



## Movable Walls & Raised Floors: Optimizing Adaptable Workplaces to Meet Changing Business Needs

How buildings, people, and organizations perform in the workplace affect one another and ultimately the corporate bottom line. Changing business needs means changing organizational structures, which in turn means changing spaces. Workspace change requires reconfiguring perimeter and enclosed space walls and relocating infrastructure outlets. Raised floors and movable walls, vital tools of an Organic Workspace® approach, better accommodate such need for change more so than traditional construction. More efficient alignment of space to changing business needs means better business.

Floors and walls, typically, are immovable objects. Within traditional construction, they are placed with great effort. Thus, space owners are often reluctant to change floorplan configurations because of the significant initial investment during construction. Unfortunately, the inflexibility of workspaces can impact the organization in negative ways, further depleting resources and reducing the organization’s ability to change.

How can that be so?

The workplace includes physical sciences, such as structural engineering, as well as social sciences, such as psychology. While many people would consider engineering to be difficult, it is the social aspects that can be more difficult as they address intangible issues of people. When designing a workplace, both approaches, as well as the way they inform each other, should be considered carefully in terms of:

Routine issues:	Complex issues:
acoustics ergonomics efficiency (e.g. layout) costs	the impact of culture collaboration privacy engagement human performance

This holistic approach to understanding the workplace includes consideration of place, people, and process<sup>1</sup> in conjunction with evolving business needs. Design decisions (who works alongside whom, layout, openness, costs, and even colors) will affect the people who occupy the space. Oftentimes, what seems like good design decisions today might hurt human, and ultimately, business performance when needs change.<sup>2</sup> Modular construction, however, using movable walls (also known as demountable partitions) and raised access floors (RAF) are vital tools for an Organic Workspace approach, which supports this perpetual need for change.

So, let’s take a holistic look at the workplace—specifically, how facilities performance impacts human and organizational performance, the role of space utilization issues and worker expectations in design decisions, and how movable walls and raised access floors can be a part of a holistic solution for adapting facility needs to meet evolving business needs.

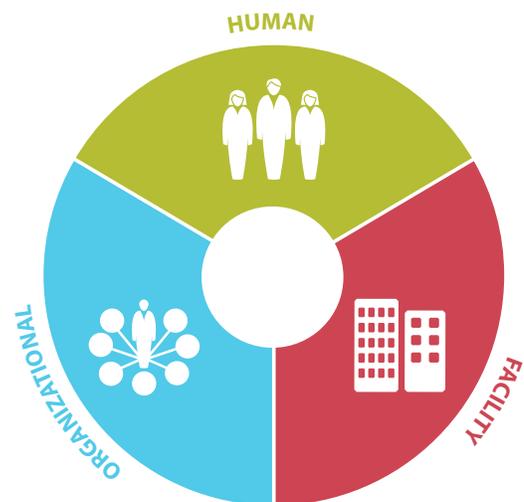
### Facility, Human, and Organizational Performances Are Inherently Connected

In the workplace, three performances—facility, human, and organizational—all influence each other.

**HUMAN PERFORMANCE** is about how people perform. Because human performance can be influenced by countless factors, it is much more difficult to define and control. These metrics may include effectiveness, creativity, engagement, motivation, collaboration, innovation, and well-being. While HR executives historically focused on these, there is an ongoing shift for real estate and facilities professionals to develop combined human resource, real estate, and facilities management practices that consider human performance when managing the workplace.

**FACILITY PERFORMANCE** is about how the built environment performs. It is usually straightforward to measure through lease costs, energy costs, cleaning costs, maintenance costs, space utilization rates, churn costs, etc. Because these measures are very understandable and relatively easy to document, usually using a computer aided facility management (or CAFM) system, facilities managers and corporate real estate executives tend to focus on them. However, the industry is shifting away from viewing space as a cost center and towards an appreciation that space is an enabler to effectiveness, and these metrics are starting to change also.

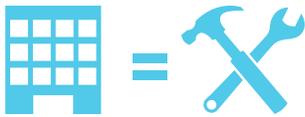
**ORGANIZATIONAL PERFORMANCE** is about how the organization performs in meeting its goals. Most of these measurements tend to be financial in nature, but many organizations also measure their impact on other outcomes. For instance, a nonprofit organization may measure success not only by its ability to manage within budgets, but also by the number of people helped. Corporate social responsibility, the measurement of the amount of “good” achieved by both nonprofit and for-profit organizations, is also gaining importance, and may become an even more essential differentiator in the future.



1 Fernando, 2003.

2 BM. O’Neill et al. 2014; M. J. O’Neill, 2007.

The ability to achieve organizational goals depends upon motivated and engaged staff. Personnel outcomes may be impacted by a wide range of issues, including the contrasting needs of solitary focus work and group collaboration,<sup>3</sup> access to people and materials, the need to socialize with coworkers, and the need to engage in the culture of the organization. Unfortunately, no matter how motivated and engaged people are, they may face difficulties performing when the workplace does not properly support the way in which they best work. Optimal facility performance allows all activities to effectively occur, which supports the cultural, social, and intellectual embodiment of the organization.



As the late Michael Brill said, “Workplace is a tool and not just a box to house tools.”<sup>4</sup>

Therefore, the key in holistic design is *the ability to adapt to change*: The business climate changes faster than ever before and the organization must be able to respond. During times of growth and recession, workgroups need to be reorganized as priorities change. This, in turn, requires physical changes in the workspace to facilitate optimal employee performance. Most organizations are challenged to keep pace with updating staff locations within their facilities management systems, let alone being able to respond with actual physical changes on the floorplate. The layout of the furniture, the ratio of individual and group spaces, collaboration spaces, and project space must be able to accommodate organizational changes. In addition to organizational change, employees’ expectations for their workplaces also are changing, and the design challenge gets more complex.

### The Challenge of Space Utilization and Meeting Workers’ Expectations

Long gone are the days when going to work meant sitting at a workstation within a space surrounded by four walls and a door that provided the appropriate privacy for focus work, while a telephone allowed for occasional communication. Today, more collaborative work is important for innovation and, rather than going to work, work “comes” to us in various electronic formats. *Work is everywhere and anytime*, and people can and will find a “place” that best supports their work.

Employees are expecting this agile approach to working in the workplace; when they can’t find it there, they’ll look outside the company walls, in a nearby café or at home. If workspaces are obstacles to effective work, more and more people will not bother to do work at corporate offices. This will reduce employees’ ability to connect to company culture and effectively collaborate, and will further reduce the already alarmingly low space utilization levels. If this seems like a huge waste, consider that among the total cost of running an organization for ten years, people related costs are about 82 percent while workplace related costs (including design and construction) are only 5 percent.<sup>5</sup> While workplaces might seem expensive, it is the people who really are.

Moreover, workplaces do affect how people work, behave, and perform. However, even the most carefully researched, designed, and constructed workplace might already be obsolete prior to move-in, depending on the construction length. It’s like painting a landscape: By the time it’s finished, several days have passed with different lighting and weather conditions that renders the scene different. Designing an effective workplace has become a moving target. Change is the only constant in the workplace environment, and such change is taking place faster than ever before. Consequently, it is no longer the question of doing it right the first time, but doing it right every time.

### Space Utilization:



“There’s a whopping 93% of ‘under-utilization’ of office buildings—the majority of commercial real estate!”

– Dr. Gabor Nagy

Companies want to keep their people at corporate offices for effective face-to-face collaboration and serendipitous interactions, but more and more people have the choice to telecommute (work from home or from a café). After all, who wants to spend two hours in traffic, or wear earplugs at work in order to focus? The way we work is also changing faster than ever. Consequently, the work environment must embrace change in an integrated, adaptable, sustainable, and cost-effective way.<sup>6</sup>

With such a significant investment in people, it’s good business to consider space from this holistic perspective: A workplace responsive to both organizational and employee needs allows an organization to maximize all of its resources. Movable walls and raised access flooring are important tools when implementing an Organic Workspace approach, and can provide the flexibility needed to make change—almost on-the-fly.

3 Nagy et al., 2016.

4 Brill et al., 1984.

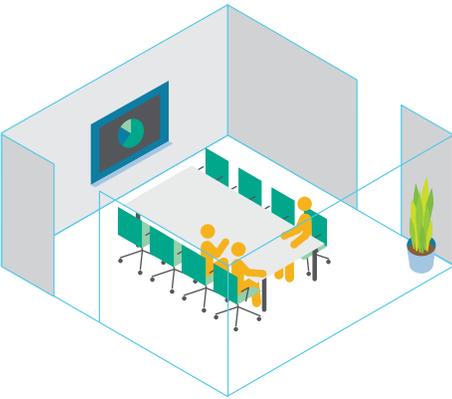
5 BOSTI, 2016.

6 M. O’Neill et al., 2014.

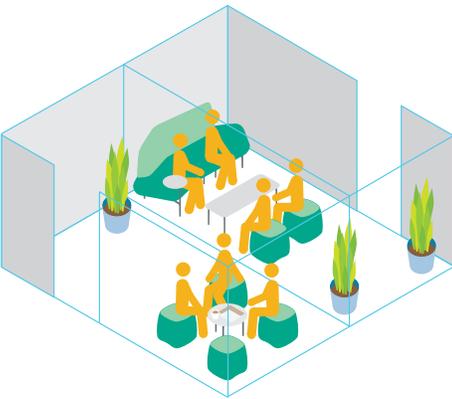
## Walls that Respond to Changing Needs

Most organizations suffer from an inability to easily modify their work environments. For example, while *time utilization* of meeting rooms is high (meeting rooms are usually overbooked), *space utilization* is usually low (e.g., two to three people using an eight-person conference room). Such workspaces are both a waste of space, but also incur hidden costs: the time staff spends finding appropriate and available space to collaborate with others.

With movable walls, an eight-person meeting room...



can easily change into two four-person meeting rooms overnight, with virtually no waste.



Or, even less costly: Do the work during business hours without the noise, dirt, and odors of traditional construction interruptions to adjacent staff.

Right-sizing these collaboration spaces provides opportunity to improve facilities performance through increased space utilization rates, decreased staff complaints, and reducing landfill, energy, and labor costs. Employee performance can be improved as less time is spent hunting for an appropriate meeting room. Also, in the reconfigured space, two individual collaboration sessions can now occur simultaneously, improving opportunity for innovation, speed to market, and staff effectiveness—all of which contribute to organizational performance.

Similar needs for change can be said for individual workspaces, too. With the current emphasis on collaboration, more and more organizations realize that focus work is very important, not only for individual work, but also for collaborative work.<sup>7</sup> And while the open office is a very efficient way to house people, by its very nature it is unable to provide the same level of acoustical privacy afforded by full-height office walls. Workers need to be agile in the way they work—to be empowered to select the optimal workspace for the task at hand, e.g., focus work. Many organizations nowadays provide efficiently shared “focus booths” for intense individual work, but the number of these can often be a miss even after careful consideration of individual workstyles and group dynamics. In traditional construction, a “miss” like this will impact employee performance because it hinders rather than enables worker agility. Movable walls can adapt to organizational changes quickly and in a sustainable way to support optimal human performances such as focus. Moreover, movable walls with glass panels provide natural daylight and exterior views even in rooms near the building core—in support of people’s health, well-being, and prolonged focus work.<sup>8</sup>

## Raised Floors Optimize Infrastructure and Employee Performance

Building occupants may not realize the amount of infrastructure modern buildings require to operate. Hidden just above our heads are miles of power cables, lighting fixtures, heating and cooling ductwork (HVAC), sprinkler pipes, pipes for hot and cold water, drain pipes, vents, speakers, fire alarms, data wiring, security cameras, occupancy sensors, phone wiring, WI-FI antennas, and other needed equipment to ensure the building safely provides for occupant needs. These systems are carefully coordinated during design and construction to minimize their impact upon each other. Once in place, they are often difficult to maintain and change.

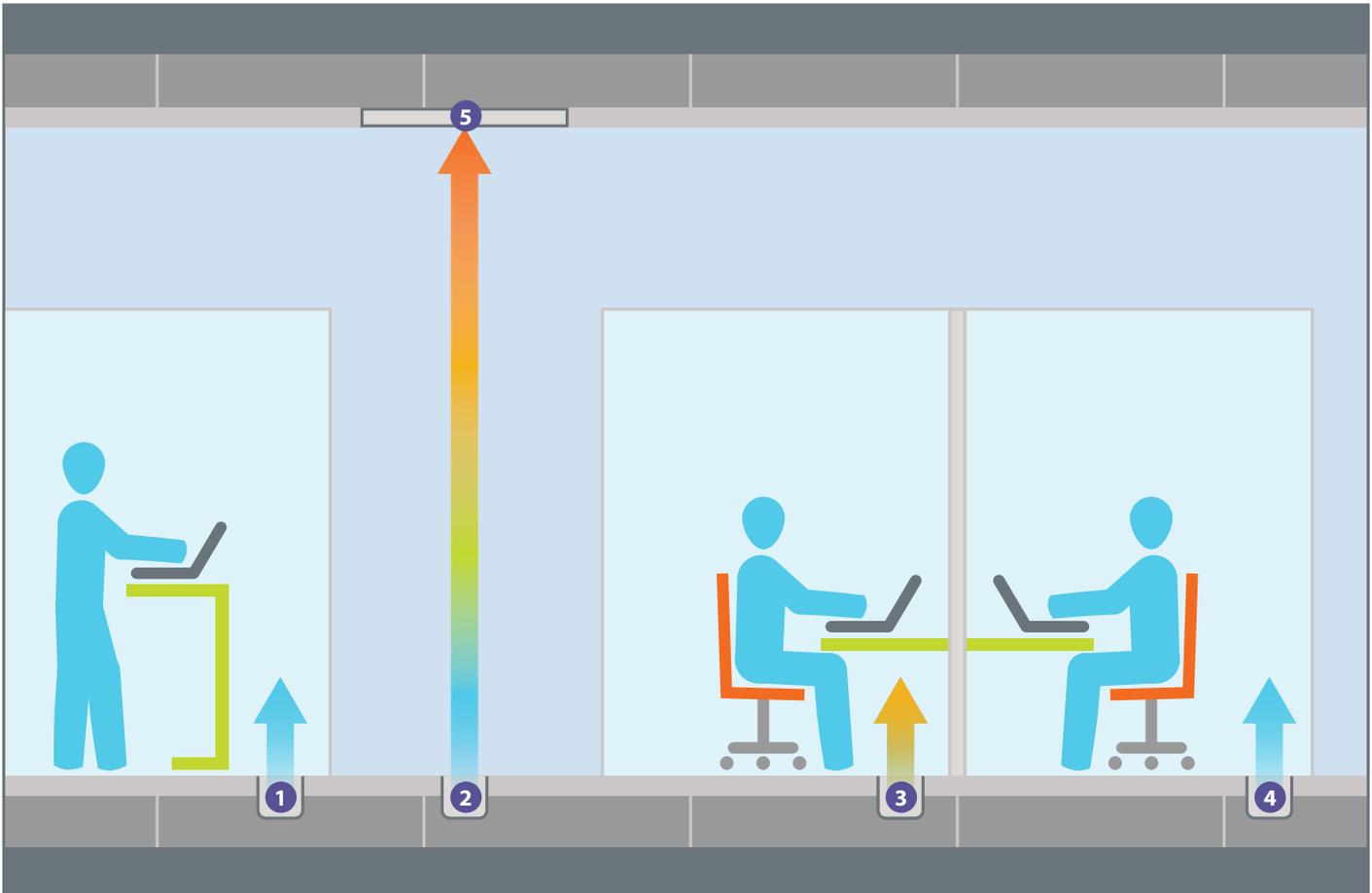
Redesigning the workspace sometimes requires changing the walls. Surprisingly, there may be just as much effort involved in altering the building systems such as lighting, fire sprinklers, fire alarms, power, data, and heating and cooling systems. Raised access floors (RAF) have long been used in technology-rich environments (such as data centers) because they offer access to underfloor systems. After all, the ability to have power and data at any possible location provides the operator with utmost flexibility. The same cannot be said for traditional slabs.

It makes sense to install systems—such as sprinkler heads, life safety systems, ambient lighting, and return air ducts—that may change less frequently in the ceiling, while the ones that are more sensitive to occupant and equipment location—such as power, data, and supply air—can be installed within easy reach, below the floor. With this type of installation, changing movable walls will not affect these systems, or their outlets can easily be relocated.

7 Heerwagen et al., 2004.

8 O’Neill et al., 2015.

The other—invisible—benefits of integrating HVAC systems for supply air within raised access floors are the advantages of underfloor air delivery (UFAD), which brings air directly to the occupant instead of feeding supply air from the ceiling. Air from the floor has several possible advantages:



- 1 Supply diffusers can be located directly at occupant locations, allowing people to control airflow based on their individual needs.
- 2 The supply air flows directly into the occupied zone, displacing contaminated air upwards into the return air system, thus providing cleaner and more stable air quality for the occupants.
- 3 Supply diffusers can provide warm air beneath workspaces, alleviating cold legs and torso.
- 4 The HVAC system can work more efficiently because the conditioned air is provided at higher temperatures than typical overhead systems, which provide approximately 55-degree air.
- 5 Supply air can be delivered at lower velocities, which can lower energy use. The HVAC designer can use several strategies including ducted supply, localized variable air volume (VAV), or pressurized plenum as dictated by the project needs.

These benefits to facility performance measures are just part of the story. An additional benefit that may impact measures of human and organizational performance is in the flexibility provided by RAF and the speed at which changes may be made. Many workspace reconfigurations may require very little below-floor work. But, when changes are required below the floor they can be made very quickly and with less impact on nearby occupants: less downtime, less effect on operations, and less time for people to be displaced—thus minimizing negative performance.

Finally, UFAD may produce another very important benefit to all office workers: clearer thinking. Recent research shows a surprising link between concentration and CO<sub>2</sub>: Removing even very low levels of CO<sub>2</sub> can significantly improve concentration.<sup>9</sup> Flowing supply air from the floor and exhausting it at the ceiling ensures that the air we breathe has as little CO<sub>2</sub> as is mechanically possible.

### **The Synergy of Architectural Interior Components: Good Alone, Better Together**

Separately, raised access floors and movable walls each have many benefits. Together, their synergy unlocks the potential of Organic Workspace design—a responsive work environment sensitive to organizational and human needs. Movable walls allow simple reconfigurations to be made in less than a day, and in almost immediate response to occupant request. Acting quickly—and giving people the space they need to be effective—tends to increase employee engagement and satisfaction. Bigger changes take more time, but with raised access floors they are typically faster than traditional construction techniques: Modifying the infrastructure either isn't needed or is done easily. Providing the customized spaces needed for an entire workgroup when they need it helps to ensure peak effectiveness.

---

Movable walls combined with raised access floors optimize an Organic Workspace approach, maximizing how responsive the workplace is to organizational change.

---

The ability to quickly and easily alter workspace configurations may mean organizations are more likely to actually make changes, ensuring that the entire organization is more responsive to changes in the business environment. Just as important, the ability to easily and cost effectively adapt workspaces may also help drive important cultural change.<sup>10</sup>

### **It's Bad Business Not to Design an Adaptive Work Environment**

Facility, human, and organizational performance in the workplace affect one another and, when considered holistically, they ultimately affect the corporate bottom line. In Organic Workspace design, movable walls and raised floors play a harmonious role, embracing change. While individually they can provide some improvement in these performances, it is the synergy of both elements that truly makes a difference. Evolving business needs mean changing organizational structures, which in turn require adaptable spaces. Creating different workplace layouts entails reconfiguring perimeter and enclosed space walls and relocating air diffusers and other infrastructure outlets. Raised floors and movable walls better accommodate such change more so than traditional construction, making it easier to quickly align the workspace while optimizing performance—so you can get back to business.

<sup>9</sup> Satish et al., 2012.

<sup>10</sup> Miller et al., 2014.

## References

Brand, Stewart. *How Buildings Learn: What Happens After They're Built*. New York: Penguin, 1995.

"BOSTI Associates: Economic Benefits," last accessed February 16, 2016, <http://www.bosti.com/benefits.htm>.

Brill, Michael, Stephen T. Margulis, and Ellen Konar. *Using Office Design to Increase Productivity*. Vol. 1. Workplace Design and Productivity, 1984.

Fernando, Tom. 2003. "SANE : Designing Tomorrow's Office." *The ARUP Journal 2*: 55–58.

Heerwagen, Judith H., Kevin Kampschroer, Kevin M. Powell, and Vivian Loftness. "Collaborative Knowledge Work Environments." *Building Research & Information* 32, no. 6 (2004): 510-528.

Miller, Rex, Mabel Casey, and Mark Konchar. *Change Your Space, Change Your Culture: How Engaging Workspaces Lead to Transformation and Growth*. Hoboken: John Wiley & Sons, 2014.

Miller, Rex, Dean Strombom, Mark Iammarino, and Bill Black. *The Commercial Real Estate Revolution: Nine Transforming Keys to Lowering Costs, Cutting Waste, and Driving Change in a Broken Industry*. Hoboken: John Wiley & Sons, 2009.

Nagy, Gabor, Michael O'Neill, Beck Johnson, and Mike Bahr. *Designing for Focus Work*. Haworth white paper, 2016.

O'Neill, Michael, Gabor Nagy, Victoria Gilbert, and Stefan Kiss. *Workplace Design for Well-being*. Haworth white paper, 2015.

O'Neill, Michael, Mike Bahr, Mark Bridgman, Kaj Helstrand, and Stefan Kiss. *Organic Spaces : The New Platform for Business Transformation*. Haworth white paper, 2014. <http://www.haworth.com/docs/default-source/white-papers/organic-spaces-the-new-platform-for-business-transformation.pdf?sfvrsn=4>.

O'Neill, Michael J. *Measuring Workplace Performance*. Second Edition. Boca Raton: Taylor & Francis, 2007.

Satish, Usha, Mark J. Mendell, Krishnamurthy Shekhar, Toshifumi Hotchi, Douglas Sullivan, Siegfried Streufert, and William J. Fisk. "Is CO2 an Indoor Pollutant? Direct Effects of Low-to-Moderate CO2 Concentrations on Human Decision-Making Performance." *Environmental Health Perspectives* 120 (12) (2012): 1671–77.

## Contributors



**Dr. Gabor Nagy** holds a Ph.D. in Architectural Engineering with an emphasis on workplace performance. With 15+ years experience and as a Haworth Research Program Manager in San Francisco, he is responsible for applied research on corporate culture, workstyle, and workplace performance, and provides advisory services to clients.



**Mike Bahr** is an architect who has specialized in leading client engagement and design management for 25+ years. As a Haworth Research Program Manager based in the US, Mike leads research programs to help clarify the impact space has on people, and vice versa, to help clients produce high performance spaces.



**Beck Johnson** holds a B.S. in Scientific and Technical Communication and an M.A. in Communication. With 15+ years of experience in social science research methodologies and as a Research Specialist at Haworth she conducts primary and secondary research addressing workplace issues.

---

*Haworth research investigates links between workspace design and human behavior, health and performance, and the quality of the user experience. We share and apply what we learn to inform product development and help our customers shape their work environments. To learn more about this topic or other research resources Haworth can provide, visit [www.haworth.com](http://www.haworth.com).*

© 2016 Haworth, Inc. All rights reserved. Published 2016.