ethonomics

ethonomics: designing for the principles of the modern workplace

paper or plastic new perspectives on a healthy workplace, community and planet

Always design a thing by considering it in its next larger context – a chair in a room, a room in a house, a house in an environment, an environment in a city plan. - ELIEL SAARINEN, ARCHITECT

The day after tomorrow is on our doorstep and once again, the workplace is ripe for reinvention as we deepen our understanding of sustainability— economic, social and environmental—and what that means in terms of human beings at work. Again, the time has come to rethink our approach to workplace design; to explore new ways to create healthy, inspiring and sustainable places in which people can feel good about where they are and what they do. We will focus on the workplace, but also address the "ethonomics" of good health at all social scales: individual, building, city and ultimately, the planet.

A Changing Landscape on Every Scale.

In the second decade of the 21st century, we are ever more aware of how organizations, and each of us, interact with our surroundings. We recognize that our behaviors as persons and our actions as groups have broad, even global, effects. Reversing the order, or completing the loop, we also know that urban neighborhoods, building architecture and the landscape of the modern workplace interact with residents, occupants and workers, enhancing or compromising health and quality of life. At every scale, both human and environmental health are becoming "mission critical."

Everything reverberates. - GEORGE BRAQUES

As we attend to issues of sustainability and health, we've come to see the complexity of our choices, knowing that even a single act, can have far-reaching and perhaps unforeseeable effects. The most prosaic situation is fraught with ethical issues. A decade ago, we went to the market and the question would arise, "Paper or plastic?" Today, the question is whether or not we have brought our re-usable canvas shopping bag. Or, do we wish to pay for a paper bag? What about buying a set of blocks for our three-year-old. "Wood or polyethylene?" Which choice is best for society, the economy and the environment? There is no easy answer, perhaps no "right" answer, even

RIGHT *As we contemplate our human presence vis-à-vis the natural world, we might also ask, "What is our role as creators and consumers? Can we reconcile human needs and desires with the nature of other living things?"*

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in so simple a matter as choosing tap water over bottled water, selecting the responsible carry-all for our purchases or the appropriate toy for our child.

Too often, we have little clear, balanced information about the environmental features of a product or accurate documentation about the real carbon footprint of a building—even one that bills itself as "green." Most of us are willing to do our bit for the environment, but are uncertain about how to choose, use and dispose of the things we purchase in the best way. Equally, there is controversy about what constitutes principled business practices or the best way to plan and build our cities.

For example, should we always choose paper, wood or glass over plastic, the "authentic" or "natural" material over the synthetic substance? And can one lead a plastic-free life? Do you have a plastic–free cell phone? What about your running shoes? Plastic is a useful and sometimes beautiful material: light, durable, moldable, flexible or rigid according to how it is formulated. And, although it has come to symbolize an attitude of careless disposability, new biodegradable plastics made from corn (rather than petroleum) can be tossed in a compost bin. How do we measure the environmental cost of a material? Or, the net effect of a "socially responsible" product?

Such questions arise as we consider the ethics of the production, distribution and consumption of goods. Food choices have a carbon footprint, as well as a nutritional profile. Foods that are packaged and transported long distances affect the health of our planet and ourselves. Even apparently benign activities raise questions. Walking and hiking are great exercise, but how much fuel did we burn driving the 4x4 to get to the trailhead? How and by whom was our high-tech windbreaker made? Many of us now look deeper than the eco-label. We want empirical data and verifiable information from companies that are transparent and accountable. We want to live intelligently and responsibly, to pursue health and happiness—and to preserve the chance of a bright future for generations to come.

The sustainability revolution is nothing less than a rethinking and remaking of our role in the natural world. -DAVID W. ORR, AUTHOR AND ENVIRONMENTALIST

Those of us who are involved in the design of buildings, spaces or products, must now ask whether our work benefits or in some way inflicts damage on living things. One has to be aware of the long term and downstream effects, not just aesthetics or the immediate need the structure or product fulfills. Today, ethics and science have as much authority as form and function, even generating concepts like "ethonomics," a combination of the words "ethics" and "economy." Noah Robischon, executive editor at *Fast Company* and creator of the Co. network of websites, defines the new word as a "hybrid of technology, design and social responsibility."[1]

The triad of technology, design and social responsibility is not wholly new. One only has to read a history of 20th century design to find an abiding concern with design and the public good and the harmony of culture and nature. The conditions however within which designers work have undergone massive change thanks to 21st century technology, so that these aspirations now take the form of "urban revitalization, green IT, alternative energy and online community-powered investing."[2]

"Sustainability," "cleantech" and "green" are firmly in place in the general lexicon and people, companies and governments have taken steps big and small in the direction of responsible practices—suggesting that we are moving away from "business as usual." Certainly I see every indication that we are beginning to design products, tools, buildings and cities that are, on balance, good for living things, although we still have a long way to travel on that particular road.

We are healthy only to the extent that our ideas are humane. - KURT VONNEGUT

In the fall of 2013, the American Institute of Architects (AIA) announced a ten-year commitment to put human and environmental health and wellness at the center of the architectural mission. Announced at the Clinton Global Initiative annual meeting, such a statement offers evidence of a cultural shift, a new consciousness if you will that encompasses broader definitions of sustainability. As a society, we are beginning to pay attention to human health and how that may be achieved given the pressure, pace and complexity of life. We are beginning to recognize that human and environmental health are essentially linked and at the core of any design pursuit, whether one is planning a livable community with a green infrastructure or designing a human-centered office.

The purpose of our paper is to take a "deeper dive" into sustainability and to consider the connections between sustainability and human health. We will explore the idea that well-designed space, in all its forms can be a catalyst for physical and psychological health (at the scale of urban planning, architecture and, in particular, the workplace). We will consider, and attempt to illuminate, the interactions between ourselves and the spaces in which we conduct our lives—and how those spaces affect human functioning and health.

First, let's take a look at three salient features of the social and cultural landscape that clearly affect our core behaviors, our health and that of our planet: technology, food and the character of our cities.

When health is absent, wisdom cannot reveal itself, art cannot manifest, strength cannot fight, wealth becomes useless, and intelligence cannot be applied.
- HEROPHILUS, ALEXANDRIAN PHYSICIAN 300 B.C.

In the 21st century, in North America, many people stay active and productive well into the 6th decade and beyond. At a basic level, most of us have access to fresh air and clean water, electricity and gas for thermal comfort and plentiful food. City planners, along with community groups, are working to make our cities greener, smarter and more inclusive; architects and designers are creating healthier places to live and work. However, we still have much to learn in order to create optimal conditions for physical and mental health and to design cities, spaces and products that promote health and bring out the best in people, rather than those that lead to disease.

A century ago, the leading cause of death in North America was infectious disease: pneumonia, tuberculosis and dysentery. In 2000, 7 out of 10 deaths in the U.S. were the result of heart disease, cancer, stroke and lung disease— chronic illnesses primarily caused by poor diet, lack of exercise and tobacco. Worldwide, the profile is somewhat different with lower respiratory infections such as pneumonia still among the top three.[3] But in developed countries, where infectious disease is controlled by sanitation and inoculation, ill health results in great part from how we live and work—particularly for the 65% of us who are sedentary white collar office workers.

Let's take a look at two elements that are integral to contemporary lifestyles, as well as to individual, community and planetary health: our use of technology and our choices about food.

technology: nutrient or nuisance?

Technology of course plays a role in all major social, cultural and economic shifts—including issues of health. It's no secret that digital wizardry has lured many of us into leading a more sedentary life than did our fathers and grandfathers. Addictive gadgets invite us to sit, surf, watch and play for hours at a time. We have to first exercise our will in order to be active, rather than a passive and immobile consumer of media in all of its forms. Often, we have to urge ourselves to walk or bike to the store, the school or the office—if the choice is feasible. Even children must be urged to put down the Kindle or the iPad and go outside to play.

According to recent data from The Neilsen Company, pre-teen children, ages 6-11, spend 28 hours a week watching TV, streaming movies or playing video games. If one adds the use of portable devices, time spent texting, listening to music, "sharing" on social media sites and so forth, the figure skyrockets to more than 53 hours a week. Technology has given us comfort, pleasure, mobility, knowledge—and a few problems.

What will the long-range effects of technology be on human physiology and psychology, social norms and economic sustainability? The question is difficult to answer given that technology advances and "disrupts" at an ever-quicker pace, changing behaviors and social norms before we can stop to think about it. Remember, we've only had the iPad for 5 years, the iPhone for 7, and take a look around at how those devices have changed the way we work and play. What might occur once wearable technology like the new Apple Watch becomes the norm?

For nearly all of human history, our comfort and survival required constant physical activity, but thanks to technology we can now shop, pay bills, work and talk to family and friends without so much as standing up. All it takes is a tap of the finger. This is equally true for most of the work that we do.

The good news is that some advances in technology may be working in our favor. In fact, there are over 10,000 consumer-oriented health apps available for iPhone download and one can also make use of digital gadgets that encourage physical activity. The Wii Fit balance board offers customized exercise routines

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and Samsung's S Health fitness tracker helps to monitor and manage exercise levels, food intake and heart rate in order to improve fitness and health. And, according to an article in the *Business Insider,* Flurry Analytics reported that between December 2013 and January 2014, health and fitness apps grew 62% in usage compared to apps overall that grew only 33%.[4] Clearly, the ethos of wellness is now part of the social milieu—and the marketplace.

Nonetheless, most of us spend most of our time indoors, sitting down; physical activity has been essentially engineered out of work and daily life. According to a report by the American Surgeon General, 60 percent of American adults are not physically active on a regular basis and while many people embark on vigorous exercise programs, most do not sustain participation. As for the youngest generation in the current workforce, they are less active and more obese than earlier generations. Today, we ask our bodies to do less, while being presented with more food than anyone could have imagined 100 years ago. The result is obesity.[5]

What can we conclude? Primarily, that it is essential to monitor electronic screen time and our use of technology. Step away from the computer, turn off the television and leave the car parked in the driveway. Instead, walk the dog, schedule a yoga class (and actually go) and set a timer when you do go online. Then, get up from your desk, stretch and take a break. Do something active, whether it's walking around a farmers' market, working in the garden or strolling down the street to the nearest park.

food: fuel and fun

Let food be thy medicine and medicine thy food. HIPPOCRATES

Food, as it relates to health, is a complex subject. As individuals in North America, healthy, safe and affordable food is available and most of us have the means to purchase it. Still, obesity in adults and children rose dramatically in the last half of the 20th century, along with heart disease, diabetes and other chronic diseases linked to diet. What is happening now? Can we identify an emerging trend? Are we more conscious of caloric content or nutritional value, foregoing processed and high-fat foods? Do we make food choices based on the value of good health? Are we aware that our choices can make a positive difference in the world?

Many of us are interested in the story behind our food: where it comes from, how it's made and what's in it. Our increasingly urban population seeks out ethnic and artisan foods, often buying fresh produce and prepared dishes from suppliers at farmers' markets, food trucks, pop-up diners and roadside stands. Local foods—as ingredients purchased for cooking or as dishes served in a restaurant—appeal to a broad range of consumers who have an interest in sustainability and a desire for fresh, organic foods.

Young workers in particular appear to be more sophisticated in their food choices, seeking out global cuisine with intense flavors and exotic condiments. A study by the Culinary Development Center notes Gen Y's preference for "authentic" foods: "If it bears the name *papusa, hummus, vindaloo, nigiri,* or *arepa,* it had better be a close approximation of the native form." At the same time, the study found that while a twenty-five-year-old may appreciate healthy food, he or she is also prone to fueling the day with caffeine and "indulging in some of the most decadent fast food around." Still, this generation does gravitate toward organic, free range, hormone-free, cruelty-free, grass fed and locally grown products—even while lacking consistency in its choices.[6]

For the 20,000 employees who work at Google, "food is deeply entwined with the company culture and identity." There is no generic bulk food in its cafes, of which there are 17 for the 4,000 workers at Google's Mountain View campus. The company supports local farmers, organic produce, hormone-free

PREVIOUS PAGE *As TV and computer screens tempt us into a sedentary lifestyle, the activity that once burned calories does not occur. Thus, we must become more aware and in control of our food choices.*

FOLLOWING PAGE *In well-designed cities, the natural and built environments are interwoven, the urban fabric enriched by an infrastructure of parks, wall-mounted gardens and other green spaces that create a beautiful, sustainable place to live and work.*

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meats, fresh-squeezed juice and "raw" food. The reason? First, because it's part of the Google ethos. And, because good food enjoyed in a casual communal setting is an excellent way to keep workers happy, healthy and productive—willing and able to work long hours at the campus.[7]

Such interest in healthy eating and authentic foods—as opposed to generic, packaged and highly processed foods—parallels concerns about food production and transport, ethical consumerism and healthy ecosystems. At the same time, there is still a fast food venue at every major intersection and while McDonald's now puts apple slices in every Happy Meal (a small concession to health), a recent study based on the U.S. Department of Agriculture's Healthy Eating Index shows only slight modifications to fast food menus and "given that fast food is ubiquitous in the U.S. diet, there is much room for improvement."[8]

Food trends are, of course, just that—trends. This week, the healthy thing to eat is kale, flax seeds and yogurt. Tomorrow, it will be something else. One trend that has entered the mainstream is the preference for organic food and the growth of the organic food industry—the fastest growing sector of the American food industry. Organic food sales grew by 17 to 20 percent a year in the early part of the 21st century and today, organic products are sold in most conventional grocery stores, as well as at farmers' markets that have popped up across the U.S. In fact, the U.S. Department of Agriculture (USDA) has a weekly farmers' market outside its Washington, D.C. headquarters and now spends roughly $5 million a year as part of its Farmers Market Promotion Program.[9]

Emblematic of person and social values, the food on our plates has an effect beyond providing nutrients or inflicting damage on our own bodies. The transportation of produce from distant locales has a carbon footprint. Pesticides and herbicides used in large-scale farming seep into rivers, affecting biodiversity and the health of our communities. Packaging presents problems of waste and landfill. The value of choosing to purchase fresh, nourishing food from a local farm is now recognized at the level of community and national policy, resulting in reforms like the Child Nutrition Reauthorization Act, as well as programs such as the Edible Schoolyard Project.

Clearly then, choosing to eat local, seasonal, wholesome food is not only a matter of personal health, but is also linked to healthy communities, biodiversity and a sustainable environment. As we look at how our cities are changing, many becoming "greener," we will see a parallel to the shift from a fast-food culture to a good food culture.

building the healthy city

Today's knowledge work happens not just at the scale of people and offices, but at the scale of buildings, cities, and ultimately the globe. - GENSLER 2013 WORKPLACE SURVEY

Looking at the city as a human habitat, urban planners and civic leaders are working together to create and sustain a more robust urban environment, one that incorporates efficient public transit, walkable neighborhoods, parks, trails and other amenities that invite outdoor activity and recreation. Urban greening and urban agriculture have the potential to promote better health, even helping to alleviate depression and other psychological disorders.

While the health of those who live in urban environments is affected by a myriad of factors, individual physical activity is key—and city streets and sidewalks can either promote or inhibit walking, running or cycling. The World Health Organization identifies four environmental factors that inhibit physical activity in our cities:

• Violence
• Heavy traffic
• Poor air quality
• Lack of pedestrian friendly infrastructure, as well as parks and recreational facilities

At the same time, those who live in high-density urban areas are often healthier than their surburban and rural counterparts as the city lends itself to walking. Residents are often able to walk to a corner market, the playground, the transit stop or even to the office itself. Ideally, our cities are safe, pedestrian and bicycle-friendly places with a range of mixed-use commercial areas and plenty of green space and fresh air.

In fact, unlike a decade ago, start-ups, co-working groups and established companies alike are choosing to locate offices at high-density sites that offer access to public transportation—or, to lease space at office parks with lots of green space, walking trails and eco-friendly commuter programs. Pinterest, Twitter, Airbnb and Zynga have recently chosen to locate new offices in San Francisco

PREVIOUS PAGE *In an inclusive, amenity-rich community, people work, play and create in all types of settings that animate the city, allowing access to elements that cultivate physical and mental health.*

FOLLOWING PAGE *Mixed-use city planning blends residential, commercial, cultural, recreational and even light industrial uses to foster land-use efficiency and environmental sustainability, as well as a stronger sense of community.*

rather than in the suburbs of Silicon Valley, at least in part to take advantage of the city's technology talent, culture and walkability. Twitter is reportedly working with the city to improve transit and create new dedicated bike lanes.

Among architects, planners and civic leaders there has been a fundamental reassessment of how urban planning impacts human health, as well as the soil, water and living things with which the city co-exists. Is it important? Yes. By the year 2050, 70% of the world's population will live in cities. Is it complex? Yes. A city is as complex as a living organism and requires multiple strategies to remain or become sustainable. Among those strategies:

• Keep cities compact and plan dense, mixed-use neighborhoods that promote walking
• Provide fast, reliable and energy-efficient public transportation, in which pedestrian and bicycle infrastructure is a component
• Protect parks, urban agriculture and other "green" aspects of the urban ecology
• Protect riparian corridors and waterfront sites ("blue" spaces)
• Fund educational, cultural, recreational and health care facilities
• Conserve resources: e.g., use household waste to fuel power plants; use storm water runoff to irrigate lawns and landscaping
• Make resource conservation and renewable energy part of city policy
• Address sustainable building practices (buildings represent 40% of the world's energy consumption)

The entities that rank U.S. cities as "smart" and/or "green" have different methodologies and criteria. However, Minneapolis, San Francisco, Boston, Seattle, Washington, D.C. and New York City are consistently selected for doing the most to become healthy, sustainable cities.

To quote an article in *Fast Company*, "Smart cities find ways to become more efficient, to deliver more services via mobile technology, to optimize existing infrastructure, and to leverage citizen participation to create better land-use decisions and to break down bureaucracy in order to stimulate a creative, entrepreneurial economy. In short, smart cities are innovative cities." In 2013, Seattle moved up to the #1 spot with San Francisco and Boston tied for the #2 spot in *Fast Company*'s rankings.[10]

Interestingly, *Fast Company*'s description of "Smart Cities" could easily translate into language appropriate to Smart Companies who find ways to *become more efficient, to do more via mobile technology, to optimize existing infrastructure, and to leverage employee engagement and collaboration in order to reach better decisions and stimulate a creative, entrepreneurial culture.*

The American College of Sports Medicine publishes an American Fitness Index that ranks healthy, fitness-friendly cities according to the following

criteria: bans on smoking in public places, new parks, walking trails and bike trails, and a population that prioritizes healthy habits and ranks low in obesity and cardiovascular disease. The top cities: Minneapolis-St. Paul, Washington, D.C., Portland and San Francisco.

What puts Minneapolis-St. Paul at the top of the list? A higher percentage of city land area set aside as parkland, more farmers' markets per capita, a higher percentage of people who use public transportation, bicycle or walk to work, and a greater number of trails, playgrounds, tennis courts and other recreation areas per capita.

The U.S. and Canada Green City Index is a study of 27 cities conducted by the Economist Intelligence Unit and sponsored by Siemens with an advisory panel of global experts in urban environmental sustainability. While San Francisco takes the top spot for overall performance, New York City ranks number one in land use thanks to its high density, green space and projects like MillionTreesNYC—which has planted 949,000 new trees (and counting) since 2007.

Many cities and smaller communities promote urban gardening with the result that a wealth of fruit trees, vegetables and herbs are greening vacant lots, schoolyards and even rooftops, such as Twitter's new San Francisco building and Chicago's City Hall. In Pittsburgh, the GreenUp program provides residents with soil and plants to "green up" vacant lots—transforming more than 100 lots in this way. In New York, an abundance of urban gardens and farmers' markets supply fresh produce to some of Manhattan's trendiest restaurants. In fact, local sourcing and greenmarket items on the menu have become more the rule than the exception among New York chefs.

In the fall of 2014, a free tree give-away sponsored by MillionTreesNYC featured fruit trees with edible fruits: peaches, pears, figs, almonds and apples. More than 4,000 new fruit trees found homes in backyards and gardens in all five boroughs, a large-scale planting event designed to enhance the urban landscape and enable residents to "forage" from their own property.

In conclusion, we might note that, as human beings, we evolved and adapted to natural stimuli such as sunlight, weather, plants, animals and landscapes, which remain essential contexts for our functioning, health and survival. Today's urbanites live in a built world with perhaps a swathe of green, but chances are, we have not fully adapted to skyscrapers, freeways and mini-malls. These busy environments can clutter the mind, while nature tends to let the mind rest, replenishing energy and helping to restore equanimity. More and more, thoughtful architects and designers are incorporating parks, gardens, trees, small landscapes and other natural elements to create more sustainable urban environments.

the healthy workplace:
ideal or idealistic?

In the 1950's and 60's, employee health was seldom factored into office design. Clerical staff in the central typing pool worked under flickering fluorescent lights and did not enjoy either privacy or access to windows and views. In the coveted corner office, a long day was likely to be fueled by coffee, cigarettes and the infamous 3-martini lunch—and there was no company gym, volleyball court or cocoon-like break room to relieve stress. At the same time, people at work frequently left their desk and walked across the office to deliver a memo, retrieve a file or set up a meeting. Incidental exercise—walking—was routine. And office workers rarely worked more than 10 hours a day. By the end of the 20th century, that was no longer the case.

An awareness of health in the workplace emerged in the 1980's with a focus on air quality. With the advent of LEED in 1998 and GREENGUARD certification in 2001, "green" building practices began to be widely adopted, contributing significantly to occupant health. At the same time, technology presented new challenges to health as workers spent long hours seated at computers and began to experience aches, pains and disorders of the musculoskeletal system. Computer-intensive work began to drive the design of highly adjustable work chairs, height adjustable tables and other tools designed to alleviate workers' discomfort, fatigue or injury. Ergonomics became a key tenet of design.

Today, the risks associated with sedentary work are widely acknowledged and fortunately, mobile technology has opened the door to a workplace in which people are free to work in a variety of settings—choosing to sit, stand or even recline. One can move and shift one's posture at frequent intervals to relieve the intensity of any single position and moderate its effects. In this way, the body maintains comfort and its potential for good health. "Active design" strategies are now an essential feature of the modern, sustainable workplace.

Released from spending all day at our desk, we are able to work in a more flexible, open-ended way and the workplace itself has become more open, eliminating the barriers to movement and interaction. At Cisco, for example, a "Connected Workplace" plan includes open spaces called quads, plazas where employees can meet informally, a commons for breaks, and enclosed offices called colleges.[1]

let's get physical:
activity-based design

Sitting has become the smoking of our generation. - NILOFER MERCHANT

The human body is built to move. It follows that the human-centered workplace should provide people with the opportunity for physical activity; with a choice among working postures as well as workspaces. Alert, engaged and healthy workers are most often those who are afforded a stimulating and inspiring work environment that encourages movement—to sit, stand and walk around.

Perhaps the greatest risk to personal health at work is simply sitting in your chair. And one of the best things you can do for your body and mind is to get up and move. We are more alert after taking a walk with a co-worker or friend—and perhaps having an insightful conversation. Likewise, we feel more vital and clear-headed after a run or a workout, as our body releases mood-boosting endorphins. And that feeling of well-being is likely to affect the way we interact with others—less negative feelings and fewer expressions of anger, irritation or resentment.

"The human being is designed to move," says James Levine, an endocrinologist and researcher at the Mayo Clinic in Rochester, Minn. "You need to move your body. If you stop your body, idle it—which sitting is—it crumbles on every level." What results, is an increased risk of obesity and diabetes, high blood pressure, cardiovascular disease, cancer, depression, and possibly Alzheimer's disease.[12]
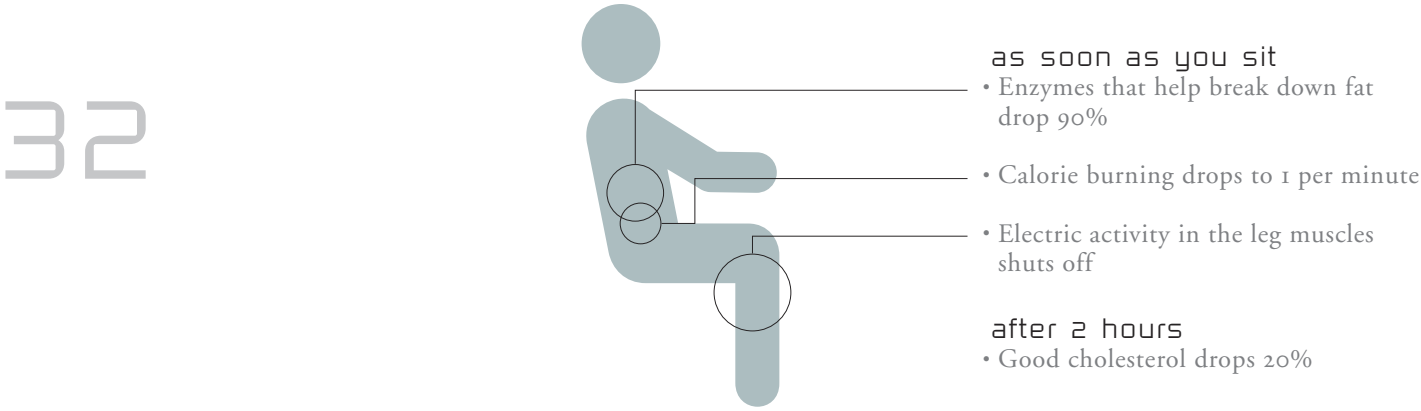
Dr. Levine also makes the point that there is large opportunity to use energy while performing non-exercise activity: climbing the stairs to your office, standing up to stretch, walking to a conference room or going outside for a stroll during the lunch hour. Activity need not be a heart-pounding game of squash, and in fact, an hour of vigorous exercise does not neutralize 8 hours of sitting. Dr. Levine notes that if you increase movement throughout the day, you can significantly improve the amount of energy your body uses and over time, improve your general state of health.

Recently, a colleague sent me compelling infographics, which highlight statistics on the detrimental effects of sitting for prolonged periods of time.

3:1 *The sit-to-stand program that a research collaboration with the University of Waterloo's Spine Biomechanics and Injury Prevention Laboratory has shown to significantly reduce whole body discomfort versus sit-only or stand-only working with no negative impacts on worker productivity.*

SOURCE *Karakolis T, Callaghan JP. 2013. Private Report. Assessment of Discomfort, Posture and Productivity While Performing Office Work on a Counterbalance Height-Adjustable Table.*

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Personally, I rarely sit at my desk for hours on end. I jump at any chance to walk across the office to talk with a colleague. Not only does it add steps to my day, but I can often be more productive talking with a coworker rather than exchanging a long chain of emails.[13]

how sitting wrecks your body People with sitting jobs have twice the rate of cardiovascular disease as people with standing jobs.

as soon as you sit
• Enzymes that help break down fat drop 90%

• Calorie burning drops to 1 per minute

• Electric activity in the leg muscles shuts off

after 2 hours
• Good cholesterol drops 20%

Numerous researchers have linked sitting for long periods of time with a wide range of health concerns, including obesity and cardiovascular disease. Standing requires more muscle activity than sitting, thus offering some benefit with regard to the risks associated with obesity. At the same time, standing for long periods of time can strain lower back muscles and put pressure on legs and feet. What's the answer?

**we know standing is healthy. now we know when to stand!**

An in-depth, laboratory-controlled study undertaken by eminent biomechanist Jack P. Callaghan, PhD in partnership with Teknion, has provided new insight into the relative benefits of sitting down or standing up to work.[14] Dannion Smith, Director, Ergonomic Initiatives at Teknion notes, "Dr. Callaghan's study at the University of Waterloo is groundbreaking. We learned not only that periods of standing are beneficial to human health and productivity, we also learned how often to alternate sitting and standing at work. We found that there is a proper ratio of standing to sitting if one is to achieve optimum health benefits."

Dr. Callaghan, who is Professor and Canada Research Chair in Spine Biomechanics and Injury Prevention at the University of Waterloo, found that initially, workers should alternate sitting and standing at a ratio of 3:1.

This ratio helps to prevent any strain or pain workers might experience upon standing for longer periods of time. Ideally, however, one should attempt to lengthen time spent standing, with a goal of reversing that ratio to 1:3. For an eight-hour workday, this would break down to two hours of seated work and six hours of standing. "It's quite a shift in thinking," notes Dannion "and we are continuing to conduct research to refine our knowledge."

Several recommendations emerged from Dr. Callaghan's study, including the suggestion to change postures often and not wait for pain or discomfort. Each person must discover what is most comfortable, but in general, those who changed postures more often—even with the same total sedentary exposure— exhibited the greatest benefit. Impressed by the results of his research partnership with Teknion, Dr. Callaghan has launched a "Move Early, Move Often™" initiative to encourage those who work in corporate office environments to move frequently throughout the day in a meaningful, healthy way.

The profound results of Dr. Callaghan's research are consonant with other studies that invalidate the misconception that one can go to the gym for an hour to counteract the effects of 8 hours of immobility. Unfortunately, spending a few hours a week engaged in moderate or vigorous activity doesn't offset the risks of extended sitting. Rather, the solution is simply to sit less and move more.

3:1
WORKDAY MOBILITY
Treadmill Program

| 9AM | 10AM | 11AM | 12PM | 1PM | 2PM | 3PM | 4PM | 5PM | 6PM |
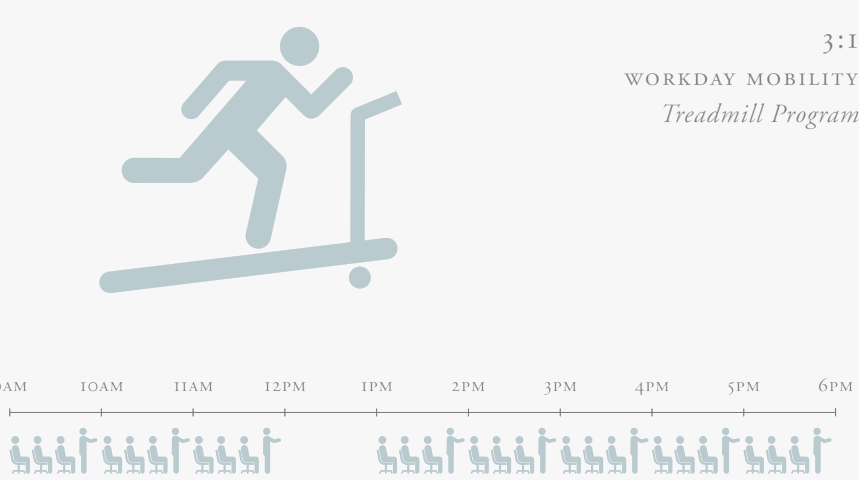
• Pace while talking on the phone, organizing papers or eating lunch
• Stand at a sit/stand desk—or take your laptop over to a high countertop
• Walk, rather than gathering around a table, for a meeting
• Program your phone to remind you to change position every half an hour
• Take a break—stand up, stretch and stroll over to the coffee bar
• Walk to work or at least to the bus stop or train platform

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• Where possible, join co-workers on the volleyball court, take a yoga or zumba class or simply use your lunch hour to walk to a plaza or stroll through a park

The effects of movement—even leisurely movement—can be profound and include weight loss, increased energy and mental clarity. Even better, the muscle activity required for standing, walking, running and cycling triggers processes related to the proper functioning of all of the body's organs and systems. Moving jump-starts your heart, fills the lungs and puts your nervous system back into action.

Architects, designers, facilities managers and others who are involved in planning and designing work environments are using this knowledge to create work environments that get people moving. As an example, the new Bullitt Center in Seattle, a six-storey, 50,000-square-foot building designed to "be the greenest commercial building in the world," promotes occupant health in several specific ways:

• Encourages workers to walk, bicycle or take public transit to work—no parking for automobiles is provided on site;
• Prompts tenants and visitors to walk by placing elevators at the back of the lobby. A dramatic staircase with outdoor views invites people to take the stairs;
• Provides access to views and operable windows;
• Each worker's desk can be positioned within 30 feet of the building's huge windows to ensure abundant daylight and fresh air;
• Foregoes materials that contain formaldehyde (NAUF), volatile organic compounds (VOCs) or other potentially toxic compounds; and
• Creates an inspiring work setting with attractive architecture and landscape design. A neighborhood pocket park adjacent to the Bullitt Center offers a restorative spot to take lunch or a break.[15]

Attractive stairways, like the Bullitt Center's glass-enclosed stairs, are an important trend in building design, as are "activated" staircases with landings furnished with bar height tables or lounge chairs. In some cases, staircase steps double as bleacher seating. Other active design strategies include "intentional inefficiencies" that locate printers, copiers and recycling bins at a distance from where people are seated. Company leadership can support active design strategies by offering employees incentives for healthy behaviors such as providing bike storage and repair and lockers for those who cycle to work.

Companies that actively promote movement are beginning to realize positive effects. In 2012, New Balance, one of the world's leading athletic companies, released the results of its Organizations in Motion™ program, a workplace experiment conducted with Wellness & Prevention, Inc., that measured the impact of physical activity on energy levels, cognition and engagement.

At the end of the 90-day program, 53% of associates who responded to the survey reported taking more frequent breaks and increasing physical activity at work—and 89% stated they would continue to do so. The physical activity appeared to have a positive impact on associates' energy level with 37% reporting high energy levels in the middle of the day (11% higher than pre-program) and 42% reporting increased engagement and ability to focus.

The theory behind Organizations in Motion is similar to that applied to athletic training. Micro-bursts of movement alternating with rest and recovery stimulate flow throughout the body, which leads to a brief period of hyper-oxygenation in the brain. The phenomenon lasts only a minute or two, but the effects linger—increasing energy and attentiveness.[16]

A recent article in the Business Insider describes Facebook's new headquarters in Menlo Park, California, noting that employees can choose to sit or stand at work—and many choose to stand. It seems that a trend of standing is taking off and isn't limited to social media cultures like that of Facebook.

Twitter has located its new headquarters in a restored Art Deco building in downtown San Francisco that features a yoga studio and roof garden. And those who work at Nike in Beaverton, Oregon, stay healthy by playing squash, running on a track, taking a swim, using the 34-foot climbing wall or trying the Tour de France simulator. Across the country, corporate fitness centers are turning up. At General Mills in Minneapolis, employees not only work out in the gym, but go outside for snowshoeing and cross-country skiing—"authentic" forms of exercise that challenge the entire body and offer psychological benefits as well.

Accenture in New York takes a very holistic approach to employee health with programs to get employees to move, eat well and reduce stress. The high-tech consulting company also provides subsidized childcare, a nursing mothers' program and generous maternity leave. Accenture's 10,000 Steps a Day program encourages employees to get up and move, while the Athletic-Minded Traveler helps people to stay active while on the road by supplying maps of running routes and the locations of health clubs, lap pools and other resources. There's confidential support for mental health issues, as well as online coaching for nutrition, stress and exercise.

Research continues to offer new insight and information. The British Government has initiated The Active Buildings study as an investigation into how the spatial layout of office buildings influences the step count and sitting time of office workers. World experts in Epidemiology & Public Health, Health Psychology and the Built Environment & Spatial Design are working together to develop novel ways to promote indoor movement and to assess building potential for activity generation. The study is in process, but supports the concept that office-based physical activity strategies are important and warrant investigation.

Let nature be your teacher. -WILLIAM WORDSWORTH, 19TH CENTURY ENGLISH POET

What other factors affect health? As human beings we are highly responsive to multi-sensorial experiences of nature—which are, in fact, profoundly important to human functioning, health and well-being. Research compiled by the University of Washington shows that both visual access and "being within green space helps the mind to focus" and can help "alleviate mental stress and illness."[17] In order to thrive, people need access to daylight and a pleasant view, while spaces that contain natural elements or provide access to the outdoors can offer cognitive respite, stimulate creativity and improve work performance.

The WELL Building Standard®, created by Delos® and the WELL Building Institute, notes that the impact of lighting on occupants is another of the primary elements that must be addressed to ensure that we design human-centric buildings and spaces. Multiple independent studies confirm that workers who get ample sunlight are more likely to be active, to sleep well and to enjoy better mental and physical health in general. In fact, the benefits of light are so great that some countries in Europe require that workers be within 27 feet of a window.[18]

Research undertaken by the Sacramento Municipal Utility District involving 300 workers also found that a "better" view—gauged by size and vegetation content—was consistently associated with better worker performance. Furthermore, self-reports of good health were strongly associated with views and those with the widest views of the natural landscape were least likely to report negative health symptoms. Reports of chronic fatigue were strongly associated with a lack of natural light and outdoor views.[19]

Artificial lighting—including office lighting and the light emitted by electronic devices—can disrupt our circadian rhythms, resulting in insufficient or poor quality sleep. And new findings suggest that a consistent pattern of restful sleep may be more important to our general health than diet or exercise. Poorly designed lighting can also result in eyestrain, headaches, blurred or double vision and increasing near or far-sightedness.

Natural light provides the best spectrum of light and allows the eye to refocus to different distances, thus maintaining the flexibility of the eye's dilating muscles. The presence of natural vegetation, seen through a window or placed inside the office, also reduces stress and supports workers' ability to focus their attention. Beyond plants placed here and there, companies are using "green walls" and "indoor forests" to bring more of nature into the office environment.[20]

What's the theory behind our tendency to want to connect to nature? Biophilic design posits that human beings have a biological need to affiliate with nature. For example, the preference for a wide landscape view relates to a hypothesis known as the "savanna principle," which proposes that much of human evolution took place on the East African savanna and that a bias for a savanna-like landscape persists. Parks around the world, for example, are typically designed to resemble a grassland with widely spaced, spreading trees. At the same time, people like to view the "savanna" from a sheltered pathway or from above to avoid feeling exposed or vulnerable.

The concept of biophilic design arises from the recognition that the human mind and body evolved in a sensorially rich natural world that remains critical to our health and well-being. Thus, workspace design must take into account how human beings perceive, interpret and respond to space, as well as to natural light, artificial light and other aspects of their surroundings. Biophilic design connects the built environment with nature through strategies such as floor-to-ceiling and operable windows, naturally ventilated atria, indoor gardens and roof gardens, as well as organic forms and decorative motifs drawn from nature.

Biomimicry, as applied to design, is slightly different. It's about learning from natural systems and processes to find effective solutions to design problems. Biomimicry may have an effect on the form or aesthetics of a building but it's not simply about how buildings look—it's about how they function. Biomimicry and biophilic design hold much promise for improving building architecture and design by drawing upon our innate affinity for nature—and on a broader scale, achieving sustained and reciprocal benefits between the built and the natural environment.

disruption: collaboration or chatter?

One person's data is another person's noise. -K.C. COLE, SCIENCE WRITER

For many organizations, creating a 21st century workplace seemed to mean an open workplace—one without walls, doors, cubicles or privacy. That trend, and the assumption that people will collaborate more effectively in an open space, has proved to be something of a misfire. In fact, distracting crosstalk and chatter drives people to use headphones or escape to a "quiet room" to think and focus. At the same time, cell phones, text alerts and other forms of technology disrupt concentration and, for many, undermine a calm, focused state of mind.

Indeed, the open plan is embraced by some and deeply regretted by others who say that lack of speech privacy inhibits in-depth conversation and that continual noise disruptions contribute to physical and mental exhaustion. Even in start-ups, where one might expect Gen Y workers to feel perfectly at home in a big, open space populated by their peers, people often seek out a quiet corner, a room with a door or simply escape to the park or a café where disruptions are minimal.

The phenomenon of the open office has had unexpected consequences. Now, the pendulum swings back as we begin to see that creativity and even collaboration require the ability to retreat as well as connect. It means providing a mix of open and enclosed spaces, lounges and soft seating areas, conference rooms and break rooms, that support how individuals cycle through the day—writing a report, going to a meeting, pausing on a stairway for a quick update and joining colleagues in the kitchen for beer and chips on Friday afternoon. People work differently than the open plan alone can accommodate. Individuals need time to reflect, solve problems and selectively share with others.

Noise ranks high on the list of office workers' complaints and it isn't getting better in spite of the fact that an electronic hum has replaced the clack-clack of typewriters and that heating, ventilation and air conditioning equipment are now quieter than twenty years ago. A study undertaken by the University of California, Berkeley, Center for the Built Environment, found that noise and

PREVIOUS PAGE *"Head in the clouds"
formerly suggested "blue sky" daydreams and
fantasies; today, it is likely to be a technological
metaphor, a reference to a virtual world that
encircles our planet.*

lack of speech privacy are experienced as distracting and stressful, especially when one needs to concentrate on a task. The open office makes it difficult to escape sounds generated by coworkers and "green design, with its emphasis on hard surfaces and environmentally friendly insulation, is compounding the problem," adds David Sykes, executive director of the Acoustic Research Center in Cambridge, Massachusetts.[21]

The University of California study indicates that speech privacy may be a more important issue than noise, especially in offices with large open areas, ubiquitous cell phones and common areas where groups convene adjacent to individual workspaces. Although the noise level, in terms of decibels, is relatively low, office workers complain about intrusive telephone conversations—especially speakerphones—as well as the fact that it is impossible to have a conversation without being overheard. The lack of privacy increases stress and "chips away at good health."[22]

Dissatisfaction with the distractions and interruptions experienced in the open plan is likely to correlate with the kind of work being done (programmers generally need more quiet than sales staff) and with the individual worker's level of introversion or extroversion. "Quiet," a well-researched book by former Wall Street attorney Susan Cain, has made an impression on the business world by reminding us that we are not all extroverts who thrive on a high level of interaction, activity and stimulation.[23]

Extroverts tend to be talkative, assertive and gregarious in the workplace. They enjoy "thinking out loud" and prefer to collaborate or socialize with co-workers rather than spend time alone. But at least one-third of people are introverts, who prefer to work on their own or with one or two people with whom they are comfortable. Introverts can also be highly creative as they are reflective thinkers able to generate ideas in solitude. Introverts are not "shy," lacking social skills or the ability to succeed—take Bill Gates, Warren Buffett and J.K. Rowling as examples of successful introverts. It does mean that one-third of the people in an open plan are likely to be uncomfortable there.

Gensler featured an interview with the author of "Quiet," in the firm's Dialogue publication entitled, "Stressed out by Openness." Cain noted that workspaces should be designed, "where there's an ability to pick and choose how much stimulation you want, at any given time. Serious flexibility is crucial. We need more of a choice to either work in a big, open clattery area, or in quieter places, in nooks and crannies."[24]

Research studies conducted by Gensler bear out the premise that people are searching for quiet—and not just introverts or those whose jobs require a high level of focus. According to Gensler's 2013 U.S. Workplace Survey, 69% of workers are dissatisfied with noise levels at their primary workspace and 77% prefer quiet when they need to focus. In still another study, employees

in cubicles received 29% more interruptions than those in private offices. And employees who are interrupted frequently report 9% higher rates of exhaustion. Plus, error rates double after an interruption.[25]

Jason Feifer, Senior Editor at *Fast Company* bemoans the loss of his private office and the need to wear earphones and listen to music while working: "Back when I had an office, I left work with my mind still happy and fresh; I emailed myself ideas while walking home, as some newsy podcast told me even more useful info. Now, at the end of a day of nonstop jazz, I leave work feeling fried. I miss my podcasts, which my brain just doesn't have room for. I walk to the subway in silence, repairing."[26]

Other people are not the only distraction in the workplace. Increasingly, we live and work in world that is always "on"—potentially causing physical, emotional and psychological stress. Work can and does follow us home, extending the workday and the workweek to 24/7. At the same time, texts, IM and social media alerts interfere with our focus at work. The constant monitoring of devices is a growing distraction, nibbling away at our ability to stay on task.

Our inability to focus on any given task is becoming a real concern. The Mayo Clinic offers courses to aid with "attention therapy" and "practicing presence." There are camps and clinics popping up across the country to provide a "tech detox." And there are apps that will alert you when it's time to take a break.

Recent research stresses the need to "layer in spaces" that support all work modes and are equipped with seamless technology that enables workers to fluidly move from space to space. In some cases, employees do prefer a shared space where one can easily speak to a neighbor when there's a question about a project or an idea to bat back and forth. At other times, an employee needs a room with a door. To enhance flexibility, some spaces can be designated as "quiet zones" or "tech-free zones," while others can be set aside for small group conversations. At the coffee bar, high tables and stools invite solo or ensemble work, as do semi-private booths in a cafeteria. Libraries also provide a place where conversation is discouraged and quiet reigns.

Thus far, we have considered ways to promote activity, incorporate nature and address issues of disruption and privacy—all important to create the conditions for a safe, healthy, engaging and inspiring work environment. We've begun to sketch a building filled with natural light, supplied with a variety of spaces—pools of activity and quiet nooks—as well as open stairways and access to shady courtyards or rooftop gardens. Next, we consider the critical role played by textiles, color and materials in defining the built environment and influencing building occupants.

The character of our surroundings provokes a visceral and an emotional response—whether from specific color combinations, the juxtaposition of materials or a mix of textures. Our sense of sight enriches our experience, as we perceive the light and luster that activate and enliven space. Our sense of touch elicits response through the tactility of soft, plush textiles or that of strongly textured wood and stone. Such contrasts or dualities create beautiful and meaningful spaces that conspire to keep people engaged and refreshed.

dualities in textiles and materials that stimulate and create interest
• Warm / cool
• Textured / smooth
• Shiny / matte
• Formal / informal
• Natural / synthetic
• Pattern / solid
• Organic form / geometric form
• Large scale / small scale
• Dark / light
• Action / rest

As interiors change to reflect social and cultural transformations—specifically, a paradigm shift in our attentiveness to how the built world affects human experience and aspiration—textiles are responding in significant ways. Today, design addresses the fact that people spend more time at work and interacting

PREVIOUS PAGE *Interior design based on the patterns found in nature; the wide variety of rhythmic and non-rhythmic visual, auditory and thermal stimulation (i.e., colors and shapes, the sound of birds, shifting patterns of light) can help to restore well-being and enhance performance.*

FOLLOWING PAGE *Our performance at work, our physical and mental energy, depends in large part upon the quality of our environment—the walls, windows and chairs; the colors, shapes and textures that surround us.*

with technology and looks to the natural world for texture and tactility as an antidote to the pervasive flat, smooth surfaces of screens and devices.

Interior materials and finishes, and textiles in particular, can help to bring a sense of warmth and comfort to building interiors. After all, for much of human history, people have used local materials and the themes and patterns of nature to create structures. Humankind has always used grasses and leaves, animal skins and fur, stone, wood and metal to build and ornament its dwellings. Surrounded by technology, we still respond to natural stimuli—sunlight, water, landscapes—essential contexts for human health and even survival.

bring nature indoors with materials by using
• Earthy, metallic mineral tones and colors found in nature
• Warm and cool tones together
• Strong or extreme textures that mimic nature
• Patterns found in nature
• Natural fibers such as wool and linen
• Natural materials such as wood, metal, stone

Along with enhancing comfort and aesthetics, sustainability and wellness are now fundamental when selecting textiles for the workplace. Today, textiles need to perform for durability and be easy to clean and maintain. They should not emit VOCs or contribute harmful substances into water streams or landfills. Chemicals of concern like formaldehyde and heavy metals should be avoided. Because textiles play an important part in the health of building occupants and have potential environmental impacts, designers can select those made using post-industrial or post-consumer fibers, along with natural materials from renewable sources.

sustainability and wellness concerns with textiles and materials
• Indoor air quality = Low VOCs
• Free of chemicals of concern (PVC free, no heavy metals, etc.)
• Antimicrobial to prevent spread of germs
• Easy to clean with water and mild cleanser
• Recycled content (recycled polyester)
• Natural fibers (wool)

Materials are also very useful in responding to the challenge of balancing quiet/privacy with interaction/public in an open, democratic workplace. Textiles help to maintain balance via their multi-faceted aesthetic and functional value. Acoustic treatments that create a pleasant, comfortable setting can be accomplished in various ways, but textiles play an important role. Carpet, textile wall covering, fabric wrapped panels and partitions, ceiling panels, drapery, wall systems finished with fabric, and upholstery all enhance the perceived and actual acoustics of a space. As furniture

evolves to incorporate acoustic elements, textiles are an important part of that evolution.

types of acoustical treatments involving textiles
• Thicker textiles (like felt) used for upholstery, wall panels, and partitions
• Wrapped wall panels with acoustic backing to fabric
• Demountable wall systems with textile fascias
• Ceiling panels or "clouds"
• Drapery

Mere color, unspoiled by meaning, and unallied with definite form, can speak to the soul in a thousand different ways. – OSCAR WILDE

Color is perhaps the most important feature in an interior space. It is a means of instant communication, a powerful tool for conveying mood and evoking emotion. It can energize or calm. It can change one's perception of scale and temperature. Today, color is often used to brand interiors and convey a company's ethos—most often, by translating brand colors into accents that activate a space. Accent colors are used for wayfinding as well, where bold colors help building occupants find different departments or common amenity spaces, such as the pantry or café.

Neutrals, both warm and cool tones, provide a foil for stronger and brighter colors, while also providing visual relief from the brighter, more active areas. And white is extraordinarily powerful with many positive connotations: purity, clarity, serenity and simplicity. It acts as a foil to darker tones, but is also clean, crisp, and bright, enhancing every space with light.

uses for color
• Earth tones = warmth, comfort
• Spice tones = warm, bold
• Warm neutrals = subtle, sophisticated
• Cool neutrals = technical, modern
• Yellows = bright, cheerful, optimistic
• Metallic tones = rich, elegant
• Reds and Oranges = active, lively, energetic
• Greens = fresh, natural, balanced
• Blues and Purples = tranquil, calm

Of course, the messages and meanings of color also depend upon value and saturation, the interrelationship of adjacent colors and, very importantly, context, which must be carefully considered in determining the effects of color in a given space. Without doubt, however, the selection of color and color combinations is essential to creating an inspiring and restorative interior environment.

the architecture of happiness: healthy workers are happy workers

Currently, a new generation seeks—and expects—a rewarding work experience. This generation makes choices about where to work based on company culture, transparency, social commitment and the quality of workplace design and amenities, including those that support wellness.

Company culture and the character of the workspace (which embodies the culture) have become key reasons to work "here" rather than "there." Workers value a culture characterized by ethical, "good citizen" practices, as well as inclusiveness, individual autonomy and the free flow of information. Employee well-being is an ideal even at start-up firms, where resources are limited while giants like Google offer lavish health-oriented amenities, including volleyball courts, subsidized massages and free healthy meals and snacks as part of creating the "happiest most productive workplace in the world."[27]

human and environmental health at the center of architecture and design

The interest in healthy lifestyles and sustainable ways of living and working is not limited to Millennial workers with their "start-up" perspective and admiration of superstar companies like Google, Facebook and Apple. As one writer in Forbes magazine pointed out, "... Baby Boomers who are aging are equally invested in a healthy lifestyle, healthy communities and a healthy planet, but perhaps Millennials depart in the expectation that the places that they work will embody those ideals and support those goals. It is not simply a matter of catering to a younger demographic, but of understanding their world view, appreciating their point of view and making the most of their unique abilities—specifically their exceptional ability to learn, create and work effectively both as teams and individuals."[28]

And after all, if people are a primary asset, then it only makes sense to ensure that workers are cared for and prospering. If we take significant steps to promote physical and psychological health and well-being among every generation at work, we can begin to reduce medical costs, improve productivity and performance, net happier and more engaged workers and ultimately realize greater economic value.

Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity. - WORLD HEALTH ORGANIZATION, 1948

Our ability to create a healthy workplace, along with healthy neighborhoods and communities depends on our ability to bring our human systems—social, economic, cultural—into harmony with natural systems. It depends on continuing to question, research and create new knowledge about built environments that promote human physical and mental well-being.

Design of the workplace must be practiced as an interdisciplinary and integrative process set within the context of human and planetary health. There is an enormous opportunity here for sustainable design and architecture to grow beyond preventing environmental degradation to become truly restorative, to not only alleviate the damaging effects of work but to make work a catalyst for health.

The potential is there. The issue is not technical, it is ethical. Our workplaces can enable the physical and mental vitality that's needed to learn, create and innovate. Even more, design can help create places where work is a richer experience, one that embraces the fullness of our nature as social, curious and inventive beings.

How do we inspire a new generation and tap into the passion for meaningful work, as well as an innate ability to collaborate, to learn and ultimately to lead? Company leadership, HR, IT, finance, facilities management and design must come together to create a positive culture, varied workspaces and a healthy work environment. *Any form of standing still—physical, mental, metaphorical—is unhealthy.*

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summary

We began this paper by discussing a cultural shift—a new awareness of how deeply human and environmental health are connected. We began with a discussion of the lifestyle choices we make as individuals. In that context, we looked at three key features of the cultural landscape that influence our behaviors, our health and that of the natural world: technology, food and the urban environment.

technology In terms of human health, we see that technology (i.e., communications technology and in particular, mobile high-tech gadgets, rather than new medical, industrial or scientific technologies), has engineered physical activity out of daily life. The result? A sedentary population with a high incidence of obesity and diseases related to lack of exercise.

food While healthy and affordable food is readily available to most people in North America, many forego a healthy diet and daily consume high-calorie processed foods that contribute to disease. At the same time, research reveals a significant trend towards selecting organic, locally produced ingredients and prepared foods—a shift that can have a positive effect on human health and the natural environment.

urban environments Over 80% of the U.S. population lives in an urban area. While violence, traffic, poor air quality and a lack of pedestrian-friendly infrastructure remain impediments to health, many cities are now focused on creating urban environments shaped to human needs and reflecting our human affinity with natural systems. Strategies include improving transit, supporting the use of renewable energy and planning cities to maintain contact with the natural world.

The conditions addressed in urban planning and design parallel those being tackled by architects and designers committed to creating buildings and work settings that are rather like good neighborhoods. We note four primary challenges—and opportunities—to create healthy, people-first buildings and workspaces: (a) promote movement/physical activity, (b) incorporate or evoke nature, (c) reduce noise and disruption and (d) employ materials that help to create a safe, comfortable and inspiring environment.

movement Building architecture can promote movement across the office landscape. Architectural strategies include accessible open stairways with multiple landings and views into active spaces, on-site multi-purpose fitness/recreation facilities and a variety of large and small-scale, open and enclosed, spaces that encourage people to move around to collaborate, socialize or focus on a task.

At the work desk, adjustable furniture allows people to sit, stand and change postures frequently to reduce fatigue and stress on joints and muscles, to burn calories and promote circulation throughout the body, which has multiple health benefits, including enhanced cognitive function.

nature Concepts of biophilic design are generating new ways to design buildings and building interiors to incorporate or evoke nature, changing not only how structures and workspaces look, but also how they function. Research shows that by connecting spaces to the natural world—providing windows, daylight, fresh air, plants, water, natural materials and decorative motifs drawn from nature—we can improve the physical and psychological health of building occupants. Equally, such strategies can reduce energy use and provide other environmental benefits.

disruption The office is a place for creativity and collaboration, requiring spaces that support fluid and spontaneous interactions—but also quiet spaces that minimize noise and the potential for disruption when thinking, analyzing, writing and reading. People need a place to withdraw from the flow of activity and also want to control noise, especially what others can hear them say and what they hear other people say.

sensory stimulation Creating workspaces that are inviting, comfortable and uplifting depends upon a skillful combination of materials, textures, patterns and colors. It is essential to choose materials that do not contain toxins or emit VOCs. Designers also choose materials for their sound-absorbing value, pleasing tactile qualities and the visual richness of color, pattern and texture. Beyond aesthetics, varied sensory stimulation can engage and energize people at work.

Given what we have learned about the impact of human systems on natural systems—and the impact of environments upon human beings—we can posit that the power of design today is something more than aesthetics, communication or the creation of desirable products. Rather, it must be practiced as a process of integrative thinking (a synthesis of design, technology, science and humanistic principles) set within the context of social, economic and environmental ethics: "ethonomics."

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This paper opens with a quote by the Finnish architect Eliel Saarinen: Always design a thing by considering it in its next larger context—a chair in a room, a room in a house, a house in an environment, an environment in a city plan. The following pages offer our thoughts specific to the concentric contexts of city, building and workplace—strategies to create a healthier metropolis, a human-centered architecture and spaces that enhance productivity and well-being.

a work in progress: the active, healthy metropolis

The public and private entities charged with shaping the built environment are now embarking on new ways to promote physical activity through "active design." Urban planners are working to create engaging streetscapes, pedestrian-oriented mixed-use developments and neighborhoods with parks that invite indoor and outdoor activity. While no one strategy will bring about healthier lifestyles, research suggests that active design measures, implemented over a broad range of urban environmental and architectural projects, can benefit those who live in our cities.

At the scale of the community, active design encourages walking, bicycling, transit use, active recreation and taking advantage of access to healthy foods (e.g., attending farmers' markets and participating in urban gardens). Each and all of these elements contribute to a more livable city and a healthier populace.

Why does active design matter? In the 21st century, the biggest public health epidemics are not infectious diseases, but rather obesity and related chronic diseases such as diabetes, heart disease and some cancers. Today, physical inactivity and unhealthy diets are second only to tobacco as the leading cause of premature death. Urban planning strategies that champion physical activity can improve physical and health and the sense of well-being that goes along with living in safe, walkable neighborhoods with access to a variety of urban amenities.

According to a study undertaken by multiple New York City departments in partnership with architectural and planning academics and the AIA, key measures include planning city neighborhoods for density and mixed land use and providing access to:*

• Transit and transit facilities
• Plazas, parks, open spaces and recreational facilities, and design these
  features to maximize active use
• Full-service grocery stores and fresh produce
• Pedestrian-friendly streets with high connectivity, landscaping, lighting,
  benches and water fountains
• Continuous bicycle networks and infrastructure like safe bicycle parking

Active design is aligned with a sustainable city model as the strategies that promote activity also offer environmental benefits. Mixing uses and increasing population density help to promote walking and using mass transit—which helps to reduce our use of fuels and the release of pollutants. Parks and open green spaces improve air quality, as well as quality of life. Ultimately, cities designed to enhance the experience of their inhabitants, also bring economic and environmental benefits to the community.

For more information about Active Design Guidelines, visit http://www.nyc. gov/html/ddc/html/design/active_design.shtml. Active Design Guidelines was developed by a partnership of the New York City departments of Design and Construction, Health and Mental Hygiene, Transportation, City Planning, and Office of Management and Budget, working with leading architectural and planning academics, and with help from the American Institute of Architects New York Chapter.

key

RESIDENTIAL
COMMERCIAL
RETAIL
PUBLIC/CIVIC
PLAZA
TEKNION
BUS LINE
METRO LINE
BIKE LANE
BIKE & RUNNING TRAILS

SHOPPING DISTRICT

HOSPITAL/CLINIC

PERFORMING ARTS CENTER

ART MUSEUM

LIBRARY

COMMUNITY HEALTHCARE

FARMERS´ MARKET & PLAYGROUND

COMMUNITY GARDEN

HOTEL

SCHOOL

BOATHOUSE/RESTAURANT

tek

architecture:
people friendly buildings

A growing movement in the architectural community believes that sustainable design will reach its potential only when we begin to seriously consider how a building affects the people who interact with it. In the last century, much of the built environment was designed in such a way that it was disconnected from—if not antagonistic to—the natural world and indeed, human beings. While sustainability (and LEED principles) have become basic tenets of good design, more can be done to design buildings and work environments with positive impacts on health and well-being: promote movement, minimize disruption and incorporate or evoke nature.

incorporate nature Creating a direct connection to nature often takes the form of living "green" walls, indoor gardens or water features that bring elements of the natural world into the built environment. Equally important, buildings can be designed to elicit a restorative response by providing outdoor views and allowing natural light to flow through the interior of the building.

Strategies include:
• Install sufficient glazing along external walls to provide prospect
  views and situate enclosed spaces in the building core.
• Use glass to define enclosed spaces, especially partitions facing the
  external wall.
• Keep workstation partitions low (52" at the most) and orientate
  workstation spines perpendicular to the exterior window wall.

evoke nature Materials, colors, shapes and patterns that reference nature are analogues of "real" nature, prompting a biophilic response in human beings. Design offers a myriad of ways to evoke nature: textiles that employ colors, textures and patterns drawn from nature; furniture with organic shapes and lighting that mimics the shifting patterns of sunlight and shadow. Interiors might even be designed to give the impression of being out of doors by combining wood and stone elements with abundant vegetation and water features.

represent natural spaces Because human beings respond both psychologically and physiologically to the qualities and configurations of space, architecture offers a subtle, but powerful, way to affect our mental and emotional

state. The most engaging spaces replicate the character of the natural landscape and the design of many of our earliest dwellings—offering an experience of both prospect and refuge; exhilarating views and intimate nooks in which to withdraw from the flow of activity. Transitional spaces that create visual and physical connections are also important and include: thresholds, portals, bridges and fenestration. Lastly, design can approximate the sensory stimulation of the natural landscape by varying color, pattern, light, sound and elements of scale to convey both complexity and a reassuring sense of order.

promote movement In essence, an "active workplace" provides a variety of spaces designed for specific types of work, encouraging workers to move from space to space to complete different tasks throughout the workday. Ideally, the office plan will provide formal and casual meeting spaces with varied degrees of openness or enclosure. Furniture can include lounge chairs and sofas gathered around low tables to allow for relaxed postures, as well as a meeting table and work chairs. Writable or pin-able walls invite workers to walk to a shared space to confer with colleagues. Attractive stairways connect people as well as floor levels.

While applying strategies to get workers moving across the floorplate, design can also act as a catalyst to movement by providing efficient, easy-to-use height adjustable desks and tables at the individual workstation, in meeting rooms and in shared workspaces. Thus, workers can sit or stand at will. This ability to change one's posture has significant physiological benefits, but also provides a sense of control and empowerment conducive to worker engagement and satisfaction.

Activity or context-based floorplans encourage physical and psychological health by allowing people to choose to work where they like. According to personal preference, workers can elect to tackle the task at hand at a traditional or standing desk, in a lounge area or café booth or inside a closed-door office. Adjustable furniture, along with lightweight furniture that can be dismantled, folded or rolled offers a complementary strategy for encouraging movement and improving worker health and performance.

minimize disruption Disruption of attention and focus while working causes stress, errors and fatigue. In today's open work environments, it is essential to address noise levels with sound absorbing elements: wall-coverings, carpet, acoustic ceilings or special ceiling treatments, window treatments and perhaps, "white noise." Further, the office should offer non-assigned spaces for heads-down work that offer protection from the chatter and clatter of the open workspace. These places of refuge can take the form of small team rooms, one-on-one booths and quiet rooms where conversation and mobile phones are verboten.

While a certain amount of visual and auditory input can be stimulating, the presence of too much fluctuating activity and noise is exhausting—

especially for thoughtful introverts. In a healthy office, there is recognition that concentration and quiet reflection are part of the collaborative process, modalities that require a degree of privacy and freedom from disruption. Most of us have new ideas on our own and then work with others to develop thoughts more fully. Always, it's important to consider the wide range of people with different personalities and different needs.

As the world continues to urbanize and more people work longer hours indoors, often at a computer, it becomes ever more important to employ design to reduce stress, enhance creativity and improve mental and physical health. We need design that connects us with nature, that supports our biological need to move and our emotional need to occasionally withdraw to think or rest as much as we need the means to draw people together and connect their working thoughts and ideas.

design for balance

A variety of spaces that differ in scale, enclosure and furniture allow workers to choose a space appropriate to the task and to the amount of interaction or privacy desired.
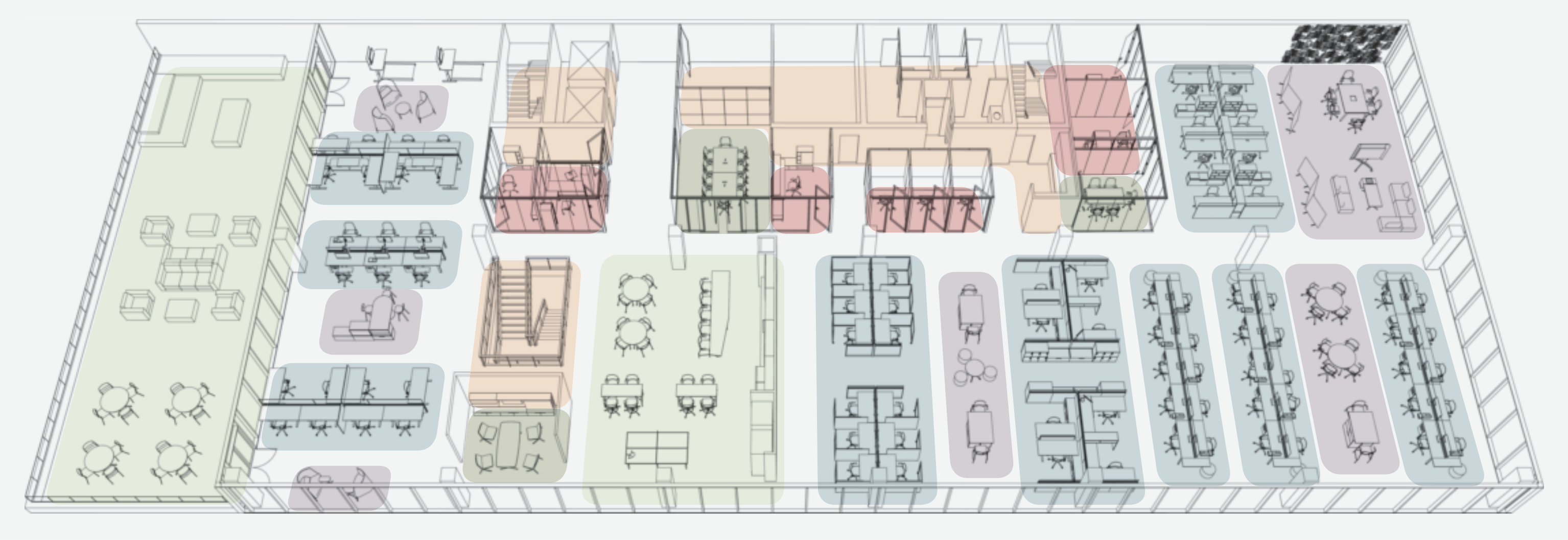
key

- 🔵 OPEN WORKSPACE
- 🟠 SUPPORT
- 🟣 COLLABORATE
- 🟢 CONFERENCE ROOMS
- 🔴 PRIVATE SPACES
- 🟢 RELAX

design for movement

Rather than clustering resources in a central location, copiers, supplies, lockers and other support tools are placed at a distance—requiring workers to walk around the office. A wide central stairway encourages use in lieu of the elevator.

FILES OR LOCKERS & COATS

COPY & MAIL

CENTRAL STAIRWAY

CENTRAL PANTRY

key

SUPPORT

human-centered design

Multiple design strategies are employed in order to evoke, incorporate or create a visual connection to nature and to maximize access to fresh air, natural light and a view of the outdoors.

OUTDOOR AREA 02

GREEN WALL

GLASS WALLS ON OCCUPIED INTERIOR SPACE FOR LIGHT AND VIEWS

GREEN WALL

ACCESS TO OUTDOOR SPACE

01 OPEN WORKSPACES & PRIVATE AREAS

key

- OPEN WORKSPACE
- OUTDOOR AREA
- PRIVATE SPACES WITH VISIBILITY TO OUTDOORS

human-centered design

01 open workspaces & private areas

• Lounge furniture integrated with technology supports collaboration and connects dispersed teams.

• Enclosed spaces remain essential for focused work or confidential meetings.

• Varied levels of privacy support diverse tasks and workstyles.

• Reconfigurable and height-adjustable furniture responds to changing needs moment by moment.

• Workstations at a maximum height of 52" and placed perpendicular to windows provide access to daylight and views.

02 outdoor area

- Outdoor spaces serve multiple functions—a place to meet, to relax or to focus on work.

- Access to outdoor spaces promotes physical and psychological health

by providing workers with a revitalizing dose of fresh air and sunlight.

- A rich variety of work settings—including outdoor spaces—are possible and valuable

even in urban environments.

design for choice

Intelligent planning can create a truly high-performance workplace, one that supports worker creativity and well-being by encouraging movement and accommodating the need for privacy, as well as stimulation.

WORK WITH PRIVACY 05

WORK IN MOTION 06

04 TRADITIONAL SPACE

INFORMAL SPACE 03

PING PONG TABLES

02 WORK TOGETHER

01 TEAMWORK

key

USER ADJUSTABLE

MOVEMENT (MOVE YOUR BODY)

design for choice
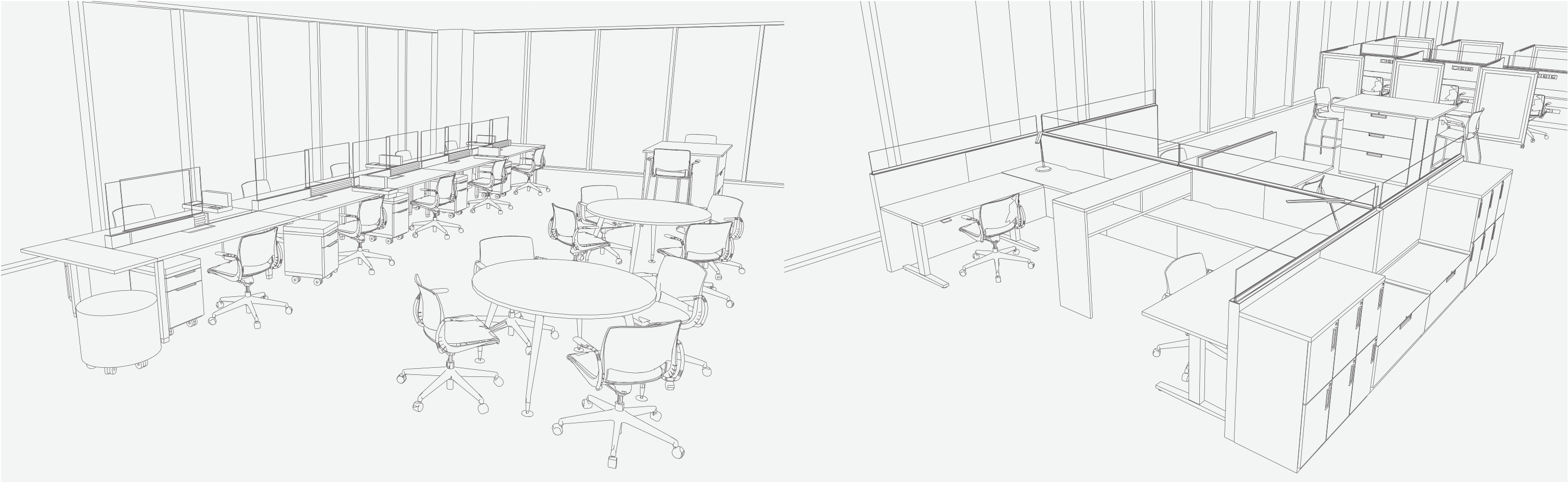
01 teamwork

- Open workstations permit easy interactions among coworkers.

- Users can adjust the level of privacy with sliding screens and accessory placement.

- Peninsula worksurfaces provide a zone for impromptu meetings.

- Ottomans and cushioned pedestals offer casual guest seating.

02 work together

- Panels and screens offer a degree of visual privacy without compromising the ability to interact.

- Lockers and seated-height cabinets placed along a circulation path provide a spot to stop and share ideas.

- An "island" of lateral files, along with counter-height seating, creates a place for conversation.

- A variety of standing height surfaces support stand-up meetings.

- Mobile white boards facilitate collaboration.

design for choice
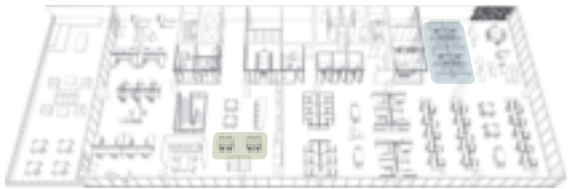
03 informal space

- Lounge areas create an informal workspace that offers a restorative break from a heads-down workstation.

- Counter-height tables encourage users to stand or to use height-adjustable stools for a healthy change in posture.

- A variety of tables and seating options invite informal meetings or socializing.

04 traditional space

- Strategies to minimize noise and disruption are essential for focused work.

- Placing storage along the spine and perpendicular to the worksurface contributes to a private workspace.

- Users can control the level of privacy with opaque screens and aperture openings.

- Adjustable ergonomic seating permits proper posture and healthy circulation, maintaining user comfort over longer periods of time.

- Ergonomic seating also permits bending, twisting and other movements that promote mental alertness and physical well-being.
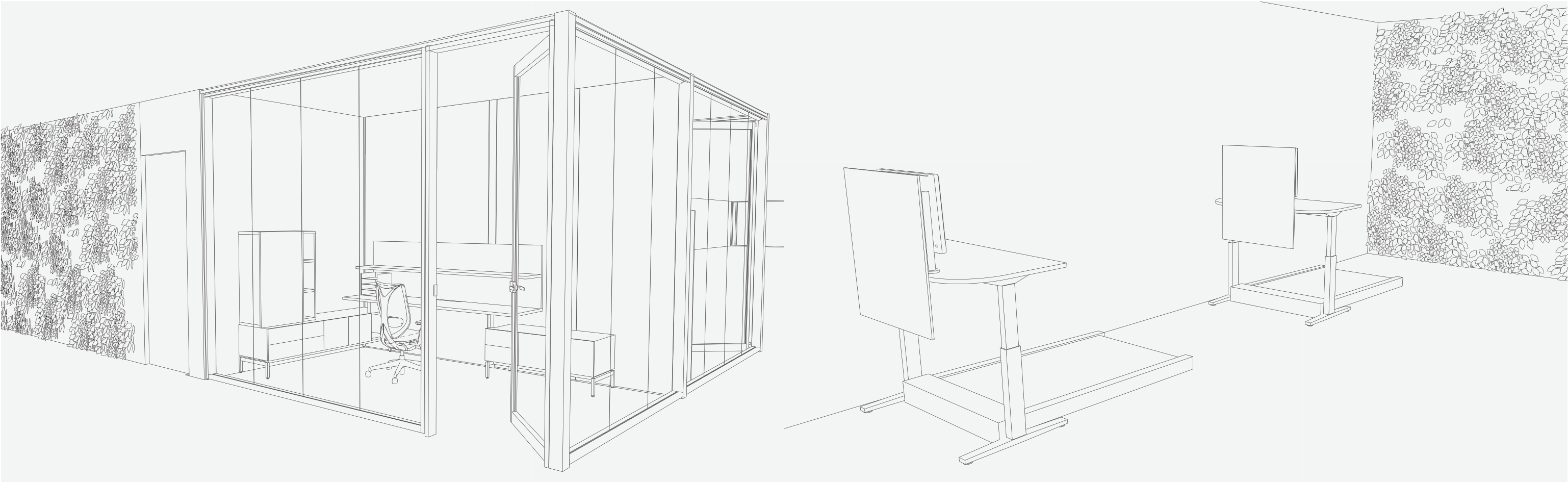
05 work with privacy

- A small office or other enclosed space is ideal for those who need a quiet space for focused work.

- Small offices are equipped with desk-height worksurfaces, functional wall panels and a variety of storage appropriate for longer stays.

06 work in motion

- Treadmill workstations allow users to walk as they think, phone or use a keyboard.

- Walking increases activity and burns calories. It can help control weight, reduce stress and improve general health.

- The treadmill workstation adjusts in height in order to accommodate a range of user heights and preferences.

ergonomic and
active design

*Furniture can promote good health and reduce
discomfort by encouraging users to frequently
alternate posture as they work and by relieving stress
on the musculoskeletal system.*

WALKSTATIONS

02 ADAPTABLE FURNITURE
AND SPACES

ERGONOMIC SEATING AT
ALL DESKS

KEYBOARD AND
MONITOR ARMS **01**
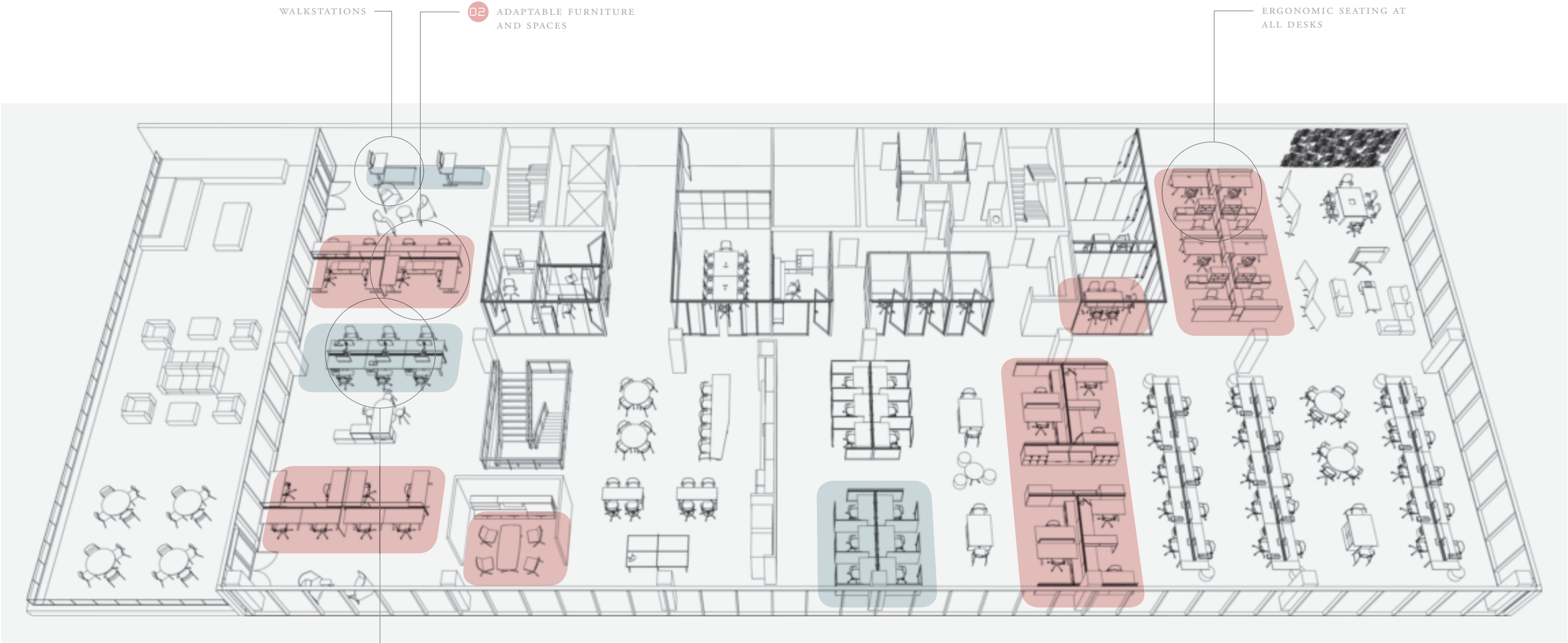
key

KEYBOARD TRAYS

HEIGHT ADJUSTABLE
TABLES

ergonomic and
active design
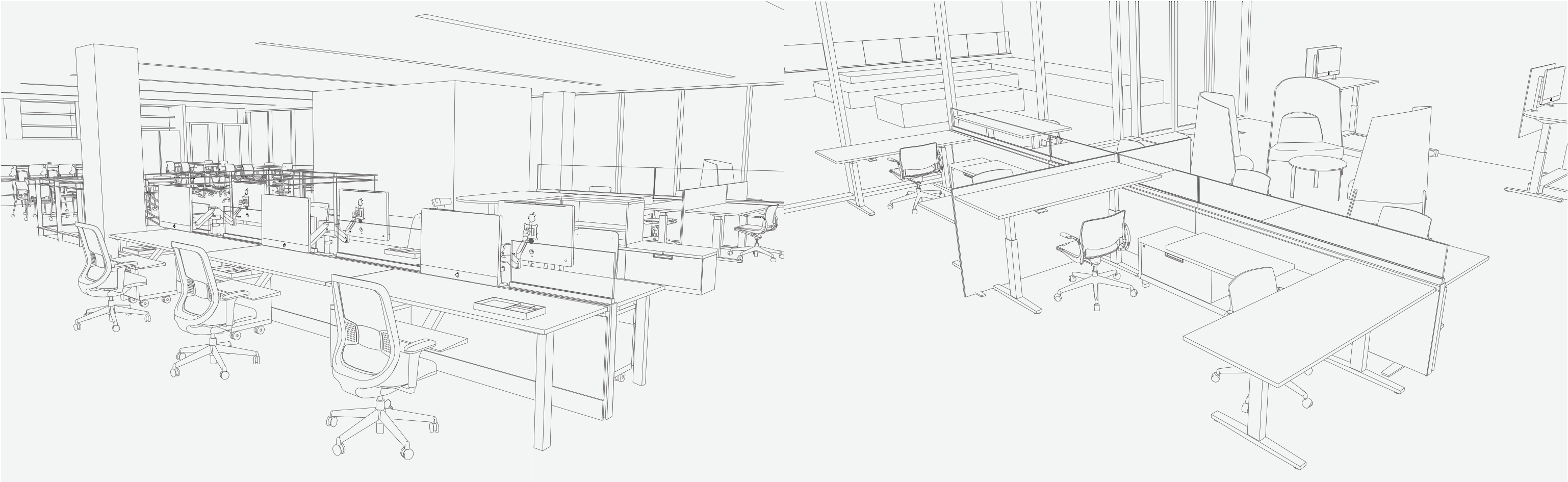
01 keyboard and monitor arms

- Easy adjustment within the workstation allows users to achieve healthier postures.

- Adjustable keyboard trays can be placed at the appropriate height for each person.

- Monitor arms can be positioned at the desired depth.

- Accessories allow users to personalize the workstation to meet individual ergonomic needs.

- Fully-featured seating that incorporates a weight-balancing mechanism and pivot arms allows the user to actively adjust position throughout the day.

02 adaptable furniture and spaces

- A variety of spaces helps to balance activity/ interaction with seated/ focused work.

- A freestanding spine maximizes reconfigurability in team areas.

- Height-adjustable tables give users a choice based on the needs of the body, not the task at hand.

- Lounge seating, defeatured task chairs and seated-height credenzas offer diverse seating options, thereby encouraging users to get up, move and change posture.

design for collaboration

By providing a spectrum of collaborative spaces across the office floorplate, workers are encouraged to leave the workstation and walk around to meet with colleagues on a formal or informal basis. One-on-one meeting spaces, casual lounge areas, formal meeting rooms, traditional conference rooms and "scrum" spaces offer a multitude of choices.

ONE-ON-ONE ROOM 07

TRADITIONAL CONFERENCE ROOM 06

TRADITIONAL CONFERENCE ROOM

05 SCRUM SPACE

ONE-ON-ONE 03

02 INFORMAL TEAM ROOM

01 CASUAL MEETING AREA

TEAM MEETING 04

key

CASUAL/INFORMAL MEETING SPACES

ONE-ON-ONE SPACES

FORMAL MEETING SPACES

design for collaboration
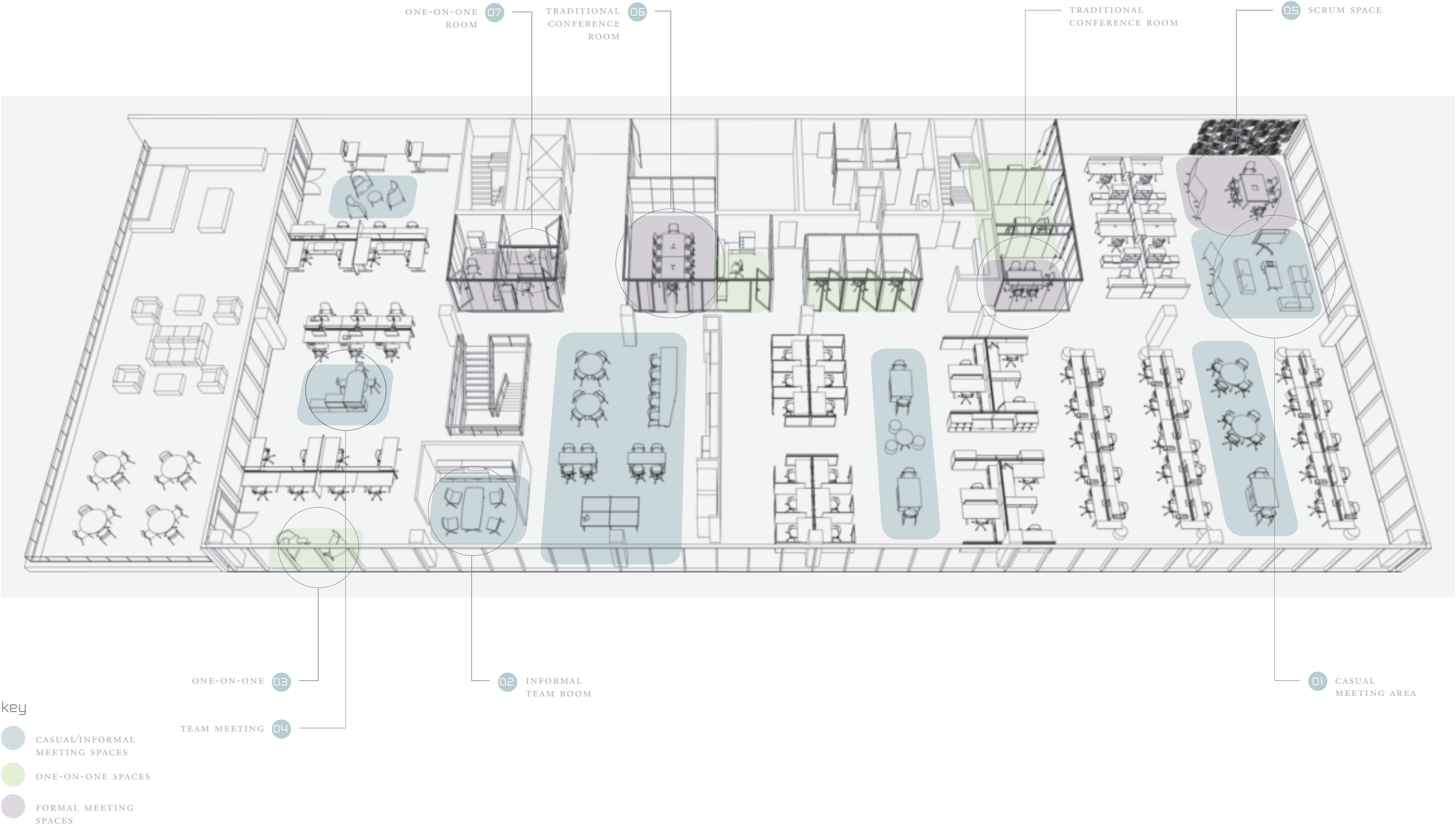
01 casual meeting area

• Modular seating with integrated technology can be configured in various ways to create collaborative spaces with the welcoming look and feel of a lounge.

• Freestanding acoustic screens provide a degree of separation and an acoustic barrier when placed between meeting areas and adjoining workstations where heads-down work is performed.

02 informal team room

• Semi-enclosed spaces equipped with height-adjustable tables offer a private space for a single user or act as a brainstorming room for a group of team members.

• Height-adjustable tables support meetings that take place standing, seated at a table or seated on lounge furniture.

• Wall-mounted storage accommodates

technology that supports collaborative work among team members who are present or at a distance.

03 one-on-one

• High-back lounge
  seating placed near
  a window or away
  from open, high-
  activity areas provides
  a destination with a
  sense of privacy for a
  single user or one-on-
  one conversations.

04 team meeting

• A bank of files
  can define a team
  meeting space by
  providing seating
  at a variety of
  heights, along with
  worksurfaces at
  seated, counter and
  standing heights.

• When placed
  between clusters
  of workstations,
  such areas are
  easily accessible,
  encouraging workers
  to use the area for
  brief exchanges of
  information and ideas.

• Low storage fitted
  with cushions provides
  a comfortable seat and
  42" high cabinets that
  support a cantilevered
  worksurface give
  the user options for
  standing or sitting at
  counter height.

design for collaboration
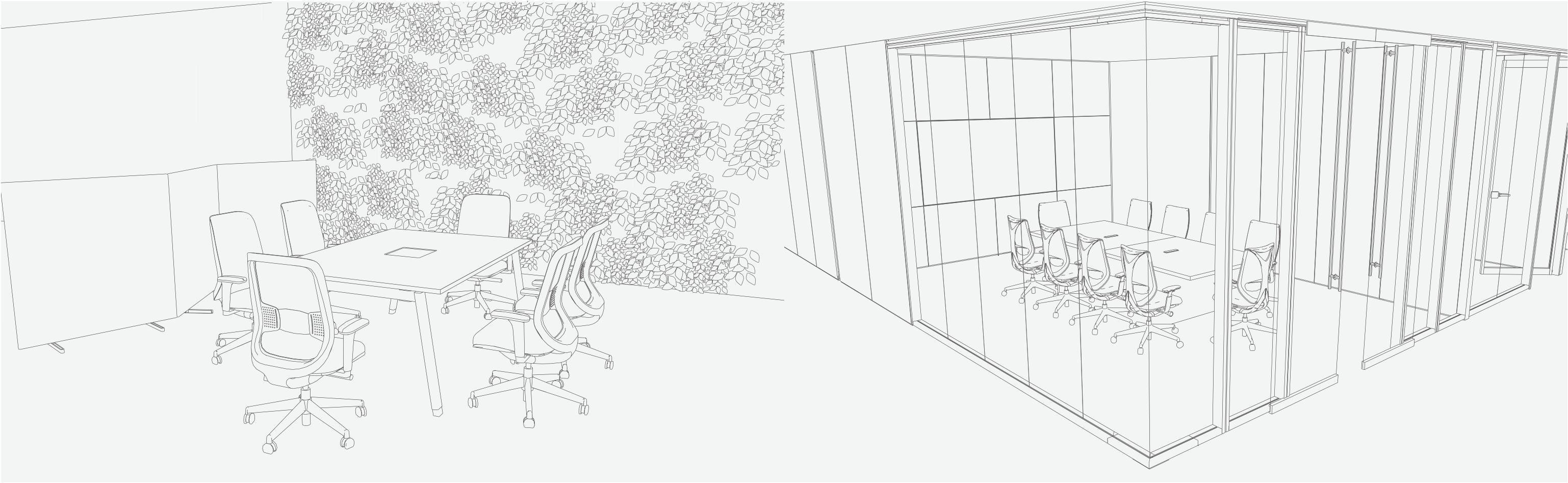
05 scrum

- In heads-down focused areas, space is required for more formal or private meetings between members of a team.

- Meeting tables with integrated

technology and movable screens provide the privacy required in these areas.

06 traditional conference rooms

- Traditional conference rooms, often centrally located, provide a more formal space for larger groups when privacy is required.

storage and audio equipment, and ergonomic seating to allow for longer meetings.

- They are equipped with technology,
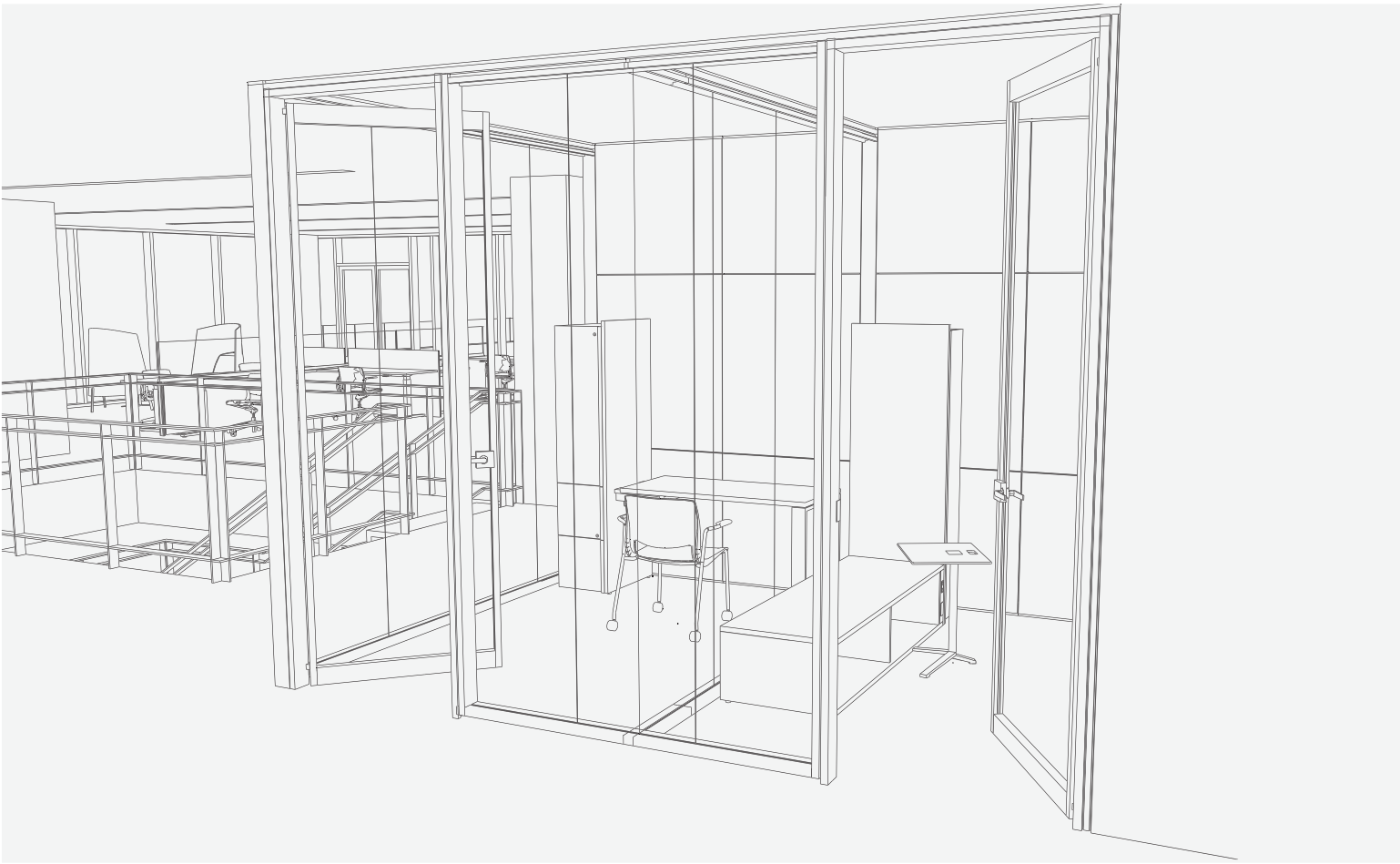
07 one-on-one room

• Small offices or
enclosed spaces are
ideal for users who
need a private
space to perform
heads-down work.

allow users to work
in a more casual
seated position.

• Loungers with coat
and open storage

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