
KTH Architecture and
the Built Environment

# THE OFFICE

## AN EXPLORATIVE STUDY

**Architectural Design's Impact on Health, Job Satisfaction & Well-being**

CHRISTINA BODIN DANIELSSON

FRONT COVER
Skattehuset (the Tax Authority Building) in Stockholm by architect Paul Hedqvist, 1959
PHOTOGRAPH AND COVER DESIGN BY: Christina Bodin Danielsson
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KTH School of Architecture and Built Environment
School of Architecture
Royal Institute of Technology
SE- 100 44 Stockholm, Sweden
Christina Bodin Danielsson
christina.bodin.danielsson@arch.kth.se, christina.bodin.danielsson@bredband.net

*Tillägnad*
*mamma & pappa—tack för ALLT*

*Dedicated to*
*mum & dad—thanks for EVERYTHING*

# SUMMARY

This doctoral thesis examines the office environment's influence on employees' perception of their workplaces, their organizations and their job satisfaction, as well as their health and well-being. It is based on an empirical study of 491 office employees from twenty-six companies and divisions in large companies. Seven office types, defined by their architectural and functional features, are represented in the study group: cell-office, shared-room office, small open plan office, medium-sized open plan office, large open plan office, flex-office and combi-office. The research has its basis in architecture, although an interdisciplinary approach using organizational and management theory, environmental psychology, and social and stress medicine has been employed. Qualitative (Articles I & V) and quantitative methods (Articles II & IV) were used. The thesis also contains an explorative, review article. Thus it comprises all in all five articles.

Article I is an analysis of the importance of architectural quality for employees´ perception and experience of the office using Lynch's method (1960) developed to measure inhabitants' perception of architectural quality in cities. The study shows that in the office the experience to a high degree is independent of both the scale of the office and office type; instead it is determined by the quality of the plan layout combined with the quality of other design features. It also shows Lynch's method to be useful in foreseeing where the elements that reinforce 'imageability' will most likely appear in an office environment.

Article II investigates employees' environmental satisfaction focusing on:
1) ambient factors; 2) noise and privacy; and 3) design-related factors. The results, based on regression models with age, gender, job rank and line of business as additional covariates, show office type as a factor with a statistically significant impact on satisfaction with the office environment. Employees in cell-offices are prominently most satisfied, followed by those in flex-offices, cell-offices rate low only on social aspects of design-related factors. A major finding is the internal differences between office types where employees share workspace and facilities with lowest satisfaction in medium-sized and large open plan offices.

Article III is a review article that analyzes the employees' office experiences in two ways: 1) by framing the physical work environment's influence on employees into the model of organizational theorist Davis (1994); and 2) by categorizing the office experience into two groups based on the nature of the experience and problems related to them. The results of the emperical study presented in Article II are the basis for the discussion in this article.

Article IV examines employees' health, well-being and job satisfaction. A multivariate analysis applied to the study sample and equivalent to that of Article II shows significantly higher risks for ill health and poor well-being in medium-sized and small open plan offices, compared especially with cell-office. In medium-sized open plan and combi-offices the employees evince the lowest job satisfaction. The best chance for good health status and job satisfaction is in cell-offices and flex-offices.

Article V examines the office architecture´s importance for employees' perception of their own workplaces and organizations based on the two key components of architecture—the aesthetical and functional dimensions. The results show that overall the employees had positive experiences of their office environments. These mainly concerned the aesthetical dimension, whereas the negative comments dealt with the functional dimension. The aesthetical dimension appears not only to set the agenda for employees' perception of the workplace and organization as a whole, but also for the perception of the functional dimensions. The functional dimensions were only in focus when the workstation and its proximate area were discussed.

*Keywords: employees, office environment, office type, architectural features, functional features, architecture, experience, satisfaction, dissatisfaction, health, job satisfaction, perception*

# SAMMANFATTNING

Det övergripande syftet med doktorsavhandling en är att studera kontorsmiljöns påverkan på anställda, på deras: 1) uppfattning av den egna arbetsplatsen och organisationen, 2) trivsel med kontorsmiljön, inklusive 3) hälsa, välbefinnande och arbetstillfredsställelse. Studien bygger på en empirisk studie med 491 kontorsanställda från tjugosex företag/avdelningar i större företag. Sju kontorstyper har identifierats, definierade av sina arkitektoniska och funktionella karaktärsdrag. Kontorstyperna är: cellkontor, delat rum, litet-, mellanstort- och stort kontorslandskap samt flexkontor och kombikontor.

Arbetet har sin utgångspunkt i arkitektur, men ett tvärvetenskapligt angreppssätt tillämpas på kontorsmiljö som inbegriper organisationsteori, miljöpsykologi samt stress- och socialmedicin. Både kvalitativ (artikel I & V) och kvantitativ metod (artikel II & IV) används. Avhandlingen inbegriper dessa artiklar samt en översiktsartikel (artikel III) och omfattar därmed fem artiklar:

Artikel I studerar vikten av arkitektonisk kvalité för kontorsanställdas upplevelse av den egna arbetsplatsen och organisationen. I artikeln undersöks även möjligheten att använda den metod Lynch (1960) utvecklade för att undersöka stadsmiljö utifrån ett användarperspektiv i en interiör miljö. Resultatet visar att upplevelsen av arkitektonisk kvalité vare sig bestäms av kontorets storlek eller kontorstyp utan av kvalitén på planlösning och detaljutformning. Metoden framstår även som ett användbart verktyg i designprocessen för att förutse var de element som Lynch anser stärker arkitektonisk kvalité kommer att uppstå i en miljö.

Artikel II undersöker trivseln med arbetsmiljön bland kontorsanställdas i olika kontorstyper. Fokus är på: 1) miljöfaktorer (ljus, ventilation, temperatur), 2) buller och avskildhet (privacy), samt 3) designrelaterade faktorer (arbetsstation, kontorslokal och kontorsbyggnad). Den multivariata regressionsanalysen visar att signifikanta skillnader i trivsel med kontorsmiljön mellan olika kontorstyper kvarstår när hänsyn tagits till ålder, kön, befattning och bransch. Mest nöjda är de som arbetar i cellkontor, därefter de i flexkontor. I cellkontor är man dock missnöjd med kontorsgestaltningens stöd för social verksamhet. Störst missnöje återfinns i mellanstort och stort kontorslandskap. Studien pekar även ut intressanta skillnader i trivsel med arbetsmiljön mellan anställda i olika typer av öppna kontorsmiljöer.

Artikel III presenterar en forskningsöversikt om kontorsmiljöns påverkan på anställdas kontorsupplevelser. Två olika analysmetoder för kontorsupplevelser redovisas: 1) en modell för kontorsmiljöns påverkan utvecklad av organisationsteoretikern Davis (1994), och 2) en kategorisering av kontorsupplevelsen i två olika grupper baserat på dess karaktär och problem relaterad till den. Diskussionen i artikeln exemplifieras med resultaten från artikel II.

Artikel IV behandlar kontorsanställdas hälsa, välbefinnande och arbetstillfredsställelse i olika kontorstyper. Samma multivariata regressionsanalys som i artikel II tillämpas. Resultatet visar att störst sannolikhet för god hälsa finns i cell- och flexkontor, medan risken för ohälsa är signifikant högre bland personal i mellanstort kontorslandskap. Högst arbetstillfredsställelse rapporterar de som arbetar i flexkontor och delat rum tillsammans med de i cellkontor. Lägst arbetstillfredsställelse återfinns i mellanstort kontorslandskap och kombikontor.

Artikel V granskar arkitekturens och dess två huvudkomponenter, de estetiska och funktionella dimensionerna, betydelse för de kontorsanställdas uppfattning om den egna arbetsplatsen och organisationen. Av studien framgår att man överlag är positiv till det egna kontoret. De positiva upplevelserna är främst kopplade till arkitekturens estetiska dimension, medan de negativa upplevelserna är kopplad till dess funktionalitet. Den estetiska dimensionen tenderar även att dominera upplevelsen av arbetsplatsen och organisationen som helhet, funktionaliten är dock i fokus när den egna arbetsplatsen och dess närområde diskuterades.

*Nyckelord: kontorsanställd, kontorsmiljö, arkitektoniska karaktärsdrag, funktionella karaktärsdrag, kontorstyp, arkitektur, upplevelse, trivsel, hälsa, välbefinnande*

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Exploring the interdisciplinary field of the architectural design's impact on employees and organizations leads inevitably into a multi-disciplinary field of science. Hence the work requires inputs and insights from several scientific disciplines of research. I consider myself privileged to have had several supervisors—formal and informal.

The doctoral work is a collaboration between the School of Architecture and Built Environment, Royal Institute of Technology (KTH), Stockholm, and Örebro University. I sincerely thank my two principal supervisors: *Magnus Rönn*, Associate Professor at the School of Architecture and Built Environment, KTH; and *Lennart Bodin*, Professor of Statistics at Örebro University and senior researcher at Karolinska Institute in Solna, Sweden.

Magnus Rönn's support and enthusiasm throughout the work—even before he stepped in as my main supervisor—has been excellent. By offering me a position at the School of Architecture and Built Environment and in the research group 'arc•plan' at a crucial phase of the research project, I found the essential, scientific environment I so needed to complete the first step of a doctoral thesis, the licentiate thesis. Magnus Rönn´s assistance in the analysis and structuring of the qualitative data was indispensable for the project, as was his feedback and support. I am also thankful for the opportunity he has given me to teach at the school and develop my educational experience.

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designs. My gratitude also goes to *the various clients* I have worked with through the years: for their insight and courage in hiring me, as my distinct views of office design inevitably lead to both different design processes and an unusual office structure. This research project was in its final phase of the doctoral thesis, sponsored by the *Swedish Research Council Formas* and the *L E Lundberg Foundation*. The first phase, the licentiate thesis, was supported by *AP Fastigheter* (today Vasakronan), with further backing from *Offecct AB* and *the Helgo Zetterwall Foundation*. Participation at international conferences and seminars has been made possible through financial support from *Formas, the Knut & Alice Wallenberg Foundation* and *the Swedish for Council Social Science & Working Life Research (FAS)*. The research visit to the Department of Architectural Technology, CPUT, in Cape Town, was made possible by a grant from the *Lars Hierta Foundation*.

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## TACK - THANKS

Christina Bodin Danielsson

Melängen outside of Söderköping,
the summer of 2010

# LIST OF ARTICLES

The doctoral thesis based on two empirical studies comprises of following five articles:

1. Danielsson, C. (2005). Applying Lynch's Theory on Office Environments. *Nordic Journal of Architectural Research* (Swedish: Nordisk Arkitekturforskning), Nr 4:69-79

2. Bodin Danielsson, C., & Bodin, L. (2009). Differences in Satisfaction with Office Environment Among Employees in Different Office-types. *Journal of Architectural and Planning Research, 26*(3), p. 241-257

3. Bodin Danielsson, C. (2007). Office Experiences. In H. Schifferstein & P. Hekkert (Eds.), *Product Experience.* San Diego, CA: Elsevier Scientific Publications, Netherlands

4. Bodin Danielsson, C., & Bodin, L. (2008). Office Type in Relation to Health, Well-being, and Job Satisfaction Among Employees. *Environment & Behavior, 40*(5), 2008.

5. Bodin Danielsson, C., Aesthetics versus Function: What matters to Office Employees? Article submitted for publication

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# CONTENTS

# 1 Introduction

The modern office building manifests economic strength and a belief in the future, and it has been given a dominant role in the urban landscape among larger cities of the Western world. The office is also the daily work environment for a majority of the employed population in these societies, where employees often spend more than 40 hours per week. Thus it exerts a significant impact upon the lives of a great number of people. The purpose of this doctoral thesis is to investigate the office environment´s influence on employees´ environmental satisfaction, as well as on their health and well-being. Poor working environments cause considerable suffering and illness as well as costs for society (European Commission, 2002b; Milczarek, Schneider, & Rial González, 2009). There are high rates of sick-leaves among the Swedish working population; and mental ill-health is attributed as the single most common reason for sick-leave among the white collar workers (Åsberg, Nygren, Rylander, & Rydmark, 2002). In addition to the need for people who work longer hours for financial reasons, as well as an increased aging population in the Western world, the subject of maintaining a sustainable work environment is a pressing concern (Westerlund et al., 2009). These factors combined make it appropriate to look at the possible relation between health and well-being among office employees in relation to office environments. Through research we know also that the psychosocial work environment does have an impact on the health and well-being among employees (e.g., R. Karasek & T. Theorell, 1990; Siegrist, 1996; Toomingas, 1997).

The connection between job satisfaction and perception of the psychosocial work environment is also well established. The question at hand, however, is if there is any connection between the physical office environment and the health and well-being among employees. When studying the possible influence of the physical environment on health and well-being, job satisfaction should thereby be considered. There is research suggesting a relation between job satisfaction and health and well-being (e.g., Beehr, 1995; Lu, 1999). This is important since job

satisfaction is important at both an individual, as well as an organizational level. In fact job satisfaction is very critical for organizational efficiency since it is possibly associated with low rates of absences and turnover (Sundstrom, 1986). Taken the above mentioned factors together it is important for this doctoral work to investigate the office environment's influence on employees' job satisfaction. In addition to this it is also important to investigate the employees' perception and satisfaction with office environments in different office types. This doctoral thesis thus studies environmental factors and psychological responses associated with office environments. Which aspects of the office environment the employees perceive as most satisfying or troublesome in different office types is also investigated. This is not only done in order to detect what importance different environmental factors have on the environmental satisfaction, but is also done due to their possible influence on the employees' health status and job satisfaction.

Besides the above mentioned purposes this thesis also sets out to investigate employees' perception of their workplaces and organizations based on the architectural design of the office. This is done in order to see what role it may play for these sometimes decisive matters not only for the employees' job satisfaction and health and well-being, but also for the welfare of the organization as a whole. In the investigation of the architectural design's importance in this regard, special attention is paid to the quality of the architectural design and to the two main components of architecture—its aesthetical and functional dimensions.

The fact that I share my time between research and practice, and in my work as a practicing architect specialized on office buildings and interior office environments has undoubtedly played a major influence on this research project. Through the years of practicing architecture and continued education I never came across any course or discussion about how people perceive and experience different environments, nor which implications this may have on the users. The psychological aspect of the spaces I, as an architect, designed was never on the agenda. I specifically recall my position as the leading architect in a project dealing with a larger office building the years before I had the opportunity to start my research. Through this project, it became increasingly evident to me that important aspects in the design process were lacking. In the design of the new office building the parties involved in the project never discussed the goal with the architecture. Instead the discussions concerned mainly economical and practical aspects. If the architectural design was discussed at all it was always with regard to issues such as trends and taste preferences or economical issues in connection with architectural features. The overall goal—how to create a supportive work

environment, supportive to the employees and the organization - was never on the agenda. This was unfortunate since; after all, the ultimate performance in an organization depends on the individual members and their efforts.

When, in September 2002, I had the opportunity to start this research project, it soon became evident that studying the office environment from a strictly architectural point of view was not possible. I realized that my field of research was not only within the field of architecture, as the primary focus was on employees and its possible impact on their welfare as well as organizations out of different aspect. The research issues were actually interdisciplinary and spanning several disciplines such as: 1) organizational-oriented research, 2) environmental psychology, and 3) occupational health including social and stress medicine. Thus aiming to investigate the physical environment of offices and its influence on the employees and organizations out of a health, job satisfaction and experience perspective all three fields of research are important to consider.

## 1.1 Overview of Dissertation

The overarching aim of this doctoral thesis is to investigate the office environment's influence on employees' and organizations. In order to do so it focuses on two aspects of environmental influences: 1) its impact on office employees' health, well-being and job satisfaction, as well as environmental satisfaction, and 2) its impact on the employees' perception of the own workplace and the organization as a whole.

In order to investigate the overall hypothesis that the office environment has an influence on these aspects, it has also been necessary to look at how employees perceive and experience the office environments from an architectural point of view. There are physical and functional conditions at an office which dictate the architectural and functional features of the office design, which together define an office type. These two features have in this work been given the role of explanatory variables in the analysis. More specifically, with regard to the first focus of the thesis the satisfaction with single environmental factors in office environment among employees in different office types are investigated. In addition, the frequency of complaints in different domains of environmental factors has been investigated. This has been done in order to understand which factors the employees are most satisfied/dissatisfied with and also to see if there are any differences among employees in diverse office types in this respect. In addition to this the physical office environments' influence on employees´ health status and job satisfaction is also investigated in the thesis with the same approach to the matter.

Health status is in this work defined as self rated sick-leave, general health as well as emotional health. Job satisfaction is defined by the employee's perception of the psychosocial work environment as well as attitude towards work itself.

The first section of this doctoral thesis is compromised of three chapters. In brief the first section provides a framework for the five articles included in the dissertation. Its first chapter provides an introduction to the thesis followed by a second chapter that gives an overview of the multi-disciplinary field of environmental influences in office environments. The historical background of office designs is also described here within a Swedish context. The third chapter 'Research project' presents the basis as well as its empirical data of the project. It describes the research objectives, methods used and choices made with respect to limitations in the research project. A simplified model for analysis is described as well as. In the final part of this chapter an overview of the project and its five articles are done. The concluding discussion presents the major findings and contributions of the research project, but also its shortcomings and limitations and possible directions for future research. This first section of the doctoral thesis is followed by references and appendices.

The second and also last section of the doctoral thesis comprises the five individual articles. Article II and IV are written in collaboration with statistician Lennart Bodin, my co-supervisor, who also has done the statistical analysis presented in the thesis.

# 2 A Multi-disciplinary Field of Research; THE OFFICE ENVIRONMENT'S INFLUENCE

The physical environment is fundamental to our perception of the world and the work environment constitutes a major part of our daily lives. Our surrounding environment is perceived and evaluated through impressions based on our sight, hearing and touch and further emotionally evaluated by our intellect (Lynch, 1960). Lynch explains the intellectual evaluation of the environment as when you see a door you first recognize it, and then you understand and interpret it as a door with its specific function. The creation of an environmental image is a two-way process between the observer and the observed.

Besides architecture, the fields of research that deal with the environment and its influence on humans in an office setting are: 1) organizational-oriented research, 2) environmental psychology, and 3) occupational health, which includes fields such as social and stress medicine. The four fields, though they apply different approaches to the subject, share the insight and recognition of the architecture's importance for organizations and their members. The different fields of research apply different perspectives and scales to the subject of the architecture's environmental influence on the individual and the organization as a whole.

It is only the field of architecture that uses the term architecture to describe the built environment surrounding us. The other fields use terms such as physical environment or physical setting to describe the same subject. As this doctoral thesis has its foundation in architecture the term architecture will mainly be used to describe the physical environment. Another reason for using the term is that I see office research as a cohesive field of research, in other words a field of research that holds multidisciplinary problems.

## 2.1 An Organizational and Management Approach

Most organizations and businesses operate in office buildings which sets the conditions for the activities performed in the building. Even though the architectural design does not by itself determine the behavior and well-being of the employees, it has an impact through its aesthetic, functional and social implications on the social arena of the organization and group constellations, i.e. on interaction and cooperation among employees. What unites the eclectic field of organizational theories that recognize the architecture's importance for organizations is their recognition of it as a possible mean to achieve higher productivity or creativity. The symbolic implication of the office design on the individual's perception of the workplace and its own organization has gained architecture additional interest from organizational-oriented research. The field applies both an individual and an organizational perspective to environmental influences and its scholars deal with individual and group as well as organizational outcomes. The organizational and management interest in architecture is expressed in research through a wide range of perspectives to its benefits from an organizational and management point of view. So does e.g. Kupritz' (2002) regard the workplace design as a key factor in the human resource development training in corporate business. Whereas Pfeffer (1997) who is interested in the social dimension of work recognizes the role of architecture in social situations. Baldry et al. (1997) on the other hand relate employees' well-being, productivity, and work processes to the physical work environment. Most of the researchers that investigate the architecture´s impact on organizations are however not found within the management field but within the design and behavior fields (L. Cohen, 2007). What unites the theorists that apply an organizational and management perspective to architecture independent of their background is their acknowledgement of the fact that organizations mainly consists of people, thus the effectiveness and success of organizations is highly dependent on employees' efforts. They view architecture as one factor in increasing employees' effort. Becker has expressed it this way: "In the short run, productivity defined in terms of strict output measures may make sense, but in the long run, the absenteeism and turnover stimulated by the changes required to obtain high productivity in the short run may impose a significant cost on the organization' (Becker, 1981, p. 94).

## 2.2 An Environmental Psychology Approach

The interest of how the environment interacts with the individual through physical stimuli posed by environmental factors engages a certain field of psychology called environmental psychology. One of many definitions to environmental psychology is:

> "Environmental psychology is the study of the interrelationship between behavior and experience and the built and natural environment."
> (Bell, Fisher, Baum, & Greene, 1990, p. 7)

The field is strongly connected to architecture through a common interest in the built environment and the concept of place; in brief, the former focuses on its perception and environmental influence and the latter on its design. To quote the environmental psychologist Evans the field's interest in the concept is expressed in research questions such as: "How are places developed, how do they acquire meaning to people, how are they related to people's action, their preferences, and even to their emotional reactions and well-being? And what does the concept mean across generations or across cultures?" (Evans, 1996, p. 4). The relationship to architecture, which it grew out of, was however more evident in its early years. This shows in work by architectural theorists Hesselgren (1986) and Lynch (1960) as well as in the early work by the architectural psychologist/ environmental psychologist Canter (see e.g., The psychology of place, 1977).

Environmental psychology has accordingly focused on environmental influences with a special interest on environmental factors and their impact on psychological and behavioral outcomes. The area of environmental psychology that deals with the physical work environment applies interpersonal as well as organizational perspective to the subject. It was developed post-Hawthorne with the growing interest in the physical environment's influence on employees that arose at that time. (For the Hawthorne studies see latter section on different organizational theories). An overview of how environmental psychology relates to the other fields of psychology that investigates the work place is presented in Sundstrom's table on page 25.

The human behavior at work is especially difficult to investigate as: a) there is a complex interaction between the individual and the physical workspace, and b) simultaneously with this there is also a social interaction with colleagues and management. This means that even though we, to some extent, are surrounded by the same environmental factors at home and at work, our perception of them and their influence on us differ due to various contexts. We do e.g. consciously or unconsciously evaluate a situation in a hierarchical context in an organization, which influences our

perception of environmental factors at work. The ownership and ability for control is also different. In home environments, occupants often have full control and ownership or long-term leases with contractual agreements, which is hardly ever the case with workspaces where the organization maintain clear ownership and control of the physical environment (Mazumdar, 1992).

The investigation of environmental influences is intricate and in each case the environmental psychologists attempt to inquire how the process between the individual and his/her physical surrounding works. The influence can either be direct, indirect, i.e. mediating or moderating, but due to its complexity it is common that the two latter concepts are confused with each other. In order to reach further knowledge about the relationship between the human and his/her surrounding environment it is very critical to recognize the difference between a mediating process or moderating process according to environmental psychologist Evans (1996). In short a mediating process seeks to identify the mechanisms that underlies an observed relationship between an independent variable, also called predictor, and a dependent variable, also called criterion via the inclusion of a third explanatory variable, known as a mediator variable (MacKinnon, 2008). A mediating relationship specifies the chain of causality and addresses questions such as 'how?' or 'why?' does the independent variable influence the dependent variable. A moderation processes on the other hand addresses the issue of 'when?', 'for whom?' or 'under what condition?' does a correlation between the independent variable (predictor) and the dependent variable (criterion) hold true (Beaubien, 2005).

## 2.3 An Occupational Health Approach

Occupational health, with its subdivision of social and stress medicine, deals with the work environment's influence on the individual's health status with regard to psychological and physiological aspects.

Though the link between the architecture and employees' health status is often not as direct or easy to measure as the link between the office environment and its organizational or environmental psychological outcomes the perspective should not be excluded. Leaving out the subject of the work environment and its impact on employees' health status would in the context of this thesis leave important issues unrevealed. The subject is not only of interest out of an individual or an organizational perspective, but also to societal perspective, which the dramatic increase of stress-related illnesses the last decades in Sweden shows (Krantz, 2003; Lundberg & Melin, 2002).

The work environment plays a significant part in a lot of people's

lives. Its importance in people's daily life has grown with the modern society, where people tend to live in single households and work long hours. The fact that the work environment plays such a significant part in a lot of peoples' lives makes the psychosocial environment at work of greatest importance for health and well-being (Lenéer-Axelsson & Thylefors, 1991). Research has e.g. shown that the psychological and psychosocial well-being has an important impact on cardiovascular diseases as well as other diseases correlates, and this in turn affects sick-leaves (e.g., Hjemdahl, 2003; R. Karasek & Theorell, 1990).

More than 50 per cent of the population in the western countries work in offices (Duffy, 1999), and the number is steadily growing. This combined with the fact that the mental health related diseases is the single most common reason for sick-leave among white collar workers in Sweden today (Åsberg, Nygren, Rylander, & Rydmark, 2002) makes the issue of the work environment for office employees highly important. Though the work environment mainly deals with psychosocial aspects, the physical aspect should not be excluded, as there is a constant interplay between the two.

Humans are under the negative influence of stress at work as well as outside of work. Researchers have e.g. established an increased stress levels in society as a whole due to higher demands on top achievements, lean organizations and a higher pace in working life (Krantz, 2003; Lundberg & Melin, 2002). A reasonable amount of stress has however a positive influence on the individual and underactivity may in fact lead to stress. In the search to find the answer to why certain people get ill and others remain healthy under stress the focus has mainly been on "unhealthy" environments or unhealthy circumstances, instead of what makes people healthy and less stressed. Stress research has assumed that recovery from stress takes place in the absence of stressors instead of focusing on factors that are restorative to their nature (Hartig, Böök, Garwill, Olsson, & Gärling, 1996). Among those that have been concerned with the matter is Evans (Evans, 2003), who has hypothesized that certain architectural features in design elements may enhance restorative processes. It would be features that support fascination, curiosity, or involuntary attention to enhance recovery from mental fatigue. Example of design elements that hold such features according to Evans are views of nature, indoor plants, fireplaces, fountains, aquariums and animals (e.g. an aviary) as well as paintings of landscapes and other coherent, tranquil scenes.

In order to understand how humans react to stress different types of models have been developed that apply somewhat different perspectives to the subject. When discussing stress at work it is inevitable to describe some of the most known stress models that try to explain work stress. The models do however not focus on the physical environment but apply

a more general approach to stress. Two models apply a psychosocial approach to stress; the Demand-Control model by Karasek and Theorell (1990) and the Effort-Reward Imbalance model by Siegrist (e.g., Kuper, Singh-Manooux, Siegrist, & Mamot, 2002; Siegrist, 2003) .The third stress model which is more biologically oriented is called the Allostatic Load model and developed by McEwen (McEwen & Norton Lasley, 2002) (McEwen & Norton Lasley, 2002). In brief:

- *The Demand-Control model* describes the stress reaction as being triggered by perceived demands/ambitions on the one hand, and perceived ability/ resources to meet these demands and ambitions on the other hand. For example if the work demands are high but the employee experiences no social support or ability to control the situation, stress will occur.
- *The Effort-Reward Imbalance model* explains in contrast to the former model stress as a reaction to an imbalance between the effort a person puts into a job and the recognition he/she gets in terms of rewards from the employer for this effort.
- *The Allostatic Load model* applies a biological approach to stress and hypothesizes that over-activity, as well as under-activity of the allostatic systems contributes to health problems. According to McEwen stress in itself is not dangerous, stress reactions are dangerous only if the individual is not able or capable to relax and recover from a stressful event afterwards. It is then stress related diseases occur.

As we discuss different conditions that may lead to stress disorders it is important to bear in mind that the sensitivity to stress is both individual and gender related. It is e.g. well known that women are more susceptible to stress related diseases (e.g., Chesney & Orth-Gomér, 1998; Orth-Gomér, 2003). A possible explanation for this is the different life conditions for men and women, as women often have double workload since they beside normal job tend to have the main responsibility for the household. It has e.g. been established that women in a managerial position have higher levels of stress then men in equal positions (Lundberg & Frankenhauser, 1999). When the women came home from work the stress level increased among the women, while it among the men decreased. The multiple roles situation of women has however also benefits as it give the individual a greater perception of being needed and a greater social network. Another gender difference is that women to a greater extent consume medicine when stressed, while men consume alcohol (Krantz, 2003).

## 2.4 An Architectural Approach

Architecture is the art and science of designing buildings and other physical structures, including building-, interior- and landscape architecture and urban design. It refers to all environments shaped or built by

man. Although architecture is the major field that studies the physical environment it has not been very concerned with the environment's influence. When investigating environmental influences the focus has mainly been on building performance out of a functional or aesthetic perspective from a professional point of view (Collins, 1971; Holm, 2006). The research within architecture that deals with office design´s influence on employees is sparse. The office research that exists within the architectural field can briefly be categorized into the following fields: organizational-oriented research (e.g., Duffy, 1974a, 1974b, 1974c; Duffy, 1999; Söderberg, 1993, 2003), communication oriented research (e.g. Penn, Desyllas, & Vaughan, 1999), spatial oriented research (e.g. Grajewski, 1993; Peponis & Shpuza, 2008),[1] and workplace planning oriented research (e.g. Ahlin & Westlander, 1991).

The exterior design of office buildings as well as their interior layout of rooms has changed over time with different trends in society and the architects' ambition has been to find the most efficient office layout in line with the current trend. Some organizational theorists have had a great impact on office design and office work, e.g. Fredrick Taylor and Henri Fayol (for more details see latter section on different organizational theories). Taylor´s theory 'scientific management' is considered to be the most influential theory for office design (Duffy, 1999) with its strict hierarchies and control of employees, which were not trusted by the management. In short it is organizational and management theories that together with technological inventions especially within the field of telecommunication that have led the development of the office design (e.g., Ahlin & Westlander, 1991) .

Two traditions within the architectural design of office can be identified—the northern European tradition and the North American tradition (Duffy, 1999). The North American tradition includes countries such as the United States, Canada, the United Kingdom and the Pacific Rim cities such as Tokyo, Hong Kong etc. This tradition focuses more on management and efficiency and office buildings are used as symbols of economic strength and prosperity. The architectural design has often been in the corporate International style. The other design tradition—the northern European includes the Nordic countries but also the former West-Germany and the Netherlands. The emphasis within this tradition has been on the site location and the work environment. The latter emphasis is probably due to the wide range of labor legislations that admits the employees´ co-determination at the workplace in the countries

**1** Within this field you mainly find conference proceedings, e.g. Steen, J. (2009) Spatial and social configurations in offices. Proceedings of the 7th International Symposium on Space Syntax, Stockholm, Sweden. http://www.sss7.org/Proceedings/04%20Building%20Morphology%20and%20Emergent%20Performativity/10_Steen.pdf

within this office tradition (Duffy, 1999), e.g. the Act on Co-determination at Work in Sweden (in Swedish MBL, Lagen om medbestämmande).

In this review of the architectural approach to the office the focus is on the development of different office types presented in an historical context. The review is based in Sweden, thus within the northern European design tradition, as the research project was conducted in Sweden and the Swedish conditions are more known to the author.

The need of offices came with the development of industrial production and manufacturing. The clerical work during these early days took place in suitable rooms within the homes of the bourgeois class that owned the industries as no specific buildings were assigned to administrative work (Christiansson & Eiserman, 1998). The tradition to locate the administrative work next to the production plants continued as the first larger companies in the early days of Swedish industrialism in the 1880 moved to central locations in the cities, e.g. Separator (later Alfa Laval) and LM Ericsson (later Ericsson). To design specific office buildings did not become common in Sweden until the late 19th century when the first so called 'office palaces' appeared in the larger city centers in the United Kingdom and the United States in the mid 1800s (Christiansson & Eiserman, 1998; Duffy, 1999). In Sweden the first office palace built was built by the banker Wallenberg in Stockholm 1863, in the Old Town, the city center at the time. With it started a trend to have the clerks working in large office spaces behind a counter. The banker and the board had their private offices located in separate rooms adjacent to the larger office space.

The first open plan offices were not very large but they became gradually larger with the introduction of the new architectural style called the Chicago School from the United States. It emerged with the new technology at the time—the steel-frame construction—which made it possible to build without supporting walls and thus change office space easily after the tenants' needs. An additional factor for the development of the open offices was the development of the fluorescent lighting in 1895. It made the plan layout of offices less dependent on natural daylight, and the whole depth of the building could be used for light sensitive office work. The first office built in this style in Sweden was Centralpalatset (The Central place), constructed around 1896-99 by the architect Stenhammar. It became a model for future office buildings due to its flexibility through the new construction system.

At the beginning of last century the largest offices were found in banking with an average of about thirty employees per office. The workforce was male, with only one out of five or six employees being a woman. It was a higher percentage of women found in the insurance

companies (Bedoire, 1979).

The most important book for office design—Taylor's book on scientific management—was published in Sweden in 1913. It was succeeded by other books of great importance for office design such as Leffingwell´s book 'Scientific Office Management' published in 1917 and Galloway´s book 'Office Management, its Principles and Practice' published in 1918. The idea was to find general rules that described all kind of office work in detail in order to find methods to rationalize the work by 'office automations'. This idea was quickly picked up by the Swedish association for employers, Industriförbundet (the Industrial Association), precursor to the contemporary Confederation of Swedish Enterprise. During and after World War I it became established that routine-based work preferably should take place in large open spaces, so called 'Bullpens' under the strict supervision of management through the influence of these management specialists. It was prescribed that the more qualified office work took place in single office rooms, so called 'cell-offices'. There were several reasons for the breakthrough of these new ideas of office design: 1) the lack of workforce and thus a necessity to rationalize clerical work, 2) the growth of administrative work in business overall; and 3) women´s entry on the labor market (Ahlin & Westlander, 1991; Bedoire, 1979). The former status of clerical work had declined as the work at the offices became more or less machine-like in line with Taylor's theory and the other theorists. Three years before Taylor's book was published in Swedish the first office building designed in accordance with his ideas was built in Sweden for Trygg (later Trygg-Hansa) by the architect Lallerstedt. The office spaces consisted of twenty or so smaller office rooms and a 450 m² large open office space with a glassed ceiling. About one hundred clerks worked here and eight departmental managers supervised the office work.

Exhibitions about the 'modern office' were arranged in Sweden 1929 and 1935 (Bedoire, 1979). It was advocated that office buildings should be organized for large pools of office workers in rows under the supervision of a manager. An analytic and engineer-like approach toward architecture was established during this period. Career progress, in line with office design, followed a chronometer-like precision that was marked by a gradual reception of rewards after a well-defined pattern. The idea of very large open plan offices for the routine-based clerical staff, often a female workforce, was now established. However, despite all efforts the Bullpen concept never grew particularly popular in Sweden. One of the reasons for this was that office work was often organized around smaller work units.

Parallel with the different trends in office architecture the structure

of the labor market had changed drastically during this period, the amount of white-collar workers grew by 300 per cent from 1910 to 1930 in Sweden. By the 1930's the office employees in the private sector was about 250 000 people (Bedoire, 1979).

The architects focus during the early 20th century in office design had mainly been on flexible plan layouts and not on the employees' work environment. This lead to less suitable work environments and criticism gradually arose against the situation. By the 1930s criticism against the fixation on flexible plan layouts started to appear among architects as well, with the architect Tengbom[2] in the lead. He introduced the idea of double-sided corridors with individual cell-offices along the facades and facilities in the core of the building. It was presented for the first time in his building Citypalatset (The City Palace). The architecture was influenced by the new modernistic movement, which had its breakthrough in Sweden in the 1930s as well. In 1935 an important article by Carlman (1935) on office planning was publishing in the journal Byggmästaren (The Builder), the precursor to Arkitektur (The Swedish Architectural Review). The article introduced the Swedish audience to the Philadelphia Saving Fund Society Building, the first International style skyscraper built in the United States by the architects Howe & Lescaze. The building represented a new trend in office design which was very different to the Bullpen-offices. The plan layout of PSFS Building was developed around the idea of how the paper works its way through different departments of the building. The individual offices were designed with regards to good lighting and ventilation conditions and their sizes determined by the work carried out in the specific room. The office building provided good service facilities for the office employees in communal areas, such as rooms for exercise and dining areas etc. The PSFS Building influenced the Swedish office architecture in two ways: 1) from now on modern office building should be tall, so-called skyscrapers, in order to signal modernity, and 2) the concept of office work became synonymous with working in an individual room, so-called cell-offices, after the Second World War in Sweden. The connection between architectural design and rationalized office work was now established. The first Swedish office building based on ideas of the paper's way through the office was built for the insurance company Thule by architect Clason. It was built in 1938-40 on Sveavägen, the prominent boulevard in central Stockholm. The rationalizing of the office work was now done by the grouping of the workstations by new mechanical and technical equipment. The departments were carefully investigated and qualified work was separated from routine based work.

After the Second WW a new era entered office design in Sweden with the introduction of computers and Automatic Data Processing (ADP). This did not only change the work conditions at the office but

**2** Ivar Tengbom (1878-1968)

also changed the design of office buildings towards really tall building. The office building for the publisher Bonnier designed in 1949 by father and son, Ivar and Anders Tengbom[3] with its 21 stories and its plan layout with individual cell- offices along the facades was unmistakably influenced by the tall PSFS Building. The Bonnier Building became the raw model for the office buildings to come with its height and the placement of elevators, staircases and necessary installations in the core of the building.

It is not established when the cell-office was 'invented' and who its inventor was as it developed gradually over time. By the 1950s it was however the dominating plan model for office buildings (Nyströmer, 1956). The trend during this decade was to build tall office buildings. The most known office buildings from this period in Sweden are: the building for the insurance company Folksam in Stockholm, by the architects Eriksson & Tegnér, Skattehuset (the Tax Authority Building) in Stockholm and the building for the shipbuilder Kockums in Malmö both by architect Paul Hedqvist and the WennerGren Center Building in Stockholm by the architects Lindström & Bydén (Ahlberg, 1980; Bedoire, 1979). The architects´ efforts and ambitions were put into the communal spaces such as high-class entrance halls, conference rooms and the dining rooms; but not into the design of the individual cell-offices. The difference to the earlier Thule Building is in this regard remarkable, according to Bedoire (1979).

Then in the mid-1960s with the need for rationalization the open plan office was back again in the shape of Bürolandschaft (office landscape). It was now however presented in a new version by the 'Quickborner Team für Planung und Organisation' from the former West Germany. Their first office with the new type of office landscape was designed for a company called Behringer in Mannheim in 1960. They successfully promoted the office type as something new and different to the earlier criticized Bullpens. The idea was to change the construction of the office building and do away with the cell-offices in an attempt to facilitate communication through physical accessibility of office employees. They intended to achieve a more 'efficient organization' by increasing the interaction and transaction of information among employees (Christiansson & Eiserman, 1998). The idea had grown out of the human relations movement in the philosophy of management (Sundstrom, 1986), though it was the introduction of better fluorescent lighting systems, central air-conditioning and acoustic ceilings that made it possible.

The architectural design of the office buildings changed with the new open plan office, short buildings were now designed as opposed to the earlier taller office buildings. Originally supervisors and managers

**3** Anders Tengbom (1911-2009)

at higher positions were also intended to sit in the office landscape, which had not been the case before. This idea about a more democratic organization without a visual hierarchy attracted a lot of people during this era (Bedoire, 1979). A more efficient organization with regard to communication and interaction was not the only aim; it was also to lower the cost per square meter per employee and to be able to meet organizational changes easily without any reconstruction. This was made possible with larger floor plans and greater ceiling height. At the time they thought they had a satisfactory solution to the environmental problem connected to the office type. In Sweden it was said that the office should fulfill the so called 4L-qualities: noise, lighting, air-quality and layout (in Swedish: ljud, ljus, luft and layout) (Ahlin & Westlander, 1991). Neither windows nor individual lighting by the workstation were considered necessary for good work conditions. Instead a general artificial lighting system for the whole office at high strengths, up to 2000 lux was promoted. Acoustic problems were solved with acoustic panels and textile flooring. The workstations were grouped in organic shapes in order to achieve some privacy by avoiding direct eye contact between workstations and communication paths twisted like paths in a natural landscape.

The new open plan office grew quickly in popularity in Sweden as famous architects adapted the concept. In 1965 architect Anders Tengbom published a proposal for a new office building for the insurance company Trygg-Hansa in the journal Arkitektur, 1965/3 (The Swedish Architectural Review). The proposal was highly influenced by a trip he had done to the former West Germany to study the new office type. It was, however, Volvo who built the first well known large open plan office in the new style in Sweden. It was built 1965-67 in the suburb of Torslanda, outside of Gothenburg by the architects Lund & Valentin (Christiansson & Eiserman, 1998; Olsson, 1967). Enthusiasm and ambition was high with the project as Volvo was in a phase of expansion just like the Swedish economy at the time. According to the Swiss office consultant Raoul Illig, that assisted Volvo in the design process, it was necessary for a dynamic and expansive company like Volvo to work in an office landscape in order to facilitate transference of information and interaction (Illig, 1967). Being a car manufacturer Volvo applied an engineer-like approach to the building process. When finished, the office was considered to resemble the Volvo car itself, due to its careful detailing, lack of luxury and very efficient but not very adventurous design (Olsson, 1967).

Swedish literature that was published in the 1960s on the new open plan office was mainly handbooks, e.g. Ottosson's book (1967) on office landscape and rationalization. In accordance with the strong open plan

trend the formerly so modern Thule Building that had held both open plan offices and cell-offices was in the late 1960s converted into the new version open plan office as the insurance company Skandia moved into the building. The final establishment in Sweden of the new office concept came with 'Postgirohuset,' a house for a division within the Post Office Administration situated in Stockholm. It was built between1968-71 by the architect firm Ancker, Gate & Lindegren with assistance from the Quickborner Team. To be able to achieve great flexibility a module ceiling with movable lamps and acoustic plates were used, and the 'electrical wiring' was taken down from the ceiling and moved to the workstation, which was something new at the time.

The scientific knowledge of the office design´s impact on employees and organization was limited, but in 1966 the large 'Office environment inquiry' (Kontorsmiljöutredningen) had been published. It mainly dealt with the cell-office, but different types of open plan offices were also investigated (Wolger & Wiedling, 1970). This inquiry together with other research that was published during this period showed that open plan office was combined with higher risks of extra strain for the employees, especially for those with more qualified work (see review in Ahlin & Westlander, 1991). This research combined with the growth of an employee-oriented work life policy in Sweden lead to a growing criticism against the open plan offices in the mid 1970s, which made the return of the cell-office possible (Bedoire, 1979). Though the new open plan office was supposed to be more democratic, it was according to employees still an expression of surveillance by the management since it despite all efforts resembled the Bullpens of old times to some extent. Both office types meant that employees shared workspaces, often large ones. In the new open plan offices the employees were, however, neither arranged in lines nor under the surveillance of a supervisor in an office or on a floor above. They also held communal spaces for breaks, telephone calls or meetings to some extent. In accordance with this movement, the Trygg-Hansa office building that was in Anders Tengbom's original sketches published in the journal Arkitektur 1965 designed as a new open plan office was now redesigned. When completed in 1976 on Kungsholmen in central Stockholm it was built as an office with both open plan offices and cell-offices in a double corridor plan layouts with double corridors.

In 1972 an important office building in the debate concerning good work environment was built by the architect Hertzberger for the administration office (the Centraal Beheer Offices) in Appeldoorn, the Nederlands. It was designed in northern European tradition and the start of a movement against the conformity in office design that had developed during the past decades. Personal expressions and modification of the workstation in accordance with the individual employee's personal

preference was encouraged. The workstations were gathered into smaller groups and every workstation admitted privacy as well as openness as each space was well-defined in the larger communal space. The workstations were designed to hold a home-like atmosphere as opposed to the established corporate office architecture whose architecture not only is indifferent and anonymous but also expresses the individual´s rank in the organization (Budd, 2001; Duffy, 1999). As a contribution to the discussion on good work environments in offices a third office type, combi-office, was introduced in the late 1970s by the architect Sjöman in the design journal Form, in 1977. (For office definitions see Chapter 3 'Research project'). The idea of combi-office was to combine the advantages of cell-offices and open plan offices, but avoid their disadvantages. The cell-office was not considered to be space efficient and the open plan office on the other hand was criticized for problems with noise and lack of privacy. By 1978 the first actual combi-office was built for the company Canon, in Sätra outside of Stockholm, by the architectural firm Tengbom (Christiansson & Eiserman, 1998). It was a low building; only three stories high, with an atrium in its middle that admitted daylight to all the communally shared spaces in the core of the building. Walls of windows connected the individual offices with this communal multi area outside the rooms. Ten years later, in 1988 the most known combi-office in Sweden was built by the Norwegian architect Torp for the SAS Airlines headquarter in Frösundavik, Stockholm. For many years it was regarded as the raw model for good office design. Jan Carlzon, the CEO at the time was very involved in the building project. Originally every employee had an own office with a glazed wall towards a corridor on one side and a window on the other side towards the exterior or to the 'interior street,' around which the whole building was oriented. The corridors outside the office rooms expanded to large communal spaces, called 'multi-spaces'. All together the fairly large private offices, the shared multi-spaces and the interior street lead to a fairly substantial amount of square meters per employee. Due to this the building has gone through different reconstructions since the year 2000 in order to become more cost efficient. In 2010 the company finally decided to vacate the building for the same reason.

Cell-office was the dominant office type in Sweden in the 1980s, despite the introduction of the new combi-office and the growing demands of interaction and transaction of information among employees. It was well established as being the best office type from a work- environment perspective. Privacy, which this office type provides so well for, was not only considered important at the time it was considered a basic human need as well (Christiansson & Eiserman, 1998). The economical

advantages of the open plan office were outweighed by work environment issues that were considered more important.

When discussing the development of different office types the rise of new technologies has to be incorporated as it has highly influenced the nature of the work being performed in offices and hereby their design. The spread of computers with the automatic data processing (ADP) and video display terminals (VDTs) in the 1960s and the advanced work-processing technology in the 1970s and 1980s marked a shift away from the use of paper as the medium for exchanging information. The research focuses at this time were: a) on computers and their impact on employees´ work situation, e.g. their health status and performance, and b) on what impact the new office equipment would have on the future office work. The more traditional architectural issues were left a side for questions concerning psychology, ergonomics, economics and computer science and architectural research became a workplace oriented field of research (Ahlin & Westlander, 1991).

By the 1990s new technology lead to the development of an office type that was independent of time and space, the so-called flex-office. The ideas with the office type are that: a) a common computer system with all work is accessible from all workstations and from outside the office, b) the employees hold no individual workstation as they are expected to work from outside the office to some extent, and c) in order to cut down costs the flex-offices are dimensioned for only 60-70% of the workforce. All personal working material is stored in personal cupboards at the office. Among the most known flex-offices designed during the 1980s are that of the computer consultancy company Enator (later TietoEnator) and Digital Equipment AB. Enator's office was built 1985 in Kista, outside of Stockholm by the architectural firm VBB and the interior architects Ahlsén & Lindström. Enator used the office in the marketing of the firm, but most of all to boost the internal atmosphere and organizational climate (Alvesson, 2000). To use the office as a means to increase employees´ loyalty towards the organization, like Enator and also formerly described SAS was something new that came with the economic boom in the 1980s according to Ahlin & Westlander (1991). The most known flex-office is Digital Equipment´s office in Solna outside of Stockholm as it went to the extreme in terms of flexibility. Just like Enator the office was used as a strategic tool to enhance the company's image, though Digital Equipment only used it in its external marketing.

In the late 1990's the criticism against flex-offices grew strong and the office type was considered inhuman, as the employees had no personal workstations. In the first decade of the 21st century it appears to be back, however with more careful gestures. It is now established that the office type demands a very conscious management style and that

the working methods of the organization have be in line with the office type in order to function well. The main goal for choosing this office type thus should not be to cut down on square meter per employee but to find an office type that focuses on efficiency and flexibility instead of when and where the work is carried out. Due to the ability to cut down on square meters with flex-office it will most likely become a popular office type among businesses in competitive markets where the work is highly individual and independent. So does e.g. Hoffman, the director of the foreign correspondence department at The Washington Post, in an interview in the fall of 2009 describes his newspaper´s need of new working methods (Ohlsson, 2009). He foresees that the numbers of offices for corresponding journalists will either reduce or disappear in the future.

Since the beginning of the 21st century so called 'hotel offices' have been launched. They offer small businesses the opportunity to rent office space in a building and share common work facilities with other tenants; an idea not too dissimilar from the apartment offices in the early days of office history in the 19th century. These new hotel offices offer access to the most modern technology for a reasonable rent, which is made possible by the fact that the costs are shared between the tenants. A new version of 'office hoteling' where people work in cafés instead of rented office space started to appear in San Francisco, U.S.A. a decade ago. It has since then spread and become popular among independent, digitalized entrepreneurs in the urban areas of the world. For the cost of a cup of coffee or lunch these new nomads of the digital era 'rent' workspace and internet access. A more regulated version of having the office at a café have lately appear where office space, access to internet, printers and meeting rooms is offered at cafés for a monthly fee. One of the first known 'café offices' of this kind in Sweden is the 'Coffice, ' which is run by a group of landscape architects called Combine in Stockholm (Rehnfeldt, 2010).

## 2.5 A Changeable World with New Conditions

When investigating office environments and their influence on employees and organizations, one has to take into account the extensive changes the labor market has gone through in Western society during the 20th century, from the industrialism to a global labor market. These changes have had long gone consequences for working life at an individual and organizational level— questions all at issue in this doctoral thesis.

In the new global economy the workforce has become a product that can be priced to dump just like any other product (Braverman in Allvin, Aronsson, Hagström, Johansson, & Lundberg, 2006). As a consequence of this salaries drop when the supply of workers are greater

than the demand and vice versa in times of shortage, thus it is often more profitable for the companies to offer temporary employment. Paralleling this trend, we see more traditional management responsibilities such as planning and executing work moved from the employer to lower levels in organizations such as the work team and the individual levels. Although this new order mainly is found in consultancy firms in the IT/media or management sector, worldwide companies have adapted this approach as well (Allvin et al., 2006). The new conditions of the labor market means that the individual employee, besides being willing to take on more responsibilities in order to 'survive, ' must also: a) make sure to be demanded on the market by always being up dated, b) cultivate a network of contacts, and c) always provide good service for clients in order not to lose them. Due to this emphasis, the new era is called the 'Knowledge Society' though the name 'Service Society' might be just as adequate as the focus even among producers is more and more on the service offered to clients.

With the changed emphasis in society, new demands have been put on individuals as well as on organizations. The majority of work carried out in the Knowledge Society is office work with an emphasis on mental work, which may lead to mental stress for the individual. This is e.g. the risk with a heavy workload combined with unclear demands. A heavy workload itself may also lead to mental stress if the individual find it difficult to stop thinking about work in the spare time and does not prioritize natural breaks from work, something very important to health and the ability to cope with high demands. An additional risk factor in modern society is that most of our wakening hours tend to involve mental activity and the average arousal level has supposedly increased. In fact, researchers talk today about a new type of mental stress called 'techno-stress'. An additional stress factor is that the technological development makes us within constant reach and contact, which has changed the work conditions to a great extent (Johansson, 2002). There are however not only risks with the advances in the information and communication technologies (ICT), for some employees it provides more freedom in how, when and where to perform the work, something that is referred to as 'flexibility by trust' or empowerment (Allvin et al., 2006). An obvious advantage of this is that it makes it easier to plan family life. For organizations the new demands that have come with the global market and Knowledge Society means that they need to be innovative and creative in order to survive the competition. Ultimately the employees must hold these abilities. The organizations must also always be ready for change as the conditions quickly change on the global market.

Parallel with the dramatic change of the conditions for both individuals and organizations the past decades, the office work has got

a more dominant part in the personal life of a lot of people as well as in society as a whole. It is a consequence of that we spend more and more of our waking hours working (Mustard, Lavis, & Ostry, 2006), and a majority of the work is today office work in Western society (Duffy, 1999). Besides this it has to be taken into consideration that the formerly described sharp border between work and home in many cases has disappeared. An example of this is the so called telecommuting, also called home-based telework, which has given the office a new role for both employees and organization. The office has become more of a home harbor where employees go to meet colleagues and to get information and for the organization it has become an arena where one influences and inspires the employees. The impact of all the described changes on employees and organizations has implications on several aspects within the area of this doctoral thesis.

## DIFFERENT TIMES — DIFFERENT THEORIES

As the conditions of the world have changed different approaches to understand it out of organizational and management perspectives have emerged. In 1911 the book 'Principles of Scientific Management' by Taylor was published in the United States. This was to become one of the most influential organizational theories in modern industrial history as its influence on industrial work environments and office environments cannot be overestimated (Duffy, 1999). Taylor developed the theory as an approach to handling production efficiently in factories during his work with production at the Bethlehem Steel Mills and the Ford Industries assembly line. It includes several principles of how to guide organizational practices, it advocates a rationalized, routine-based work with a high degree of specialization in order to achieve a more efficient production (Spector, 2006). Despite the importance of Scientific Management the work by Fayol should in this context not be underestimated. This French organizational theorist recognized the importance of administration for the success of larger organizations. According to his administrative principles the individual should obey the organization and its management; interaction should thus always be vertically and not horizontally structured in an organization. Together these two men 'invented' management rules that have completely dominated working life in the 20th century and led to organizations that are hierarchically and sequentially ordered (Allvin et al., 2006). The management's interest in the physical office environment came through their theories primarily focus on design aspects that would facilitate: a) supervision of the workforce (e.g. direct surveillance and monitoring of the employees) and b) the coordination of work. The outcome was office employees arranged in long rows in a large workspace with the

supervisor placed in a glassed office surveilling the workforce and the progress of work, so called Bullpen-offices. The office architecture played thus a central role in these management theories (e.g., Bedoire, 1979; Sundstrom, 1986)

In terms of studies, the single most important research project for the recognition of the environment as an important factor in management are the well known Hawthorne Studies, which took place at the Western Electric Company from 1924-1932. The Hawthorne researchers discovered that many social aspects of organizational life affected employee behavior and performance. The best known Hawthorne study is the investigation of lighting-level effects (Roethlisberger & Dickson, 1939). The result from this specific study was interpreted as that the employees' changes in behavior were due to the notion of change rather than a result of the actual environmental changes made. The employees' perception that management was concerned with their work environment and thus their welfare was interpreted as the reason for steadily increasing results at the department where the experiment took place. This phenomenon has come to be called the 'Hawthorne effect' (Spector, 2006). Though the Hawthorne studies have been criticized due to methodological and interpretational reasons human behavior could after this no longer be investigated isolated from the social and physical context. Instead the social context, including group influences, social status, informal communication and norms was incorporated and embedded with the architecture (Becker, 1981; Sundstrom, 1986).

Besides the Hawthorne studies, the Two-Factor theory by Herzberg has played a major part in the recognition of the architecture from an employee point of view. It plays an important component in Herzberg and his colleagues' theory from 1959, presented in the book 'Work Motivation' (2003). The theory makes a distinction between factors that lead to: a) high job satisfaction and work motivation, called motivators, or satisfiers, and b) factors that lead to dissatisfaction, called hygiene factors, or dissatisfiers. For an acceptable level of job satisfaction among employees the hygiene factors have to be adequate. It is however not possible to improve it with hygien factors such as physical work environment, salary and other material benefits; for this you need motivators like work assignments, personal development as well as good leadership and cooperation (Spector, 2006). The theory means that the architectural design plays only a decisive role if employees are less satisfied and motivated at work as it then may have a trigging effect on dissatisfaction. If the architecture already is fairly good an even better environment will not enhance satisfaction, only reduce dissatisfaction according to the theory. It must though be said that the theory has been criticized for being badly empirically documented (Mitchell McCoy, 2002). Researchers have

also failed to find a clear-cut distinctions between the two factors (Locke, 1983) and it is by some even considered to be invalid (Locke & Henne, 1986). Though the theory is controversial today it is recognized for: a) incorporating architectural issues in organizational theory, b) leading to the application of job enrichment in many organizations, but c) most of all for being the basis for the well known Job Characteristics Theory by Hackman and Oldham (1976).

Also the psychologist Maslow incorporated architecture in his famous human behavior theory, according to Sundstrom (1986), though he did not apply a work environment perspective to the subject. His theory suggests that each person has a hierarchy of needs, including needs for social relationships and personal growth and the physical environment satisfies the basic need for shelter and security (Maslow, 1943). There are similarities between Maslow's theory and the Two-Factor theory as Maslow meant that once the basic needs are satisfied, the individual gives attention to the higher-order needs. In Maslow's theory, the work place is only a factor when it fails to satisfy basic needs whereas it in Herzberg's theory, as formerly described, the work environment is only a factor if it is inadequate and thereby create dissatisfaction.

Some additional theorists need to be mentioned in this review of organizational theories that through history have recognized architecture as an important component for the welfare of individuals and organizations. E.g. the sociologist Weber who emphasized the formal roles in human relations implicitly recognized the importance of the architecture in a psychological and behavioral context due to its symbolic value at the workplace (Sundstrom, 1986). Interpersonal relationships play a major part in some organizational theories though different perspectives are applied to the subject. The interest for communication and social aspects in different theories rose with the emergence of the human relations movement, which started with the Hawthorne experiments. Since then the belief that the office design could define and reinforce relationships has been established though different approaches to the workplace´s role in this interplay (Sundstrom, 1986). E.g. the social theorist Homan, whose research concerned social behavior and interpersonal relationships, treats the environment as a part of the technological component of an organization. He with his interest in open plan offices recognized the association between architecture and patterns of interaction (Ibid.). For a more detailed picture of different psychological approaches to the workplace see the following table.

## Approaches to the psychology of the work place

| Fields of psychology | Approaches |
|---|---|
| *Pre-Hawthorne Applied psychology* | - Focus on ambient conditions (especially temperature, noise, lighting)<br>- Individual level of analysis<br>- Mechanistic, deterministic model of person-environment relationship |
| *Post-Hawthorne Industrial-organizational psychology* | - Focus on physical environment as a component of job satisfaction<br>- Individual, interpersonal, organizational level of analysis<br>- System models (especially sociotechnical system) |
| *Human factor psychology* | - Focus on equipment design, ambient conditions<br>- Individual level of analysis, sometimes interpersonal analysis<br>- Reciprocal model of person-environment interaction (man-machine system), sometimes deterministic model |
| *Environmental psychology* | - Focus on offices as total environments<br>- Interpersonal and organizational levels of analysis<br>- Social-psychological and ecological model |

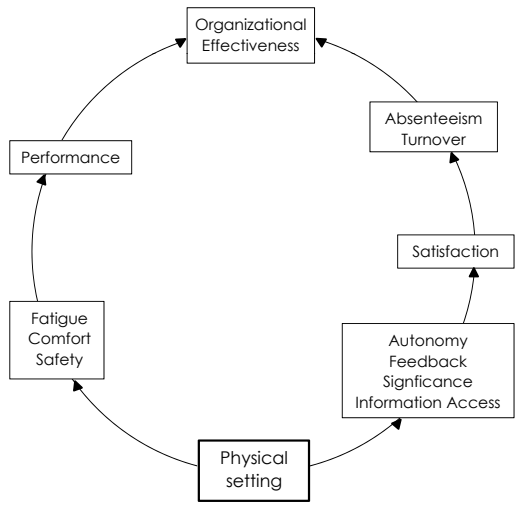
Table of approaches to the psychology of the work place (Source: Sundstrom, 1986, p. 54).

The different fields of psychology described in the table can also be read in a historical context, as the pre- and post-Hawthorne studies. The field of applied psychology, which is pre-Hawthorne, applied an individual level on the analysis and focused on ambient factors. The industrial-organizational psychology, which is post-Hawthorne, focuses on the physical environment from a motivational perspective and on both an individual and organizational level. The human-factor psychology, also post-Hawthorne, applies a more technical approach with the focus on equipment design and ambient factors. An individual level of analysis is mainly used and sometimes an interpersonal as well. The environmental psychology, also post-Hawthorne, focuses on the total environment and applies an individual psychological, interpersonal as well as organizational levels of analysis often described in models.

### Theories On Effectiveness, Performance and Creativity

Later in the 1970s and 80s the importance of architecture with regards to organizational effectiveness and performance was emphasized more by theorists such as Steele, Becker and Sundstrom. Steele (1973) looks at the interior architecture from a wider perspective and examines it in terms of its main functions as: 1) shelter and security, 2) social contact, 3) symbolic identification, 4) task instrumentality, 5) pleasure, and 6) growth. Becker (1981) means that architecture by facilitating the work can have

the characteristics of an environment-support-system. As such it can affect both intrinsic as well as extrinsic aspects of work and as such play an important part in organizational effectiveness. He emphasizes design and its importance in facilitating social and communication patterns such as feedback and performance of work tasks. According to him location and nature of storage system have an impact on the effectiveness in work performance, as well as noise reduction and provision of privacy that can facilitate concentration and reduce work interruptions. See Becker's model of the physical setting's contribution (i.e. architecture) and its influence on both individual and organization value.




Model of the Physical Setting's Contribution on Behaviors Model of the Physical Setting's Contribution on Behaviors (Source: Becker, 1981, p. 88).

Together Steele and Becker also have investigated how the design supports performance (Becker & Steele, 1995). They have developed 'organizational ecology,' a concept they describe as a dense web relationship that consists of spatial, technological, cultural, demographic and work process factors. The aim is to understand how the architecture at work may support workplace initiatives that lead to high performance, such as teamwork, telecommuting, and cross-functional collaboration.

Sundstrom (1986) finally views the workplace through a framework based on three levels of analysis—individual, interpersonal, and organizational. He associates each level with: 1) different facets of the architecture (e.g. ambient conditions, workstations, and room layout), 2) different outcomes (e.g. individual satisfaction, group cohesion, and organizational effectiveness), and 3) different underlying key processes (e.g. stress, attitudes, and symbolic status). The individual level of analysis is then according to the framework associated with workstations,

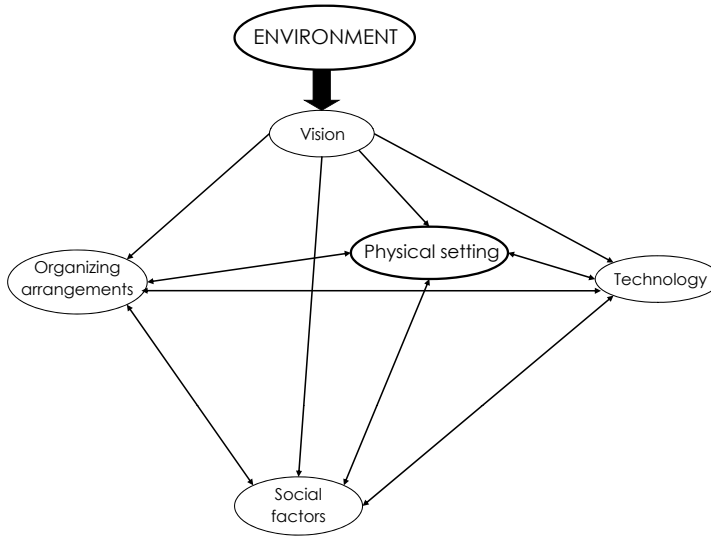
stress and job performance, whereas room layout, communication and group cohesion are associated with the level of interpersonal analysis. The interpersonal relations at the workplace can at three key levels of analysis contribute to organizational effectiveness through: 1) individual satisfaction or performance, 2) links with communication, and 3) support of the organization's structure. The evidence for such contributions is however indirect at its best, according to Sundstrom, though support for the hypothesis that workplace satisfaction influences employees' job satisfaction is found (Sundstrom, Burt, & Kamp, 1980; Sundstrom, Town, Rice, Osborn, & Brill, 1994).

In the last two decades the pressure has increased on organizations to be innovative in order to survive on the highly competitive global market with the emergence of the New Economy and the Knowledge Society (Allvin et al., 2006). Thus creativity is a key factor for organizations. How it works and is reinforced and what part architecture plays for it thereby engage several researchers. E.g. Mitchell McCoy, an interior architect and environmental psychologist, investigated in her thesis the allocation of workspace for creative teams in large organizations in regard to team members' satisfaction and performance (McCoy, 2000). Creativity in organizations has combined with how organizations successfully deal with changes during uncertainties and in competitive markets also concerned the International Workplace Studies Program (IWSP) at Cornell University under the supervision of Becker (Becker, Sims, & Schoss, 2003; Becker & Steele, 1995; Becker, Tennessen, & Dahl, 1997).

### The Interaction Between Architecture and Organizational Structure

In Porras and Robertson's model (1992) architecture is assigned great importance for an organization's success, thus included in their framework with five key factors. It recognizes the influence of the environment on the organization's corporate image as it states the purpose, direction, focus and motivation of the organization to both its members and clients. Their model in contrast to formerly described models does not include employee satisfaction, it applies also a more visionary and design management oriented perspective on architecture. Its five key factors of the model interrelate and affect each other and the vision is the main factor — it is a tool for the organization with regard to both short and long term goals. It simultaniously forms and is influenced by the additional four factors: 1) organizational arrangements, 2) social factors, 3) technology and 4) physical setting, i.e. architecture. The organizational arrangements are the formal structures that guide the coordination of people and processes within the organization (strategies, administrative systems, routines and reward systems). Social factors are the informal

characteristics of individuals and work groups, which often are difficult to change (organizational culture, management style and interaction). The technology is the technological systems used in the organization combined with job design. Finally the physical setting/architectur is the combination of space configuration, physical ambience, interior design and overall architectural design. See the following figure for the interrelation between the different factors in their model.




Model: Factors Constituting the Organizational Work Setting
(Source: Porras & Robertson, 1992, p. 729).

The sociologist and architect Söderberg (2003) who has used Porras and Robertson's theory in her own work argues that the space can either support and facilitate activities, or have the opposite effect if efforts of organizational improvement and development are done without any consideration of the architecture. Porras & Robertson's model is advocated a useful method for the management to include architecture in the vision and goals of an organization. Yet another architect Duffy has put a lot of effort into connecting the organizational structure and the architecture of the workplace (Duffy, 1974a, 1974b, 1974c). He speculates in his work that the two complex qualities of organizations—bureaucracy and interaction—are associated with two qualities of office environments—differentiation and subdivision.

## 2.6 A Holistic Approach to Office Design

There is a need for a holistic approach to office design because:

a) knowledge of the environmental influences is found within different disciplines, and b) environmental influences operate between different factors as well as at different levels simultaneously. The importance

of a multidisciplinary approach between the involved disciplines in a work environmental context is further emphasized by the Swedish Work Environment Act. It applies different perspectives to the work environment, which according to Lenéer-Axelsson & Thylefors (1991) goes into the following divisions:

- *the physical work environment*; that surrounds people in their worksituation.
- *the organizational work environment*; deals with the formal situations, which dictate the decision making as well as the distribution of work.
- *the social work environment*; comprise the social relationships and interactions between individuals and groups at work.

The holistic approach to office environment applied in this review integrates the four fields that deal with its environmental influences, which are: architecture, organizational-oriented research, environmental psychology and occupational health. As the aim is to give a wide perspective to the subject no differentiation between the different disciplines is applied in this review; all research is instead described in an organizational context. Environmental factors and environmental stressors in the office are discussed in combination with fundamental aspect for the perception of these. They are presented at an individual as well as at a group level depending on their character. Though this discussion on exterior stimuli in office environments moves over a wide field of research its starting point is the architecture of the office and its influence on individuals and organizations. Some aspects of great importance are only briefly overviewed as they are more thoroughly described in the individual articles of the thesis. This is e.g. the case concerning some of the environmental factors as well as the discussion on Davis' framework (1984) of physical setting variables influencing behavior in organizations. It should also be said that obvious environmental risk factors such as pollution (pollutants) and bad air quality are not discussed since they are outside the field of interest, despite their importance from an employee's health perspective.

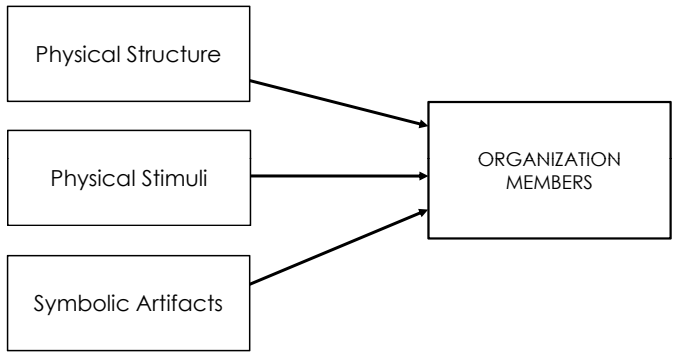
## ENVIRONMENTAL INFLUENCES IN OFFICES

The exterior stimuli from surrounding environments influence us psychologically as well as physiologically; the office environment accordingly influences employees and thus their organizations. Human behavior in the work environment is difficult to investigate due to the complex interaction between the individual and the physical workspace on one hand and the social interaction between colleagues and departments on the other. An additional factor that complicates interaction further is that while organizational members need a place to work, to which often a lot of emotions are tied, the requested workspace

is usually seen as a provision by the organization that it maintains clear ownership and control (Mazumdar, 1992). Nevertheless the workplace includes important factors such as control, functional opportunities, and nonverbal self-expression for the individual.

### A Framework to Understand Environmental Influences in Offices

Davis' framework (1984) describes how architecture influences members of an organization, thus here used as a starting point for a discussion on environmental factors in an office setting. The framework divides the physical environment, i.e. architecture, into three categories: 1) physical structure, 2) physical stimuli, and 3) symbolic artifacts. The division of architecture into these categories clearly emphasizes its relation to the employees and the organization. See the following figure of Davis' framework.




Physical Setting Variables influences Behavior in Organization
(Source: Davis, 1984, p. 272).

Davis' framework and its relation to different environmental factors and stressors in office environments are more thoroughly described in the article 'Office Experiences' in this thesis.

*Physical structure*—can be defined as the architectural design of a building as well as the physical placement of furnishings which influences or regulates social interaction according to Davis' framework (Ibid.). The physical structure is closely connected to aspects such as communication, privacy, group constellations etc.

*Physical stimulus*—is the term Davis uses for those aspects of the architecture that intrude into the organization members' awareness and influences their behavior. In environmental psychology the term environmental factor is used instead for the aspects of the environment that give physical stimuli in an environment. The physical stimuli can have a positive as well as negative influence on the individual. If the physical stimuli are perceived as negative they cause frustration, difficulties in concentrating on work as well as less satisfaction with work. Example of

physical stimuli in an office that compete for the individual's attention are such as conversations, telephone ringing, e-mails, different objects in the room and the surveillance by supervisor as well as by colleagues. There are more physical stimuli in an environment with a lot of people, by the mere fact that there are more people. When office employees experience too much stimuli, this may cause a decline in concentration, an opinion often expressed by employees in open plan offices (e.g., Oldham & Brass, 1979; Sundstrom et al., 1980; Sundstrom, Herbert, & Brown, 1982). People may also experience crowding, which is an environmental stressor related perception of density (Stokols, 1972).

Physical stimuli in the environment can arouse physical reactions in an individual and possibly also activate behavior (Porter & Lawler, 1965). The interaction with features and properties in an environment can be evaluated as levels of arousal, adaptation, fatigue, stress, safety, and security. For groups, they can be evaluated as levels of communication and collaboration, status and identity, and crowding or privacy (Mitchell McCoy, 2002).

*Symbolic artifacts*—are according to Davis (1984) aspects of the architecture that individually guide the interpretation of the social setting. For instance, the architectural design of the office, the type and style of furnishings, the colors of the walls, the presence or absence of carpeting, framed certificates or photographs displayed on walls or desk—all communicate information about the organization and the people who work there (Ibid.). Symbolic artifacts are strongly associated to status cues and the images of organizations. A field within organizational theory called design management deals with these matters.

Symbolic artifacts communicate with their observers/users. They are subject to interpretion, with both intended and unintended consequences. One may be oblivious to them or incensed by them (Ibid.). The reason that status plays an important role in the interpretation of the office environment is that organizations are more or less hierarchically structured; the members therefore measure themselves consciously or unconsciously hierarchically in relation to others. Different means are used to measure status in the office context, e.g. the symbolic artifacts of an office environment. There is often a parallel between organizational structure and the workplace. In a review of different office buildings Duffy (1978) observed the fact that hierarchical differences were reinforced by physical differences between offices occupied by officials of various occupational positions. Symbolic artifacts often play a part in the sometimes hard process of changing office environment. Taking away traditional statues symbols at the workplace may meet resistance, as some employees then might feel deprived of their personal belongings and identity. It is also a mean to reduce the hierarchical position of an

individual within an organization (Mazumdar, 1992). There is undoubtedly a psychological dimension to status, which also may be connected to employees' satisfaction with the work environment (Davis, 1984). Traditionally the impact of symbolic artifacts is used in the design of banks, insurance companies and law firms, since their offices are used to complement or confirm the professional status as well as meet the needs of the clients for comfort, security, and confidentiality. The office design should neither convey conflicting messages to employees nor clients of an organization, thus it is important to know what function and what purpose the office design should support (Becker, 1982).

## THE PERCEPTION OF ENVIRONMENTAL FACTORS

There are psychological concepts closely connected to environmental factors and whether an exterior stimulus will be perceived as a threat or not needs to be described before a discussion of different environmental factors and stressors in the office.

*Personal control*—a fundamental component in all concepts closely related to the perception of environmental factors and stressors. A discussion on concepts related to the perception of these should thus have its starting point in personal control. People feel better and have better mental health when they have a sense of control of their surroundings. When it is thwarted helplessness may occur (Banduara et al. in Evans, 2003). Personal control refers to autonomy and it reflects the individual's belief regarding the extent to which he/she is able to control or influence outcomes in life. There are tree main types of personal control: a) behavioral (direct action on the environment), b) cognitive (the interpretation of events), and c) decisional (having a choice among alternative courses of action)(Averill, 1973).

Personal control can be achieved by different means psychological as well as physically in an office environment (Lee & Brand, 2005; O´Neill, 1994; Rodin, Solomon, & Metcalf, 1978; Veitch, Gifford, 1996). It is reinforced psychologically by enhancing: a) the feeling of autonomy and confidence at work, b) motivation in decision-making, and c) ability to take part in different changes at work. Physically it may be reinforced or thwarted by the architectural design. The size, location and permeability of rooms influence the degree of social control. Architectural features which are inhibiting in this case are e.g. large structure, long interior corridors and lack of rooms for privacy and concentration as well as rooms for group and teamwork. In addition poor visual surveillance interferes with territorial control and feelings of ownership (see review in G. Evans, 2003). Personal control in the workplace is reinforced by participation in the design process, the ability to control the closest work environment and to personalize it (Evans & McCoy, 1998). Our desire for personal control of the surrounding environment is believed to be

a fundamental characteristic of humans (for review see e.g., Rothbaum, Weisz, & Snyder, 1982). Research suggests that the experience of control and influence at work determines the experience of privacy and crowding in the workplace, which both are significant factors in terms of employee affective outcomes, e.g. job satisfaction (Carlopio & Gardner, 1995). Research has shown personal control important in relation to ambient factors, e.g. having the possibility to individually choose which ambient factor to improve has proved positive effect on acceptability on the overall indoor environment (Clausen & Wyon, 2005). Besides this control may be a key aspects in terms of creativity at work as highly creative teams is found to be stimulated by the sense of freedom and control over work (Mitchell McCoy, 2000).

*Privacy*—a concept that comes from environmental psychology (Altman, 1976, 1977; Pennock & Chapman, 1971). The term is used to describe anything from the need for space—visually and physically, via psychological separation, low population density and control over space to freedom of activity. One of the major functions of privacy is to serve the individual's self-identity (Altman, 1975; Westin, 1967). The need for it is both highly individual and culturally dependent. Privacy is sometimes classified as coping strategy as it is a mean for the individual to control and handle environmental stress (see latter discussion). At a group level it plays a major part in terms of communication and collaboration. There are several definitions of privacy. Sundstrom (1986) defines it by two categories: acoustical and visual privacy. Acoustical privacy includes speech privacy as well as isolation from noise. Visual privacy means isolation from unwanted observation and visual stimuli. In a work environment it is achieved by obstructing direct visibility over workstations and sudden appearances of visitors. Sundstrom (Ibid.) describes the three central ideas of privacy as: 1) retreat from people, 2) control over information, and 3) regulation of interaction.

When an individual experiences too little interaction, the result may be isolation on the other hand too much interaction may result in crowding (G. Evans, 1979; Stokols, 1976). The reason privacy is important in office environments is the fact that office work to a great extent involves the sharing of facilities and workspaces with others. The key objective in office design is to achieve an appropriate balance between accessibility and physical separation among employees. The office environment should ultimately meet the employee's needs of: 1) Need-for-Privacy (NFP) and 2) Need-for-Socializing (NFS) when carrying out the work (Haans, Kaiser, & de Kort, 2007).

Privacy as well as the amount of workspace has however to be viewed in relation to the function that is performed (Marans & Spreckelmeyer, 1982). Different office types allow different degrees of acoustical and

visual privacy. The office type that offers best acoustic and visual privacy is cell-office, though there are different means to achieve privacy in open plan offices. Acoustic privacy is often more complicated to achieve than visual privacy. The physical features that determine perception of privacy and crowding are e.g. partitions and distance to colleagues (Charles & Veitch, 2002; Stokols, Smith, & Prost, 1975).

Research indicates that privacy correlates both with employees´ satisfaction with the workplace and job satisfaction (Sundstrom et al., 1980). The same study found it to be more important for job satisfaction of employees with 'complicated jobs,' whereas it was the opposite effect on those with more routine based work. An explanation for this may be status.

Privacy is strongly connected to status and importance in organizations (Steele, 1973), often manifested by the fact that those with the highest rank often hold private offices and are least accessible. Regarding this it is hard to know whether it is privacy itself or the status expressed by it that influences job satisfaction. Privacy is important out of other aspects as well, e.g. its claimed impact on the success or failure of training interventions in organizations (Kupritz, 2000). Most importantly the concept of privacy is important due to its obvious relation to interaction and communication among individuals, crucial aspects in office design.

## ENVIRONMENTAL STRESS

An environment that leads to discomfort or a sense of threat for the individual causes environmental stress. The physiologist Selye, who introduced stress in the 1840s, divided the human reaction to stress into a defense and an adaptation mechanism. The more recent office researcher Sundstrom (1986) has translated Seyle´s classification into the following psychological stress reactions that may occur among office employees as:

1) *Arousal*, also the general level of physiological excitation, a consequence of intense stimuli such as an environmental stressor. Its effect on behavior depends on the level of arousal it causes in the individual.
2) *Stress*, a response to a condition that is perceived as a threat to the individual's well-being. Stress is difficult to distinguish from arousal and often a matter of degree. However, stress usually refers to a stronger or more intense reaction, reserved for environmental conditions perceived as having threatening consequences.
3) *Distraction and overload*. Distractions caused by the physical environment may divert from a task. It can also lead to an overload of the individual's capacity. Theories of overload describe it as demands that exceed a person's capacities.
4) *Fatigue*, a response to overload or environmental stressors such as noise, crowding etc. It leads to less comfort and ability to perform.

When a physical stimuli, classified as an environmental stressor, is recognized by an individual it is taken care of by a *coping strategy* (e.g., S. Cohen, Evans, Stokols, & Krantz, 1986; Lazarus, 1966). The 'coping response' is the action the individual takes to handle the stressor that is imposed on it (S. Cohen et al., 1986). Examples of coping strategies are e.g. patterning and personalization. (For more details see article 'Office Experiences' in this thesis).

### Environmental Stressors

If the response to an environmental factor is stress this is then classified as an *environmental stressor*. Fundamental to all environmental stressors is the fact that they, in a sense, lead to a certain degree of loss of control as formerly discussed. Examples of environmental stressors in office environments are crowding, noise, disorientation and environmental deprivation. Here will only the most important environmental stressors in office environments be discussed—noise and crowding. (For details on other environmental stressors see article 'Office Experiences' in this thesis).

*Noise*—by definition unwanted sound, thereby often both uncomfortable and stressful in work environments. As a source of overload it may add to job-related stress (R. Karasek & T. Theorell, 1990), even though it is not threatening to office employees' health and well-being (Vischer, 1996). It is the most important environmental factor in office environments since it is: a) the single most common reason for complaints in offices with open plan layouts, and b) it correlates with office employees' environmental dissatisfaction (Nemecek & Grandjean, 1973) and job dissatisfaction (Sundstrom et al., 1994). Yet another reason for paying special interest to noise is its negative effects on performance. It must here however be pointed out that some sound from colleagues is actually good, as it may be stimulating, strengthen cohesion and make people feel that they are not working in isolation.

The human reactions to noise are individual. Besides this the purpose of the noise, the possibility to foresee and control it affects the grade of annoyance. But also the attitude towards the noise source, type of work assignment and the personal character affect the grade of annoyance. The most disturbing noise is not always the loudest. Instead it has been shown that colleagues' conversations as well as telephone ringing e.g. are more disturbing than noise from office equipment and traffic, which is interpreted as noise that carries meaning and information that is most disturbing (see review by Sundstrom, 1986). The distance to the person talking may also have an effect, i.e. one survey has found that talk from people close by was not disturbing, whereas conversation further away than approximately 8-10 m from the own workstation was perceived as disturbing (Christensson, 2009).

The acceptance and tolerance of noise is greater if the belief is that one cannot eliminate the noise, e.g. noise caused by traffic outside (Byström, 1999), whereas a controllable stressors such as noise from e.g. equipment is positively influenced by perceived control. It reduces negative outcomes, especially high levels of stress are essentially eliminated (S. Cohen, Evans, Stokols, & Krantz, 1991); especially the stress hormone adrenaline is reduced by the ability to control noise (Frankenhauser, 1980). Experiments have shown the negative outcomes to be more dependent on the sense of control than the exact amount of exposed noise (Glass & Singer, 1972).

In terms of interference by noise it appears to depend on the relative simplicity or complexity of the task as well as the noise level. There are however contradictory results concerning performance and noise. E.g. Sundstrom et al. (1994) could not find any correlation between noise disturbance and performance rating. Whereas Haka et al. (2009) in a laboratory study of an open plan office found that interference on performance depends highly on the speech condition. At exposure of intelligibility of irrelevant speech at levels of 0.65 STI (Speech Transmission Index) the performance (operation span task, serial recall, and activation of prior knowledge) deteriorate significantly. The subjective perception of disturbance were however more sensitive, although performance was not affected. Other laboratories studies have showed that unpredictable noise can cause adverse aftereffect (see review by S. Cohen, 1980). Also the frequency appears to have an impact, where low frequency noise has a negative influence on cognitive performances as it is hard to get used to and ignore, thus easily make people tired. Besides this low frequency of noise increases the level of stress hormone cortisol in the saliva among people (Bengtsson, 2003). Concering performance it is related to the tolerance of noise whose tolerance threshold decreases at difficult assignments and already at a level of 35 dB it is significant (Franzén, 1969). Despite this, in some circumstances constant noise during brief work sessions is associated with improved performance, which is explained as a positive distraction of attention (Sundstrom, 1986). It is hypothesized that more extrovert personalities are stimulated at noise levels which others find detrimental, e.g. in terms of reading comprehension (Standing, Lynn, & Moxness, 1990). Results concerning the impact age and gender have on the level of disturbance is contradicting. Some research has shown age to have a significant impact on how easily one is disturbed by noise (Byström, 1999). E.g. one study did not find any disturbance by conversation noise among children in an open space school nor any reduction in performance during higher noise sessions (Weinstein & Weinstein, 1979). Other research indicates that disturbance is independent not only of age, but also of gender and education (Canter & Stringer, 1975).

*Crowding*—an environmental stressor which may lead to physiological arousal (e.g., Aiello, Epstein, & Karlin, 1975; Evans, 1979) and its stress symptoms are both behavioral, (e.g. reduced ability to be social and creative, increased intention of job turnover) and physiological (e.g. high blood pressure)(see e.g., Oldham, 1988). Experimental laboratory studies as well as studies on college students and prisoners have revealed negative impacts of crowding on stress. Symptoms of prolonged stress have also shown from living in high-density environments (see review by Evans, 2003).

The perception of crowding is closely connected to privacy as interference in privacy is often reported when the individual perceive problems with crowding. It is more important for employees´ job satisfaction in open plan offices than privacy attained by partitions (Oldham, 1988). Highly related to the concept of personal control crowding is not only a result of high density and insufficiency of space, but also a result of more social stimulation or interaction and interference with activities than desired (Stokols, 1972). Regarding treshold value for crowding there are contradictory results. In an extensive review by Duval et al. (2002) no such value was found in terms of environmental satisfaction for social density (occupants per office), though architectural detailing appears though to have a mediating effect on it (Wochel & Teddlie, 1976).

## ENVIRONMENTAL FACTORS IN THE OFFICE

The most dominant aspect of the interior design in an office is the plan layout—it sets the framework within which other physical factors have to subordinate. It determines not only the borders of the space and the placement of furnishing, but also architectural features such as design elements and architectural detailing. Above all the plan layout sets the conditions for the environmental factors and their architectural qualities by determining the placement of windows and thereby the visual and natural lighting condition of a space. It include ambient conditions i.e. noise, temperature, air quality, lighting, as well as colors, artifacts etc. As noise is perceived as a stressor it is in this review treated in the section environmental stressors.

### Temperature and Air Quality

Temperature and air quality are environmental factors that are technical to their character and outside the field of architecture. They are however strongly influenced by the architectural solution of a building as well as workstation design. They are highly important in the design of offices since an unsatisfactory indoor climate can cause complaints about other factors of the environment (Franzén, 1969). Complaints on thermal comfort are also together with noise the most common reason for complaints in offices (Jensen, Arens, & Zagreus, 2005). It has been hypothesized if

these complaints go unheard they are easily translated to dissatisfaction with management (Sundstrom, 1986). More recent research shows though that thermal complaints are more related to the size of the shared workspace, with which has a negative correlation, than to psychosocial factors (Pejtersen, Allermann, Kristensen, & Poulsen, 2006).

*Temperature*—is associated with dissatisfaction in both offices and factories and when frequently fluctuated it is supposedly also associated with a decline in job satisfaction (BOSTI, 1981). A substantial fraction of employees in offices and factories find that temperature often is either too high or too low. Even small departures from the range of comfort can create dissatisfaction with temperature. A large Danish study on perception of temperature among employees in offices with different plan layouts found it more common to complain about too high temperature than too low temperature (Pejtersen et al., 2006). However, due to individual differences people report wide differences in thermal comfort in similar climatic conditions (e.g., Griffiths, 1970) . It appears that the ideal temperature condition for the average employee is approximately 21° (70 °F) (see review by Sundstrom, 1986), with a slightly warmer indoor temperature for women (Hedge, 1982). Research concerning gender differences is however inconsistent. According to Griffiths (1975) individual differences in comfort is not depending on gender, age or geographical origin for that matter.

*Air quality*—is related to employees' satisfaction as well as annoyance among employees according to a review by Sundstrom (1986). The researchers at BOSTI (1981) have found that a drop in airquality will just as well as in temperature leads to a decline in job satisfaction (1981). Air quality, has however seldom been shown to have an effect on performance exceeding 3-4% over the whole range commonly occurring in offices (Wargocki, Wyon, Baik, Clausen, & Fanger, 1999; Wargocki, Wyon, Sundell, Clausen, & Fanger, 2000). Good air quality is defined as moderate air movement and humidity, as well as free from pollution. The latter is normally not a problem in office environments. Bad air quality in office environments is normally due to not frequently enough changed air, which thereby perceived as stuffy.Ventilation requirements depend on factors such as population density, geographical position, season, building materials and plan layout (e.g., Franzén, 1969; Woodson, 1981). Several studies show higher prevalences of symptoms and complaints in offices within mechanically ventilated buildings than those with natural ventilation (Mendell & Smith, 1990).

### Lighting, Colors and Windows

*Light*—significantly influences our perception of the environment and the architectural design (Dahlin, 1999).

Daylight has also beneficial effects regarding perceived stress (Walch et al., 2005) and feelings of anxiety (Lehrner, Eckersberg, Walla, Pötsch, & Deckee, 2000). We know e.g. that individuals chronically exposed to shorter hours of daylight suffer more sadness, fatigue, and some even from clinical depression (Rosenthal in Evans, 2003). It is found that people in windowless offices feel more restricted and tense (Ruys, 1970) and that those working next to windows during summertime are more alert due to higher levels of stress hormones compared with those further away. Sociability is also influenced by light through the same stress hormone. In this context it is worthwhile to know that sociability is partly inverted with concentration (Küller & Lindsten, 1992). Previous outcomes are explained by the individual´s level of stress hormones and melatonin. The latter is a sleep hormone determined by the access of daylight that affects our alertness (Ejhed & Liljefors, 1990). Concerning health and well-being it is beneficial to know that too much light may cause glare, which in a work setting can lead to eyestrain and headache (J. A. Veitch, 2001; Vischer, 1996).

The influence of the quality of light on performance is contradictive. The research that proves natural lighting to be superior to artificial light is scarce (Mitchell McCoy, 2002). It as well as satisfaction in windowless rooms may thus depend more on the function of the space, its size and duration of time present in the room than the lack of natural daylight (Ibid.).

*Colors*—have a great impact on the atmosphere of a room, which in turn is determined by the lighting conditions of the room (Dahlin, 1999). The perception of color is in architecture also closely connected to materials, their characteristics with regard to structure, luster and transparency, something rarely considered in the psychological research of color conducted in laboratories (Ibid.). The darker the color is the stronger sense of space as light colors tend to expand the space and give a perception of openness (Dahlin, 1999; Sundstrom, 1986).

Research has shown that there is a strong preference for great variety of bright colors in office environments (Hedge, 1982). The choice of color at the workplace is by employees and clients often interpreted symbolically. It can thus be classified as a symbolic artifact in accordance with Davis' model (1984) previously described, which is due to its emotional and physical effect on people (Küller, 1995). Research on commercial settings has shown that customers' evaluation are affected by wall colors (Babin, Hardesty, & Suter, 2003). People in general prefer blues, reds and greens, as well as lighter colors. The hue seems to be more important than values or saturation for preference (Guilford, 1934).

Warm colors (such as red and yellow) are believed to have arousing physiological and psychological effects in contrast to cool colors (such

as blue and green) (e.g., Jacob & Suess, 1975). Green is found to evoke positive emotions such as relaxation and comfort (Kaya & Epps, 2004). The empirical evidence regarding health benefits of color in health care settings is however weak (see review by Dijkstra, Pieterse, & Pruyn, 2006). The often contradicting research might depend on an individual effect of colors. Dijksta et al. (2006) found in their research that when they adjusted for personality, green wall color had only an effect on stress among certain individuals with a low ability to screen off unwanted stimuli. With regard to colors' effect on office employees' performance it appears that individuals with a low ability to screen off unwanted stimuli performed more poorly in a red office (vs. blue or green) than those with a high ability to screen (Kawallek, Woodson, Lewis, & Sales, 1997).

*Windows*—admit daylight as well as a view of the exterior, thus the placement of windows is important. The view itself appears to influence well-being and satisfaction among employees as well.

The health aspects of view have been argued in several articles. To mention some: Kaplan et al. (1988) found in a study that office employees with views of only built components, had higher levels of job stress than those with views of natural elements. The latter group also showed higher job satisfaction. A view of nature seems to also have health benefits, e.g. Hartig et al. (1991) found that the diastolic blood pressure declined more rapidly among individuals who viewed trees and vegetation than those who viewed urban settings. In addition, anger appears to decline easier in 'natural environments,' whereas it increases in urban environments (Hartig, Evans, Jamner, Davis, & Gärling, 2003). In terms of direct health outcomes in hospital settings studies have shown that access to a natural view has positive effects on recovery after surgery (Ulrich, 1984), on intensive therapy (Keep, James, & Inman, 1980) and on post-operative delirium in post surgerical patients (Wilson, 1972). In extreme environments such as prisons, beneficial effects of views of nature on health have been found as well. Moore (1982) has showed that inmates with a view consisting of adjacent farmlands have lower rates of sick call than those who overview the prison yard. However, when research that is conducted in hospitals and prisons are compared with office environments, one must bear in mind that the circumstances in these settings are in many aspects very different to those in office environments. A stay in hospital or in prison is not voluntary; the duration of exposure is also longer. In office environments it is possible to move around and change environment much easier than in the former environments.

In terms of satisfaction and preference among office employees, it is known that windows by workstations are highly appreciated and a source for satisfaction with the physical environment (Sundstrom,

1986). These positive effects of views overlooking nature have, besides the positive effect of daylight, been attributed to the ability to register information regarding the time of day, weather, and seasonal changes. Sundstrom (Ibid.1986) means however that the positive attribute attached to windows in office environments possibly is due to their value as status symbols in office settings. Status is e.g. known to have a positive effect on environmental satisfaction. Whatever the reasons for the positive effects on office employees may be, the preference for views of nature is strong. Studies have e.g. found that employees with no windows tend to decorate their workspaces in preference for more 'natural' themes, in comparison with employees with windows (Heerwagen, 1990; Heerwagen & Orians, 1986).

### Artifacts and Artwork

Compared with other aspects of the interior stimuli there is limited research on how physical objects such as artifacts and artwork influences human psychology and behavior. Despite this, artifacts, architectural detailing and artwork are believed to reinforce the identification to a place and in an organizational setting reinforce the identity of an organization to its members and their loyalty to the organization by making the workplace unique by design and architectural features. Artifacts and artwork are, according to Davis' model (1984), 'symbolic artifacts' as they symbolically communicate information about an organization both to its members as well to the market outside. Health benefits as well as other benefits of artifacts and artwork is more thoroughly described in the article 'Office Experience' in this thesis.

### The Workstation

For the individual, one of the most important aspects of the workplace is the workstation (Sundstrom, 1986). Feelings towards the workplace and the building were people work is highly influenced by the feelings towards the immediate workplace and to what level specific environmental attributes are available to them (Marans & Spreckelmeyer, 1982). A positive correlation between permanence of the workspace design and pride in the workspace among employees has also been identified (Devereaux Ferguson, Horan, & Ferguson, 1997).

The workstation consists of many different physical objects that when combined should support work activity. The major aspect of the workstation is its set up with different furniture. Adjustability of furniture and storage elements may also contribute more to privacy than actual workspace enclosure, which is known to increase environmental satisfaction (O´Neill, 1994). Besides the importance of ergonomics furniture for employees´ satisfaction with their work environment, it reduces the experience of crowding at one's own workstation (Carlopio & Gardner, 1992). The same study showed also that the higher job rank

the individual holds, the greater emphasis is put on ergonomic furniture for environmental satisfaction (Ibid.).

As office work to a high degree means work at a fixed sitting position bad ergonomic design of a workstation may lead to an increase in physical and mental stress for the individual. Improper workstation design in terms of computer equipment and poor furniture are costly to society. E.g. in the U.S. the cost to compensate for only low back pain work related injuries is estimated to be billions of dollars per year (see review by Carlopio & Gardner, 1992). The same review highlights another economic reason for ergonomic furniture such as high adjustable desks and seating—its positive impact on productivity.

Aspects other than ergonomics such as e.g. the ability for storage at the workstation are important for the environmental satisfaction with it (O´Neill, 1994). In a survey by the American market research company Louis Harris & Associates 67% of the respondents rated accessibility to equipment and reference material as important for personal comfort (In Marquardt, Veitch, & Charles, 2002). In this context the lesser need for physical storage of work and reference material by the workstation for many office employees due to the new ability for digital storage in recent years has to be recognized.

The concept of privacy is highly related to workstation design and important for the satisfaction with the workstation. How to design it in order to achieve privacy at the workstation is not always obvious though, which an American study on privacy in open plan offices shows. In the study the employees had low preference for barriers such as partition screens and walls to achieve privacy. Instead two field characteristics were preferred—minimal traffic around the workstation and being located away from the main traffic flow (Kupritz, 1998). Also other studies have shown that although high screens admit more privacy they are not preferred out of all choices. E.g. a Canadian study found that employees with lower partition screens at the workstation had a higher overall environmental satisfaction than those with high screens. This was explained by factors such as an improved sense of space and better ambient conditions with lower screens (e.g. better air flow and access to overhead lightning (Charles & Veitch, 2002). The study showed also that workstation size correlates with occupants' satisfaction; which could be due to the increased distance to co-workers as well as the amount of personal workspace.

## CONCEPTS THAT OPERATE AT A GROUP LEVEL

Some of the most important concepts related to the architecture of the office operate at a group level. Examples of such concepts are interaction and communication between individual employees as well as between

groups and departments within an organization. When investigating the impact of the architectural design for employees and organizations it is thus important to look closer at how it operates in regard to interpersonal relationships.

### Communication

Both the architectural design and the physical location can reinforce communication (see e.g., Conrath, 1973; Estabrook & Sommer, 1972; Lang, Burnette, Moleski, & Vachon, 1974). Within an organization there is however several factors that influence how people meet and interact. The key factors are: a sense of control, the character of the work assignment, the proximity to colleagues´ workstations and the access and proximity of places for meetings and interaction at the office.

People communicate less when they cannot control communication (Bencivenga, 1998), thus in organizations where the sharing of information and innovation are vital factors for success, the architecture needs to reinforce a sense of control. The choice of communication depends though on the complexity of the work assignment. High-complexity information demands face-to-face meetings, whereas telephone or e-mail function well for less complex information (Allen, 1997). Management relies highly on face-to-face spontaneous and unplanned meetings as well (Kotter, 1982) and these takes place physically at what researchers calls 'activity nodes' or 'nodes'. The ecological psychologist Bechtel (1976) defines 'activity nodes' as a place where people's paths cross during their regular, daily activities. The concept is closely related to Lynch's term 'nodes' used for strategic spots, from where there are intensive foci to and from in a townscape (Lynch, 1960). Nodes are described as 'primarily junctions, places of a break in transportation, a crossing or convergence of paths' (Ibid. p. 47). Successful nodes/ activity nodes are the focal points in a neutral territory, visually prospect (i.e. it is possible to see what happens in a space without entering), includes activity generators (e.g. coffee machine) and furniture arrangements that encourage social interaction (Bechtel, 1976; Becker & Steele, 1995; Lawson, 2001).

Communication is also promoted by proximity (e.g. between workstations and departments in an organization) as it increases the chances for people to meet and interact. Research has shown that distance correlates highly with the number of contacts between two people; the further people sit from each other the less frequently they talk (Conrath, 1973). Face-to-face communication is a vital component for creativity, friendship and trust; thus if these three factors are vital for an organization, visual contact and proximity to colleagues has to be promoted by the architecture (Allen, 1997). Research has shown proximity to also be an important factor for friendships to develop; it is perceived

as higher by employees with more colleagues nearby (Szilagyi & Holland, 1980). Davis (1984) implies that the sheer location in a building also will influence how quickly a newcomer to an organization will meet and get to know colleagues at the workplace and develop cooperative working relationships. Also whether the direction of the physical communication in an office is vertical or horizontal has proved to have great impact on the degree of communication between colleagues, where horizontal leads to significantly more interaction (Estabrook & Sommer, 1972). The choice to locate the board and executives at the top floor of high-rise office buildings as formerly described, thus not only has implications on status but also on the degree of communication between top management and the rest of the organization in a negative way.

With regards to formal meetings research has not found any correlation between physical accessibility and amount of time spent in formal meetings. For informal and spontaneous meetings proximity is however of greatest importance (Sundstrom, 1986). Research has shown that formal and scheduled meetings are overrated in comparison to spontaneous meetings for organizational efficiency as they occur less frequently and last longer (Kraut, Fish, Root, & Chalfonte, 1990). They are also less efficient with regard to exchange of information and bond building between colleagues. Considering the importance of informal interaction and exchange of information for the welfare of organizations, an extra effort should in accordance with these findings be put into creating gathering places such as activity nodes/ nodes and communal workstations. We should also be more cautious in cutting down floor space in communal spaces in our aspiration to cut down cost, due to its decisive impact on meetings and interactions among members in an organization.

### Groups and Teams in an Organizational Context

Groups and teams are major features of organizational life, as a major part of the activities that take place in organizations require some degree of cooperativeness and coordination through groups and teamwork. The awareness of the importance of interaction and operation of groups and teams has grown combined with an increased concentration of work across functional divisions. Despite this the dynamics of teamwork is still to a great degree uncertain (Mullins, 2008). Four factors are although identified to contribute to group cohesiveness and performance in organizations: 1) membership factors, 2) organizational factors, 3) group development and 4) maturity of a work environment. The interest in the architecture's part with regard to groups and teams depend on its impact on interaction and meetings; it can either support or inhibit interaction, and thereby effect whether cohesiveness will develop or not between colleagues in a group or team. In workplace design it is thus important

to know that co-operation is more likely to develop in a smaller group as problems with communication and co-ordination increases with group size, which also supervision do. The ideal group size for a strong group identity is hard to estimaste as it depends on several variables. Despite this it is believed that it should not exceed ten to twelve members as groups beyond this size easily split up into subgroups and the figure of seven people +/-2 is referred to as an ideal size for strong group identity (see e.g., Mullins, 2008; Svedberg, 1992). In addition to this, it is more likely to develop if the group works on the same location and with good visual access and proximity between its members in order to admit face-to-face conversations and spontaneous meetings.

Whether the workspace is enclosed or open influences the cohesion between colleagues as the ability to speak freely has a positive impact on cohesiveness within groups. Enclosed workspaces are also positive from a creativity perspective. MitchellMcCoy (2000) found the ability to work without control and surveillance from management to be a key factor for the success of highly creative teams. In line with this other researchers have found that the opposite to enclosed workspaces—dispersed offices—have a negative impact on team work and collaboration (Metiu in L. Cohen, 2007). IWSP at Cornell University found that team-oriented bullpens or shared workspaces are better on fostering comfort with team members, informal communication and cohesiveness than partitioned environments, especially high-walled cubicles perform poorly out of these aspects (Becker & Sims, 2001). Becker and Sims found though an age difference regarding the positive effect as the older employees had more problems with concentration and disruption in open workspaces.

### Cohesiveness

Cohesiveness is beneficial out of several aspects. From an occupational health point of view it is good due to its buffering effect on stress—it is proved that a good psychosocial environment at work makes it easier to cope with stress. From an organizational and management point of view it is not only beneficial for creativity and communication within organizations, as formerly described; cohesiveness at a workplace is also important as it leads to lower turnover and absenteeism. In addition to this, cohesive groups are also more likely to be successful. Success has a strong motivational influence on the level of work performance. There is however one critical aspect to this—it may lead to a strong group identity which facilitates the development of internal norms which may not always go hand in hand with the organization's norms (Sundstrom, 1986). Strong group pressure may also develop within these types of groups. A negative aspect of group pressure is exemplified by the well known Hawthorne experiments on its bank wiring group. The researchers found its group pressure so strong that no member despite financial

incentive dared to produce more than what the group had decided on, an output well below the level they were capable of producing. Yet another critical aspect with strong groups is that conflicts between individuals in work groups are often the reason behind disturbances in organizations. To create well-functioning groups is thus vital for the welfare of an organization (Lenéer-Axelsson & Thylefors, 1991).

## 2.7 Summary

The office environment has to be recognized as important at an individual level in terms of environmental satisfaction, health status and job satisfaction since a majority of the population works in offices in the Western world. For a lot of these people the work environment, both the physical and psychosocial aspect of it, plays a significant part in their lives; in some cases it is the most important environment in daily life.

The subject of environmental influences is vast and this review does not claim to give a full coverage of the subject. The author's intention was instead to show the need for an integrative approach to environmental influences in the organizational setting between all disciplines that deals with architecture and its implication on employees and organizations. The review shows that architecture in an office setting serves different purposes; there is not only an individual perspective to the office environment but also an organizational and a societal perspective to the matter. From an organizational perspective, architecture can be used as a device to reinforce the organizational members´ identification and loyalty to the organization though its influence on environmental satisfaction and job satisfaction. It may also contribute to the organization´s success through its impact on cohesiveness and creativity—motivational factors important in a competitive market. At a societal level there is a lot to be gained if we are able to design office environments that support individuals and organizations. Poor working environments cause considerable suffering and illness as well as have high costs for society at large (European Commission, 2002a; Milczarek et al., 2009). Every means we can find to reduce the number of sick-leaves and promote health is important, thus the impact of the office environment needs to be incorporated.

Review of architectural approaches to office environments reveal that different trends in office design have developed as new needs and technological opportunities have emerged. This combined with the current view on work environments, the political views in society and status of office work has had a great influence on the architects´ ambition with office design. The latter factor is easily read through history in the architectural design of office buildings and office environment's interior (Bedoire, 1979). Traditionally office design has been used as a status

marker and the goal has often been to achieve a private, large corner office with a nice view (Duffy, 1999). The emergence of new digital technologies and a shift towards more flexible office work might however lead to a change in the mind set of what status is in terms of the office.

The connection between architectural design of offices and the scientific knowledge of its environmental influence on employees and organizations has never been very strong. Instead the influences have come from different trends in society, digital technologies and contemporary management theories; in the latter case, often with a shallow approach. Spatial implication of office design has almost been completely ignored in office research and the research has instead adopted views and methodologies from other fields that deal with work environmental issues without much connection to the core of architecture — space and its impact on humans.

The lack of connection between practice and research in architecture is a problem as a scientific based design process is an important means to developing the field. In my opinion, the creation of a multi-disciplinary field of office design is vital as the environmental influence in an office setting by nature is multi-disciplinary. As individuals we are part of context—a context that consists of several factors that interact not only with us but also with each other. In an office it means that environmental influences operate on several levels—it operates simultaneously at an individual, a group and an organizational level. In a multi-disciplinary field of office design where the disciplines approach each other, the field as a whole will expand and new perspectives and theories of how office design influences individuals and organizations can develop. In the end new knowledge will emerge, also with benefits for each individual discipline. So would e.g. the organizational and management field by approaching the field of environmental psychology probably gain a better insight about how the individual environmental factors exercise influence at both an individual and group level. In another way, environmental psychology would, by approaching organizational-oriented research, earn better insight about the impact of the organizational factors on the employee, i.e. their influence on his/ hers perception of the own office and how this in turn influences the image of the own organization. If the organizational-oriented research approaches the field of occupational health it would probably gain a better insight onto how health aspects of the environment has impact on organizational aspects such as job satisfaction and motivational factors, all vital for organizations. The field of occupational health and stress medicine may in turn learn a lot by approaching the organizational aspects of the office environments as these set the agenda that determines the conditions for organizations and their employees. Finally, one can ask oneself what architecture as

a field would gain by approaching the fields of research that investigates the impact of the environment that they design. The obvious answer is that the field of architecture would gain important knowledge about what architectural design does to individuals and organizations; knowledge that can improve architectural design in order to fulfill the need of its users better. Formerly described gains are gains for each individual field, but in my opinion that is not were most benefits would be gained. Instead it will be found at an overall level as synergy effects will come out of a holistic, multi-disciplinary approach to environmental influences on employees and organizations. We will see and understand things we would otherwise never do due to the different perspectives to the subject of environment, in other words the whole field of science will expand.

There is another aspect to research concerning environmental influences and that is the question of how we get the scientific knowledge out into the practice. The profession of architecture is a practical and not very theoretical profession as a majority of architects works as practicing architects. The focus in the profession is on 'making' (Dunin-Woyseth & Michl, 2001), it deals with finding functional and aesthetical, as well as, economical solutions to problems in our physical world. The environmental impact of the created architecture is often forgotten or neglected by architects and other parties in the design process. One reason is that the accumulating knowledge is spread over a large scientific field with different approaches and thus both hard to find and understand for architects. Another reason is that for a practicing architect this knowledge is often very abstract and hard to transfer to the design process directly. Guidelines combined with reference objects of good examples and cases would be good methods to assimilate knowledge into the design process, however not enough as research has to be put into practice by a more systematic approach. The architectural design needs to fulfill the following categories of demand on the physical office environment:

- Individual demands,
- Organizational demands on the building and,
- Technological demands on the building.

At times these demands stand in direct opposition to each other, but the creative design process can find a balance between them. It is my firm belief that a design process based on scientific knowledge is the best tool to meet these needs and to achieve a supportive work environments; supportive at both an individual and the organizational level. Although the architectural design process often is intuitive and built on knowledge based on personal experiences and professional practice, in my opinion, it is no contradiction to have a scientific foundation. The challenge therefore in the future is to create a joint venture between research and architecture in order to design supportive environments with high architectural quality.

# 3 Research Project

## 3.1 Basis and Approaches Applied

This research is primarily grounded in the field of architecture, but due to the complexity of the research issue depending on the nature of its research questions it embraces the described multi-disciplinary field. In focus is the possible connection between the office type and its influence on: 1) satisfaction/dissatisfaction with the office environment among employees; and 2) the health and well-being, and job satisfaction among the employees. The architecture of the office is also investigated from different aspects with the focus on: 3) architectural quality and a) its importance in relation to office type for employees' perception of their own offices; and b) how to capture the employees' perspective on it; and finally 4) what importance the two key components of architecture—the aesthetical and functional dimensions—have for the office employees and how they influence their perception.

Since the focus is on office type's impact on the individual, important aspects within the multi-disciplinary field have to be considered in the analysis of the research project's empirical data. This includes the influence of organizational culture and individual environmental factors on the individual's perception and evaluation of an environment in a broad span, and psychological responses to these. But also the influence of the psychosocial work environment and general life circumstances. These factors that may all highly influence the employees' perception and satisfaction with the office environment, as well as their health, well-being and job satisfaction; thus have to be considered in an analysis of the office type's influence on employees.

The main research question of this project is to ascertain whether office type is a determinant—i.e. an explanatory factor—for self-rated health, well-being and job satisfaction. An implication of this research objective is the necessity to examine the office types' potential influence

on employees' satisfaction with their physical office environment and individual environmental factors due to their possible impact on the main research question. Previous research has shown that if psychological needs are fulfilled at the workplace, it has a positive impact on health status and job satisfaction (Beehr, 1995; Lu, 1999; Siegrist, 1996). If no covariance is detected between satisfaction/dissatisfaction and the office environment, self-rated health and well-being, and job satisfaction, it is equally interesting.

The research project was conducted in a three-step analysis of the empirical data: 1) The first step investigates the perception and experience of the office environment using a qualitative method, as presented in Articles I and V; 2) The second step investigates the employees' attitude and satisfaction/dissatisfaction with different aspects of the office environment relating to quantitative method, as presented in Articles II and III; and 3) The last step investigates the employees' self-rated health, well-being and job satisfaction in relation to which office type they work in, and is presented in Article IV.

In order to conduct this research project, who aims to investigate office types' possible influence on employees, the statistical analysis of the quantitative data was conducted in two steps. A first comparison between employees in different office types was carried out with the intention of investigating possible differences with regard to: satisfaction with office environment, health and well-being, and job satisfaction. This first step of the analysis was done without any consideration of other factors that could provide an alternative explanation for differences between employees in different office types, i.e. confounders of the main hypothesis concerning office type. The first step in statistical analysis was executed using a simple, logistic regression model (see figure 1).

Step 1 in analysis:

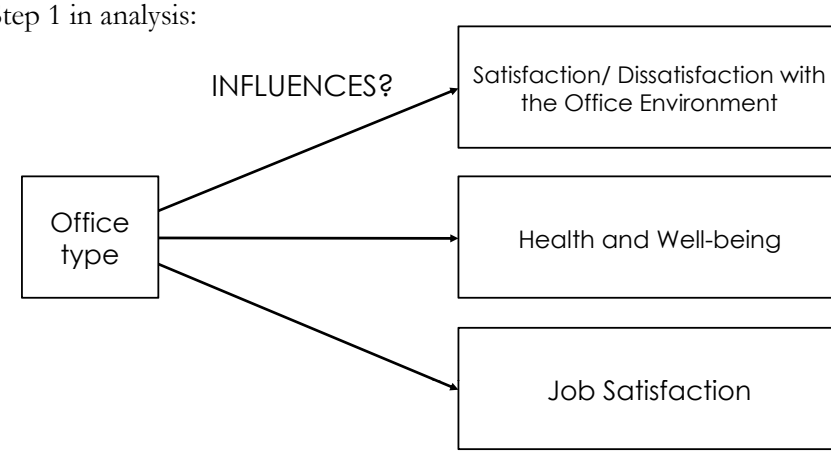



Figure 1. Step 1 of the statistical analysis in a logistic regression model, without consideration of the influences of confounders.

To be able to determine whether an established variance between employees in different office types could depend not on the office type but on other potentially explanatory factors, an additional analysis was necessary to conduct. This multivariate analysis was performed using an extended logistic regression model. In the analysis of satisfaction/ dissatisfaction with the office environment among employees (figure 2), as well as health status and job satisfaction among employees (figure 3), the following background factors, i.e. confounders, were considered: age, gender, job rank and line of business.

If differences remained after step 2 of the analysis, the hypothesis that office type has an influence on the employees has been reinforced.

Step 2 in analyses:

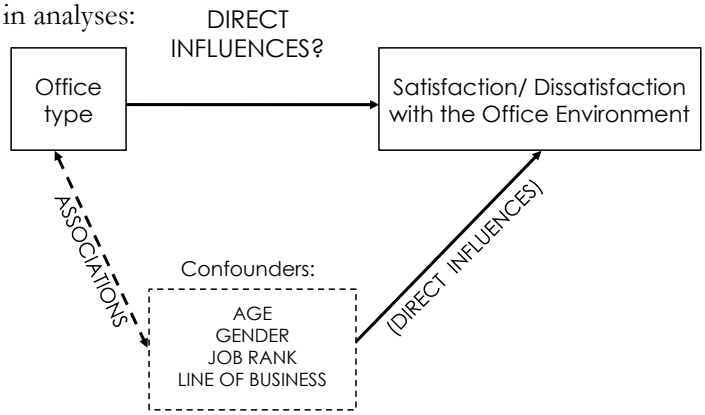



Figure 2. Step 2 in the statistical analysis of satisfaction/dissatisfaction with the office environment among employees in different office types. Multivariate analyses were utilized with a logistic regression model, as well as a Poisson regression model.

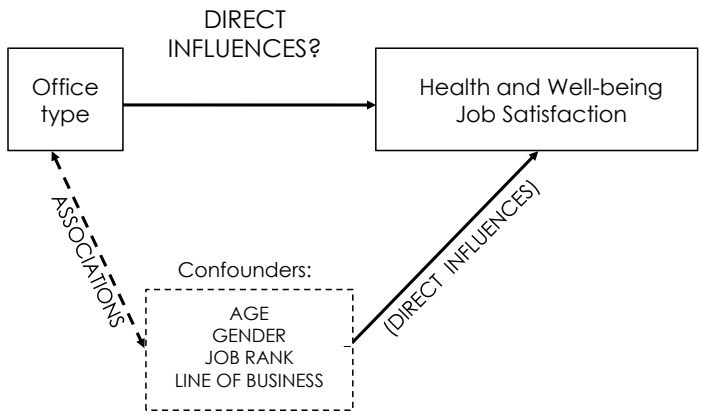



Figure 3. Step 2 was also performed in the statistical analysis of health and well-being, and job satisfaction, among employees in different office types. Also here multivariate analysis was utilized in a logistic regression model and a Poisson regression model.

One could, of course, use a different approach when analyzing the impact of the office type on employees. E.g. models with different factors as mediators which are included in the chain of causal relations could be discussed. An analysis of this kind could have been done without neglecting the effect of other important factors, such as age, gender, job rank etc. Such an analysis would be easier to perform using linear regression instead of logistic regression or a Poisson regression model—it could have been considered. Despite the importance of psychological impact on satisfaction and general health status, as well as job satisfaction, the aim of this doctoral thesis has not been to investigate the importance of psychosocial factors for employees regarding satisfaction with office environment or health and well-being, or job satisfaction for that matter. The main goal has not been to add knowledge to the field of psychology but rather to add knowledge to the field of architecture and its design process. It is well known that psychosocial factors have a great influence on psychological and physiological health (e.g., Hjemdahl, 2003; Karasek & Theorell, 1990; Lundberg & Melin, 2002). The psychosocial aspects are, however, delicate due to their cultural nature and have to be analyzed in a cultural context. For these reasons this doctoral work choses only to look at the possible relationship between office type and the outcome of the employees' satisfaction with their office environment and their health status, as well as job satisfaction. The psychosocial work environment is included as an item in the index of the outcome of job satisfaction, instead of analyzing it separately as a mediating factor.

The overall goal of this research project has been to add knowledge to the architectural field and illuminate the impact of office environment on employees out of different aspects. This is a delicate matter since the research project is in a multi-disciplinary field where several fields of science meet, with their various perspectives and approaches. I have therefore chosen to include environmental psychology and the other fields that deal with environmental influences as tools in my doctoral thesis. I am aware of the problem with working in a multi-disciplinary field, yet I choose not to see it as an obstacle but rather a challenge to apply different scientific approaches to my doctoral work. Being an architect, I recognize that architecture and the physical environment are significant components of the psychological and physical well-being of people. I am, however, well aware of other aspects that may have an even greater impact on individual health and well-being, such as psychosocial factors in the workplace, and general life circumstances. I hope in my further research to be able to go deeper into this matter and to examine the mediating effect of important background factors for employees' health and well-being in an environmental context.

## 3.2 Research Objectives

The purpose of the present doctoral thesis is to study the office environment's influence on the employees' perception of their workplace, their organization and their job satisfaction, as well as on their health and well-being. In the analyses the office environments have been classified into different office types and defined by their architectural and functional features which are described later in section Methods and Materials.

With the objective being to investigate the office environment's influence on employees and the organization, the main questions at issue are:

- *Are there any differences between employees in different office types with respect to health status, job satisfaction or satisfaction with the workplace?*
- *If so, can these differences be traced to the office type itself?*
- *What role does the architectural quality of the office play in relation to this?*

In addition to these general research objectives, specific questions will be addressed in the separate sub-studies and articles.

The initial qualitative study presented in Article I is based on semi-structured interviews. It investigates the employees' perceptions of different office environments. The perceptions are examined through the interviews and 'mental maps' the respondents' drew of their offices. The relation between the perception of the environment and its architectural quality is investigated as well as the architecture's influence on social behavior and on the cooperation between employees. The article discusses the possible benefits of a user perspective in the design process based on their perceptions and experiences. The questions at issue are:

- *Is Lynch´s method, which was developed for urban environments, useful as a tool to evaluate interior environments such as offices?*
- *What is important for the employee's positive experience of an office environment?*
- *What role does the architectural quality play in the employees' perception of the office in relation to office type?*
- *What determines the employees' experience of architectural quality in the office?*

Both Articles II and IV are based on a quantitative study of 491 office employees who filled out a questionnaire that covered such issues as health, well-being, organization, leadership, psychosocial work environment and motivation, as well as physical, environmental factors and office architecture. Important, confounding factors such as age, gender, job rank, and line of business are considered in the statistical analyses.

In Article II, employees' satisfaction with the office environment and various environmental factors are analyzed. Also, psychological aspects closely connected to environmental factors are analyzed in relation to office types as well as the employees' satisfaction with design

features in different office types. The questions at issue are:

- *Does office type have an impact on employees' satisfaction with the office environment?*
- *Which aspects of the physical environment cause most complaints?*
- *Which design features do employees express most satisfaction/dissatisfaction with?*

Article III analyzes the employees' office experiences, in doing so it applies to two approaches to the matter: a) it frames the physical work environment's influence on office employees into a model developed by organizational theorist Davis (1994); and b) it categorizes the office experiences into two groups based on their nature and problems related to this. To exemplify the two approaches to office experiences the article uses the results of the study presented in Article II in the analysis. The questions at issue in article are:

- *How do we combine the theoretical and scientific perspectives with the practioner's (i.e. architect, designer etc) perspective in the analysis of office environment?*
- *Is it useful to categorize and analyze office experiences based on their nature and any problems related to them?*
- *If so, is a categorization of office experiences helpful in the design process of office environments?*

In Article IV the impact of the office design and the office type on the office employees' health, well-being and job satisfaction are studied. The questions at issue are:

- *Is there any difference between health and well-being among employees in different office types?*
- *Is there any difference with regard to job satisfaction in different office types?*
- *If so, is it in the same office types where the employees rate their health and well-being as good that they also have the best results with regard to job satisfaction?*

The final study presented in Article V is a qualitative study and explorative to its character. The study is based on semi-structured, in-depth interviews of nineteen office employees from eighteen different companies/divisions. The article investigates the two key dimensions of architecture—the aesthetical and the functional—and their importance for the employees' perception of the workplace and organization as a whole. The questions at issue are:

- *What is important for the employees' perception of the office environment?*
- *Which dimension is most important for the individual employee, and for the workplace as a whole?*
- *Does it deviate between employees in different categories of offices?*
- *What importance does architectural quality play with regard to the former questions?*

## 3.3 Methods and Material

### STUDY DESIGN AND ANALYTIC MODELS

With the aim being to investigate the office environmental influence on employees, both a qualitative and quantitative approach was considered necessary in this empirically based research project. Using an architectural perspective—the foundation of this doctoral thesis—it was important to comprehend different aspects of individual employee's perceptions and experiences of their office environments, only accessible using a qualitative method. To get a broader picture and to understand the quantitative data it was thus important to consider it in relation to qualitative data, which allows employees to formulate their perceptions and experiences of their office environments in their own words. The qualitative data was used as a guideline in the analysis of the quantitative data; the two approaches used in the research project were thus complementary. Qualitative and quantitative data were collected separately, although from the same sample of office employees.

Articles I and V, investigates employees' perceptions and experiences of the physical office environments as well as the office environment's possible relation to cooperation and social atmosphere at the workplace. Both articles use a qualitative approach which allows for the possibility of capturing different nuances that would have been difficult to discern otherwise. The method used was the semi-structured interview.

Article I is focused on two aspects – a) the employees' experiences of architectural quality in the office from a user perspective, measured by the concepts 'imageability' developed by Lynch (1960); and b) the usability of Lynch´s method in interior environments. Article V also investigates the employees' experiences of the office architecture though it focuses on what importance the two key components of architecture, the aesthetical and functional dimensions have for employees' perceptions of their own workplace and organization. The data was coded and categorized in order to see what and how employees described their offices in relation to which office category they worked in in this study, instead of office type due to the size of the sample (for definitions see later section Office Definitions). The analysis of architectural quality in terms of aesthetical and functional dimensions of architecture was based on Werner's work (2000) of users' descriptions of architectural quality in dwellings. An interview guide for the semi-structured interviews was designed and used in both articles. It is presented in appendix 2.

Both Articles II and IV apply a quantitative approach to their research questions. In Article II the employees' satisfaction with the physical office environment and individual environmental factors is investigated in relation to office type. Psychological aspects connected

to the physical environment are also investigated. In Article IV the employees' self-rated health, well-being and job satisfaction are studied in relation to office type, in order to detect possible differences between employees in different office types. In both cases the statistical processing of questionnaire data and the estimation of the data were carried out with a logistic regression model and a Possion regression model using univariate and multivariate analyses. Adjustment for the following confounding variables was done in both Articles II and IV: age, gender, job rank and line of business. These confounding variables are all known to influence the perception, psychology and behavior of people. Well-established and validated questionnaires were used to collect data in the quantitative study (Lindström et al., 1997; Söderberg, 1993; Vischer, 1996). The questionnaires are presented in appendix 3.

Article III will not be discussed in terms of methods and materials since it is a review article. The empirical data used to exemplify the review comes from the study in Article II; thus for statistical analysis of the data see Article II.

Results from the regressions are reported with the overall statistical significance of office type as an explanatory factor for the outcomes, and the p-value of the hypothesis of no effect of office type has been given. P-values less than 0.05 have been interpreted as evidence of an effect of office type on health and other outcome variables. The Odds Ratio (OR) and Relative Risk (RR) for the office types, with cell-office as a reference category given the value 1.0, are also reported. ORs and RRs close to 1.0 are interpreted as no, or only a small, difference in the proportion of inferior outcomes from that of the cell-office category. ORs and RRs higher than 1.0 are interpreted as a higher proportion of inferior outcomes, and ORs and RRs less than 1.0 as a lower proportion. The OR can also be interpreted as a rough estimate of the relative risk of an inferior outcome, in particular when the outcome is comparatively rare. The structure used to specify the logistic regression models is given in Hosmer & Lemeshaw (2000). The statistical software used are SPSS (Version 13, SPSS Inc, Chicago, IL, USA), Statistix (Version 8, Analytical Software, Tallahassee, FL, USA) and STATA (Version 9, StataCorp, College Station, TX, USA).

## PROCEDURE

A convenience sampling method was used, which in this case means that prior to data collection the author inspected several offices in order to examine whether they fitted one of the seven office definitions used in the study. Then the managements of the offices were asked if they wanted to participate in the study, which a majority of them chose to do. The participating companies then appointed a contact person, usually a middle manager at the specific office division of interest or someone

from the human resources department. The individual respondents were asked, either by the company management or the contact person, whether they wanted to participate. Participation was voluntary and information about the purpose of the study was given to each respondent either by e-mail or in a personal presentation given by the author, depending on the particular company's request.

For the qualitative study presented in Articles I and V, an 'intensive purposing sampling method' (Patton, 2002, p. 234) was used which in this case means that out of the sample of 491 office employees from the participating twenty-six companies/divisions in larger companies, nineteen people were selected for semi-structured interviews.

### Article I and Article V

The semi-structured, in-depth interviews took place in the late spring and summer of 2004 in Stockholm, Sweden. The respondents were interviewed individually at a quiet and comfortable location of choice. All interviews where held at the respondent's workplace, with the exception of one that was held at the Royal Institute of Technology, the workplace of the author. The duration of the interviews varied between 1.5-2 hours. The author conducted and recorded all interviews with a tape recorder. Respondents were also asked to draw a 'mental map' from their memory of their offices (Lynch, 1960). After they had drawn the mental map the respondents were asked to mark their workstation on a blue print of their office. In those cases where the respondent worked in a flex-office, the respondent was asked to mark the workstations they normally chose to work at. Article I is based on three of the in-depth interviews combined with their mental map exercises, whereas Article V is base on all nineteen in-depth interviews in the sample excluding the mental map exercise.

### Article II and Article IV

The contact person at office distributed the questionnaires personally to the respondents or to their post-boxes at the office. They were returned by mail to the author or picked up by the author in sealed, anonymous envelopes at the workplace in accordance with the previous agreement. The respondents had approximately two weeks to fill out the questionnaire; in some cases it was delayed due to respondents not having enough time. The respondents filled out the questionnaires at a location of choice. The only instructions they were given was to fill it out alone at a quiet place. They were also told not to consider the answers for too long and always stick with the first spontaneous answer that came into their minds.

## STUDY GROUP

### Article I and Article V

Out of the sample of nineteen respondents (men $n$=9, women $n$=10), three interviews were used in Article I. For Article V all nineteen

interviews were used. Respondents from each office type were selected, which were divided into different office categories. In the sample of each office category it was then strived for as a high degree as possible of different companies and line of businesses. The nineteen respondents were selected with regard to age, gender and job rank in order to achieve as great a variation as possible. However, it was difficult to attain an equal number of respondents in each office type, which probably is due to that respondents perceived the duration of the interviews was long and had difficulty to allot time for it. Participation was voluntary and the respondents were told that the in-depth interviews would focus on their perception of the architecture at their workplaces.

In Article I only three of the interviews were used. The selection of respondents was done in accordance with the aim to analyze office environments that differed with regard to size and office design. An interesting alternative would have been to select respondents in the same office environment in order to analyze individual differences in perception between respondents in the same office environment. However interesting it would be to investigate difference in the perception of the exact same environment it was not the aim of this analysis. In Article V no selection was made, as all nineteen interviews were used.

An overview of the distribution of background factors collected within the qualitative study group is presented in Sociodemographic table 1 of appendix 1.

### Article II and Article IV

The sample comprised 491 office employees (men $n$=247, women $n$=236, no information on gender $n$=8) from twenty-six different companies/divisions in larger companies in the Stockholm area, Sweden. The respondents that did not specify their gender were only used in the univariate analysis where no adjustment for confounding variables was made. Each office that took part in the research project represents one of the seven office types that were used in the study (see section Office definitions). The distribution of different office types within the sample of twenty-six different companies/divisions in larger companies is presented in table 2 of appendix 1. The mean age of the respondents was 41 years old (21-64 years old). The response rate was relatively high considering the size of the sample: 72.5% (men 68%, women 74%). This is probably due to the fact that the author had personal contact by e-mail with all employees who had been administered the questionnaire, both before and during the response period. This may have lead to more loyalty towards the author and the research project, and thereby a higher propensity to answer the questionnaire. The offices with highest response rate, with rates at 100%, were all offices where the author had

given a personal presentation of the research project. This probably led to this extremely high compliance. On the other hand, the offices with the lowest response rates had less involvement with contacted persons or had not had any personal presentation at the office. The offices with the lowest response rates tended to be in the more stressful line of business, such as sales organizations and consultants businesses with a lot of work outside the office premises. The distribution of office types within the twenty-six companies/divisions is presented in table 2 of appendix 1.

## SOCIODEMOGRAPHICS

An overall, general review of background data with respect to age, gender, job rank and line of business shows that the sample of 491 office employees has a uniform distribution with regard to age and gender. With regard to job rank the largest proportion of employees hold middle-low job ranks (50 % of the respondents). The largest lines of business in the sample are the media and IT sectors. An overview of background data of the whole sample and its distribution of different office types is presented in Sociodemographic table 3 of appendix 1.

## OFFICE DEFINITIONS

In order to enable a comparison between different office environments, it was necessary to categorize them. Traditionally there are two main methods of categorizing office environments: either by spatial organization or by work organization. There are limitations in using only one method since there is a strong correlation between the two.

I have used the definitions from Ahlin and Westlander (1991) and Duffy (1999) as the basis for my own definitions of office types. Ahlin and Westlander (Ibid.) use the physical feature, i.e. the plan layout, to define different offices. They define the plan layout at two levels: a) one main level called *plan model* that is defined by the principle of spatial organization in an office; and b) one detailed level called *room type*. According to the authors the following plan models exist: 1) cell-office; 2) combi-office; and 3) open plan office. Room type, which enables analysis at a more detailed level, is used to analyze individual office rooms, but not whole office plan layouts like plan model. The room type is found in three categories: single rooms, shared-rooms (2-3 people/room), and large rooms (more than 4 people/room). There is a connection between room type and plan model in relation to individual room solutions. Duffy (Ibid.) uses another approach: he defines different office categories. He combines the physical features with functional features in his definitions, though there is a focus on function. Duffy has defined four categories of office types, each with a unique pattern of work and spatial requirements. He uses non-traditional names which are

more descriptive of the different types that he has recognized in office design. According to Duffy, the four different types of office are: 1) cell, the equivalent of cell-office; 2) club, the equivalent of combi-office; 3) hive, the equivalent of open plan office; and 4) den, the equivalent of flex-office. In my opinion both definition methods have their limitations. The problem with the definitions proposed by Ahlin and Westlander is that they are too flexible. Using their definition method one ends up with as many definitions as number of offices that are being analyzed, since there is almost an endless combination of different plan models and room types.

The definitions by Duffy are less broad and include both the spatial organization and the function of office work, with an emphasis on the latter. I find that Duffy's combination between the two is necessary, since the two are always so closely connected. The weakness of Duffy's definition, though, is that it is too focused on the actual work and technology of the office work. He talks vaguely about the spatial organization and its influence on the actual work, i.e. the architectural interpretation of the office work. Another weakness is that he leaves out a very common office definition—the shared-room office. When Duffy describes the different categories as he has identified them, there seems not to exist any mixed versions of definitions. He is quite rigid in his definitions, with the work taking place in the different office categories. For example, when he describes the flex-office it seems as if it is the only category used by architecture firms, which is naturally not the case.

In my categorization of different office environments seven different office types is identified, based on the work of Ahlin & Westlander (1991) and Duffy (1999). These are: cell-office, shared-room office, open plan office (including small, medium-sized and large open plan office), flex-office and combi-office (Ahlin & Westlander, 1991; Duffy, 1999). The open plan office has a great variety, with different sub-divisions which range from 4 people/ room to more than 100 people in a shared, communal space. To my knowledge no internal distinction between different types of open plan solutions has been made in the research of open plan offices. The medium-sized open plan office is, however, an established definition of an office type in Sweden, called 'storrum' (large room office), where it is the most common open plan office type (Christiansson & Eiserman, 1998). In this research project the three following definitions of open plan offices are based on the amount of people sharing the same workspace: small open plan office with 4-9 people/room, medium-sized open plan office with 10-24 people/room and large open plan office with > 24 people/room. The smaller and larger open plan offices do not have established definitions for open plan offices. However, they were use in this research project since there

exist group psychology theories which means that the group identity is dependent on the size of the group; groups of 7 people (± 2 people) are preferable so as to enhance group identities (Mullins, 2008; Svedberg, 1992).

The office types are defined by *architectural features* and *functional features*, since there are limitations in using only one category of feature to define offices due to the symbiotic relation between the two features. Among the architectural features the spatial organization is the most dominant and, as such, critical for many functional features, in particular the execution of work and administration of it. It must to be said that the office types should be construed as prototypes. Each office that took part in the study represents one of the seven office types that have been identified in office design (Ahlin & Westlander, 1991; Duffy, 1999):

1. The *cell-office* is a single person room office. Corridors, where every room has access to a window, characterize the plan layout. Most equipment is in the room. The office work is often highly concentrated and independent.
2. The *shared-room office*[4] is defined by 2-3 people sharing a room.The shared-rooms are either the result of a team-based work organization that emphasizes interaction within projects, or the consequence of a lack of space. In the latter case the people tend to have similar work assignments. Most office equipment is outside the room, though the team-based shared-rooms sometimes have their own equipment within the room.

*Open plan offices.* The open plan office exists in different varieties, depending on the amount of people sharing workspace. In this study the following three definitions of open plan office are used:

3. *Small open plan office,* with 4-9 people/ room. Considered a good size for teams (Svedberg, 1992).
4. *Medium-sized open plan office*,[5] with 10-24 people/ room. The most common size of open plan office in Sweden (Christiansson & Eiserman, 1998).
5. *Large open plan office*, with more than 24 people/ room. Not very common in Sweden (Ibid.).

Open plan office is defined by employees sharing a communal workspace. There are neither walls between workstations nor access to individual windows. The work is often routine-based with low levels of interaction between employees. The purpose of these office types is to be flexible with

**4** Definition by Ahlin and Westlander (1991) for a room shared by more than one person. The original definition in Swedish is 'delat flerpersonrum' (room shared by several people).
**5** Christiansson & Eisermann (1998) conclude that a medium-sized open plan office with 10–24 people/room is the most common size of open plan offices in Sweden. It is called 'storrum' (large room office).

organizational changes which are managed without any reconstruction. For reduction of noise and some privacy there are often screens between workstations.

6. The *flex-office* is defined by employees not having any personal workstation. It is often in an open plan layout, but not necessarily. It is the most flexible office type, since not only is the office plan flexible but also the employees. A good IT system is necessary since the choice of workstation is unrestricted and all work is dependent on access to the shared computer system. The flex-offices are dimensioned for < 70% of the workforce to be in the office, as these dimensions are based on the assumption that much of the work is carried out outside of the office or that the employees are absent due to illness etc.
7. The *combi-office*[6] is nowadays an office type with no strict spatial definition. Instead it is the teamwork and sharing of communal facililities that defines it. There is good access to back-up spaces for teamwork, concentrated work meetings etc. Over 25% of the work of employees' takes place within the office at places other than one's own workstation on an 'as needed' basis. The work is in its nature both independent and interactive, and it thrives on teamwork.

The seven office types are in Article V categorized into three groups in the analysis of the data due to the small sample size of the study. The three groups are:

1) *Individual and smaller shared workspace*—office types with smaller workspace for one individual or a few individuals (including cell-office and shared-room office).

2) *Traditional open plan office*—office types with shared workspace of different sizes (including small open plan office, medium-sized open plan of-fice and large open plan office).

3) *More flexible open plan offices*—open plan offices with flexible ways to work and a plan layout and IT-system that support the more flexible work methods (including flex- and combi-office).

## MEASUREMENTS

### Qualitative Measurements

For the qualitative studies presented in Articles I and V, a semi-structured interview guide was created with the aim to investigate the employees' perceptions and experiences of the physical office environment, and

**6** The combi-office was first introduced as an idea in Sweden in 1977 by Svante Sjöman (Christiansson & Eiserman, 1998). The traditional combi-office was a combination of cell-office and open plan office where every person had an individual room with windows facing the communal space. Most of the office facilities were outside the individual room in the communal multi-space.

their possible relation to cooperation and social atmosphere in the office. The guide which followed a model given by Lynch (1960) was divided into two major sections. Its first section covered background aspects including personal and professional background, health status and work situation. It also defines the office type of the respondent. The second section briefly covered issues related to health status and work situation, based on selected questions from the QSP Nordic/AH questionnaire (Lindström et al., 1997).

The major part of the interview guide covered the perception of the architecture at the office. Its first component was based on questions from a doctoral thesis by Nylander (1998) called 'Bostaden som arkitektur' (The dwelling as architecture). The second component was based on questions used in the work by Lynch (1960) developed to measure the inhabitants' perception of their city inhabitants. The questions were transformed to suit an interior office environment for the purpose of the two studies. An important part of Lynch's method was to let the respondents draw mental maps of their environment based on memory recall. This method was also incorporated into interviews and used in the study presented in Article I. The last component of the interview guide covered questions related to the social interplay between employees at the respondent's workplace, and the possible relation between the architecture and the social atmosphere at the office. It was based on a questionnaire developed by Söderberg (1993). Only selected questions of her work were used that suited the object of the research project.

The application of an open-ended interview aimed at capturing the specific points of each respondent without predetermining the issues of the interviews. The focus in the interviews was on the individual's perception of the architecture of own office, its possible influence upon the employee's view of the workplace, the atmosphere among the colleagues and the perception of the organization as a whole.

The interview guide is presented in Swedish in appendix 2.

#### Quantitative Measurements

The questionnaire used was a combination of three different questionnaires that together covered the fields of: 1) health and well-being; 2) satisfaction with the psychosocial work environment and the work itself; and 3) physical environment and architectural design. For each field well-known and validated questionnaires were used (Lindström et al., 1997; Söderberg, 1993; Vischer, 1996). The first part of the questionnaire covered the respondent's individual background, including age, gender, level of education, line of business, job rank, years in current profession, years in current employment etc. To collect data on the respondent's self-rated health status and work situation, the QPSNordic questionnaire (General

Nordic Questionnaire for Psychological and Social Factors at Work) was used with the addition of the AH (Arbete och hälsa) questionnaire (Eng. Work and health questionnaire), the latter developed by the Section of Personal Injury Prevention, Karolinska Institutet, Sweden. The physical environment and architectural design incorporated two questionnaires: the BIU (Building-In-Use) Assessment (Vischer, 1996) and a questionnaire developed by Söderberg (1993) called 'Grupporganisation och inre miljö i samspel' (the interplay between group organization and interior design). The BIU, which was developed in Canada, was translated into Swedish by the author. In both cases the number of questions were shortened compared to the originals.

In total, the questionnaire covered 141 items of which some included sub-questions. The scales varied from two-scaled items to six-scaled. Out of all of the questions 19 covered the general background of the respondents, 84 covered the health and work environment, while 38 questions with sub-questions covered architecture and the physical environment.

The questionnaires are presented in Swedish in appendix 3.

In Article II the following outcomes were compared in the statistical analysis with respect to office type. *Perception of the physical environment* was measured by the following factors (with different outcome variables from the BIU Assessment (Vischer, 1996):

1) *Ambient Factors* measured using the following three factors: Temperature, Ventilation, and Lighting Condition, each factor having one outcome variable.
2) *Noise and Privacy* measured using the following two factors: Noise, measured by three outcome variables, and Privacy, measured by three outcome variables.
3) *Design-related factors* measured using the following three factors: Workstation Design, measured by four outcome variables, Workspace Design, measured by three outcome variables, and Office Design, measured by four outcome variables.

The *social atmosphere of the office and its correspondence with the architecture of the workplace* were measured by the following, selected, outcome variables from the questionnaire developed by Söderberg (1993):

4) *The cohesion, competition and territories* within the work group, between the work groups and the office as a whole. The interplay between these aspects of the social interaction and architectural design of the workspace was measured as well.
5) *The personalization and privacy issues* at the workstation and workplace as a whole.

6) *The quality of the workstation and workspace* in general, with regard to quality of lunch and break areas, as well as ergonomic aspects of the workstation.

For details on factors and internal outcome variables, as well as the dichotomization of variables, see Article II.

In Article IV the following outcomes were analyzed:

A. The *general health and well-being* of the respondents were measured by the following selected domains from the QPSNordic/AH questionnaire:

1) *Health and well-being*, measured with the three outcome variables: 'sick leave', in two different formulations, 'general health', and 'physical and psychological health.'

2) *Emotional health*, measured by five outcome variables: 'efficiency', 'accuracy', 'calm and harmony', 'energy', and 'sad and depressed'. The quality of sleep was measured by one outcome variable, 'general quality of sleep'.

B. *Job satisfaction* is in this thesis defined as satisfaction with the psychosocial work environment and the attitude towards work itself. It was measured by:

1) *Psychosocial work environment*, measured by three outcome variables: 'work demands', 'leadership' and 'cooperation'.

2) The *attitude towards work itself*, measured by two outcome variables: 'goals at work' and 'satisfaction with work'.

For details on outcome variables and dichotomization, see Article IV.

## 3.4 Overview of Articles

The current doctoral thesis comprises five articles. Four of the articles are based on empirical findings—both qualitative and quantitative. In addition to these four articles one article, Article III, is a review article which incorporates the results of one of the empirical articles in its analysis.

The aim of the research project was to investigate the office environment's influence on the employees in accordance with different respects: a) the employees' health, well-being and job satisfaction; b) the employees' satisfaction with the office environment and individual environmental factors; and c) the employees' perception of architectural qualities in office design, their experience of this and its influence on the conception of their own workplace and organization.

In the following section an overview of each article is presented with respect to aim, method and major findings. Discussions and conclusions are presented in the last section of the chapter.

Article 1:

## OFFICE DESIGN:
## Applying Lynch's Theory on Office Environments

This article analyses the importance of architectural quality for the employees' perception and experience of their offices by analyzing three different office environments. The method developed by Lynch (1960) for urban environments is investigated as a tool to analyze and evaluate office design from a user perspective. The reason for investigating this method is the notion that it is based on the employees' perception and experience of an environment. The article also discusses the possible benefit of such a method in the design process.

Lynch's method is based on the concept of 'imagebility' which, according to Lynch, was the 'quality in a physical object which gives it a high probability of evoking a strong image in any given observer' (Lynch, 1960, p. 9). The method uses five different elements to measure the 'imageability' of a space, which are: landmark, node, path, edge, and district. In the investigation of how useful the method would be for evaluating interior office environments, these elements have been 'translated' to fit an interior architecture.

Out of a sample of nineteen semi-structured interviews with employees in different office environments, three were selected for further investigation and analysis. All three had internal differences with regard to office type and/or office size. The investigation of the three office environments reinforced the hypothesis that valuable knowledge could be obtained, knowledge that probably would have been hard to access using alternative methods. A plan layout analysis which is based on architectural design focuses on spatial, functional and aesthetical aspects, but the user perspective is left out. Useful information for the design process is thus, in the author's opinion, lost and the full picture of an environment's impact is not obtained. For example, if employees in an office were interviewed regarding how they actually perceive and use their current environment prior to changing that environment, a lot of mistakes and bad solutions could possibly be avoided in the design of the new environment. Lynch's method it is possible to foresee where landmarks most likely will appear and paths will develop, but a perception analysis—a perception not owned by the trained architect but by the employees themselves. In other words, this method provides guidance on how an architectural design will be received by employees at its completion. So it is a useful tool for creating the architect's intended environment.

Besides the benefits attained by using Lynch´s method in the design process, another major finding of the study is that to a high degree the

employees' experiences of architectural quality in the office appear to be independent of the scale of the office and the office type. They appear instead to be determined by the architectural quality of the plan layout combined with the quality of other architectural features in the office design.

The inevitable question, then, is why the employee's perceptions and the use of space are of interest in the design process. The main reason is that the physical environment can probably be designed to reinforce human behavior and well-being (e.g. Becker, 1981; S. Cohen et al., 1991; Evans & McCoy, 1998; Lawsons, 2001). Therefore this makes it of interest and significance not only to architects, direct users and clients of architectural services, but also to the general public. Since employees' perceptions and use of space are important, it is critical to be able to find a way to transfer them into the architectural design process. In the author's opinion, Lynch's method may well fulfill this need since it is based on graphical illustrations and easily translated to the architectural process.

*Key words: office environments, design process, architecture, Lynch's method, 'imageability,' user perception, experience*

## Article 2:
## Differences in Satisfaction with Office Environment Among Employees in Different Office Types

This article investigates the satisfaction with the physical office environment and individual environmental factors in the environment among employees in seven office types. The seven office types identified in current office design are: cell-office, shared-room office, open plan office(including small, medium-sized and large open plan office), flex-office and combi-office (Ahlin & Westlander, 1991; Duffy, 1999). The office types are defined by their architectural and functional features. It is necessary to use both classes of features, since there is a strong correlation between the architectural features of an office—physical features where spatial organization is the dominant aspect—and functional features, the actual work taking place in the office using attributes that derive from these functional features. The office types used should be construed as prototypes, since it is rare to find offices that completely fit into a specific category; some overlaps always exist.

This article and article IV are based on a sample consisting of 491 employees from twenty-six different companies/divisions in larger companies in the Stockholm area, Sweden. For the analyses 469[7] employees

**7** The total sample comprised 491 employees, of whom only 469 were selected for analyses due to missing information on background factors for 22 of the employees.

rated their physical environment and psychological responses, both of which are closely related to environmental factors, such as privacy and personalization.

The article focuses on differences in satisfaction with environmental factors in the following domains: 1) ambient factors, 2) noise and privacy, and 3) design-related factors (workstation, workspace, and office design). Current office research investigating the perception of environmental factors among employees tends to compare conventional cell-offices with open plan offices without clearly describing what kinds of open plan offices are being studied; the open plan offices are simply defined by the fact that a group of employees share a common workspace with no walls between workstations. They lack specifications, with regard to architectural and functional features, and thus clear definitions. It is the intention of this article to investigate both cell-offices and the internal differences between the various office types in which workspaces and work facilities are shared.

The outcome variables were defined by the questionnaire as either individual—covering the three different domains of the study and categorized as either 'good environment' or 'inferior environment—or summary scales obtained by sums of inferior outcomes. This was done separately for ambient factors, noise and privacy, and design-related factors.

In the statistical analysis, logistic regression models were used in both univariate and multivariate analyses of individual items. In the latter, adjustments were made for the confounders: age, gender, job rank and line of business. The first three items are well known confounders in all kinds of empirical research. Line of business was added to the study since it was expected to influence the employees, as there ought to be different conditions in different lines of businesses. The main, explanatory variable for differences in perception was office type, with cell-office as the pre-chosen, reference category.

The summary scales were analyzed using Poisson regression, while the individual variables were analyzed using logistic regression.

Overall, among employees in different office types the study found differences in satisfaction with the office environment, which were related to the psychological responses. Differences in the frequency of complaints were also found in the three different domains of environmental factors. The analysis of frequencies in complaints within the three domain showed that noise and privacy caused most dissatisfaction among employees. Cell-office had a prominent position with regard to satisfaction with the office environment in general, followed by flex-office. Although in many respects cell-office scored the highest with regard to design-related factors, this office type had, however, low values in terms of its social aspects. It had the lowest value of all for workspace

design's support of affinity. Employees in flex-offices were the most satisfied with the social aspects of the physical environment. The highest prevalence of dissatisfaction with the physical environment was reported among employees in medium and large open plan offices. For example, with regard to noise disturbances, 12% of the employees in cell-offices reported disturbances 'by voices, office equipment etc.', compared with 50% and 45% in large and medium open plan offices respectively.

In this article it is hypothesized that the differences in environmental satisfaction between employees in different office types can be ascribed to the features of the office types. This argument was reinforced when the differences persisted after adjustment for the confounders in the multivariate analysis. The unique features of the cell-offices explain the prominently higher satisfaction with the physical environment among employees in cell-offices: this offers autonomy and personal control of the environment with regard to ambient factors, noise, and privacy conditions etc. In other office types some sort of compromise regarding shared space is unavoidable. It is only with the aspects of environmental control interaction and affinity that employees in cell-offices were less satisfied. In other words, the same architectural and functional aspects that are positive from the perspectives of ambient factor and personal control are not so with regards to the aspects interaction and affinity. There were internal differences between office types that share workspace and work facilities, though there was no predictable pattern between them. On the other hand, those in medium-sized and large open plan offices reported distinctly lower satisfaction than employees in other office types. The relatively high satisfaction score among employees in flex-offices can probably be imputed to the fact that this office type offers independence as well as freedom of choice. The high dissatisfaction among employees in medium-sized and large open plan can probably also be attributed to the features of these office types. The ability to seek privacy when necessary, which possibly has a mediating effect on other disturbances, is not offered in these office types. An additional factor is that shared work facilities, such as printers, tend to be in open spaces.

*Key words: office environment, employees, office type, architectural features, functional features, satisfaction, environmental factors*

## Article 3:
## Office Experiences

In this article the experiences of the physical office environment is discussed, namely its influence on the individual employee and thereby its influence on the organization to which the employee belongs, An interdisciplinary approach to the subject is applied as the article touches upon numerous fields of research that deal with how the work environment

influences employees and their experiences. Despite practicing a holistic approach, the focus here is on the interior experiences of office environments among employees.

This article analyzes the employees' office experiences in two ways: a) by framing the physical work environment's influence on the office employee in a model developed by organizational theorist Davis (1994); and b) by categorizing the office experience into two groups of experiences, based on their nature and problems related to it. To clarify the interpretation of the two approaches to office experiences—i.e. how they can be understood and analyzed through them—this article uses the results of the Article II study.

Davis's model (1994) describes how physical office environments influence employees. In his article he evaluates the interdisciplinary field of office research. He analyses the office environment's influence on the members of an organization, i.e. the employees and the management, by dividing the office environment into the following categories: 1) physical structure; 2) physical stimuli; and 3) symbolic artifacts. Through Davis's division of the physical office environment, the differences between the employees and the organization are emphasized, and this division clearly shows the various means by which the physical environment exerts its influence on the former. He suggests that these categories have a pervasive effect. The division is here used as a starting point for a discussion concerning the perception of the physical office environment and its influence on the individual and the organization. The three categories are useful when investigating employees' office experience of individual environmental factors and psychological concepts in the organizational context of environmental influence on behavior and attitudes.

The article also discusses the office experience from a more practical point of view based on the nature of the experience and its components, and on how problems are related to it. The office experiences are here classified as either: 1) *design-specific experiences*; or 2) experiences related to general conditions of an office environment that have a general solution to the environmental problems they cause, from here on called *general experiences*.

*Design-specific experiences*—are dependent on the unique condition in each specific office, highly determined by its office type which is defined by its architectural and functional features. This condition is the context that sets the framework for these experiences. The design-specific group of experiences is to a great extent dependent on the spatial conditions at a specific location. When there is a problem related to design-specific experiences it is solved by case-specific solutions based on the architect's/designer's previous experiences in solving this type of problem. Solutions to problems which have their origin in design-specific experiences are

dependent on both the skill of the individual architect/ designer and the available knowledge of the problem within the profession. At a professional level the transfer of case-specific solutions to a repertoire of knowledge is important, in order to be able to reuse others' experiences in new design projects (Schön, 1983).

*General experiences*—are, on the other hand, not related to a specific design of the office but to the general conditions in the office. Work environment problems that are related to general experiences can be handled in the design process by general solutions—the so-called cookbook solutions—such as regulations and specified demands described in programs. The solutions to this group of problems are dependent on the architect's/designer's insight into the problem and the comprehension of the regulations that will work as guidelines in the design process.

These two groups of experiences are highly coupled, for they have a mediating effect on each other. For example, dissatisfaction with a general experience such as ventilation noise often influences the experience and perception of design-related factors which are design-specific experiences by nature.

Davis's framework combined with the aforementioned classification of office experiences provides access to the subject of environmental influences in an office setting from two different perspectives which complement each other: 1) the theoretical and scientific perspective; and 2) the practitioner's perspective. A combination of the two perspectives provides a more holistic approach to the understanding of office experiences, but also a method to transfer research into practice which is important for creating office environments that support employees as well as organizations in the best possible way.

*Key words: office employee, organization, physical environment, office experience, design-specific experience, general experience*

## Article 4:
## Office Type in Relation to Health, Well-being and Job Satisfaction

This article investigates the influence of office type on employees' health, well-being and job satisfaction. The same office types as described in Article II are investigated here.

The study is based on a sample consisting of 491 employees from twenty-six different companies/divisions in large companies in the Stockholm area, Sweden that was analyzed in Article II. The focus is now on the employees' rating of their health status and job satisfaction. The outcome variables were defined in the questionnaire as either individual

items defined by perceived, psychosocial work environment and attitudes towards work itself, and categorized as 'good' or 'inferior', or as summary scales obtained by sums of inferior outcomes. This was done separately for all three areas of health: emotional health, quality of sleep, and job satisfaction.

In the statistical analysis 469 employees were used of the 491 in the sample due to a lack of adequate information on essential covariates. Logistic regression models were used in univariate as well as multivariate analyses for the individual items. The main explanatory variable for health, in accordance with the aim of the study, was office type. Four additional covariates—age, gender, job rank, and line of business—were included as confounding factors. The first three factors are well-known confounders for individuals' health and well-being, and to some extent for job satisfaction as well. Line of business has been added as a confounder since there are presumably different work environment conditions in different lines of business. Since the aim of the study was to investigate the role of office type, the influence of these background variables had to be taken into account in the multivariate analysis. The analyses of the summary scales were analogous to the analysis of the individual items, with the exception that Poisson regression was used instead of logistic regression.

The results of the study show clear differences between employees in different office types. Risk of inferior health and poor well-being were found in both medium-sized open plan offices (10-24 people per room) and small open plan offices (4-9 people per room). Employees in these office types manifested significantly higher risks of poor health compared with those in other office types. In terms of job satisfaction, medium open plan and combi-offices evinced the highest prevalence of inferior job satisfaction. The best chances for good health and well-being were found among employees in flex-offices, followed by those in cell-offices. These employees rated their health better than those in other office types. With regards to job satisfaction, employees in flex-offices and shared-room offices scored the highest in job satisfaction, followed by those in cell-offices. There were, however, internal differences regarding which items for job satisfaction the employees were most satisfied with in these office types. (Notify: Erratum for table 7 in Article IV).[8]

We hypothesize that the different architectural and functional features of these office types explain this difference in distribution. Employees in cell-offices scored positively on outcome variables that related to factors such as control and independence, while employees in

**8** Erratum table 7, an open circle ('o') should have been printed at the intersection between the row, 'Quality of sleep,' and the column, 'Flex office.' Filled circles ('•') should have been printed at the intersection between the row 'Quality of sleep' and the columns 'Medium-Sized Open Plan Office' and 'Large Open Plan Office'.

flex-offices were satisfied with regards to variables related to cooperation and leadership. The conclusion, based on the results of this study, is that the hypothesis that the office type defined by its features is an explanatory variable for health, well-being and job satisfaction has been reinforced. The reinforcement is based on the fact that the significance has, in many cases, persisted after the adjustment for gender, age, job rank and line of business. The results indicate a correlation between office environment and health, well-being, and job satisfaction, but they must be investigated further. Enhanced knowledge in this field of research could lead to important advances at individual, organizational and societal levels.

*Key words: office type, architectural features, functional features, employees, health, well-being, job satisfaction*

## Article 5:
## AESTHETICS VERSUS FUNCTION:
## What Matters to Office Employees?

This explorative study aims to investigate the office architecture´s importance for employees´ perceptions of their own workplace and organization. It investigates the two key components of architecture—the aesthetical and functional dimensions—and their importance for the employees´ perception. The manuscript focuses on questions such as: 1a) Which dimension is most important for the individual employee and for the workplace as a whole? b) Does it deviate between employees in different categories of office type? 2) What impact do the two dimensions have on the employee´s views of their own workplace and the organization? 3) What importance does architectural quality have with regard to the former questions?

The capacity of architecture to reinforce certain experiences and behaviors has been recognized in research (e.g., Canter, 1976; Davis, 1984; Lawson, 2001). This study pertains to this research tradition as it applies an architectural perspective to issues that traditionally belong to the field of organizational management. The knowledge of the importance of architecture and its two key components with regard to employees´ perceptions of their workplace and organization is limited. This explorative study hopes thus to contribute by investigating the architectural experience in the office. By recognizing the varieties of open plan offices that exist in contemporary office design, it also aims to see if there are differences between employees´ experiences in different office categories. This variation in open plan offices has not been identified in comparative office studies, which instead have compared employees' in open plan offices in general versus individual offices, so-called cell-offices.

A qualitative approach is applied in the research issues of this empirical study, based on nineteen, semi-structured, in-depth interviews with office employees from eighteen different companies/divisions. The sample comes from a larger study of 491 office employees in twenty-six companies/divisions in the Stockholm area, Sweden. The nineteen respondents work in one of the seven office types identified in contemporary office design. These office types are defined by their *architectural features*, physical features, of which the spatial layout is the most dominant aspect, and their *functional features*, i.e. how work is carried out and organized in the office. Due to the small sample size, the office types are categorized into three groups: 1) *Individual and smaller shared workspace*: office types with smaller workspace for one individual or a few individuals (including cell-office and shared-room office); 2) *Traditional open plan office*: office types with shared workspace of different sizes (including small open plan office, medium-sized open plan office and large open plan office); and 3) *More flexible open plan offices*: open plan offices that utilize flexibility for work and have a plan layout and IT-system that supports the more flexible work methods (including flex- and combi-office).

The study results showed that the employees mainly focused on the work itself and thereafter on the social life at the workplace. The physical work was rarely mentioned without my prompting, as it was taken for granted. Which office category the employee worked in also appeared to influence their focus: in individual and smaller, shared workspaces the focus was on the work itself, whereas in larger shared workspaces it was mainly on the social life. The latter group of employees gave both more detailed information about the office environment and had a more nuanced image of their own office. Overall the employees were positive about their physical work environment. The positive experiences of the office environments were mainly concerned with the aesthetical dimensions of the architecture, whereas the negative comments dealt with the functional dimensions. The former dimension was also given both more space and importance in the interviews. This appeared not only to set the agenda for employees' perceptions of the own workplace and the image of the organization but also their perception of the functional dimensions which were only emphasized when the closest work environment—the workstation and its proximate area—was discussed.

Taking into consideration the fact that the study was explorative, the most interesting result in my opinion was the ascertained importance of the aesthetical dimension of the architecture for the overall image of the workplace and the organization. The aesthetical dimension appeared to work at a higher level than the functional, and thus it should

be given more attention in the design of work environments. The role of the aesthetical dimension seems to be underestimated in the debate concerning what a good environment is, as the focus traditionally has been on functionality, while aesthetics has been considered a luxury. The results indicate that the aesthetical dimension does not only operate at an individual level but also at a group level, for it influences the employees´ perceptions of the workplace and the organization as a whole.

*Key words: office experience, office employees, architecture, aesthetical dimension, functional dimension, workstation, workplace*

## 3.5 Discussion and Conclusions

In this section major findings and contributions of the empirical studies are discussed. Thereafter shortcomings and limitations are addressed, followed by concluding remarks and a brief outline of potential directions for future research.

### MAJOR FINDINGS AND CONTRIBUTIONS

The purpose of the present doctoral thesis was to study the office environment's influence on employees and organizations, with an emphasis on the employees' experiences. The main issues turned out to be health, well-being and job satisfaction. The office architecture's importance for employees' perceptions of their own workplaces and organizations was also studied. This has not only been done because of the capacity of architecture to reinforce certain experiences and behaviors, but also to understand its impact on health status and job satisfaction. Two major findings in this research are of a conceptual nature: a) the recognition of the importance of the architectural and functional features that define the office types; and b) a new and more sensitive definition of open plan offices based on the number of people sharing a workspace. Both concepts appear to be of great importance for health status and job satisfaction, but also for environmental satisfaction and perceptions of employee's own workplaces.

To analyze the office environment based on the architectural and functional features combined that define the different office types was beneficial as the differences between office types, which at first appear to be small, thereby could be detected and understood. The subdivision of the traditional open plan offices into three categories— small, medium-sized and large open plan—was also highly beneficial in the analysis of the quantitative data, and is more informative than the definitions in previous research where group size was not considered. The acquired knowledge of the internal differences between employees in different office types with regard to: a) employees' health, well-being and job satisfaction, b) satisfaction with office environments and individual

environmental factors, and c) their perception of their own workplaces and organizations is significantly important for the understanding of the office environment's impact. This knowledge is a vital aspect for considering the design process in order to achieve better office environments from an employee's perspective.

## HEALTH, WELL-BEING AND JOB SATISFACTION

One of the major findings in the analysis was the clear difference between the office types with regard to self-rated health status as well as job satisfaction (Article IV). Multivariate analysis remains the procedure for calculating the effect of office type, after adjustment for age, gender, job rank and line of business. Health status was divided into: 1) physical health, which included sick leave, general health and physical and psychological health; and 2) emotional health, which concerned emotional aspects of health and sleep quality; it is known that the two latter aspects can influence each other. The employees in cell-offices have in general a better self-rated health compared with those in other office types. These employees also reported a relatively high job satisfaction. The high ranking of the cell-office with regard to health was not that surprising, considering it is often referred to as the best office type from an employee perspective (e.g., Brookes & Kaplan, 1972; review by Sundstrom, 1986; Sundstrom et al., 1994; review by Wineman, 1982).

The good, self-rated health status among employees in flex-offices was more surprising since this office type has often been harshly criticized due to its lack of a personal workstation. Having an individual workstation is closely connected with the psychological concept of personalization which in turn is considered a basic human need. Cell-office and flex-office rated well for different outcome variables of general health status. In the outcome of the analysis of physical and psychological health, the cell-office, flex-office, and shared-room office all ranked well. When it comes to sick leave, the flex-office employees had the best ranking. Apart from the obvious explanation that this office type is good for employee health, another possible explanation is that only 'survivors' remain in this office type over time. By 'survivors' is meant the people who actively choose to work in this unique office type and are well suited to work there. An additional explanation could be that there is a 'hidden sick leave' since this office type allows the individual to work from home by choice.

With regard to emotional health, the employees in flex-offices reported the best ranking, closely followed by employees in cell-offices (see Erratum for table 7 in Article IV). These two office types also had good and similar outcomes for quality of sleep, but for some other outcomes they differed, although not to a great extent. Cell-office

employees reported better scores on aspects such as having no problem with efficiency and accuracy in work due to emotional problems, whereas employees in the flex-office reported less problems with work capacity due to lack of energy or feeling sad and depressed. These differences are interesting for a number of reasons. Could it be that the cell-office due to its features allows more freedom to concentrate and consequently its employees find it easier to carry out the work efficiently and accurately? Another possibility is that regarding these aspects employees in the cell-office have better emotional health because the cell-office's environment reinforces certain characteristics such as the facility for efficiency and accuracy. Why flex-office employees reported the least problems regarding lack of energy and being sad and depressed is hard to explain. Possibly it is connected to the same theory used to explain why of all employees they have the lowest rate of sick-leave. The satisfaction with leadership as well as the goals at work could of course be another feasible explanation.

With regard to job satisfaction, employees in the cell-office ranked highly which was the same result for employees in the flex-office and shared-room office. The distribution for the separate items for job satisfaction was however different for the three office types. Employees in cell-offices reported greater satisfaction with work itself in comparison with the other two categories which may be related to the greater focus on individual work in this office type. The employees in flex-offices and shared-room offices were, on the other hand, more satisfied with social aspects of job satisfaction such as the relationship to the closest supervisor and cooperation within the work group.

Concerning all aspects of health and well-being, there was a higher prevalence of lower health status in small and medium-sized open plan offices (see Erratum for table 7 in Article IV). They stood out as being 'high risk' office types in this respect. In terms of health in general, excluding emotional health, large open plan office employees reported ratings indicating higher risks. With regard to emotional health, there was higher risk for employees in medium-sized open plans, tightly followed by those in small open plan offices. They reported high risk on several outcome variables for emotional health which is remarkable. There were, however, in these two office types some internal differences with regard to the distribution of high risk outcomes among employees.

The presented results show that office types which can be classified as high risk in terms of job satisfaction not necessarily are the same as those in which there are high risks for health and well-being. Medium-sized open plan offices demonstrated a high risk in both aspects though. The highest prevalence of job dissatisfaction was though reported in combi-offices. There was a somewhat different distribution in combi-offices and medium-sized open plan offices in terms of dissatisfaction

beside the dissatisfaction both groups of employees' had with work itself. Those in medium-sized open plan offices were dissatisfied with the lack of cooperation, an aspect which employees in combi-offices were satisfied with. In comparison, employees in combi-offices were mostly dissatisfied with leadership and work goals.

To summarize, these results are interesting because the estimated effect of office type on health, well-being and job satisfaction has persisted after adjustment for the potentially confounding factors of age, gender, job rank and line of business. This reinforces the hypothesis that the office type as defined by its architectural and functional features has an influence on the health, well-being and job satisfaction among the employees.

## ENVIRONMENTAL SATISFACTION WITH THE OFFICE

There were two major findings with regard to the two aspects of satisfaction with office environments and individual environmental factors between employees in different office types (Article II). At first there was the substantial difference between employees in office types where the employees share workspaces and facilities and those working in cell-offices.

That cell-office employees were more satisfied with their physical environment, including design-related factors, might not be a surprise since features that allow independence and control over one's own workplace in many aspects define this office type. It was only with regard were to the workspace's support of affinity that cell-office employees wewless satisfied and in this respect they were the least satisfied of all employees. The second major finding was the internal differences in environmental satisfaction between employees in the office types in which workspace and facilities are shared. So did, for example, flex-office employees report high satisfaction with privacy in comparison with other employees that share workspaces, which was unexpected. Although they reported no ability for seclusion within their workspace, at the same time they reported no problem with being overheard or observed.

Looking at different aspects of environmental satisfaction, it was clear that most dissatisfaction concerned noise and privacy—two very controversial issues in office design. The highest dissatisfaction was reported in medium-sized and large open plan offices, with a somewhat higher degree of disturbance from noise reported in large open plan offices. Most satisfied with noise and privacy were employees in cell-offices followed by those in flex-offices which as formerly discussed was unexpected.

With regard to design-related factors, the internal differences between the office types that share workspaces and facilities were even clearer. Most satisfied were employees in flex-office followed by those in

shared-room offices and small open plan offices. Flex-office stood out in comparison to all other office types due to the clear focus on social aspects among its employees. They reported high satisfaction with design-related factors such as the workspace design's support of affinity, the office design's ability to reinforce interaction and access of good spaces for breaks. The importance of this result is that it demonstrates that cell-office and flex-office, the most contrasting office types, to have the most satisfied employees—they satisfy different needs of the employees, to a great extent based on their specific features. Both office types have their respective advantages and probably suit different types of jobs and lines of business. Regarding dissatisfaction with the physical office environment and aspects highly connected to it, medium-sized and large open plan offices stand out as 'high risk' office types as their employees reported significantly higher degree of dissatisfaction.

The most important finding may be the great differences in terms of dissatisfaction between employees in office types where workspace and facilities are shared. The differences in perception and experiences of the office environments in these office types which share the communal features of shared workspaces and facilities indicate that the differences depend on other differences in architectural and functional features. In terms of the traditional open plan offices it may well depend on the group size as well.

## OFFICE EMPLOYEE'S PERCEPTION OF ARCHITECTURE

The result of the first qualitative study presented in Article I featured Lynch's method (1960) for assessing architectural quality from a user perspective, which he defined as 'imageability.' The method originally developed for analyzing architectural qualities in cities as perceived by the inhabitant was in the study found to be useful in office environments. The method proved also to have the advantage of easily transforming architectural experiences into graphical diagrams, which makes it easy for the user to express his/her opinion of an environment. It is also easy to render the user's experiences into an architectural sketch of a plan layout with the method. The method should thus appeal to architects and thereby be easier to incorporate in the design process. In addition to this a major finding of the study is that the perception of architectural quality in the office to a high degree appears to be independent of both office type and the scale of the office. Instead it appears to depend on the quality of the plan layout combined with the quality of other architectural features of the office.

In the second qualitative study, presented in Article V, the office architecture's importance for employee's perceptions of the own workplaces and organizations was investigated. The focus was on the

two key components of architecture—the aesthetical and functional dimensions—and their importance for the employee's perception. The result indicates that the physical office environment is not in focus when the respondents think about work; it appears instead to be taken for granted. It also demonstrates that employees in different office categories have different foci as they think of work: those in individual and smaller, shared workspaces focused on the work itself, whereas those in larger shared workspaces focused on social life. An interesting finding is that the respondents' experiences of their office environments mainly were positive, and their focus were on the aesthetical dimension of the office architecture, not the functional. It was both given more importance and associated with more positive feelings.

To summarize, together the qualitative and quantitative studies of this doctoral thesis constitute a complementary work, as the analysis of the quantitative data would have been harder to conduct without having heard the employees' own words about their workplaces described in the qualitative data, i.e. in the in-depth interviews. Both approaches were thus necessary in this doctoral work as the semi-structured interviews brought the attention to the employee's personal perceptions of the office architecture which was useful in the analysis of results from the quantitative data about the physical environment.

### Limitations and Shortcomings

There are some limitations and shortcomings of this research project that need to be mentioned. A major limitation is the fact that the empirical study is cross-sectional, as both the qualitative and quantitative studies were conducted from January to July 2004. The fact that the respondents were studied at a defined time period and not over a period of time results in a weaker causal interpretation. Hence no definite cause for the differences between employees in different office types can be established.The result is nevertheless well in line with the stated hypothesis that the office type can be an explanatory variable for health, well-being and job satisfaction among office employees. It is also in line with the hypothesis that the office type can be an explanatory variable for the perception of different environmental factors and related aspects. Despite this, with a larger sample and an enlarged database covering the individuals' experiences of previous office locations, some information on the effect of transitions from one office type to another might have been retrieved and analyzed. This limitation concerns especially the qualitative studiewhich have a smaller sample.

Another shortcoming is that the study was conducted in only one location, the Stockholm area, a typical urban setting having different life conditions than in less populated areas. The optimal would have been if

it had been done in other locations in Sweden simultaneously in order to isolate the possible influence of location. An enlarged study—in time and space—would, however, put much higher demands on available resources.

Information was obtained from validated questionnaires used in previous studies on working conditions, thus the obtained data may be considered valid for the research purpose in this respect. Scores for symptoms and perceptions were formulated on ordinal scales. To comply with more strict assumptions for the statistical analysis, the items were dichotomized, which leads to some loss of information. Our belief is however that this approach balances adequately the requirements of higher validity in the statistical models.

Correction was made for the same set of confounding variables in all the multivariate analyses. This choice was both based on a priori grounds drawn from experiences from similar studies and on the fact that the potential confounding variables were differently distributed for the investigated office types. In an overarching and more exploratory investigation such as this one, of the three areas of interest (i.e. health status, job satisfaction and satisfaction with the office environment) measured with several items, this approach was deemed to be satisfactory. Yet a limitation in the statistical analysis is the number of confounders, but with the size of the sample it was not appropriate to use more covariates in the multivariate analysis. Other factors than the chosen confounders would certainly have influenced employee perception of the environment, e.g. the general life situation and the socio-economic group of the respondents. However, the belief is that these factors would not cause a severely uneven distribution for the seven office types, once our four confounders have been considered.

Another issue concerns the structure of the models. Should the covariates be considered as confounders, mediators or modifiers? Statistical interactions were tested and found to be less important; thus modification seems less relevant in this case. Mediating or confounding is another choice. Based on the same argument, i.e. for an overall assessment of all these items, the choice was confounding, but it is recognized that a more detailed analysis of a small number of specific items could lead to specialized and somewhat different models.

Finally, individual *p*-values for testing statistical significance should be interpreted with some caution. Since several items are analyzed, more emphasis should be directed to the overall picture. Furthermore, the results for the shared-room offices are based on the smallest sub-sample. Hence they are most vulnerable to sampling fluctuations.

Concerning the qualitative data a limitation is the fact that only nineteen employees were interviewed, thus not all twenty-six companies/divisions were represented in the sample. A larger sample could possibly have given somewhat different results. Due to the duration of the in-depth interviews—between 1.5 to 2 hours each—it was, however, not possible within the scope of the research project to include more subjects. The interviews focused on the architectural interpretations of the environment and among others things its influence on cooperation within workgroups and the office as a whole. It was not possible to control for the influence of organizational culture on the perception and experience among the subjects. The organizational climate has however been surveyed in every case and has been considered during the analysis. That individuals hold different experiences and preferences was however perceived as a more important limitation. Individual preferences are naturally hard to control for in this type of qualitative study, but one has to be aware of the problem.

## CONCLUDING REMARKS

This doctoral thesis is an attempt to fill the gaps in our knowledge of how the physical environment influences the office employees and thereby their organizations, with the focus on health status, job satisfaction and satisfaction within the office environment. In doing so it has been important to simultaneously investigate the architectural design's importance for employees' office experiences and their perceptions of own workplace and organizations.

The study presents results that demonstrate that the office type itself, defined by its architectural and functional features, has an impact on the employee health status and job satisfaction. The results also evince that most likely the office type itself has an impact on the satisfaction with office environments, as well as certain environmental factors. This conclusion is based on the fact that in many cases the differences in health status, job satisfaction and environmental satisfaction persisted among employees in different office types after adjustment for confounding factors well known for having an influence on these outcomes.

Certain characteristics stand out as playing a more important role for the employees with regard to the subject of the thesis. Summarizing the results it shows that the employees in cell-offices are clearly most satisfied with their office environments, followed by those in flex-offices. The cell-office employees rated low only on social aspects of design-related factors. One of the major findings from this research are the differences between employees in office types where workspaces and work facilities are shared. Here the architectural and functional features

that define each office type, as well as the size of the group sharing a workspace, seem to play a decisive role. Based on the derived results, medium-size and large open plan offices could be described as high-risk office types in term of satisfaction with the office environment. In term of health status the risks for worse health status and poor well-being are indicated for small and medium-sized open plan offices. Employees in these office types showed distinguishably higher risks compared with those in other office types, and with regards to cell-office the risk was statistically significantly higher for ill health. The best likelihood for good health was in cell-office and flex-office. In terms of job satisfaction employees in medium-sized open plan offices and combi-offices showed the highest prevalence of low job satisfaction, wheras the likelihood of high job satisfaction was best in shared-room offices and flex-offices, followed tightly by cell-offices.

Another conclusion is that more accurate office definitions are needed in future research when investigating the impact of environmental factors on employees, but also that the architecture's role for employees' perceptions of the own workplaces and organizations needs to be investigated further. This is important in order to get a better picture of the environmental influences on office employees and thereby improve the design process in order to create better office environments from both an employee and an organizational perspective. In respect to this architects have to understand the impact of different environmental factors in an office if they want to foresee the outcome of their design proposals.

The aim of this research was to supply the design processes with an improved basis for decision-making, as it tends to be more based on subjective opinions than scientific knowledge. With improved knowledge important gains could be achieved at an individual, organizational and societal level. A lot of decisions are made based on short-term gains since the initial costs are overestimated in relation to the life cycle cost of a building and its users. The use of this knowledge for better allocation of investments in buildings could, in other words, potentially reduce the costs for personnel, e.g. less sick-leave, increased diligence, etc.

Thus the focus in a debate on office design should be on how the architecture can support the individual employee as well as the organization as a whole. Supportive in the sense means that work will be carried out in environments that support different aspects of work, i.e. individual, concentrated work but also social interaction and cooperation between colleagues. These factors have decisive impact not only on the office employees' environmental satisfaction, health status and job satisfaction but also their perceptions of the own workplaces and organizations. The great challenge lies however in implementing these

results with different parties that influence the office design such as architects, real estate owners and managers. Despite the difficulties that comes with this, an interdisciplinary approach is critical when designing offices, as there are many factors influencing the employees and these are found in different disciplines. These results also demonstrate that there is a correlation between office types and the health, well-being and job satisfaction that needs to be investigated further in a longitudinal perspective. In forthcoming studies it is important to look deeper into office types and the features that seem to play a decisive role in this interaction. A central aspect should thus be to investigate whether these features coincide with the elements used by Lynch (1960) to rate imageability, i.e. whether the office environments that are rated as having high imageability by the employees are the same as the ones where the employees report good health status and high job satisfaction. An additional aspect to investigate is if there are individual environmental or design-related factors that play an essential part in the evaluation of imageability. As the aesthetical dimensions of architecture seem to be of greater importance for employees' satisfaction with the work environment, it would be interesting to investigate these in relation to the health status and job satisfaction as well. Finally, do these environmental factors and design-related factors relate to specific features of the office types that are important for the health, job satisfaction and satisfaction with the own office environment? Are they also related to factors that have a great impact on the employees' perception of the own workplace as well as the organization as a whole?

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# 5 Appendices

# APPENDIX 1

TABLES

**Table 1.** Sociodemographic data of qualitative study group. Distribution of age, gender and line of business stratified for office type

| SEMI-STRUCTURED INTERVIEWS | **Cell-office** | **Shared-room** (2-3 pers./ room) | **Small open plan office** (4-9 pers./room) | **Medium-sized open plan office** (10-24 pers./room) | **Large open plan office** (25- pers./room) | **Flex-office** | **Combi-office** |
|---|---|---|---|---|---|---|---|
| **Gender** | | | | | | | |
| Women | 1 | 2 | | 1 | 2 | 2 | 2 |
| Men | 1 | 1 | 1 | | 2 | 2 | 2 |
| **Age group** | | | | | | | |
| 21-34 years | | 29 (m)<br>31 (m) | 32 (m) | 34 (w) | | | |
| 35-49 years | 30 (w)[1] | 42 (w) | | | 35 (w)<br>48 (w)<br>49 (m) | 42 (w)<br>45 (w) | 36 (w)<br>41 (w)<br>43 (m)<br>34 (m) |
| >49 years | 59 (m)[2] | | | | 53 (m) | 50 (m)<br>50 (m) | |
| **Line of business** | | | | | | | |
| Media, IT | | | | 1 | | 1 | 1 |
| Personal & economic guidance | | 1 | 1 | | 4 | 1 | 1 |
| Technical professions | 2 | 1 | | | | | |
| Business adm./management | | | | | | 2 | 2 |
| Service sector | | 1 | | | | | |

[1]w= respondent was a woman
[2]m= respondent was a man

**Table 2.** Distribution of office type within different companies and divisions in larger companies

| COMPANY/DIVISION IN LARGER COMPANY (Total n=485 people) [1] | Line of business | Cell-office (n=137) | Shared-room (n=26) | Small open plan office (n=44) | Medium-sized open plan office (n=59) | Large open plan office (n=77) | Flex-office (n=83) | Combi-office (n=59) |
|---|---|---|---|---|---|---|---|---|
| **Company 1** | Media, IT | | | ■ | ■ | ■ | | ■ |
| **Company 2** | Technical professions | ■ | | | | | | |
| **Company 3** | Technical professions | ■ | | | | | | |
| **Company 4** | Pers. & econ. guidance | ■ | ■ | | | | | |
| **Company 5** | Technical professions | ■ | | | | | | |
| **Company 6** | Technical professions | ■ | | | ■ | ■ | ■ | |
| **Company 7** | Pers. & econ. guidance | | | ■ | ■ | ■ | | |
| **Company 8** | Pers. & econ. guidance | ■ | ■ | ■ | | | | |
| **Company 9** | Media, IT | ■ | | ■ | ■ | ■ | | |
| **Company 10** | Technical professions | ■ | ■ | | | | | ■ |
| **Company 11** (Division) | Business adm./manag. | | ■ | ■ | ■ | ■ | | |
| **Company 12** (Division) | Business adm./manag, | | | ■ | ■ | ■ | | |
| **Company 13** (Division) | Business adm./manag. | | | ■ | ■ | ■ | | |
| **Company 14** (Division) | Business adm./manag. | | ■ | ■ | | | | |
| **Company 15** | Media, IT | | | | | | ■ | |
| **Company 16** | Pers. & econ. guidance | | | | | | ■ | |
| **Company 17** | Media, IT | | | ■ | | | | ■ |
| **Company 18** | Business adm./manag. | | | | | | ■ | |
| **Company 19** | Media, IT | | | ■ | | | | |
| **Company 20** | Media, IT | | | | | | | ■ |
| **Company 21** | Media, IT | | | ■ | ■ | | | ■ |
| **Company 22** | Media, IT | | | ■ | ■ | | | ■ |
| **Company 23** | Pers. & econ. guidance | | | ■ | ■ | | | ■ |
| **Company 24** | Media, IT | | | | | ■ | | ■ |
| **Company 25** | Media, IT | | | | | ■ | | ■ |
| **Company 26** | Media, IT | | | | ■ | | | ■ |

[1] From 491 subjects 3 were excluded since they had no information on office type, and the 3 subjects from the service sector were excluded, since that number was too small for analysis.

**Table 3**. Sociodemographic data and job characteristics for 491 office employees. Distribution of age, gender, job ranks and line of business is stratified for office type.

| BACKGROUND FACTORS | Cell-office (n=137) | Shared-room (n=28) | Small open plan office (n=44) | Medium-sized open plan office (n=59) | Large open plan office (n=77) | Flex-office (n=84) | Combi-office (n=59) | Total [1] (n=491) |
|---|---|---|---|---|---|---|---|---|
| **Age groups** | | | | | | | | |
| 21-24 years | 38 (28%) | 15 (54%) | 12 (27%) | 13 (22%) | 19 (25%) | 26 (32%) | 33 (56%) | 156 (32%) |
| 35-49 years | 51 (38%) | 7 (25%) | 15 (34%) | 24 (41%) | 30 (39%) | 31 (38%) | 20 (34%) | 178 (37%) |
| >49 years | 46 (34%) | 6 (21%) | 17 (39%) | 21 (36%) | 28 (36%) | 25 (31%) | 6 (10%) | 149 (31%) |
| Missing information | 2 | | | 1 | | 2 | | 8 |
| **Gender** | | | | | | | | |
| Male | 80 (59%) | 16 (57%) | 21 (48%) | 24 (41%) | 35 (46%) | 36 (44%) | 35 (59%) | 247 (51%) |
| Female | 55 (41%) | 12 (43%) | 23 (52%) | 34 (59%) | 42 (54%) | 46 (56%) | 24 (41%) | 236 (49%) |
| Missing information | 2 | | | 1 | | 2 | | 8 |
| **Job rank** | | | | | | | | |
| High job rank | 35 (26%) | 3 (11%) | 9 (21%) | 5 (9%) | 13 (17%) | 17 (20%) | 13 (22%) | 95 (20%) |
| Middle-high job rank | 8 (6%) | 4 (14%) | 3 (7%) | 9 (16%) | 14 (19%) | 10 (12%) | 18 (31%) | 66 (14%) |
| Middle-low job rank | 74 (54%) | 14 (50%) | 21 (47%) | 32 (56%) | 37 (49%) | 41 (49%) | 25 (42%) | 243 (50%) |
| Low job rank | 19 (14%) | 7 (25%) | 11 (26%) | 11 (19%) | 11 (15%) | 16 (19%) | 3 (5%) | 78 (16%) |
| Missing information | 1 | | 1 | 2 | 2 | | | 9 |
| **Line of business** | | | | | | | | |
| Media/IT | 10 (7%) | 8 (29%) | 19 (43%) | 29 (50%) | 37 (48%) | 42 (50%) | 47 (83%) | 192 (40%) |
| Pers. & economic guidance | 45 (34%) | 7 (25%) | 14 (32%) | 17 (29%) | 5 (6%) | 39 (46%) | 3 (5%) | 130 (27%) |
| Technical professions | 74 (55%) | 7 (25%) | 1 (2%) | 2 (3%) | 8 (10%) | 2 (2%) | 2 (3%) | 96 (20%) |
| Business adm. /management | 5 (4%) | 4 (14%) | 10 (23%) | 10 (23%) | 27 (35%) | 0 | 5 (9%) | 61 (13%) |
| Service sector | 0 | 2 (7%) | 0 | 0 | 0 | 1 (1) | 0 | 3 (1%) |
| Missing information | 3 | | | 1 | | | 2 | 9 |

Note 1: In the total there are 3 subjects with missing information on office type.



98

# APPENDIX 2

INTERVIEW GUIDE
Intervjumall för djupintervju (Swedish)

English translation of interview guide available on request

# Djupintervju



## BAKGRUND

Datum för intervju:

Namn:

Ålder: Kön:

Företag: Bransch:

Vilken anställningsform har du?
(ex. tillsvidare anställning, frilans, vikarie, projektanställning)

Civilstånd: Barn, ålder på ev. barn:

Resväg till jobbet i tid räknad: Antal år inom Ditt yrke:

Befattning på jobbet: Leder andra personer i arbetet::

## Vilken kontorstyp stämmer bäst med Din arbetsplats?

- Cellkontor ☐

- enskilt arbetsrum omgärdat av fyra väggar
- tillgång till utsikt från eget fönster
- tillgodose de flesta arbetsfunktionerna i det egna rummet, även enskilda möten

- Delat rum ☐

- delat rum med 2-3 personer omgärdat av fyra väggar
- tillgång till utsikt från eget fönster
- tillgodose de flesta arbetsfunktionerna i det egna rummet

- Kontorslandskap ☐

Antal personer .....

- varje medarbetare har egen arbetsplats
- ej tillgång till eget fönster
- tillgodose de flesta arbetsfunktioner i det gemensamma rummet
- möten i specifika rum

- Flexkontor ☐

- ingen inviduell arbetsplats
- bygger på tillgång till avancerad informationsteknologi, vilken gör medarbetarna oberoende av tid och rum.
- har de personliga tillhörigheterna i en rullhurts eller eget skåp
- ej tillgång till eget fönster
- tillgodose samtliga arbetsfunktioner i de gemensamma utrymmena
- möten och privata telefonsamtal etc. i specifika rum

- Kombikontor ☐

- individuell arbetsplats – antingen i eget rum eller i delat arbetsrum med andra
- arbetar mycket i grupp på annan plats än den enskilda arbetsplatsen. Minst 20% av arbetstiden i grupp på annan plats inom kontoret. (Ej informationsmöten med dagordning)
- hög grad av självständigt arbete i kombination med hög grad av arbete i projektgruppen
- tillgång till eget fönster beroende av arbetsplatsens placering (se beskrivning ovan)
- samtliga arbetsfunktioner tillgodoses i de gemensamma utrymmena
- möten liksom grupp- och projektarbeten i specifika rum

*Vad tycker Du om att sitta i .....?*
(cellkontor, celat rum, kontorslandskap, flexkontor, kombikontor)

## Frågor baserade på QSPNordic/AH-enkäten
# HÄLSA OCH VÄLBEFINNANDE

1) Hur är Din allmänhälsa nu? Hur har Du upplevt din allmänhälsa de senaste åren?

2) Känner Du dig återhämtad/utvilad när du vaknar?
Känner Du Dig mentalt trött dagtid?

3) Känner du Dig stressad just nu? Har Du känt dig stressad under det senaste året?

4) Hur trivs Du med livet generellt? Har Du gått igenom något jobbigt de senaste åren?

# ARBETSMILJÖ

1) Hur trivs Du med din arbetssituation nu? Hur har Du trivts med Din arbetssituation under det senaste året?

2) Hur många timmar arbetar du normalt per vecka?

3) Har Du ofta har svårt att koppla bort arbetet när Du är ledig?

4) Hur tycker du att samarbetet fungerar med din närmaste chef, överordnad?
Får du exempelvis klara besked om vad han/hon förväntar sig av Dig?
Får Du feedback på om Du gjort ett bra resp. dåligt arbete?

5) Har det förekommit någon form av förändring på Din arbetsplats de senaste 12 månaderna så som uppsägningar, omorganisation eller någon annan typ av inskränkning?

6) Har Du varit sjukskriven för någon sjukdoms under det senaste året som Du anser har med stress att göra?

# UPPLEVELSE AV ARKITEKTUREN
## Del 1 – baserad på frågor ur Nylanders doktorsavhandling *Bostaden som arkitektur*, sektionen för Arkitektur, Chalmers, Göteborg 1998

1) Vad var ditt första intryck av kontoret?

2) Trivs Du? Och vad är det i så fall som gör att Du trivs?

3) Fungerar kontoret bra?
Är det något speciellt som Du saknar eller som Du gärna hade sett annorlunda?

4) Har Du någon favoritplats på kontoret, där Du slår dig ned för att hämta andan eller för att utföra koncentrerat arbete? Vad är det som gör denna plats till favoritplats?

5) Hur fungerar fikarummet och arbetsplatser ihop?

6) Finns det olika zoner, gränser inom kontoret? Någon som känns mer eller mindre privat?

7) Vet Du hur möbleringen gått till på kontoret? Har det varit många möbleringsförsök eller föll allt snabbt in på rätt plats? Får man möblera den egna platsen själv?

8) Har de olika rummen bytt funktion på kontoret?

9) Har Ert kontor någon speciell status?
Hur är Ert kontors status i jämförelse med andra kontorsarbetsplatser?
Är Ert kontor populärt jämfört med exempelvis andra avdelningar inom företaget eller andra företagskontor?

10) Identiteten? Hur ser Du på kontorets identitet och den i relation till Dig själv?
Kontorets identitet i relation till din yrkesroll?

11) Umgås Du med Dina arbetskamrater? Tycker Du att kontorsutformningen uppmuntrar till umgänge? Finns det platser som det känns naturligt att träffas vid?

12) Vet Du att arbetskamrater har slutat för att de inte trivts med kontoret?

13) Trapphuset/entrézon, hur är det? Mörkt, lagom stort, påkostat och representativt?
Passar det med yrkesrollen? Passar det med övriga kontoret?

14) Finns det skillnader i dagsljuset i rummen?

15) Upplever Du kontoret som ljust, är fönstren lagom stora?

16) Har Du tillgång till eget fönster vid din arbetsplats?
Har Du tillgång till bra dagsljus på din arbetsplats? Är det artificiella ljuset bra/tillräckligt?

17) Insyn kontra utblick ifrån Din arbetsplats?

18) Har Du upplevt att det finns riktningar eller axlar på kontoret? Genomblickar tvärs genom kontoret mellan olika rum?

19) Hur rör Du Dig mellan de olika rummen inom kontoret, olika korridorer?
Finns det en tydlig angivelse hur Du bör röra dig?
Finns det olika sätt att röra sig på? I så fall, upplever Du det som positivt/negativt?

20) Är det bra att kunna gå runt genom kontoret?

21) Upplever Du huset eller kontoret som djupt eller smalt?

22) Öppna eller slutna rum, är det något Du tänker på?

23) Har de olika rummen på kontoret olika stämningar eller atmosfär, vad beror det på?

24) Materialen på kontoret hur upplevs de?

25) Hur är det med förråd, skåp, hyllor och andra fasta inventarier? Upplevs de som vackra, bra eller dåligt utförda?

26) Kvalitetsmässigt - är det ett bra hus? När Du tänker på sådant som målarfärg, detaljarbeten i trä och plåt, material och detaljutformning av fönster och dörrar?

27) Vad tycker Du om färgsättningen på kontoret?

28) Är hallen representativ? Är hallen välkomnande då Du kommer till jobbet på morgonen? Påverkan den Din känsla då Du kommer till jobbet?

## Del 2 – baserad på frågor ur Lynch bok *Image of the City*, MIT Press,The Massachusetts Institute of Technology and the President and Fellows of Harvard College, Cambridge, MA, USA 1960

1) Vad är det första Du tänker på då Du tänker på Din arbetsplats? Den sociala miljön, den fysiska utformningen eller arbetet i sig?
Om Du enbart tänker på den fysiska miljön – vad är det första Du tänker på då Du tänker på Din arbetsplats/kontor?

2) Skulle Du vilja göra en snabb skiss över Ditt kontor?
Gör den som om Du snabbt skulle förklara kontoret för någon som är ny på platsen.
Betona det Du tycker är viktigt för förståelsen av kontoret.

3) Skulle Du vilja beskriva hur Du rör Dig när Du kommer till kontoret på morgonen, från entréhall fram till arbetsplatsen via olika platser Du rör Dig. Ifall Du slår dig ner hos en kollega osv. Vad tänker Du på när Du rör Dig genom kontoret - särskilda lukter, synintryck som spelar roll för den bild Du har av kontoret och hur Du rör dDig?

4) Ifall du beskriver Ditt kontor, är det något som Du upplever som distinktivt och viktigt för miljön. Det kan vara någon liten detalj, eller stor.

5) Hur skulle Du generellt beskriva Ditt kontor och Din enskilda arbetsplats? Har Du någon specifik känsla kopplad till Ditt kontor och Din enskilda arbetsplats?

6a) Tycker Du att det är viktigt att snabbt kunna orientera dig då Du är i en lokal eller kommer in i en byggnad? Är sådana faktorer som att ett rum är spännande och därmed mindre överblickbart viktigare för Dig?

b) Är Ditt kontor lätt att orientera sig i, känns det logiskt planerat?
Upplever Du det som viktigt?

## Del 3 – baserad på frågor ur Söderbergs enkät, Kap. 3 "Grupporganisationer och inre miljö i samspel" (bilaga 3.1). I antologin: *Välkommen till Teletjänsten – Organisation, lokaler, arbetsinnehåll i förnyelse*, G. Westlander et al. (red.), Arbesmiljöinstitutet, Göteborg, 1993

1) Hur bedömer Du rummets/lokalernas bidrag till sammanhållning/gruppkänsla inom gruppen och gentemot andra avdelningar ifall det sådana finns?

2) Upplever Du att det finns ”revirindelningar” inom kontoret? Ifall det är så, bedömer Du att det kan hänföras till lokalernas utformning eller grupporganisationen?

3) Har Du någon möjlighet att dekorera eller på annat sätt göra Ditt arbetsrum mer personligt?

# APPENDIX 3

QUESTIONNAIRES
QSPNordic, AH-questionnaire, BIU-questionnaire,
Interplay between Group Organization & Interior Design

ENKÄTER (Questionnaires) (Swedish)
- Anställning & Kontor (Employment & Office type)
- Personlig bakgrund (Personal background)
- Hälsa & Arbetsmiljö (Health & Work environment)

English translation of questionnaires are available on request

# ENKÄT

## BAKGRUND

Namn: Datum för intervju:

1. Ålder:
2. Kön:
3. Företag:
4. Bransch:
5. Vilken anställningsform har Du?

Tillsvidare anställning ☐

Frilans ☐

Vikarie ☐

Projektanställning ☐

Annan: _____

## Vilken kontorstyp stämmer bäst in med din arbetsplats?

Kryssa i ett av följande alternativ.

6. Du har eget rum (Cellkontor) ☐
7. Du har ingen egen fast arbetsplats (Flexkontor) ☐
8. a Du sitter i ett kontorslandskap ☐

   b Hur många är ni ungefär som delar rum? _____
   Med rum avses här den sammanhängande ytan som delas med medarbetare.

9. Du arbetar i grupp på annan plats än Din enskilda arbetsplats mer än 30 % av din arbetstid. Du kan med andra ord sägas ha tillgång till mer än bara Din enskilda arbetsplats.
   (Kombikontor) ☐

Ifall du svarat ja på fråga 7, 8 eller 9:

10. Hade Du på den arbetsplats där Du arbetade innan Din nuvarande arbetsplats tillgång till enskilt rum?

**JA** ☐

**NEJ** ☐

11. Civilstånd:

| Gift | Sambo | Flickvän/ pojkvän | Singel |
|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ |

Ifall Du är född utomlands:

12. Vid vilken ålder kom du till Sverige? _____

13. a Antal hemmaboende barn: _____

b Ålder på hemmaboende barn: _____

14. Hur lång resväg har Du tur och retur till arbetet i minuter räknat? _____
(Räkna in gång- och väntetid, men ej tid för inköp eller att hämta och lämna barn hos dagmamma, på dagis, skola etc.)

15. Vilken är Din högst avslutade utbildning?

- Grundskola ☐
- Gymnasieskola - högst två år ☐
- Gymnasieskola - längre än två år ☐
- Universitet-/högskoleutbildning ☐
- Forskarutbildning ☐

Annat, ange vad: _____

16. Hur många år har Du arbetat inom Ditt nuvarande yrke? _____

17. Hur länge har Du varit på denna arbetsplats? _____
(Med arbetsplats avses här arbetsgivare.)

18. Vilken befattning har Du på jobbet? _____

19. Leder Du andra personer i arbetet? **JA** ☐ **NEJ** ☐

# ARBETE OCH HÄLSA

20. Med tanke på Din hälsa - tror du att Du kan arbeta i Ditt nuvarande yrke även om två år?

- Antagligen inte ☐
- Jag är osäker på det ☐
- Ja, ganska säker ☐

21. Hur många gånger under de ***senaste 12 månaderna*** har det hänt att Du gått till arbetet, trots att Du med tanke på Ditt hälsotillstånd borde varit hemma?

- Ingen gång ☐
- En gång ☐
- 2-5 gånger ☐
- Mer än 5 gånger ☐

22. Händer det att Du tar ut semester eller kompledigt istället för att sjukanmäla Dig när Du är sjuk?

- Aldrig ☐
- Någon enstaka gång ☐
- Ganska ofta ☐
- Ofta ☐
- Ej aktuellt (ej varit sjuk) ☐

23. Hur många dagar under de ***senaste 12 månaderna*** har Du sammanlagt varit borta från arbetet pga. egen sjukdom? (sjukskrivning, vård, behandling eller undersökning)

- Ingen dag ☐
- 1 - 7 dagar ☐
- 8-24 dagar ☐
- 25-99 dagar ☐
- 100-365 dagar ☐

**Instruktioner till frågorna 24 t.o.m. 29:**
Detta formulär innehåller frågor om hur Du ser på Din hälsa. Informationen skall hjälpa till att följa hur Du mår och fungerar i Ditt dagliga liv. Besvara frågorna genom att sätta ett kryss i den ruta Du tycker stämmer bäst in på Dig. Om Du är osäker, kryssa då i den ruta som känns närmast.

24. I allmänhet, skulle Du vilja säga att Din hälsa är _____

| Utmärkt | Mycket god | God | Någorlunda | Dålig |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

25. Följande två frågor handlar om aktiviteter som Du kan tänkas utföra under en vanlig dag. ***Ar Du p.g. a. Ditt hälsotillstånd begränsad*** i dessa aktiviteter nu?
Om så är fallet, hur mycket?

a) Måttligt ansträngande aktiviteter, som att flytta ett bord, dammsuga, skogspromenader eller trädgårdsarbete

| Ja, mycket begränsad | Ja, litet begränsad | Nej, inte alls begränsad |
|---|---|---|
| ☐ | ☐ | ☐ |

b) Gå uppför flera trappor

| Ja, mycket begränsad | Ja, litet begränsad | Nej, inte alls begränsad |
|---|---|---|
| ☐ | ☐ | ☐ |

26. Under de ***senaste fyra veckorna*** , har Du haft något av följande problem i ditt arbete eller med andra regelbundna dagliga aktiviteter som en följd av ***Ditt kroppsliga hälsotillstånd?***

| | Ja | Nej |
|---|---|---|
| a) Uträttat mindre än Du skulle önskat | ☐ | ☐ |
| b) Varit hindrad att utföra vissa arbetsuppgifter eller andra aktiviteter | ☐ | ☐ |

26.5 Under ***de senaste fyra veckorna*** , har Du haft något av följande problem i Ditt arbete eller med andra regelbundna dagliga aktiviteter som en följd av ***känslomässiga problem*** ? (t ex nedstämdhet eller ängslan)

| | Ja | Nej |
|---|---|---|
| a) *Uträttat mindre* än Du skulle önskat | ☐ | ☐ |
| b) Inte utföra arbete eller andra aktiviteter så *noggrant* som vanligt | ☐ | ☐ |

27. Under de ***senaste fyra veckorna*** , hur mycket har *värk eller smärta* stört Ditt normala arbete? (innefattar både arbete utanför hemmet och hushållssysslor)

| Inte alls | Litet | Måttligt | Mycket | Väldigt mycket |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

Frågorna här handlar om hur Du känner Dig och hur Du haft det under de senaste fyra veckorna. Ange för varje fråga det svarsalternativ som bäst beskriver hur Du känt Dig.

28. Hur stor del av tiden under de ***senaste fyra veckorna***

a) har Du känt Dig ***lugn och harmonisk*** ?

| Hela tiden | Större delen av tiden | En hel del av tiden | En del av tiden | Litet av tiden | Inget av tiden |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

b) har Du varit ***full av energi*** ?

| Hela tiden | Större delen av tiden | En hel del av tiden | En del av tiden | Litet av tiden | Inget av tiden |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

c) har Du känt Dig ***dyster och ledsen*** ?

| Hela tiden | Större delen av tiden | En hel del av tiden | En del av tiden | Litet av tiden | Inget av tiden |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

29. Under de ***senaste fyra veckorna*** , hur stor del av tiden har ***Ditt kroppsliga hälso-tillstånd eller Dina känslomässiga problem*** stört Dina möjligheter att umgås? (t ex hälsa på vänner etc.)

| Hela tiden | Större delen av tiden | En hel del av tiden | En del av tiden | Litet av tiden | Inget av tiden |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## SÖMN OCH ÅTERHÄMTNING

30. Hur bedömer Du på det hela taget Din sömnkvalitet?

| Mycket bra | Ganska bra | Varken bra eller dålig | Ganska dålig | Mycket dålig |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

31.

a) Känner Du dig utvilad och återhämtad när Du börjar arbeta igen ***efter par dagars ledighet?***

| Aldrig | Sällan | Ibland | Ganska ofta | Mycket ofta |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

b) Känner Du dig utvilad och återhämtad när Du börjar arbeta igen efter en flera veckors lång ledighet/ semester?

| Aldrig | Sällan | Ibland | Ganska ofta | Mycket ofta |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

# STRESS

32. Instruktioner: Sätt ett kryss i den ruta som bäst passar in på Dig som Du vanligtvis brukar reagera. Försök att vara så ärlig Du kan när Du svarar, och tänk inte för länge på varje fråga.

| | | Nästan aldrig | Ibland | Ofta | Nästan alltid |
|---|---|---|---|---|---|
| a) | Jag känner mig tidspressad | ☐ | ☐ | ☐ | ☐ |
| b) | Jag rör mig snabbt, som om jag hade bråttom | ☐ | ☐ | ☐ | ☐ |
| c) | Jag tycker mycket illa om att stå i kö | ☐ | ☐ | ☐ | ☐ |
| d) | Jag blir irriterad på andra bilister | ☐ | ☐ | ☐ | ☐ |
| e) | Jag går på högvarv och driver på mig själv | ☐ | ☐ | ☐ | ☐ |
| f) | Jag blir otålig på människor som gör saker och ting långsamt | ☐ | ☐ | ☐ | ☐ |
| g) | Jag tävlar med mig själv och andra | ☐ | ☐ | ☐ | ☐ |
| h) | Jag gör två eller flera saker samtidigt | ☐ | ☐ | ☐ | ☐ |
| i) | Jag känner mig irriterad och upprörd inombords | ☐ | ☐ | ☐ | ☐ |
| j) | Jag pratar fort och med starkt eftertryck | ☐ | ☐ | ☐ | ☐ |
| k) | Jag kommer på mig själv med att skynda mig, även när jag egentligen har gott om tid | ☐ | ☐ | ☐ | ☐ |
| l) | Jag blir irriterad på människor som är fumliga eller slarviga | ☐ | ☐ | ☐ | ☐ |
| m) | Jag äter fort och är den som är färdig först | ☐ | ☐ | ☐ | ☐ |
| n) | När jag talar med andra vill jag gärna få första ordet och övertyga de andra om att jag har rätt | ☐ | ☐ | ☐ | ☐ |
| o) | Jag får utbrott av irritation och ilska | ☐ | ☐ | ☐ | ☐ |
| p) | När jag talar med andra tänker jag på annat än det vi pratar om | ☐ | ☐ | ☐ | ☐ |
| q) | Jag har svårt att göra "ingenting" | ☐ | ☐ | ☐ | ☐ |
| r) | Jag faller andra i talet | ☐ | ☐ | ☐ | ☐ |
| s) | Jag blir irriterad över de fel andra människor begår | ☐ | ☐ | ☐ | ☐ |
| t) | Folk i min omgivning säger åt mig att varva ner | ☐ | ☐ | ☐ | ☐ |
| | | Nästan aldrig | Ibland | Ofta | Nästan alltid |

## ARBETSKRAV

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta / Alltid |
|---|---|---|---|---|---|---|
| 33. | Är Din arbetsmängd så ojämnt fördelad att arbetet hopar sig? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 34. | Måste Du arbeta övertid? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 35. | Måste Du arbeta i mycket högt tempo? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 36. | Har Du för mycket att göra? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 37. | Kräver Ditt arbete snabba beslut? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 38. | Ar Dina arbetsuppgifter för svåra för Dig? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 39. | Kräver Ditt arbete maximal uppmärksamhet? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 40. | Kräver Ditt arbete komplicerade beslut? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 41. | Utför Du arbetsuppgifter som Du skulle behöva mer utbildning för? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 42. | Kräver Ditt arbete att Du skaffar Dig nya kunskaper och färdigheter? | ☐ | ☐ | ☐ | ☐ | ☐ |

## ROLLFÖRVÄNTAN, MÅLSÄTTNING & FEEDBACK

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ Alltid |
|---|---|---|---|---|---|---|
| 43. | Finns det klart definierade mål för Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 44. | Vet Du vilket ansvarsområde Du har? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 45. | Vet Du precis vad som krävs av Dig i arbetet? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 46. | Måste Du utföra saker som Du tycker skulle göras annorlunda? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 47. | Får Du arbetsuppgifter utan att få de resurser som behövs för att utföra dem? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 48. | Ställs det oförenliga krav på Dig från två eller flera personer? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 49. | Innebär Ditt arbete arbetsuppgifter som är i konflikt med Dina personliga värderingar? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 50. | Är målen för Ditt arbet utmanande men realistiska? (varken för svåra eller för lätta) | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 51. | Får Du regelbunden information som visar hur Du presterar i relation till Dina mål? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 52. | Om Du har flera samtidiga mål, vet Du då vilka som är viktigast och vilka som är minst viktiga? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 53. | Låter Din chef Dig vara med och att sätta upp Dina mål? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 54. | Får Du information om kvaliteten på det arbete Du utför? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 55. | Kan Du själv direkt avgöra om Du gör ett bra arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | Instäm-mer inte alls | Instäm-mer något | Tvek-sam | Instämmer i stort sett | Instäm-mer helt |
|---|---|---|---|---|---|---|
| 56. | Det finns klara verksamhetsmål i den verksamhet som jag arbetar i | ☐ | ☐ | ☐ | ☐ | ☐ |
| 57. | Min arbetsplats har tillräckliga resurser för att målsättningen skall tungera (t ex tid, pengar, utrustning, medarbetare) | ☐ | ☐ | ☐ | ☐ | ☐ |

## KONTROLL I ARBETET

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 58. | Om det finns olika sätt att göra Ditt arbete på, kan Du då själv välja hur Du skall göra det? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 59. | Kan Du påverka mängden arbete Du får? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 60. | Kan Du själv bestämma Din arbetstakt? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 61. | Kan Du själv bestämma när Du skall ta en paus? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 62. | Kan Du själv bestämma hur länge Du tar paus? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 63. | Kan Du bestämma Din arbetstid? (flextid) | ☐ | ☐ | ☐ | ☐ | ☐ |
| 64. | Kan Du påverka beslut angående vilka personer Du skall arbeta tillsammans med? | ☐ | ☐ | ☐ | ☐ | ☐ |

## KONTROLL I ARBETET

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 65. | Kan Du påverka beslut som är viktiga för Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 66. | Kan Du påverka hur Din arbetstid förläggs? | ☐ | ☐ | ☐ | ☐ | ☐ |

## SKICKLIGHET I ARBETET

| | | | | | | |
|---|---|---|---|---|---|---|
| 67. | Är Du nöjd med kvaliten på det arbete Du gör? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 68. | Är Du nöjd med den mängd arbete Du får gjord? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 69. | Är Du nöjd med Din förmåga att lösa problem i arbetet? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 70. | Är Du nöjd med Din förmåga att upprätthålla ett gott förhållande till Dina arbetskamrater? | ☐ | ☐ | ☐ | ☐ | ☐ |

## SOCIALT SAMSPEL

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 71. | Om Du behöver får Du då stöd & hjälp med Ditt arbete från Dina arbetskamrater? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 72. | Om Du behöver, får Du då stöd och hjälp med Ditt arbete från Din närmaste chef? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 73. | Om Du behöver, är Dina arbetskamrater då villiga att lyssna till problem som rör Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 74. | Om Du behöver, är Din närmaste chef då villig att lyssna på problem som rör Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 75. | Får Du uppskattning för Dina arbetsprestationer från Din närmaste chef? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 76. | Har Du lagt märket till störande konflikter mellan arbetskamrater? | ☐ | ☐ | ☐ | ☐ | ☐ |

## LEDARSKAP

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 77. | Upplever Du ett i stort sett fungerande ledarskap från Din närmaste chef? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 78. | Uppmuntrar Din närmaste chef Dig att delta i viktiga beslut? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 79. | Uppmuntrar Din närmaste chef Dig att säga ifrån när Du har en annan åsikt? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 80. | Hjälper Din närmaste chef Dig att utveckla Dina färdigheter? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 81. | Fördelar Din närmaste chef arbetet på ett på ett opartiskt och rättvist sätt? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 82. | Behandlar Din närmaste chef de anställda på ett rättvist och jämlikt sätt? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 83. | Är förhållandet mellan Dig och Din närmaste chef en orsak till stress? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 84. | Litar Du på ledningens förmåga att klara framtiden för arbetsplats/organisation? | ☐ | ☐ | ☐ | ☐ | ☐ |

## ORGANISATIONSKLIMAT

### Belönas man för ett väl utfört arbete på Din arbetsplats/ arbetsenhet?

| | | Mycket lite eller inte alls | Ganska lite | Något | Ganska Mycket | Väldigt mycket |
|---|---|---|---|---|---|---|
| 85. | Materiella belöningar | ☐ | ☐ | ☐ | ☐ | ☐ |
| 86. | Immateriella belöningar (uppmuntran och annat stöd) | ☐ | ☐ | ☐ | ☐ | ☐ |
| 87. | Tas de anställda väl omhand på Din arbetsplats? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 88. | I vilken utsträckning intresserar sig ledning för personalens hälsa och välbefinnande? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 89. | Tas de anställda på Din arbetsplats egna initiativ? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 90. | Uppmuntras de anställda på Din arbetsplats att göra förbättringar? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 91. | Kommunicerar man tillräckligt med varandra på Din arbetsplats? | ☐ | ☐ | ☐ | ☐ | ☐ |

# SAMBAND MELLAN ARBETSLIV OCH PRIVATLIV

| | | Mycket sällan eller aldrig | Ganska sällan | Ibland | Ganska ofta | Mycket ofta/ alltid |
|---|---|---|---|---|---|---|
| 92. | Påverkar kraven i Ditt arbete Ditt hem- och familjeliv på ett negativt sätt? | ☐ | ☐ | ☐ | ☐ | ☐ |

# ENGAGEMANG I FÖRETAGET/ ARBETSPLATSEN

Följande påståenden handlar om Din inställning till företaget Du arbetar i. Ange i vilken grad Du personligen instämmer i eller tar avstånd ifrån vart och ett av påståendena.

| | | Tar totalt avstånd ifrån | Tar i viss mån av-stånd ifrån | Neutral | Instäm-mer i viss mån | Instäm-mer totalt |
|---|---|---|---|---|---|---|
| 93. | För mina vänner berättar jag att företaget är ett mycket bra ställe att arbeta på | ☐ | ☐ | ☐ | ☐ | ☐ |
| 94. | Mina egna värderingar är mycket lika företagets | ☐ | ☐ | ☐ | ☐ | ☐ |
| 95. | Företaget inspirerar mig verk-ligen att göra ett bra jobb | ☐ | ☐ | ☐ | ☐ | ☐ |

# ARBETSMOTIVATION

| | | Ja, ofta | Ja, ibland | Tveksamt | Nästan aldrig | Aldrig |
|---|---|---|---|---|---|---|
| 96. | Känner Du Dig motiverad för Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | Ja, ofta | Ja, ibland | Tveksamt | Nästan aldrig | Aldrig |
|---|---|---|---|---|---|---|
| 97. | Upplever Du att arbetsuppgif-terna stimulerar Dig i Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |
| 99. | Skulle Du vilja arbeta färre antal h/ve om Din ekonomi tillät det? | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | Fler än 20 dagar | 15-20 dagar | 10.-14 dagar | 5-l 9 dagar | Mindre än 5 dagar |
|---|---|---|---|---|---|---|
| 100. | Hur många dagar i månaden har Du en stark vilja att arbeta? | ☐ | ☐ | ☐ | ☐ | ☐ |

| | | Mycket nöjd | Ganska nöjd | Varken nöjd eller missnöjd | Ganska missnöjd | Mycket missnöjd |
|---|---|---|---|---|---|---|
| 101. | Hur nöjd eller misssnöjd är Du med Ditt arbete? | ☐ | ☐ | ☐ | ☐ | ☐ |

# AVSLUTANDE FRÅGOR KRING DIN ARBETSSITUATION

| 102. | | Stämmer inte alls | Stämmer inte särskilt bra | Stämmer ganska bra | Stämmer precis |
|---|---|---|---|---|---|
| a) | Jag finner ständigt nya och intressanta aspekter i mitt arbeter | ☐ | ☐ | ☐ | ☐ |
| b) | Det finns dagar då jag känner mig trött redan innan jag går till arbetet | ☐ | ☐ | ☐ | ☐ |
| c) | Det händer ofta att jag talar om mitt arbete på ett nedvärderande sätt | ☐ | ☐ | ☐ | ☐ |
| d) | Jag behöver mer tid för avkoppling nu än förr för att återhämta mig från arbetet | ☐ | ☐ | ☐ | ☐ |
| e) | Jag klarar påfrestningarna i mitt arbete bra | ☐ | ☐ | ☐ | ☐ |
| f) | På senare tid har jag utfört arbetet alltmer mekaniskt istället för att använda hjärnan | ☐ | ☐ | ☐ | ☐ |
| g) | Jag ser mitt arbete som en utmaning | ☐ | ☐ | ☐ | ☐ |
| h) | På jobbet känner jag mig ofta känslo-mässigt urlakad | ☐ | ☐ | ☐ | ☐ |
| i) | Med tiden förlorar man ett djupare intresse för det egna arbetet | ☐ | ☐ | ☐ | ☐ |
| j) | Efter jobbet har jag vanligtvis lust och ork för mina fritidsaktiviteter | ☐ | ☐ | ☐ | ☐ |
| k) | Ibland känns mina arbetsuppgifter riktigt motbjudande | ☐ | ☐ | ☐ | ☐ |
| l) | Efter jobbet känner jag mig ofta trött & utsliten | ☐ | ☐ | ☐ | ☐ |
| m) | Jag kan inte tänka mig ett annat yrke | ☐ | ☐ | ☐ | ☐ |
| n) | Normalt hinner jag gott & väl med mina arbetsuppgifter | ☐ | ☐ | ☐ | ☐ |
| o) | Med tiden engagerar jag mig mer och mer i mitt arbete | ☐ | ☐ | ☐ | ☐ |
| p) | I mitt arbete känner jag mig stark och säker | ☐ | ☐ | ☐ | ☐ |

| 103. | | Nästan aldrig | 1-5 ggr/ dag | 6-10 ggr/ dag | Mer än 10 ggr/dag |
|---|---|---|---|---|---|
| | Hur stor del av en vanlig arbetsdag arbetar Du vid dator? (Arbetar Du hela Din arbetsdag vid dator kryssa i rutan med texten: 10 ggr/dag = 100%) | ☐ | ☐ | ☐ | ☐ |

# UPPLEVELSEN AV FYSISKA MILJÖN PÅ KONTORET

Ringa in den siffra som överensstämmer bäst in med din uppfattning.

104. Hur är temperaturkomforten på Ditt kontoret i allmänhet?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Generellt dålig | | | | Generellt bra |

105. Hur kallt är det?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| För kallt | | | | Komfortabelt |

106. Hur varmt är det?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| För varmt | | | | Komfortabelt |

107. Hur är det med temperaturväxlingar?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Alltför ofta förekommande | | | | Generellt komfortabelt |

108. Hur är ventilationskomforten?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Generellt dålig | | | | Generellt bra |

109. Hur är luftkvaliten?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Unken luft | | | | Frisk luft |

110. Hur är luftrörelsen?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Stillastående | | | | Ofta utbytt |

111. Hur är det med buller/ ljudstörningar?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Generellt dålig | | | | Generellt bra |

112. Hur är bakgrundsljudet generellt?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Störande | | | | Inget problem |

113. Hur är det med ljud från röster, kontorsutrustning som skrivare mm?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Störande | | | | Inget problem |

114. Hur är det med ljudnivån på ventilationssystemet?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Störande | | | | Inget problem |

115. Hur är det med ljudnivån på belysningen?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Bullrigt | | | | Inget problem |

116. Hur är ljudnivån utomhus?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Störande | | | | Inget problem |

117. Hur gott om utrymme har Du på Din arbetsplats för arbetsmaterial?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Otillräckligt | | | | Tillräckligt, fullgod |

118. Hur gott om utrymme har Du på Din arbetsplats för personliga saker?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Otillräckligt | | | | Tillräckligt, fullgod |

119. Hur väl är Din arbetsplats avskärmad?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

120. Hur väl är Din arbetsplats avskärmad ljudmässigt för samtal?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

121. Hur väl är Din arbetsplats avskärmad ljudmässigt för telefonsamtal?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

122. Hur är det artificiella ljuset?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

123. Hur starkt är ljuset?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

124. Bländas Du av det artificiella ljuset vid Din arbetsplats?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Mycket bländning | | | | Ingen bländning |

125. Anser Du att Din arbetsplats stödjer Dig i Ditt arbete?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Försvårar arbetet | | | | Underlättar arbetet |

126. Hur skulle Du bedöma Din tillfredsställelse med denna byggnad?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Missnöjd | | | | Mycket nöjd |

127. Hur s bedömer Du tillgången på dagsljus vid Din arbetsplats?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Dåligt | | | | Bra |

128. Bländas Du av dagsljus vid Din arbetsplats?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Mycket bländning | | | | Ingen bländning |

# GRUPPORGANSATION & INRE MILJÖ I SAMSPEL

Ringa in den siffra som överensstämmer bäst in med din uppfattning.

129. Hur upplever Du att sammanhållningen/samarbetet är...

| | | Mycket bra | Ganska bra | Ganska dålig | Mycket dålig |
|---|---|---|---|---|---|
| a) | inom Din egen grupp? | 1 | 2 | 3 | 4 |
| b) | mellan olika arbetsgrupper på arbetsplatsen? | 1 | 2 | 3 | 4 |
| c) | inom företaget som helhet? | 1 | 2 | 3 | 4 |

130. Hur bedömer Du att Ditt eget arbetsrum/lokalen där Du sitter ...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | underlättar kontakter inom gruppen? | 1 | 2 | 3 | 4 |
| b) | ger gruppkänsla/samhörighet? | 1 | 2 | 3 | 4 |

131. Hur bedömer Du att arbetslokalerna i sin helhet i arbetsplatsen underlättar kontakter mellan grupperna?

| Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

132. Upplever Du att det finns revir...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | inom Din egen arbetsgrupp? | 1 | 2 | 3 | 4 |

133. Upplever Du att det finns konkurrens...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | inom Din egen arbetsgrupp? | 1 | 2 | 3 | 4 |
| b) | mellan olika arbetsgrupper? | 1 | 2 | 3 | 4 |

134. Har Du någon möjlighet att dekorera eller på annat sätt göra Din arbetsplats mer personligt?

| | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |

135. Hur bedömer Du att Ditt eget arbetsrum/lokalen där Du sitter...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | ger möjlighet till avskildhet? | 1 | 2 | 3 | 4 |

136. Besväras Du på något sätt av ...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | bristande möjlighet till avskildhet? | 1 | 2 | 3 | 4 |
| b) | att kunna avlyssnas? | 1 | 2 | 3 | 4 |
| c) | att vara iaktagna? | 1 | 2 | 3 | 4 |
| d) | den allmänna ljudnivån? | 1 | 2 | 3 | 4 |

137. Hur bedömer Du att Ditt arbetsrum/lokalen där du sitter har ...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | allmänt bra arbetsmiljö | 1 | 2 | 3 | 4 |

138. Hur bedömer Du att arbetslokalerna i sin helhet på företaget innebär...

| | | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|---|
| a) | trevliga pausutrymmen | 1 | 2 | 3 | 4 |
| b) | bra matutrymmen | 1 | 2 | 3 | 4 |
| c) | allmänt bra arbetsmiljö | 1 | 2 | 3 | 4 |

139. Vad har Du för synpunkt på arbetsplatsernas utformning med avseende på följande…

| | Mycket bra | Ganska bra | Ganska dåligt | Mycket dåligt |
|---|---|---|---|---|
| a) bekvämlighet | 1 | 2 | 3 | 4 |
| b) sittkomfort/stolar | 1 | 2 | 3 | 4 |
| c) arbetsställning | 1 | 2 | 3 | 4 |

140. Hur stor del av arbetsdagen kan Du säga att Du känner verklig tillfredsställelse med Ditt jobb?

| För det mesta | Större delen | C:a halva tiden | Bara stundtals | Nästan aldrig |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

141. Hur bedömer Du Ditt eget arbetsrum/lokalen där Du sitter...

| | Inte alls | I någon mån | Ganska mycket | I hög grad |
|---|---|---|---|---|
| a) bidrar till arbetstillfredsställelse? | 1 | 2 | 3 | 4 |
| b) är trivsamt? | 1 | 2 | 3 | 4 |