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2025:
The Office as Thinking Space

Places, Environments, and Interfaces of Future Knowledge Work

Market Foresights No. 4 / 2015

Contents

Generation Y: Younger knowledge workers in particular demand innovative tools, new interfaces, and social networking opportunities.

Introduction

Performance and result orientation without attendance: 'Agile Working' is on the rise. Will traditional office work space be redundant by 2025? And what does that mean for employers, building contractors, office furniture manufacturers, IT service providers etc.?

The way we will and want to work in the future will have a hugely impact the look and feel of offices and environments for knowledge work five, ten, or fifteen years from now. Numerous trends, topics, and technologies are transforming the working world as we know it today. As much as smart automation in industrial production ('Industry 4.0') will sustainably change production processes,[1] computerization, internet, cloud computing, virtualization, and artificial intelligence will influence the way work is organized in the tertiary and quaternary sector. More and more business sectors become digital. While new IT-supported business models develop in the service sector, knowledge work and intellectual endeavors, too, experience more and more 'digital enhancement'. To a certain degree, they are even replaced by intelligent systems.[2]

The value of knowledge work, in particular of interdisciplinary, integrated, or collaborative knowledge work is growing, particularly in industrial countries. In the economy of the 21st century, 'knowledge workers' are becoming an increasingly relevant production factor.[3] In the always-on society, information and data are accessible at any time and from any place. Digitalization and virtualization of content will increasingly lessen the relevance of the fixed office space. Cloud and crowd working models of cooperation across borders emerge instead.[4] It becomes more and more important to involve clients, external experts, and freelancers in the value-added process in general or specific projects. A work space without physical boundaries will also require revised concepts of working hours.

Generation Y professionals will demand more and more flexibility. Demographic changes and an ever intensifying lack of specialists requires that companies look and compete for qualified employees in knowledge intensive jobs. The 'war for talent' will not only be decided by way of salary, but also by offering attractive, i.e., stimulating

Home office, video conferences and cooperation in virtual teams: The traditional office space that requires attendance will increasingly lose relevance compared to more flexible modes of work.[5]

working conditions to young employees with high potential. For a generation that grew up with the Internet and digital media, this also includes innovative tools, new interfaces, and social networking opportunities.

Technologies that allow access to office and company applications via laptops, smartphones, and tablets are being integrated into daily operations.[6] By the same token, the idea of the 'consumerization of IT' describes a trend characterized by users who determine their work environment individually by using equipment, software, and services they predominantly use for private purposes. In this context, the issue of data security becomes more relevant.

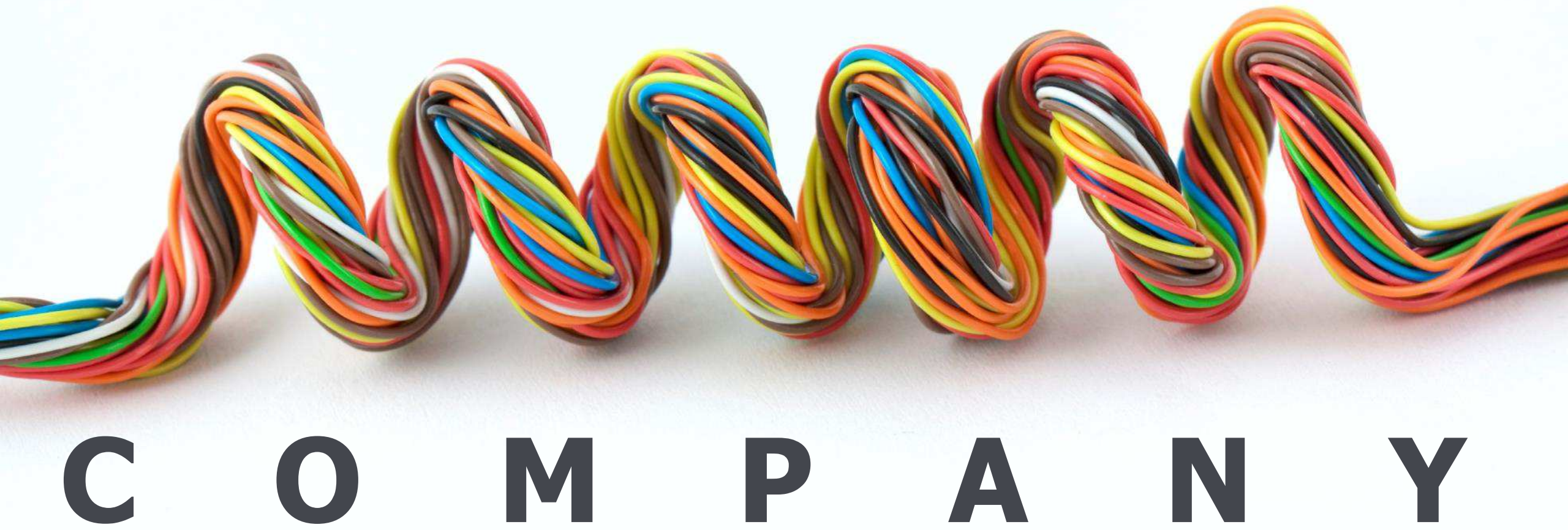
Globalization and ever-growing flexibility, increasing project work in varying teams and new concepts of working hours designed to harmonize work and private life, pose new demands on the accessibility of the physical work environment. The office without physical borders is defined not only by the virtualization of knowledge-based content and communication, but also by multi-locality. Urban office space near mobility hubs will likely still be in high demand in the coming years. Companies will have to provide fewer office space. Sharing office space and office-as-a-service models become increasingly more important.[7]

The demands and desires concerning space and workplace design are changing. In addition to high functionality, sustainability and health considerations have become high priority aspects in workspace discussions. This creates implications for construction and development companies that have to increasingly focus on green-building concepts (sustainable materials, energy efficiency, building automation, etc.), as well as for designers, interior decorators, and furniture manufacturers that have to offer flexible, adaptive, and ergonomic solutions to remain successful in the future.

What exactly will tomorrow's knowledge production and thinking space look like? A starting point: The trend goes toward flexible space.

Broadened Horizons: The increasingly digitalized and virtualized office of the future spans across borders. New thinking- and working spaces emerge.

Agile companies: The number of offices per ten scientists will drop from eight in 2010 to seven in 2020.[8]



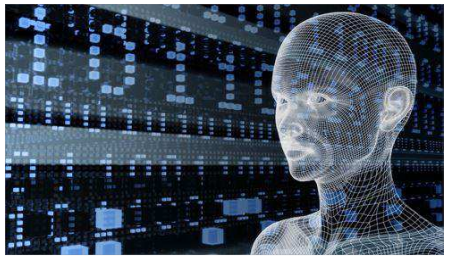
01

2025:
The Office as Thinking Space

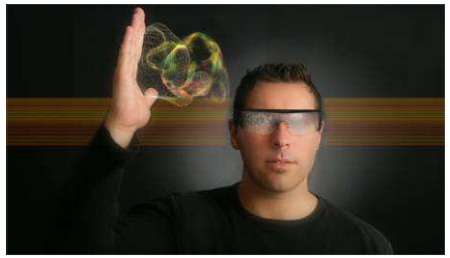
Which trends will influence knowledge work and impact thinking spaces and office real estate in the future?

Informatization

Network economy



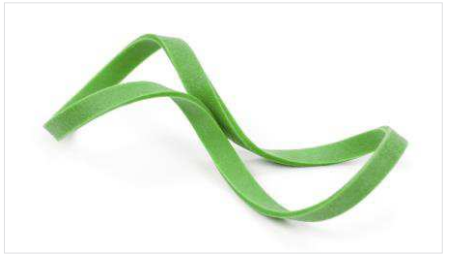
Human-machine interfaces



Virtualization

Changing work/life environments

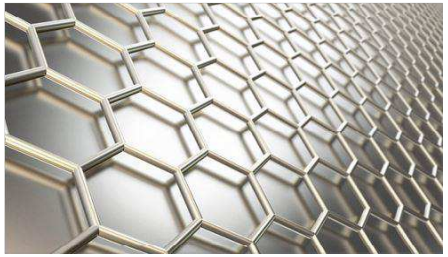
Generation internet



Flexibilization

Salutogenesis

Ecological sustainability



Material innovations

Energy innovations

Mobilization

2025:
The Office as Thinking Space

Knowledge is the only resource that grows when it is being used. The knowledge that is accessible world wide doubles in ever shorter intervals. The causes for this 'knowledge explosion' include increased research and education spending, ever rising expert specialization, networking among different knowledge authorities, and the growing accessibility of information. The structural change toward a service and knowledge society, particularly in the industrial world, elevates knowledge work to an increasingly important factor in value creation.[9] In general, we witness that activities in all business sectors are progressively based on knowledge.

Due to demographic changes, the competition for knowledge workers will intensify in the next two decades, even if the trend for ever higher qualification may counteract this development. By 2018 at the latest, the number of employed workers in Germany will begin to decline. By 2030, we expect a decrease by 680,000 employees.[10] The competition for young talent will not be determined only by the size of the paycheck, but also by quality criteria such as employer branding or harmony of family and professional life. 'Space' becomes a

By the year 2030, the number of employees in administrative and office jobs in Germany will decrease by 680,000.[11]

In the future, offices will serve as temporary anchor points for human interaction rather than as permanent work space.[12]

particularly significant quality criterion.

Cities will remain strongholds of office and knowledge work. In Germany, the process of urbanization has not yet run its course. The share of people living in urban areas will grow from 74.3 percent in 2010 to 78.6 percent in 2030.[13] In recent years, metropolitan areas have become more attractive. Cities like Hamburg, Köln, Frankfurt, Berlin, and Munich will likely experience a growth of eleven to thirty percent.[14] In addition to better career opportunities, the factors contributing to people’s decision to migrate include the well developed infrastructures in urban areas as well as the large variety of leisure activities and cultural diversity.[15] The way a city attracts highly qualified employees with location, a company's recruitment process will benefit from offering attractive working and thinking spaces as well as flexibilities. This trend goes far beyond traditional concepts of the office space. Social, technological, and economic trends require that we rethink the space of the future office.

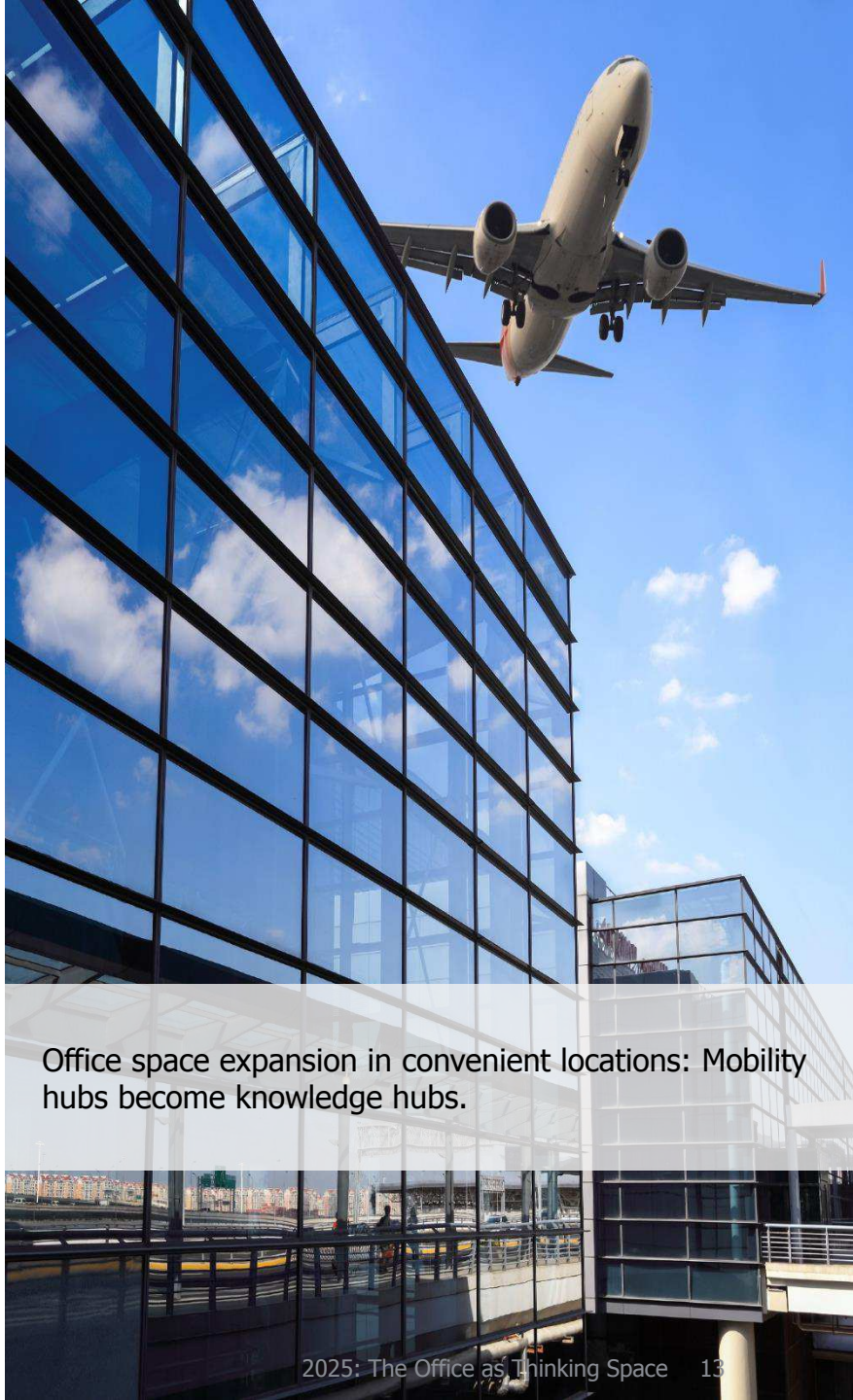
A growing need for project work, an increased exchange of knowledge across department and company borders, globalization, and intercultural exchange as well as progressive digitalization and virtualization of content and communication – all these factors release the knowledge worker from the traditional fixed office space in the company. Instead, the 'office everywhere' becomes relevant. In the future, progressively powerful and efficient mobile devices combined with innovative and secure cloud technologies will enable people to work anywhere, anytime. In addition, performance and result oriented employment structures foster independent working habits. Thus, work spaces will enter a competition concerning aesthetics, functionality, and accessibility. In the year 2025, contingent on demand, knowledge workers can choose among several options depending on their usefulness for daily professional tasks and private interests. After all, about 30 percent of the companies polled assume that the number of employees working from a home office all or at least part of the time will grow in the future. Only

2025: Multi-local work structures are more established than today. The office everywhere and traditional office work space complement one another.

four percent believe that this number will decrease.[16] In 2025, multi-local work concepts will be more established than today. The traditional office will be used less frequently than today – and in different ways. Offices will increasingly become anchor points for human interaction and social and communicative junctures. They will foster interpersonal exchange and a common experience of work, which in turn mainly solidifies the employee's identification with the respective company and its culture. Essentially, they will be the home base for the 'office everywhere'.

Work environments will increasingly be divided in zones that either serve the task, foster communication and/or creativity, or offer relaxation. Ambient intelligence supports this process or its respective usefulness. Examples are intelligent light, climate and soundproof systems such as furniture, walls, etc., which can flexibly adjust to situations, people and their moods either per voice or gesture control, or automatically, via wearable interfaces or biometric detection methods, for example. Shape memory materials could tap innovative applications in the sectors of ergonomics or individualization.[17] In the future, we may carry a digital blueprint of our ideal work space with us like a profile so we can download not only a virtual, but an actual desktop from the cloud. Suitable technologies will support the trend toward desktop sharing. Thus, when employee A uses the same desktop on Monday which is used by employee B on Tuesday, it is individualized based on personal needs and desires, and will feel like one's own.

The increase of mobile communication between people, technology, and information in the cloud on the one hand, and the general mobility and distribution of knowledge space in today's global network society on the other, will create a high demand for office space in convenient locations. By expanding their office space, mobility hubs such as train stations, airports, etc. can reach out to new target groups. Potential customer groups would include consulting companies, legal firms, marketing- and design agencies, etc. In other words, businesses that involve a lot of travel.[18] An example is 'The Squaire' at the Frankfurt airport, a new office and hotel complex that is marketed as



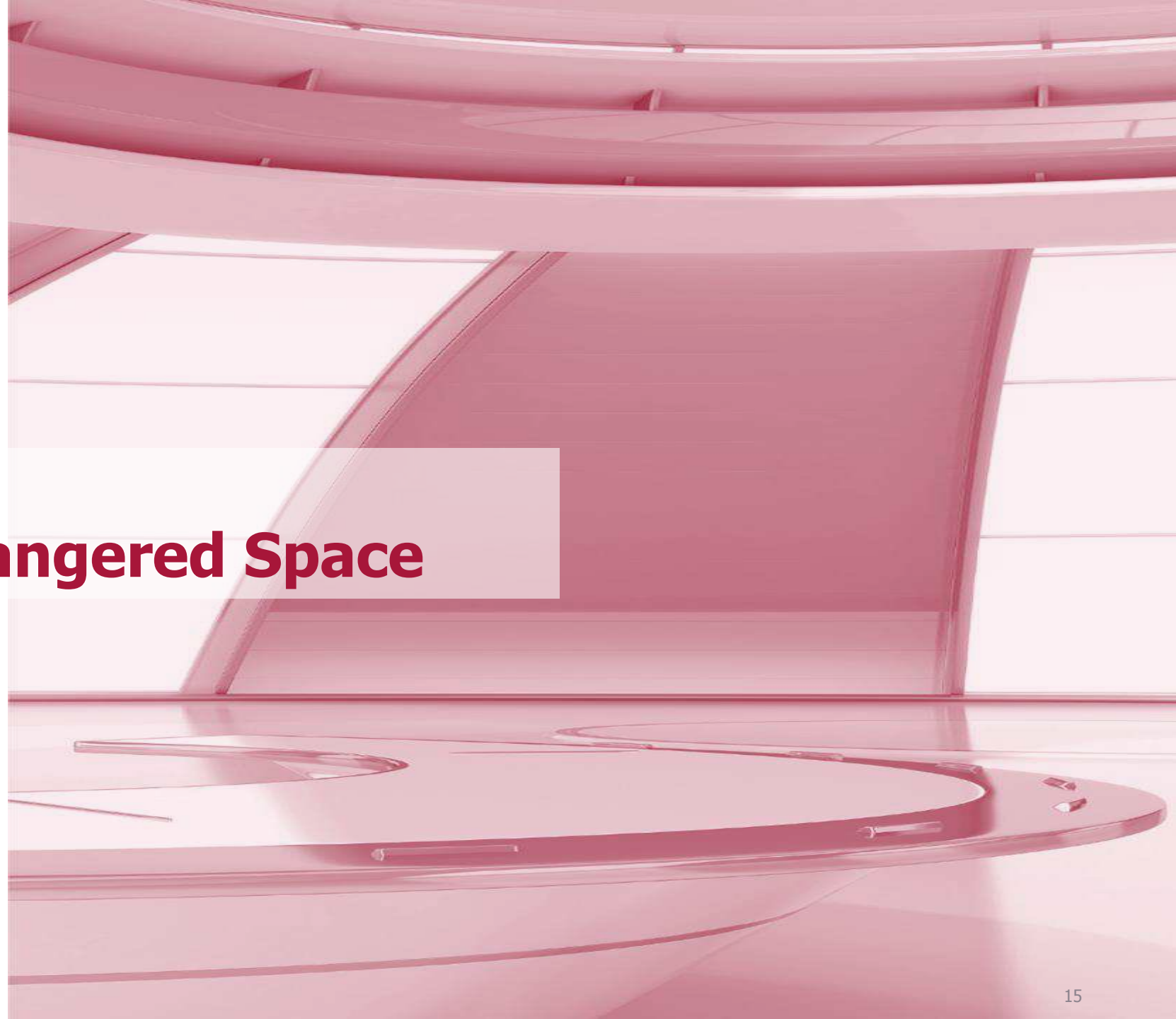
Office space expansion in convenient locations: Mobility hubs become knowledge hubs.

the perfect business location in the global world.

No matter how flexible the future work environment will be, an employee's identification with a company will still be an important factor influencing motivation and productivity. Augmented reality glasses like Google Glass or the HoloLens[19] announced by Microsoft could provide virtual access to the company's 'home base', as well as to vital corporate design elements from any work space anywhere in the world. Design and ambiance could increasingly move to the virtual world while furniture, surfaces, and walls function as their projection area.

02

2025:
The Office as Endangered Space



2025: The Office as Endangered Space

In the long run, we have to assume that office space vacancies in rural areas, C-towns and on the periphery of A- and B-towns will increase.[20]

The demand for fixed office space will decrease. Outsourcing and office-sharing can help companies control the cost of office space and work space equipment, which, given rising real estate prices and leases, is a significant factor, particularly in attractive locations. In fact, on a regular business day, the average work space is used only at a capacity of 42 percent today.[21] Therefore it makes sense for companies to hold only a minimum of office space, while renting additional space temporarily as needed. Office architecture changes, too, becoming more minimalistic. The single- and two-room office will be replaced by a more open office plan designed to provide efficiency and usefulness. This can reduce the need for office space by up to 50 percent.[22]

Although the German economy is growing and the unemployment rate has hit an all-time low, the demand for office space has stagnated. In addition to more office space efficiency, i.e., the recent reduction of office space required per capita, this is due to the trend towards part-time employment, as well as the fact that traditional office jobs have not increased.[23]

On the other hand, the structural change towards a service and knowledge society creates new office jobs. We have to assume that until the near 2020, the number of office workers in Germany will grow by 80,000 per year.[24] Due to demographic changes, the overall population of the gainfully employed will likely decrease, which will have a negative effect on the demand for office space in Germany. Job market measures, such as an increased employment of women and older citizens or incentives for increased migration, might slow down this development, but will not stop it. This general development will play out with significant regional differences, depending on the particular employment developments in specific locations.

In addition to the mid- and long term effects of demographic changes and the necessity to reduce costs, new modes and methods of cooperation will question the traditional office space. In 2012, about 4.7 million people, i.e., 12 percent of the gainfully employed in Germany, have sometimes, if not mostly, worked from home. Although the home office trend in Germany declined between 2008 and 2012[25], the expansion of data networks, ever more

Working everywhere and at any time: The human-machine interfaces of the next generation turn mobile devices into virtual desktops.

powerful devices, as well as new human-machine interfaces and virtualization techniques (gesture control, thought-interface, 3D-visualization, augmented reality, etc.) will likely change that in the future. After all, about 33 percent of Germans assume that by the year 2025 they will work in a home office.[26]

In the long term, the trend toward decentralized work will include far more places than the home office or the train, particularly when everyone can remotely access everything they need to work from everywhere and at any time. If the difference between work and spare time progressively blurs, our work environment will surround us like an aura, which can be faded in and out at will, no matter whether we are at the office, at home, in a co-working space, at the coffee shop, or in the park. Depending on our needs, we can add virtual surfaces and interact with them.

In the future, even cars will likely be used as work space. As early as 2020, about 250 million networked vehicles will be on the road world wide.[27] In the 2020s, semi-autonomous cars will prevail, and in the 2030s their fully autonomous counterparts will take over.[28] This would make the mobile office a reality. No doubt, these vehicles will have adequately adjusted interiors.

More and more companies allow their employees to use their own mobile devices, software applications etc. at work, because it increases productivity. At the same time, company laptops and smartphones are used privately. The trend toward the mobile and highly integrated work creates its own challenges: companies have to protect their IT-infrastructures and data from new risks. The increasing digitalization and virtualization of work environments in the 'office everywhere' becomes an entryway for computer viruses and industrial espionage.

The bring-your-own-device (BYOD) trend as well as highly integrated and decentralized infrastructures create significant risks for IT and data security.

03

2025: The Office as Space for Opportunities

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The lines between ambiance and work place blur: In the future, every surface can be 'upgraded' to a touch screen.

In the next ten years, intelligent high-tech furniture and surfaces will move into many offices. Information and interactive surfaces are no longer limited to the traditional monitor, screen, whiteboard, flipchart etc. The sector of organic electronics in particular will offer interesting future market opportunities for office furniture manufacturers. The roll-to-roll process makes is possible to print electronic circuits based on conductive plastics. This provides a basis for low-cost electronics, which will offer completely new opportunities. Wafer-thin, flexible OLED foils can be mounted onto diverse surfaces and structures. Office furniture, electronics, and information technology mix and mingle. The first flexible plastic OLED displays will hit the market in 2016 and will likely develop into a multi-billion dollar market in the smartphone and television sector.[29] In the medium and long term, it will be possible to 'upgrade' any surface to a touch screen.

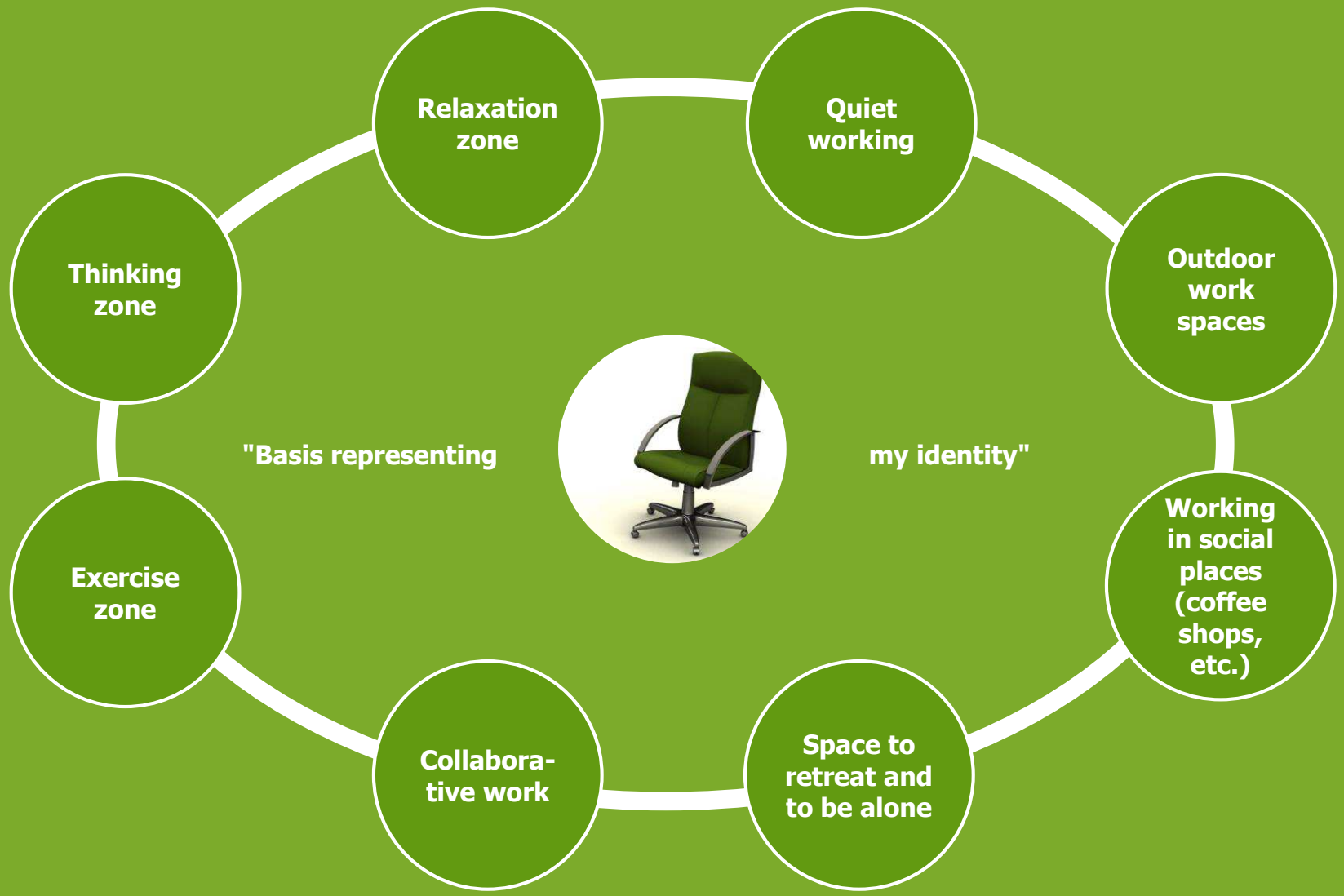
In the future, rooms won't even need windows any more. The airplane manufacturer Airbus, for example, has filed a patent request for a cockpit in which OLED foil screens replace the windows.[30] In addition, OLED modules will increasingly be used as surface light source.

Together with ambient intelligence, high-tech furniture, and smart surfaces will result in increased productivity and well-being of knowledge workers. Information can be visualized on large screens or 'follow' us from room to room. Intelligent textiles with inbuilt sensors and electronic circuits react to touch, measure vital parameters, and provide optical or haptic feedback. In 2025, the smart office is capable to adapt to its users depending on the situation, perhaps even with foresight. In the future, it is not us who care for our devices and technologies, but our devices and technologies care for us.

In tandem with new technologies, the functionality of office furniture will gradually expand. A first step in that direction: In spring 2015, IKEA will introduce furniture that facilitates a wireless upload of mobile devices like smartphones or tablets via Qi-technology.[31]

Agile company structures, highly integrated work, and changing needs of younger knowledge workers

From work space to spaces for work
Preferred future working concept of the younger generation.[32]



in particular place more demands on flexible office space. The desire is an open office concept fostering easier cooperation in combination with quiet zones, smaller conference rooms, and experiential spaces that encourage creativity.

At the same time, office space needs to anticipate the different functional requirements of varying occupants. Therefore, investors and owners should keep in mind the highest possible flexibility of space when building or converting real estate. Office real estate with adaptable room structure and space efficiency will likely still be highly marketable in the future.

In the context of climate change, new legal requirements, and the shifting public consciousness concerning environmental issues and resource exploitation, sustainability becomes ever more significant. Therefore, the concept of green building provides an important future market in the real estate sector. In addition to environmentally friendly and low emission construction materials that complement traditional materials, solutions that increase the energy efficiency of buildings will have great significance.

Recyclable construction materials will become increasingly common. Nanomaterials improve both the energetic and hygienic characteristics of materials. The integration of regenerative energy and innovative energy-harvesting systems will play an ever increasing role for the energy management in new buildings. Intelligent technologies (smart elevators, electrically dimmable windows, programmable air conditioning etc.) will also contribute to optimizing the energy efficiency of office real estate.

Offices will be judged increasingly based on their CO_2 balance or their ecological footprint. Whether a company is environmentally and socially responsible has become a significant criterion when choosing an employer, particularly for younger employees.

The office of the future is green: Ecological sustainability is a mega trend that offers numerous future opportunities.

Between 2014 and 2023, the European market for energy efficient buildings (products and services) will almost double to reach a total of 81 billion Euro.[33]

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There is growing interest in healthy life styles and behaviors that can counteract negative environmental stressors, lack of exercise, bad nutrition and stress. In the last two decades, the number of psychological illnesses has significantly increased. The rise of affective disorders (mood disorders such as depression) is particularly noticeable, and as a result, disease statistics show higher absence rates. Life-balancing, defined as the ability to harmonize public expectations with one's own life goals, is becoming more and more important. Preventative health care is considered a component of a better quality of life. At the same time, physical and psychological health are considered an important prerequisite for economic productivity. Health becomes a status symbol. Two thirds of corporate decision makers and HR managers in Germany are convinced that taking a holistic approach to a company’s concept of health care will become more and more important. The ergonomic and age appropriate design of the workplace gains significance.[34] Accordingly, products and services relating to health care and wellbeing will be an important growth market.

Conceptual Approach:
What are the products and services relating to the trend toward health oriented self-improvement that can be offered via mobile devices and wearables (self-tracking, quantified self) in knowledge work environments?

Ergonomics will remain a relevant aspect in the office furniture market. In the future, seating furniture in particular can be equipped with sensors that give feedback when a person takes a wrong sitting position or when it is time to change to a high desk. Plessey Semiconductors, for example, has developed a driver drowsiness detection system for the automobile sector, which enables the capture of EKG and breathing functions via sensor electrodes in the seat without physical contact.[35] Intelligent tracking solutions based on facial recognition would be suitable to determine when fatigue sets in at work and to encourage a short break. Self-tracking via mobile devices and wearables has long reached further than the niche market of technology aficionados and is being practiced by more and more people. The market for playful health-oriented self-improvement in a professional context offers great growth potential. Additional examples for health solutions at work would be zones reserved for fitness that are equipped with appropriate machines, or integrating fitness-studios, wellness centers etc. in office buildings and complexes. A combination of furniture and fitness-machines would be thinkable, too. These furniture/fitness machines could even be used for energy harvesting. In the future, a 3D scan will allow office furniture to adapt to the physique of employees.

Supplying the work force with high value nutrition such as organic produce, local products or functional and brain food (foods that provide an additional benefit), opens up future market opportunities in the field of catering.

Increasing mobility as well as the growing number of freelancers, entrepreneurs, and start-ups will increase the need for office space above and beyond traditional office real estate. Between 2012 and 2013 alone, the number of co-working spaces has grown from 2,000 to 3,000 world wide.[36] In the

Increasing productivity and health orientation: Also in work environment playful self-tracking shows great growth potential.

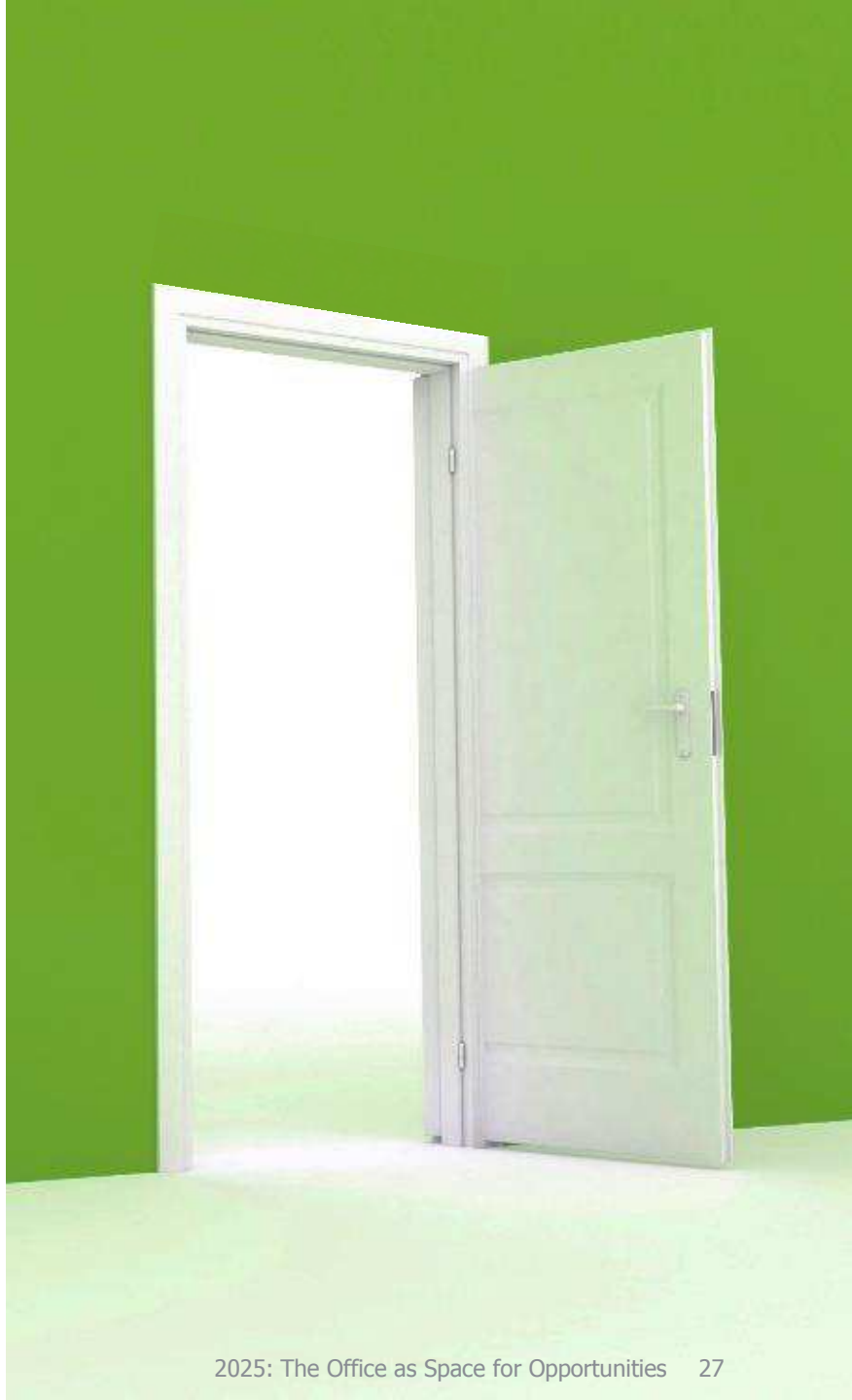
Coworking does not only opens up a huge potential of opportunities for freelancers and start-ups, but also for corporations. Coworking spaces will **profit**, too.[37]

future, coworking will become a realistic option even for larger companies that want to offer their employees more flexibility, or companies that cannot or do not want to offer permanent office space. It is also an ideal option for temporary projects that require the cooperation of external experts. Coworking space could also be rented to foster the creativity of employees for a specific temporary project.[38/39]

Coworking and other office-as-service-models offer great opportunities for providers of temporary housing. The Hotel Schani near the main train station in Vienna, which will open its doors in 2015, for example, specifically defines itself as coworking hotel.[40] Train stations, airports, shopping centers with a good transportation infrastructure will offer mobile knowledge workers space to retreat and relax, and to work. The 'sleepbox' concept developed by two Russian architects is particularly interesting: The 'sleepbox' offers travelers about four square meters of space to work and sleep at mobility hubs and it can be rented in increments of 30 minutes and up.[41] The work-on-the-go concept 'WW' by the British design student Julie Berdou imagines high-tech glass cubes with small workstations in public places that can be searched and booked via an app.[42]

Mobile service providers can profit from an expanded service for knowledge workers by offering networked work space in trains and airports, in waiting and transit areas, as well as by providing a specialized mobile-office shuttle service. The growing automation of transportation will turn the automobile itself into a workspace, which will pose new challenges for automobile designers and manufacturers.

In conclusion: Provide flexible space that is appropriate for knowledge work and add adequate suitable equipment.



Opportunities in the future market 'Thinking Spaces'

If they provide flexible space, companies will benefit from contented and productive employees.

The fragmentation of the work environment with regards to locality, time, and context increases the demand for specialized and individualized space and equipment.

Providers of temporary and flexibly adaptable work space profit from the trend towards mobile and networked jobs.

Digitalization and virtualization are the basis for the development of innovative communication and human-machine interfaces that are in high demand, particularly with the younger work force.

The combination of space and service in hybrid solution packages allows companies to offer real added value to their customers.

The demand for environmentally sustainable buildings, office furniture, and office supplies will grow.

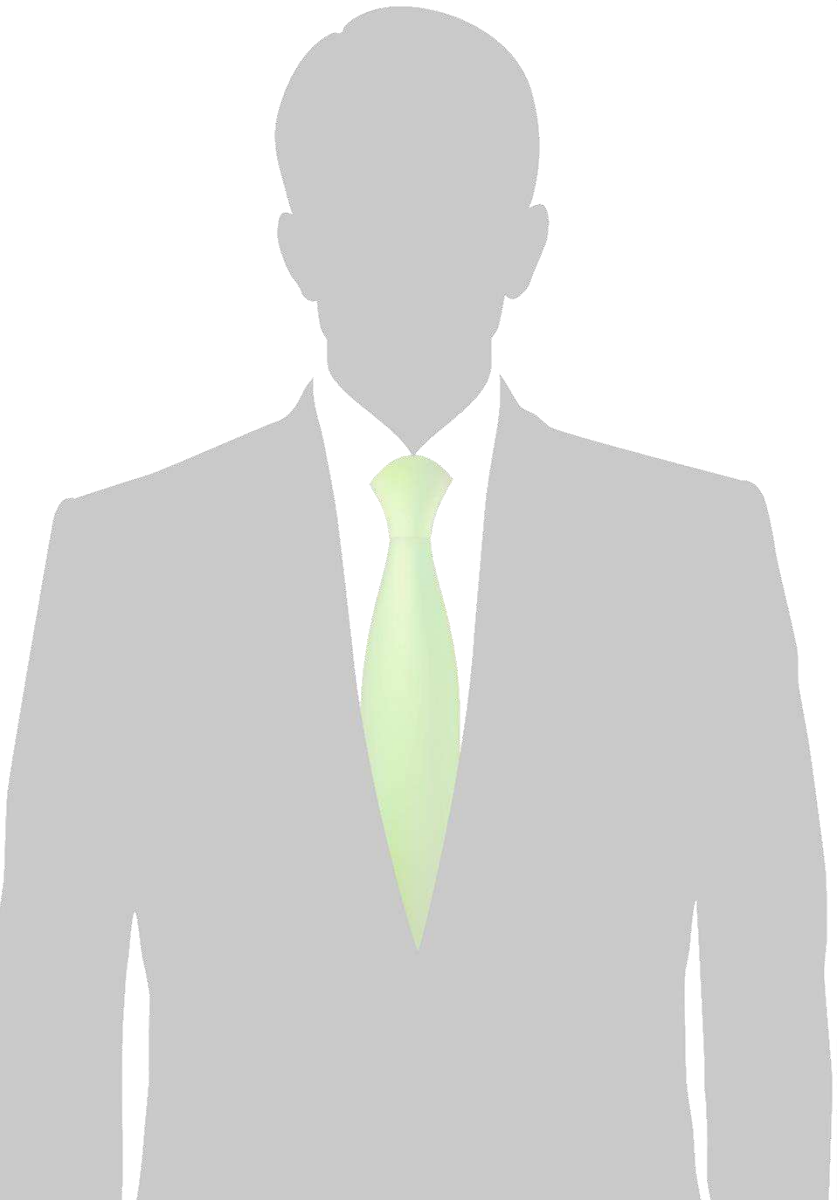
Products and services dealing with the issues of health and well-being at the work place will develop into a billion Euro market.

Solutions from the sectors of ambient intelligence and adaptive assistance systems offer opportunities in the sectors of ergonomics, ambiance, and energy efficiency.

The integration of electronics, particularly of foil touch screens and displays, into office furniture will enable the manufacturing of completely new interactive surfaces.

Mobile service providers can tap into an attractive target group by offering innovative services for knowledge workers.

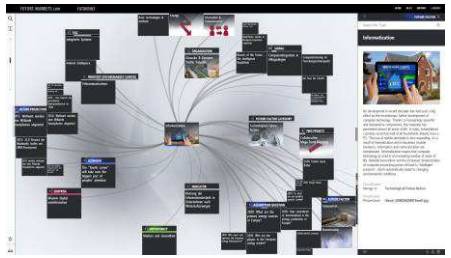
Are you adequately prepared to meet the demands placed on future 'Thinking Spaces'?



- What types of work space formats and space solutions can you offer to foster the creativity and productivity of your knowledge workers?
- Is your real estate adaptable to tomorrow's highly flexible working world?
- Are there new competitors and start-ups with innovative work space solutions that rival your company? Which ones would be suitable for future cooperation?
- Which IT-based solutions would refine your product portfolio or even develop entirely new business sectors?
- What kinds of health oriented products and services addressing the sector of knowledge work could you offer?
- Which mobility services will be in high demand with knowledge workers?
- How will highly networked and decentralized work structures affect the security of your company?

Seize your opportunities in future markets!

Solutions



FutureNet:
Your semantic
data base of future markets

Future Radar Workshop:
Your trend map

Future Business Radar:
Your business fields in future markets

Future Strategy:
Your future strategy

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Wallufer Straße 3a
D-65343 Eltville
Tel: +49 (0)6123 60109 - 0
Fax: +49 (0)6123 60109 - 29
office@futuremanagementgroup.com
www.FutureManagementGroup.com

Registry Court: Amtsgericht Wiesbaden
Registration Number: HRB 17918
Tax Id: DE 227 644 650

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Gregor Schiffer

Partner and Leader FutureMarkets-Center 'Construction and Living in the Future' as well as 'Energy and Infrastructure' within the FutureManagementGroup AG

Contact:

SG@FutureManagementGroup.com
+49 - (0) 173 – 34 69 748

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