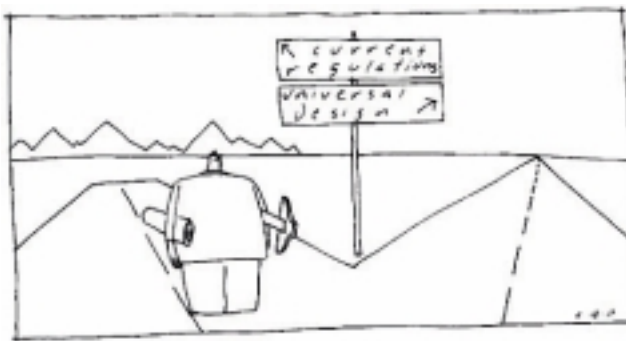


Equal Opportunity Facilities

Designing for Universal Accommodation

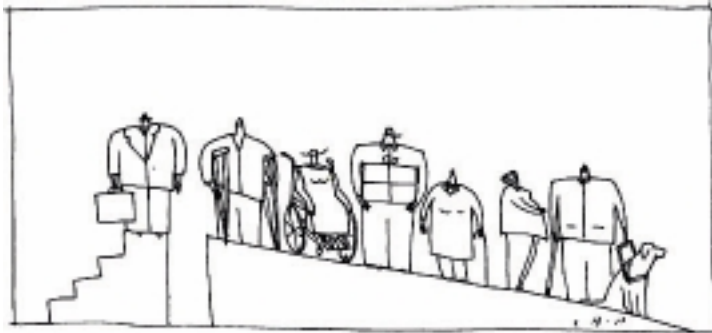


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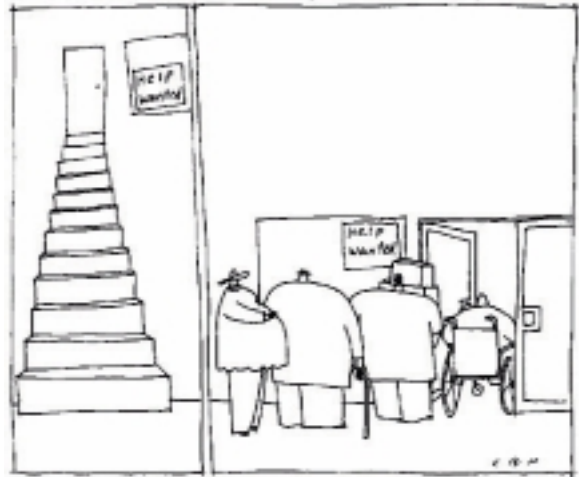
Supporting people at work is the obvious and admirable goal of facility design. But several developments in recent years have complicated formerly assumed notions of who working people are, what they look like, and what their bodies can do. The increasing diversity of the work force, for example, has required designers and facility managers to consider the physical needs and preferences of women, of older workers, of workers of a greater variety of races, ethnicities, and cultural backgrounds, and of workers sharing jobs and working unconventional hours. Meanwhile, the increased incidence and awareness of cumulative trauma disorders and vision difficulties give a sharper edge to ergonomic considerations. The danger of such work-related injuries means that providing a well-designed environment is a matter not only of productivity and morale, but of health, safety, and, at the worst extreme, avoiding litigation.

In the long run, though, no single factor may more effectively alter perceptions of the work force and the work environment than the passage of the Americans with Disabilities Act (ADA). The idea of accommodating workers with disabilities has added a dimension to work force diversity that has caused many designers and managers to give up on accommodating every single variable individually and to seek a more elegant, overall solution. That approach is often called "universal design."

Universal design is the idea of designing for the widest possible range of ability with as few barriers as possible. It draws on guidelines developed to help businesses comply with the letter of the ADA, but goes beyond these to seek the spirit of the law. According to Susan Carter, an environmental designer with special expertise in planning office environments for people with disabilities, universal design provides long-term benefits beyond compliance with the law: "By adhering tightly to a set of narrow guidelines, you're almost sure to find yourself caught short when those guidelines change. Following the broader precepts that determined those guidelines insures a much longer life for workplace design, with all the cost savings that longer life provides."¹ Industry experts also argue that universal design often prevents injuries, sparing employees physical trauma and employers related expenses in health care costs and lost productivity.



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Who is able-bodied, anyway?

The idea of universal design is especially timely because considering the needs of people with disabilities has compelled architects, designers, and facility managers to take a more careful look at the actual physical condition of the work force. The word “disability” typically brings to mind a person in a wheelchair. After all, a person in a wheelchair is the universal symbol of accessibility. But people who use wheelchairs make up only a very small minority of the total number of people with disabilities — about 1.5 million out of 48.9 million, according to a Census Bureau poll.² “We expect a disability to be glaringly obvious,” says Carter, “but the large majority of disabilities are much more subtle.”³ In fact, the three leading causes of disability among Americans over the age of 15 are arthritis/rheumatism (7.2 million people), back/spinal problems (5.7 million), and heart trouble (4.6 million).⁴ The definition of disability under the ADA is broader than conventional notions, so that the ADA protects people with all these limitations and many more, such as learning disabilities, chronic health conditions like diabetes, and mental disorders. In fact, the Equal Employment Opportunity Commission (EEOC) has declared that certain conditions never considered disabilities before, such as obesity, deserve protection under the ADA.⁵

An awareness of the variety of disabilities leads even further, to a new awareness of the more ordinary, temporary challenges workers face. An injury suffered in a weekend softball game, for example, or the discomforts of pregnancy can leave workers temporarily hard pressed to navigate their usual work routines. Even a momentary problem such as having to carry a big, awkward box around the office could make one appreciate automatic doors, sloped floors, or other factors meant to make the environment barrier free.

In fact, statistics suggest that the ideal person—average height and weight, perfect physical health—is less the norm than one would think. A Census Bureau report estimates that 17 percent of all 18- to 64-year-olds—almost one in five—have a disability that affects their work.⁶ A 1990 National Health Interview Survey (NHIS) found that almost 17 million Americans ages 18 to 69 report a “work limitation” due to a chronic condition covered by the NHIS’s definition.⁷ The Job Accommodation Network (JAN), meanwhile, reports that every year 780,000 employees experience a disability or illness that will disable them for at least five months; half of these will not return to their

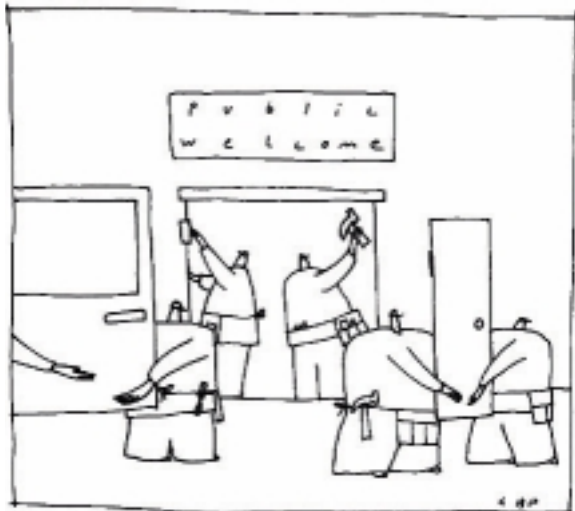
jobs.⁸ The “graying” of the work force, moreover, also contributes significantly to the number of people coping with some hearing, vision, or mobility limitation, and projections suggest the percentages will increase. According to the Bureau of Labor Statistics, the median age of the American work force, which was 34.8 in 1982, is rising sharply and will reach age 39 by the year 2000.⁹

The ADA and design principles responding to the need for accessibility are not, therefore, meant only to pave the way for people with disabilities who might enter the work force in the future. Universal accessibility is an idea already overdue for the millions of workers now in the work force who cope with disabilities obvious or subtle.

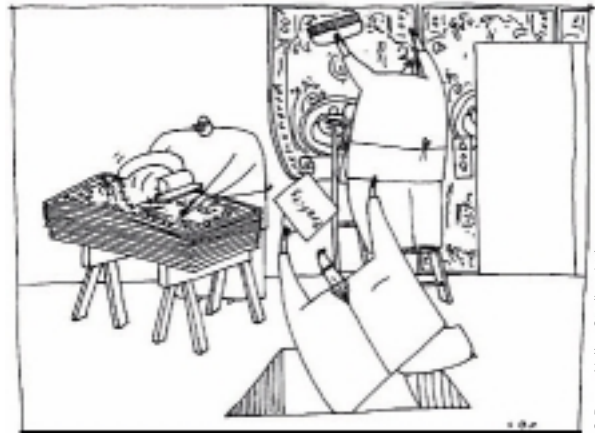
ADA basics.

The fundamental purpose of the ADA “is to extend to people with disabilities civil rights similar to those now available on the basis of race, color, sex, national origin, and religion through the Civil Rights Act of 1964.”¹⁰ In general, existing buildings must provide improved access for those with disabilities; specifications for new buildings and buildings undergoing renovations are more stringent. Of most interest to those with responsibility for workplaces are two sections: Title I, Employment, and Title III, Public Accommodations.

Title I: Employment. In order to ensure that those with disabilities can compete in the job market, Title I requires all employers to provide “reasonable accommodations” to qualified individuals with disabilities unless doing so would result in “undue hardship.” This means at least making one’s employment office accessible, with reserved parking, curb cuts, ramps, wide doorways, and an elevator if the office is on an upper floor. The employer is expected to consider without discrimination qualified persons with disabilities. For new hires, as well as current employees with disabilities, the employer must make reasonable accommodation. Under Title I, employers are obliged to do this, however, only for the *known* disability of an applicant or employee. And since the employee is the one who best knows his or her limitations and needs, the law stipulates that it is the employee’s responsibility to request accommodation. If the employee does not request accommodation, the employer is not bound to provide it, but the intent of the law is that employers and employees will work together to find an acceptable solution.



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Options for providing reasonable accommodation can include restructuring a job, modifying work schedules (to permit regular medical treatments, for example), or modifying a workstation or equipment. Employers are not expected to make accommodations that cause “undue hardship,” a phrase that must be defined on a case-by-case basis.

Title III: Public Accommodations. Under this section, people with disabilities are assured access to all public accommodations, including theaters, doctors’ offices, showrooms, and retail stores. The title does not cover most corporate offices, but legal, medical, and insurance offices are included. Those responsible for existing facilities must remove any architectural barriers and structural communication barriers “where such removal is readily achievable, i.e., easily accomplished and able to be carried out without much difficulty or expense.”¹¹ Barrier-removal options the law considers readily achievable include installing ramps, flashing alarm lights, accessible door hardware, offset hinges to widen doorways, grab bars in toilet stalls, raised toilet seats, and accessible paper cup dispensers at inaccessible drinking fountains; making curb cuts; repositioning shelves, telephones, and paper towel dispensers; and rearranging tables, chairs, vending machines, and display racks. Where barrier removal is not readily achievable, the public accommodation must provide alternatives, such as offering home delivery or relocating activities to an accessible area.

Since 1992.

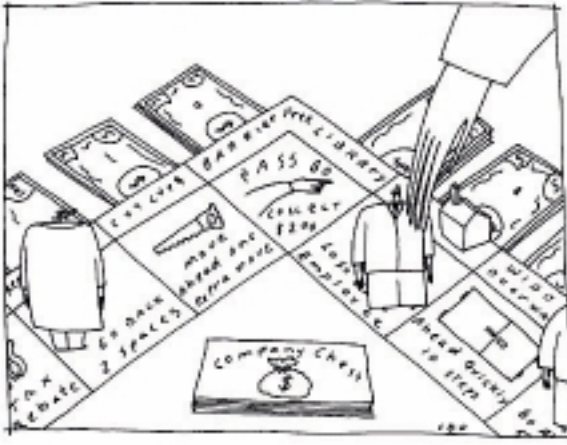
Before the law went into effect in July 1992 (or July 1994 for businesses with 15 to 24 employees), many business owners worried about its implications. The ambiguous phrases “reasonable accommodation” and “undue hardship” left many employers wondering exactly what was expected of them. But most of all, employers were concerned about cost—the cost of getting their facilities up to code, the cost of making those reasonable accommodations, and the potential cost of litigation should hard-to-please employees decide to file complaints.

Generally, however, the law has not been as frightening in practice as in prospect. According to a 1995 Harris Poll sponsored by the National Organization on Disability, 80 percent of executives surveyed reported

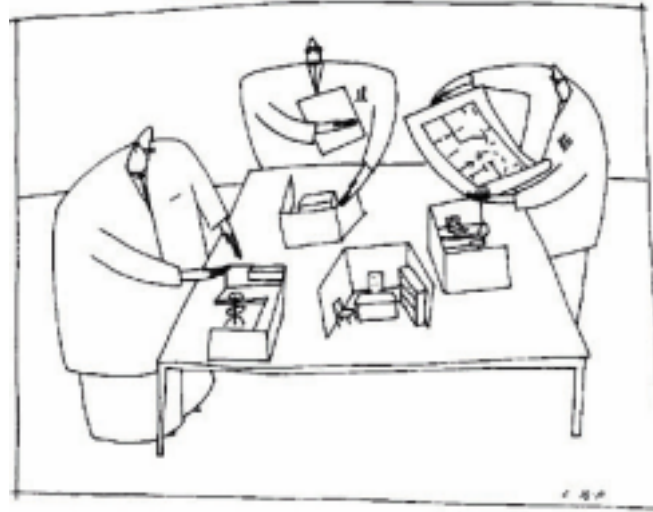
the cost of accommodating people with disabilities has increased only a little or not at all. Only seven percent reported a large increase. Sixty-six percent of executives surveyed reported no increase in litigation, and only 14 percent saw “a little” increase. Best of all for people with disabilities, the number of companies who have actually made accommodations has increased. In 1986, 51 percent of corporations surveyed had made some accommodations. In 1995, the figure had risen to 81 percent.¹²

Once people have a little familiarity and experience with it, the ADA seems less intimidating than expected. According to Marcia Daley, a design consultant with Herman Miller, Inc., “Most companies are finding that complying with the ADA has been easier than they thought. Bathrooms seem to be the most difficult issue, but many companies were working on bathrooms and entrances before the ADA. As for accommodating individuals,” she says, “many existing products answer the need without costing extra. It’s often simply a matter of choosing drawer pedestals with an easy-grip pull or a work surface with electric height adjustment. Workers with disabilities,” she continues, “don’t want their offices to look different. And their offices don’t have to if designers simply understand the needs involved.”¹³

The experience of Sears, Roebuck and Company confirms the idea that the cost of accommodation is not as high as was feared. A study on the company’s experience showed that making accommodations for employees with disabilities cost an average of \$121 per accommodation. Two-thirds of accommodations cost nothing, and only 3 percent exceeded \$1000.¹⁴ [For a copy of the study, call (800) 526 7234 in the U.S. or (800) 526 2262 in Canada.] A Job Accommodation Network survey showed that nearly 70 percent of accommodations made by businesses they surveyed cost less than \$500. Moreover, respondents reported significant benefits. Making accommodations allowed them to hire or retain a qualified employee, increase a worker’s productivity, avoid the cost of training a new employee, and save on workers’ compensation or other insurance costs. Estimating the dollar value of these benefits is an inexact science, but using a figure representing the mean of cumulative benefits since the ADA took effect, JAN estimates that every dollar spent in accommodation brings \$50 in benefits.¹⁵



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Some argue that these positive results are not the whole story and that the ADA has not really done what it was primarily intended to do—open up opportunities for people with disabilities. One research firm found that between 1991 and 1993 the proportion of disabled men in the work force dropped from 34 percent to 30.2 percent, while in the same period the participation rate of non-disabled men increased to 82 percent.¹⁶ Critics suggest that the ADA has actually led employers worried about interpreting the ambiguities of the law to avoid new hires with disabilities. They can do so because discrimination in the hiring process is hard to prove, and the EEOC has concentrated its efforts to defend people with disabilities on cases involving firing or non-accommodation among people already in the work force.¹⁷

In fact, enforcing the law has been a bumpy process so far. Of the 45,000 complaints against employers filed with the EEOC since July of 1992, only 24,500 have been resolved and only 4,000 have resulted in remedies for employees. Most others were resolved because the cases fell through—the EEOC was unable to find the complainants, for instance—or were dismissed as unreasonable. In 1994, the EEOC did bring 35 cases to court, and some complainants do sue on their own. But adjudicating disputes is still difficult, and the EEOC is currently attempting to streamline its own processes and seek alternative means of settling cases.¹⁸

Another problem, according to Carter, is that once employers get “up to code,” they become complacent. “They find that minimum compliance is easier than they thought, and then they believe their job is done,” she says. “Many have a hard time believing the statistics about the number of workers with disabilities. Younger managers, especially, simply cannot relate to having a disability and so the subtlety of many disabilities escapes them.”

Workers with disabilities also need more education about the ADA and the accommodations available to them. Angela Jones of JAN says she gets many calls from frustrated workers. “I hear from people whose employers have tried something that didn’t work, as well as from people whose employers haven’t tried anything at all. Often, the workers themselves do not know they have the right to be accommodated,” she says.¹⁹

James Mueller, an industrial designer with a lifelong commitment to designing environments accessible to people with disabilities, confirms that there is still a long way to go in fulfilling the intentions of the ADA. “We have not yet moved as far as we would like to,” he says, “but further than before the law was passed. Laws like the ADA are simply trying to get businesses to do what they should be doing anyway, and many businesses were working on improvements before the law was passed. Of course,” he concludes, “the most cost-effective thing is to plan for accessibility from the ground up.”²⁰

Good business.

According to experts like Mueller, businesses should be working toward universal design not only because it is the right thing to do legally or morally, but also because it makes good business sense. With a shrinking traditional work force, businesses have already been coping with a shortage of qualified workers and have been turning to non-traditional constituencies to fill out their ranks: women, including young mothers; ethnic and racial minorities; older workers; and workers with disabilities. Even drawing on all these groups, qualified skilled workers will be increasingly difficult to find and recruit. Businesses simply cannot afford to ignore people with disabilities, especially when, for reasons already outlined, such people already comprise a significant and growing percentage of the work force. Moreover, any worker could develop a disability due to an accident or sudden change in health, and all workers are aging. Businesses cannot afford to jettison, at the first sign of disability, the investment of training and experience that each worker will represent.

Happily, creating workplaces more thoughtful of people with disabilities helps everyone else, too. Automatic doors, for example, greatly assist people with arthritis, but also help a person pushing a stroller or a person with a heavy briefcase. The benefits of such architectural and design elements are fairly easy to discern, but the increased awareness of ergonomic issues has benefits as well. “While I see some employers being resistant to anything other than the basic requirements,” says Mueller, “others recognize immediately that universal design is a good idea.” In fact, says Mueller, “the effects of the ADA will eventually become invisible because designing for accessibility will simply be considered good design and good business.”

Already design schools are integrating the concept of universal design into their curricula. Robert Anders, professor of Industrial Design and head of Design Management at the Pratt Institute in Brooklyn, New York, served as a national advisor for the recently established Universal Design Education Project. Funded by the National Education Commission (NEC) and several foundations, this project provided grant money to 21 universities to help them assimilate universal design into their design school courses. Anders emphasizes that simply complying with the ADA will not be enough in the future. "Universal design is necessary for the simple reason that the demographics of the work force are changing—not just in the U.S. but on a global level as well," says Anders. "Besides that, Americans are becoming much more sophisticated about ergonomics. They will not put up with a poorly designed user interface in their car, home, or office."

Toward universal design.

What can businesses do to create an environment universally accessible in its design? Cathy Geerlings, a staffing and Equal Employment Opportunity representative for Herman Miller who has a muscular disability, suggests that employers make an effort to educate themselves. "Unfamiliarity with people with disabilities and fear of complications when working with them are the biggest barriers to opportunity," she says, adding that "employers often make a bigger deal out of accommodating a person than they need to and than the person herself does." She also suggests making connections with nonprofit agencies who assist people with disabilities in order to gain knowledge about accommodation, match jobs and people with disabilities, and build experience. "Good experiences spread more opportunity," says Geerlings.²¹

Mueller advises making the environment as barrier free as possible, of course, but he also emphasizes the importance of creating an atmosphere in which facility issues are considered important. "Workers should feel confident that the employer is interested in the productivity of every worker. The employer should make it clear that resources are available and that workers can feel safe when bringing up problems and suggesting solutions relating to accessibility." In this effort, workers with disabilities can be especially valuable: "People with disabilities are keenly sensitive to their environment; their survival depends on it," observes Mueller. Suggestions received from workers with disabilities can make everyone's work go more smoothly.

Some fundamentals.

The following section offers some practical suggestions for making facilities more accessible. Many resources are now available with more detailed and technical information; the suggestions outlined here are meant only to get readers thinking about broad directions. Employers in the process of planning or renovating a facility should expect to work with an interdisciplinary team that could include designers, office furniture experts, officials of code enforcement agencies, building construction contractors, manufacturers, and people with disabilities. Note also that some people require accommodations involving special technology such as computer screen readers or TDDs (text telephones). Such technology is not mentioned here; these suggestions involve only accommodations possible with readily available office furniture products or with strategic design.

Layout.

It is difficult to generalize about basic floor plans, but a more barrier-free layout might require that facility managers evaluate the most commonly traveled routes with mobility limitations in mind. Can workers get together to confer easily and informally? Is there an accessible path to conference rooms? Can people with disabilities get to common areas such as a cafeteria, a copy machine room, or a large bank of files?

Office furniture is, of course, another highly complex factor because of the many choices available. Facility managers can narrow those choices by remembering that versatility and adjustability are fundamental concepts in universal design. Systems furniture with panel systems that have a wide selection of hanging components adjustable in small increments can support a variety of individual work styles and limitations.

Desks that feature adjustability of height and angle of work surface are best; electronic adjustment is ideal. For knee-well width, a minimum of 30 inches will ensure enough space to accommodate the width of most wheelchairs. A desk with a minimum knee-well depth of 19 inches allows the person who uses a wheelchair footrest to sit comfortably at the desk without the footrest bumping the back wall of the desk. As for work surface depth, 38 inches is the maximum, since deeper work surfaces make it difficult for a person with limited reach to retrieve objects from the outer edge. Work surfaces should be no



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more than two inches thick; otherwise, once the work surface has been raised high enough to fit a wheelchair underneath, the top surface will be uncomfortably high.

Matte or eggshell work surfaces are better than glossy ones, since the glare from highly reflective surfaces causes problems for those with perceptual disabilities or visual limitations by making the objects they *can* see less recognizable.

Storage units should feature *U*-shaped handles that are four and one-half inches wide with a one-and-one-half-inch clearance on the inside. Push latches that involve no grasping or pulling motions are the easiest types for people with manual limitations to operate because, as with *U*-shaped pulls, they require very little fine motor movement.

Employees can arrange their own storage for accessibility. They should place most-used or bulkiest items between 36 and 48 inches above floor level and within at least six inches less than arm's length. Those parameters mark the range that is most accessible to those with upper extremity or mobility limitations.

Movable storage units reduce the amount of mobility required to gain access to storage, and employees who have difficulty walking can use a movable storage unit to provide support and to move materials across the room. Open storage is preferable to closed storage for ease of access. If that is not available, side-hinged doors are preferable to doors that must be lifted or lowered.

Chairs need to be of good quality, properly fitting, adjustable; this is extremely important both for preventing injuries and strain and for supporting those with arthritis or other mobility limitations. Chairs should allow the sitter to place both feet flat on the floor—many standard chairs are too high for smaller people. Chairs should also feature backrests and seat angles that adjust to support forward-leaning and reclining postures. This supports different tasks and work styles; besides, all workers should alter their posture periodically to avoid stiffness and strain. The extent and ease of adjustment are critically important. If adjustments require turning the chair over and wrestling with a stubborn release knob, most people won't bother, and the potential ergonomic benefits are lost.

Some chair features can enable people with arthritis or other mobility limitations (including those associated with pregnancy) to rise from a chair more easily. These features include firm padding; long, firm

armrests with a large grip area; and a large base so that users can place their feet directly under the body when rising. Locking casters and lift mechanisms—features taken from hospital or geriatric products—can help those with more extreme limitations.

When planning how materials will be moved around the offices, Mueller suggests that facility managers find ways to favor "pushing rather than pulling, pulling rather than carrying, carrying rather than lowering, and lowering rather than lifting."²² The "closed fist" rule is another helpful guideline: If it can be operated with a closed fist, virtually everyone can use it.

Proper lighting levels are important to prevent eyestrain for everyone, not just for those with visual limitations. The optimal ambient level is 300 to 500 lux, which is lower than many offices are used to. This lower ambient level should be supplemented with individually controlled task lighting, since different people require different amounts of light. Older people, for instance, generally need more light than younger people.²³ Different tasks require different light levels as well. Workers—especially those working with computers—should be able to adjust not only intensity but also angle in order to provide enough illumination while avoiding glare. Windows should be fitted with blinds whenever glare or strong backlighting might be a problem. Controlling glare is especially critical for older workers, since the lens of the eye tends to cloud with age, making glare more bothersome. The need for more light for older eyes can intensify glare problems, so older people especially need control over their lighting in order to achieve a comfortable situation.

Computers bring a number of ergonomic challenges into the office. Besides positioning the chair and work surface comfortably and achieving proper lighting configuration, the computer components themselves must be properly positioned. Keyboards should be movable and adjustable (0 to 15 degrees from horizontal) and not positioned too high—wrists should be flat and relaxed. The computer screen's center should be positioned 10 to 15 degrees below the line of sight. All glare, from windows, lights, and light-colored surfaces, should be reduced as much as possible. Dark-on-light displays are preferable to minimize glare as well. Radiation is a concern still under investigation, but a distance of about an arm's length from the screen is currently considered acceptable. Workers should take frequent short breaks from VDT operation to rest the eyes and stretch the body.

Adjustable computer equipment used knowledgeably is important for everyone in order to prevent cumulative trauma injuries and eyestrain. But older workers, especially, need flexibility in their computer setups. Older people often wear bifocals, so that objects must be low and close or high and farther away in order to appear clear. So the ability to adjust the position of their equipment should be built into the workstations, along with the ability to adjust lighting.

Floors, doors, and walls seem like mere background to those without disabilities, but they can become troublesome obstacles. Principles of universal design for floors include marking changes in level with contrasting color or brightness in order to warn those with vision limitations of the change in level. Contrasting floors and walls with bright/dull or light/dark combinations are also helpful. Thin, unpadded, loop-pile carpeting is easiest for those using crutches, walkers, or wheelchairs. Phone and electrical outlets should be positioned within easy reach rather than down near the floor.

Some kind of change in texture on each side of doorways alerts those with sensory disabilities that a door is near. Windows that extend from the mid-point of the door to the top help everyone avoid collisions. Installing textured handles or locks on doors to dangerous areas is another simple, easily implemented precaution. Slow-opening automatic doors reduce chances of injury and allow people to get in and out in plenty of time.

Those with hearing impairments find that it is more difficult to hear what a co-worker is saying when there is excessive ambient noise from the whir of computers, air conditioners, or background conversation. Since 30 percent of older people suffer from some hearing loss, chances are good that people in virtually every workplace could benefit from **noise-management strategies**. Sound-absorbing panel systems, carpeted floors, and certain wall materials help absorb general background noise. Individual workstations should have as much enclosure as possible in order to keep relevant sounds in and distracting sounds out. A sound-reflective material placed where the worker speaks on the phone or holds conferences helps that person hear his or her own voice better—so that she or he does not speak too loudly—and also helps the person hear others.

Finally, **emergency systems** are the one element in the workplace that currently *must* be universal in design. The preferred redundant alarms, which are auditory, visual, and tactile, can be perceived by everyone. Alarms should be placed close to emergency exits so that they can be used for guidance to the exit. Evacuation routes should be clearly marked with the access symbol. At the very least, employers must establish a buddy system, pairing those with disabilities with employees who do not have disabilities, and hold regular practice drills for emergency evacuation. Informing local emergency services of specific needs for assistance is also an important measure.

It is tempting to seek the “good enough” facility solutions that merely comply with the law. But disabilities are not the exceptional circumstance they used to seem, and those responsible for facilities will have to seek more comprehensive, long-term solutions. “This is not tragedy,” writes Mueller. “This is life. The tragedy would be to assume that life ends at a certain age or with a disability.”²⁴ Universal design seeks to ensure that it will not.

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