Open Plan Design and Productivity

Exploring a New Acoustic Solution

When open-plan spaces were introduced into commercial interior design, they were expected to be an egalitarian, democratizing influence: it was imagined that they'd level organizational hierarchies, encourage workers to collaborate and improve performance. Now that the open plan has been in widespread use for more than 30 years, its inherent disadvantages are better known. In the words of bestselling author Susan Cain, open- plan workplaces "make people sick, hostile, unmotivated and insecure."[1] And they're noisy.

But with more than 70% of American offices currently built according to open-plan designs, the concept will be with us for the foreseeable future.[2] It is difficult, expensive, and impractical to rebuild workspaces from the ground up—when it isn't downright impossible. So it's vital to consider a workspace's acoustic elements in the initial planning stages of its design.

Demands for productivity—both individual and organizational—are on the rise. How can architects and designers tasked with fostering both **collegiality** and **individual productivity** re-imagine workspaces to achieve these ends? And how can this be accomplished in a way that's both **efficient** and **cost-effective**? How can we counter the clear disadvantages of open-plan spaces while retaining their strengths?

This white paper takes a close look at a single interior design element that can dramatically increase workers' satisfaction and productivity without significantly increasing building or design costs: the incorporation of **acoustic lighting** in open-plan spaces.

Versatile, environmentally-friendly, more efficient and less expensive than single-purpose solutions, acoustic lighting alone has been shown to reduce ambient noise by as much as 40% in controlled test conditions.[3] When coupled with other noise-damping materials like soft furnishings, carpets, or acoustic ceiling tiles, acoustic lighting can enhance their effectiveness. But even employing acoustic lighting in isolation will reduce irritating environmental noise. Thus it is an option that every forward-thinking interior designer should consider at the onset of the design process, and beyond.

THE RISE OF THE OPEN-PLAN WORKSPACE

Born in Germany in the late 1950s as the *Bürolandschaft*, open-plan office design came to the U.S. on a large scale alongside postwar economic growth and increases in white-collar employment. By the 1980s, the open plan had come to dominate new office construction, and it continues to be popular today, especially with startups, technology companies, and those who describe their culture as "innovative." Google, Facebook, Yahoo, Netflix and eBay are just a few of the major corporations that have adopted open floorplans. Former New York City mayor Michael Bloomberg brought the open office model into city government with his famous "Bullpen," which he thought would promote open communication, transparency and fairness.[4]

The open-plan concept remains attractive to architects and designers because it offers advantages of cost and efficiency. More workers can be housed per square foot, saving on rent and lowering real estate costs overall. Open workspaces also require less energy to heat, air condition and illuminate, improving the carbon footprint of the companies that use them. They can be easily scaled up or reconfigured as personnel needs change, too.

Proponents describe their workplace cultures as flexible, and are enthusiastic about how open-plan offices foster creativity, collaboration and the ready exchange of ideas. Particularly if *all* employees—including those in the C-suite—are housed in open offices, hierarchies are flattened, and a sense of community grows.

Despite their popularity and their many advantages, however, open-plan workspaces pose significant challenges for both their designers and their inhabitants.

Chief among these—though all-too-frequently neglected among design considerations—is environmental noise.

THE DRAWBACK: OFFICE NOISE

Noise in the workplace has clear and demonstrable negative impacts on job satisfaction, productivity and employee health. In a 2005 survey, for instance, more than **99%** of respondents stated that their **concentration was impaired** by environmental noise at work.[5]

Employees have also reported **higher stress levels, poorer relationships with co-workers**, and **decreased performance** after having been relocated from traditional to open-plan offices.[6]

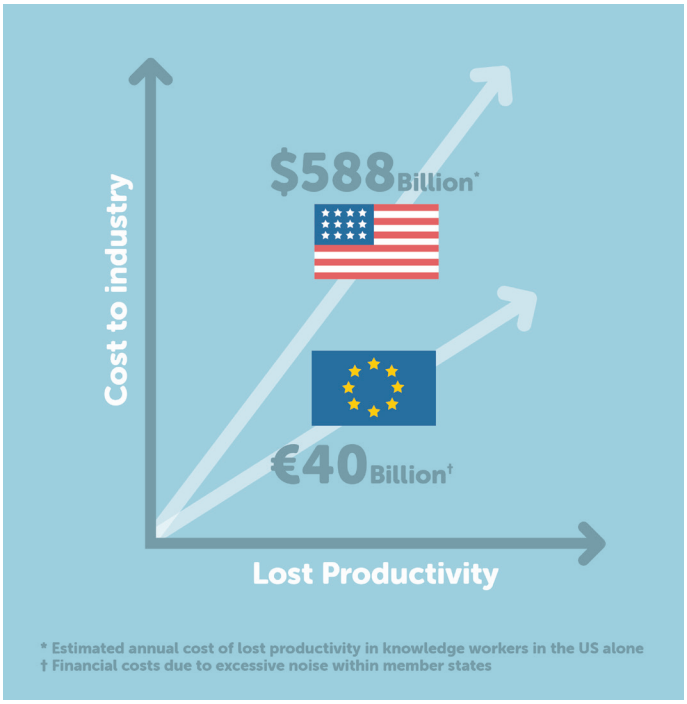
And researchers have found physical evidence of stress in workers exposed to noise levels typical of open-plan offices. A study conducted by Cornell University environmental stress expert Gary Evans documented elevated epinephrine levels in these subjects.[7] Epinephrine, a stress hormone, drives the body's "fight or flight" response by increasing blood pressure and heart rate. Over time, elevated levels can increase **heart attack risk** and **weaken the immune system**.

Among the irritants and annoyances open-plan office workers encounter each day, those resulting from overhearing others' conversations are reported to be the worst.

> "Noise levels" and "sound privacy" were the most frequently mentioned causes of workplace dissatisfaction.[8]

Studies have also corroborated what these workers have long suspected: that office noise is particularly detrimental to thinking and solving complex problems. A large-scale meta-analysis performed in 2011 synthesized previously published studies to determine the impact of ambient noise on task performance. The researchers found that subjects' performance on cognitive tasks—including reading and interpreting text, maintaining focus and reasoning mathematically—degraded significantly when ambient noise was present.[9] Most distracting of all was nearby intermittent speech. Other research has suggested that working memory is especially impaired by these auditory distractions.[10]

These findings are particularly troubling in light of the importance of cognitively challenging labor for growth in today's economy. Knowledge workers comprise a growing percentage of the workforce, and the intellectual capital they possess is among their employers' greatest assets. Though it is difficult to quantify the precise impact of workplace noise on companies' bottom line, we can be sure that it is significant. One research firm estimated the annual cost of distraction to knowledge workers at $588 billion in the U.S. alone,[11] while the European Union calculates financial costs due to "excessive noise" within member states to be around €40 billion.[12]



Now that open-plan workspaces have been widely used for more than 30 years, and their disadvantages clearly understood, it is time for architects, engineers and interior designers to attend more closely to sound and office acoustics, and to do so from the earliest stages of the design process. Using intelligent strategies to mitigate workplace noise will improve employees' well-being and productivity, increase companies' ability to retain top talent, and contribute to their overall

competitiveness and profitability. Considering acoustic needs from the outset of design is economical and will boost occupant satisfaction initially and throughout the building's life cycle.

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THE LIMITATIONS OF TRADITIONAL SOLUTIONS

But mitigating workplace noise effectively poses a huge challenge. None of the elements architects and designers have turned to most often—cubicle partitions; soft furnishings and floor coverings; or acoustic ceiling tiles, wall panels and baffles—is ideal for use in all cases. Each has inherent limitations.

Cubicle partitions: may actually make the problem worse
One traditional solution, dividing an open-plan office into cubicles, may in fact exacerbate the problem by giving workers unconscious motivation to speak louder.

Cubicles "provide the illusion of sound privacy, but actually make people less aware of the noises they create."[14]

Further, cubicle-style partitions don't dampen the sound waves that travel *above* them, and thus are ineffective in preventing noise from echoing back from ceilings.

Soft furnishings: inconsistently effective
Without question, incorporating soft furnishings into the design of any interior space will reduce sound transmission within the area. But few of these materials have been subjected to rigorous testing, and they may not perform predictably or consistently in a particular office environment.

Acoustic ceiling tiles, wall panels and baffles: can't be used everywhere
These products can work well in many settings, but their performance and usability are limited by particulars of the space in consideration. Suspended ceilings reduce overall room height, and may create an atmosphere that's drab, stuffy, or even claustrophobic.

Wall panels aren't suitable for use in some contemporary high-rise buildings because these structures have too little available wall space. If most of a room's exterior perimeter is made of glass—a highly reflective material—more acoustic material will be needed than can fit on the available wall space. Baffles can be employed wherever ceiling design permits, but care must be taken to ensure that they don't interfere with a room's existing illumination systems or the flow of natural light.

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THE BENEFITS OF ACOUSTIC LIGHTING

Acoustic lighting is a revolutionary addition to the interior designer's toolkit. Combining the effective sound absorption of traditional acoustic panels with energy-efficient LED illumination, acoustic lighting is a versatile and streamlined approach to mitigating unwanted environmental noise. Its many benefits include:

Cost-effectiveness
Every building design includes a plan and budget for illumination. Acoustic lighting illuminates while also providing with effective sound control—without requiring that separate resources be directed towards acoustic engineering or planning.

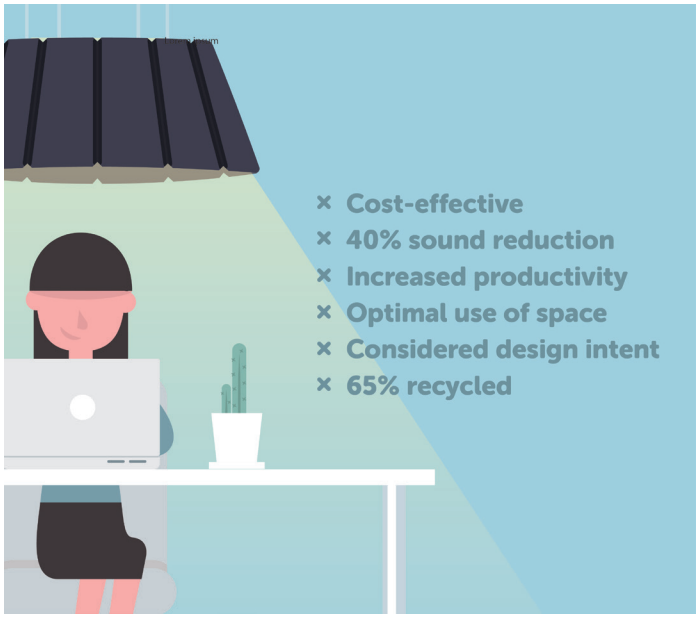
Optimal use of limited space
Conversational speech is generated at head level, and reverberates from the ceiling. Acoustic solutions are most effective when positioned to impede these sound waves near their point of origin and in their primary path of travel—between desktops and ceilings. Yet this space has not traditionally been used for acoustic treatments, which have instead been placed on walls, floors, and ceilings. Occupying what was formerly unused space, acoustic light fixtures are positioned for optimal effectiveness.

Considered design intent
Employing acoustic lighting doesn't mean you need to sacrifice beauty in the interest of practicality. Available fixtures are styled to fit within a variety of color schemes and design trends. Each is an artfully imagined decorative element in its own right.

Sustainably-sourced materials for use in "greener" buildings
The acoustic panels used in today's lighting solutions are manufactured from dense polyester fiber material that includes 65% post-consumer recycled content, and is 100% recyclable itself.

Flexibility and adaptability
Though acoustic lighting works well in open-plan environments, it is no less effective in other types of spaces. Incorporating acoustic lighting fixtures can improve acoustic conditions in traditional private offices, meeting rooms and breakout areas, and hybrid collaborative workspaces. And it retains its effectiveness even if layouts or patterns of use change.

Enhances the effectiveness of other solutions
The more surface area of acoustic material is exposed in a room, the more sound reverberation will be dampened. Acoustic light fixtures perform better than ceiling- or wall-mounted treatments of similar size and material because the lampshade's interior and the exterior are both exposed, doubling the functional surface area for sound absorption. Adding additional noise-control elements—whether these are plants, carpets, or traditional solutions like ceiling-mounted baffles—will simply improve acoustic performance even further.



SUMMARY

Acoustic lighting can merge seamlessly with current office designs while remaining adaptable for use in tomorrow's hybrid workspaces. It's beautiful and versatile, and its dual-purpose nature makes it inherently more efficient than other acoustic solutions.

All workplaces require illumination, so why not choose lighting fixtures that also incorporate acoustic panels? By so doing, you can design a sensory environment—with intentionally-chosen levels of light and sound—that boosts worker productivity. In these surroundings, employees will experience less stress, which will better their health, comfort, focus and co-worker relationships.

These powerful benefits make acoustic lighting a wise investment for designers, architects and all workspace planners—indeed for anyone who seeks to improve employee well-being, boost productivity, and enhance office culture.

With the coming of acoustic lighting, we're on the brink of a revolution in design thinking. Before putting pen to paper, or commencing a new space's planning process, tomorrow's designers will go beyond vision: they'll think of *all* the senses when creating optimal occupant experiences.

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