

# Paladino<sup>•••</sup>

## Wellness in the Built Environment

Make a data-informed business case for wellness in commercial projects



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# Introduction

Quantifying wellness



Leading twenty first century architects, developers, and building owners are finding firm ground at the intersection of business, environment, and design.

Technology is driving a bias in business systems and organizational design towards an educated, purpose-driven workforce.

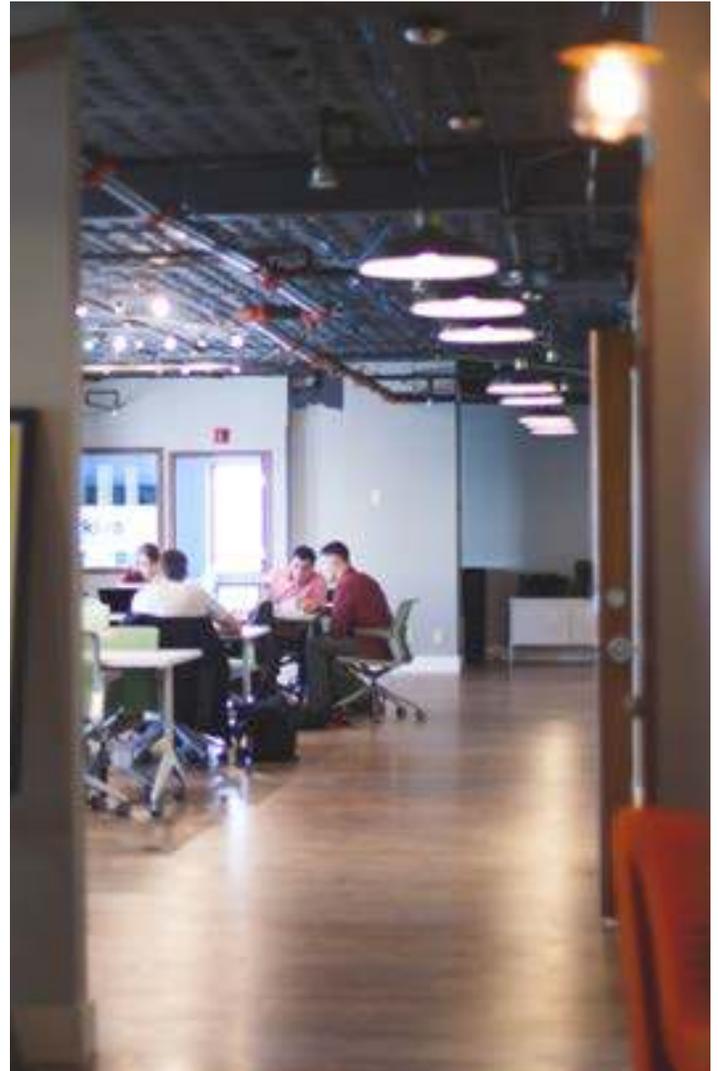
Issues like climate change, human health, and resiliency are resetting business system anchors. And design is dramatically changing what an office looks like.

Creating a destination employment experience at this intersection is one sure way to outperform peers.

The concepts are simple.

The question is: how to do it?

We've outlined a three-part roadmap that shares the lessons we have learned in this exciting and dynamic sector of the healthy real estate space. It addresses the business landscape, the environment landscape, and the design landscape; and then presents a repeatable methodology to bring the best science into your design and decision-making.



***Wellness has direct business benefits that the building design can support in spades.***



# Today's Landscape

The intersection of business, design, and environment

## Business Perspective

Knowledge-based and technology companies are the leading-edge of business expansion in the 21st century. And these companies are in a talent war for digital natives and workers that bring a new and unique demand to the work place – they want to experience purpose in their work.

These workers are well connected through the digital economy, and understand the magnitude of challenges like climate change, physical and emotional wellbeing, and social equity.

More than ever, wellness and human performance are top-of-mind for real estate owners, operators, developers, and architects when considering design and operations decisions. They are embracing the financial return on investment (ROI) on wellness-centered building design because wellness design features don't just feel good – they pay back. They pay back in terms of engagement, productivity, recruiting effort, and innovation.

In 2015, Glassdoor published a report examining the financial performance of companies named on their “Best Places to Work” list, examining whether companies with high employee satisfaction are also high-performing companies as measured by stock.

The research found that these companies outperformed the S&P 500 by a significant margin, among constructed investment portfolios. An investment into the Glassdoor-constructed portfolios of “best place to work” companies in 2009 would follow the green and blue lines, outperforming the baseline average of the S&P 500.

Companies that address wellness and human performance benefit from actual returns that give them an edge with investors. Not to mention the edge that these companies experience in the war for talent among professional industries.

As Glassdoor's study notes, this type of research suggests “an important economic link between company intangibles, such as employee satisfaction, and broader financial performance among large publicly held companies.”





# Today's Landscape

The intersection of business, design, and environment

## Environmental Perspective

This improved business performance is logical given the plethora of research linking key wellness design strategies to human performance and productivity gains. While this emphasis on the value of the human connection to nature is influencing architecture, there is lingering confusion about how to define wellness and how to talk about it regarding real estate design and operations.

How does wellness shift from an idea to implementation? How do architecture teams leverage wellness to design buildings that create tangible business value for owners and developers?

Start with what we know:

- People spend more than 93% of their time indoors. (source)
- Mainstream trends support the positive benefits of spending more time outside and unplugged. (source)
- Research shows that a connection to nature supports brainpower and cognitive function. (source)

Focusing on wellness design in the workplace supports employee engagement. Wellness design strategies are rooted in supporting people's health and happiness. And when people are happy and healthy, they are engaged.

Employee engagement is also a key measurement of ranking the best places to work. Research shows that companies that invest in their people and the workspaces for their people outperform the rest of the market from a financial valuation standpoint.

Researchers from the Finnish Forest Research Institute measured people's well-being in three different environments: urban streetscapes; busy city parks; and wilder forests. The team found that people began to feel psychologically restored after just 15 minutes of sitting outside in the park and the forest, and these feelings increased after a short walk.

And a study by researchers at the University of Illinois and the University of Hong Kong found that even looking at pictures of trees can significantly reduce stress among participants. Their study went on to document that the more trees there were in the picture, the less stressed the participants felt.

## Design Perspective

Nature is multisensory, and so should be the spaces we design. We can do this by using intentional design features to give people something to touch, smell, hear, and see. These types of strategies to reconnect our biological selves with the built environment.



# Today's Landscape

The intersection of business, design, and environment

## Research links human performance to nature

While the interest in healthier building designs and work spaces may be gaining renewed interest, the research is well established. Human performance has been studied deeply by reputable organizations and academic institutions for decades. That's why one of the first challenges that real estate designers face is navigating the figurative avalanche of available research.

The abundance of research has become part of the problem. There is more information than any one project team could need, and identifying which studies most closely relate to a design decision can seem like searching for a needle in a haystack.

Every designer, developer, building owner, executive, or human resources leader will need a different data set based on what is most relevant to their role. The project team's values need to sync with the chosen study's metrics, or the data won't serve the team or the project.

Further, some of the best research can compete or conflict, adding to the confusion. How is a project design team expected to navigate this overwhelming body of research and apply it effectively to their project?

**Nature begets precedent.** One key insight to designing for wellness is to recall the connection

to nature. If nature can drive human performance, then it should also drive the design of the building that people work in.

Climate responsive design in turn requires familiarity with the attributes of the local climate type. We frequently find value in the globally-based Koppen climate system.

Koppen climate zones are organized the experiential pattern of the weather, soils, and vegetation, rather than by latitude. Wet or dry, sunny or overcast, colder or warmer patterns are used to define climate at any location.

By using a system like Koppen, a host of 'sister cities' can be examined for precedent design. While the languages and cultures may be different, human response to climate is universal.

Thus, an architect in Seattle (climate zone Csb, or Mediterranean climate) can look to other Csb cities like Santiago, Chile; Ankara, Turkey, and Cape Town, South Africa for architectural inspiration.

Using this approach, the kit of parts for a climate zone becomes apparent through inspection. High north facing windows, top lighting, thermally neutral perimeter, heat recovery on ventilation, and occupant controls are being deployed in every Csb region. The designer can easily build upon the shoulders of others who have gone before.

# The upshot

Outcomes through insights



The intersection of business, environment, and design offers tantalizing business value when owners unlock it. Understanding the cumulative and relevant impact of the research data requires significant effort. And this knowledge must be translated to design features that can be refined, priced, and built.

This is the problem that Paladino has set out to solve.

Paladino and Company has collected the most respected and applicable human performance studies and conducted supplemental research to develop a platform that can be used to support and validate wellness design concepts.

We have tracked the studied influences and impacts to marry the right study to the design issue being solved, and have accumulated the information into a data set that can be applied to each owner's business values and priorities. The solution is called Upshot™.

***Unlock business value***

***Use research to support  
and validate wellness  
concepts***

# The upshot

Outcomes through insights



Upshot combines project-specific data, owner values, and third-party research on a customized dashboard with a simple visualization. Upshot is customized for each project so the goals and studies being considered are tailored to the task at hand. The process is transparent and collaborative, giving each interdisciplinary member of the integrated

team the opportunity to accept or challenge an assumption based on the data. The integrated team tracks ideas and inputs; and then, uses the impact documented in the applicable research to assess ROI of design concepts and combinations. All the evaluated features align the analysis to the client biases so that the right data is used for the project in the right way.

The third-party research is in the background and provides the data, including attributes like air quality, visual acuity, energy, water, and financial impacts. Only the studies that are applicable to the project and owner's business are included, and the irrelevant studies are filed away.



# The upshot

Outcomes through insights



Translating the various and sometimes conflicting research into a lightweight solution helps clients identify ways to make their buildings and the people in them more economically productive through techniques including wellness design. Upshot also helps the integrated team to focus on the owner's goals during the value engineering process so that the features that drive wellness and human performance aren't eliminated because they were considered exclusively in the context of first-costs.

This approach helps integrated design teams to show how a kit of parts can drive human performance; and how research and data are used to validate the design strategy to the owner. By using research in an organized and systematic way, linked to design strategies and human outcomes, teams can consider hard data about employee contributions to an owner's business in financial terms, instead of qualitative ideas about happiness or retention.



***All the evaluated features align the analysis to the client biases so that the right data is used for the project in the right way.***



# Turning Research

into design

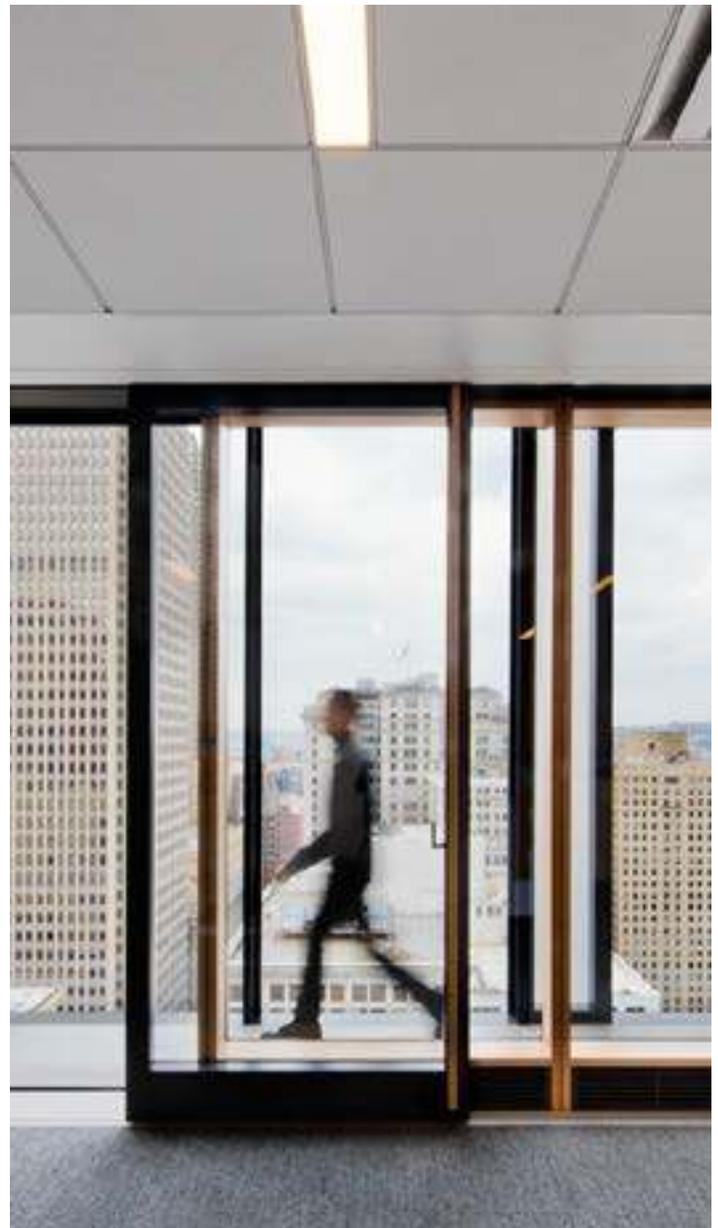
## How does wellness go from an idea to implementation?

Rather than making soft promises, use building science and reputable third-party studies to quantify the impact of these design features down to dollars and cents – That’s the value proposition that wellness offers.

Let’s look at two real-world examples that address light and air. In terms of wellness, there are a range of additional factors and relevant studies that link to them such as active design, biophilic design, and programming, so these examples are representative, but not exhaustive.

More than ever, wellness and human performance are top-of-mind for real estate industry experts when considering design and operations decisions. They are embracing the financial return on investment (ROI) on wellness-centered building design because wellness design features don’t just feel good – they pay back. They pay back in terms of engagement, productivity, recruiting effort, and innovation.

The research about light and air tells us there are several key lighting strategies that drive human performance and business returns.





# Turning Research

into design

## Daily interactions with light

Researchers at the Interdepartmental Neuroscience program at Northwestern University in Chicago reported that the detrimental impact of working in a windowless environment is a universal phenomenon. Compared to workers in offices without windows, those with windows in the workplace received 173 percent more white light exposure during work hours and slept an average of 46 minutes more per night. (source).

When natural light isn't an option, the kind of artificial lighting that is used can make a difference. Breanne Hawes and colleagues from the Cognitive Science Team at the United States Army Natick Soldier Research Development and Engineering Center and Tufts University compared the effects of different types of light on mood, perception, and cognition in military personnel. The researchers found evidence that LED lights provide a cognitive advantage over fluorescent lights, potentially leading to a better mood and higher workplace efficiency. (source)

Specifically, participant study groups were exposed to varying light types and color temperatures and tested on verbal and spatial memory tasks, while also self-reporting on their mood. The higher the color temperature (with the LEDs), the more efficiently the participants completed the memory tasks, and the most positive moods reported. This study suggests that using cooler LED lights could positively impact moods and work efficiency.

## How we applied the research to a design

PNC Financial Services is headquartered at The Tower at PNC Plaza in Pittsburgh, Pennsylvania. The Tower Opened in 2015 and has been widely recognized as the greenest high rise in the world and the greenest building in North America.

PNC's leadership team understood that daylight was good for their employees, but prior to engaging Paladino, no one had provided PNC with specifics explaining how daylight relates to the business – nor the impact of key design decisions about lighting. They didn't have the data necessary to understand that the right design decision could capture millions in added employee productivity each year compared to a conventional design. Paladino used Upshot to quantify what the total cost of ownership and return on investment would be for various daylight schemes. Our evaluation of available data combined with the design concepts unearthed a solution that could return \$25 Million per year in added employee productivity compared to a typical lighting design scheme.

The equation was simple: The total number of employees was multiplied by company-average salary and a human capital ROI metric to determine the amount of revenue produced by the building each year.

From this, Paladino calculated that PNC could expect to generate a top line of \$600 million



# Turning Research

into design

annually from the employees based in their company headquarters.

Next, Paladino reviewed the current research on daylighting and its effects on human productivity. The research was narrowed to the six most relevant studies for this owner and their business model. The studies showed a range of productivity gains, so Paladino used an average from studies of 5.54%. This metric was then applied to the revenue potential to predict the productivity increase in dollars.

But everyone doesn't sit in a daylit space all the time, all year. And the research indicated that productivity differed based on the type of work is being performed – lighting impacts headsdown task production differently than it impacts group collaboration. So we applied two knock-downs in the prediction to account for the affected population, the time in the space, and how people worked:

1. How much the benefit presents itself for how much of the year, across the floorplate.
2. How people work in the space, and how much time is spent on focused independent activity compared to unfocused or collaboration time.

Considering these factors and applying the optimum lighting solution, the prediction was a 4.2% productivity increase for the building, equaling an estimated annual revenue increase of \$25 Million/year.

Instead of telling the PNC executive sponsors that employees are happier and will work more efficiently in a well-lit space, we were able to present them with the financial business impact that better lighting could offer. Based on the research and the details presented in the Upshot dashboard, the PNC executive sponsors could credibly anticipate that a resultant investment in a design kit of parts to facilitate a robust daylight strategy could create \$25 Million in added value each year.

***Ultimately the design kit of parts included a double skin façade with automatic shades that move vertically and horizontally according to the sun's position on the building, perforated to maintain light penetration and views while preventing glare. The interior lighting included advanced LED with controls.***



# Turning Research

into design

## Let's talk about air

Air quality has a massive impact on cognitive function. Cognitive function encompasses mental agility and memory, and the ability to think, learn, and output either logically or creatively.

A fascinating Harvard study by researchers from Harvard's Center for Health and the Global Environment on how green buildings affect health and cognitive function compared three types of interior office environments:

1. Typical code building
2. Green building
3. Enhanced green building (defined by the lowest levels of VOC (50  $\mu\text{g}/\text{m}^3$ ) and the highest levels of OA per person (40 cfm).

Harvard scientists tested occupants across key cognitive function domains: crisis response, strategic thinking, decision-making, and focused activity.

The study found that the cognitive scores were a whopping 101% better in the regular green building conditions. People responded to emergencies faster, made decisions quicker, and test results showed better results on strategic thinking exercises.

Other studies also validate the importance of air quality such as fewer sick days and better cognitive performance.

Therefore, any design concept that is targeting human performance must consider, model, validate, and prove that its design options address air quality to be credible.

In the case of one Paladino client, a corporation was relocating its headquarters campus to an existing building with deep floor plates, high ceilings, and large non-operable windows bays. An open workspace plan was anticipated, and the goal was to bring in as much clean fresh air as possible to enhance the human experience, wellness, and productivity of the employees - and therefore support business returns. The project team analyzed the best ways to integrate increased ventilation into the space including operable windows, a mechanical system, or a combination of the two.

Paladino worked with the design team to optimize the interior program and the building envelope, using Upshot and third-party research to provide analytics and technical support to the approach.

Using this data and research, the owner was able to evaluate the three options developed and consider the designs in the context of long-term business performance.

To link the appropriate kit of parts for this design solution to the research and the owner's business goal, six key building features were considered:

# Turning Research

into design

1. Opacity blinds for occupancy control, glare reduction, maintaining light, and view
2. Louvers to bring light deeper into the space
3. Automated windows to optimize air flow and reduce energy consumption
4. Non-automated awning windows, which are intuitive and appropriate for the local climate
5. Fans to increase occupant comfort
6. Controls that empower people to control their space, and reduce energy consumption

The building features were organized into a range of design schemes from a Basic to Optimized. The owner was able to make informed business decisions by using Upshot to explore the range, including first-costs and employee performance.

The optimized scheme presented to the owner included:

- Daylight louvers on the upper windows, which allows light and air to pass through, while preventing glare.
- An automatic upper window which opens completely, dramatically improving the amount of air that can be brought in.
- The automated windows are integrated with the Mechanical design, saving energy and improving air quality.
- The occupant-controlled bottom operable windows are accessible below the blinds to give the occupant options for additional air flow.

- Ceiling fans increase employee comfort by creating air movement and supporting heating and cooling of the space.
- A 'Good Day' indicator light drives the sequence of operations of this integrated design.

We tested each scheme against business-as-usual (code building) to determine payback to the owner.

The initial investment of the Optimized scheme was estimated to pay back in fewer than 2 years, to produce \$3.5M/yr in added revenue over the Basic scheme; and result in a Net Present Value of \$90M over 20 years. This ROI model, built on the design kit of parts and research, included returns from human performance improvements only, and did not include added returns anticipated with energy savings.



These findings are specific to this project. The same model can be used to assess another project, but different inputs and outputs should be expected.

# Conclusion

Link to designs to owner values



Building design holds the intersection of business, design, and environment. It's time to talk about human performance in hard metrics that businesses understand, and every project team should understand the client/owner's views on both wellness and business goals before beginning any design.

Some clients think about wellness in terms of productivity – the more their employees can positively contribute to financial growth, the better. Other clients view wellness decisions in the context of a talent war, so they value talent attraction and employee satisfaction.

Understanding the owner's values helps the architect, owner's representative, and developer to impact the owner's business and to present the concepts that matter most.

And whether the owner values talent attraction, productivity, or reduced sick days, all businesses care about people, because they know that people are their biggest investment.

So don't make another soft promise that people will feel better in a space with lots of light, air, and low-toxin materials. Instead, use research and building science to translate design strategies into a language that clients can understand, and businesses can benefit from.



# Learn More:

## About Paladino and Company

With offices in Seattle, Austin, and Washington DC, Paladino and Company is a green building consulting firm that operates at the intersection of business, design, and sustainability. This is achieved through rigorous analysis and abundance thinking as a driving force for change.

We help organizations to improve the design and operations of their buildings to minimize costs, increase profitability, and enhance employee satisfaction by operating under a three-part framework:

- Abundance drives us to identify resources that are readily at hand, and to employ them to the best possible effect.
- Attitude: Our team has the experience and instincts to create change, bring people into the journey, and challenge conventional thinking.
- Analytic rigor that delivers an industry-leading program of exemplary quality by raising the bar, in an implementable and cost effective manner.

With more than 2,000 green projects internationally, including more than 745 LEED certified buildings and WELL and Fitwel certified projects, Paladino serves architects, developers, and owners in industries including commercial real estate, higher education, hospitality, industrial, multifamily, and mixed-use.

Contact us to make a difference in your business, buildings, and people through your real estate.

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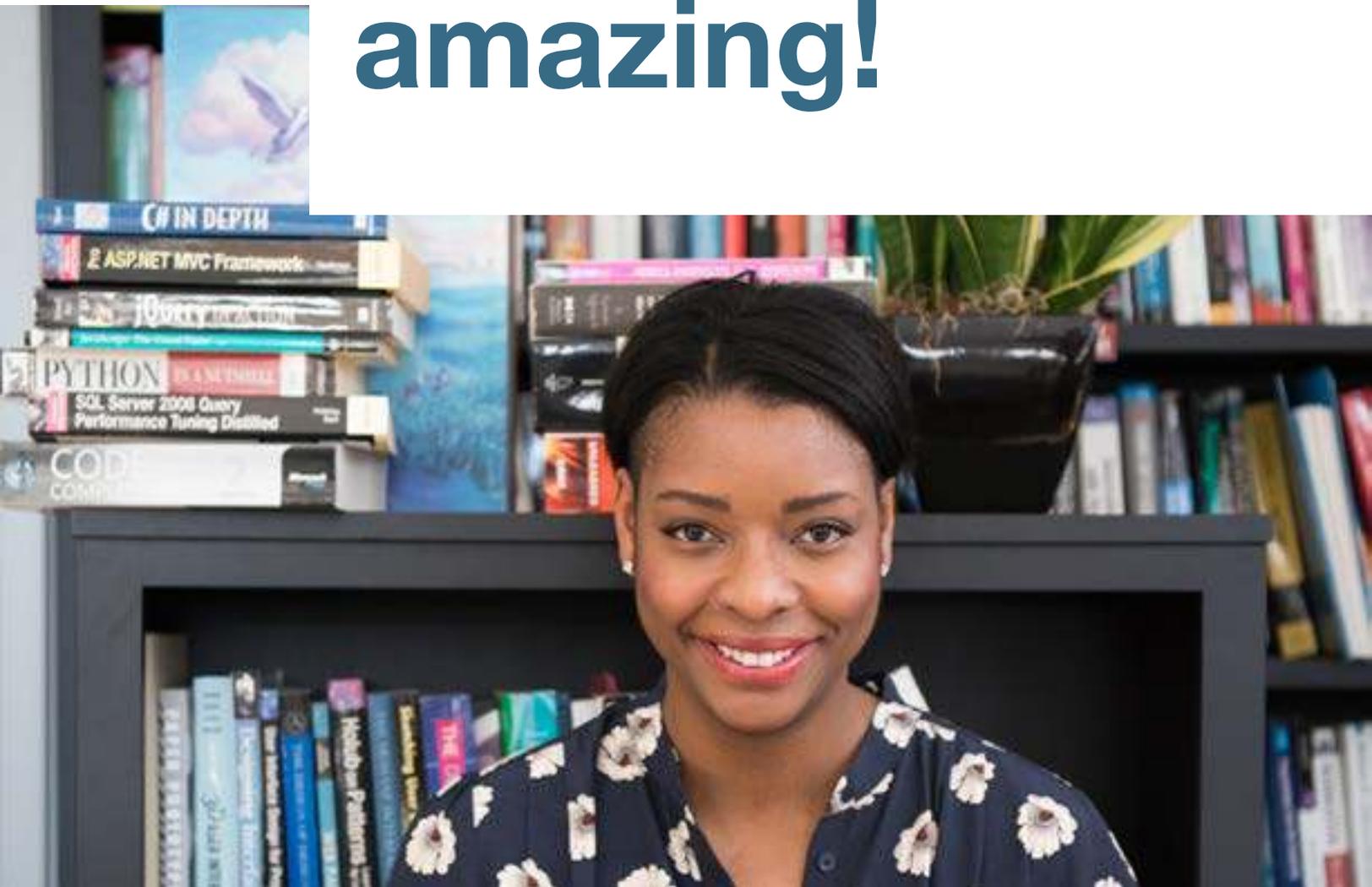
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# Paladino<sup>❖</sup>

**Do something  
amazing!**





# Today's Landscape

The intersection of business, design, and environment

**Biophilia is a term that literally means love of nature. Stephen Kellert wrote that biophilia is “a complex of weak genetic tendencies to value nature that are instrumental in human physical, material, emotional, intellectual, and moral wellbeing. Because biophilia is rooted in human biology and evolution, it presents an argument for conserving nature based on long-term self-interest.”**

Thankfully architects, owners, and developers are getting wise to the power of nature. Architects that create new interactions between people and nature can achieve the “happiness effect” that spending time in the natural world provides.

Learn more about biophilic design [here](#).



# Better Decisions

With Third-Party Certification



# Project

Showcase

Here are examples of projects that used sustainability and third-party certifications in the master plan to achieve heightened results.



# THE TOWER AT PNC PLAZA PITTSBURGH, PA

Core and Shell Fitout

Integrated Design  
Management  
LEED Management  
Energy Modeling



The Tower at PNC Plaza is the LEED Platinum certified commercial office headquarters for The PNC Financial Services Group. Built to reflect PNC's leadership in green building, energy efficiency, and commitment to innovation, the approximately 800,000 square foot tower began construction in spring 2012 and opened in fall 2015.

Designed to be the greenest office tower in the world, the building went beyond standard certification by adding unprecedented sustainable innovations and technologies.

Paladino served as strategic green building advisor, creating an IMO to guide the owner and team through a sustainability design process embedded throughout design and construction.

Paladino developed sustainability performance criteria organized around three pillars that reflect PNC's values: Community Builder; Workplace Innovator; and Energy Responder.

Paladino managed the integrated design process to identify key performance indicators for each pillar, develop sustainability approaches, and articulate

design criteria. This interactive process of setting goals, establishing criteria, and then validating the building's performance through concrete indicators created a dynamic relationship between the building, the occupants, and the community.

Paladino assisted PNC with RFP development and bid reviews, provided technical analysis and peer review of design team analyses, and managed the Tower's application for LEED Platinum certification.

# IWBI WELL AAP National - US

LEED ND

Highly curated

Experiential sustainability

Place making

When architects contact IWBI about alternative path credits for WELL certification projects, their calls go to Paladino. We are contracted as the tech support for IWBI to help architects get their projects certified.

The IWBI needed to expand the reach and services for the WELL Building Standard, which includes rapidly scaling up its technical support for WELL APs and firms pursuing WELL certifications.

The organization was out of capacity to handle its Alternative Adherence Paths (AAP) and International Equivalence questions that were incoming from registrants.

Paladino was engaged to rapidly build a team of AAP reviewers and technical experts to field the registrants questions.

In addition to Paladino's considerable qualifications in LEED, the firm was chosen because of its early and potent experience with WELL certifications and its team of WELL APs, including the first in the nation.

While LEED and WELL

have similar organizational structures, the spirit of the WELL certification is distinct from that of the LEED certification, and as reviewers, Paladino needed to navigate seamlessly between the two systems.

Thanks to Paladino's services, the IWBI has been able to stabilize its AAP and IE market expansion; and the in-the-field registrants are recognizing top-of-class customer service with excellent technical accuracy and recommendations.

# EXPEDIA CAMPUS SEATTLE, WA

LEED NC  
Salmon Safe  
WELL

Cognitive function

Flexibility & Collaboration

Learn and Test culture



The HQ project includes the conversion and expansion of an existing office campus on 40 acres of waterfront property.

The conversion transforms a former bio-medical facility into more than 800,000 sf of collaborative office space; and the addition contributes 200,000 sf of executive space.

This project vision is an investment in people. It is a campus tailored to Expedia, set in a landscape unique to Seattle and the tech world. The HQ is a platform to stand on as Expedia transforms the travel industry.

The values are based on core tenets: Staff harness a passion for travel through a test-and-learn culture, driven by cognitive function, curiosity, and delight; with a program optimized for flexibility and collaboration.

The entry emulates a forest, incorporating native plant and tree species. Employees and visitors see a sculptural landform that sweeps into a flowing water feature, and are greeted by panoramic views of the Puget Sound just beyond the terraced Great Lawn, which is large enough to host a full-scale soccer match. Adjacent to the Great Lawn is a pebble and dune landscape that mimics the

native shoreline typology that once skirted the waterfront campus. Spaces scale from intimate flowering courtyards to a vegetated amphitheater large enough to host the entire Expedia team.

The validation strategy reflects the project complexity. Salmon Safe aligns with an upland project location and the owner's commitment to impact reduction. LEED NC was selected for the vertical development to align to industry practice. Selected aspects of the WELL standard were adopted to align with Expedia's human performance goals across its diverse workforce.