

Research-Informed Design

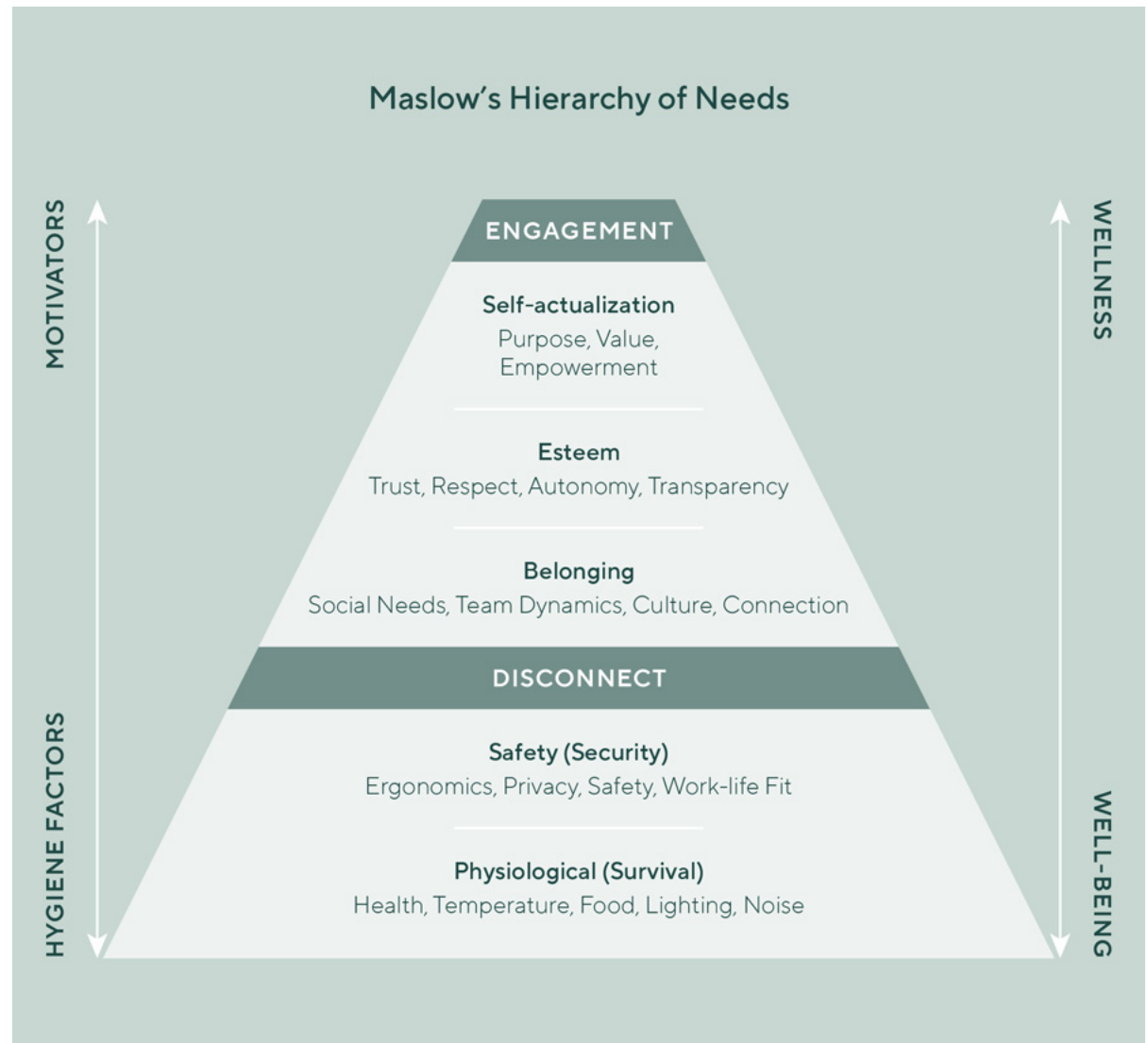
Benefits-Based Design

Kimball International



Organizations can benefit from workplace design and add value to their operations in many ways. Architecture creates spaces that are life sustaining while design generally supports psychological and social well-being and positive human experiences. While engineering ensures achievement of goals noted at the lower levels of Maslow's Hierarchy of Needs, architecture and design supports fulfillment of higher level ones. Some of the benefits flowing from design are universal and others more project specific. Research findings, tools, and methodologies presented in this white paper can be used to identify both sets of benefits/values in the post-COVID-19 era and convey the implications of design decisions to interested parties.

A real world case study details how design can have a significant effect on organization outcomes.



1 / Benefits That Should Flow From Workplace Design

Assessing the benefits that flow from workplace design, or any other investment decision, involves considering the repercussions of resource allocations—of which include humans and their skill sets, organizational funds, and time. Design decision makers need to continuously ask themselves these questions:

- How should resources be spent?
- Have resources been well spent?

As the world returns to work following the COVID-19 pandemic, re-established business/commercial sites will be fundamentally different than those of the pre-outbreak era. For example, employee density will be reduced, to ensure that employees are able to maintain health-supporting spatial separation. Workplace environments will also feature additional interpersonal screening/privacy barriers and utilize materials previously found in healthcare settings. These sorts of environmental modifications are both fundamental and inarguable as they are crucial to maintaining employee health. Workplace design can only add benefit to organizations when it protects users' lives. Workplace environments that do not support achieving the objectives noted on the lower levels of Maslow's hierarchy can not promote those at its higher levels. Employee health and safety are the foundations for employee wellbeing.



A review of applied psychological research, particularly work in environmental psychology, reveals that to answer both questions about resource allocations and to develop effective workplaces, designers must keep top-of-mind the five ways that design adds the most value/benefits to organizations.⁴ These five actions build the foundation on which future discussions of benefits are based. Design that is adding the most value to organizations:

- **Communicates** positive information nonverbally while facilitating mutually desired verbal discussions. We trust the silent messages sent to us via design more than verbal ones⁵ so mission-consistent signaling is an organizational benefit and messages that we interpret as negative are stressors which degrade our performance.⁵¹ Nonverbal communication of physical safety (from disease) will be important after workplaces reopen following the COVID-19 pandemic. Humans are stressed if they are unable to interact with other humans as they feel is necessary.¹⁹ Design can facilitate effective spoken communication in a variety of ways.
- **Comforts** via support for environmental control, cognitive refreshment, and biophilic design, for example. Environmental control has been directly linked to enhanced professional performance^{34,49} and biophilic design has been shown to boost cognitive performance.⁵⁵ Experiencing a comfortable level of environmental control will be important post-COVID-19 because the spread of the disease and subsequent steps to curtail it reduced employee feelings of autonomy generally. Workplace design, via multiple sensory channels, can support cognitive refreshment,^{6,49} which in turn supports restoration of pre-exhaustion performance levels.^{47,49}

- **Continues** in use over time, evolving as individual and group design-related needs do. Familiar options are preferred,¹³ particularly when we are stressed.^{31,38} The psychological bonds formed to existing workplaces are strong, which can make redesigns of them particularly stressful for users.²¹
- **Challenges** the user by aiding their efforts to grow and develop as a person in ways they find personally meaningful. Lawrence and Nohria³⁷ report that humans have a fundamental need to evolve as a person in ways that they find meaningful.

- **Coordinates** with the requirements of activities planned for a space. For example, work that requires concentration/focus is best performed in spaces that are relatively less stimulating places to be, while tasks that don't require as much focus/concentration being best accomplished in spaces that are relatively more activating, energizing environments.^{53, 45} Lamb and Kwok²⁷ found that the negative effects of environmental stressors tied to noise, temperature, and lighting degrade cognitive performance (self-rated work performance and objectively-evaluated cognitive performance) by 2.4% – 5.8%.

Design is not magic, but the previous list indicates that it can provide powerful benefits to organizations and the people who work at them. Many factors together produce the ultimate benefit profile derived by an organization functioning in a particular place. For example, users need knowledge of a field to think creatively about it, regardless of the design of the environment.

It's important to bear in mind that environments are not entirely objectively perceived, and deviations from objectivity can determine benefits received from design. For example, Kozusznik and team²⁶ studied the effects of noise, glare/light reflections, and dust on health and report that "the participants in our study with less positive emotions tended to appraise more noise in the office compared with those with more positive emotions. Similarly, positive emotions may "color" the appraisal, making it more positive... so that the stressor is appraised as less harmful and easier to overcome... [designers] should improve the office design to enhance positive emotions... perceived control and perceived value are critical antecedents of positive emotions." In the post-COVID 19 era, perceptions of environmental healthfulness are likely to be particularly important for positive corporate atmospheres as well as for professional performance.



2 / General Design Benefits Identified by Scientists

Workplace design, specifically, provides four interrelated sorts of benefits to organizations.³ They are support for social contact, mood- and health-related benefits, and cognitive value.

Support for Social Contact

Ratti and Claudel⁴¹, in the Harvard Business Review, report that “even if we can work from anywhere, that does not mean we want to. We strive for places that allow us to share knowledge, to generate ideas, and to pool talents and perspectives. Human aggregation, friction, and the interaction of our minds are vital aspects of work... Far from making offices obsolete... technology will transform and revitalize workspaces.” Post COVID-19, supporting both employee needs for social contact and health are likely to be particularly challenging. Self-Determination Theory (SDT)¹² identifies three fundamental human needs to feel competent, comfortably autonomous, and linked to other humans: SDT recognizes “three basic psychological needs—for competence [skill], autonomy [self-determination], and relatedness [connection to others]—the satisfaction of which promotes... high-quality performance, and [psychological and physical] wellness [wellbeing].” Deci, Olafsen, and Ryan report that “Anyone interested in improving the work context within an organization and thus the performance and wellness of its employees could evaluate any policy or practice being

Support for Social Contact	Mood-Related Benefits
Health-Related Benefits	Cognitive Benefits

considered in terms of whether it is likely to (a) allow the employees to gain competencies and/or feel confident, (b) experience the freedom to experiment and initiate their own behaviors and not feel pressured and coerced to behave as directed, and (c) feel respect and belonging in relation to both supervisors and peers.”¹²

Mood-Related Benefits

Mood-related benefits are directly linked to organizational success and discussed in detail in How a Place Makes Us Feel, a whitepaper available at the Kimball International website.

Health-Related Benefits

Ways in which design can encourage physical health are fundamental to the WELL and FITWEL programs and are increasingly top-of-mind with employees in the post-COVID-19 era. Financial benefits of better employee physical health can

include, long term, reductions in health care costs (and thereby cost of goods sold), both short and long term enhanced professional performance, and reduced absenteeism, for example.

Cognitive Benefits

Multiple benefits derived from workplace design are linked to cognitive processes. The design of the physical environments that surround us have a significant effect on what goes on inside our brains, our cognitive performance.

Workplace design can be tied to a number of benefits of interest to finance and human resource professionals. Job satisfaction and workplace design have been directly linked.^{21,33} Ties between job performance and job satisfaction have been identified by a number of researchers, with increases in job satisfaction being tied to increased performance.²² Veitch⁵⁰ reports that as workplace environmental satisfaction increases there is a corresponding increase in job satisfaction and that enhanced job satisfaction has been linked to a boost in organizational commitment/intent to stay in a job as well as “more satisfied customers, and – importantly– better business unit financial performance.” Leaman’s²⁸ work indicates that workplace design can directly influence professional performance, potentially enhancing it by 12.5% or degrading it by 17% (2000).

Environmental Satisfaction

Job Satisfaction

Professional Performance

Boosts in professional performance tie directly to more desirable financial performance measures (all else remaining the same) such as:

- Cost of Goods Sold product related expenditures for labor and materials with allocated overhead are used to determine the cost of goods sold. As employee performance increases and/or health care costs, among others, decrease, COGS can be expected to decrease.
- Efficiency ratio is organizational expenses divided by revenue. A smaller efficiency ratio is better than a larger one, as it indicates that an organization has spent less money for each dollar of revenue earned.
- Earnings per share can be calculated when common stock has been issued, and will rise as profits do.
- Rate of return is the profit derived from an investment.

Many workplace design factors can be directly linked to enhanced employee and/or organizational performance and thus to organizational benefits:

1. Ventilation/Air quality
2. Acoustics
3. Natural light
4. Opportunities for cognitive refreshment
5. Visual complexity
6. Surface colors
7. Artificial lighting
8. Furniture and space planning
9. Plants

Factors listed earlier on the list are likely to provide larger benefits to an organization when they are optimized for employee performance than those later on the list. For additional information on the design elements noted, please refer to the How a Place Makes Us Feel white paper available on the Kimball International website.



Ventilation/Air Quality

Researchers³² have found that increasing ventilation rates to twice the minimum recommended by ASHRAE has a minimal cost (less than \$40 pp/year in zones studied), but can increase professional performance by 8%. Which they report is “equivalent to a \$6,500 increase in employee productivity each year. Reduced absenteeism and improved health are also seen with enhanced ventilation”. Other research² found that when people experienced low levels of VOCs or low levels of VOCs and high outdoor ventilation their cognitive performance on a range of tasks similar to knowledge work got a boost compared to individuals working in environments with high VOCs. Performance was 61% higher when only VOCs were cut and 101% higher when lower VOCs were paired with more outdoor ventilation, compared to the conventional, high VOCs site. Following the COVID-19 pandemic, there is much more interest by space users in ventilation systems and WELL™ has thoroughly discussed ventilation in its V2 standards and WELL Health-Safety Rating.

Acoustics

The World Green Building Council⁵⁴ found a 66% fall in staff performance as a result of distracting noise. In general office sound levels, should be 45 dB(A) or less to keep worker stress in check and thereby optimize productivity (at 55 dB(A) people are nearly certainly stressed).^{49, 50} Task performance is degraded both in environments that are too loud and those that are too quiet.¹

Natural Light

When workplaces feature natural light, cognitive performance gets a positive boost¹⁵ and working in a naturally lit space has also been tied to higher levels of job satisfaction.⁹

Opportunities for Cognitive Refreshment

Cognitive refreshment is reviewed earlier in this document.

Visual Complexity

Moderate visual complexity, about the same as that in a residential interior designed by Frank Lloyd Wright,⁴⁸ is desirable in workplaces. Visual clutter in workplaces degrades cognitive performance and well-being.⁴² Kastner found that “visual clutter competes with our brain’s ability to pay attention and tires out our cognitive functions over time”.⁸

Surface Colors

Research indicates that looking even very briefly at the color red worsens analytical performance^{16,17} and creative performance is enhanced by looking at greens, even for short periods of time.^{30,46}

Artificial Lighting

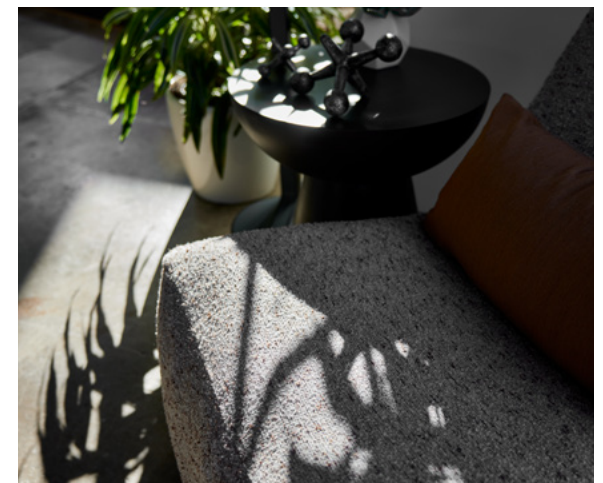
Weitbrecht and colleagues⁵² tested concentration and creativity at three different light colors (3000K (warmer), 4500K, and 6000 K (cooler), all at 1000 lux. They found that that “creativity was better under warm light (3000 K) than under colder light (4500 K, 6000 K). Concentration was best under cold light (6000 K).”

Furniture and Space Planning

Furniture and performance are clearly linked. For example, Knight and Baer²⁴ found that when people stand during meetings, group performance may improve. Bernstein and Turban¹⁷ determined that open plan offices can be overstimulating for employees, which degrades professional performance; so, in workplace screening devices can be handy. There is evidence linking the use of sit-stand desks to enhanced professional performance.¹⁸ Providing people with the opportunity to choose where to work has been linked to enhanced professional performance.⁴⁴ In the post-COVID-19 era, distances between seats, orientations of users, and “sneeze guard” type barriers between co-workers, for example, have been receiving a lot of attention because of their potential effects on user health.

Plants

People working in spaces with green leafy plants are more satisfied with their jobs than people whose work areas don’t include plants,¹⁴ have higher levels of cognitive performance,^{36,40} and greater work engagement.³⁶ The presence of green leafy plants has also been tied to enhanced creative performance.^{25,43,46} Some infection control standards make the use of live or even artificial plants in workplaces problematic (germs can live in soil and on real or fake leaves). When stringent infection control policies are in place, images of natural environments or similar visual art or surface patterns can be substituted for the plants.



3 / Multi-Factor Analysis

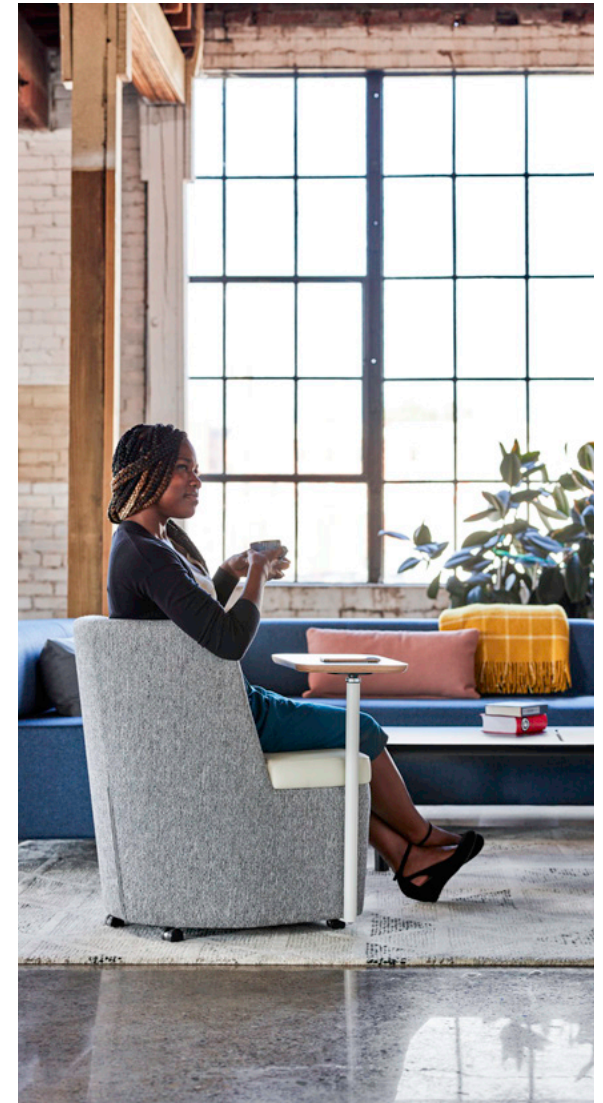


Work by the National Research Council of Canada³⁵ integrated the findings of many peer-reviewed studies conducted in the real world by experts in a range of fields, from business to medicine to engineering to psychology, among others and ultimately linked effective design of particular aspects of the built environment to organizational benefits. They determined, for example, that:

- Absenteeism drops when ventilation includes more air from outside and ventilation systems are clean and well maintained, when employees have control over environmental factors (such as temperature, whether windows are open or closed, and intensity of direct and indirect lighting compared to direct parabolic lighting). Another factor linked to lower absenteeism:

replacing older furniture with higher dark colored panels around cubicles with newer furniture with lower, lighter colored panels.

- Employees are more satisfied and less willing to leave when office conditions improve.
- People feel that their professional performance is higher in greener buildings and in newer ones and also in private offices (comparison is to shared or open offices).
- Job satisfaction has been tied to personal dimming control with a mix of direct and indirect lighting (compared to direct parabolic lighting; cubicles were also updated in the study indicated). Also linked to higher job satisfaction levels were enhanced environmental experiences tied to, for instance, better sound absorption material use, personal control over lighting, more opportunities for privacy and furniture that is ergonomically designed, including providing sit-stand desks. Private offices were linked to higher levels of job satisfaction than open-plan area working.
- The mental stress levels of people working in private offices were lower than those of people working elsewhere.



4 / Project-Specific Benefits Calculated at Particular Firms

The research noted above indicates how design can generally provide organizational/financial benefits, such as higher levels of job satisfaction and a boost in professional performance.

Enhanced professional performance, all other financial factors remaining the same, improves frequently monitored financial measures, such as those noted earlier, for example.

In this section we're shifting focus to probe specific organizational issues that can provide insights into the benefits brought to an organization via design. It is important to discuss organization-specific situations not only to see effects of a particular investment itself but also because related material can inform future actions and make it more likely that additional benefits are provided in subsequent projects and in modifications/renovations/etc. of completed projects.

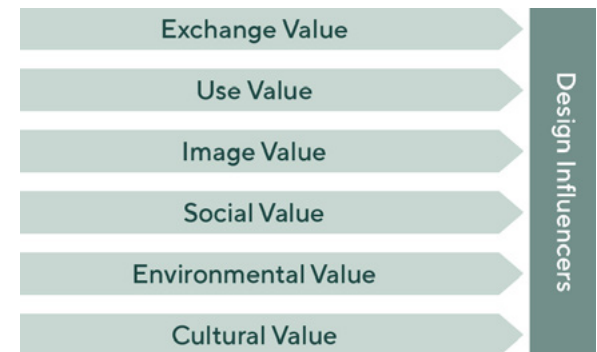
Also, asking the questions that follow during the programming phase can give developers an idea of environmental conditions that can add the most potential benefit to a particular organization.

The material provided in the paragraphs that follow is generally useful for determining the benefits that could flow to an organization from any aspect of the physical environment. Anyone trying to establish benefits received should review all of the potential sorts of value that can

be provided and all of the thought provoking questions that follow. In any one situation, a subset of the values/questions noted will be relevant or useful.

The Commission for Architecture and the Built Environment determined how value can be created by the built environment,¹¹ and considering their findings, can provide insights into benefits to an organization that can potentially flow from a particular design. CABE reports that design can influence:

- Exchange value or the market price of an asset, which is conveyed via book value and return on capital.
- Use value or how the designed element alters organizational performance by affecting employee productivity/performance, profits, and repeat business. Use value is the focus of the earlier sections of this report.
- Image value or how whatever has been designed affects the owners'/users' reputations and identities. Image value can be determined by metrics commonly used by public relations professionals, for example.
- Social value or how whatever has been designed changes "connections between people, creating or enhancing opportunities



for positive social interaction, reinforcing social identity and civic pride, encouraging social inclusion and contributing towards improved social health, prosperity, morale, goodwill, neighborly behavior, safety and security.”

- Environmental value or how kind, or not, a design option is to the planet. Groups such as the International Living Futures Institute, for example, have developed metrics that can be used to assess “greenness.”
- Cultural value which “is a measure of a development’s contribution to the rich tapestry of a town or city, how it relates to its location and context, and also to broader patterns of historical development and a sense of place. Cultural value may include consideration of highly intangible issues like symbolism, inspiration and aesthetics.”

The process of determining the benefits provided by a workplace design project builds on and is similar to activity-based planning because both require that an organization's actions and desired outcomes be carefully and comprehensively assessed—from the perspective of the organization.

The Buffalo Organization for Social and Technological Innovation's approach to workplace analysis supplies a process that can identify ways that design can benefit an organization.¹⁰ The BOSTI team, in their early rigorous empirical research, which continues to set methodological standards, recognized that the workplace is a tool that needs to support business objectives. Their "analysis involves a four-step process that:



1. Articulates business objectives...
2. From which business success factors are derived.
3. Describes the key employee behaviors needed to achieve the business success factors.
4. Describes the workplace qualities required to support those behaviors effectively and efficiently."

The questions that follow, in subsequent paragraphs, have the same objective as the BOSTI design process: they help identify the factors that drive organizational success. The factors that drive organizational success are the primary channels through which design can benefit organizations.

Several general questions can be posed to determine benefits flowing from an organization. Designers can review these questions to identify situations where specific data should be collected and compared. The most basic questions to ask that identify benefits that might be provided and quantified by design include:

Why was the planned project initiated/why was it undertaken?

If a project is initiated to improve employee retention, then calculating employee retention will indicate the benefit provided by design. If a group wants to make a workplace larger because of degraded employee performance due to crowding, then differences in measures of employee performance (more on measuring employee performance follows) in new and old environments indicates the value received.

Why is performance being measured?

Sometimes answering this question alone is enough to identify benefits of most interest/ value. For example, if a group wants to measure performance because it is concerned that financial markets are undervaluing its research and development efforts, then the benefits flowing from research and development area renovations need to be measured via changes in stock price, with general economic conditions being consistent (no recession/depression, for example).

What sorts of information will "speak" most effectively to the primary audience?

Financiers generally most value data that are rigorously quantified, for example, so perceptions obtained via qualitative methods of apparent customer service agent friendliness are unlikely to thrill the finance department, even if a project has been undertaken to improve public perceptions of customer service agent friendliness. People who value a quantitative approach to management and problem solving, like measures of benefits that are carefully quantified.

How is value being assessed now?

Changes in measures currently in use can be particularly enlightening if a measure has been in use over a period of time so long-term fluctuations can be noted. A related question is what data are you collecting now that might be relevant to a desired benefit? If a benefit desired is enhanced collaboration, and data are collected on work hours per project phase, with some project phases being known to be more collaboration intense than others, a reduction in hours spent on

collaboration intense project phases (coupled with a review to make sure project quality is constant) indicates that collaboration has been improved and a benefit received.³⁹

What information is or can be collected now and over time?

If benefits are to be determined over time, data must be collectable over that same period. For example, any organization assessing benefits via changes in iTunes sales has seen its data collection significantly impaired since iTunes has been revamped by Apple.

When specifically considering benefits/value that can arise from workplace design projects, a useful tactic is to try to identify benefits at group and individual employee levels.

When considering impacts of performance measurements at a particular organization, bear in mind that there are multiple types of work, work can be more or less structured and that ability to assess the performance of each can be more or less straightforward, indirect, or complex.²⁰ It is pretty easy to determine how design influences more structured work, which is generally more tactical, with a product that can be directly identified, such as the number of customer service claims processed in a period of time, but more difficult, but not impossible, to determine performance on more complex, less structured tasks, which can generally be described as more strategic, such as the development of patented products that have been creatively derived. Even creative performance can be measured. More creative patents are referenced more



frequently by subsequent patents in a field, for example, and patent references are tracked; data that are tracked can be compared over time, before and after workplaces are redesigned.

Some questions can be posed at the group level by designers to determine how workplace elements might benefit organizations and related data that can be gathered:

- What is the purpose of the group? What do they deliver?
- Why invest in this company? What sorts of payoffs are likely—financial or philanthropic, for example?
- How does a group add value to its investors, its community, the world, the welfare of its employees?
- What drives the success of this organization? How does the organization know if its actions are “on track”?
- What business is the group/company in? Is more revenue generated through selling X or Y? Whichever one provides most value to the organization via income earned should be

the focus of benefit conversations.

- What are customers buying? What makes them happy? Is it the functionality of a product (established through engineering, perhaps) or merely possessing it and being able to display whatever it is to acquaintances (possession/display may be established through marketing and/or public relations metrics)?

Additional questions can be posed at the individual worker level to determine how workplace elements benefit organizations and related data that can be gathered:

- How do employees with different job descriptions add value to the organization? If an individual adds value by creating online materials that other individuals click through to product offerings, more click throughs indicate benefits to the organization from whatever changes in the physical environment preceded the changes noted.
- What is the purpose of employee activities? What do they deliver? Think about the example for assessing creative performance mentioned earlier.

- How can you tell if employees are doing a good job? If a good job for a particular employee means that more job offers extended to recent graduates are accepted, then a benefit of a changed environment for recruitment teams could be recognized in a change in the number of job offers accepted.
- How are bonuses calculated/distributed? Employees like bonuses and earning them has a significant effect on their behavior. Assuming that bonuses are awarded for behaviors that are truly beneficial to an organization, then monitoring whatever factor is used to determine bonuses quantifies a benefit that flows to the organization through an activity.

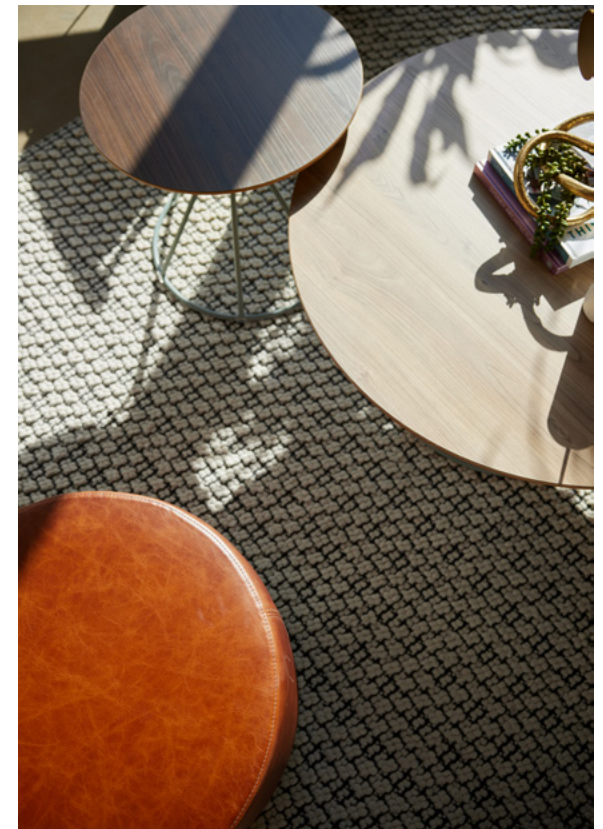
Workplace design can continue to add benefit by supporting future organizational efforts. Identifying these potential future benefits, and recognizing them during the design workplace process, if possible, involves answering these sorts of questions:

- How are work processes changing?
- How are work behaviors changing?
- How is organizational culture shifting?
- How are tools and technology changing?
- How are markets and customer/client bases changing?
- What measures will link to business performance in the future?

As organization-specific metrics are being developed, important considerations driving the benefit identification process include:

- Measure what matters. Don't measure insignificant factors, ones that don't really provide meaningful value to an organization.
- Get at root causes of outcomes viewed. Assess the most fundamental repercussion of a design decision possible; it is less likely to be corrupted by measurement "noise."
- Use multiple data collection tools/processes. Each can shed different light on the underlying issues that lead to the benefits received, and multiple tools/processes mean that the data flow does not dry up completely if one becomes unavailable.
- Consider measuring factors that are either negative or positive. Eliminating a negative situation can be as valuable as accentuating a positive one.
- Know that you will always find value in doing research at your organization because every group is unique and every situation different. An environmental modification that added benefit at another firm is not guaranteed to do the same at yours.
- Job satisfaction is a good proxy for performance, as noted above.
- Keep track of your data, now or in the future, a data base with consistent measurements, formats, etc., might be handy.

Post-occupancy evaluations effectively determine if modifications to physical environments have benefited organizations. Conducting them can consume many organizational resources, financial, temporal, and otherwise, but those expenditures are generally justified by the information collected, which can be used to fine-tune the environments assessed and/or develop future ones. The Center for Health Design has developed a toolkit that can easily be modified for POEs of non-healthcare settings. The Usable Buildings Trust discusses POE tools, and their availability.



5 / Real-World Design Case Study

In October 2019, Kimball International completed the renovation of its headquarters building in Jasper, Indiana; the space was designed by ai3 and Hafer. This paper concludes by reviewing design factors in that building that were identified above as potentially benefitting organizations via their effects on professional performance, job satisfaction, etc.

So, what does an environmental audit of Kimball International’s headquarters reveal?

- Kimball International’s headquarters signals repeatedly that Kimball International is proud of its employees and their skills and values them. This can directly contribute to opinions formed by visitors as well as

employee thoughts and behaviors, as noted above. Photos of employee teams are located throughout the space. The “Work Your Way” sign in the reception area was fabricated by a skilled Kimball International team and to a high standard. It is a dominant visual during the client greeting process. Bathrooms, even those well away from areas likely to be visited by customers, are well appointed and luxurious by usual workplace standards; the design and maintenance of these bathroom areas signals to employees how much they are valued by their employer. Kimball International’s headquarters supports social contact with customers intermittently, as they visit, and for employees on a daily, continuing basis.

- The health of employees and visitors is clearly a priority at Kimball International headquarters. Fresh, healthy foods are served in dining areas and onsite health facilities and in-building walking paths send an important message about organizational values.
- All workspaces provide spatial distancing and barriers for healthy separation along with a clean desk policy for cleanability.
- Hygiene and PPE equipment were incorporated into the design post COVID-19.
- Easily cleanable surfaces and upholstery are utilized throughout.
- Furnishings in the space are ergonomically strong and promote worker health and performance, via sit-stand desks, for example.
- There are many locations throughout the building where positive conversations are possible, from conference rooms for customer or private meetings to the centrally located, extensive break/dining area.
- The space is suffused with natural light, which has powerfully positive effects on professional performance.





- A carefully curated set of green leafy plants throughout mean that vegetation is visible inside the structure and many outside views contain some green elements. Increasing the number of larger, green leafy plants onsite and locating them strategically so that one is likely to be in view from each workspace, is desirable.

Kimball International’s Jasper headquarters has the potential to add significant value to the organization. A number of its features have been linked to enhanced professional performance and wellbeing, both physical and psychological. Kimball International clearly signals to its employees generally, and then specifically via health-related features, that they are respected as a person and for the contribution that they make to the success of the organization, which is desirable for both societal and financial/professional performance related reasons. The design of Kimball International’s headquarters includes both zones, and environmental features within those zones (such as ventilation systems), that support employee professional performance (as discussed in detail in How a Place Makes Us Feel). The form of the Kimball International building minimizes distractions and stress experienced, which are particularly important while COVID-19 remains an issue, as stressful experiences can compromise immune system responses.

- The full range of sensory experiences that users will have in the renovated space has been considered. The ventilation system, while providing excellent IAQ, also supports a temperate, fresh-feeling space that is delicately scented in the front customer-facing area of the building.
- Soundscapes are at comfortable productive volumes and noise levels are generally a sort of gentle murmur. There are white noise sound making systems in place and sound absorbing materials at the ceilings. Employees can work without audio distractions in spaces throughout the building.
- Natural materials are used throughout the space, particularly wood with visible grain; these elements help keep employee stress in check. A comprehensive wayfinding signage system also helps reduce user stress.
- Throughout the structure, light of different colors and intensities is used in ways that guide employees towards desired outcomes.
- A number of different sorts of work environments are available, providing employees with an opportunity to control their environmental experiences by selecting whichever one meets their solo or group needs at that moment.
- The use of “neighborhoods” for work groups means that employee lines of sight are long, but not overstimulating and moderate levels of visual complexity are generally present. There is the possibility of visual distraction in some work areas because of the open sightlines and transparent walls in use. These sightlines do, however, support cognitively refreshing views of outdoor spaces in some cases and interior plants, which are similarly mentally refreshing to view.

6 / About the Author

Sally Augustin, Ph.D., is a practicing environmental/design psychologist and a principal at Design With Science, a cognitive science-based design consultation firm. She has extensive experience integrating science-based insights to develop recommendations for the design of places, objects and services that support desired cognitive, emotional and physical experiences. Her clients include manufacturers, service providers and design firms in North America, Europe and Asia.

Dr. Augustin, who is a fellow of the American Psychological Association, holds leadership positions in professional organizations such as the American Psychological Association and the Environmental Design Research Association. She speaks frequently to design audiences in North America, Europe and Asia at events such as the annual meeting of the American Institute of Architects, the International Design & Emotion Conference, the biannual meeting of the Association of Neuroscience for Architecture, NeoCon/IIDEX, the Environmental Design Research Association annual conference, Healthcare Design and more.

She has appeared in publications such as The New York Times, Forbes and Huffington Post, and is an accomplished author, providing bylined articles for the Harvard Business Review and Metropolis, and writing three books, “Place Advantage: Applied Psychology for Interior Architecture,” (Wiley, 2009), “The Designer’s Guide to Doing Research: Applying Knowledge to Inform Design,” with Cindy Coleman, (Wiley, 2012) and “Designology: How to Find Your Placetype and Align Your Life With Design”, (Mango 2019).

Dr. Augustin is a graduate of Wellesley College (B.A.), Northwestern University (MBA), and Claremont Graduate University (Ph.D.).

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