operations (interview 18.04.2014) at the Weill Cornell campus, a common problem in this process is that the projects are not fully complete, and as a result he has to put money in after the project is supposed to be finished. He says this usually is a result of projects having a dedicated amount of money, and this sometimes leads to cutting some corners in the construction. He also mentions that some contractors sometimes saves costs for themselves by doing bad work and choosing cheap solutions, and in these cases it can take long time before the effects show up. An example can be badly isolated cables behind walls, or badly planned ventilation controls.

To better the handover the process NYP has incorporated commissioning agents on every project. They are external consultants that represent the interest of O&M, but are paid for by the project manager. Their job is to verify every piece of mechanical equipment and verify that every aspect of the project is done according to what was designed. They are also responsible for the as built documentation being correct and handing the documents over to O&M. After incorporating the commissioning agent one or two years ago, NYP has seen real improvements in the handover process. (Interview with director of operations & maintenance 18.04.2014)

Step 10 – Move In

The end user is moved from their existing facility to their new facility. This process starts early in the project and develop during the project. The project manager has the overall responsibility for handling this process with the client.(NYP, 2014b)

Step 11 – Close out

The purpose of this step is to close out the project financially and operationally. According to the director of facility systems (interview 18.04.2014) the process of closing out the projects is something they are working to improve. They have had instances of money sitting in closed projects for a long time after they are finished. NYP has now implemented a computer system which shows all projects, who is working on the projects, account balances and more. These systems will hopefully eliminate the problem of “dead” money in finished projects.

According to the project manager for construction projects (interview 21.03.14) is it common that an external consultant gets hired to take care of the construction management. In this way, the project manager from NYP is more like a mediator, who is responsible to report internally (to the hospital) and follow up the project through the external construction manager. One of the most important experience the project manager for construction projects (interview 21.03.14) have learned, is that a project manager use a lot of time to constantly check if the standard of construction meet the requirements of good patient care.

Evaluation

NYP runs post occupancy evaluations on all projects, usually six months after the move in. According to the project manager of interiors, who is also responsible for Post Occupancy Evaluations, this gives valuable information on what works well and what doesn't work quite so well.

It is important that the information collected in the POE is brought back in to the organization to give the project managers and operating personnel the opportunity to learn from past mistakes. At NYP this experience is shared with the organization at weekly staff meetings, and the documentation of mistakes and solutions from past projects are put in to the project documentation.

According to the project manager at Columbia this is not always looked in to as

The project manager's role

NYP has around 30 project managers hired internally. But NYP has a number of contract managers that they can put in to projects if it is a demand for more help. These contract managers are usually from small firms that serve a couple of the hospitals, so they are very flexible to use and move around. Some of them are almost permanent, since some of them have been working at NYP hospitals for several years.

The project managers at NYP do not build or design anything. According to the Director of facility systems the main task for a project manager is to coordinate the project. The project managers are responsible for:

- Financing the project (also seed funding)
- Get all the cost estimates from the consultants and the contractors, and then issue the contracts to all the different parties
- Develop and keep the budget during the project (financial management)
- Ensure that the project keep the overall schedule
- Every work task is done in a proper way in terms of the procedures

According to the project manager for construction projects (interview 21.03.14) it is common to hire an external consultant to take care of the construction management. In this way, the project manager from NYP is more like a mediator, who is responsible to report internally (to the hospital) and follow up the project through the external construction manager. One of the most important experiences the project manager for construction projects (interview 21.03.14) have learned, is that a project manager use a lot of time to constantly check if the standard of construction meet the requirements of good patient care.

At NYP do they charge the management fee from the project budget. This means that the salary of the project manager becomes part of the costs of the specific project that he / she works with. This is called in-house fee.

5

DISCUSSION

AHUS HOSPITAL & NEW YORK PRESBYTERIAN
HOSPITAL

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5 Discussion

Introduction

This study explains how a construction project is conducted at Ahus and NYP and the various factors that affect the process. FM theories by Sæbøe and Blakstad (2009) say that construction projects is out under the banner of *Space and infrastructure* within FM.

The division of internal services at Ahus is in this chapter often called the FM department. This is done to benefit the reader as there are constant comparisons between two FM departments.

5.1 Macro factors

Ahus and NYP are located in different countries. This implies that they are affected by different macro factors, especially when it comes to politics dependence and how the hospital sector is built up.

Political factors

Ahus is very influenced by political factors since the hospital is public owned. They therefore need to adapt and relate with the framework the government makes for the hospital sector, in terms of operation, public grants, public procurements, and which geographical areas they have to supply with health care services. This makes them more vulnerable to political changes than NYP.

NYP, on the other side, is not as political dependent as Ahus. They can in many ways operate like traditional companies. Since they are a private owned hospital are they responsible to bring in their own income without so much public support as Ahus. This means that NYP is more exposed for competition.

Insurance

There are some big differences around how the hospital sector is built up in Norway and USA. In Norway has every citizen the right to free health care. USA does not offer free health care on an equal basis as Norway. In USA the patients have to pay for their health care services and it is very expensive if the patient doesn't have any insurance. Therefore, is it common that the citizens in USA buy health care insurance.

Number of patients

How Ahus and NYP get patients is very different. Ahus has a responsibility to cover a geographical area of people. This means that it is a fixed amount of people they have to provide health care services to.

NYP, on the other hand, doesn't have a geographical area they have to cover, although most of their patients live on Manhattan. This means that NYP doesn't have a fixed amount of people they have to provide health care services to. Capacity and resources are therefore the only regulations to the number of patients NYP can take care of.

Different building mass

Ahus and NYP have different standards for their buildings. As mentioned in the introduction was Ahus one of the most modern hospitals in Europe after it was built in 2008. This means that the infrastructure at the hospital is fairly new.

A lot of their buildings are old and this affects the construction process. This is because the infrastructure is so old and often needs to be replaced when they are renovating rooms or buildings. NYP tries to identify the condition of the infrastructure in the feasibility phase, but when the renovating starts, it often shows that the infrastructure was older than they projected. This often leads to higher building costs than initially estimated.

Interference from public authorities

The construction business is affected by the economic cycles, because the investment amount for construction projects often is of a considerable character of money. Some countries implement an expansionary fiscal policy during economic downturns. This means that the government initiates several construction projects in order to keep people employed so the economy can stabilize.

According to the VP of strategic planning (interview 17.04.14) is the public authorities in the United States very adaptable to economic changes. This is because they are good to regulate construction project activity after the economic conditions. The VP of strategic planning has experience that the planning process for construction projects is shorter when the economy is bad, since the government is quicker to give approvals.

The time to get approval for construction projects for Ahus is quite stable, no matter how the economy is.

The public authorities interfere in construction projects for Ahus and NYP. Especially when it comes to if construction projects meet the requirements in the local plans, and if the construction projects are conducted in accordance with national laws and regulations.

For NYP the local government interferes in the products they are building. The DOH has the responsibility to regulate which health care services are being built in the local society. To obtain approval from DOH, according to VP of strategic planning, the hospital has to build something that the society needs. In Norway there is no political interference in to what Ahus choose to construct.

5.2 Organizational differences

Different type of ownership

Neither Ahus nor NYP has what Sæbøe and Blakstad (2009) calls a real estate management (REM) ownership. This is because these two hospitals do not own their buildings to achieve the highest possible return.

Ahus has what Sæbøe and Blakstad (2009) describe as a public ownership. This is because the Norwegian government owns the building and the meaning of the ownership is to cover a public service.

NYP has a corporate real estate management (CREM) ownership, since their buildings are private owned and the ownership is connected to the value of the core business rather than creating financial value (Sæbøe and Blakstad, 2009).

Organization

The three level management model (Haugen, 2008) shows that FM related work tasks occur at three different levels within an organization.

Although Ahus is governed by the SNERHA, the department of internal services at Ahus is responsible for all work tasks at strategic, tactical and operational level. A quote to sum up how little Ahus and SENRHA has to do with each other in construction projects, is from the head of the real estate department (interview 13.01.14) "I do not need them in the daily work".

At Ahus is the hospital management the supreme body for approval of construction projects. Although it is the real estate department, in collaboration with the investment committee, which is responsible for developing long-term plans for their buildings, the hospital management must approve the plans. The SENRHA has nothing to do with the approval of the long-terms plan or other construction projects related work-tasks. The only time the SENRHA is involved is to approve procurements over \$1,5M.

The real estate department at Ahus takes care of work tasks at a tactical level. For example they follow up construction and investment budgets. In addition, they manage the various construction projects. The head of O&M and the head of Real estate department have much responsibility at Ahus. This is because there are so few employees in this department, which means that there are few decision makers.

The O&M department, in the FM department, at Ahus is responsible of producing the facility services the hospital needs. This means that Ahus has an internal FM model (Sæbøe and Blakstad, 2009). According to the head of O&M at Ahus is it very important that they have their own personnel at operational level. This is because they need employees that have knowledge and experience to operate and maintain the mission-critical systems in the hospital.

The FM department at NYP is also involved in the work at strategic, tactical and operational level. The fact that NYP works at strategic and tactical level is natural since they are an independent organization. It is not so natural for independent organizations to take care of the operation by themselves.

At NYP the board is the supreme body for approval of construction projects. In the same way as at Ahus, the capital and feasibility group gives input to the strategic level by giving recommendations on which projects the hospital should conduct. According to the Dir. Of FS at NYP the capital planning and feasibility group work on a strategic level because it is all about optimize capital investment decisions.

One example of an important work task that has occurred at strategic level at NYP in recent years is the 8-year plan they have made for their buildings. Another example is the detailed

guidelines NYP has developed for their construction project. NYP has used a lot of time and resources to implement the guidelines to the project managers at tactical level.

Those who work at the tactical level in the FM department at NYP has in general the same work tasks as those at the tactical level at Ahus, regarding construction projects. NYP has their own project managers who manage and administrative the construction projects. Another important work task for NYP at tactical level is to follow up and measure work tasks at operational level. This data do they use to conduct benchmark processes.

NYP also has an internal FM department (Sæbøe & Hunnes, 2009), since they produce the facilities services for NYP internally.

Ahus and NYP have both what Sæbøe & Hunnes (2009) characterizes as central FM organizations, but there it is a difference between them. At Ahus happens all work-tasks at strategic, tactical and operational level centralized. This is because they only have one campus. At NYP are all work-tasks at strategic and tactical level centralized, but the work-tasks at operational level happen decentralized. This is because NYP has several campuses, where the campuses have their own operation departments.

Client, customer and end user

At Ahus the hospital management is the client. This is because they act on a strategic level and is the part of the organization that pays and gives the final approval for the construction projects. At NYP is the board the client, since they are the part of the organization that has to approve the construction projects. According to theories of Atkin & Brooks (2009) will the customer at Ahus and NYP be the different hospital divisions. This is because they are the part of the organization that specifies the need and sends the request to the FM department at the hospitals. The end user at Ahus and NYP is the doctors, nurses, patients and other employees at the hospitals (Atkin & Brooks, 2009).

Bureaucracy in construction processes

The size of the two organizations reflects the bureaucracy in the construction process. The FM department at Ahus consists of few people compared to NYP's FM department. The FM department at Ahus has few decision makers and they are able to do quick decisions.

At NYP is it much more bureaucracy in the construction project. This is because they often conduct large construction projects and it is therefore more staff from NYP that are involved in the projects. This means, according to the VP of strategic planning (interview 17.04.14),

that the decision process for construction projects goes slowly, since there are several decisions makers.

Economies of scale

A big difference between Ahus and NYP is economies of scale. NYP has negotiated good framework agreements in several areas for their FM department, especially when it comes to procurement. The reason why NYP can negotiate good framework agreements is because they buy large volumes of goods and services.

Ahus, on the other hand, has no framework agreements that give them special economies of scale. The fact that Ahus is responsible for their own procurements has negative and positive aspects. The positive aspect is that Ahus can make their own service level agreements and tailor them after their needs. A negative aspect is that Ahus would have a better chance to achieve economic of scale if the SENRHA had been more involved in the procurement process for their underlying hospitals. The SENRHA could negotiate agreements with different suppliers and take the full responsibility for all of the framework agreements for their underlying hospitals. With this procurement model could the SENRHA bought in larger volume of services and goods, which means that the FM department at Ahus would have a better chance to achieve economies of scale. But Ahus has the ability to use SENRHA frameworks agreements in those areas they don't have their own.

5.3 Financial factors

Financial

How the hospitals are funded affect mainly the first phases of a project. Ahus is limited by just getting a fixed sum each year, while NYP has flexibility in being able to borrow or get money donated.

The lack of money at Ahus might one reason why they are not able to expand the facilities, and has to either take space from someone or rearrange departments on each new project.

The hospitals use similar systems with framework agreements for procurements, and representatives from both hospitals were pleased with the system of three preferred providers. The impression was that this made the procurement process easier and they developed a relationship with the providers, especially on supplies for O&M.

In construction projects NYP usually used competitive bidding processes for the contractors, and one might say they have more freedom in this process as they don't have to think about procurement laws.

Differences in spending limits for the project managers

NYP has higher limits for what is considered small projects, meaning projects that don't need to go through the investment group for approval. At Ahus the limit for such projects are \$17 000 while at NYP the limit is \$100 000. This does not seem to affect the construction projects significantly.

5.4 Project Process

Construction process

Construction processes are usually carried out quite similarly all over the world, as the process has its natural way of evolving. The processes are as a result of this quite similar, and this study focuses on differences and similarities in the processes.

When interviewing the people involved in the same processes at both hospitals, it became evident that they had very similar problems and that most of the people were aware of these problems. Both organizations have to some extent introduced measures for these problems, with varying luck.

Exploiting technical knowledge and experience

As one can see from the figure 6, the early phases of the project are when changes are the cheapest and easiest to conduct.

In both organizations a recurring problem is projects have to make better use of the experience from the operational part of the organization. Both organizations are aware of this and are trying to get the operations and maintenance team more involved early in the process. During interviews it was apparent that this problem where more emphasized by the operational representatives than the project managers. This might be as a result of the operation teams causing more work for the project managers, while the operations teams are tired of having to fix problems on recently finished projects.

This also has to do with allocation of money, as funds that should have been spent by the project manager have to be used by the operational team afterwards to sort problems. As there always is a fight over budgets and getting enough money, this is bound to cause some friction.

Post occupancy evaluation (POE)

In project management it is important to evaluate past work to learn what worked well, and what didn't. This is also the case for project management, so you don't make the same mistakes twice or miss out on opportunities for better solutions.

During the interviews with the hospitals, there was no doubt all the people involved was aware of the advantages of learning from previous projects.

The project management at Ahus claimed there was rarely any time to conduct POE's, as they had to rush on to the next project. The impression we got from operations and maintenance at Ahus was that there was a real need for improving this process.

NYP had implemented measures for POE in having one person responsible for conducting these. The POE's are usually conducted around six months after move-in to allow for some use of the facilities. In this way they are able to uncover bad solutions while the project is still under warranty, and also noting good solutions for future reference.

Hand-over

The hand-over process is an important part of the construction process where the project is handed over from the project manager to the operations and management division. This process involves a lot of documentation changing hand and the responsibility for the facilities shifting from the project manager to O&M.

From the interviews from both hospitals it seems the lack of communication between the PM and O&M in the early phases of the process often results in problems when the space is handed over. Typical problems are missing documentation, missing work, or things not being according to specifications.

In the interviews the project managers and representatives for O&M tended to blame each other for the problems in the hand-over, typically by the PM claiming the specifications was not good enough and the O&M representative claiming it wasn't built according to the specifications. One may expect that there is some truth in the claims from both parties, and that it sometimes is people related.

The impression we got was that the two parties did have problems with communication, even with existing guidelines on how the processes was to be conducted.

Closing out projects

In both hospitals they had problems with money sitting too long in projects after they were finished. In some incidents substantial amounts were sitting in projects that had had no activity in years. NYP had implemented monitoring of funds in their new facility monitoring system to be able to uncover “forgotten money” in the future. It is not clear if Ahus has made improvements to their systems in the same way.

5.5 Method

Literature search

In this master thesis there have been conducted an extensive literature research in both Norwegian and international databases to find studies, papers and articles regarding facility management in hospitals, construction processes and information about Norwegian and US healthcare.

It was difficult to find literature about FM in hospitals. There is one major study that has been conducted on Norwegian hospitals that has been a great help to this study. This work by A.K. Larssen (Larssen, 2011) is very extensive and has given us some inspiration during the thesis. We further chose to support our thesis on general FM theory and theory about construction processes.

Interviews

The authors were fortunate to gain access to a lot of good information through interviews with people in central positions at both hospitals. The interviews with Ahus were made possible through contacting the employees in the division of internal services at Ahus. Only one interviewee at Ahus chose to pull out. The supervisor established contact with the director of facility systems at NYP and he proved to be a key factor in getting information from NYP. He was able to arrange interviews with representatives from all parts of the FM organization in addition to providing a lot of information himself.

As a result of the organization at NYP being significantly larger, it was not possible to get the same amount of interviews at Ahus as NYP. There is also a chance that the information

obtained from the interviews is colored by the interviewees' personal opinions and their relation to the project management.

When conducting the interviews it was not always possible to follow the pre-made interview guide. The interviewees would often go off topic and talk generally around the hospital and the processes, in these cases the authors found it best to just let the subjects speak freely.

Case studies

In agreement with the supervisor the authors chose to study Ahus hospital in Norway and NYP Hospital in the US. There was a common interest to look at the two hospitals and their FM organizations, and it was agreed that looking at a similar process at both hospitals would be interesting. By following the life cycle of a construction project from idea to daily operation and maintenance, the authors learned a lot about the two organizations and the processes.

One drawback for the case study is that the access to interviewees and written documentation was much better at NYP and the authors were therefore able to obtain much more information about the processes from NYP than they did from Ahus.

6

CONCLUSION

DIFFERENCES AND AFFECT ON PROCESS

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6 Conclusion

In this chapter the authors will answer the problem definition.

There are many different factors that affect how Ahus and NYP organize and conduct their construction projects. In order to present the main findings of this study the authors have chosen to present them in a model.

The model shows the factors that directly and indirectly affect the construction process at Ahus and NYP. The model is structured in the same way as the discussion chapter, in that the authors have divided into macro factors, organizational factors, financial factors and process related factors.

	Ahus	NYP
Macro factors	<ul style="list-style-type: none"> - Very politically dependent. - The planning process is not affected by economic climate - New buildings which means better infrastructure - Only political interference if the construction project follows laws and regulation, and not the product. 	<ul style="list-style-type: none"> - Politically independent - Faster planning processes in bad economic times - Old buildings with bad infrastructure - Political interference in relation to laws and regulations, in addition to approval from DOH about the product.
Organizational factors	<ul style="list-style-type: none"> - Publicly owned - Small organization - Few decision makers in construction projects - Little bureaucracy in construction projects - Quick decisions - Little economies of scale 	<ul style="list-style-type: none"> - Privately owned - Large organization (Expertise in many fields) - Many decision makers in construction projects - Lots of bureaucracy in construction projects - Slow decisions - Economies of scale in many fields
Financial factors	<ul style="list-style-type: none"> - Financed by government funds - Easier to conduct early phase processes. - Unable to borrow money or receive donations to finance construction projects 	<ul style="list-style-type: none"> - Must provide for their own income as traditional companies - Costs more to implement the early stages of construction projects - Depending on borrowing money and donations to finance their building projects
Process related factors	<ul style="list-style-type: none"> - Do not conduct post occupancy evaluation (POE) of their construction projects - Public procurement - Lack of space, no opportunity to build more. Spends a lot of time moving people around 	<ul style="list-style-type: none"> - Conduct post occupancy evaluation (POE) and use the knowledge into the next project - Do not have to deal with any procurement policy - Lack of space, expensive to construct more because of land prices

Table 13: Conclusion

6.1 How the differences affect the construction process

Macro environmental factors

Political changes can affect how much money gets allocated to Ahus

Political will to speed up regulatory processes in bad economic times gives positive influence to construction projects at NYP

A large amount of NYP's facilities has old infrastructure, this leads to greater uncertainty and increased costs in construction projects.

The government has a more direct influence on what is built at NYP, meaning the government has the authority to stop projects if it is not fitting with the needs for health services in NY. Ahus does not have such limitations.

Organizational factors

As a result of being publicly owned, Ahus has political guidelines they need to follow, NYP has fewer limitations in how they operate. This simplifies the construction process in several areas e.g. procurements

NYP is a larger organization; this means they have more experts, knowledge and experience in-house. This makes it easier and cheaper to get input or help in construction processes.

Ahus can make faster decisions as there are fewer decision makers in the organization. As a result of this there is less bureaucracy in the construction projects.

NYP has achieved economies of scale on several areas, especially on procurements. This means they are able to broker better deals on supplies and services. This particularly affects the operational phase.

Financial factors

Ahus gets public funding which means they know in detail how much they have to spend each year. NYP has more uncertainty in their funding and this affects how in detail they can plan future construction projects.

Ahus conduct the early phases of a construction project more efficiently as a result of being a smaller organization with shorter decision lines. This means they have the ability to decide whether a construction project is feasible or not at an earlier stage than NYP. This makes the early phases a lot cheaper to conduct at Ahus than they are at NYP.

NYP has more sources of funding and as a result of this has more room for creativity to finance construction projects than Ahus. This gives them more freedom to conduct construction projects at any given time.

Process related factors

NYP conducts post occupancy evaluations, which gives more knowledge about mistakes and successes in past construction projects. This gives a better foundation for decisions in construction projects.

NYP has greater flexibility when it comes to procurements, as Ahus has to follow laws of public procurement.

6.2 Suggestions for further research

Based on the research conducted in this thesis, the following fields of further study are presented:

Communication between project managers and operation personnel:

Both hospitals seems to have problems with communication in the construction process, it could be interesting to dig deeper in why this is.

How is knowledge share between the different hospitals in the SENRHA:

The hospitals seem to be operating individually with no real sharing of systems and knowledge. This could be an exaggerated opinion presented in the interviews, but it is interesting if the hospitals does not benefit from being part of a larger cooperation.

Compare the POE process at different Norwegian hospitals:

Post occupancy evaluation is a valuable source of information for future construction processes. It would be interesting to see how different Norwegian hospitals conduct these (if at all) and evaluate these processes towards existing theory.

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8 Attachments

8.4 Interview guides

8.4.1. Interviews with Ahus

Interview guide with Elvira Maric

Date: 13.01.14

Place: Ahus, Norway

Role: Head of the real estate department, Ahus.

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3

Organization structure

- Can you describe the organizational structure of the real estate department?
- Is all the hospital in Southern and Eastern Norway Regional Health Authority organized like Ahus?
- How does the real estate department of Ahus work together with Southern and Eastern Norway Regional Health Authority?
- How develop the annual budgets for the real estate department of Ahus?

Construction process

- Can you describe the construction process step-by-step for building a new room
- What are the main challenges in a construction process?
- What is your role and what are you responsible for in a construction process?

Purchasing and framework agreements

- Which standardization initiatives are made for the procurement of goods and services for the real estate department?
- How is the purchase process, from input to output?
- Which amounts restrictions have health Eastern Norway Regional Health Authority given the real estate department of Ahus?
- Do you think there is a lot of bureaucracy when it comes to procurement of goods and services to the real estate department? If so, in which areas?
- How does public procurement affect purchasing and framework agreements?
- What works well and less well regarding purchasing and framework agreements?
- How does the real estate department assure the quality your purchases of goods and services?

Handover process

- Can you describe the handover process?
- What are the main challenges in a handover process?
- How do you as a project manager try to involve the facility management department in to the project?

Space Management

- How does the real estate department work when it comes to Space Management?
- How does the real estate department monitor available space?

Sharing of knowledge

How does the real estate department share knowledge internally and externally?

Does the real estate department have any focus on conducting benchmark processes?

How do you use the data from a benchmark process?

Computer Systems

- What kind of computer systems does the real estate department use for construction projects?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee want to add?

Phase 5

- Thanks for the interview

Interview guide with Alf Jørgensen

Date: 28.01.14

Place: Ahus, Norway

Role: Head of the operations and maintenance department, Ahus.

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3**About the interviewee and his department**

- What is your role in the facility management department?
- When and how does the facility management department get involved in new construction processes?
- How does the facilities management department contribute in construction projects?
- How is the facilities management department financed?
- Who makes the annual budgets for the facilities management department?

Handover

- Can you describe the handover process for construction projects?
- How are you and your department involved in the handover process?
- What are the biggest challenges in the handover process?
- Who has the responsibility (the project group or the facilities management department) to cover the cost of missing work after the handover process is completed?

Purchasing and framework agreements

- How do you experience the bureaucracy when it comes to purchasing? Is it many decision makers?
- Which standardization initiatives have been developed when it comes to purchasing for the facilities management department?
- Does the facilities management department have any framework agreements with some suppliers?

Knowledge sharing

- How does the facility management department share knowledge internally and / or with external hospitals?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee want to add?

Phase 5

- Thanks for the interview

Elvira Maric (second interview)**Date:** 15.05.14**Place:** Ahus, Norway**Role:** Head of the Real estate department at Ahus**Phase 1**

- A short summary of the most important findings from New York Presbyterian Hospital
- Inform about the tape recorder

Phase 2**Go through the construction process at Ahus step by step****Evaluation process of potential projects**

- Who are the members of the investment group?
- How is the selection process for the projects that the investment group evaluates?
- Is it a democratic evaluation process?

General information about construction projects

- What is the normal time perspective for a project, from the request until it's finished?
- How much money yearly do Ahus use on development and renovation projects?
- Has Ahus developed any 8-10 years plan for construction work?
- What are the most important projects in this plan?

Funding

- If there is an acute need for larger investment for a real estate project - How does Ahus financed this project?
- How is the funding structure for real estate projects?
- Do Ahus revise any donations money to real estate projects from private individuals or companies?

Increase income

Master's Thesis

- Do Ahus have any focus on expanding the patient capacity, in hope to be given more money from the government?
- How do Ahus work in terms of turnaround time for their patients?
- How does the real estate department of Ahus to improve the turnaround time for the patients?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

8.4.2 Interviews with New York Presbyterian Hospital

Interview guide with Matthias Ebinger

Date: 26.02.2014

Place: New York Presbyterian Hospital, Weill Cornell. USA

Role: Director of facilities systems, New York Presbyterian Hospital

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3

- What is the project manager's role in a construction project?
- What is the commission agent's role in a construction project?
- What is F.A.C.E (renovate spaces)?
- What is facility condition index?
- How are construction projects regular funded?
- What is New York Presbyterian Hospital's 10 years plan, regarding their buildings?

Phase 4

- Plan who we are going to interview from New York Presbyterian Hospital
- What kind of documentation, regarding construction projects, can Matthias send us?
- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

Interview guide with Carroll Baker

Date: 21.03.14

Place: New York Presbyterian Hospital, Columbia. USA.

Role: Project manager

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3**Construction process**

- Can you describe the construction process step-by-step for building a new room
- What are the main challenges in a construction process?
- What is your role and what are you responsible for in a construction process?

Purchasing and framework agreements

- Which standardization initiatives are made for the procurement of goods and services for the real estate department?
- How is the purchase process, from input to output?
- Do you think there is a lot of bureaucracy when it comes to procurement of goods and services to the real estate department? If so, in which areas?
- How does public procurement affect purchasing and framework agreements?
- What works well and less well regarding purchasing and framework agreements?
- How does the real estate department assure the quality your purchases of goods and services?

Handover process

- Can you describe the handover process?

- What are the main challenges in a handover process?
- How do you as a project manager try to involve the facility management department in to the project?

Share of knowledge

How does the real estate department share knowledge internally and externally?

Does the real estate department have any focus on conducting benchmark processes?

How do you use the data from a benchmark process?

Computer Systems

- What kind of computer systems does the real estate department use for construction projects?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

Interview guide with Marjorie Sobylak

Date: 16.04.14

Place: New York Presbyterian Hospital, Weill Cornell. USA

Role: Senior Interior Project Manager at New York Presbyterian Hospital

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about her background

Phase 3**About the interviewee and her department**

- What is your role in a construction projects?
- In which phase of the construction process do you get involved?
- Are you working close with the project manager during the construction project?

The interiors role in construction projects

- Why are interior architects important in construction projects?
- What are the main challenges between the project manager and the interior architect in construction projects?
- Maintenance documentation – What kind of documentation system do NYP hospital use for maintenance?
- Post occupancy evaluation – After the patients have moved in, how do you evaluate the room after they are in use?
- Can you tell us about POE (post evaluation occupancy)?

Knowledge sharing

- How do you use this information later? Do you share the information with other hospitals?

- Were you involved in the bone marrow transplant project at Columbia Hospital?

Standardization

- How do you work with standardization when it comes to furniture (Are there for example some suppliers you have long term contracts with?)

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

Interview guide Ellie Dalton

Date: 17.04.14

Place: New York Presbyterian Hospital, Weill Cornell. USA

Role: Vice President Strategic Planning

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3

How are you involved in a construction project?

Funding

- How does NYP Hospital finance construction projects?
- Who decides which construction projects that shall be conducted and not?

Purchasing and framework agreements

- Does NYP hospital have any framework agreements with some suppliers for construction?
- What is important for NYP hospital when it comes to choosing a contractor for a construction project?
- Can you explain the project manager's role in a construction projects?
- Do the project managers use the guidelines active in the construction projects?

Space management

- What kinds of methods does NYP hospital use to find free space?
- What kind of systems does NYP Hospital use to monitor free space?

Knowledge sharing

- Documentation – How do the project group handle project documentation so that other project group can get accesses to it later?
- How do project managers share knowledge and experience with each other?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

Interview guide with Dan Lilly

Date: 18.04.14

Place: New York Presbyterian Hospital, Weill Cornell. USA

Role: Head of the facilities operation at Weill Cornell, New York Presbyterian Hospital.

Phase 1

- Introduction of ourselves
- Inform about the tape recorder
- Background and the purpose with the interview

Phase 2

- Interviewee talks about his background

Phase 3**About the interviewee and his department**

- What is your role in the facilities operation (FO) department?
- When and how does the facilities operation department get involved in new construction processes?
- How does the facilities operation department contribute in construction projects?
- How is the facilities operation department financed?
- Who makes the annual budgets for the facilities operation department?

Handover

- Can you describe the handover process for construction projects?
- How are you and your department involved in the handover process?
- What are the biggest challenges in the handover process?
- Who has the responsibility (the project group or the facilities operation department) to cover the cost of missing work after the handover process is completed?

Purchasing and framework agreements

- How do you experience the bureaucracy when it comes to purchasing? Is it many decision makers?

Master's Thesis

- Which standardization initiatives have been developed when it comes to purchasing for the facilities operation department?
- Does the facilities operation department have any framework agreements with some suppliers?

Knowledge sharing

- How does the operation department share knowledge internally and / or with external hospitals?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

Interview guide with Matthias Ebinger

Date: 23.04.14 (Last interview)

Place: New York Presbyterian Hospital, Weill Cornell. USA.

Role: Director of facilities systems, New York Presbyterian Hospital

Phase 1

- Inform about the tape recorder
- The purpose with the interview

Phase 2

- Sum up the most important findings from our interviews with employees at New York Presbyterian Hospital

Phase 3**Organization structure**

- How many employees are there in the real estate department?
- Have there been any major organizational changes in the real estate department over the recent years?
- Can you describe the different under divisions in the real estate department?
- How do you work towards the other departments?

Knowledge Share

- Do the project managers have the possibility to participate to internal and external courses and forums?
- In new construction projects, does the project group involve other project managers that have conducted similar construction projects?

Purchasing and framework agreements

- Have NYP some framework agreements? If so, in which areas?
- Is there an open bidding process every time?

Computer system

- Has NYP a computer system for how a project shall be carried out?

Phase 4

- Summarize findings
- Have we understood the interviewee correct?
- Review the answers if they are unclear
- Anything the interviewee wants to add?

Phase 5

- Thanks for the interview

