

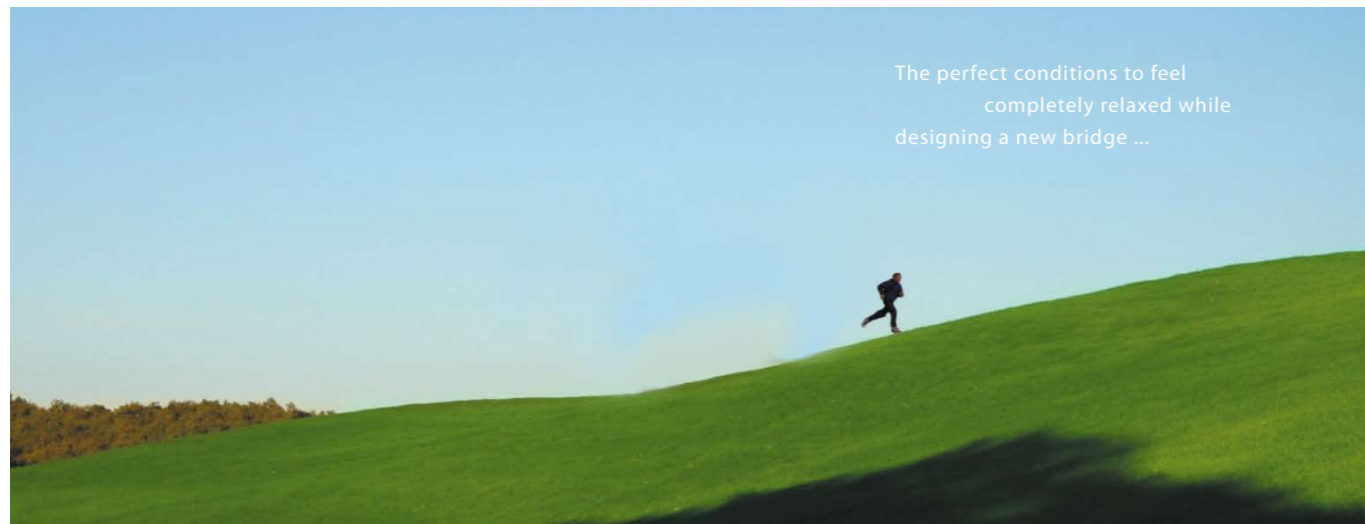
Ergonomics

HAWORTH®



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dyes**

The perfect conditions to feel
completely relaxed while
designing a new bridge ...



Humans are the smallest economic unit ...

... whose **productivity** depends on their intelligence, knowledge, motivation, flexibility, surroundings and physical **and** mental well-being. A person's success, whether as an individual or as part of an organisation, company or economy, is directly related to their surroundings, which foster or inhibit development. **Working** need not diminish the quality of life, nor impinge upon **leisure time**. The transition from one to the other is gradual, erasing the clear division between them – as are the boundaries between the spaces we work and live in. Approximately 50% of all employees already work in offices and perform mental tasks. The demands that are made on the office as the **heart of business** processes are increasing, as are the expectations on **humans** as **key production elements**. Creativity, spontaneity and adaptability are deciding factors in a company's success – but they cannot be handed down as orders from the top. They can only be nurtured and improved by showing common sense and commitment.

“We shape our buildings and afterwards
our buildings shape us.”

Winston Churchill

An office building is a **stationary** object. Today’s architects consciously define their work to contradict this: they **design room to move**, because agility and adaptability is exactly what companies expect from **employees and furniture**. That is exactly how we see our task as an **all-in-one** office furniture provider. To place humans – who we defined as the **smallest economical unit** – in a position, as part of the whole, where they can optimise their work while remaining healthy and balanced. We consider ergonomics to be more than merely bio mechanical work. Furthermore, we do not like to view the office as a **cost factor** but rather as a **production factor**, in which the “human capital” is eager to work profitably and harmoniously for the company. At the same time, the office is the **permanent base** that continues to provide support to those employees who are away from the office. It is the **heart** that supplies the team with digital, social and, if necessary, spatial infrastructures. If the **cost-benefit** ratio is the yardstick to determine the willingness to make investments, then employees are the greatest cost factor. More than 80% of office costs are **human resources costs**. Investing in measures that increase **productivity** and prevent performance losses resulting from illnesses or disturbances should convince any business leader.

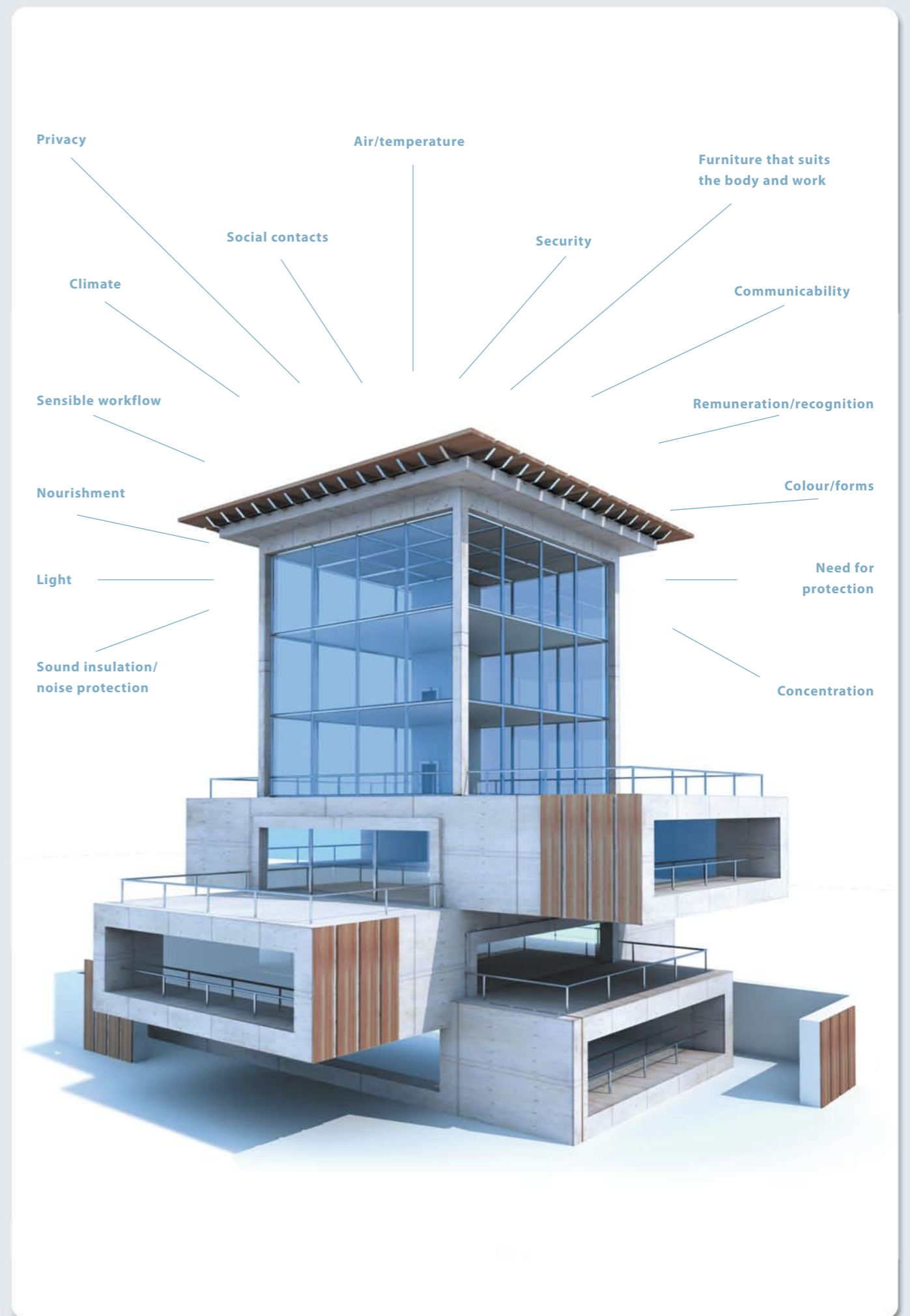
Office costs

20 % furnishing, office, equipment	80 % human resources costs
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Hard and soft comfort factors.

If we look at the activity that takes place within an office building, we can quickly list the **comfort factors** that allow employees to be creative and do their best. Hard and soft factors are of equal importance to achieve this. A colleague who constantly talks loudly on the telephone can be as disruptive as an uncomfortable chair or an incorrectly positioned computer screen. **All factors are important.** To us ergonomics is more than making the correct movements while performing a task. **Psychosocial aspects** and organisation, design and even taste are also deciding factors. Countless matters cannot be planned or calculated in advance. Individual perceptions cannot be dictated by architects. Today, having a feel for what is “right” is in demand. Buildings are constructed foremost to satisfy our natural **urge to protect ourselves** – a house is our third skin. We expose ourselves to new “threats” within the office building: physical and mental stress, which are caused by the work itself, and working conditions, which are also created by human behaviour. Haworth, as an **all-in-one** provider, creates, develops, consults on and implements solutions that are permanently co-ordinated as an integral system that is defined as “**integrated workspaces**”.



Humans as a whole.

The **limits** of our ability to perform are defined by our **weaknesses** – physically and mentally.

The interaction between body and mind, comfort or pain, relaxation or tension ... As soon as

we feel discomfort somewhere between the head and feet our **entire system** is off balance.

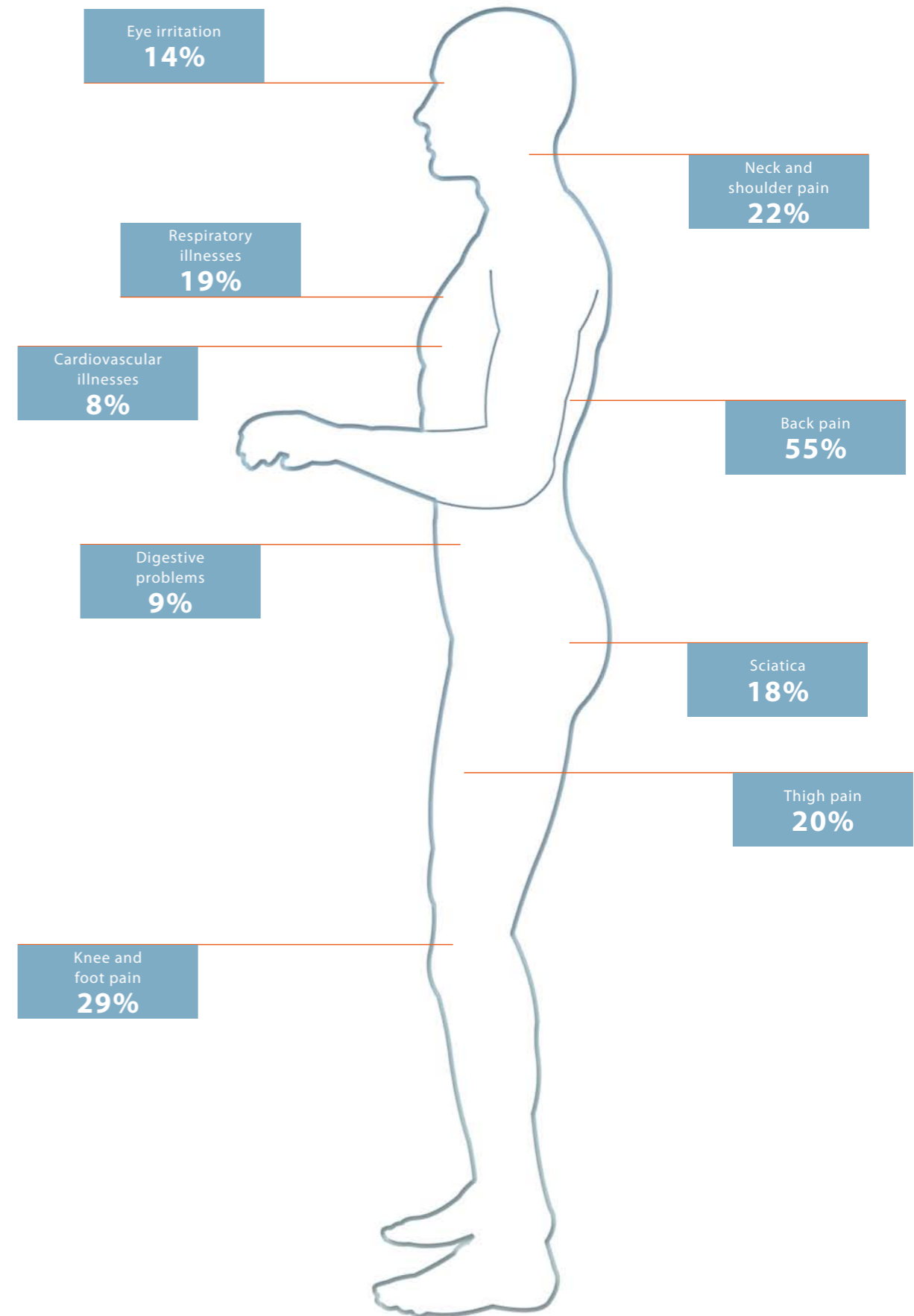
As one of the leading office furniture companies Haworth is committed worldwide to **integral**

offices and to creating ergonomically correct workstations that treat humans, who are the

performers in the economy, fairly and respectfully.

Our recipe is to reduce everything to the essentials: we design **adaptable workspaces**, in which

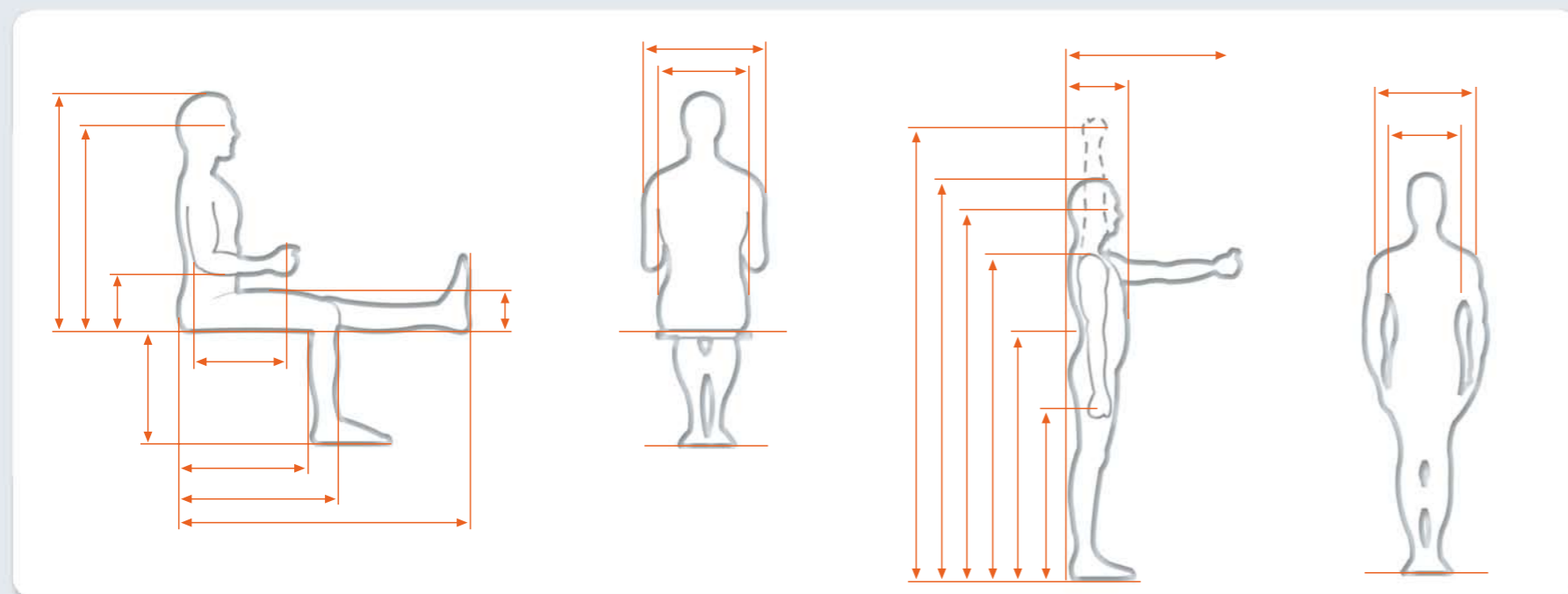
humans can concentrate, relax, be creative and work efficiently.



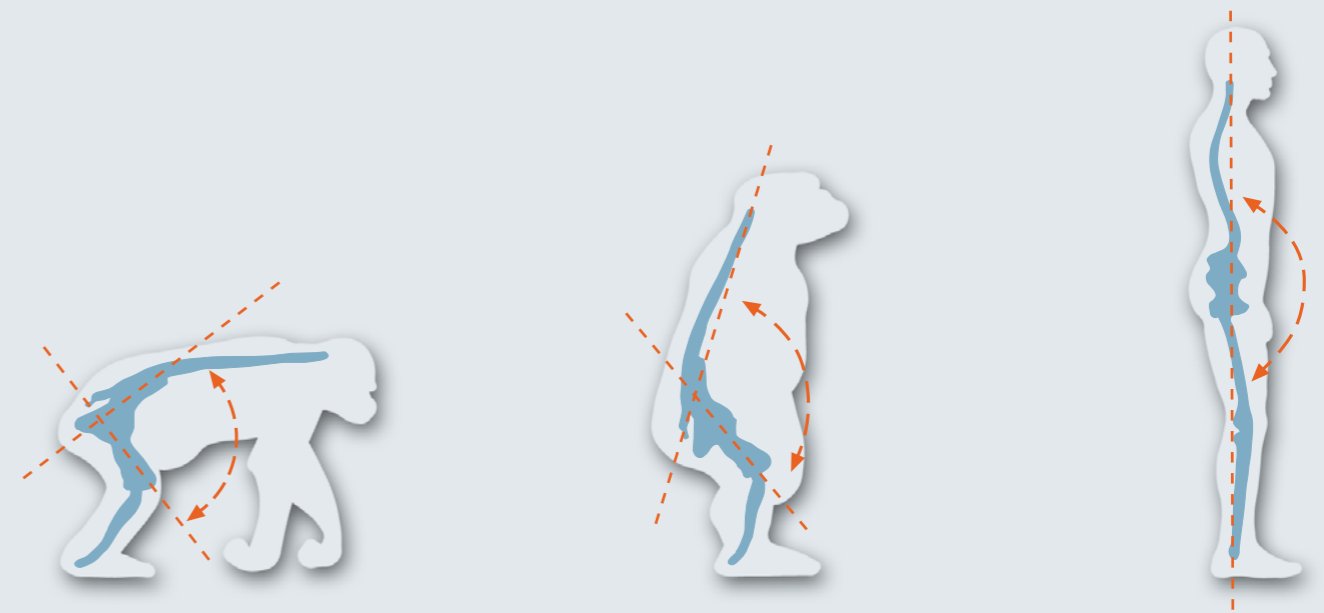
Humans – the measure of all things.

An important prerequisite for furnishing ergonomic office workstations is knowing the users' exact body measurements. Older **anthropometric statistics** no longer apply. Due to acceleration (faster growth) and changes in eating and living habits, certain body measurements can increase or decrease. Demographic influences, especially migration and an extended life expectancy, have made it necessary to alter the measuring methods and update the data. As a result, the latest research was not based on nationality but on the **local population**, and age groups between 18 and 65 were taken into consideration. The definition of the collected body measurements is based on the European EN 7250 standard, is made up of **69 parameters** and provides the industry with clarity and security for their planning. These are used as orientation aids by the clothing industry, as well as the manufacturers of gloves, glasses or athletic equipment, to define sizes. Part of the

standardisation is to consider the age groups 18-25, 26-40, 41-60 and 61-65 and to determine the average values for the working population between the **ages of 18 and 65**. The 5, 50 and 95 percentiles were also defined. Transforming body measurements into "shapely products", such as office chairs and desks, as well as, based on the latest statistics, the DIN 33402, EN 1335 and NPR 1813 (NL) ergonomic standards form the basis for the Haworth Group's development of **integral work surroundings**. New work methods, such as **desk sharing** or **hoteling**, lead to a continuous increase in the demand for furniture with an **extreme adjustment range**. This allows people with extremely different body sizes to share a workstation in a flexible manner. In order to allow each employee to perform at his or her highest and most efficient level, all relevant components have to be co-ordinated. The interaction between work, humans, and the means at their disposal has to be scrutinised constantly and corrected or optimised as necessary.

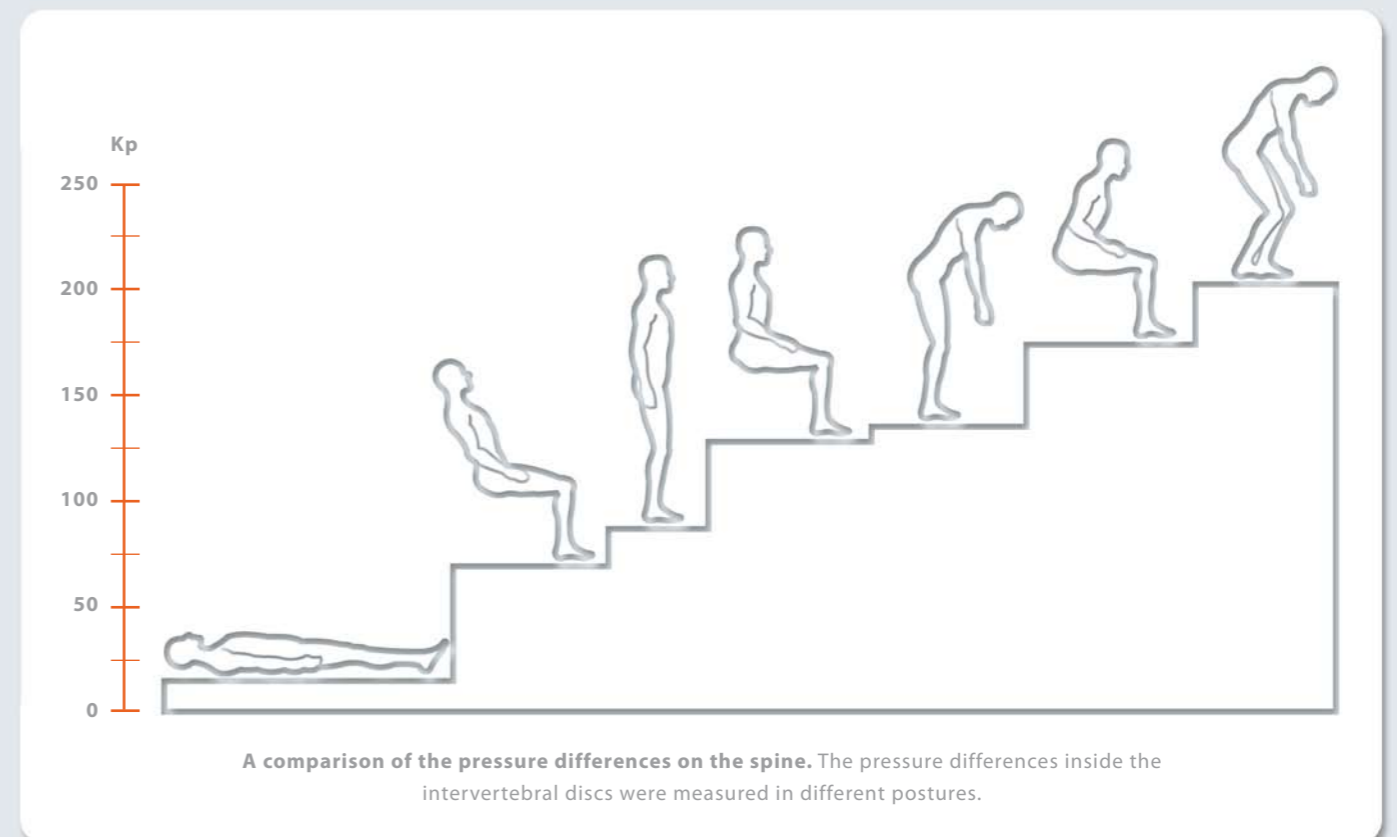


Are humans designed badly?



The transition from a quadruped to an upright human being is a structural problem.

Maybe we are in an inopportune phase of our evolution at the moment. Maybe everything will be better in two or three million years, but until then our backs, in particular, will cause us problems. The intervertebral **discs** and **muscles**, which are the most vulnerable and **weakest links** in the locomotor system, are the main problem. Back pain clearly leads the statistic of complaints. New office sickness, known as RSI syndrome (repetitive strain injury) and CTS (carpal tunnel syndrome) have joined the list of the classic problems caused by sitting due to the increase in computer work. These are the collective names for neck, head, arm and hand problems. Pain, swelling, numbness or tingling sensations are alarming symptoms that are caused, in particular, by the **constant repetitive** movements made while using the mouse or keyboard.

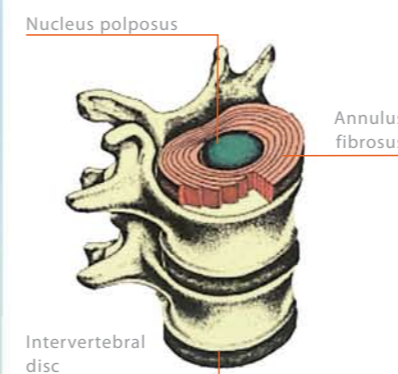


A comparison of the pressure differences on the spine. The pressure differences inside the intervertebral discs were measured in different postures.

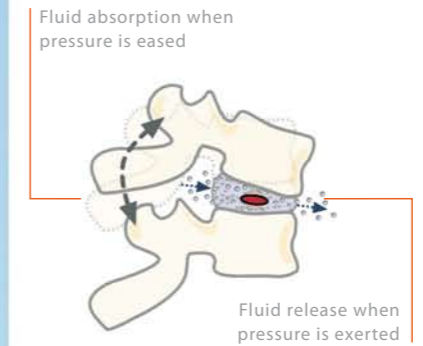
The main problem: the spine.

Sitting is considered a resting position after you have been standing or walking. Sitting relaxes the locomotor and cardiovascular systems. The body reduces its activities and energy use. This is good for the brain and mental work. But humans are not made to sit for a long time. The **intervertebral discs**, which act as shock absorbers and elastic buffers between the vertebrae, can only be supplied with nutrients by diffusion in a depressurised state. Constant pressure and drying out can lead to irreparable damages. The typical **forward-leaning posture** means less strain on the back muscles than the **“correct”** upright posture. That, in a sense, creates a **conflict of interests**. Each recommendation for one or the other sitting posture can only be a compromise. In addition, consideration should also be given to the blood flow and the lymphatic system, which are responsible, amongst other things, for our immune system. The nutrient supply to the cells and the metabolism are lowered by lack of activity and can also cause pain or permanent damage.

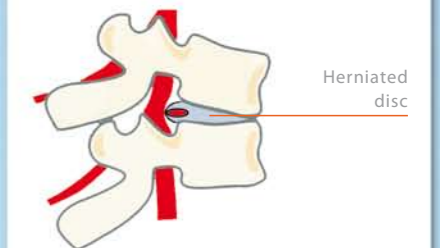
The **spine** consists of 24 movable vertebrae. They are linked by the intervertebral discs, which function as shock absorbers. The spine's ideal shape is the double-s curve. It balances the spine and distributes the weight perfectly. The risk of long-term, invariable pressure is the drying out of the intervertebral discs. As a result, they become brittle and sustain irreparable cracks.



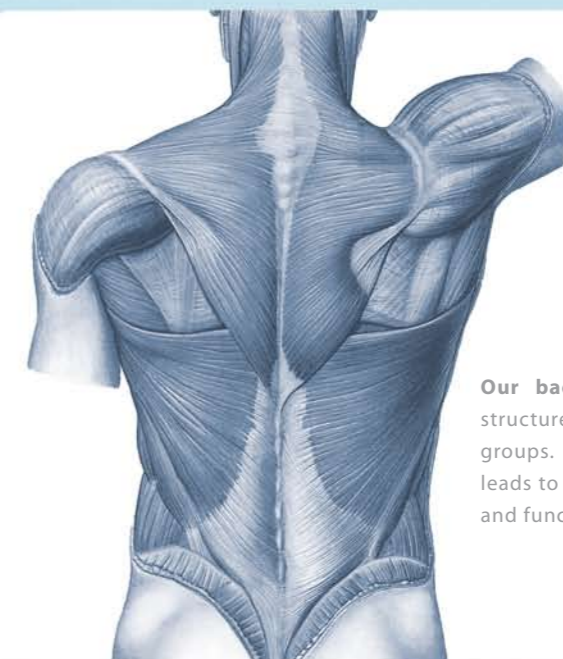
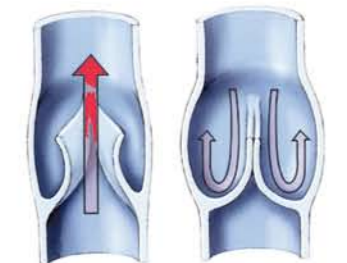
The intervertebral discs take up **nutrients** by diffusion when pressure is exerted and eased. Like a sponge the nucleus pulposus absorbs fluids and releases them under pressure.



A **herniated disc** is caused when the nucleus pulposus shifts backwards towards the spinal canal. As a result, the intervertebral disc bulges forward or the annulus fibrosus tears. This places pressure on the nerves, causing pain or even paralysis.



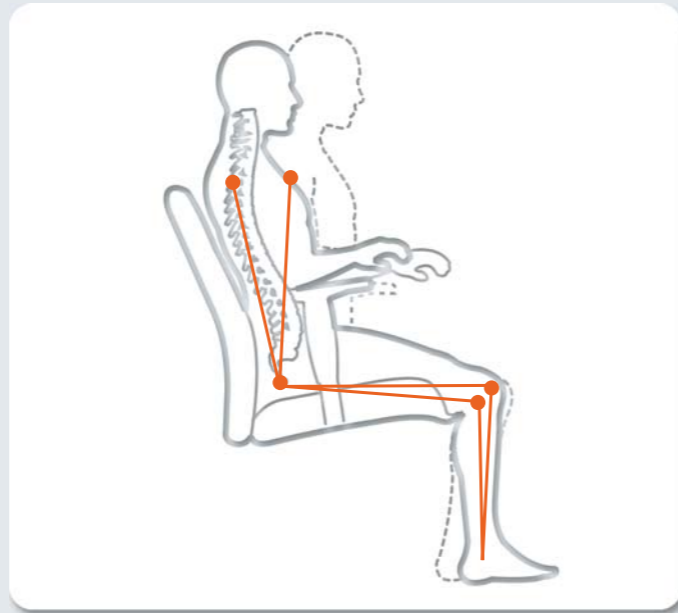
The **cardiovascular system** supplies the body with oxygen and nutrients. Its activity is reduced while we are sitting. The disadvantageous distribution of pressure and tension leads to vascular congestion and metabolic disorders.



Our **back muscles** are a complex structure of differently sized muscle groups. The wrong sitting posture leads to tension and causes metabolic and functional disorders.

The solutions:

- 1 **Dynamic sitting with synchronous mechanics.**



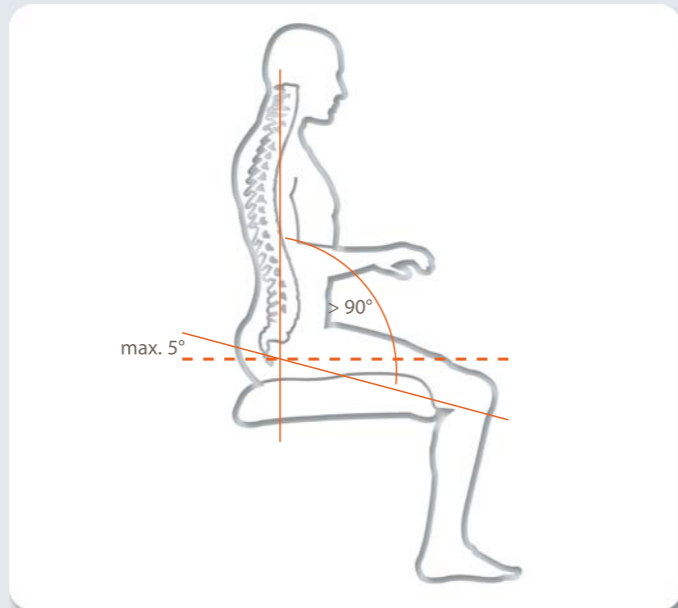
Dynamic, active sitting is the decisive strategy in order to provide the intervertebral disc with **nutrients** despite the maximum pressure that is exerted while sitting. In general, this means that no sitting posture is correct in the long term, but rather that **constantly changing** from one sitting position to another eases the pressure on the intervertebral discs and stimulates the blood flow, metabolism, breathing and, therefore, enhances our ability to perform. This chair design supports dynamic sitting by additionally optimising the posture in any sitting position. Haworth offers **2-point** or, alternatively, **3-point synchronous mechanics**. It provides optimal weight distribution and helps alleviate pressure points in every position.

- 2 **Correct sitting posture.**



In general, the ideal sitting posture is achieved by maintaining the spine's **double-s shape**. The posture is improved by tilting the pelvis forward. This raises the chest, makes breathing easier and stretches the cervical spine, which is thus better able to carry the head's weight (approx. 9 % of the body weight). As a result, the neck muscles are **less likely to become tense**. The posture is optimised by actively supporting the lumbar.

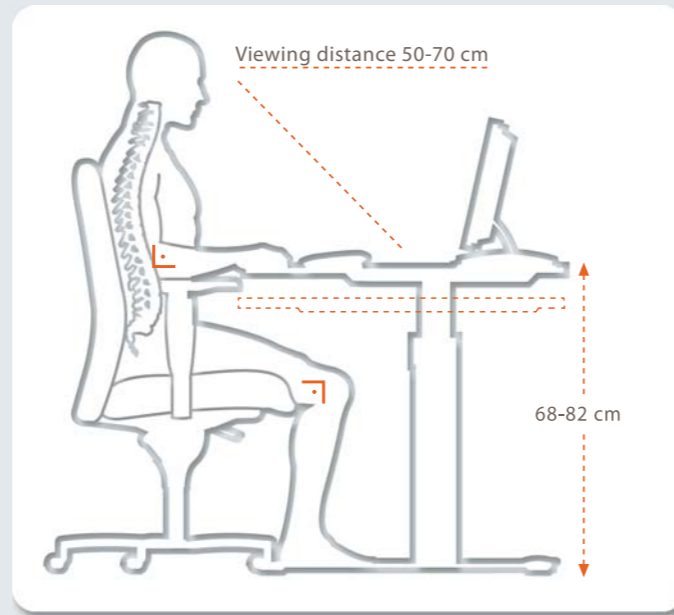
- 3 **Open sitting angle.**



A sitting posture with an angle of over 90° between the upper body and the thighs supports the **upright posture** and improves breathing, the metabolism, digestion and thus the ability to perform. Scientific tests show that a slight incline in the seat of approx. 3-4° also optimises our posture when we sit for longer periods of time. A greater seat inclination is problematic since we tend to slide to the front, thus losing our contact with the backrest, and can no longer maintain the spine's double-s shape. Chairs that have **adjustable seat angles** are especially advantageous because they adjust to individual needs.

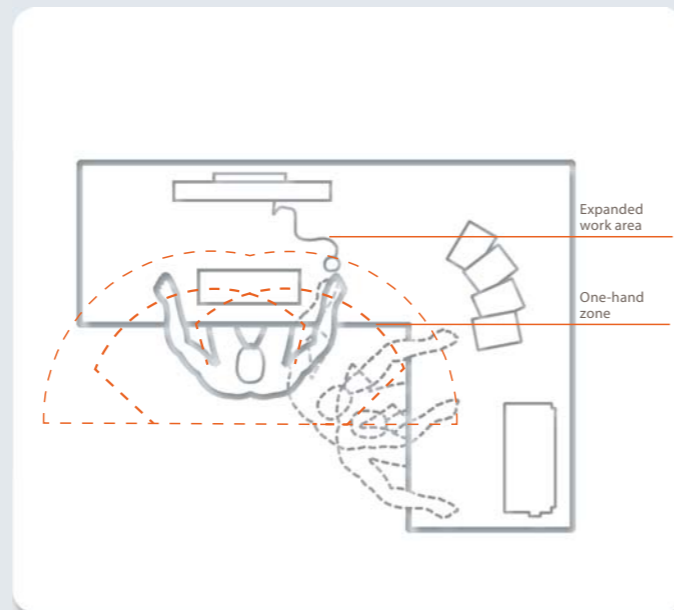
The solutions:

4 The correct posture (seat/seated workstation).



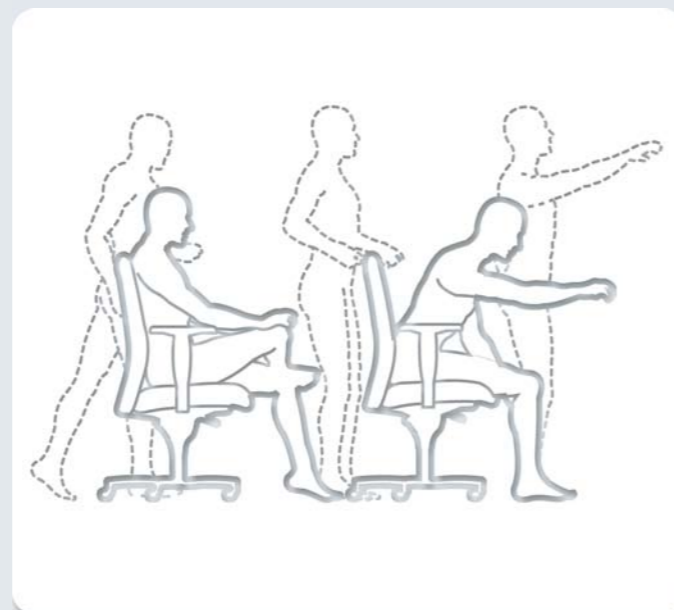
Even the best chair is useless if it is adjusted incorrectly. Your posture is correct if your upper and lower arms form an angle of about 90° while the seat is positioned horizontally and your lower arm rests on the desk top. The entire soles of your feet should touch the ground without effort. Height-adjustable armrests relieve the pressure on arms and elbows and prevent tension in the shoulders and neck. Height-adjustable tables are the ideal solution to adjust them to individual body sizes. Electric motor-driven height-adjustable desks are especially practical when desk sharing.

5 Correctly organised reach.



Your workstation should be sensibly organised to accommodate the task that you are currently performing. If you work mainly at the computer, you should pay particular attention to the positioning of the keyboard and the computer screen in order to prevent tiring and one-sided pressure, which are the result of an incorrect head posture. If you perform varying tasks, e.g. computer work and filing, you should make sure that you have sufficient space. Avoid great contrasts in colour and light.

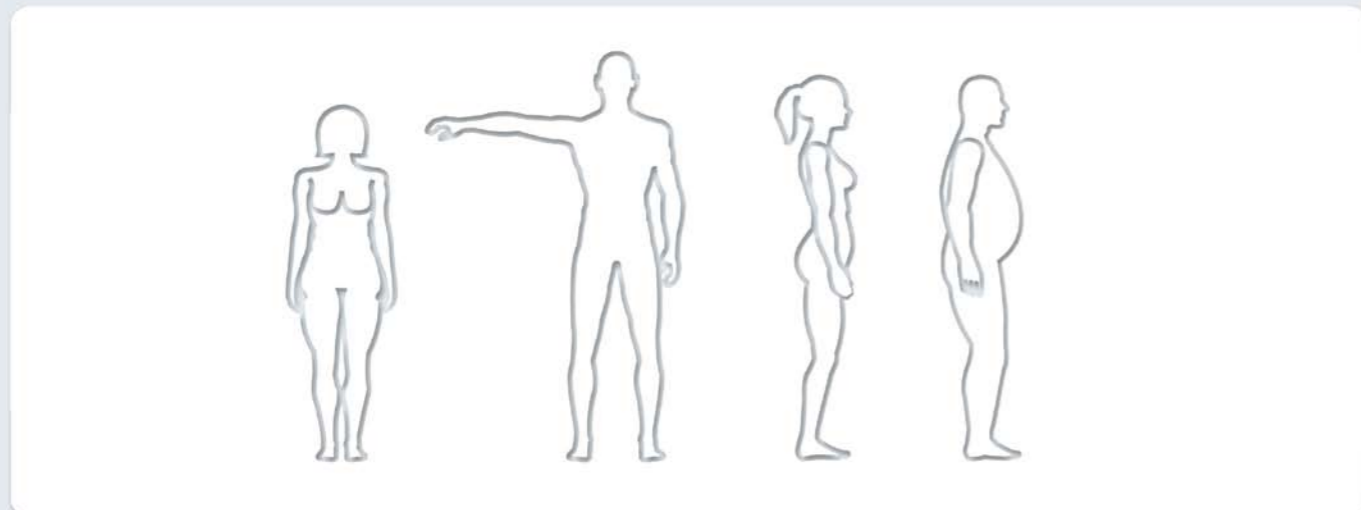
6 Dynamic work.



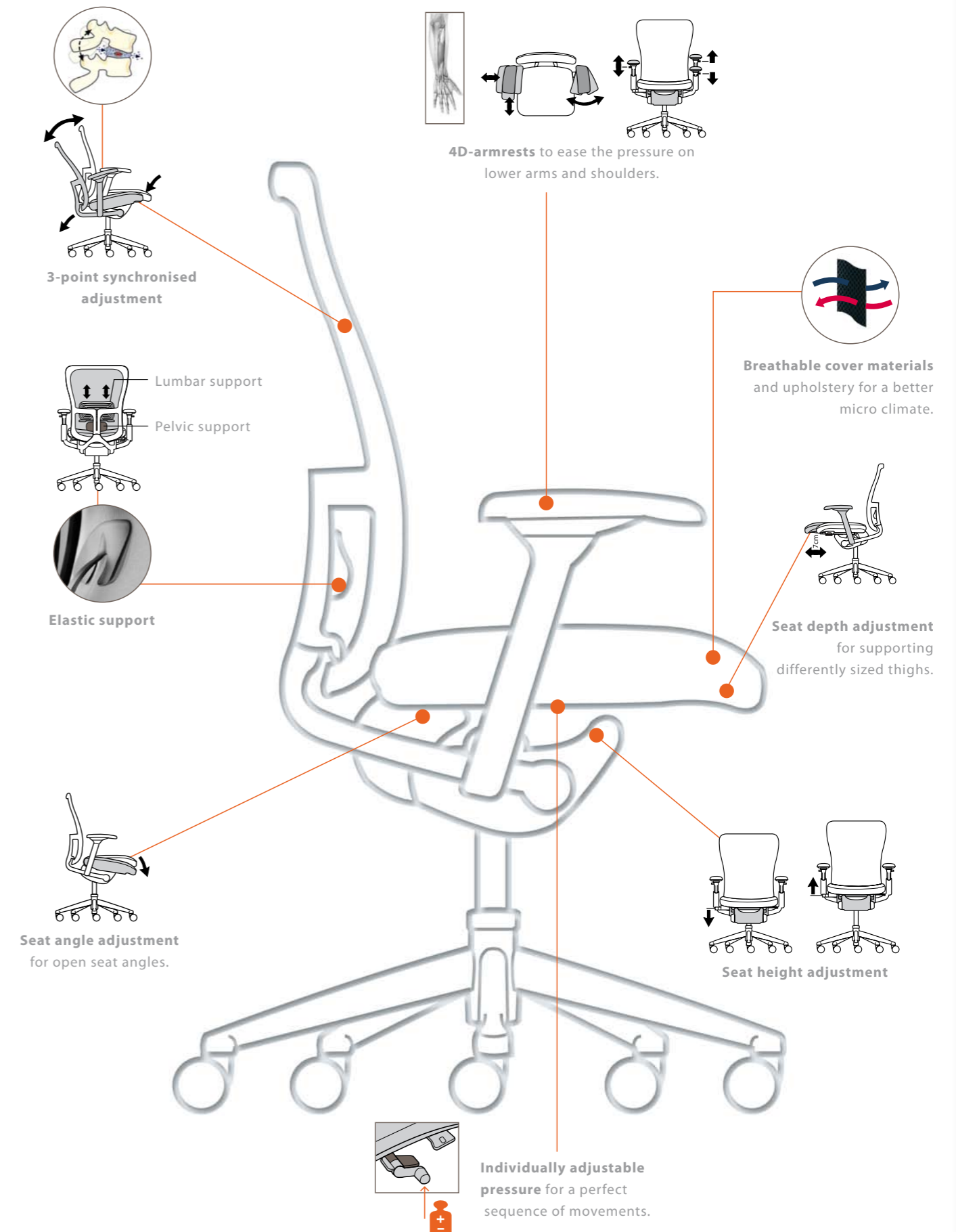
No matter how well you sit, your body needs **change** regularly. Organise your workstation so that you cannot reach everything from your chair. Stand up to go to the copier, printer, a team meeting with your colleagues or during a short break. Stretch to reach shelves or put your feet up. Take the stairs instead of the elevator for a change. Take a walk outside during your lunch break, if possible. If you exercise regularly in addition to these suggestions, you will provide your body with the support it needs at the desk. So-called cardio exercises at the gym, jogging, walking, swimming or weight lifting strengthen the back muscles ... but even here the motto is: it all depends on a sensible mixture of activities and personal attitude.

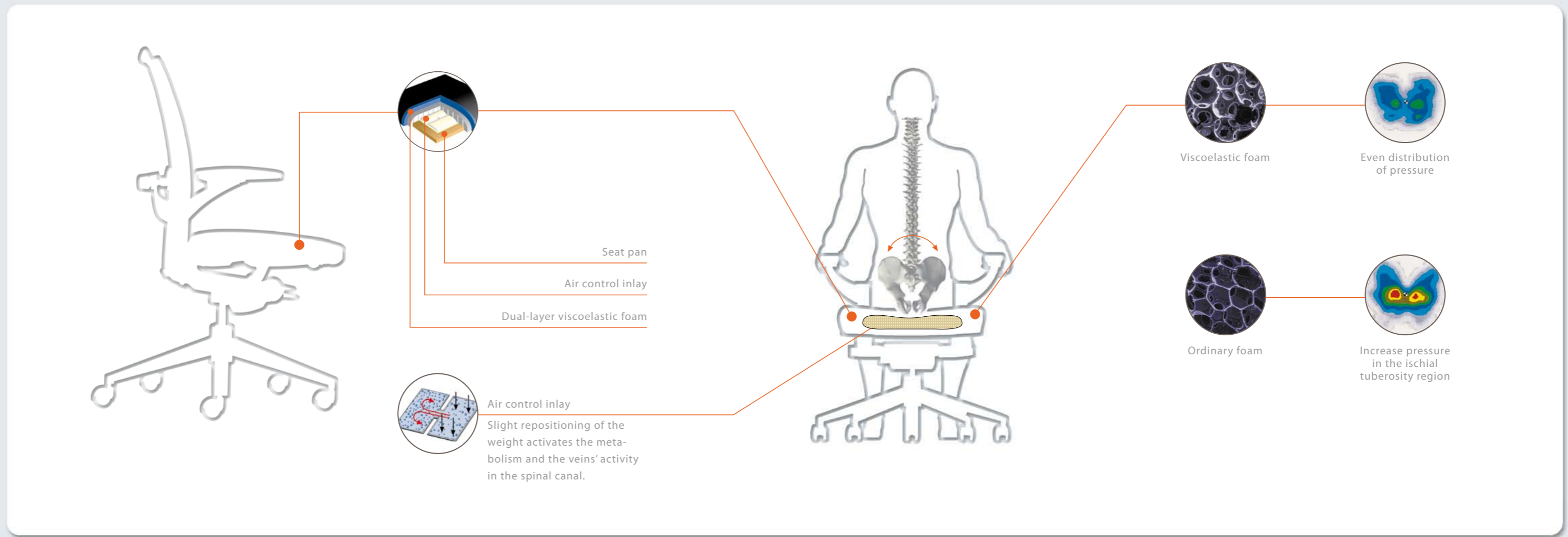
Flexibility and adaptability across the board.

The prerequisite for healthy sitting is a chair design that supports all of the user's critical body parts and, at the same time, encourages him or her to move. The chair's ability to adapt to the user's needs is of the utmost importance. Desk sharing concepts, in particular, demand that chairs adjust quickly to different heights and bodyweights. **The large adjustment range** for the seat height, backrest pressure and lumbar support as well as the seat depth and inclination and the height and width of the armrests make System 76, for example, an ideal partner. It fulfils the latest European EN ISO 7250 standard and acknowledges the extreme differences in the "working population".



Anatomy of a chair



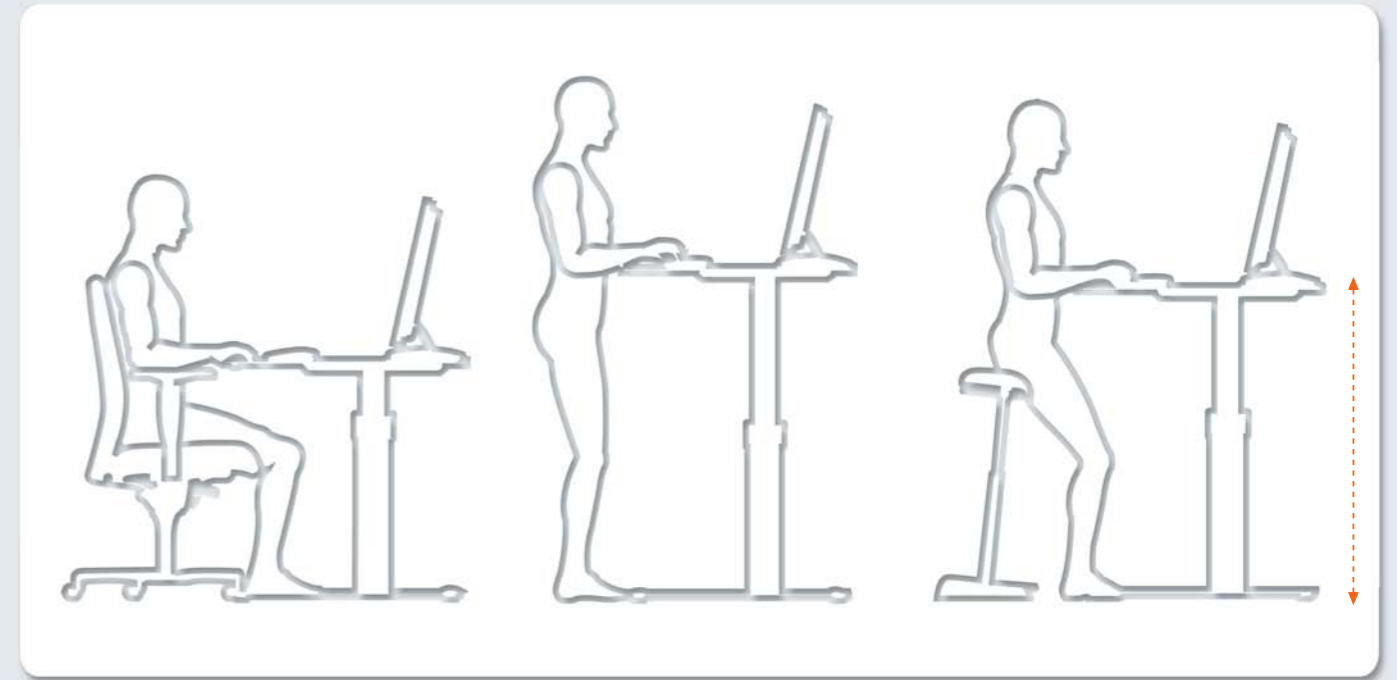


Sitting better with AIR•GO•PUR®.

Nearly the entire weight of the upper body rests on the ischial tuberosity. A rising sense of pressure as well as tension thus spreads throughout the buttocks and pelvis, causing irritation and pain. A reduction in the veins' activity causes, amongst other things, low back pain syndrome. Venous stasis in the spinal canal exerts pressure on the nerve exits and branching in the lumbar region. After a short while, sitting becomes torture. The new AIR•GO•PUR® seat provides optimal

relief from pressure in the buttock region. A dual-chamber, air-filled cushion animates the user to shift his or her weight and creates a swinging motion in the pelvic region. This spreads to the lumbar vertebrae and increases the blood flow as well as the metabolism. The viscoelastic foam ensures depressurisation and conforms to the body by pressure-point relief. The combination of these innovative technologies sets new standards in regard to seating comfort.

Standing/seated workstations: the better alternative.



In the long term, no posture is the “**right one**”. Thus, the next logical step is to develop dynamic sitting into a **standing/seated workstation**. The electric motor-driven desktop allows the user to personally decide and change his or her position and posture at any time. You can change your position, as is strongly recommended, to accommodate the task you are currently performing – whether you are talking on the phone, writing, designing or talking to colleagues. This will help you to avoid exerting one-sided pressure on certain regions of the body. Furthermore, the sense of **making your own decisions** will help you to go about your work in a **more relaxed state**. The additional costs of implementing standing/seated workstations are comparatively low in regard to the costs that result from illnesses. **Reducing** the number of sick days by just four will cover the additional investments. In line with an economic calculation, standing/seated workstations are amortised after a short period. Because an electric motor-driven height-adjustable desk can be adjusted to fit the user’s requirements and body size exactly it offers many advantages, even while sitting. An adjustment range of 66 to 118 cm covers the needs of extremely different body sizes and ensures ergonomic support, even in desk sharing environments. The additional use of a standing aid can be useful. Overall, the table design must be stable and free of vibrations.

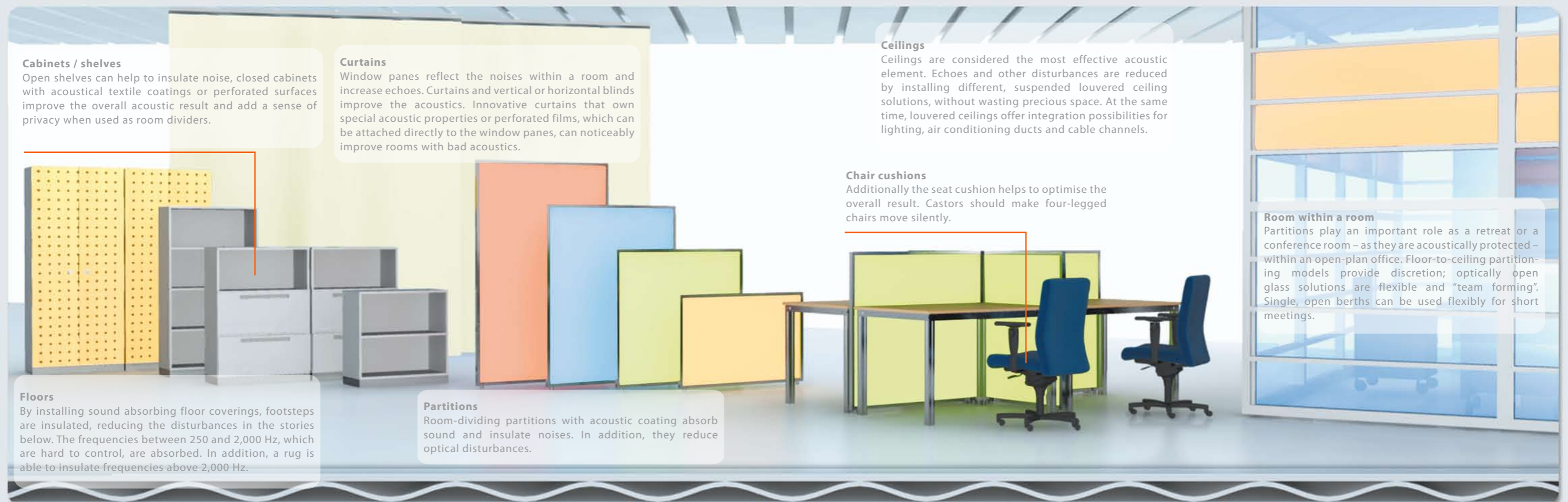


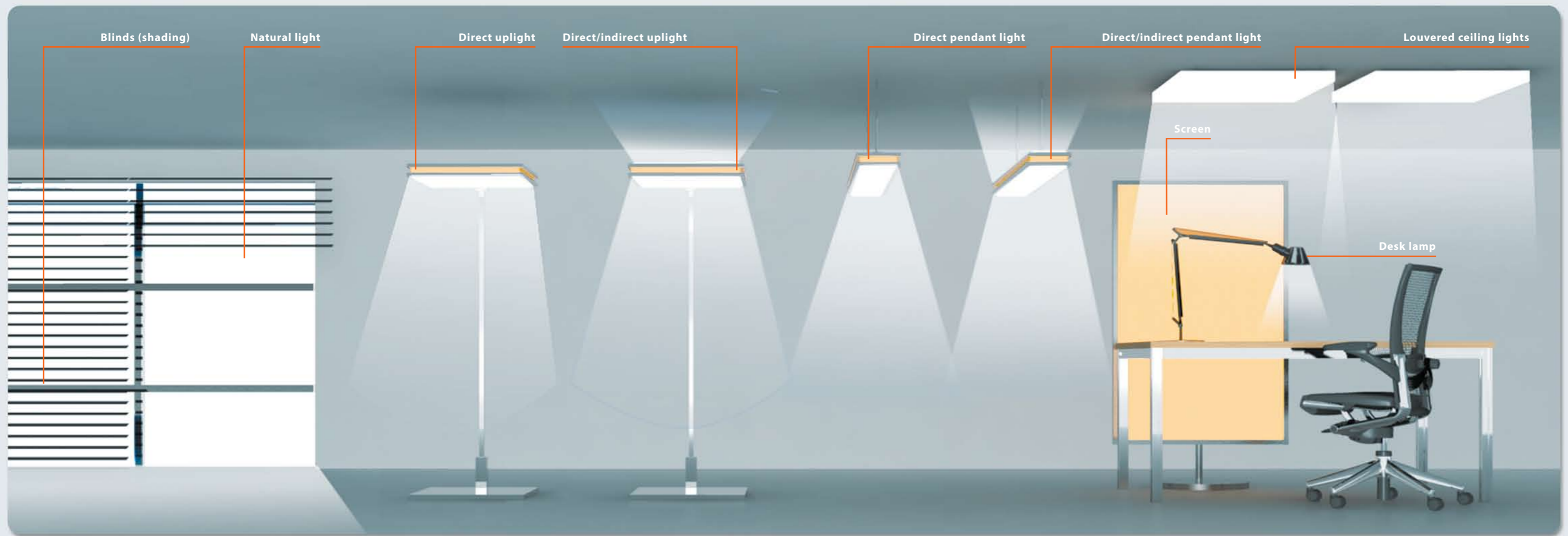
Acoustics, another topic for

– calm – discussion.

Open-plan and team offices are flexible, more adaptable and reflect the demand for flatter hierarchies, for open communication and higher **group intelligence**. The following aspects are the disadvantage of literal “close co-operation”: noise, interruptions, additional stress-inducing factors. The informal, positive atmosphere of human interaction turns negative. Conversations, telephone calls, laughter, coughing, footsteps, printer noises, the copier, etc. – individually or as a whole – create a disruptive, and depending on how each employee is feeling that day, unbearable

acoustic backdrop. Noises above 65 dB cause damaging disorders to the vegetative nervous system. Several measures can reduce noise. Again we suggest an integral solution that achieves the best results in regard to acoustic management. Different frequencies can be absorbed and insulated in a controlled manner by applying different measures. The objective is to minimise the employees’ emotional stress and to maximise the advantages of open communication and an interactive exchange for the good of the company. By using the appropriate computer programmes, acoustic experts can calculate and simulate the noise development within an office in advance. Since the acoustics within a building can be attributed to different companies and suppliers, we suggest that the responsibility for the acoustics be centralised.





Light – the fourth dimension.

Artificial light has advanced civilisation like no other invention, since it alone has freed work from its dependence on daylight, time and space. But that has also given us the ability to trick our inner **biological clock** – which is not always good for our mood. Light not only represents the physical ability to recognise designs, writing and colours. It also directly influences our ability and willingness to perform. Office light normally consists of a combination of natural daylight and artificial light. Modern architecture makes it increasingly easier to manage daylight. Shade systems, reflective surfaces, directional lighting and fibre glass elements provide natural and

energy-saving lighting. In most offices, artificial lighting is created by anti-glare neon lights, which are integrated in the louvered ceiling. A combination of **direct and indirect lighting** is considered a better alternative. Adding flexible **shade elements** helps to prevent glaring and can – depending on their design – have acoustical advantages. Not enough light influences our ability to perform and quickly leads to eye irritation or headaches and tiredness due to eye strain. **Light management** is advantageous. It simulates daylight and supports the natural rhythm. As we all know, light creates **atmosphere**. By selectively controlling light intensity, colour and direction, rooms can be set in scene and can be designed as integral offices.

The working climate – literally.

The room climate strongly influences our well-being and, therefore, our ability to perform.

Several factors can be defined and researched individually:

Temperature: each person feels it differently. We recommend a temperature of 21-22 °C. Heating, light and the development of heat by people and machines must be taken into consideration. High temperatures cause drowsiness; low temperatures can cause colds and loss of concentration.

Air movement: draughts that touch the skin often lead to cooling and severe tightening of the muscles. This frequently occurs in air-conditioned rooms. Draughty windows or cold that is reflected off of glass surfaces also have a negative effect on employees' health. In the winter, rooms should be aired in intervals by opening windows or doors for 5 to 10 minutes. Cold bridges, which are created because of bad construction solutions, often lead to the growth of unhealthy mildew.

Humidity: the perfect humidity level ranges from 40 to 65%. A balanced humidity helps to create a sense of comfort. Dry air, especially when heating, irritates the mucous membrane and causes skin and eye irritation. Since humidity is considered a transport for heat, a balanced humidity helps to lower heating costs. One of the best humidifiers is the "classic" container of water that is attached to the heating unit. Plants regulate the humidity and, furthermore, help to filter pollutants.

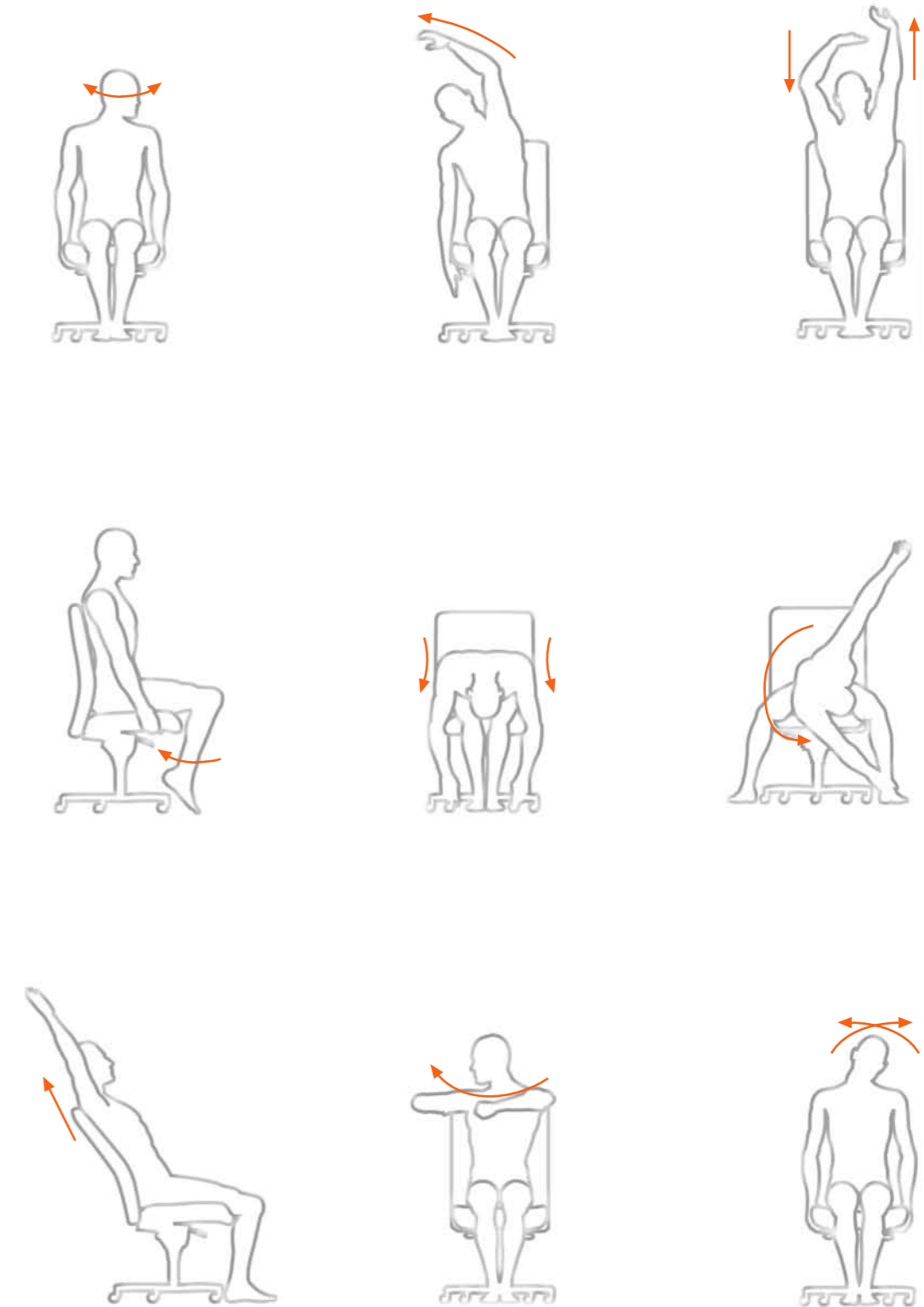
Pollutants / electro smog: all building materials, furniture and machines are potential sources of pollutants. You should therefore check the respective levels and certificates to determine whether the furniture, floor coverings, technical equipment, etc. are suitable when purchasing them. Talking about the so-called "sick building syndrome" has heightened the awareness of architects, planners and consumers and has led to the removal and avoidance of sources of danger.

Wellness factors – a new discovery: the interest in the positive influences of smell and touch on humans is growing. Smells, which we are aware of consciously or subconsciously, control our mood and concentration. The surfaces that we touch with our hands conjure up a sense of security or unease. These are entirely new disciplines that will soon be an inseparable part of integral office design ... You will smell and feel it.



Wellness at work.

We sit too much! The “**office sapiens**” spends approximately 80,000 hours in a sitting position at work alone. If we combine a lack of movement with bad eating and consumer habits and add to that the daily stress, then we will get “every kind of civilisation sickness”. **On the other hand**, humans have never been as health conscious or as fitness- and wellness-oriented as today. We are therefore on the right path. The **food pyramid** provides clear recommendations to eat fruit, vegetables and whole grains and to avoid excess consumption of animal fat and sweets. **Drinking fluids** is particularly important – especially water or fruit juices. Water thins the blood and helps to transport nutrients to the body cells. Water acts as a detoxant, cools and increases all circulatory systems and the metabolism. This increases your well-being. If **power napping** is a part of your corporate culture, then you are definitely of the moment. Catching a couple of minutes of sleep in between work will rejuvenate you. By the way, even a chair can be used as sports equipment. Some exercises will keep you fit and increase the blood flow and metabolism. Remember: sitting is work. The muscles and tendons tighten in order to keep the body upright. By doing some exercises you will be able to counter the tightening. Exercise – particularly when sitting – is the right strategy. **If we have to sit for a long time, then at least sit correctly.**



In conclusion ...

The **Hawthorne effect**, which derives its name from the plant where the effect was first observed, proves that **each** change in one's surroundings leads to a short-term improvement. Since change generally has a stimulating effect on those involved, even a negative change can lead to an increase in productivity. Of course, we do not recommend the latter. Rather, we call on you to strive constantly to make improvements. Listen to your body, make changes, be flexible, stay active – mentally and physically – and find the right balance between your professional and private life. We will gladly support you in your endeavour.



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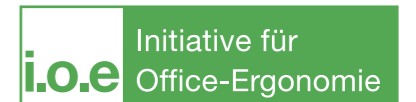
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Alle verwendeten Marken und Produktnamen können eingetragene Markenzeichen sein oder Markenzeichen einzelner und werden hiermit anerkannt.

Toutes les marques et noms de produits sont des marques déposées ou des marques appartenant à leurs propriétaires respectifs et sont donc reconnues.

Alle merken en productnamen kunnen geregistreerde handelsmerken of handelsmerken van hun respectievelijke houders zijn en hierbij erkend.