RESTING FOR PRODUCTIVITY

Integrating rest spaces in the workplace to improve public health, happiness & productivity
ABSTRACT:
Modern culture & the digital revolution encourages workers to forgo sleep to work & play around the clock. Sleep debt & fatigue leads to decreased productivity and compensating habits such as ingesting caffeine. Though napping benefits learning, memory, speed, accuracy, fatigue, health & longevity, survey research shows most do not consider napping an appropriate method of dealing with work fatigue and unproductivity.

This study investigated innovative rest and break spaces, & created Design Guidelines for rest & break spaces, & Application studies illustrate how design guidelines in the real-world scenario. Trends suggest design guidelines for rest & break spaces will hold increasing significance in the future, as the line between personal & professional life blurs, & nature of where & how people work evolves.

One hopes this research will inspire companies & cultures to integrate well-designed rest & break spaces in their work spaces. Doing so will not only benefit health, happiness & productivity, but also the bottom-line.
# A Need for Rest Environments

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Introduces the study & its background, project statement, hypothesis, research methods & end goals--to inspire and guide companies to integrate rest and break spaces in the workplace.
In today’s digital culture, where people do not get enough sleep yet frown on resting in the workplace, nappers must be creative combatting their fatigue (see Fig. 1.1)

In addition to the ubiquitous coffee shop, caffeine is found in energy drinks, chewable gummies, energy tablets, soaps, lip balms, mints, and even baked goods such as donuts and bagels. While excess caffeine is known to be addictive, and possibly damaging to one’s health and mental state, it is still a popular solution to combating fatigue.

Chronic mental and physical fatigue is a disease plaguing America. In today’s technologically-driven culture, personal electronic devices such as computers, video games, and music players allow people to work and play 24-hours-a-day. People are getting less and less sleep.

Consider for instance the growing number of forms caffeine and other stimulants are offered on the market.

Most organizations allow workers to take breaks to maintain productivity—lunch breaks, coffee breaks, smoke breaks, and such—but nap breaks are still widely regarded as unacceptable (Anthony 12). Negatively associated with lazy attitudes, reduced worker productivity, and lower company profits, people who nap as a productivity break must often do so secretly, and in creative venues. Some furtive methods of napping discovered from anecdotal evidence and personal experience include napping in the car, in class during class, under the desk, and even in the bathroom.

Though it is popular opinion, society’s negative attitudes towards napping is unjustified, as research indicates that napping actually improves worker mood, performance, and productivity.
This study establishes a need for rest and break space design through literature & survey research. Design Guidelines will identify fundamental principles for designing rest & break spaces. Design Applications will illustrate how guidelines may apply to a variety of workplaces and cultures.

This study investigates the design potential for integrating rest spaces in the workplace and the possible benefits that may result for worker health, happiness, and productivity. Interpretive-historical and survey research led to development of design guidelines and design applications that illustrate optimal ways of creating rest spaces in a variety of workplace sizes and layouts.

Potential break areas of survey companies were redesigned to provide real-world applications of the design guidelines, and suggest new ways of working and resting for productivity.

Ultimately one hopes this research will inspire a variety of companies and cultures to incorporate well-designed rest and break spaces in their work spaces, recognizing that it will not only benefit health, happiness and productivity, but also the bottom-line.
research methods

Interpretive-Historical & survey research was conducted to identify a need for rest and break spaces in the workplace & learn from past innovations in rest & break space design.

**SURVEY**

A survey was distributed via pen & paper or electronic form to willing participants. Data regarding productivity and fatigue patterns, how individuals remedy fatigue, attitudes towards resting in the workplace, and other physical or psychological requirements needed to understand how to design rest and break spaces was collected. Preferences to variables such as posture, light, noise, and other environmental design factors were identified. (See Appendix A for sample of survey distributed.)

Survey companies varied in size, from small companies employing less than 30 people, to large companies employing more than 500 people. They included KYA Design Group, LLC, a Hawaii-based architecture firm with 27 employees, Architects Hawaii, Ltd., a Hawaii-based architecture firm with roughly 90 employees, and Kohn Pedersen Fox, a NewYork-based Architecture firm with over 500 employees, as illustrated in Figure 1.3.1.

The survey population was composed of a total of 128 subjects. Approximately two-thirds of survey subjects were male and one-third were female. While subjects ranged from 18-85 years old, the majority of the study population were 26-65 years old. Survey subjects identified with cultures from all over the world, including Asian, African, mainland American and Hawaiian cultures, with the majority of subjects identifying with mainland American and Hawaiian cultures.

Although companies surveyed were all full-service Architectural firms, the principles illustrated by design guidelines and case-study applications can apply to any work space, regardless of profession.
FIGURE 1.3-1
Survey population demographics

- COMPANIES SURVEYED (left to right): Architects Hawaii, Ltd., KYA Design Group, Kohn Pedersen Fox
- COMPANY LOCATION
- CULTURAL IDENTITY (width = # of ppl)
- 20 MEN
- 20 WOMEN
- AGE (length = # ppl)
This study tests the hypothesis there is a public need for well-designed rest & break spaces in the workplace. Identifying needs & benefits of napping & taking breaks on health, happiness & productivity will hopefully lead to increased acceptance & practice of resting in the workplace.

This study also tests the hypothesis that design guidelines for rest & break spaces, will apply to work environments of many different sizes, floor plan layouts or programs.
Chapter 2 establishes a need for rest environments in the workplace based on literature & survey research. Existing knowledge on the effects of resting on health and productivity, as well as solutions for creating relaxation through design are discussed.
Sleep needs fluctuate across the life cycle; generally adults need 7-9 hours of sleep everyday.

Sleep needs depend on body composition, age, sleeping habits, quality of sleep, sickness, and such. While sleep needs vary over the life cycle, the average adult generally needs between 7 and 9 hours of sleep for optimum health, as shown in Figure 2.1-1 (National Sleep Foundation). Restricting sleep to less than 7 hours a night has been associated with brain deficiencies such as lapses of attention, slowed working memory, slower cognitive processing, depression and body deficiencies such as obesity, diabetes, heart disease, reduced glucose tolerance, increased blood pressure, and even death (Banks & Dinges 519, 526, National Sleep Foundation).

Unfortunately, people become accustomed to sleep deprivation and do not recognize its increasingly negative effects. For instance, on a study population of 35 healthy adults, subjects who got less sleep performed worse on Psychomotor Vigilance Tests (PVT) that measured their attention span, over a 14

<table>
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<th>Age</th>
<th>Sleep needs</th>
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<tr>
<td>Newborns (1-2 months)</td>
<td>10-18 hours</td>
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<tr>
<td>Infants (3-11 months)</td>
<td>9-12 hours during the nights and 30-minute</td>
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<tr>
<td>Toddlers (1-3 years)</td>
<td>to two-hour naps, one to four times a day</td>
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<td>Prechoolers (3-5 years)</td>
<td>12-14 hours</td>
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<td>School-aged Children (5-12 years)</td>
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<td>Teens (11-17)</td>
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<td>Adults</td>
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**FIGURE 2.1-1**  
Sleep Needs Vary over the life cycle. The average adult generally needs between 7 and 9 hours of sleep for optimum health (National Sleep Foundation).
Many do not recognize when sleepiness affects their performance, and thus sleep less than the recommended 7-9 hours a night (Banks & Dinges 524).

<table>
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<th>Short Sleep (&lt; 7 hrs/night)</th>
<th>Long Sleep (&gt; 8 hrs/night)</th>
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<tr>
<td>+26% mortality</td>
<td>+24% mortality</td>
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<tr>
<td>+21% mortality</td>
<td>+17% mortality</td>
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Finally, 2007 study of 21,268 twins aged 18 and older, twins being closely if not identically genetically similar, found that sleeping less than 7 hours or more than 8 hours a night resulted in increased mortality risks of roughly 20-25%, see Figure 2.1-3 (Hublin 1250).

Interestingly, although too little sleep hurts health and performance, too much sleep is also associated with depression, illness, diabetes, heart disease, accidents, and death.

Research over the past 20 years has shown a U-shaped curve, with the lowest mortality rates associated with seven hours of sleep, and higher mortality rates with less than six and greater than nine hours of sleep per night (Hublin, National Sleep Foundation, Stampi). Variables such as low socioeconomic status and depression are often associated with over-sleeping, however, and may explain the paradoxical correlation (National Sleep Foundation).
Sleep Deficiency

Americans are sleeping less and less, creating a sleep debt that is harmful to health, safety, economy & productivity.

Sleep deficiency is a public health problem. According to a 2005 US National Sleep Foundation poll, among 1,500 adults whose mean age was 49 years old, 40% got less than the recommended seven hours of sleep a night necessary for optimum health. As a trend, Americans are sleeping less and less. According to the same poll, as shown in Figure 2.2-1, the number of subjects that slept 8 hours a night or more decreased by 9% while the proportion of subjects that slept 6 hours a night or less increased by 4% from 1998 to 2005 (Banks & Dinges 520).

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<td>31</td>
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**FIGURE 2.2-1**
Reported sleep times from the 1998 and 2005 National Sleep Foundation Gallup Polls show Americans, as a trend, are getting less and less sleep (Banks & Dinges 520).
Public sleep deficiency is not only dangerous for personal health it is also dangerous for public safety. Sleep loss leads to deficiencies similar to intoxication, as “24 hours without sleep or a week of sleeping four to five hours a night induces an impairment equivalent to a blood alcohol level of 0.1%” (Czeisler & Fryer 4). Roughly 60-90% of industrial accidents occur as a result of sleepy workers (Anthony 26-27), while an estimated 25% of drivers admitted to falling asleep at the wheel (Anthony 27). The Highway Safety Commission estimates each year 250,000 auto accidents and 10,000 fatalities result from sleeping drivers (Anthony 15).

The economic costs of public sleep deficiency are large. Sleep-related fatigue costs US businesses an estimated $150 billion a year in absenteeism, workplace accidents, and lost productivity (Institute of Medicine 158). In 1994, the annual cost in property loss from sleep-related automobile accidents was estimated to be between $29.2 and $37.9 billion, as illustrated in Figure 2.2-2 (Institute of Medicine 158). Not sleeping is bad for health and wealth.

Because the majority of workers do not sleep enough, many try to cope with fatigue using caffeinated beverages and other stimulants. Though caffeine is known to be addictive and detrimental to one’s health, raising blood pressure, causing irregular heart rates, accelerating breathing, causing anxiety and sleep disturbance when used in excess (Mednick 21), 43% of Americans state they are “very likely” to use caffeinated beverages to combat daytime sleepiness (National Sleep Foundation).
SURVEY RESULTS:
The majority of study subjects reported sleeping between 6-7 hours on weekdays (72%), and 7-9 hours on weekends (75%). However, 43% subjects reported sleeping less than the recommended 7 hours a night. Survey data supports research that many workers compensate a lack of sleep during the week by sleeping longer hours during the weekend. Furthermore, the need to sleep longer during the weekend increased as weekday sleep deviated farther from 7 hours a night, supporting the research that adults generally need between 7-9 sleep hours a night. For instance, KYA subjects reported mean sleep periods of 6 week hours and 9 weekend hours, increasing their weekend sleep by 3 hours. Comparatively, AHL subjects reported mean sleep periods of 7 week hours and 7-8 weekend hours, increasing their weekend sleep by 0-1 hours, and showing a much stabler sleeping pattern.
Fatigue

Sleep research indicates people generally feel fatigued in the late afternoon, regardless of how much sleep they had the night before.

In a survey of 528 habitual nappers and 428 nonnappers, fewer than 5% of subjects felt alert between 1530 and 1730 (Stampi 122).

Similarly in over 55% subjects spent the hours between 2-5pm sleeping, despite specific instructions not to sleep (Stampi 72). Even if an adequate amount of sleep is had the night before, there is a strong biological tendency to feel tired in the late afternoon hours.

As illustrated in Figure 2.3-1, for a standard 9am-5pm work schedule, the optimal time to take a nap occurs between 1-4pm. From 1-3 pm, one is most likely to obtain REM sleep, the sleep stage where information is consolidated into memory, and feel enough sleep pressure, or fatigue to achieve rest (Mednick 49).

**Figure 2.3-1**
Optimal time to nap occurs from 1-3 pm (Mednick 49)
Fatigue

SURVEY RESULTS:
The majority of subjects (50-64%) reported feeling fatigued at 3 pm. Survey data supports research that people generally feel fatigued in the late afternoon hours, regardless of sleep cycle and daily habits. To cope with their fatigue, most study subjects reported drinking a caffeinated beverage (66%). The second most popular method of coping with fatigue was to take an activity break, such as walking around, chatting, eating, and drinking (44%). Few subjects reported taking a nap to cope with fatigue (12%), suggesting napping is still not commonly accepted or practiced in American culture.
Napping for productivity

Taking a nap is a method of maintaining productivity that is not only free, but also beneficial for health.

Napping is correlated with reduced risk of death from coronary heart disease. As illustrated in Figure 2.4-1, in 2007 Greek study composed of 23,681 subjects, systematic nappers—subjects who napped at least 3 times per week for at least 30 minutes—had 37% lower coronary mortality than non-nappers. Similarly, subjects who practiced occasional napping—napped less than 3 times per week, or took less than 30 minute naps irrespective of weekly frequency—had a 12% lower coronary mortality than subjects who did not nap (Trichopoulou et.al. 296-297). The association between napping and coronary mortality was particularly evident among working men, but less evident among women, as there were less working women to analyze.

FIGURE 2.4-1
Napping is associated with positive effects on health and productivity, such as reduced risk of death from coronary heart disease, increased learning and memory capacity, and increased alertness and wakefulness.
Napping was also found to be as effective as getting a full night’s sleep in terms of learning and memory. In a 2006 US study, subjects who did not sleep the night before, but napped 60-90 minutes a day, were asked to perform memory tests such as tapping out a specific sequence on a keyboard or picking out the orientation of lines on a computer screen. Surprisingly, subjects who had a 60 or 90 minute nap were able to perform as well as subjects who had six to eight hours of sleep the night before, and an better than subjects who did not sleep at all (Mednick xiv).

Finally, napping was found to increase vigilance and alertness levels after long periods of sleep deprivation. In a 1994 NASA study, 38 long-haul flight crew-members, whose mean age was 46.5 years old, were monitored during two international flights that lasted roughly 13 hours. Experimental subjects took a 40-minute nap while control subjects took no naps. Measurements of brain activity (EEG), eye (EOG) activity, and vigilance performance throughout the flight revealed that nap subjects experienced 75% fewer microsleeps—brief moments of sleep followed by disorientation, often associated with sleep deprivation—than control subjects. Nap subjects experienced an average of 34 microsleeps whereas subjects who did not nap experienced 120 microsleeps during the testing period. Furthermore, longer naps produced longer periods of alertness. Sleep inertia, or feelings of grogginess experienced after a nap session, was not observed in the 1-hour period after the nap (Rosekind et.al 1994). A follow-up study conducted by the same researchers in 1995 showed a 34% improvement in reaction times for subjects that napped versus subjects that did not nap (Rosekind et.al. 1995). Indeed, as vigilance and alertness is incredibly important for airline crews, Rosekind’s research has inspired a number of airlines, such as British Airways, to encourage napping before flights, providing nap rooms with reclining chairs, blankets, alarm clocks, and classical music (Luxe Vivant).
Productivity

SURVEY RESULTS:
When asked to rate their productivity levels for 24-hour period, the majority of subjects rated the hours between 12-4 pm as having lower than average levels of productivity. Survey data supports idea that workers may benefit from resting during the afternoon hours to reduce the length and severity of their productivity drop.
SURVEY RESULTS:
When asked to identify environmental conditions required to fall asleep, the majority of study subjects (over 50%) identified comfortable body posture, quietness, and darkness as environmental conditions necessary for them to fall asleep in.

When asked the body postures they could fall asleep in, almost all study subjects (95%) needed to lie down to fall asleep. However, a surprising number of subjects (48%) also reported they could fall asleep sitting down. Very few subjects (4%) reported they could sleep standing up.
Breaks for productivity

Although taking regular breaks requires time, it improves accuracy, productivity, & stamina, allowing more work to be completed with less time & physical discomfort.

A 2001 study found that workers who followed a regular break schedule were able to work more productively and feel less physical discomfort due to work fatigue, as illustrated in Figure 2.5-1 and Figure 2.5-2 (Dababneh et.al 164-174). The study tested two types of break schedules on workers in a meat-processing plant: the first break schedule called for a 3-minute break every half-hour; the second break schedule called for a 9-minute break every hour. Both break schedules resulted in a total of 36 minutes of extra break time in comparison

\[FIGURE 2.5-1\]
Workers who followed an experimental break schedule, taking 3-minute breaks every half-hour or 6 minute breaks every hour, showed higher production rates than the control. (Dababneh et.al. 164-174)

\[FIGURE 2.5-2\]
Workers who followed a regular break schedule also reported less discomfort in the lower extremeties than workers who did not follow a regular break schedule (Dababneh et.al. 164-174)
with control subjects who followed a standard break schedule of one 30-minute lunch break and two 15-minute breaks provided per company policy. Despite spending less time working, experimental subjects of both break schedules did not experience production losses, and in fact reported less discomfort in their lower extremities than control subjects.

Though both break schedules resulted in increased productivity and decreased fatigue, subjects preferred the 9-minute break schedule to the 3-minute break schedule, as it was less disruptive to their work day (Dababneh et al. 164-174). Although taking breaks reduces the quantity of time spent working, it results in faster work speed and reduced fatigue, and may thus increase the productivity and quality of work completed. As illustrated in Figure 2.5-2, fatigued workers need breaks no matter the situation or locale.

Similarly, a 2009 study by Cornell University found that taking regular breaks resulted in more accurate work. The study randomly assigned 21 insurance workers to use “off-the-shelf ergonomics risk management software that… present[ed] on-screen alerts at appropriate times, reminding workers to assume good posture, take a microbreak [less than 10 minutes long] and stretch” over a 10-week period. The study found that subjects who took breaks were on average 13% more accurate in their work than the control group (Lang 1). In the most extreme case, the fastest typist made almost 40% fewer errors than his counterpart who did not take breaks.

Researchers concluded that “people can measurably improve their computer productivity and substantially reduce their risk of repetitive stress injuries” if they took regular breaks instead of working long hours, despite fatigue and unproductivity (Lang 2).
SURVEY RESULTS:
Taking a closer look at how often survey subjects took breaks and what they did on their breaks, the top five break activities were (in order of decreasing popularity): drinking caffeine (66%), walking outside (39%), chatting with co-workers (29%), eating and drinking (26%) and walking around inside the work environment (12%).

Many survey subjects reported varying the types of breaks they took on a daily and weekly basis, often engaging in more than one type of break each day. Certain breaks, such as drinking caffeine, were taken an average of three times a day or 15 times a week. Other types of breaks, such as leaving the work environment to go outside, were only practiced an average of 3 times a week, and not on a daily basis.

Survey subjects reported taking an average of six breaks per week, 14 minutes per break. Thus the total amount of average break time subjects took was 84 minutes per week, not including their lunch breaks.

Survey subjects actually took less break time than break schedules suggested by existing research, that prescribed 180 minutes of break per week, or 36 minutes per day.

As discussed in previous sections, such break schedules were found to improve productivity, accuracy and fatigue, though they called for very short (less than 10 minute) breaks every hour, and may not be practical for all occupations, as they may disrupt the workday.
Restful Design

**SURVEY RESULTS:**
Daylighting and views were rated by survey subjects as the most important environmental factors for health, happiness & productivity.

Color, vegetation & natural ventilation were considered somewhat important to creating restful environments, but as important as daylighting and views.

---

**VERY IMPORTANT**

for health, happiness, & productivity

---

Survey subjects rated the following factors:

- **Very Important:***
  - Daylighting
  - Views
  - Color
  - Vegetation
  - Natural ventilation

- **Neutral:***
  - Color
  - Vegetation
  - Natural ventilation

- **Not Important:**
  - Daylighting
  - Views

---

**Graph:**

- X-axis: Color, View, Daylight, Vegetation, Ventilation
- Y-axis: Very Important (5), Neutral (3), Not Important (1)
- Colors: Blue, Pink, Yellow

---

**Legend:**

- ☀️: Happiness
- ❤️: Health
- 🧪: Productivity

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**Survey Results Chart:**

- Very Important: Daylighting, Views, Color, Vegetation, Natural Ventilation
- Neutral: Color, Vegetation, Natural Ventilation
- Not Important: Daylighting, Views

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**Note:**

Survey results indicate a strong emphasis on daylighting and views for improving health, happiness, and productivity, followed by color, vegetation, and natural ventilation.
Attitudes

While US cultures associate napping, resting & taking breaks with laziness or lack of work ethic, other cultures consider such activities acceptable in public & the workplace.

Napping is viewed and practiced differently across cultures. Cultural sleep patterns typically fall into one of three categories: monophasic sleep cultures, biphasic or siesta cultures, and polyphasic sleep cultures (Williams 108-109). In monophasic sleep cultures, sleep occurs in a “consolidated block or period of time, with a ‘widespread ideal of an eight-hour nocturnal sleep phase’” (Williams 108), and are typical of cultures found in Northern Europe and North America, including the US. As illustrated in Figure 2.6-1, monophasic sleep cultures often negatively associate napping with laziness or lack of work ethic, and consequently do not consider napping appropriate in public spaces or the professional environment.

In biphasic or siesta sleep cultures, sleep occurs in two periods of time—a short afternoon nap and a longer sleep at night—and is historically characteristic of Spain, cultures with Spanish influences, and China (Williams 108).

FIGURE 2.6-1
Monophasic sleep cultures, such as the US, often associate napping with negative stereotypes, such as laziness and poor work ethic (CSL Cartoon Stock).
Napping during culturally sanctioned times is a widespread practice, with many schools and businesses physically shutting down for two or three hours mid-day to accommodate *siesta*.

Finally, in polyphasic sleep cultures, sleep occurs in a flexible pattern, based on social roles, duties, activities and obligations, and is characteristic of Japan, parts of China, and India. The Japanese even have a term for public napping, *inemuri*, where it is socially acceptable for an individual to appear to be napping in a public situation, as long as they are able to wake-up whenever their participation is required (Williams 76).

Individuals practicing *inemuri* often remain seated or even standing, achieving rest simply by closing their eyes. As illustrated in Figure 2.6-2, it is not uncommon to observe individuals napping in meetings, the subway, and other public settings.

Ironically, globalization has caused many historically biphasic cultures, such as Spain and China, to shun mid-day napping and siesta in favor of working long hours without rest, equating this Westernized view of work ethic with modernization. Especially in big cities, where workers live far from the office, the dwindling practice of siesta has

**FIGURE 2.6-2**

In polyphasic sleep cultures, such as Japan, it is socially acceptable to rest in public, as long as it does not interfere with one’s duties and responsibilities. Thus it is commonplace to observe people sleeping in public settings, such as the subway, parks, social gatherings, and even work events (Asian Offbeat).
prompted the Spanish government to cancel siesta for its employees in 2005 (Drabelle 2008). Similarly napping has become more of an individual choice, with fewer establishments shutting down mid-day in China (Williams 111). In cultures that equate modernization with the workaholism, napping is thought of as archaic and unnecessary.

Paradoxically, as biphasic cultures are “modernizing” themselves by forgoing siesta, historically monophasic cultures such as the Germany, are rediscovering the benefits of napping as a naturopathic method of remedying fatigue. In 2002, 22% of Germany’s population reported practicing siesta at least three days a week, with another 4% even taking two naps on the same day. In contrast, the same study found only 7% of Spaniards nap in current times (Ford 2002).

In the US, however, napping is still generally regarded as inappropriate for the workplace, save for a few exceptions that will be discussed in the Design Models chapter. Consider, for instance, what occurred when Honolulu politician, Rod Tam, proposed his now infamous Senate Bill 2511, Naps for State Employees, on 24 January 2000 (See Appendix B for full copy) which states: “legislature finds… a short nap during the work day is beneficial to the human mind and body…State law presently requires that state workers have a ten minute break in the morning and another in the afternoon. This act does not create a new break, but allows for a productive use of one of those breaks…to allow state employees to take a ten minute nap” (State of Hawaii Senate).

Tam was inspired to propose SB2511 in response to state workers’ complaints that they would be harassed and penalized by their supervisors when they tried to nap at their desks during approved break times. As Tam states, “I proposed [SB2511] to protect employees and their privacy to do what they wanted on their own break times. It is a health issue because tired employees are unproductive” (Tam 2010).

From his business travels throughout Asia, Tam found naps or periods of rest were already built into the workday, and helped his energy levels and productivity. The difference between Western and Asian work cultures, Tam states, is that “in the Western world, it is thought that workers should work every minute” whereas in Asian cultures rest breaks are more accepted (Tam 2010).
When SB2511 was proposed, it was immediately ridiculed as evidence of the laziness and ineptitude of state workers and politicians.

Consider, for instance, the parody of SB2511 by Honolulu cartoonist John S. Pritchett, printed in the Honolulu Weekly on 26 January 2000 (Pritchett), and shown in Figure 2.6-3. Pritchett imagines naps imposed on state workers like they are kindergarteners, instead of being practiced at individuals’ discretions. Pritchett does not make the distinction that these naps would have occurred during already scheduled break periods, but implies they would occur during times when state employees were supposedly “working,” with tax payers footing the bill. Though humorous, Pritchett’s cartoon does in fact misconstrue the nuances of SB2511, to make it seem entirely ridiculous.

The public ridicule of SB2511 in turn shamed supporters, preventing the bill from passing. As Tam states, “the news media criticized [SB2511] so much that employees didn’t want to come forth [to support SB2511]. the media creates opinions that kill legislation” (Tam 2010).

Tam learned from his experience that although napping is socially acceptable in Asian cultures, it is met with skepticism and associated with lazy work ethic and sub-standard performance in Western cultures. Negative attitudes have, in turn prevented legislation from sanctioning napping in the workplace, even though research shows its practice is actually beneficial.

FIGURE 2.6-3
Parody of Senate Bill 2511 “Naps for State Employees” imagines a scene similar to kindergarten nap-time, should state workers have been allowed to nap during approved break times. As printed in Honolulu Weekly, 01/26/2000 (Pritchett).
### Attitudes

Commonly cited reasons given for why survey subjects would not nap at work were (in order of decreasing popularity): work disruption, longer work hours, gogginess, unprofessionalism, and inability to fall asleep.

### SURVEY RESULTS:

Although the majority of survey subjects acknowledged that napping and taking breaks increased productivity and should be allowed at work, over 60% reported they would not personally nap at work.

Reasoning that napping will result in work disruption, longer work hours and gogginess is challenged by existing research that shows resting for 20 minutes or less will result in increased speeds, accuracy, stamina, and productivity, without causing sleep inertia or feelings of gogginess. However, reasoning that napping is unprofessional and that subjects would be unable to fall asleep are challenges that must still be addressed through rest space design and education to change negative stereotypes towards resting in the workplace.
Nap pods, nap rooms, home-offices, pod hotels, aircraft design, work furniture, & work spaces provided case-study research & design inspiration for rest environment design & design guidelines. Site visits and personal interviews were used in addition to literature research, as noted.
Inspiration for furniture design to promote relaxation is provided by nap pod research.

The MetroNaps EnergyPod is a futuristic twist on the reclining chair, outfitted with a hood that surrounds the head, controls light, and lulls the user with tranquil, relaxation-inducing music (see Figure 3.1-1). MetroNaps opened a nap center from 2004-2008, in New York’s Empire State Building. At their New York location, users could rent an EnergyPod in 20 minute intervals, with the EnergyPod providing a combination of light and vibration to awaken the user. (MetroNaps).

Currently MetroNaps offers EnergyPods through their UK and Australia stores, and on their web site. Companies may buy or rent EnergyPods directly, to install in their work spaces (see Figure 3.1-2). Some of MetroNaps prominent international clients include Proctor & Gamble, the W Hotels, and Google. The EnergyPod design teaches that only the upper body needs to be enclosed, to controlling light, sound, and create a sense of privacy.
POWER NAP CAPSULE

Distributed by Hammacher Schlemmer, the Power Nap Capsule provides a semi-enclosed sleeping environment using a fiberglass-reinforced plastic frame and a 6-inch thick foam mattress covered with leather (see Figure 3.1-3, 3.1-4). The unique undulating shape of the Power Nap Capsule positions users’ head and legs slightly above their lumbar regions, to relieve pressure on the back, encourage proper spinal alignment, improve circulation, and promote relaxation. The sleeping surface is 12-inches longer than a king size mattress, and the entire capsule measures 57” H x 53” W x 116”L and weighs 180 lbs. The Power Nap Capsule may be purchased from Hammacher Schlemmer’s catalogs and online website. (Hammacher Schlemmer).

FIGURE 3.1-3
Power Nap Capsule fits up to two people. (Squidoo)

FIGURE 3.1-4
Power Nap Capsule is a high-end nap pod, made of fiberglass-reinforced plastic, foam, and leather. (Hammacher Schlemmer)
El Zulo, a Spanish phrase meaning ‘the hiding place,’ is a 2006 concept design by Frank Ehnes that uniquely puts users into an “upright embryonal position” (see Figure 3.1-5). The advantages of the upright body positioning are that it allows users to relax the back muscles without lying down horizontally, theoretically making it easier to get up and resume working.

The El Zulo has yet to be produced, but it nevertheless provides an intriguing solution to reducing the time it takes to waken from a nap, as well as reducing the footprint dimensions (Hanish).
The NapPak is a portable nap space, electronically inflated to provide enclosure, or deflated for storage and transportation (see Figure 3.1-6). A textile inlay provides a blanket and pillow for comfort and hygiene, should there be multiple users. The color scheme uses translucent white to create relaxation on the interior, and the bright orange to create excitement and interest on the exterior. When inflated, the NapPak measures 93”L x 32”W x 32”H. (NapPak) The NapPak inspires strategies for portability and ensuring hygiene using personal items for multiple users.
A number of companies have incorporated nap spaces in their work environments, to relax and rejuvenate tired and fatigued workers.

**GOOGLE, SWITZERLAND**

At Google Engineering Headquarters in Switzerland, (see Figure 3.2-1), a darkly lit and painted room features reclining chairs, an aquarium wall, and even a bathtubs filled with plastic balls, to encourage mental and physical relaxation (Glass Box Design, CoolBoom).
YELO

Yelo, a wellness spa that provides reflexology, massage, and nap services, illustrates how to design full-sensory sleep environments. Located in Manhattan, New York, users may rent YeloCabs—honeycomb-shaped cabins (see Figure 3.2-2) that feature a patented leather reclining chair and allow users to control settings for light, sound, and even smell (Bedrin). Users may choose the color and intensity of the LED lights that surround the perimeter of the YeloCab (see Figure 3.2-3), a type of relaxing music or environmental sound.

**FIGURE 3.2-2**
YeloCab is shaped like a hexagon to avoid sharp edges and corners. (YeloSpa)

**FIGURE 3.2-3**
Users may control color, brightness, sound, smell, and temperatures of the YeloCab (YeloSpa).
such as rain forest or urban sounds, to play during their session, and an aromatherapy scent to fill their cabs. Other amenities include purified air, 500-thread count linens and soft cashmere blankets (YeloSpa).

A site visit and personal interview with Michael Hazel, Yelo Director of Operations, provided insight into the design of the Yelo sleep cabins and sleep chairs. According to Hazel, YeloCabs are designed to simulate the experience of being in the womb, hexagonally shaped to be free of sharp walls and corners, and stimulating for all five senses. Standard YeloCabs measure 78 square feet, or roughly eight feet by ten feet (Hazel).

Yelo relaxation chairs allow users to recline with their legs bent and elevated slightly lower than their heads, to slow the heart rate and take pressure off knees, hips and back (Hazel). Indeed the researcher was able to fall asleep after only 5 minutes of entering the YeloCab, and was woken by simulated sunrise created by LED lights located behind the head, that got increasingly brighter and changed color from red, to orange, to yellow, to a white.

According to Hazel, Yelo users vary in terms of age, gender and profession. Interestingly, Yelo actually attracts a high number of male clients—35-40% of their clients are men—compared with traditional spas that usually service 20% men and 80% women (Hazel). Yelo’s unusually high percentage of male customers is due to Yelo’s nap room, a unique service that serves a practical function and does not require clients to undress or use beauty products.

Other characteristics of Yelo clients are that they typically live or work close to Yelo—80-90% of Yelo users live or work within three blocks from Yelo—and earn over $100,000 a year (Hazel). From his experiences speaking with individuals and corporations, Hazel estimates most people would not travel more than 1-3 blocks to use a service outside of their corporation.

Regarding why individuals chose to purchase Yelo services, stress was the most common reason; other reasons include sleep deprivation, word of mouth, or media publicity (Hazel). According to Hazel, even when Yelo users do not fall asleep during their sessions, most experience reduced stress levels and increased energy levels from Yelo’s nap spaces & services.
Yelo also markets itself to corporate clients, through health fairs and other such venues. A number of companies such as Time Warner, Nike, Alvin Ailey Dance Theater, BMI, Bad Boy Worldwide, Yahoo & Newsweek hold corporate contracts with Yelo, where employees receive a discount on Yelo services, up to 50%, in return for promotion of Yelo services. One company nurse even writes prescriptions for Yelo treatments to patients. (Hazel)

One challenge Yelo faces is overcoming negative stereotypes of napping that cause Yelo to be perceived as a novelty service. In fact, Yelo’s original business model proposed installing YeloCabs directly in work environments. However, Yelo met resistance to devoting substantial funds and floor space to napping areas that are not guaranteed to be popular or beneficial for productivity—Hazel estimates it would cost approximately $50,000 to install a standard YeloCab. (Hazel). Another challenge Yelo faces is enticing clients to travel more than 3 blocks to use its services, as this limits the client base Yelo may attract.

Yelo was a valuable case study, as it not only illustrates strategies for controlling light, sound, temperature, smell, ambiance, and gently waking users from their periods of rest, but also challenges facing those in the business of providing nap and relaxation services.
pod hotels

Space efficiency & futuristic design merge in pod hotel research.

Pod hotels have been open for decades in Asia, to accommodate professionals working late nights or on business trips. Visitors sacrifice amenities such as windows, private bathrooms, & space, in exchange for cheaper rates. Today pod hotels are found in many major cities, such as New York, Tokyo, and Amsterdam. (Fodor’s Travel)

CAPSULE INN

The Capsule Inn (see Figure 3.3-1 & 3.3-2), located in Akihabara, Tokyo is composed of two main sections: a public lounge that includes a bathing area, and a private space where individual sleeping units, or capsules, are located (Capsule Inn Akihabara). Since bathing areas are communal, men and women are separated on different floors. Each capsule measures 72” L x 36” W x 36”H, (Fodor’s Travel), and are molded of reinforced plastic, designed in the image of a jet airplane’s cockpit (Capsule Inn Akihabara).

FIGURE 3.3-1
Capsule Inn units are stacked vertically and horizontally to save space. (Capsule Inn Akihabara)

FIGURE 3.3-2
Capsule Inn units made of molded plastic, modeled after the airplane cockpit. (Capsule Inn Akihabara)
Yotel, open since 2007, offers cabins in numerous airports across the UK, such as Heathrow and Gatwick in London and Schiphol in Amsterdam. Travelers may choose from premium, standard, or twin cabins, which range from approximately 75ft² to 108 ft² (see Figure 3.3-3). Each cabin is soundproofed, and contains a sofa-bed, desk, closet, shower, & TV. Yotel rooms must be booked for a minimum of four hours. (Yotel)
Qbic Hotels, located in Amsterdam, offers futuristic cube-shaped rooms called “Cubi,” that enclose only the bed and bath areas for sound proofing and space efficiency. Curtains provide privacy for individual units, separating them from a central hallway (see Figure 3.3-4). Customers may choose the “mood lighting” of their Cubi, such as Mellow Yellow, Red Romance, Deep Purple Love, and such (see Figure 3.3-5). Qbic’s Amsterdam has been in business since 2007. (Qbic Hotels)
home office

Home offices provide inspiration for merging comfort, with multi-functions, and productivity.

The Internet, globalization, and a depressed economy, have led many companies to encouraging working from home and other satellite locations (Friedman 37). Working from home leads to a number of benefits such as cost savings on operations, space, travel, greater flexibility and control over the work environment.

SHUFFLEHOUSE

The concept for the Shufflehouse (see Figure 3.4-1), designed by Percy Conner Architects in 2000, illustrates futuristic ideas on how to merge the work environment into the home. Pods that contain rest areas, may be opened or closed, defining space based on the user’s needs, and reflecting a blurred line between the work and home environment (Antonelli 199).
The Room by Office for Design & Architecture (ODA) (see Figure 3.4-2) is a “modular dwelling system that can be retrofitted into existing spaces…[and] consists of 3 elements: the Pod, the Media Station and the Satellite, which includes a desk and storage tower”. The Room modules may be purchased from and installed by ODA directly. Materials and construction methods may be varied to fit budgetary constraints. (Office for Design & Architecture)
Bed in Business, designed by Hella Jongerius of Rotterdam, Holland, is a high-tech, extra-long bed whose corners may be adjusted from horizontal to upright positions (see Figure 3.4-3). Users may find a comfortable body posture and adjust the height of the computer screen embedded at the foot of the bed. “Smart pillows” utilize touch sensors, and contain an embedded keyboard and mouse, to allow users to work and sleep in the same bed. Jongerius describes her bed as the “ultimate symbol of rest and relaxation, dreaming, doing nothing…sleeping and making love have been fused with work…and with the hectic life of the world beyond the bed.” The Bed in Business “exploits the frequent phenomenon of creative thought while at rest and furnishes the means with which to immediately execute ideas,” allowing people to take advantage of those ‘aha’ moments immediately. The Bed in Business has been manufactured by Dutch firm, Auping, since 2000 (Antonelli 222).
Innovative break rooms encourage relaxation, spontaneity, informal interaction, collaboration, and camaraderie.

LEDGO GROUP, DENMARK

At the LEGO Group Development Department in Billund, Denmark, a multi-use break room incorporates reception, meeting, lounging and eating areas in a single space, with one long and undulating table (see Figure 3.5-1). Such multi-use programming creates “an environment for organic socializing: planned meetings, spontaneous conversations and new friendships and ideas” (Hoy), thereby creating a more dynamic and active energy in the space. The extra long table also creates an interesting feature for people to ambulate around, providing a wide circulation path and encourage a little bit of physical activity.
GOOGLE, SWITZERLAND

Google, the company behind the widely-used Internet search engine, is also known for its innovative break room design. Its extravagant headquarters in Zurich, Switzerland features massage parlors, game rooms, hammock rooms, gyms, and quirky mixed-use spaces in addition to the aquarium-lined nap rooms, previously discussed (see Figure 3.5-1). Google illustrates out-of-box break room design, that encourages physical activity, a range of body postures, vibrant color schemes, and above all fun and relaxation. (Popgive. CoolBoom)

FIGURE 3.5-1
Google Headquarters in Switzerland features slides, massage parlors, hammocks, gyms, game rooms, mixed-use ‘igloos,’ to promote fun and relaxation (Popgive. CoolBoom.)
Conceptual & existing aircraft seat designs provides inspiration for creating transformable furniture meant for comfort and space efficiency.

**QANTAS SKYBED**

The Qantas Skybed, designed by Marc Newson and developed with B/E Aerospace, allows passengers to control their body position electronically, transforming from an upright seated position to a 6'-6”, 170° sleeping position (see **Figure 3.6-1**). Other features of the design include a cocoon-like headboard with screen for privacy, in-seat back massage function, and LED reading light. In 2004 the Skybed won the Chicago Athenaeum Museum Good Design Award, are already being used in Qantas International Business Class flights, on the Boeing 747, Airbus 330, and Airbus 380 (Matthew).

**FIGURE 3.6-1**
The Qantas Skybed allows users to recline or lie down at 170° (Hoy)
STEP SEAT

To take advantage of unused vertical space, Emil Jacobs of Jacob-Innovations, LLC, proposes the “step seat principle” that “involves elevating alternate rows of seats, from one to five steps above the cabin floor” (Chase) so that passengers may lie down in stacked pods, instead of sitting adjacent to one another. (see Figure 3.6-2) The stacked seating also allows rows to be installed closer together, compensating for lost space from wider pods. However, disadvantages of the design are that it restricts visibility and potentially slows evacuation times. The Step Seat design was patented in 2006, but has yet to be implemented (Chase).

FIGURE 3.6-2
The Step Seat design allows airplane passengers to lie down by taking advantage of vertical space. (Chase)
Mario Martinez Celis merges the convertible seat-bed with using vertical space (see Figure 3.6-3) in his 2008 entry in the Create the Future Design Contest, featured in the NASA Tech Briefs. Celis’ conceptual design for the Airbus 380 provides all passengers, from economy to first-class, with seat-beds, unlike current designs that only allow business class passengers to enjoy the seat-bed. Furthermore, the elevated row of Celis’ design increases the seat count from 555 to 594 seats on the Airbus 380 (Garvey).
Flexible work spaces for independant professionals to collaborate and inspire.

**1. FIGURE 3.7-1**
The Hub in Amsterdam, features a cafe & meeting rooms. At night it transforms into event space. (Ryan)

**2. FIGURE 3.7-2**
Paragraph in New York, is designed by writers for writers. The loft space is divided into a writing room, kitchen & lounge. (Ryan)

**3. FIGURE 3.7-3**
theOffice in Santa Monica, California, incorporates vegetation, upscale furniture & earthy finishes to create an indoor-outdoor feel. (Ryan)

**4. FIGURE 3.7-4**
BCN, in Kreuzberg, Berlin, uses predominately white finishes to create a feeling of calm and meditation. A boxing bag provides a venue for physical activity. (Ryan)
Independent professionals often find they benefit from collaborating with others. As a result, co-working spaces have developed in most major cities of the US, Europe, and Asia, with approximately 600 co-working spaces operating worldwide today, as illustrated in (See Figures 3.7-1, 3.7-2, 3.7-3 & 3.7-4. (Foertsch) They provide meeting and work space for the self-employed, allowing people from many different professions to work in proximity and possibly collaborate. There are co-working spaces geared for every niche from writers to working mothers. Co-working spaces provide a rich work community for the self-employed, as well as an efficient platform from which to build a business on (Kesler).
Design Guidelines illustrate principles for incorporating rest environments in the workplace, based on literature & survey research, as well as guidelines for environmental or ‘green’ design, put forth by the US Green Building Council.
Provide **body position** that allows users to relax neck, back & leg muscles. Horizontal position is preferred by majority.

Use **light control** as darkness encourages rest & relaxation.

Use **sound control** to prevent loud noises from disrupting rest.

Visually screen the head and torso to provide **privacy**

Provide **thermal control** by using individually controlled thermostats or personal items. Thermal comfort is subjective.

Create a **mixed use** program so that rest will be used throughout the day.

**Image Credits**
01 Google, Switzerland  02 Power Nap Capsule  
03 Capsule Inn, Tokyo  04 MetroNaps Energy Pod  
05 Yelo, New York  06 NapPak
Relax neck, back & leg muscles.

A horizontal sleeping position is generally considered the most comfortable position for rest.

Use hypo-allergenic, closed foam materials rated for bedding to reduce risk and spread of bed bugs, dust mites and such. Choose products that do not break down, to reduce risk of particles being inhaled.

If rest spaces have multiple users, develop a plan for materials to be sterilized; viruses such as the Human papillomavirus (HPV) can be transferred by direct skin contact.

Use low volatile organic compounds (VOC) materials, free of urea, formaldehyde and other similar chemicals, that may be found in any petroleum based foam materials.

Padding between the user and the floor is all that is needed for the unsupported horizontal body position.

Support under the neck and knees allows the back to relax more than the unsupported horizontal position.

Inspired by the supported Savasana or corpse yoga pose, this position counteracts forward bending and hunching tendencies commonly experienced during computer work.
Reclining chairs allow users to rest their neck, back and legs without having to lie down. Users must be able to recline substantially, however, as a majority of people cannot rest sitting up. (Architectural Graphic Standards, 7th Ed 5)

Putting users in a body position similar to that of a massage chair, the front-supported sitting position allows users to rest their neck, back, and legs while not requiring them to fully lie down. Theoretically users should have an easier time waking becoming fully-functional than if lying horizontally, but the ability of users to achieve sleep in this position is untested. (El Zulo nap pod)
Provide light control. Darkness encourages rest & relaxation. If total darkness is undesirable, use indirect lighting to create a relaxing atmosphere. Avoid light fixtures that shine directly overhead or in the eye. Indirect lighting creates a more relaxing atmosphere.

**INDIRECT LIGHTING**

**PHYSICAL BARRIER**

**ARCHITECTURAL**
Shades or screens may be used as window treatments or additions to the individual work station to block daylight or indoor lighting. Roll-up varieties allow barriers to be more discreet when not in use.

**USER-SUPPLIED**
Sleep masks or sunglasses, and similar personal items are the least costly strategy to controlling light, and may be tailored to individual comfort and aesthetic preferences.

(Architectural Graphic Standards, 7th Ed., 709)
DIMMABLE LIGHTING

INCANDESCENT
- Halogens not recommended unless excessive heat gain from fixture usage is desirable
- Initial cost: Cheapest option
- Life (hr): 750-12,000

COMPACT FLUORESCENT
- Initial cost: 2-3 x Incandescent
- Life (hr): 9,000-30,000

(Architectural Graphic Standards, 7th Ed. 709)

ON / OFF SWITCH

LED
- Initial cost: 15-16 x Incandescent
- Life (hr): 50,000+

COMPACT FLUORESCENT
- Initial cost: 2-3 x Incandescent
- Life (hr): 9,000-30,000

INCANDESCENT
- Halogens not recommended unless excessive heat gain from fixture usage is desirable
- Initial cost: Cheapest option
- Life (hr): 750-12,000

(Architectural Graphic Standards, 7th Ed. 709; LED Source)
**DISTANCE**

Sound interference decreases with distance from source. A minimum 8 ft is desirable between rest environment and potential sources of disrupting noise.

*(Architectural Graphic Standards, 7th Ed. 73)*

**SOUND MASKING**

To protect against intrusive and distracting noises in the office environment, use white noise or an otherwise relaxing soundtrack, such as sounds of nature or rainfall, to provide sound masking. Speakers may be located above the acoustical tile ceiling, in corners of the room, or other convenient locations.

*(Architectural Graphic Standards, 7th Ed. 73)*

**USER-SUPPLIED**

Ear plugs, headphones, and similar individual products are the least costly and most customizable method of sound-control.
SOUND ABSORPTION

ACCOUTSTIC FOAM
Surface-mounted for sound proofing. Use a fire-rated and toxic free (when burning) product, that has low levels of volatile organic compounds (VOC) materials, free of urea, formaldehyde and other similar chemicals, that may be found in petroleum based foam materials. Acoustic foam is often used in sound booths and recording studios.

ACCOUTSTIC CEILING TILE (ACT)
Found in a variety of patterns, colors, and edge profiles.

ACCOUTSTICAL FABRIC
Surface mounted; fabric flexibility of fabric allows for curvilinear and other non-orthogonal applications.

WALL INSULATION
Made of batt or foam; integrated into the wall system. Requires greater planning, since difficult to install post-construction.

ACCOUTSTIC PANEL
Wide variety of forms such as wall panels, wall and ceiling baffles, ceiling clouds, and banners.

(All Noise Control)
Use visual screening to provide privacy. Although screening the entire body is ideal, screening just the head and torso region provides enough sense of privacy for rest and relaxation.

**ENCLOSED ROOM**

Assigning a fully-enclosable room used primarily for resting is the most private, but most costly strategy for creating a rest environment. However, environmental conditions such as light levels, sound, smell, atmosphere and décor are best controlled in a fully-enclosed resting room.

(Google, Yelo and similar nap rooms

**FULL-BODY SCREENING**

Roll-up privacy screens allow users to transform any low-trafficked area, such as quiet nooks, areas for storage, and even under the individual workstation, into an opportunity for rest.

Nap Pod

Individual work station
PARTIAL-BODY SCREENING

Provide a sense of privacy by screening the users’ head and torso. However, not all users may feel such a strategy provides a sense of privacy. Furthermore, not all work cultures may agree that being able to partially view a resting worker is professional.

Screened Nap Pod

Screening may also function as decorative and relaxing elements, such as an aquarium walls.

Aquarium Pod
ACTIVE CONDITIONING

Provide individual thermostat controls. Providing individual active conditioning, or HVAC, controls is the most costly method of thermal control. However, costs may be offset by lower-conditioned temperatures, occupancy detectors, and passive conditioning strategies.

(2009 LEED Reference Guide 528)

PASSIVE CONDITIONING

Provide individual passive conditioning controls, such as operable windows, mounted or free-standing fans, and shading devices. These, and other such passive conditioning strategies control the speed and quantity of airflow, as well as solar heat gain.

(2009 LEED Reference Guide 528)
User-supplied methods of thermal control, such as personal blankets and desk fans, are the least costly and most customizable strategies for thermal control.
Mixed-use programming allows for flexibility; so that space may be used throughout the day. Choose programs that are informal, relatively quiet and low-traffic. Programs that may complement rest spaces include libraries, storage, intimate meeting spaces, lounges, and such.

Programs that complement rest environments do not involve noisy activities, and are used infrequently throughout the day, such as library, storage, meeting and lounge areas.
4.2 breaks

Use daylight to increase focus & productivity & decrease energy loads.

Use views & vegetation to increase productivity & sense of well-being.

Use mixed-use programming for flexibility; space may be used throughout the day.

Provide enough area or method of stimulation to encourage physical activity.

Provide congregation area, as socializing with others is a popular break activity.

Create a distinctly different experience than that of the individual work station, to encourage rest & relaxation.

Use bright accent colors on a neutral field to increase focus & productivity.

Use natural ventilation to improve indoor-air quality & reduce energy loads.

Image Credits
01 Unileverhaus, Germany 02 Genzyme Center, Massachusetts
03 Lego Group, Demark 04 Bloomberg, New York 05 Google, Switzerland
06 Google, Switzerland 07 Lego Group, Demark 08 Genzyme Center, MA
Use daylight to increase focus, productivity, connection to the outdoors, & sense of wellbeing. Daylighting also reduces energy loads and costs. Aim to achieve daylight illumination levels between 25 foot-candles (fc) and a maximum of 500 fc (2009 LEED 549).

**MINIMIZE OR MITIGATE EAST -WEST FACING WINDOWS**

East or West facing windows are difficult to shade. Minimize use of east or west facing windows, or mitigate low sun angles with shading devices such as vegetative walls. (Meder et.al. 64)

**LIGHT-COLORED INTERIOR FINISHES**

Light colored, matte finishes reflect and distribute daylight without creating glare. Dark colored finishes do not reflect light well. Glossy finishes may create unwanted glare. (Meder et.al. 65)
SIDE-LIGHTING

SIDE-LIGHT ZONE
Ceiling should not obstruct a line in section between the window head and a distance two times the height of the window head in the floorplane.

LIGHT SHELF
Light shelves bounce daylight through the wall into the interior, providing indirect side lighting. Light shelves must protrude past roof line to be effective.

ATRIUM
Atriums are an attractive daylighting strategy that not only provides side-lighting, but also a connection to nature, vegetation, and the outdoors.

(2009 LEED 550-552; Meder et al., 66)
TOP-LIGHT ZONE

Vertical walls or partitions should not obstruct a line in section 35° from the skylight to the floor plane.

CLERESTORY
Clerestories bounce daylight through the roof into the interior, providing indirect top lighting. Clerestories create less heat gain than skylights.

LIGHT TUBE
Light tubes capture and redirect daylight into the interior using lenses and reflective tubing. Tubes are able to run up to 30 feet in length.

(2009 LEED 550-552; Meder et al. 66)
TOP-LIGHTING continued

SKYLIGHT
Skylights have the potential to cause excessive heat gain and glare when designed inappropriately. Strategies to reduce heat gain include venting or shading. Strategies to reduce glare include glazing or baffling. Glazing should have a solar heat gain coefficient of 0.5 or less.

(Meder et.al. 67)
Work spaces that create connection to nature lead to increased productivity, comfort, sense of well-being & employee retention. Connection with nature may be established through a visual connection with outdoor views, or through incorporation of natural elements in indoor architecture.

MINIMUM SIZE

View openings should minimally fall between 30 and 90 inches above the floor, to allow for views in both seated and standing positions.

OUTDOOR CONNECTION – VIEW

Views with natural elements, such as vegetation, water, rock formations, and even human activity allow workers to feel connected to nature.
Incorporating natural elements into interior architecture may be used to enhance or supplement workers' sense of connection with nature. Greater control in terms of quantity and quality may also be exerted over exterior views than interior elements. Indoor connection to nature...
Getting light physical activity helps to reduce mental & physical fatigue, maintain focus & productivity. Allowing people to stretch their legs without having to leave the office, results in more efficient and presumably shorter break times.

Activities that are interactive, entertaining, and require movement, are ideal for meeting multiple needs of moderate physical activity, relaxation, social interaction, and building camaraderie. Type of activities may be chosen based on space and cost requirements.
**AMBULATION AROUND AN OBSTACLE**

An obstacle that creates ambulatory circulation helps to encourage physical activity. Do not close off or block circulation paths. Locate anchors on opposite ends to encourage movement. Anchors should be highly desirable and/or frequented areas, such as food-related amenities, entrances and exits, and such.

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**HORIZONTAL LINES**

Horizontal lines help to encourage and reinforce a sense of movement. May help to define main circulation path.
Socializing with others is a popular break activity. Encourage congregation with furniture arrangements that support social interaction, and activities that attract people and provoke thoughts and conversation.

Arranging furniture so people may interact face-to-face, or at 90 degree angles to one another. Linear furniture arrangements do not inspire interaction or support congregation.
Provide forms of entertainment in the break environment that attract users, as well as provoke thoughts and conversation. Interesting events will spark conversation and encourage interaction long after the event has ended. See Guideline 04, Physical Activity, Entertainment section for activity ideas.
Break rooms should provide unique experiences, distinctly different from the individual work space. Distinguish the break space from the work space to encourage informal interaction, relaxation, and freedom to work in environments other than the personal work station.

### UNIQUE ATMOSPHERE

**LIGHTING**
Light intensity and color may be manipulated to create varying effects on mood and atmosphere, to help distinguish break from work experience.

**Bright**
Bright lighting can help create a more exciting and stimulating environment

**Soft**
Soft or dim lighting helps to create a calmer, more relaxing environment.

**Temperature**
For a warm appearance, use bulbs of 3000 Kelvin (K) or less. For a cool appearance, use bulbs of 4000K or more. For a neutral appearance, use bulbs between 3500-4000K

**COLOR**
Brighter colors and a more varied color palette helps to create a fun and informal tone that helps to distinguish break from work spaces.

**DÉCOR**
Furniture should be movable for flexibility and spontaneity. Choose furniture, accents and accessories that help to distinguish and enforce concept of the break area.

(Lighting: Meder et.al. 71-72)
Mixed-use programming encourages flexibility, spontaneous interaction & collaboration; so that space may be used throughout the day. Programs that may complement and be incorporated into break environments include meeting, conference, presentation, and reception space.

Programs that complement break environments encourage lively, interactive, and collaborative environments.
Many people spend the majority of their time indoors. Mold, chemicals & pollutants cause health risks, especially if allowed to build up. Use natural ventilation to improve indoor-air quality, and reduce energy loads heating and cooling systems.

**SIZE**

Outlet openings should be slightly larger than inlet windows. Outlet openings should be located at body level for maximum comfort. Outlet openings can be located at convenience, as outlet locations do not significantly affect airflow.

**LOCATION**

**OPPOSITE WALL**
Locate openings diagonally for cross ventilation; when possible, orient the room 45 ° from wind direction to improve air flow.

**ADJACENT WALL**
Space windows as far apart as possible, to improve airflow. Casement windows recommended, as open glazing helps to guide airflow.

**SAME WALL**
Space windows as far apart as possible, to improve airflow. Casement windows recommended, as open glazing helps to guide airflow.

(Meder et.al. 53-55 2009 LEED 410)
OPERABLE WINDOWS

All window types should be provided with sun protection, such as shading, or screening, or glazing.

CASEMENT
90% effective open area.

AWNING
75% effective open area. Open glazing provides rain protection.

HOPPER
45% effective open area.

JALOUSIE
75% effective open area. Provides best air control, but opening is obstructed by louvers.

(Meder et al. 54)

natural ventilation
OPERABLE WINDOWS continued

SLIDING
45-50% effective open area.

DOUBLE HUNG
45% effective open area.
Size & geometry of opening poor choice for ventilation.

PIVOT
0-90% effective, depending on position.

(Meder et.al. 54)
FANS

Fans may be used to help circulate air, and increase airflow. Size of fan affects impact on airflow, with bigger fans able to move more air.

CEILING
Ceiling fans are less obstructive than mounted or desktop fans, but allow less individual control.

MOUNTED
Mounted fans are more visible than ceiling fans, but allow more control over the direction of airflow.

DESKTOP
Desktop fans are the least costly and most customizable fans. Size, speed, location, and appearance may be controlled by the user.
color

Use bright accent colors on a neutral field to increase focus & productivity.

NEUTRAL

Use light-toned neutrals such as white, grey, or beige for major field colors, to create a calming effect and reflect more daylight. However, dark-toned neutrals such as dark brown or black may be used for accent colors, and to camouflage exposed pipes and ducts on the ceiling plane.

ACCENT

Use accent colors sparingly. Pin points of bright accents with high contrast provide more clarity and focus than large applications of bright color.
COLOR PSYCHOLOGY

EXCITING
Bright, vivid colors cause excitement and evoke a sense of playfulness. Red is correlated with excitement, increasing heart rate, and perspiration. Lime green has been found to be the fastest color the human eye can recognize. As a result, it is often found on safety equipment. When used sparingly, to highlight intended features, bright colors are able to draw the attention, and increase focus.

CALMING
Neutral or lightly saturated colors create a relaxing and calming effect. Light colored hues have an added benefit of reflecting more light. Neutrals such as white, grey, and tans work well in large areas, as they will match with a variety of accent colors, though lightly saturated versions of any color can also create a calming effect.
To illustrate how to apply design guidelines, break & rest spaces of selected companies were hypothetically redesigned. Companies featured include: Kohn Pedersen Fox (KPF) in Manhattan, New York & Architects Hawaii, Ltd. (AHL) in Honolulu, Hawaii.
**Company Profile**

**SIZE:** 500+ people  
**LOCATION:** Manhattan, New York  
**TYPE:** Full-service Architecture firm

**Kohn Pedersen Fox**
**redesign** 18th floor
break space that offers a linear seating arrangement that is functional, but too similar to the individual work spaces. Used for break, meeting and presentation, space seats 18 people & contains a kitchen without a range, & pantry.

Guidelines illustrated:
4.2A daylight
4.2C physical activity
4.2D congregation
4.2F mixed-use
18th FLOOR BREAK AREA
Curvilinear tables, ceiling soffit and shelving provide a fun, organic experience, and even increase the seat capacity of the existing space. Ceiling, table and light fixtures add accents of color. Green wall features sustainable plants, to connect with nature and educate visiting school groups.
future break space and library of 6th floor office, that was under construction at the time and had yet to be designed. Program requirements included: break space to seat 48; library to serve as meeting area and staff lounge.
A major challenge for the design library was creating a space that could function both as a formal meeting area and in informal break and rest space. The parti distinguishes formal and informal sides with a curved wall and different furniture, finishes and color schemes. A circular parti was used for the meeting space to create a sense of formality and encourage collaboration.
6th FLOOR LIBRARY
(informal space)
The rest and break area features bright colors and quirky furniture shapes to create a sense of playfulness and informality. Behind the wet bar, a 5'-0" x 10'-0" room houses a rest area equipped with a reclining chair.
If budget was not a concern, an aquarium could replace the wet bar for visual screening, and chairs could be mounted and vertically stacked on the wall, to increase the number of people able to rest at a time. This strategy incorporates a connection with nature into the rest space.

**6th FLOOR LIBRARY**

(rest space)

**guidelines applied**

4.1A body position
4.1D privacy
4.2D nature
6th FLOOR BREAK AREA
Using curvilinear forms and bright colors create an exciting and fun respite from straight and ordered work spaces. Since the openings of the 6th floor break space faces a brick light well, the quality of daylighting is poor, and the view unattractive. Potted plants are used to screen the view, and an uplit ceiling soffit and self-illuminating table provides intimate lighting.
company profile

SIZE: 90 people
LOCATION: Honolulu, Hawaii
TYPE: Full-service Architecture firm

Architects Hawaii, Ltd
redesign

1 Individual work station to include rest space
2 Storage area adjacent to materials library, is an eye sore & under-utilized
3 Break space, though large, multi-use & practical, has lack-luster view, lighting, circulation & ambiance
WORK STATION REST SPACE
A translucent screen held with tension rods can transform the underutilized, dark space underneath workstations into private rest spaces. Tension rods spaced between end anchors allow screens to adapt to work stations of any shape & size. Mesh screens may be printed with graphics, and are easy to personalize. A rolling mat and other personal affects such as blankets, pillows, eye masks and ear plugs will provide a comfortable posture, thermal comfort, and sound control at a cost-effective price.

Architects Hawaii, Ltd
LIBRARY REST SPACE
Located in a quiet, secluded area, adjacent to the materials library, an unsightly storage area is transformed into a relaxing resting or reading nook. Retractable shades block unwanted light and provide privacy. A connection with nature is created with a translucent glass panel that evokes the sense of water, and strategically placed plants. A modern water feature could also replace the glass panel, providing soothing sounds of running water, and masking disruptive noise. However, if added humidity is undesirable, such as when area is prone to mold growth, water features should be avoided.

guidelines applied
4.1A body position
4.1B light
4.1C sound
4.1D privacy
4.1E thermal
4.1F mixed-use
BREAK SPACE
Curvilinear lines distinguish break space from work space. Green wall adds interest and nature to otherwise unsightly view. Large table placed centrally improves circulation flow, encourages physical activity, & fosters interaction. Playful uplighting & light colored finishes create a brighter and more relaxing atmosphere.

Architects Hawaii, Ltd

4.2A daylight
4.2B nature
4.2C physical activity
4.2D congregation
4.2E unique
4.2F mixed-use
4.2H color
The significance of rest and break space design will grow as the nature of how & where people work evolves.
The goal of this study was to inspire & guide companies to integrate rest & break spaces in their workspaces for health, happiness & productivity.

Sleep deprivation is a disease compromising the health, happiness and productivity of the majority of the American workforce. Instead of sleeping, workers rely on caffeine and longer work hours to get the job done.

Using caffeine is not only an expensive habit, it also leads to physical dependencies, withdrawal symptoms and a host of negative effects such as high blood pressure, irregular heart rates, accelerating breathing, anxiety and sleep disturbance. The high cost of public sleep deprivation, in terms of sleep related accidents and deaths, indicates caffeine alone is not providing an adequate solution to today’s sleep debt.

Providing spaces that allow workers to rest and take breaks has been proven by historical research to positively benefit memory, speed, accuracy, fatigue, coronary health, worker satisfaction, and such. However, the majority of people are still resistant to providing and using rest spaces in the workplace, for fear of appearing lazy or unprofessional.

Though napping is not a widely practiced or accepted productivity break, a number of rest-oriented products and environments—nap pods, nap spaces, pod hotels, home-offices, innovative break spaces, aircraft design & coworking spaces—provide hope that attitudes, & behavior will change in favor of resting in the workplace.


For rest spaces, survey subjects indicated that a comfortable body position, sound control and light control were the most important factors in allowing people to achieve sleep. For break spaces, survey subjects indicated that daylight and views were of utmost importance, though other environmental factors such as color, natural ventilation, and vegetation were all relatively important for health, happiness & productivity.
Application design case studies illustrate real-world implementation of the design guidelines, showing the guidelines may apply to a range of different work settings and cultures. Ultimately, one hopes the design guidelines and case study applications developed will be used to inspire and guide a variety of work places and cultures to sanction resting and taking breaks as effective methods of coping with fatigue and unproductivity, and consequently integrate rest and break spaces in their work spaces.

FUTURE TRENDS

In the future, Design Guidelines created for rest and break space will have increasing significance, because they will not only apply to rest and break spaces, but all work environments.

The nature of how people work is changing. Work spaces of the past draws negative images of low ceilings, dark corridors, small enclosed spaces, artificially lit interiors, and a sea of cubicles. Work spaces of the past were determined by status, with high status offices located on the building’s perimeter, with the most square feet of fenestration (Russell 1983, p. 58).

Today, finding information, accessing products and services, and interacting with people from around the world is cheap, easy, and instantaneous. The Internet, a global system of interconnected computer networks, has made Personal Operating Devices (POD) such as cell phones, laptops and tablet computers incredibly popular. People can access information, communicate with each other, and do work anywhere they can link into the network.

As information storage becomes more sophisticated, one might imagine entire business operations, or life-time’s worth of work, being easily transported on a POD. The location of where work occurs will be of less and less pertinence than the content and speed of how work is communicated.

PODs allow freedom to work in wherever one can link into the network.

A new paradigm of working will evolve. The physical realm is giving way to the digital realm—CDs are replaced by media players, books are replaced by tablets, postal mail is replaced by email, and the traditional office, composed primarily of individual work spaces, will be replaced by a collection of different work spaces, each with their own character and attributes.
Workers may choose spaces that best suit their needs, and not be confined to one area or one body posture for the entire work day.

Multi-use creative zones, that feature platforms for PODs to link into, could support different preferences in terms of collaboration tasks, work styles, energy levels, sources of inspiration, décor, as well as comply with Americans with Disability Act (ADA) standards, to ensure all workers have equal access to various types of work spaces.

The work day would change from workers being contained to individual spaces, to choosing throughout the day, the best work environment to accomplish their tasks and goals. As the distinction between work and home continues to blur, the distinction between work, rest and break will also continue to blur, making the design guidelines for rest and break spaces applicable to all work spaces of the future.

However, having increasingly sophisticated tools for communication, and blurring the separation between personal and professional life comes at a cost. Clients are already able contact professionals at all hours of the day, regardless of when their office is open, or even if they are on the same continent.

Work hours will no longer be limited to a particular time frame or time zone, and the concept of leaving work at the office will be much harder when the office travels with the individual. Thus as the work day infiltrates personal time, the need for designing a variety of work spaces will be of increasing significance, as people must make up lost hours of rest and rejuvenation by some means.

The office of the future will be more increasingly focused on fostering communication, collaboration, socialization with other living beings. Though humans have achieved great advancements in communication technology, it is improbable electronic devices will fully replace human contact and live interaction. At least one hopes this is the case.

Consider for instance the phenomenon of social networking. Internet sites, such as Facebook, allow individuals and companies to create user profiles, and post information such as pictures, interests, affiliations, and such. The extreme popularity of social networking have transformed this concept from a frivolous teeny-bopper past-time, to an integral part of everyday life and relationships, involving people and businesses of all ages, social economic levels, and cultures.
A substantial amount of time in the future will be spent interacting with digital devices instead of the living world. People may be learning how to program software and navigate through cyberspace more adeptly than in previous generations, but they are getting less practice on the nuances of real communication—communication that involves body language, tone and inflection, timing and implied meanings—and less chance to feel a true connection with other living beings.

Thus offices of the future will not be valued for their ability to provide individual work space, but for their ability connect live individuals, and provide creative, inspiring and healthy spaces that make individuals want to work and rest in them.

Following this reasoning, research that helps guide the design and incorporation of rest and break spaces to enhance health, happiness and productivity will also be increasingly valued in the future.

FUTURE guidelines for creating rest & break spaces will be more significant, as it will not matter where one works, but who one works with [see next page]
old day

WORK WORK WORK
MEET
EAT
BREAK
WORK WORK WORK

6.1

POD
Personal Operating Device

WORK
EAT
BREAK
MEET
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University of Stuttgart, Germany. Nap-Pak. 2005. Web. 27 April 2010

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Appendix A: Survey

Appendix B: Senate Bill No. 2511
Naps for State Employees
SURVEY INSTRUCTIONS:

Please answer the following survey questions as accurately as possible. If filling out via pen & paper, please print clearly, with blue or black ink, and turn in to collection point, as specified. If filling out electronically, indicate answers using the highlighting tool, and/or text, print survey as a PDF, and email to: robyny@hawaii.edu. The information gained from this survey will be used for the purposes of the researcher’s D.Arch project with the University of Hawai‘i at Manoa. All survey answers will be kept confidential, and no personal information is required to complete survey. Should any survey questions cause mental distress or discomfort, please feel free not to answer them.

DEMOGRAPHIC INFORMATION:

1. What age are you?
   a. 18-25
   b. 26-35
   c. 36-45
   d. 46-55
   e. 56-65
   f. 66-75
   g. 76-85
   h. 86-95
   i. 96-105

2. What is your gender?
   a. Male
   b. Female

3. What ethnicity do you most identify with?
   a. American Indian
   b. Alaska native
   c. Asian
   d. African American
   e. Pacific Islander
   f. White
   g. Other

4. What is your occupation?
   a. Student
   b. Professor or Administrator
   c. Architecture professional
   d. Medical professional
   e. Business professional
   f. Other

5. What size is your company? (circle one)
   a. Less than 10 people
   b. Less than 50 people
   c. 50+ people
   d. 100+ people
   e. 200+ people

6. Where is your company located?
   (city / state)

   ________________________________
SURVEY QUESTIONS

1) What are your normal working hours? *(indicate all hours that apply)*

| 12 am | 12 pm | 1 am | 1 pm | 2 am | 2 pm | 3 am | 3 pm | 4 am | 4 pm | 5 am | 5 pm | 6 am | 6 pm | 7 am | 7 pm | 8 am | 8 pm | 9 am | 9 pm | 10 am | 10 pm | 11 am | 11 pm |
|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

2) What times of day do you tend to feel tired during your normal working hours? *(indicate all hours that apply)*

| 12 am | 12 pm | 1 am | 1 pm | 2 am | 2 pm | 3 am | 3 pm | 4 am | 4 pm | 5 am | 5 pm | 6 am | 6 pm | 7 am | 7 pm | 8 am | 8 pm | 9 am | 9 pm | 10 am | 10 pm | 11 am | 11 pm |
|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
3) What does your company provide, on site, to help you cope with your fatigue? (indicate All that Apply)
   a) Refreshments (What type?)
   b) Caffeinated beverages (coffee, energy drink, etc.)
   c) Break room without a place to sleep
   d) Nap room
   e) Recreational room (What recreational activity?)
   f) Other
   g) Nothing

4) How do you cope with your fatigue? (indicate All that Apply)
   a) Drink a caffeinated beverage (coffee, energy drink, etc.)
   b) Smoke a cigarette
   c) Take a break (what activity do you engage in?)
   d) Take a nap (If your company does not provide a nap space, where do you nap?)
   e) Other
   f) Nothing
5) Please identify features of your company's Break Room that help you relax (indicate All that Apply)
   a) Color (what color is your room?)
   b) Refreshments (what kinds of refreshments?)
   c) Light control (how is light controlled?)
   d) Ventilation control (how is ventilation controlled?)
   e) Sound control (how is sound controlled?)
   f) Décor (what features in particular?)
   g) Other
   h) Do not have break room

6) How often do you use your company's break / relaxation room? Check or highlight □ if Does not Apply
   times / week

7) How long do you use your break room per session? Check or highlight □ if Does not Apply
   minutes/session

8) Please identify features of your Nap Room that help you relax
   a) Color (what color is your room?)
   b) Refreshments (what kinds of refreshments?)
   c) Light control (how is light controlled?)
   d) Ventilation control (how is ventilation controlled?)
   e) Sound control (how is sound controlled?)
   f) Décor (what features in particular?)
   g) Other
   h) Do not have a nap room
9) How often do you use your company’s nap room? [ ] Check or highlight □ if Does not Apply

   times / week

10) How long do you use your company’s nap room per session? [ ] Check or highlight □ if Does not Apply

   minutes/session

11) What times of day you typically spend sleeping on an average work day. (indicate all hours that apply)

   12 am  12 pm
   1 am  1 pm
   2 am  2 pm
   3 am  3 pm
   4 am  4 pm
   5 am  5 pm
   6 am  6 pm
   7 am  7 pm
   8 am  8 pm
   9 am  9 pm
  10 am 10 pm
  11 am 11 pm

12) What times of day you typically spend sleeping on an average non-work day. (indicate all hours that apply)

   12 am  12 pm
   1 am  1 pm
   2 am  2 pm
   3 am  3 pm
   4 am  4 pm
   5 am  5 pm
   6 am  6 pm
   7 am  7 pm
   8 am  8 pm
   9 am  9 pm
  10 am 10 pm
  11 am 11 pm

13) If you nap during your work day, how long is your average nap? (If you do not nap, skip to question 19)

   minutes

14) After you nap, how long does it take you to feel ready to get back to work?

   minutes
15) After you nap, what do you do to make yourself ready to get back to work?
   a) Nothing; I am immediately ready to get back to work after I nap
   b) Wash my face
   c) Brush my teeth
   d) Other

16) How do you feel after you nap?  (indicate one rating only)
   1= not alert   2=less than average   3=average   4=better than average   5=very alert

17) How productive do you feel after you nap?  (indicate one rating only)
   1= not productive   2=less than average   3=average   4=better than average   5=very productive

18) How is your mood after you nap?  (indicate one rating only)
   1= not good mood   2=less than average   3=average   4=better than average   5=very good mood

19) Indicate the times of day you feel most productive. Rate your level of productivity during these times
   (1= not productive   2=less than average   3=average   4=better than average   5=very productive)

<table>
<thead>
<tr>
<th>Time</th>
<th>Productivity Rating</th>
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<tbody>
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</table>
20) Indicate the times of day you feel least productive. Rate your level of productivity during these times (1=least productive 3=neutral 5=most productive)

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<th>Time</th>
<th>Productivity Rating</th>
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21) If allowed the opportunity, would you nap at work?
   Yes / No (Please list reasons for choosing Yes/No)

22) Do you think being given the opportunity to nap at work would make you more productive?
   Yes / No (Please list reasons for choosing Yes/No)

23) Do you think being given the opportunity to take a “break” at work would make you more productive?
   Yes / No (Please list reasons for choosing Yes/No)
24) What activity (s) do you engage in, when you take a “break” at work, that helps you become productive?

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<thead>
<tr>
<th>ACTIVITY</th>
<th>FREQUENCY (per week)</th>
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25) If you were an employer, would you allow your employees to nap at work?
   YES / NO (please explain reasons for choosing YES / NO)

26) What environmental conditions are necessary for you to sleep? (circle All that Apply)
   a) Familiar surroundings
   b) Quiet surroundings
   c) Darkness
   d) Music
   e) Comfortable sleeping position
   f) Other

27) What postures are you able to fall asleep in? (circle All that Apply)
   a) Standing
   b) Sitting
   c) Lying down (back? / side? / front? Circle all that apply)
   d) Other
28) What posture do you most frequently sleep in? (circle All that Apply)
   a) Standing
   b) Sitting
   c) Lying down (back? / side? / front? Circle all that apply)
   d) Other

29) How important do you consider office design in terms of health?
   1  2  3  4  5
   Not important       very important

30) How important do you consider office design in terms of productivity?
   1  2  3  4  5
   Not important       very important

31) How important do you consider office design in terms of personal happiness?
   1  2  3  4  5
   Not important       very important

32) Please rate the following variables of office design in terms of their importance to health:

   Natural Ventilation
   1  2  3  4  5
   Not important       very important

   Daylighting
   1  2  3  4  5
   Not important       very important

   Color
   1  2  3  4  5
   Not important       very important

   Indoor Natural Features (vegetation, water, etc.)
   1  2  3  4  5
   Not important       very important

   View to the Outdoors
   1  2  3  4  5
   Not important       very important

33) Please list any other office design variables you consider important for health
34) Please rate the following variables of office design in terms of their importance to **productivity**: 

<table>
<thead>
<tr>
<th>Variable</th>
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35) Please list any other office design variables you consider important for **productivity**

36) Please rate the following variables of office design in terms of their importance to **happiness**: 

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<tr>
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37) Please list any other office design variables you consider important for happiness:

38) If you were to design an office, what would be your preferred color choice? *(choose one)*

- Red
- Orange
- Yellow
- Green
- Blue
- Violet
- Pink
- White
- Grey
- Brown
- Beige
- Other____________________
A BILL FOR AN ACT

RELATING TO NAPS FOR STATE EMPLOYEES.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

1 SECTION 1. The legislature finds that recent scientific
2 research indicates that a short nap during the work day is
3 beneficial to the human mind and body. A short nap restores and
4 refreshes a worker to continue to work after the nap in a more
5 efficient and proficient manner. State law presently requires
6 that state workers have a ten minute break in the morning and
7 another in the afternoon. This Act does not create a new break,
8 but allows for a productive use of one of those breaks.
9 State workers are encouraged to take a nap once a day at
10 their work place. For example, a worker could nap at a desk.
11 The intent is that a worker use the nap to relax, refresh, and
12 rejuvenate, without leaving the work place.
13 The purpose of this Act is to allow state employees to take
14 a ten minute nap during their recess.
15 SECTION 2. Section 80-2, Hawaii Revised Statutes, is
16 amended to read as follows:
17 '80-2 Recesses. The head of any department, board,
18 commission, or agency may allow employees [under his supervision]
19 supervised by the head to take a recess each morning and
S.B. NO. 2511

1 afternoon not exceeding ten minutes in duration, if their doing
2 so does not impair the function of the department, board,
3 commission, or agency. Employees may sleep at their work place
4 during one of the recesses in order to feel refreshed and
5 restored."
6 SECTION 3. Statutory material to be repealed is bracketed.
7 New statutory material is underscored.
8 SECTION 4. This Act shall take effect upon its approval.
9
10 INTRODUCED BY: