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Photo on the front cover: Magnus Rönn.
The photo show artistic design from an introduction course for students in architecture, called A1, at Chalmers University of Technology.

# THE SHAPING FACTORS FORMING CONTEMPORARY AND FUTURE OFFICE DESIGNS

CHRISTINA BODIN DANIELSSON

## Abstract

This article contains an exploratory survey of key determinants of future office workplaces, taking into account the current discourse on the subject, by framing the disparate knowledge on the subject in an office design context. The aim is not to present a full review of this wide field, which covers various disciplines and participants with different backgrounds. Instead, the aim is to present the subject of future workplaces and how it is debated in the various fields and the different perspectives applied to it, in order to make the subject easily accessible to architects and designers. This is achieved by gathering various discourses within the field and presenting these from a design perspective.

This survey applies a triangulation approach, where knowledge is retrieved from three sources: practice, research and case study, from which interview data is utilized. A method that highlights and contrasts different aspects and perspectives on the subject.

In addition to gathering this disparate range of discourse describing the future workplace, the primary result of this survey is the identification of six "shaping factors" that dictate the future office: 1) Generation Y, 2) Diversity of workforce, 3) Digital development, 4) Office, a meeting place, 5) Branding, 6) Flexibility. This article presents the relations between these six points as well as the potential risks and benefits from their combined and individual use. The article also aims to identify potentially important future topics to develop and study in office design, in order to be better prepared to meet the future.

## 1 Our obsession with the future

As trends in office designs respond to an organization's projection of how a future office will work and function, it is important to examine prevailing and dominant concepts and visions about the future office workplace in order to understand these.

As a necessity of meeting the demands of organizations, the office market is constantly occupied with planning for the future and trying to determine factors that will dictate the future office workplace. This phenomenon is reflected in the large amount of conferences dedicated to the theme of "future workplaces" and the "future office." By aiming to understand contemporary and future office design trends more thoroughly, this article sets out to investigate the current discourses in the disparate fields engaged in the subject. The purpose is hereby to identify the "shaping factors" of the future office workplace, i.e., the factors believed to be dictating the agenda for office design. Thus, it does not aim to give a traditional research review on the future workplace.

## 2 Approaches applied to survey

Information and knowledge have been taken from three different sources: practice, research and a case study, in which the subject of future office workplaces is discussed. These three sources are triangulated, with an aim to catch both a variety of aspects of the subject and to highlight different perspectives. The case study had the main role in this survey and in the triangulation process applied in the analysis of this survey, meaning that the information retrieved in the interviews of the case study was compared to information retrieved from the other two sources – practice and research. These sources of information had different roles at the various steps of this survey, in which the actual triangulation of information between the three different sources was done in the final third phase of the analysis.

In the first phase of the survey, interview questions were constructed for the case study. These were based on information retrieved from practice and research. (For information on interviews and selection of sample see section case study below). The second phase of the process consisted of a thematic analysis of the interviews, in which patterns and themes were sought within the data that were associated with the topic "future office workplaces". Identified themes were then clustered into different groups, and these groups were the interview results.

In the third, final phase, practice and research had the roles as sounding boards against which the interview results and the clustered groups were triangulated. In other words, the groups were compared and analyzed in relation to how the future office workplaces are described and debated in practice and research. This enabled a verification of the

interview to see whether the identified groups had any bearing in practice and research about determining the future office workplace. Only when this was the case were the interview results classified and categorized into the different concepts identified as "shaping factors" of the future office workplace. These factors were the findings, i.e., survey results.

Regarding two sources of information – practice and research – I drew on my expertise in the analysis process. This is based in both architectural work within a large practice, where I specialize in office workplace design, and in academia as a researcher with an architectural PhD focusing on Office Design. In this survey, the information from practice comes from my work with clients in various office projects. This includes information retrieved from architectural design work, workshops and seminars, but also from the conferences I attend in my role as a practitioner, and as a researcher. In this survey, knowledge from research was, besides conferences, retrieved from various literature on the topic. In addition to scientific articles, this includes white articles and reports, as most topics about future workplaces emerge out of practice. Some of the latter literature may be considered gray literature, i.e., materials and research produced by organizations outside of the traditional commercial or academic publishing and distribution channels.

In summary, although the three steps in the analysis of the survey gave the case study the main role, this acted together with practice-based knowledge as a background canvas in this article. On this canvas, scientific knowledge was then applied like paint, aiming to provide an overview of the different factors setting the agenda for future office workplace design.

## 2.1 Case study
As part of a study that investigated the concept of a "good" office, there were sixteen in-depth interviews with experts representing different sectors of the Swedish office market (see Bodin Danielsson, 2014). This article about a survey focused on the shaping factors of future office workplace design, using the parts of the interview data from the former study that covered this subject. These interviews are used as one of three sources of information used in the survey within the triangulation process of the analysis in the present survey.

Aiming for different perspectives on the office, the sample consists of respondents selected due to their different expert roles in office projects. They represent different professions and parties in the office market, which combined hold the six following perspectives on offices: 1) facility management (FM), 2) marketing/rent, 3) real-estate & office development, 4) project development & production, 5) property maintenance, and 6) research (at a building contractor). (For socio-demographics data on respondents see Table 1).

Table 1
Sociodemographic data – distribution of background factors within sample

| Respondents – experts of different sorts | Pos.[a] | Prof. role.[b] | Org.[c] | | Educ. backg.[d] | Gender (n) | | Age (n) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | f | m | f | m |
| **FM Managers (consultants, in-house)** | | | | | | | | | |
| K. B. (Deputy regional manager, Coor Service Management) | M | C | IN | | Eco. | f | | 39 | |
| K. S. (Partner GoToWork Perfect Group/ Board member IFMA (Sweden) | MM | C | | N | FM | f | | 45 | |
| 3. A. S. (In-house FM at SonyEricssson, Lund) | Emp. | I-H | IN | | Gen. | f | | 39 | |
| 4. H. H. (Architect/office developer at Ericsson Workplace Design, Group Real Estate) | Emp. | I-H | IN | | Arch. | f | | 58 | |
| **Marketing/rent (Consultants, contractors, property owners)** | | | | | | | | | |
| 5. M.H. (Manager, NAI Svefa Trans. & Rent) | M | C | | N | Eco. | | m | | 55 |
| 6. N. H. (Tenant repr., Tenant & Partner) | Emp. | C | | N | Realt. | f | | 43 | |
| 7. R. H. (Marketing director, NCC Prop. Dev.) | MM | BC | IN | | IT | | m | | 43 |
| 8. M. K. (Mark.director, Vasakronan Real Estate) | M | C | | N | Eco. | f | | 40 | |
| 9. A-M. K. (Mark. & rental director, Skanska Property) | M | BC | IN | | PR | f | | 43 | |
| 10. E. O. (Rental manager, NAI Svefa) | Emp. | C | | N | PV | f | | 42 | |
| **Real estate & Office development (Property owners)** | | | | | | | | | |
| 10. J. H. G. (Office dev., Deligentia Real Estate) | Emp. | BC | | N | Gen. | | m | | 40 |
| 12. E. W. (vice VD, Akademiska Hus) | M | PO | | N | PV | | m | | 58 |
| Project development & Production (Contractors, property owners) | | | | | | | | | |
| 13. H. S. (Project manager, Skanska) | M | BC | IN | | BE | | m | | 38 |
| 14. K. W-A. (Project manager, Vasakronan Real Estate) | M | PC | | N | BE | f | | 42 | |
| **Property maintenance (Property owners)** | | | | | | | | | |
| 15. M. V. (Property manager, Akademiska Hus) | M | PC | IN | | BE | | m | | 49 |
| Research (In-house researcher at contractor) | | | | | | | | | |
| 16. S. T. (Researcher on future workplaces) | Emp. | BC | IN | | BE | f | | 50 | |
| **Total within sample (n)** | | | 8 | 8 | | 10 | 6 | 44* | 47* |

*Notes:* a= position on the job (M=manager, MM=middle manager, Emp.= employee), b= role (C= consultant, I-H= in house, BC= building contractor, PO=property owner), perspective on offices (Eco.= economist, FM= facility manager, Gen.= diff. types of college education, not in the work field of the respondent, Arch.= architect, Realt.= realtor, PV= property valuator, IT=it system engineer, PR=public relations, BE= building engineer, R= research), c= organizational coverage area (N=national or IN= international), d= educational background , *= mean age in gender group

The semi-structured interviews covered the respondent's perspective on office design (i.e., what he/she considered important) as well as different concepts influencing office design and projections about future office design (for details on questions asked see interview guide in Table 2 in appendix). These interviews lasted between 1-1.5 hours and developed in different directions depending on respondents' perspective on offices. In line with the purpose of this survey, data was extracted from the original interviews and only parts of these that in various ways concerned the future office workplace were used. In a similar way to the previous selection process of respondents, the selection of interview questions was made to reflect a variety of different perspectives on future office workplace design. Despite this, however, the analysis of the data revealed an almost-consensus between respondents, concerning aspects of the future office workplace, although the importance the different factors were assigned partially varied between the respondents.

## 2.2 Findings

The results of this exploratory survey, based on the case study combined with the practice-based knowledge and scientific knowledge of office design, are presented here in individual sections, where each shaping factor is identified and described in its context. By framing the widespread knowledge in various disciplines on this subject, this article attempts to provide an overview of the widespread field of future workplaces and working life in relation to the design of offices. The intention is therefore to make this information easily accessible to both architectural practice and research.

Findings of the survey, based on the three sources of information used, are exemplified by citations from the interviews. These citations can be viewed as interview results, which are a part of the survey results and as such embedded in these. The purpose of using the citations in the article is to exemplify the findings, but also to make them more tangible to the reader.

The factors identified as shaping factors of our future offices are discussed in relation to both research and the discourse contained within various professional reports and lectures. The order of their presentation in the article does not reflect their importance for future designs, but instead aims only to give a good overview of the subject. The identified six shaping factors are: 1) Generation Y, 2) Diversity of workforce, 3) Digital development, 4) Office, a meeting place, 5) Branding, and 6) Flexibility.

These six factors are influenced by external global conditions, which are largely outside the control of individual organizations and sovereign territories, and are mainly related to globalization and geopolitics, combined with climate change and environmental issues. If manageable at all, this is at a national or international level through legal tools such as

legislation or agreements between parties. Although outside the scope of this survey, they are sometimes mentioned in writing and then only casually, due to their influence on the identified shaping factors.

Finally, before presenting the results one limitation needs to be mentioned: the influence of the context in which the survey has been carried out. The author works as a practicing architect specializing in office design in Sweden, although some clients are from abroad and the author follows both the national and international debate closely. The case study was also conducted in Sweden, however many of the respondents worked within international organizations. Taking this into consideration, it is important to know that the Swedish office market is similar to those in other Western countries and has become increasingly international over the past few decades.

## 3 Shaping factors of future office workplace design

Office design is about the architectural and technological design of the office and how this can support work through different means. This is becoming increasingly more important, also from a strategic perspective (Bodin Danielsson, Wulff, & Westerlund, 2013). Thus, when investigating the shaping factors of future office design, both the supportive and strategic aspects of office design should be included.
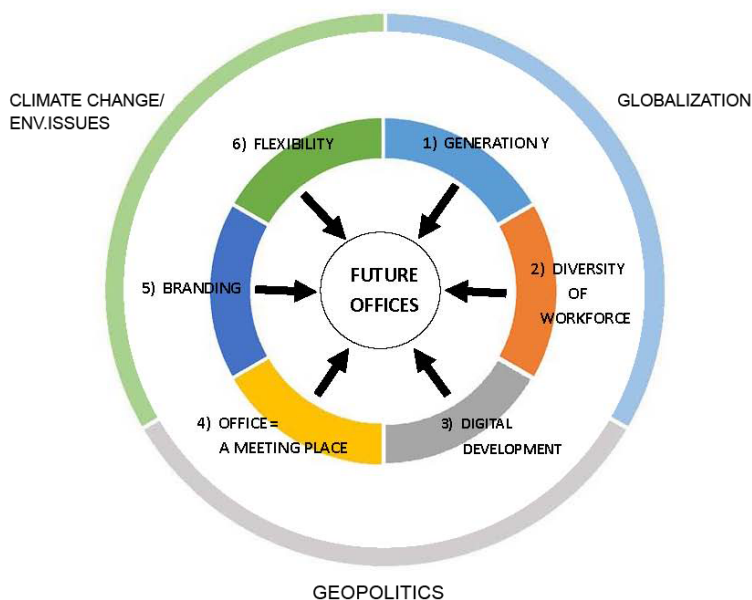


Figure 1
Shaping factors dictating the future office design

### 3.1 Generation Y

Aiming to please and attract the future work force, organizations are occupied with trying to understand the need and values of the future office workers; a subject area within which office design has gained increasingly more interest (e.g., van Meel & Vos, 2001). In this regard, one specific group of the workforce has received increasing focus as it has become progressively more important in our workplaces – Generation Y, sometimes called Millennials. This generation born between 1977 and 1994 (Paul, 2001), who graduated around the turn of the millennium are described as more family oriented and less willing to compromise their private life, in comparison to previous generations (Addici, 2012). Generation Y also tends to be techno-savvy and as a consequence computer games and the internet, which became commonly accessible to the general public around 1995, have in many cases been a "natural" part of their up-bringing (Martin, 2005).

This, combined with common access to cell phones and personal computers, is believed to have shaped their personalities and views on ICT (Information Communication Technology) and also attitude to work and management (Yeaton, 2008). Regarding both social media and relation to management, they therefore expect simplicity and speed as well. This generation also attaches great importance to personal choice. Unlike previous generations, many everyday products and services, such as kindergartens and schools, as well as distributors of electricity and telecommunications have been a matter of choice throughout their lives. As consumers, this generation is quick to choose alternative products and services that suit them (Addici, 2012). However, personal preferences and lifestyle combined with community responsibility often affect their choice of work (Cui, Trent, Sullivan, & Matiru, 2003; Yeaton, 2008). Consequently social justice, shared values and sustainable actions for employees have been recognized as important factors for the future workplace (e.g., ISS, 2013; Regus & J.B. Associates, 2009).

> The social perspective will to a higher extent become important – it's the next step. We will have to take ethical and moral position on certain issues [in our building projects]. For example, use local labor/.../ instead of buying all facility management service from large corporations, we could buy /.../ from local entrepreneurs in the neighborhood.
> K. W-A. (Head of Project department, Vasakronan Real Estate)

Furthermore, having grown up in a globalized world that emphasizes competition and marketing, Generation Y has been influenced to apply a "brand perspective" on their employee role, where the workplace is as an arena of performance (Addici, 2012).

## 3.2 Diversity – a cocktail of age, ethnicity, culture and religion

Despite the great focus on future office workforce with the standpoint of the younger employees, manifested in the great interest for Generation Y, the fact is that our future workplaces hold greater variety in the demographics. It concerns age, which includes both young and older employees, but it also applies to ethnicity and religious/cultural backgrounds.

The need for managing this development of an older workforce is well-recognized in general (e.g., Malmberg, Lindh, & Halvarsson, 2008), and accordingly with regard to the design of the future workplace (e.g., Toivanen, 2011). For demographic reasons it has become increasingly important to make it attractive for older people to stay in a working life, even if they have no economic reasons to carry on working. Additionally, cultural and religious aspects have become important for organizations. There are two major reasons for this: a) labor-shortage in certain sectors, e.g. in the ICT-sector where talents today are searched for in different parts of the world, and b) the global competition. This has resulted in a need to enter new, growing markets where local knowledge is crucial in order to succeed. Collectively, this means that organizations, in order to attract and motivate employees when creating future workplaces, need to consider a wider range of cultural and generational aspects (ISS, 2013). Age – today, we see rapid demographic changes in the age balance of the workforce in the Western world, where 50% of the workforce in EU by 2020 will be over 50 years old (European Commision, 2005). Moreover, there are demographic reasons for hiring older employees, e.g. loyalty and experience, as studies have found this group to be most useful to the employers (e.g., ISS, 2013).

Aging leads to both physiological and cognitive changes in the individual, e.g. a declining ability to respond to stress (e.g. Weinert & Timiras, 2003). It has been recognized by some that architectural design can play a supportive role in this context (Devlin & Arneill, 2003), including indications that therapeutic effects can be produced through design (Cutler, 2007). There is, however, a great lack of research in office environments in relation to aging and if it effects different age groups in various ways. In terms of differences in office workplace preferences between age groups, there are indications of some differences (Rothe, Lindholm, Hyvönen & Nenonen, 2012). For example, Rothe and colleagues found that younger generations valued work environments that support working as a team and socializing much more than older employees. These rather valued the possibility to network with others in the building, i.e., outside the team, more than the younger age groups. However, regarding the actual impact of different environmental factors on older office workers, there is a great lack of research, although the debate about this has gradually begun (Erlich & Bichard, 2008). For example, the concerns about how the experience of office environments could be affected

due to age in terms of noise, privacy and lighting have been addressed (Kupritz, 2001; Myerson, Bichard & Erlich, 2010). With regard to the value put on privacy and the opportunity to do concentrated work, no significant differences between age groups appear to exist (Rothe et al., 2012). Something which may be explained by the fact that privacy is more related to the task at hand than age. Additionally, noise is independent of age, the most commonly reported problem in open plan offices (e.g., Bodin Danielsson, 2008; Sundstrom, Town, Rice, Osborn & Brill, 1994). For example, negative effects of noise have been established in experiments in relation to both speech recognition (e.g., Dubno, Dirks & Morgan, 1984) and cognitive performance (Jahncke, Hygge, Halin, Green & Dimberg, 2011). However, less is known about noise in relation to different age groups, and one of the few studies on the subject did not find any connection between noise and age in relation to performance (Boman, Enmarker & Hygge, 2005).

Aging in relation to ergonomics varies depending on which specific areas are being examined, for instance visual or physical ones. Regarding visual ergonomics, the eye becomes less adaptable to physical conditions with age. Our vision deteriorates, as aging has negative effects on: visual acuity (distinguishing fine details), changing focus (object near vs. far away), sensitivity to contrast and glare, e.g. discomfort from harsh excessive light etc. (Haigh, 1993). Accordingly, good office environments for older employees should reduce eyestrain through antiglare and high resolution monitors as well as large displays (May, Reed, Schowoerer & Potter, 2004). Alternatively, research on workstation ergonomics indicates that older office employees are both less sensitive to ergonomic improvements and less likely to make changes than younger employees (May et al., 2004). The authors discuss the possibility that due to the nature of their disorders, older people are less susceptible to ergonomic improvements (May et al., 2004), or their work habits are less easily changed (Brisson, Montreuil & Punnett, 1999), since older people overall are less open to changes than younger ones (Alwin & Krosnick, 1991). On the other hand, the identified higher job satisfaction among older employees leads to less ergonomically related complaints (e.g., Rhodes, 1983). However, things might change as baby boomers (born 1946-64) characterized as "live to work" (Chao, 2005), become older, and as such may demand a more supportive work environment.

*Our future workplaces will have several generations, we will have different age groups with different needs and health problems. And how shall then the workplace respond to this? /.../ We will perhaps have yoga in the workplace, "stress-free" oasis in the office where you can relax, or do pause exercises to unwind…* S. T. (In-house researcher Future Workplaces, NCC Property Development)

As a whole, today's research gives no clear indications of what a support-ive office design means for older employees, nor how this group "match-es" the demands of modern working life – characterized by sedentary behavior, constant technology use and a necessity to keep updated with new technology. Factors that are possibly more demanding for older em-ployees (Johnson, Mermin & Ressenger, 2007), which relate to stress and physical inactivity with various outcomes of bad health (e.g., Karasek & Theorell, 1990; Novak & Levine, 2007; Steeves, Bassett, Thompson & Fitzhugh, 2012). Recently, an active design perspective has emerged in the field of architecture that encourages physical activity (Nicoll & Zim-ring, 2009; Smith et al., 2013), which is essential in preventing illness in this age group (Nelson et al., 2007). In addition to active design, other de-sign features such as access to restorative spaces for rest, or to recharge energy during the work day, may be equally important in office design for older employees (Erlich & Bichard, 2008).

To conclude, the importance to attract and retain older employees in working life is well-recognized from economic and skill reasons (e.g. Brooke, 2003). Therefore, work environments that do not wear people out, but instead stimulate them and make them want to continue work-ing beyond the age of 65 are crucial. Despite this insight, there is a lack of research on how to design offices workplaces that accomplish this, however.

*Ethnicity/culture/religion* – our workplaces hold today a workforce with greater diversity in terms of ethnical, cultural and religious background than twenty years ago. This greater diversity is a consequence of various factors like globalization and major conflicts in the world today, 2018/19 leading to large-scale migrations. In Europe, it is also a result of the com-mon EU labor market, and accordingly, we also find a greater diversity within markets.

A strategic goal for many organizations has therefore become to develop diverse teams possessing different cultural skills (ISS, 2013, p. 70). How do organizations attract, motivate and communicate to employees of di-verse cultural backgrounds? What does this mean from an office design perspective? There are different viewpoints and strategies correspond-ing to this. One is to adapt a design responsive to local conditions. Anoth-er to develop a strong organizational culture and identity independent of local culture that is easily recognized by all employees independent of their cultural background.

> *We don't want our identity to be different at different locations [in the world]. When staff comes here from China, we want the person to rec-ognize this office and know how things work and so. /.../ When you are at our offices, you shall feel that you are in the same family.* H. H. (Archi-tect & office developer at Ericsson Workplace Design)

Organizations can also meet the need of a heterogeneous workforce by developing more "generous workplaces", i.e. give employees more choices reflecting who they are, who they want to work with and what they want to do, provided organizational goals are achieved. Consequently, some claim the future office will consist of various environments, similar to the activity-based working (ABW) concept (Hoendervanger, De Been, Van Yperen, Mobach & Albers, 2016). Giving employees a sense of both control and freedom, makes this concept a useful management method, according to Philip Ross, CEO at Cordless Group, UK (Kinnarps, 2013). Choice of office design raises the question about personalization, i.e. the phenomenon when individuals or groups express perceived ownership of a given physical/social object at the workplace or elsewhere (Brown, 2009; Brown, Lawrence & Robinson, 2005). To what degree personalization is allowed at an employee level is an organizational issue.

Cross-cultural collaboration, posing different challenges and opportunities due to diverse cultural backgrounds, can be a major driving force behind value creation (Steelcase, 2012, p. 28). Architecture can influence the social interaction at the workplace, becoming a medium for social value (Lewin, 1951). As such architecture communicates a message to the individual or group that occupies it (Garling, 1998). Due to this force of architecture the office architecture's symbolic value is well-recognized in organizational theory (e.g., T. Davis, 1984). While these dimensions of office architecture are established, the relation to cultural diversity is not. For example, how office architecture promotes creativity and collaboration within different working groups with embedded implicit and clear cultural codes. The sparse research in this area may be due to the complexity of studying social interaction, culture and office design in relation to each other (Backhouse & Drew, 1992). One of the few existing office studies on workplace conflicts in workspaces shared by employees of different cultural backgrounds found indications of increased risks, which the researchers hypothesize could be due to different norms and views on physical and psychological space (Ayoko & Härtel, 2003).

Although diversity is not a recognized dimension in office architecture, other cultural dimensions are, for example, differences in workplace practice between countries in terms of emphasis on workplace design and the role and impact of employees on this. As result of that, factors affecting this differ, like trade union's power, labor legislation and collective agreements, e.g. between the Anglo-American countries and the Nordic countries (Bakke, Bjerrum, Koskinen, Gunnarsdóttir & Steen, 2007; van Meel, 2000).

Religion is yet another area of change that is considered to potentially influence our future workspaces. As a consequence of that we today, after the 20th century's period of secularization in the West, see a new visibility of religion and spirituality in this part of the world (Hoelzl & Ward,

2008). This often takes new expressions in society such as meditation and contemplation. From a work-life perspective, the implications of this are unclear in relation to office design and workplace behavior, as the role of religion in this context is not well researched (Burke, 2010). In modern, secular Western society, religion has remained within the private sphere, i.e., internal sphere (Hanegraaff, 1999). With the increased visibility of religion and spirituality also in our society, and a more diverse workforce, spiritual elements might, however, begin to become "natural" in future offices (Bodin Danielsson, 2014, p. 89).

To conclude, this new interest in diversity from a future workplace perspective is based in organizations' increased need and desire to integrate global operations, which take various expressions in relation to office design. One such case is the furniture manufacturer Steelcase whose project Culture Code explored the manifestation of cultural differences in the office. The project has, among other things, resulted in a set of filters that can be applied to decode spatial manifestations of culture in workplaces (Steelcase, 2012, p. 29).

### 3.3 Being in the middle of a digital revolution

The rapid digital and ICT (Information Communication Technology) development leads us to see major changes today, where previously disjointed fields such as artificial intelligence and machine learning, robotics, nanotechnology, 3D printing etc. are all building on and amplifying one another (WEF, 2016). As a result of this development, many sectors and occupations will undergo a fundamental transformation. Accordingly, many business leaders consider this new technology to be one of the major factors for the future workplace (Regus & J.B. Associates, 2009), where changing and flexible work is regarded as the most significant driver of change in advanced economies (WEF, 2016). New technologies' influence on office work is hard to grasp and overview. Already today, they are enabling workplace innovations such as remote working, telecommuting, co-working spaces and teleconferencing (Ibid.), altogether signs that over the last few decades, society as well as organizations are in the middle of a digital revolution (Brynjolfsson & McAfee, 2011; TDC/Kairos Future, 2012). Concurrently with this revolution, physical and organizational boundaries are becoming increasingly blurred and connected to various external parties. This collaborative work will partly be more remote, with freelancers and independent professionals through digital platforms, as organizations are becoming significantly more agile about managing people's work (WEF, 2016).

Among other things, developments in ICT enable a more flexible work culture, which is the reason the phenomenon called "modern ways of working" and activity based offices such as flex-office (also called innovative office etc.) are currently the most popular office trend. (For definition of flex-office see e.g., Bodin Danielsson, 2015.) This office trend

enables employees moving between different work environments both within and outside the office. Additionally, unreliable technology and poor connectivity are less problematic today, which facilitates a more flexible way of working overall (Ramidus, 2015). Resulting in the realization that a traditional workstation is not always the most productive workspace; "face time" in the office has thus become less important in many organizations (Bodin Danielsson, 2014).

Virtual teams have become commonplace in many organizations, i.e. where members communicate digitally with each other through e-mail, in video – or telephone conferences, etc. Consequently, the future office is sometimes described as a virtual office, designed for work patterns that assume both virtual and face-to-face interaction (HermanMiller, 2012). However, virtual workplaces present certain challenges altering familiar patterns, content and context of organizational communication (e.g., Kayworth & Leidner, 2000). It is not evident how office design, which aims to support office work, can ensure the quality of virtual meetings (e.g., Kayworth & Leidner, 2000).

*The technology needs to be more accessible – user friendly at the offices. Today, young people often have better technology at home than at work, so the argument that work is more efficient in the office does not apply for this group of employees. Workplaces should either be more permissive, i.e. work with various technology zones or provide employees with better technology! Use critical zones of high IT-safety in the office, instead of making a "Fort Knox" of the entire office like many companies do today.* K. S. (FM consultant, Board member of IFMA Sweden)

When discussing ICT's influences on future workplaces, a generational perspective is useful since the younger generations often possess high ICT skills and a different view on technology, resulting in other organizational challenges. It is not unusual that this group would ask for tailor-made communication solutions or prefer using their own technology devices at work, often the latest technology – a phenomenon called BYOD (Bring Your Own Device). This has also raised the problem of a disregard for IT security and as such is believed to be an influence on future offices (Addici, 2012). Solutions to these challenges are not obvious where organizations need to balance security policies with user friendliness and the productivity needs of employees, since employee satisfaction is important for both recruiting and retaining staff (Addici, 2012). A common IT standard might not be the best solution, an alternative discussed by one respondent is to set up different IT security zones that employees can move between depending on the security needs associated with the task at hand.

To summarize, rapid technological developments present opportunities as well as challenges for future office work: either it is about flexibility and productivity or about security issues. The implications of these issues are not widely debated and are also hard to foresee in relation to the future office.

## 3.4 The office as a "plaza" – a place for meetings and collaboration

With increased global competition, collaboration and team-work have been identified as major factors in future working life by business leaders (Regus & J.B. Associates, 2009). The reason for this is that collaboration is identified as crucial for innovation and creativity within organizations. A consequence of the insight is that new perspectives and ideas often present themselves when working with others, which in turn may evolve into new innovations and business opportunities. Hence, some claim that the future office primarily is about meetings and interaction. Meetings that beside organizational members and hired freelancers/ independent professionals, also involve external collaborative parties, as organizations collaborate to a higher degree across borders. In many regards as a consequence, these organizations are becoming agile in terms of their own workforce, as formerly described, and agile work process – all in order to be more flexible in a competitive and dynamic global market. For example, Scrum team and knowledge sharing, part of these agile and collaborative work processes, are more in focus today; processes traditionally found in IT and software development businesses (e.g., Holvitie et al., 2018), are now entering other knowledge work industries like e.g. medical and aerospace engineering. In agile team work, face-to-face meetings are emphasized, since extensive personal exchange of knowledge, according to Scrum team members, is a key requirement for effective team work processes (Rashid, Kampschroer, Wineman & Zimring, 2006). Furthermore, informal meetings, besides facilitating the transferring of knowledge between Scrum team members, also support their team spirit (Campbell & Campbell, 1988). A number of social and physical features of work environment helps the agile (Scrum) team to operate efficiently (Rola, Kuchta & Kopczyk, 2016). In line with this, some researchers advocate the use of office architecture to facilitate informal information exchange (Karlsen, Hagman & Pedersen, 2011). These often focus on creating open spaces for the actual project work, with supplementary work areas for training, conferences and social interaction (Santos, Goldman & de Souza, 2015). Areas like these are also found in office concepts developed to enhance efficient team process, e.g., in the team-based lean office concept (Bodin Danielsson, 2013).

In fact, there is a specific field engaged with office architecture's role for collaboration and innovation (e.g., Becker, 2004; Hua, Loftness, Heerwagen & Powell, 2011). When discussing future office design in relation to collaboration, it should be noted that it involves both individual and

interactive behavior. The societal bias towards extroverts risks focusing on meetings and interaction at the expense of individual work, which is central for innovation (Heerwagen, Kampschroerb, Powell & Loftness, 2004).

*The company will increasingly see themselves as a part of the office and vice versa. The office has become a marketplace – like a representative part of it – from a brand and marketing perspective. / ... / Being visual is important. The office being a market place is a part of this... to show who you are, what you stand for through your office building so to say.* R. H. (Marketing director, NCC Property Development)

This challenges the physical office, where employees work under the control and influence of the organization. The vision of the future office as a marketplace views this like a "home port" where employees gather when needed – to get energized, feel community with colleagues and search for information. The office, as being primarily a meeting place, is not a concept of relevance for all organizations, although it has influenced the general idea of a "modern" office. The fact is, however, that many employees, often if not daily, need to visit a specific office for various reasons – e.g. a need of proximity to certain colleagues, or space-consuming and/ or expensive equipment, only available in that location.

The focus is on collaboration, summarized like this in a report on future working life for the City of London: "The workplace must enable and encourage the sharing of experiences, knowledge and corporate culture" (Ramidus, 2015, p. 26). It may result in more project-oriented organizations, including project-based systems and type of employments (ISS, 2013, p. 64). What this means for future office design is not completely clear. We do, however, know that openness between both individuals and teams has proved positive in project oriented organizations, with individuals and groups organized around the workflows and institution or department grouping (Davis, Leach & Clegg, 2011). Consequently, work processes and organization should go hand in hand with the office design promoting shared task-relevant information, feedback and friendship opportunities (Oldham & Brass, 1979). The identification that there are different types of meetings is valuable here in order to meet the organization's needs. For example, periodical project work, in which team members share workspace, can be like one long intensive meeting session.

Research has shown that the location of the office, type of furniture and seating arrangements not only influence active participation, but also quality and frequency of meetings (e.g., Conrath, 1973; Koneya, 1976). This is also well known in practice, and the reason for organizations like Google who depend on innovations, to work actively with different types of interior and exterior meeting places at their headquarter Googleplex in Mountain View, California (Gallagher, 2010).

To summarize, the interest in the future office design of the office as a meeting place is based on its role for interaction and exchange of knowledge between people at work, which facilitate collaboration. An idea that, if not handled well, risks leading to that the equally important individual dimensions of collaboration – central for innovation – are neglected in office design. Thus, future office design needs to handle the balance act between the individual and interactive behavior of collaboration in its workplace design.

### 3.5 Branding by office design

Branding is the use of a unique design, sign, symbol, words, or a combination of these, employed in creating an image that identifies a product or service, while distinguishing it from those of competing organizations. If well-managed, branding consists of tangible and intangible attributes that can create value (Swystun, 2006). Being unique and standing out are crucial features for organizations operating globally. Consequently, branding uses different strategies to cultivate the organization's own distinctive character, such as emotional branding or architectural branding. Emotional branding as a part of the consumer-centric marketing, builds on the idea that emotions are central in our understanding and evaluation of the world. It uses a relational and story-driven strategy to forge strong bonds between consumers and brands that are emotionally and not rationally driven (Gobe, 2001; Roberts, 2004). An example of this strategy is the use of storytelling in marketing.

> *The market is very harsh today – businesses disappear, and new businesses come all the time. When you think about it, how many companies have been around for ten years? It's all about the brand. If it is something that businesses can use to make impressions with – on customers, employees and partners – it is through their architecture. To connect their own brand with the physical workplace will therefore become very important in the future.* J. H-G (Office concept developer, Diligentia Real Estate)

Architectural branding is a materialization of brand values through architecture. An example of this through office design is the so-called "Disneyfication", softening work environment designed to attract and retain employees in a short-labor economy that started in the IT-sector around the millennium (van Meel & Vos, 2001). Besides the office building and its interior, architectural branding includes several other factors today. For example, factors like location, identity of other tenants, and the local neighborhood, but also access to different activities within the building or in its immediate vicinity (Bodin Danielsson, 2014). The latter relates strongly to place branding which utilizes features of a place in its marketing, often describing specific cities or regions (Askegaard & Kjeldgaard, 2007). The increased importance that some tenants attach to the location of the office can sometimes take surprising expressions. For

instance, a location next to a highway can be attractive, since it, like a storefront, enables advertisement of the organization's brand towards passers-by on a 24/7 basis. This all relates to the description of the office as a "marketplace," where the organization shows its "best sides" to various parties – customers, competitors and prospective employees.

Branding through office design focuses on two factors – external and internal branding, so-called employee branding (Bodin Danielsson et al., 2013). The former is directed towards the market with its parties, e.g. clients, competitors and potential employees. While the latter factor is internal and uses the office environment to increase the employees' loyalty and pride, and as such is associated with both job satisfaction and employee turnover. Organizations also use internal office branding to reinforce change in corporate programs, to make their values and purpose explicit (Bodin Danielsson et al., 2013; Haynes, 2012; Khanna, van der Voordt & Kopels, 2013). The interest in internal branding has increased with an organizational awareness that the most valuable mediators are employees who speak well of their own organization, which is more efficient than any costly advertising. This also relates to social media where employees today can share their opinions about their workplace with a public audience in ways, which were previously not possible.

> It is a lot of talk about branding, it is considered important because people have heard others talk about it. Unfortunately, only few do it with satisfactory results though, i.e. are mature in competence in order to succeed with architectural branding that fits the organization's operation. A-M. K. (Marketing & rental director, Skanska Property)

The increased interest in branding has resulted in it being an integral part of the construction and building industry today. People with PR and marketing backgrounds work within these organizations at different levels and the competence is thus now so to say "in-house". The aim is to get the "right" customers either as buyers or tenants for their office buildings. Respondents in the case study claim that despite increased awareness of branding through office design in many organizations, there is often a lack of know-how or an understanding that branding must be built with a long-term perspective in mind. Regardless of this, there is no doubt that branding will become increasingly important for our future workplaces (e.g., Addici, 2012; Kinnarps, 2013; Steelcase, 2012). In order to succeed, branding through office design must, however, be true to the nature of an organization or even be part of its DNA (Steelcase, 2010).

### 3.6 Flexibility – an influencing factor yesterday, today and tomorrow

Flexibility is consistently an important component in office development due to the shifting nature and needs of organizations renting office space. The challenge is that today flexibility in office development

is associated with issues such as globalization and geopolitics, climate change and environmental sustainability, combined with rapid technological development etc. In many organizations, this results in a demand for agility, expressed as a need for flexibility at several levels. This in turn leads to increased work load and stress due to a management focus on efficiency and productivity (Toivanen, 2011, p. 165). Among business leaders, the importance of flexibility has been identified as a major challenge, where businesses have to capture and manage this issue in order to accommodate future working life (Regus & J.B. Associates, 2009). This flexibility focus has resulted in the development of the concept "Adhocracy distributed office" (ISS, 2013), i.e. an office that meets the needs of an ad hoc organization that is dynamic, entrepreneurial and creative, focusing on opportunities to develop new products aiming to become "asset-light, mobile, and flexible" (ISS, 2013, p. 14), in order to anticipate future developments.

The uncertainty that many organizations operate in, has resulted in various flexible work arrangements, including increased flexibility among tenants. This in turn has led to a demand for flexible office space that may choose different design solutions. For example, interior walls that are no longer being regarded as building parts, but as furniture or elements of décor, easily moved or taken away. Another design strategy is the "scalable" office, which manages internal mobility and regrouping in different ways without requiring much effort. This strategy is already adopted by some organizations since flexible, movable walls due to poor production or installation quality do not always fulfill sound proofing requirements.

> Everything is flexible today – people are flexible, e.g. on leave for various reasons, projects are flexible therefore organizations reorganize all the time with new employments and teams etc. Office must be able to handle internal change and mobility – be "scalable" in other words. This concerns all things at the office – administration, regrouping etc.
> K. B. (Deputy regional manager, Coor Service Management)

Another method to gain more flexibility is to make it easier to move individual employees and teams from one workspace to another within the office – something achieved by guaranteeing both a consistent quality of workspace and equal access to different work environments throughout the office. The increased interest in activity-based office types like flex-office is also a result of this organizational need of being flexible and adaptable, hence it's not only a result of ICT development as discussed previously. As such, there are different methods available for organizations to achieve flexible office space.

A flexible working life is associated with risks to employees' health and well-being, e.g., stress-related ill-health (e.g., Schieman, Milkie & Glavin,

2009; Toivanen, 2015). In an office context, other risk factors such as bad ergonomics and improper postures due to lack of access to easily adjustable ergonomic workstations also have to be recognized (ISS, 2013). Without this, a high-quality working life, combined with productivity in flexible workplaces of the future is threatened. Additionally, the flexible office spaces may also contradict the importance that employees attach to "personal" office environments that suit the individual personality and work-related needs as formerly described, because it can be harder to personalize, i.e. construct ownership of a given physical/social object. Personalizing the workstation through different means is both an expression of employees personal and professional identity (Rafaeli & Pratt, 2001), and as such is considered as an individual coping strategy that contributes to the sense of "control of a place."

In line with the increased interest in personal office environments as well as architectural branding, there might be a rise in demand for customized office designs resulting in decreased interest in the "one size fits all" general office solution. Instead, an office design that meets the specific requirements of an organization, which operates at both an individual and organizational level, will be required. This may result in an office design with a clear identity in relation to both work environment and brand. However, there is an inherent conflict in this condition because both organizations and real estate owners demand generalized and flexible office buildings for economic reasons. Consequently, for real estate developers and organizations designing a workplace for the future, a flexibility perspective is by some described as a struggle "to balance the needs for organizational flexibility, while, at the same time, developing new means for enabling, enhancing and measuring workers' productivity" (ISS, 2013, p. 37).

## 4 Discussion and conclusions

This article set out to investigate which factors are believed to dictate future office design according to the current broad workplace debate on future working life in practice, as well as research. It does by no means offer a full review of the field of future working life nor was this its purpose. Instead, it has aimed to contribute to the field of architecture by framing current discourse from the perspective of office design, seeking to make the subject more easily accessible to both research and practice-oriented architects and designers. The result of this survey is a prediction based on the three sources of information used and should be understood as such. Before discussing the individual shaping factors identified and how these relate to one another, it is important to recognize that the concept of the future office involves many different issues. In addition, we should also remind ourselves that the concept of future offices, according to Davis, Leach & Clegg (2011, p. 204) reflects and accommodates the changing economic circumstances of a business. This is reflected in the six shaping factors identified as setting the

agenda of the future offices in this survey: 1) Generation Y, 2) the Diversity of the workforce, 3) The rapid digital development, 4) Office, a meeting place, 5) Branding, and 6) Flexibility.

The identified shaping factors interrelate with each other in the sense that they will all simultaneously have an impact on the future workplace and people's work situation, and because of this, they will affect each other. Some of them are directly related to each other, while others are only indirectly related. Both the first factor "Generation Y" and second factor "Diversity", concern the future workforce and how the future office design can support this, enabling all organizational members to work efficiently. When the needs of the young "techno-savvy" generation stand in direct opposition to the various needs and priorities of other groups of employees, e.g. older employees, this can be handled through an inclusive design view on the matter. This means offering an office environment that supports both these groups' needs, without having one group's needs dominate and rule over another group's need. Regarding the greater diversity of the future office workforce in terms of cultural and religious background, the individual organization itself must take a stand on the issue, in the end, and consider whether it wants this to be expressed in the office design, or only in the organizational culture. The power as well as the decision lie with the organization regarding how it can reach its best potential with the assistance of all its employees.

The third shaping factor, "The rapid digital development", about the impact of new technology, offers great opportunities as well as challenges. In terms of the latter, it is recognized that rapid digitalization of society causes problems for more vulnerable groups of society like older people or cognitively disabled people. Only with a clear, user-friendly approach in the development of digital solutions can an inclusive office design be achieved in the future. How far an organization needs to go in order to please or attract certain employee groups depends on the aim and focus on the individual organization. The fourth shaping factor "The office, a meeting place" aims to support collaboration and innovation, holds an inherent risk, due to the dual dimensions of collaboration – the individual and interactive behavior – that needs to be supported. Besides the internal risk imbedded in this shaping factor, it is associated with the composition of the workforce and needs of various employee groups as well as with the shaping factor of the new technology. Although the shaping factor of the office as a meeting place, and that this emphasizes the need for physical interaction and face-to-face meeting for exchange of knowledge among team members, the fact is that many meetings are virtual today – for practical as well as environmental reasons. It has become increasingly clear that the two types of meetings complement each other, and in many cases, they cannot replace each other due to the different needs they fulfill. The fifth factor – "Branding by office design" – deals with the organizational culture and PR, and as such it should relate

to all former factors, as good branding is true to the DNA of the organization. This is something that will become more important for the future office workplace, as employees have become more experienced with branding and hereby more critical. If badly handled, branding by office design can have negative effects for organizations. The sixth, final shaping factor, "Flexibility", is not new – it is a need that will however become increasingly important in future office design, due to the conditions of the market that many organizations operate in. Although it is a demand that needs to be fulfilled, it should nonetheless be done with caution since it can create opposition to many of the other shaping factors. For example, the branding by office design aiming to profile the organization also must consider the needs of the members of the organization, where the needs should be recognized and met as much as possible to support them in doing a good job. An office design that is very flexible in relation to organizational changes can have difficulties in recognizing and meeting the needs of members that make up and constitute the "know how" of the organization.

When dealing with the subject of the future office workplace, one needs to bear in mind that this is a discourse in which architects or researchers rarely participate, and to an even lesser extent employees, i.e. those expected to populate our future workplaces (Toivanen, 2011). Instead, this is dominated by future strategists, economists, facility management and organizational consultants, furniture suppliers and thinkers of various backgrounds and agendas. Gathering knowledge of the wide spectrum of the discourse, the survey reviews the subject from an office design perspective, with information retrieved from three sources – practice, research and a case study. Besides reflecting the vision of the future office in the discourse, the survey emphasizes that the shaping factors are also a response to the context in which organizations operate today, which includes circumstances such as globalization and geopolitics, combined with climate change and environmental issues. Due to the width of the debate and the field that covers the subject, the identified shaping factors of the future office workplace are presented in a framework with a clear office design perspective that describes potential future scenarios as well as future areas of research to investigate.

To conclude, the success of creating offices able to meet the future demands summarized in the six shaping factors, is now in the hands of various actors within the office sector. In the creation of this, architects could play a more central role than they do today in workplace design. The architect could have the role as a unifying force in creating the future office workplaces, as it is in the actual design of the office that the six identified shaping factors become concrete and take a physical form. A work that holds seemingly contradicting goals and needs – i.e. to create flexible offices, which are easily adaptable for organizational changes and needs, but simultaneously personal and designed for specific needs.

All these issues must be considered, which is not an easy task, although the office market is prone to be adaptable to change. A final conclusion of the present survey is that to succeed with this, and simultaneously guarantee a high-quality working life and productivity, a closer collaboration between practice and research is necessary.

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# References

Addici. (2012). Lecture 2012–04–25: Presentation of 4 trend reports by Martin Weibull, Young Advisory Group. In Addici (Ed.), *4 trend reports for Addici by Young Advisory Group*. Stockholm: Addici.

Alwin, D. F., and Krosnick, J. A. (1991). Aging, cohorts, and the stability of sociopolitical orientations over the life span. *American Journal of Sociology*, *97*(1), 169–195.

Askegaard, S., and Kjeldgaard, D. (2007). Here, there, and everywhere: Place branding and gastronomical globalization in a macromarketing perspective. *Journal of Macromarketing*, *27*(2), 138–147.

Ayoko, O. L., and Härtel, C. E. J. (2003). The role of space as both a conflict trigger and a conflict control mechanism in culturally heterogeneous workgroups. *Applied Psychology*, *52*(3), 383–412.

Backhouse, A., and Drew, P. (1992). The design implications of social interaction in a workplace setting. *Environment and Planning B: Planning and Design*, *19*(5), 573–584.

Bakke, J. W., Bjerrum, E., Koskinen, T., Gunnarsdóttir, S., and Steen, J. (Eds.). (2007). *A Nordic guide to workplace design*. Oslo: Telenor Research and Innovation. Retrieved from https://alexandra.dk/sites/default/files/downloads/NWoW/02132_dekar_a_nordic_guide_to_workplace_design.pdf.

Becker, F. (2004). Office at work: uncommon workspace strategies that add value and improve performance. San Francisco, CA: John Wiley & Sons.

Bodin Danielsson, C. (2008). *Differences in perception of noise and privacy in different office types*. Article presented at the 20th International Congress of Acoustics '08, Paris, France 29 June–4 July.

Bodin Danielsson, C. (2013). An explorative review of the Lean office concept. *Journal of Corporate Real Estate*, *15*(3/4), 167–180. doi: 10.1108/JCRE-02-2013-0007

Bodin Danielsson, C. (2014). *Vad är ett bra kontor? (Eng. What is a good office?)*. Stockholm: Svensk Byggtjänst.

Bodin Danielsson, C. (2015). Aesthetics versus function in office architecture: Employees' perception of the workplace. *Nordic Journal of Architectural Research, 27*(2), 11–40.

Bodin Danielsson, C., Wulff, C., and Westerlund, H. (2013). Is perception of leadership influenced by office environment? *Journal of Corporate Real Estate*, *15*(3/4), 194–212. doi: 10.1108/JCRE-03-2013-0008

Boman, E., Enmarker, I., and Hygge, S. (2005). Strength of noise effects on memory as a function of noise source and age. *Noise & Health*, *7*(27), 11–26.

Brisson, C., Montreuil, S., and Punnett, L., 1999. Effects of an ergonomics training program on workers with video display units. *Scandinavian Journal of Work, Environment and Health*, *25*(3), 255–263.

Brooke, L. (2003). Human resource costs and benefits of maintaining a mature-age workforce. *International Journal of Manpower*, *24*(3), 260–283.

Brown, G. (2009). Claiming a corner at work: Measuring employee territoriality in their workspaces. *Journal of Enviromental Psychology*, *29*(1), 44–52.

Brown, G., Lawrence, T., and Robinson, S. L. (2005). Territoriality in organizations. *Academy of Management Review*, *30*(3), 57–594.

Brynjolfsson, E., and McAfee, A. (2011). Race against the machine: how the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy. Lexington, MA: Digital Frontier Press.

Burke, R. J. (2010). Workplace stress and well-being across cultures: research and practice. *Cross Cultural Management: An International Journal*, *17*(1), 5–9.

Campbell, J. P., and Campbell, R. J. (1988). Productivity in organizations: New perspectives from industrial and organizational psychology. San Francisco, CA: Jossey-Bass.

Conrath, C. W. (1973). Communication patterns, organizational structure, and man: Some relationships. *Human Factors*, *15*(5), 459–470. doi: 10.1177/001872087301500503

Cui, Y., Trent, E. S., Sullivan, P. M., and Matiru, G. (2003). Cause-related marketing: how generation Y responds. *International Journal of Retail & Distribution Managment*, *31*(6), 310–320.

Cutler, J. L. (2007). Physical environments of assisted living: research needs and challenges. *The Gerontologist*, *47*(3), 68–82.

Davis, M. C., Leach, D. J., and Clegg, C. W. (2011). The physical environment of the office: Contemporary and emerging issues. In G. P. Hodgkinson and J. K. Ford (Eds.), *International Review of Industrial and Organizational Psychology* (vol. 26, p. 193–235). Chichester, UK: Wiley.

Davis, T. (1984). The influence of physical enviornment in offices. *Academy of Management Review*, *9*(2), 271–283.

Devlin, A. S., and Arneill, A. B. (2003). Health care environments and patient outcomes. A review of literature. *Environment & Behavior*, *35*(5), 665–694.

Dubno, J. R., Dirks, D. D., and Morgan, D. E. (1984). Effects of age and mild hearing loss on speech recognition in noise. *J. Acoustical Society of America*, *76*(1), 87–96.

Erlich, A., and Bichard, J.-A. (2008). The welcoming workplace: Designing for ageing knowledge workers. *Journal of Corporate Real Estate*, *10*(4), 273–285. doi: 10.1108/14630010810925136

European Commision. (2005). Green article – Confronting demographic change: A new solidarity between generations, employment & social affairs. Retrieved 12 May, 2012 from http://ec.europa.eu/employment_social/social_situation/green_article_en.html

Gallagher, I. (2010). Googlekontor utmanar privat och offentlig sfär (Eng. Google office challenges the private and public work sphere). *Byggindustrin*, *36*(Nov.). Retrieved 9 December, 2010 from http://www.byggindustrin.com/googleplex-utmanar-privat-och-offentlig-__8336

Garling, T. (1998). Introduction – Conceptualizations of human environments. *Journal of Enviromental Psychology*, *18*, 69–73.

Gobe, M. (2001). Emotional branding: the new paradigm for connecting brands to people. New York, NY: Allworth Press.

Haigh, R. (1993). The aging process: A challenge for design. *Applied Ergonomics*, *24*(1), 9–14.

Hanegraaff, W. (1999). New age spiritualities as secualar religion: A historian's perspective. *Social Compass*, *46*(2), 145–160.

Haynes, B. P. (2012). Corporate real estate asset management: Aligned vision. *Journal of Corporate Real Estate*, *14*(4), 244–254.

Heerwagen, J. H., Kampschroerb, K., Powell, K. M., and Loftness, V. (2004). Collaborative knowledge work environments. *Building Research and Information*, *32*(6), 510–528.

HermanMiller. (2012). *New technologies, new behaviors*. Retrieved 10 September, 2016 from http://www.hermanmiller.com/content/dam/hermanmiller/documents/research_topics/New_Technologies_New_Behaviors.pdf.

Hoelzl, M., and Ward, G. (2008). Introduction. In G. Ward, and M. Hoelzl (Eds.), *The new visibility of religion. Studies in religion and cultural hermeneutics* (p. 1-11). London: Continuum International Publishing Group.

Hoendervanger, J. G., De Been, I., Van Yperen, N. W., Mobach, M. P., and Albers, C. J. (2016). Flexibility in use. Switching behavior and satisfaction in activity-based work environments. *Journal of Corporate Real Estate*, *18*(1), 48–62. doi: 10.1108./JCRE-10-2015-0033

Holvitie, J., Licorish, S. A., Spínola, R. O., Hyrynsalmi, S., Macdonell, S. G., Mendes, T. S. and Leppänen, V. (2018). Technical debt and agile software development practices and processes: An industry practitioner survey. *Information and Software Technology*, *96*, 141–160.

Hua, Y., Loftness, J. H., Heerwagen, J., and Powell, K. M. (2011). Relationship between workplace spatial settings and occupant-perceived support for collaboration. *Environment & Behavior*, *43*(6), 807–826.

ISS. (2013). *ISS 2020 vision. New ways of working – the workplace of the future*. Soborg, Denmark: Copenhagen Institute for Future Studies. Retrieved 22 September, 2016 from http://www.publications.issworld.com/ISS/External/issworld/White_articles/2020_New_Ways_of_Working/#/.

Jahncke, H., Hygge, S., Halin, N., Green, A. M., and Dimberg, K. (2011). Open-plan office noise: Cognitive performance and restoration. *Journal of Enviromental Psychology*, *31*(4), 373–382. doi: 10.1016/j.jenvp.2011.07.002

Johnson, W., Mermin, G., and Ressenger, M. (2007). *Employment at older ages and the changing nature of work*. Washington DC: A AARP Public Policy Institute.

Karasek, R., and Theorell, T. (1990). Healthy work: Stress, productivity, and the reconstruction of working life. New York: Basic Books.

Karlsen, J., Hagman, L., and Pedersen, T. (2011). Intra-project transfer of knowledge in information systems development firms. *Journal of System Information Technology*, *13* (1), 66–80.

Kayworth, T., and Leidner, D. (2000). The global manager: a prescription for success. *European Management Journal*, *18*(2), 183–194.

Khanna, C., van der Voordt, T. J. M., and Kopels, P. W. (2013). Corporate real estate mirror brand: a conceptual framework and practical application. *Journal of Corporate Real Estate*, *15*(3/4), 213–230.

Kinnarps. (2013). Lecture at Ability Conference 2013 "Future Office and Working"(2013-10-09). Kinnarp Trend Report 2013 presented by E. Slunge and P. Lundström. In Kinnarp (Ed.), *Kinnarp's Trend Report 2013*. Stockholm: Kinnarps AB. Retrieved 20 October, 2013 from https://download.architonic.com/pdf/310/3598/kinnarps-trendrapport.pdf.

Koneya, M. (1976). Location and interaction in row-and-column seating arrangements. *Environment & Behavior*, *8*(2), 265–282.

Kupritz, V. W. (2001). Aging worker perceptions about design and privacy needs for work. *Journal of Architectural and Planning Research*, *18*(1), 13–22.

Lewin, K. (1951). *Field theory in social sciences*. New York: Harper and Row.

Malmberg, B., Lindh, T., and Halvarsson, M. (2008). Productivity consequences of workforce aging: Stagnation or Horndal effect? *Population and Development Review*, *34*, 238–256.

Martin, C. A. (2005). From high maintenance to high productivity. What managers need to know about generation Y. *Industrial and commercial training*, *37*(1), 39–44.

May, D. R., Reed, K., Schowoerer, C. E., and Potter, P. (2004). Ergonomic office design and aging: a quasi-experimental field study of employee reactions to an ergonomics intervention

program. *Journal of Occupational Health Psychology, 9*(2), 123–135.

Myerson, J., Bichard, J.-A., and Erlich, A. (2010). *New demographics, new workplace: Office design for the changing workforce*. Farham: Gower Publishing.

Nelson, M., Rjeski, W. J., Blair, S. N., Duncan, P. W., Judge, J. O., King, A. C. and Castaneda-Sceppa, C. (2007). Physical activity and public health in older adults: Recommendation from the American College of Sport Medicine and the American Heart Association. *Circulation, 116*(9), 1094–1105.

Nicoll, G., and Zimring, C. (2009). Effect of innovative building design on physical activity. *Journal of Public health Policy*, *30*(Suppl. 1), 111–123. doi: 10.1057/jphp.2008.55

Novak, C. M., and Levine, J. A. (2007). Central neural and endocrine mechanisms of non-exercise activity thermogenesis and their potential impact on obesity. *Journal of Neuroendocrinol, 19*(12), 923–940.

Oldham, G. R., and Brass, D. J. (1979). Employee reactions to an open-plan office: A naturally occurring quasi-experiment. *Administrative Science Quarterly, 24*(2), 267–284.

Paul, P. (2001). Getting inside Gen Y. *American Demographics, 9*(September), 42–49.

Rafaeli, A., and Pratt, M. G. (2001). Symbols as a language of organizational relationships. In B. M. Staw and R. I. Sutton (Eds.), *Research in organizational behavior Vol. 23* (p. 93–132). Stanford, CA: JAI Press.

Ramidus. (2015). *Future workstyles and future workplaces in the city*

*of London*. Retrieved 16 September, 2016 from www.cityoflondon.gov.uk/economicresearch

Rashid, M., Kampschroer, K., Wineman, J., and Zimring, C. (2006). Spatial layout and face-to-face interaction in offices – a study of the mechanisms of spatial effects on face-to-face interaction. *Environment and Planning B: Planning and Design*, *33*, 825–844.

Regus, and J.B. Associates. (2009). *The workplace of the future*. London: Regus.

Roberts, K. (2004). *Lovemarks: the future beyond brands*. New York, N.Y.: PowerHouse Books.

Rola, P., Kuchta, D., and Kopczyk, D. (2016). Conceptual model of working space for Agile (Scrum) project team. *The Journal of Systems and Software, 118*, 49–63.

Rothe, P., Lindholm, A.-L., Hyvönen, A., and Nenonen, S. (2012). Work environment preferences – does age make a difference? *Facilities, 30* (1/2), 78–95. doi: 10.1108/02632771211194284

Santos, V., Goldman, A., B., C. R., and de Souza, R. B. (2015). Fostering effective inter-team knowledge sharing in agile software development. *Empirical Software Engineering, 20*(4), 1006–1051. doi: 10.1007/s10664-014-9307-y

Schieman, S., Milkie, M. A., and Glavin, P. (2009). When work interferes with life: Work-nonwork interference and the influence of work-related demands and resources. *American Sociological Review, 74*(6), 966–988.

Smith, L., Ucci, M., Marmot, A., Spinney, R., Laskowski, M., Sawyer, A.,

and Fisher, A. (2013). Active buildings: modelling physical activity and movement in office buildings. An observational study protocol. *BMJ Open, 3*(11), 1–8.

Steelcase. (2010). Brand, culture and the workplace. Which comes first – the culture or the brand? *Steelcase Workspace Futures.* Retrieved 10 September, 2016 from http://businessfurniture.net/wp-content/uploads/2011/09/whitearticle-brand-and-culture-v1.4.pdf

Steelcase. (2012). Culture code: Leveraging the workplace to meet today's global changes. Steelcase. *Magazine 360°,* (6), 1–76. Retrieved 22 September, 2016 from https://www.steelcase.com/content/uploads/2014/2003/2360Magazine-Issue2065.pdf

Steeves, J. A., Bassett, D. R. J., Thompson, D. L., and Fitzhugh, E. C. (2012). Relationships of occupational and non-occupational physical activity to abdominal obesity. *International Journal of Obesity, 36*(1), 100–106. doi: 10.1038/ijo.2011.50

Sundstrom, E., Town, J. P., Rice, R. W., Osborn, D., and Brill, M. (1994). Office noise, satisfaction, and performance. *Environment & Behavior, 26*(2), 195–222.

Swystun, J. (2006). The Brand glossary: the resource for branding and brand management. Basingstoke: Palgrave Macmillan.

TDC/Kairos Future. (2012). Rapport från kontorsrevolutionen. Följ med TDC in i framtiden (Eng. Report from the office revolution. Follow TDC into the future). Retrieved 28 January, 2013 from www.tdc.se/kontorsrevolutionen

Toivanen, S. (2011). Workplaces of the future – how are they studied? A literature study of Foresight and Delphi methods. *Nordic journal of working life studies, 1*(1), 161–167.

Toivanen, S. (2015). Framtidens arbetsplats. Att utveckla hållbara och friska kontor (Eng. Workplace of the future. To develop sustainable and healthy office). Retrieved 12 May, 2016 from https://www.ncc.se/globalassets/vart-erbjudande/future-office/1728-2011_book_framtidens_arbetsplats-swe-168x230_web.pdf

van Meel, J. (2000). The European office – Office design and national context. Rotterdam: 010 Publishers.

van Meel, J., and Vos, P. (2001). Funky offices: Reflections on office design in the 'new economy'. *Journal of Corporate Real Estate, 3*(4), 322–334.

WEF. (2016). *The future jobs: Employment, skills and workforce strategy for the fourth industrial revolution.* Geneva, Switzerland. Retrieved 27 October, 2018 from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

Weinert, B. t., and Timiras, P. S. (2003). Invited review: Theories of aging. *Journal of Applied Physiology, 95*(4), 1706–1716.

Yeaton, K. (2008). Recruiting and managing the "Why?" generation: Gen Y. *The CPA Journal, 78*(4), 68–72.

## Appendix

Table 2
Interview guide: Semi-structured interview on what matters in office design with experts in different fields of the office market

| | | |
|---|---|---|
| **Perspective on Office Design*** | | |
| Q1 | Can you tell me about your perspective on offices (through your professional role)? | |
| Q2 | Which three factors do you think will be most important in future office design? | |
| Q3 | What is a "good office" according to your approach to office design? | |
| Q4 | Where do you think the trend points towards when it comes to future office design? | |
| Q5 | Do you see other demands in office design today than before? | |
| **Concepts influencing Office Design*** | | |
| Q5 | Branding – How do you view office design from a design management perspective? | |
| Q6 | Environmental issues – What does it mean in your work? | |
| Q7 | Environment – Branding, is there any relation between these to one another? | |
| Q8a | Flexibility – What does it mean to you in your job? | |
| Q8b | Flexibility – What did it mean 10 years ago, has its meaning changed over time? | |
| Q9a | Space efficiency – How do you relate to this concept in your work with offices? | |
| Q9b | Space efficiency – Has the importance of this concept changed over time? | |
| **Visions in Office Design*** | | |
| Q10a | What characterizes the successful offices project you have been involved in? Are there any common features? | |
| Q10b | What characterizes the non-successful offices project you have been involved in? Are there any common features? | |
| Q11 | What is your vision for office design? | |
| Q12 | What is office design about? | |
| Q13 | What should be given priority in office design? | |

*= In the original interview guide the questions were somewhat differently ordered, but in order to give a good overview the questions are here categorized in accordance with their theme.

### Biographical information

Christina Bodin Danielsson
Architecture School, School of Architecture and Built Environment, The Royal Institute of Technology (KTH)
Address: SE-100 44 Stockholm
SwedePhone: 0045 61718360
Phone: +46 73 765 23 29/+46 8 790 85 41
Cellphone: +46 73 255 78 58
E-mail:
Christina.bodin.danielsson@arch.kth.se

Affiliation: The Stress Research Institute, Stockholm University, SE-106 91 Stockholm, Sweden

Architect Christina Bodin Danielsson, PhD, works both as a practicing architect and researcher. She is associate professor in Architecture (human-environment interaction) at the School of Architecture, KTH. In her work as practicing architect she works as specialist at Brunnberg & Forshed Architects Ltd, Stockholm. Bodin Danielsson has completed post-doctoral research at the Stress Research Institute, Stockholm University and at Department of Design Analysis (DEA), Cornell University, USA.

Dr Bodin Danielsson research concern the interplay of people and the physical environment in various ways, i.e., behaviour, psychology and attitudes in different environmental contexts. Her research field is interdisciplinary with its origins in architecture, but it extends into fields such as environmental psychology, occupational health and organization behavior, but has social psychology and sociology implications. She is involved in various research projects on social sustainability, health and wellbeing related to the physical environment in different settings like offices, housing etc. Her office research deals with office design's but also outdoor environment's influence on employees and organizations, aiming to find environmental factors important for the welfare for both parties this concerns social cohesion, information transaction, psychosocial work environment (e.g. job satisfaction, social cohesion, conflicts), change management and implementation processes. Another area of interest to Bodin Danielsson concerns social sustainable architecture and how the physical environment can reinforce health and improve the quality of life in various ways among e.g., residents.