



High Performing Buildings for High Performing People

Tuesday, May 16, 2017
11:15 am – 12:30 pm

Panelists

- Michael Myer, Pacific Northwest National Laboratory
- Hakon Mattson, Anthem Inc.
- Jordan Hibbs, Department of Energy (moderator)

Michael Myer

**Pacific Northwest National
Laboratory**

Light is Light

“Artificial” Lighting / Electric Lighting



“Artificial” Lighting / Electric Lighting



“Artificial” Lighting / Electric Lighting

Green Offices May Be the Key to Productivity—and Employee Health

Thursday, April 06, 2017 - by *Bryn Huntpalmer*

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What really improves employee performance? Better accessibility and technology? Streamlined communication? Great company perks? While those things certainly don't hurt, environmental features, like lighting and air quality, may play a bigger role than you ever imagined. A number of recent studies confirm that conventional office design could be slowly crushing employee productivity from within—and that “greening” spaces with selective materials

and health-conscious decor could be the key to eliminating production lag.

As team leaders and innovative thinkers, we tend to reject elements that are out of our control. But subconscious environmental triggers influence us nonetheless, whether we want to admit it or not. Humans are keenly attuned to differences in light, color, and air quality—and in your office, strategically adapting surroundings to mirror natural environments may be the difference between a team that just does the bare minimum and one that's hitting it out of the park. In particular, if you want to see improved performance—and return on investment—pay attention to your building's lighting, decor, and air quality.

Daylighting Offices for Improved Employee Efficiency

The same circadian rhythms that govern sleep patterns impact awareness and activity as well. In other words, if your employees aren't sleeping well, they're probably not performing well, either, and vice versa. And light exposure plays a massive part in that process. The type of light—and even the color and intensity—affects physical and neurological activity.

In a [literature review](#), the National Renewable Energy Laboratory (NREL) found that daylighting offices significantly affected not only employee productivity, but also absenteeism and overall health. Specifically, views of natural greenery were associated with improved concentration—particularly when it came to tasks that participants found to be boring or monotonous. Real-world results seem to back up those finds. For instance, when Lockheed Martin remodeled their offices to include daylighting features, they witnessed a 15 percent bump in employee productivity, according to the same NREL review.

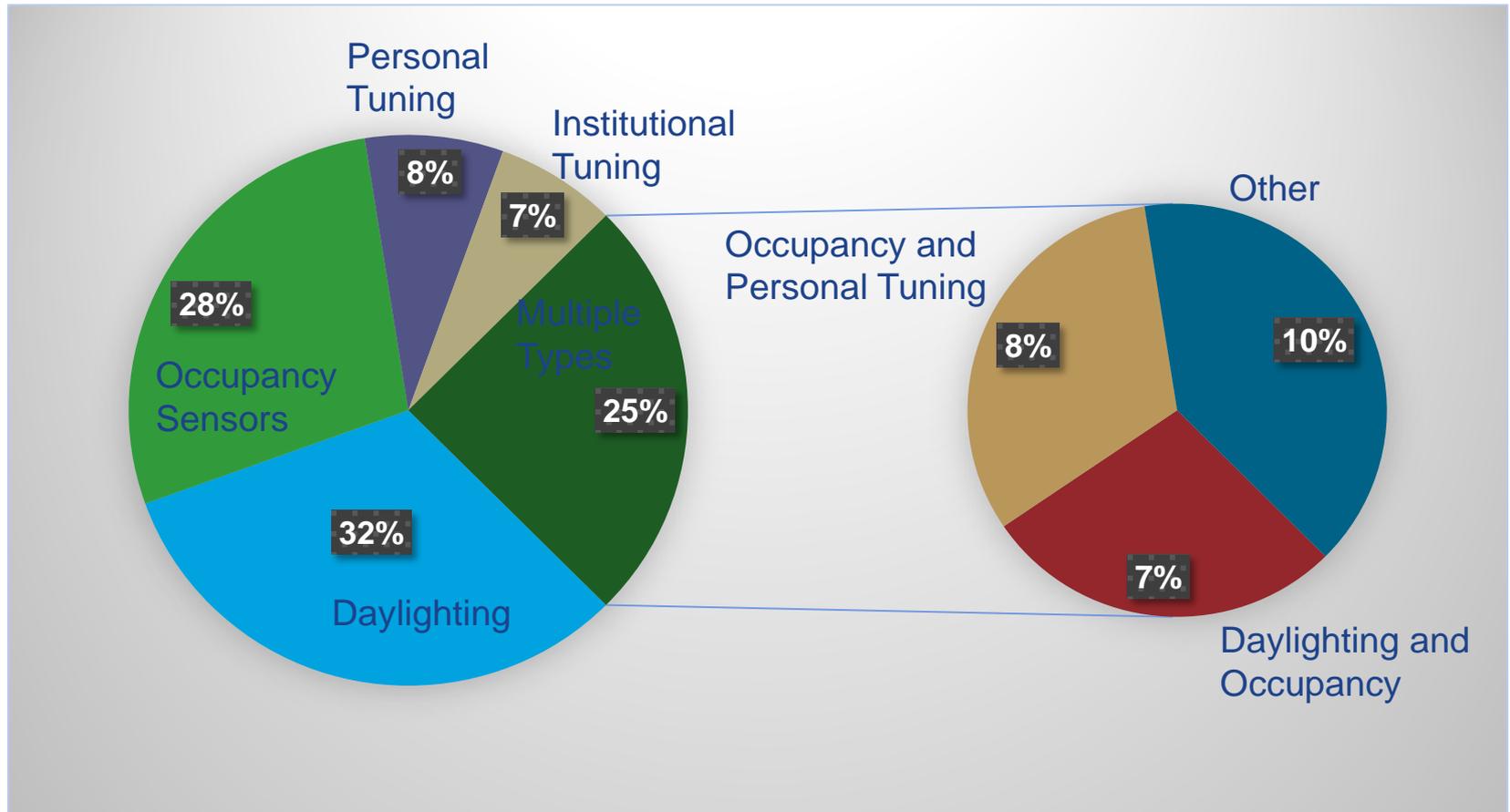
Unfortunately, more natural light can come at a cost. Any time you widen an opening in a building's outer envelope, you place yourself at risk for heating and cooling losses, which drive up energy spending. Conditioned air slips through small cracks in the window assembly—and even makes its way through the glass itself, if your windows are inefficient. An airtight assembly and high-performance glazing system come with a higher associated cost, but businesses traditionally make up that expense in energy savings. Consider this staggering statistic: In 1990, inefficient windows in commercial buildings [cost businesses at least \\$20 billion](#). And when you factor in the added value in improved production—not to mention local government and utility rebates that may be available to businesses—[new windows](#) seem like a very smart buy, indeed.

Summary:

- All lighting behaves the same way
- People want a connection to the outside
- Daylighting helps save energy

Lighting Controls

Lighting Controls



Lighting Controls



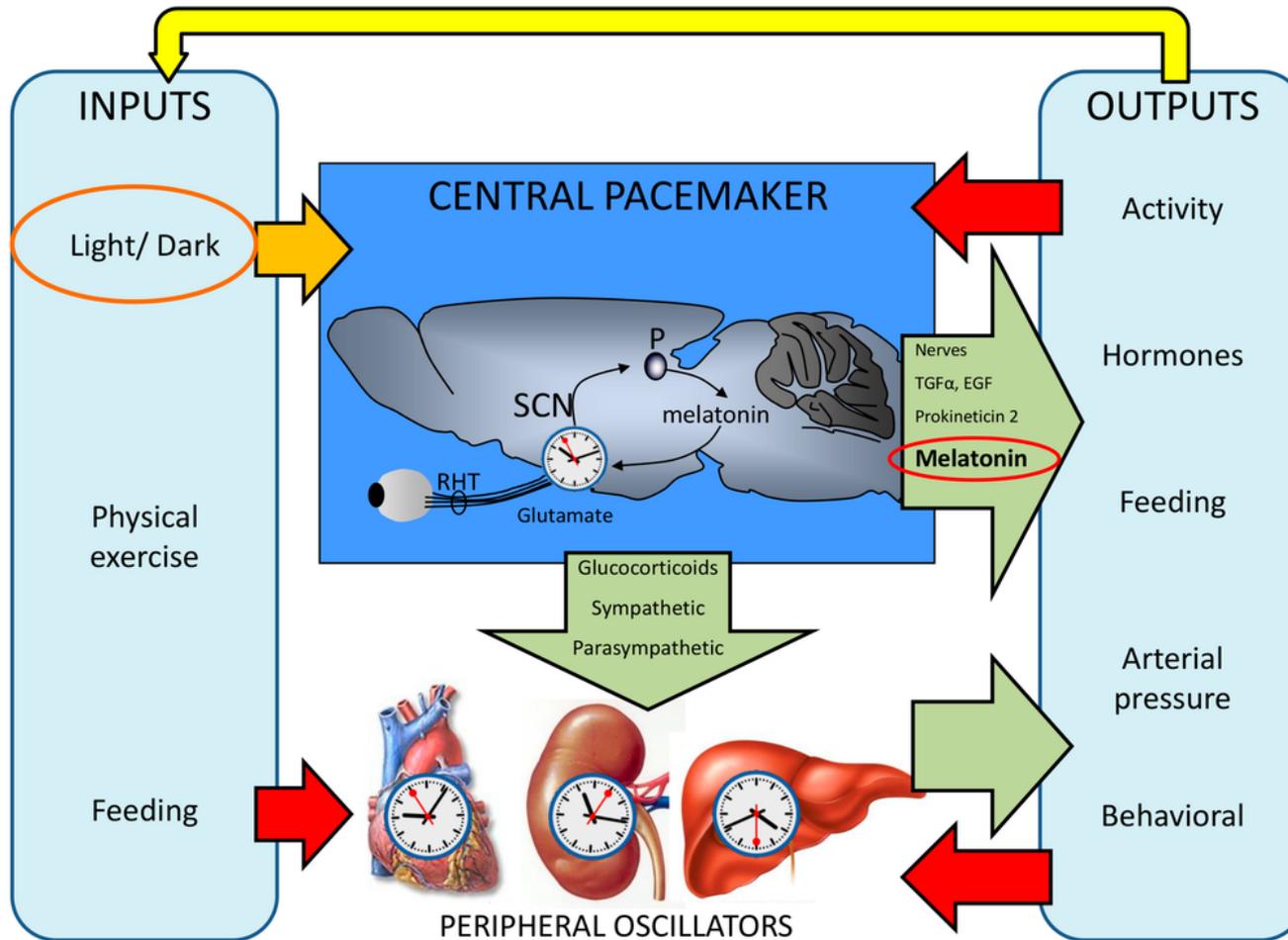
Tuning – end users like having their own control of the lighting

Summary:

- People like to control their lighting
- Tuning saves energy
- Control can come in different forms

Circadian System

Circa = About Dia = Day



Circadian Lighting



A Case for Circadian Lighting in Federal Buildings

It's 5 a.m. on a cold winter morning. The wind is howling, a few clouds are swirling overhead, and a day's old snow is covering the grass. Having just finished packing his lunch, Jimmy Smith grabs his work bag and walks to his car to begin his long, dark commute to work in the big city. Jimmy works in a federal building and will drive his car 20 minutes to a commuter station where he will then board a train that will take him the remaining 45 minutes into town. Once Jimmy arrives in the city, often before sunrise, his usual routine takes him to a local coffee shop where he orders a triple espresso, the first of three trips to the coffee shop he'll make that day. Jimmy next walks the three blocks to his office where he climbs four flights of stairs and walks down a narrow, dimly-lit hallway to his cubicle to start his day.



By 11:00 a.m., Jimmy is exhausted and has to get another caffeine jolt so he can remain alert to continue his workday. On most days, Jimmy will leave his cubicle to go home around 4:30 p.m. and will arrive back home around 6:00 p.m. During the winter, he rarely sees the sun as he leaves for work and returns from work when it is dark outside.

What is missing in Jimmy's daily routine? The presence of light! While this story may sound like the beginning of a fiction novel, it is the current reality of a lot of people working in office buildings. Health and lighting researchers, interior designers, building owners, even the federal government have started to invest more resources into studying the connections between light and the health of people working inside buildings. The nexus of light and health is a topic of conversation that is growing by the day, and it is something that anyone who works indoors should better understand. But let's start at the beginning.



Connection between light and health

Light has three basic functions, all of which have different pathways in the brain: the first is light for vision so a person can see, the second is light to convey information such as a traffic light indicating red to stop and green to go. The third function of light is to maintain the body's

GSA's Office of Federal High-Performance Green Buildings

U.S. General Services Administration working with the Lighting Research Center is currently actively doing research on if / how to best focus on circadian lighting

Circadian Lighting

GSA

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ABOUT US



Home > About Us > Organization > Office Of Government-wide Policy > Office Of Federal High-Performance Buildings > Projects And Research > Building Research > Circadian Lighting >

PROJECTS AND RESEARCH

Overview

Facility Management Institute

Building Research

> Circadian Lighting

Edith Green-Wendell Wyatt Federal Building

Federal Center South Building 1202

GSA Headquarters - 1800 F Street

NCR Regional Office Building

Wayne N. Aspinall Federal Building

Collaborative Construction Practices

EPA Demonstration Project

The Fort Carson Energy Research Project

Climate Adaptation Policy and Planning

GSA Carbon Footprint Tool

Green Roofs

Sustainable Facilities Tool

Circadian Light For Your Health

The use of daylighting in buildings has focused primarily on reducing energy consumption and providing pleasant interior environments. However, light, especially daylight, may be good for one's health through impacts on the body's circadian rhythms. Given that people spend a majority of their waking hours indoors at work, daylight- if appropriately engineered and supplemented by electric light when necessary - may have unrecognized health benefits for millions of federal employees.



What are Circadian Rhythms and Circadian Light?

A person's "body clock" is regulated by circadian rhythms, which are physiological processes that occur approximately every 24-hours.

These 24-hour rhythms have also been widely observed in plants, animals, fungi, and even bacteria.

An example of a circadian rhythm is a person's wake/sleep cycle. A function of light is to entrain the body's circadian system to the solar day so that the wake/sleep cycle is in synch with the natural light/dark cycle on Earth. Circadian stimulus is a function of the light stimulus entering the eye and the body's biological response to that light stimulus. It takes into account the total light spectrum, time of day, and the duration of light exposure. If a person's circadian functioning is entrained, a person sleeps well at night and is alert during the day. On the contrary, a person who does not receive adequate circadian stimulus will

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FOR MORE INFORMATION

- [A Case for Circadian Lighting in Federal Buildings \[PDF - 376.88 KB\]](#)
- [Lighting Research Center, Rensselaer Polytechnic Institute](#)

What We Have Learned So Far

- People receive more light at work than anywhere else
- The best time of day for circadian stimulus is in the morning for at least 30 minutes
- People seated near windows and on higher floors receive more circadian stimulus

Circadian Lighting



Challenges to circadian lighting systems:

- How to “track” / quantify the amount of light?
- Challenges to retrofitting buildings
- How to accurately design for it?
- Company monitoring your personal information?

Summary:

- Lighting is an input to your circadian system
- Other external elements affect the system
- Each person's system is different
- Research is very early
- Designing for circadian systems has challenges

Productivity

Productivity



Employers Brace for March Madness



CyberMonday Could Cost Almost \$450M in Lost Productivity



Will USA Soccer Beat Productivity?

CHICAGO, June 24, 2014 -- Millions of Americans could be watching the US soccer team take on Germany this Thursday in a match that will play a crucial role in deciding the team's fate in the World Cup. The problem is the big game will be played mid-day on Thursday, when many of those watching the broadcast or internet stream should be working. So, what can the nation's employers do to prepare for the potential collapse in productivity?

Probably nothing, according to one workplace expert.

"Employers may simply want to prepare for the fact that many workers could be taking an extended lunch on Thursday. Other employers will probably notice a significant drop off in internet speeds, as bandwidth is consumed by multi-tasking employees attempting to get work done while streaming the game at their desks," said John A. Challenger, chief executive officer of global outplacement and executive coaching firm Challenger, Gray & Christmas, Inc.

"On the bright side, employers can be thankful that soccer games are relatively short, compared to other sporting events, with most lasting just a couple of hours as opposed to football and baseball games that can last more than four hours," said Challenger.

In the past, World Cup soccer was not even on the radar for employers worried about productivity. However, the sport has rapidly grown in popularity in recent years. Nearly 16 million Americans tuned into America's match against Ghana, according to Nielson statistics. It is estimated that another 470,000 streamed the game to their computers, tablets and smartphones via WatchESPN.

Productivity

Bizarre Study Finds Pizza Motivates Employees More Than Cash Bonuses

Why money isn't all that great of a motivator. And why pizza is.



By Betsy Mikel *Owner, Aveck* @BetsyM



1 COMMENTS



CREDIT: Getty Images

Strapped-for-cash startup founders who need to motivate their teams to move mountains, listen up. Got \$30? Great. That's all you need to make your employees more productive. But don't hand out cold, hard cash. Instead, tell them you'll buy everyone pizza if they work hard.

A productivity experiment found that pizza was a fantastic motivator for increased

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[The Worst Thing You Can Say in a Job Interview, According to a Hiring Expert](#)

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[She Fired Microsoft Over YouTube \(Then Beats by Dre Came Knocking\)](#)

[7 Habits To Build Your Center Of Influence](#)



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HR NEWS

Too Hot! Too Cold! Temperature Affects Productivity

By SHRM Online staff
Jan 4, 2010



REUSE PERMISSIONS

When it comes to the workplace, if you can't stand the heat ... productivity suffers. That's the conclusion of a CareerBuilder survey of 4,285 full-time U.S. workers that found 22 percent claiming a too-hot workplace makes it difficult to concentrate at work. Eleven percent made the same claim about chilly workplaces.

"There are many factors that can affect workplace productivity," CareerBuilder's vice president of HR, Rosemary Haefner, said in a news release. Those factors include the workplace temperature as well as burnout and the economy, she added.

Other findings from the survey, conducted from Aug. 20, 2009, through Sept. 9, 2009, and released in December 2009:

- 27 percent of workers described their workplace as too hot; 19 percent said it is too cold; 54 percent said it is just right.
- 19 percent of workers suspect that their employer turned down the thermostat in 2009 to cut costs.

The survey results are the latest in a number of studies on workplace temperatures' effect on productivity.

Productivity

The screenshot shows the top of a website with the logo 'BUILDINGS SMARTER FACILITY MANAGEMENT'. A search bar is visible. Below the navigation menu (MEDIA | FM TOPICS | EVENTS | PRODUCTS | EDUCATION | RESOURCES), the main heading is 'Editor's Letter'. The article is dated '04/28/2017 | BY CHRIS OLSON' and titled 'The Paradoxes of Perception and Office Productivity'. It features a portrait of Chris Olson, Chief Content Director. Social media sharing icons are on the left. At the bottom, there is a 'RELATED COVERAGE' section with a link to 'Is the business case for healthy buildings turning a new corner?' and a small article preview for 'INTERIORS Five Trends Transforming the Office Space and the Impact on Your Buildings & More'.

Productivity = more output per unit of time

What metric are you using?

Employee satisfaction?

Employee performance?

Will the lighting help you code in Excel better or faster?

Will the lighting help you review more contracts per day?

Productivity or Effectiveness

Kamel Boulos and Berry International Journal of Health Geographics 2012, 11:25
<http://www.ij-healthgeographics.com/content/11/1/25>



INTERNATIONAL JOURNAL
OF HEALTH GEOGRAPHICS

REVIEW

Open Access

Real-time locating systems (RTLS) in healthcare: a condensed primer

Maged N Kamel Boulos^{1,2*} and Geoff Berry³

Abstract

Real-time locating systems (RTLS, also known as real-time location systems) have become an important component of many existing ubiquitous location aware systems. While GPS (global positioning system) has been quite successful as an outdoor real-time locating solution, it fails to repeat this success indoors. A number of RTLS technologies have been used to solve indoor tracking problems. The ability to accurately track the location of assets and individuals indoors has many applications in healthcare. This paper provides a condensed primer of RTLS in healthcare, briefly covering the many options and technologies that are involved, as well as the various possible applications of RTLS in healthcare facilities and their potential benefits, including capital expenditure reduction and workflow and patient throughput improvements. The key to a successful RTLS deployment lies in picking the right RTLS option(s) and solution(s) for the application(s) or problem(s) at hand. Where this application-technology match has not been carefully thought of, any technology will be doomed to failure or to achieving less than optimal results.

Keywords: Real-time locating systems, Indoor tracking, Assets and individuals tracking, Healthcare optimisation

State-of-the-art review

Real-time locating systems (RTLS, also known as real-time location systems) are local systems for the identification and tracking of the location of assets and/or persons in real or near-real-time. An RTLS consists of specialised fixed receivers or readers (location sensors) receiving wireless signals from small ID badges or tags attached to objects of interest and/or persons, to determine where the tagged entities are located within a building or some other confined indoor or outdoor space (Figure 1). Each tag transmits its own unique ID. The tag ID is logged against the asset or person to which/whom it is attached. The tags periodically transmit their ID, and depending on the technology chosen, the system locates the tags (and therefore the tagged entities) within a few rooms on one of several floors or to a specific room or part of a room on a specific floor. When staff members require portable assets, they

log onto the system at a workstation (or using a mobile device), identify where the closest available item is located, and go and get it.

RTLS location information typically does not include complete or continuous navigation details such as speed, direction, or spatial orientation of tracked assets and persons. Standards governing RTLS include ISO/IEC 24730 standards series, which describes a form of RTLS used by a subset of vendors, but does not cover the full range of RTLS technologies [2].

Emergency first response, healthcare and hospitals [3-6], care homes [7] and even everyday home life (as an assistive technology, where applicable) can all potentially benefit by using an appropriate RTLS solution.

RTLS components and technologies

In an RTLS, the location engine software communicates with tags and location sensors to determine the location of tagged entities. The location engine relays the information to specialised middleware and applications. The middleware in an RTLS acts as the "plumbing" between the core RTLS components (tags, location sensors and location engine software) and a range of software applications capable of displaying and exploiting the real-time

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²International Society for Photogrammetry and Remote Sensing, Commission M - Geodatabases and Digital Mapping, WG IV/4 - Virtual Globes and Context-Aware Visualization/Analysis, SPRS Headquarters (2008-2012), National Geomatics Centre of China, Beijing 100048, People's Republic of China

Full list of author information is available at the end of the article



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Nursing
Times



'Recognising sepsis early can prevent lives being destroyed'

JENNI MIDDLETON, EDITOR

HOME NEWS EVENTS CLINICAL ARCHIVE LEARNING UNITS AND PASSPORT STUDENTS OPINION JOBS SUBSCRIPTION OPTIONS

Nurses waste 'an hour a shift' finding equipment

10 FEBRUARY, 2009



COMMENT

MOST POPULAR MOST COMMENTED

More than one-third of nurses spend at least an hour finding items of equipment during an average hospital shift, according to a survey by Nursing Times.



Trust makes 12-hour shifts standard for most nursing staff



Trust doubles newly-qualified intake after paying NMC fee

Summary

Quick Facts: Registered Nurses

2016 Median Pay ?	\$68,450 per year \$32.91 per hour
Typical Entry-Level Education ?	Bachelor's degree
Work Experience in a Related Occupation ?	None
On-the-job Training ?	None
Number of Jobs, 2014 ?	2,751,000
Job Outlook, 2014-24 ?	16% (Much faster than average)
Employment Change, 2014-24 ?	439,300

Productivity or Effectiveness

Lighting is the most common and regularly arrayed item in the building.



Lighting serves as an easy power location for sensors which assist in effectiveness

Summary:

- Employee is most expensive form of “capital”
- Many, many, many elements effect productivity
- Define your metrics
- Color, shadows, and quantity of light are biggest factors for productivity
- New technologies allow for more effectiveness
- Lighting allows for the platform for productivity

Hakon Mattson

Anthem, Inc.



High Performing Buildings for High Performing People – Workplace Wellness

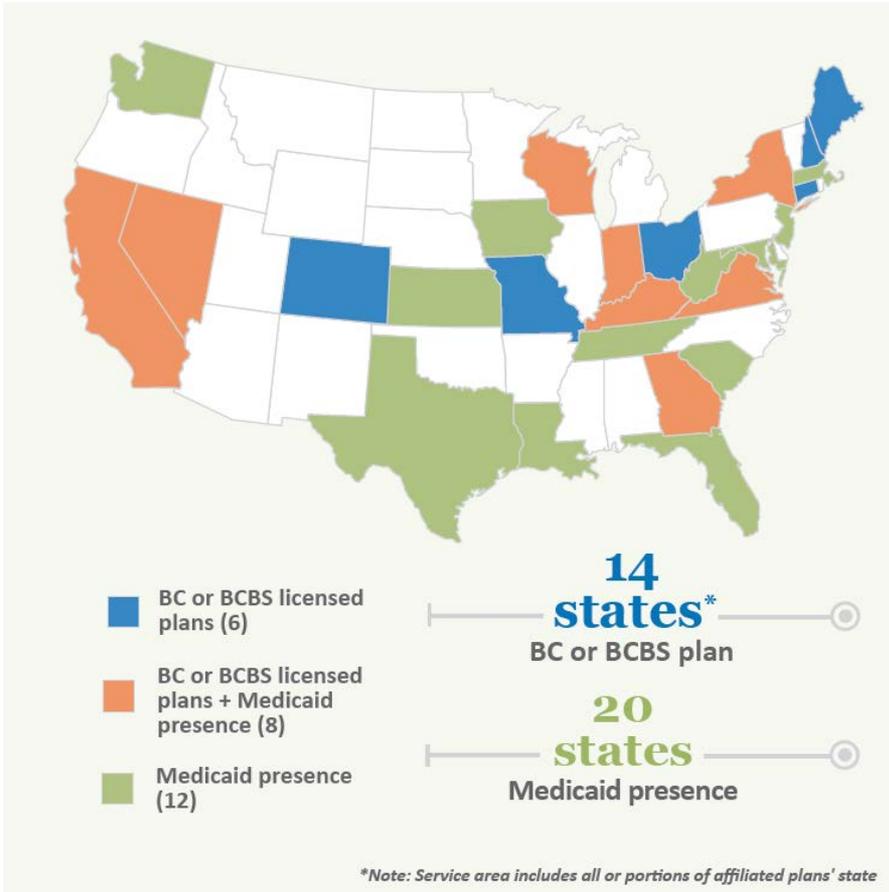
May 2017



About Anthem

Together we are transforming healthcare with trusted and caring solutions.

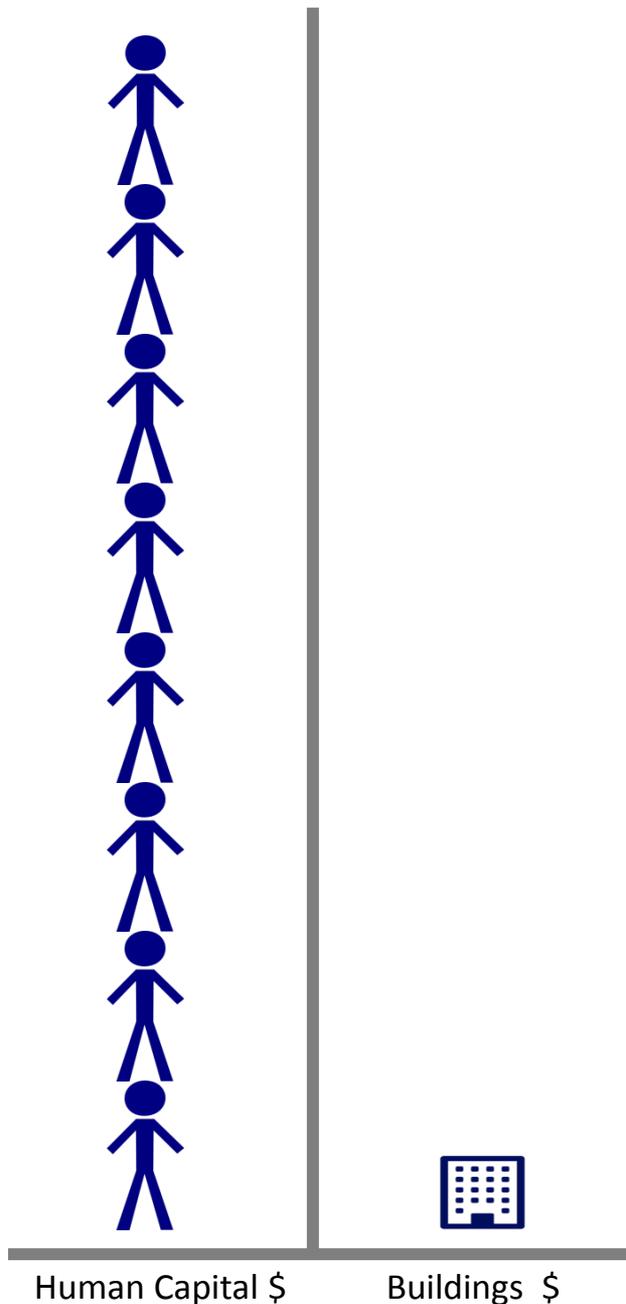
- Fortune 35 health benefits organization.
 - ~85B revenue, ~45B market cap
- Purpose includes promoting healthy lifestyles.
- Serving 1 in 8 Americans.
- 53,000 associates.



What is “workplace wellness”?

workplace wellness

- a health promotion activity or organization-wide policy designed to support healthy behaviors and improve health outcomes while at work. - *Centers for Disease Control and Prevention*



Why does advancing workplace wellness matter?

- Recruiting and retaining top talent - \$30k to \$45k per turnover¹.
- Productivity - \$550B/yr².
 - Millennials are the least engaged generation³.
- Presenteeism - \$1,100B/yr².
- Stress - \$300B/yr².
- Brand.

¹Society for Human Resource Management

²Milken Institute, UC Davis, EU-OSHA, Gallup

³Majority of U.S. Employees Not Engaged Despite Gains in 2014

Workplace wellness - past!

Health challenges

Onsite fitness facilities

Health fairs

Health risk assessments

Onsite immunizations

Wellness coaching

Workplace wellness - future!

Purpose & giving back

A best friend @ work

Creativity outlet

Work/life balance

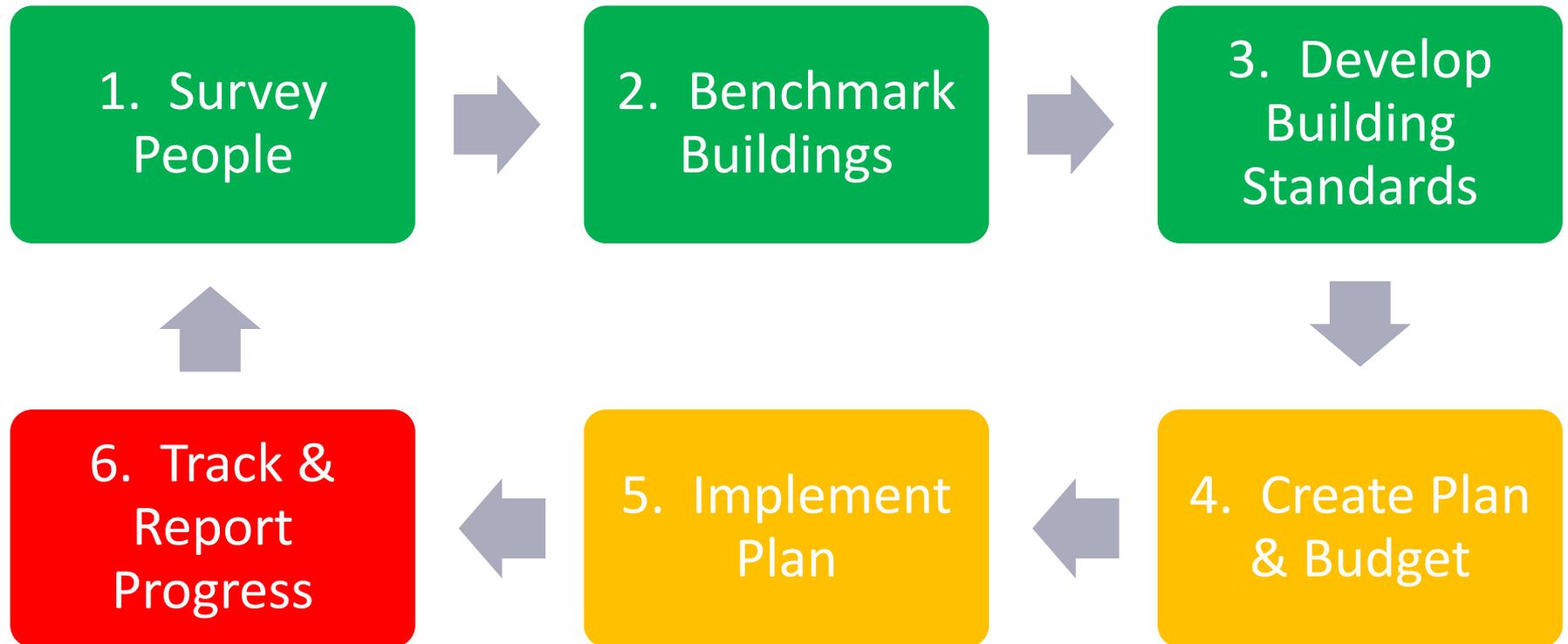
Fair pay

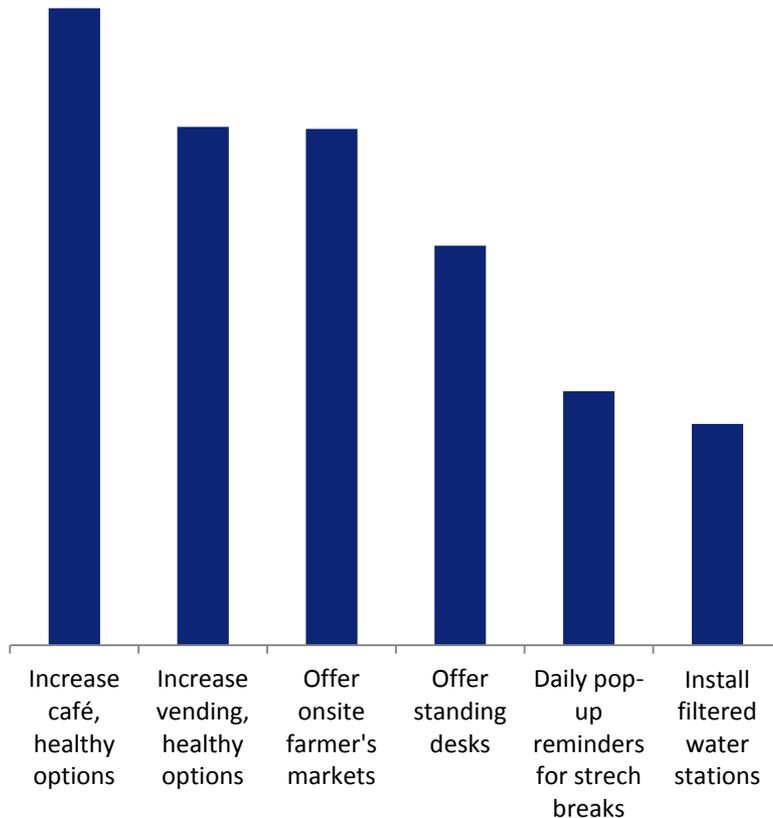
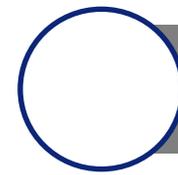
The built environment



**The built environment
as a destination to
improve wellness!**

Creating high performing buildings to promote wellness



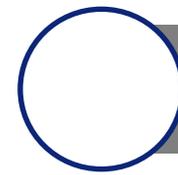


Current best practices:

- **The Anthem Healthy Workplace Soapbox Challenge.**
 - 348 ideas.
 - 3,527 votes.
- **Materiality Assessment.**

Future opportunities:

- **Utilization of occupant IEQ surveys.**



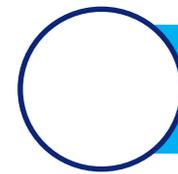
Current best practices:

- Preventative IEQ testing for all major locations.
- 3rd party healthy buildings scorecards & certifications.

Future opportunities:

- HR related metrics and correlations with the built environment:
 - Voluntary turnover
 - Productivity
 - Absenteeism

1. Location	✓	Location			
2. Building Access		1.1 - <u>Walk Score™</u> of 50 or above			
3. Outdoor Spaces		<table border="1"><tr><td>Yes</td><td>No</td><td>Not Applicable</td></tr></table>	Yes	No	Not Applicable
Yes	No	Not Applicable			
4. Entrances and Ground Floor		MORE INFORMATION			
5. Stairwells					
6. Indoor Environment		1.2 - <u>Walk Score™</u> of 70 or above			
7. Workspaces		<table border="1"><tr><td>Yes</td><td>No</td><td>Not Applicable</td></tr></table>	Yes	No	Not Applicable
Yes	No	Not Applicable			
8. Shared Spaces		MORE INFORMATION			
9. Water Supply					
10. Cafeterias and Prepared Food Retail		1.3 - <u>Walk Score™</u> of 90 or above			
11. Vending Machines and Snack Bars	✓	<table border="1"><tr><td>Yes</td><td>No</td><td>Not Applicable</td></tr></table>	Yes	No	Not Applicable
Yes	No	Not Applicable			
12. Emergency Procedures		MORE INFORMATION			



Current best practices:

- 3rd party certifications commitment.
- Demand ventilation with active CO2 monitoring.
- Green cleaning policy.

Future opportunities:

- More stringent 3rd party certifications.
- Utilize Health Product Declarations (HPD).

0	0	0	Materials and Resources	13
Y		Prereq	Storage and Collection of Recyclables	Required
Y		Prereq	Construction and Demolition Waste Management Planning	Required
		Credit	Building Life-Cycle Impact Reduction	5
		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
		Credit	Construction and Demolition Waste Management	2

0	0	0	Indoor Environmental Quality	16
Y		Prereq	Minimum Indoor Air Quality Performance	Required
Y		Prereq	Environmental Tobacco Smoke Control	Required
		Credit	Enhanced Indoor Air Quality Strategies	2
		Credit	Low-Emitting Materials	3
		Credit	Construction Indoor Air Quality Management Plan	1
		Credit	Indoor Air Quality Assessment	2
		Credit	Thermal Comfort	1
		Credit	Interior Lighting	2

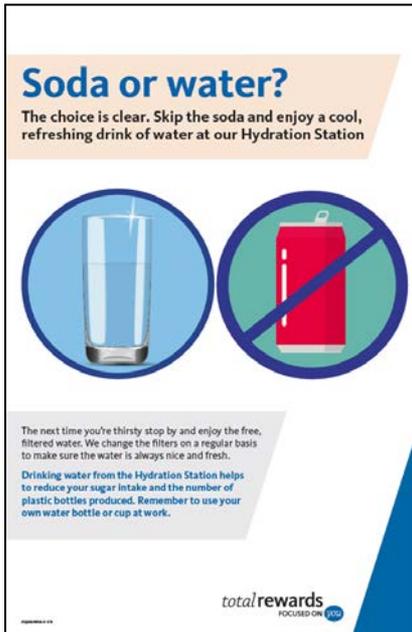


Current best practices:

- Interior fitness circulation.
- Onsite fitness centers.
- Open stairs.

Future opportunities:

- Expansion of sit/stand desks.
- Incorporating walk scores into lease decisions.



Current best practices:

- Filtered bottle fillers.
- Healthy foods contract – HR partnership.
- Mini farmer’s markets.

Future opportunities:

- Healthy catering mandate.
- Limit single serve items to < 50g sugar.

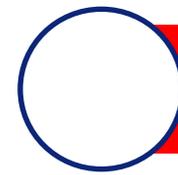


Current best practices:

- Right to light.
- Sound masking and phone rooms.
- Ergonomics assessments.

Future opportunities:

- Circadian lighting design standards.
- Additional use of under floor air delivery systems.



Current best practices:

- Look/feel & purpose driven branding.
- Collaboration zones.
- Mothers and quiet rooms.

Future opportunities:

- Onsite wellness libraries.
- Biophilia standards.

Thank You

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