

Nature at Work

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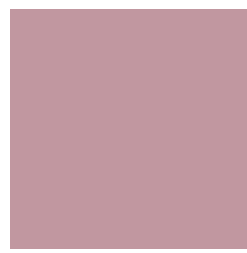
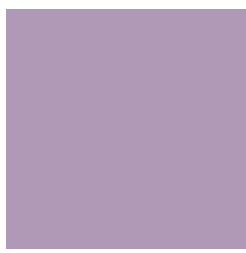
Do you enjoy where you work?

What could make it better?

Do you enjoy how you work?

What could make you more productive?

The creative mind is a delicate, valuable thing.
It is not a computer, and the creative is not a machine.
She is a living organism, and thrives when she is connected to
her community, nature, and in a state of balance in work, rest
and play.

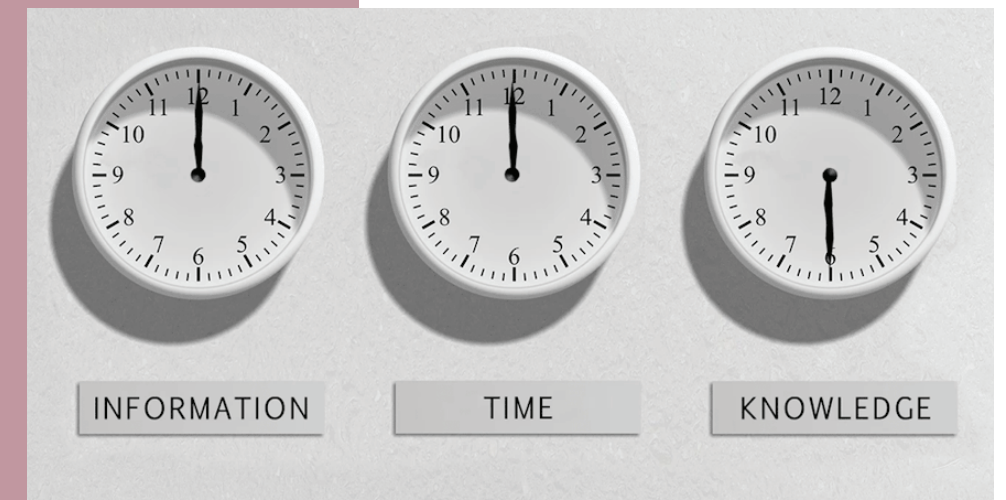


This project will pose three questions to help the creative live and work more sustainably:

1. What if we changed our work schedule to fit our modes of thinking?
2. What does a designer's lifecycle tell us?
3. What if our work spaces evolved along with us?

Living and working sustainably helps the creative mind remain energized, productive, efficient, flexible and connected. Some of the more mechanistic ways of working, thinking and connecting currently in practice have become obsolete and are no longer serving our species, or other species.

Creative professionals also suffer a high risk of career dissatisfaction, stress, burnout, and frustration. In addition to these issues, creatives also find it difficult to stay relevant and compete with younger colleagues. The very systems that propel creatives in their pursuits can be the cause of early professional death if not reevaluated frequently. It may prove valuable if creatives use the same tools for design evaluation to evaluate their own living and working processes.





Overall Problem Statement:

Our current work day structure and flow is not well suited for the creative mind.

Stakeholders:

The problem impacts the design community, the general public who use our products, and anyone who is involved in our design projects.

Key Issues:

Our key issues include mental and physical energy, managing stress and emotions, work/life balance, and getting adequate exercise and sleep.

Key Design Drivers:

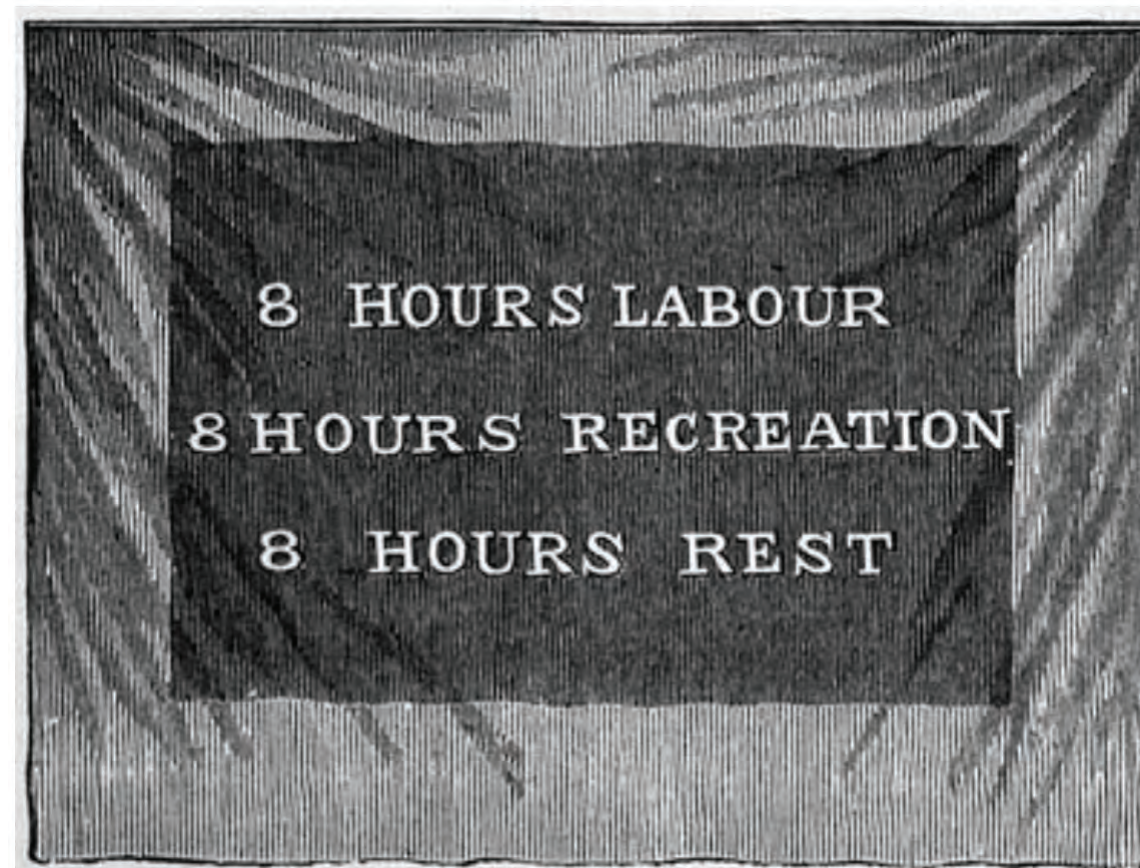
For the most part our process is based on an outdated model and an over-use of technology and electronic devices. We are constantly thinking about the future, and we find it difficult to focus on one task at a time, for the amount of time required to complete the task.

Key Design Objectives:

In redesigning our work day, we evaluate our motivation for working and ways to regenerate a process that uses a lot of human and ecological resources.

"The larger the monetary reward,
the poorer the performance. –
money doesn't motivate us, at all,
instead emotions do."

Dan Pink



Our current 8-hour work day was found by Ford factories to be more efficient and productive than the former 10- to 16-hour work day. While this model made sense for factories, assembly lines and general labor during the industrial revolution, this type of work requires a primarily physical set of tasks.

This model does not necessarily make sense for those in creative professions like design, engineering and the arts. As Pink points out, if the work is purely mechanical, bonuses increase productivity. However, when cognitive skills were required, larger rewards lead to poorer performance.



"They're always where they are. And that to me is the essence of wisdom really. To be where you are and to allow action to arise out of that being. That's the natural world."
Boyd Varty



Nature is efficient and balanced. The lion does not think about his efficiency when he is resting, nor does he think about resting when he is being efficient. To take a cue from nature, humans need to be fully present in the activity or state they are in, when they are in it.

In addition to being present, we must also minimize distractions and emphasize focus by avoiding multi-tasking.



Other cues we can take from nature include being balanced, giving and taking, creating zero waste, remaining connected to all forms of life, and getting adequate rest.



3 FACTORS LEAD TO BETTER
PERFORMANCE & PERSONAL
SATISFACTION...

AUTONOMY
MASTERY
PURPOSE



Image: RSA Animate

Autonomy: Our desire to direct our own lives. In short: "You probably want to do something interesting, let me get out of your way!"

Mastery: Our urge to get better at stuff.

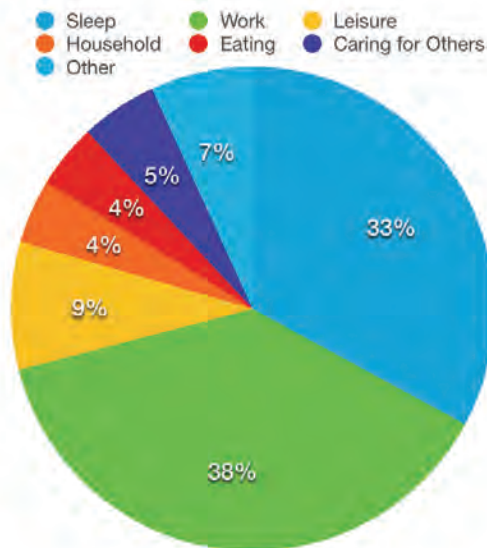
Purpose: The feeling and intention that we can make a difference in the world.

"Negative emotions like fear and sadness can lead to brain activity and thought patterns that are detrimental to creative, productive work: **avoidance of risk, difficulty remembering and planning; and rational decision-making.**"

Alice Isen



ACTUAL WORK DAY TIME USE		
ACTIVITY	HOURS	
Sleep	8	
Work	9	
Leisure	2	
Household	1	
Eating	1	
Caring for Others	1	
Other	2	



Actual Work Day Time Use for Americans age 25-54, 2014

Managing stress, emotions, and rewards that are in tune with our values can bring regenerative principles into our work days.

Bringing regenerative principles from nature into our work day can invigorate our work, promote sustainable workforces and produce more concentrated, inspired and efficient efforts and products.

Stressors Time Map				
TIME	SITE PRODUCTIVITY	OFFICE PRODUCTIVITY	DELIVERIES	INSPECTION
6:00AM	1	0	1	0
7:00AM	2	1	2	0
8:00AM	3	4	3	0
9:00AM	3	5	4	0
10:00AM	4	5	5	1
11:00	1	5	0	0
12:00PM	0	4	0	0
1:00PM	3	4	0	1
2:00PM	4	3	1	2
3:00PM	3	2	2	3
4:00PM	2	4	3	0
5:00PM	1	5	4	0



This mapping looks at a typical work week of the construction site and site office of a design-build firm one month away from final inspection and owner occupancy.

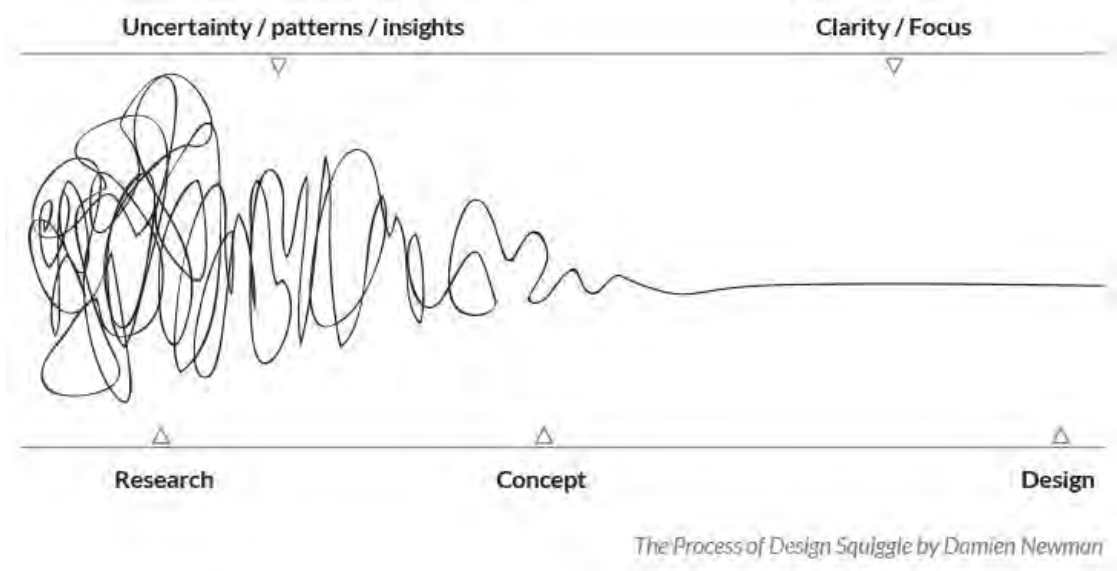
Evaluation: Americans work long hours and rarely take vacations. This is extreme. Rest, recreation, home care, health and care giving are other activities.

Looking to Nature: Nature is balanced.

Key Takeaways: A more balanced distribution of activities during the work day could lead to a more balanced life, reducing stress, connecting people and increasing productivity.



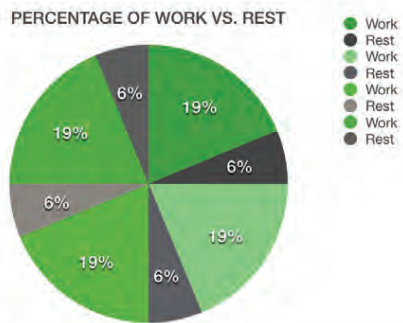
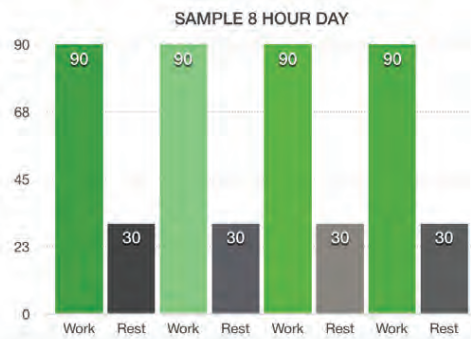
Work Versus Rest



Alternative 1

An 8-hour workday based on the principle that we can only concentrate on a task for 90-120 minutes before we lose focus and require a 20-30 minute break to recover.

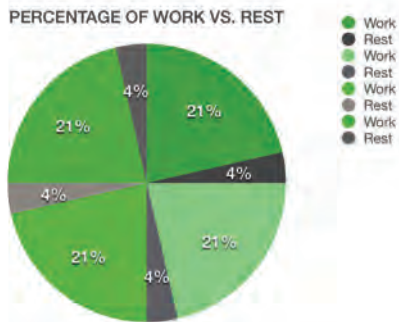
NATURAL WORK AND REST CYCLES	
ACTIVITY	MINUTES
Work	90
Rest	30
Work	90
Rest	30
Work	90
Rest	30
Work	90
Rest	30



Alternative 2

An 9-hour workday based on the principle that we can only concentrate on a task for 90-120 minutes before we lose focus and require a 20-30 minute break to recover.

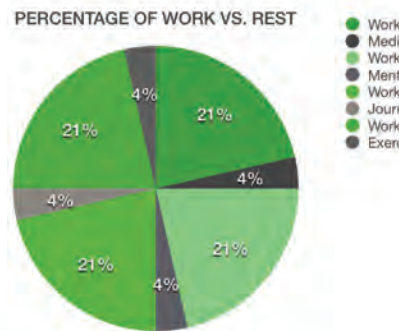
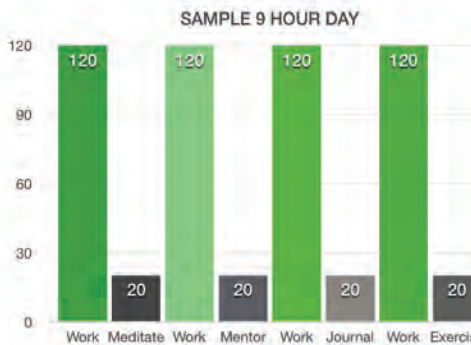
NATURAL WORK AND REST CYCLES	
ACTIVITY	MINUTES
Work	120
Rest	20
Work	120
Rest	20
Work	120
Rest	20
Work	120
Rest	20



Alternative 3

An 9-hour workday based on the principle that we can only concentrate on a task for 90-120 minutes before we lose focus and require a 20-30 minute break to recover - utilizing recovery to energize our creativity.

NATURAL WORK AND REST CYCLES	
ACTIVITY	MINUTES
Work	120
Meditate	20
Work	120
Mentor	20
Work	120
Journal	20
Work	120
Exercise	20



Evaluation: Redistribution of activities in a week day may lead to a more balanced life, reducing stress, connecting people and increasing productivity.

Looking to Nature: Nature is adaptive.

Key Takeaways: Our work processes and lifestyle can adapt, as our lives have changed drastically since the typical work day was established during the Industrial Revolution.



8-Hour Work Day SWOT

STRENGTHS

Stable
Predictable
Controlled
Repetitive
Measurable
Financially Reliable
Financially Rewarding
Performance Driven

WEAKNESSES

Monotonous
Repetitive
Inflexible
Standardized
Causes Traffic
Congestion
Demeaning
Dehumanizing

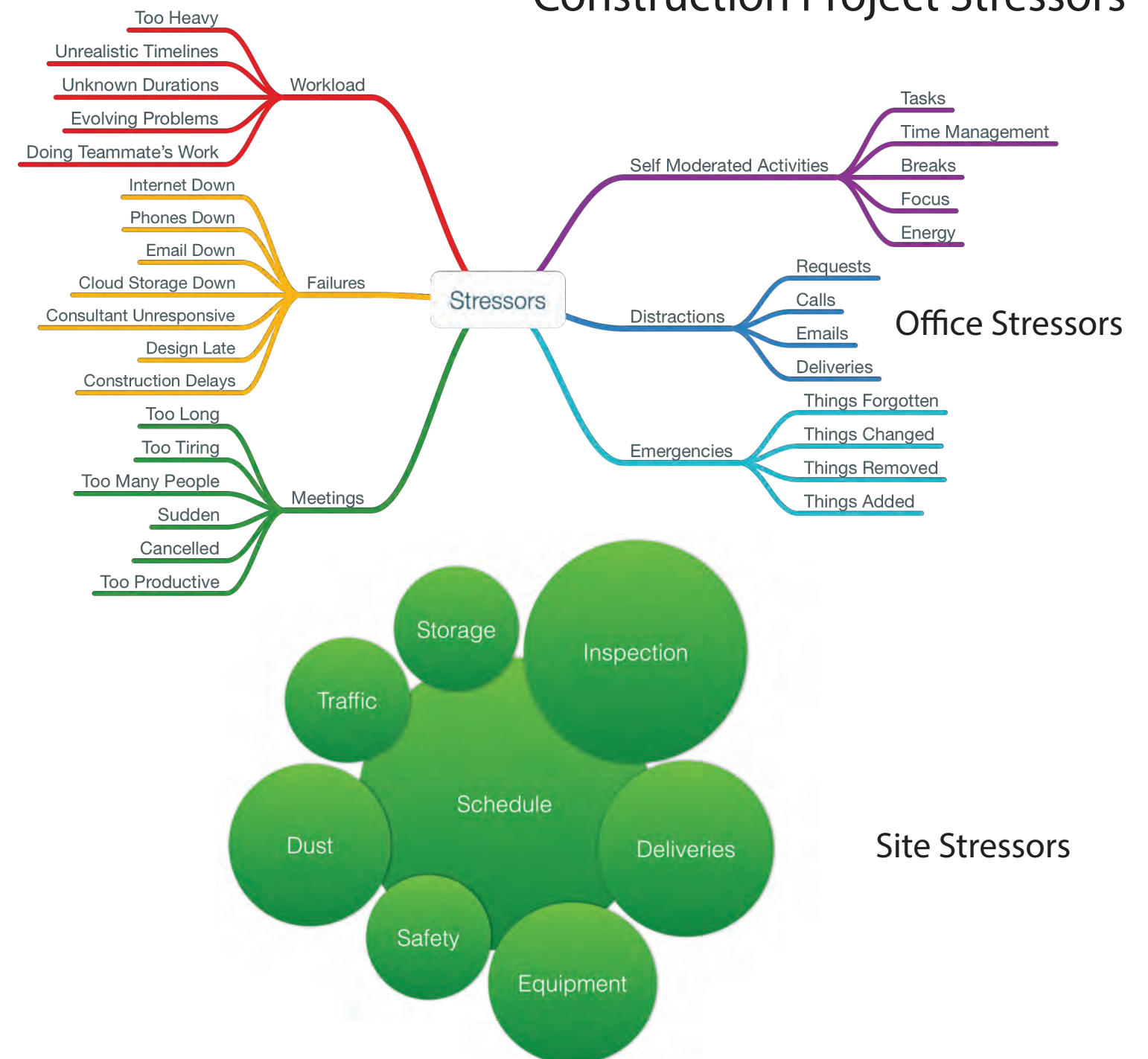
OPPORTUNITIES

Increase Balance
Increase Efficiency
Increase Emotional
Rewards
Increase Social
Connection

THREATS

Lower Productivity
Lose Control
Harder to Measure

Construction Project Stressors





Summary

Various stressors during a day on a construction project can disrupt routine or required activities, causing redistribution of resources and focus. Time management is simply not a useful tool as priorities continually shift. This continual flux of direction impacts the entire project team, including office staff and external sub-contractors and trades. Although office staff and external parties may have more autonomy than site staff, their work schedules are also impacted by site stressors even if to a lesser degree.

These stressors may cause delays to other projects and tasks, increasing the likelihood that staff may be required to work overtime, dipping into their evenings and weekends. These times are generally reserved for the “other” activities accounted for in a typical American workday. When workers begin to take time away from their other activities to meet demands at work, they create greater imbalance with respect to other areas in their lives.

Why do these other areas matter? **How can our daily lives better reflect, mirror or connect with nature?**

1. Nature is holistic and inclusive. Natural systems are inter-dependent. We are dependent on and connected to nature.
2. When people take on mechanical roles, they not only disconnect from other people, they disconnect from parts within themselves.

To hold ourselves accountable to our own values and to those we care for, we can continue to evaluate our lives and the parts of our human experience that drive what we do at work. Many design professionals will say that their work is the most important thing they do, but most also understand that in order to have a successful career they must be as well, whole and efficient as possible.

Energy efficiency in nature can provide a lens through which to observe personal energy management.
Balance. Equilibrium. Zero Waste. Restoration. Regeneration. Reuse. Light. View. Connection. Adventure.

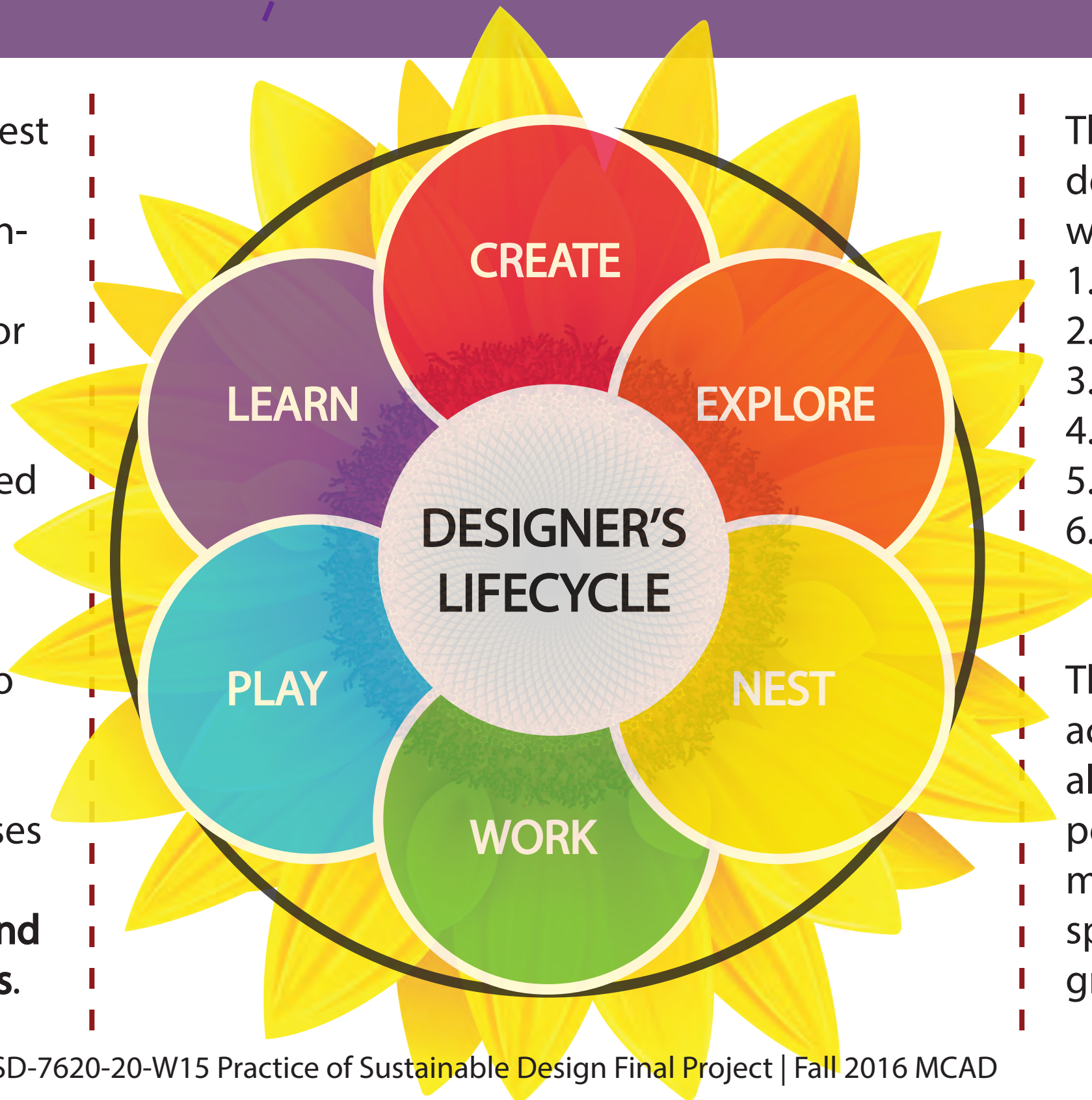
What makes us tick?

A balanced life consists of balanced energy distributed to various personal values. These values drive our activities and determine where and how we use our resources. We are responsible to ourselves and our profession. We must ensure our practice and lifestyles are at least as sustainable as our projects.



Research in Work Versus Rest cycles contributed to an expanded view of a designer's entire **day**. A balanced work schedule accounts for additional stages beyond work and rest. A balanced work life accounts for varied stages in a designer's **life cycle**.

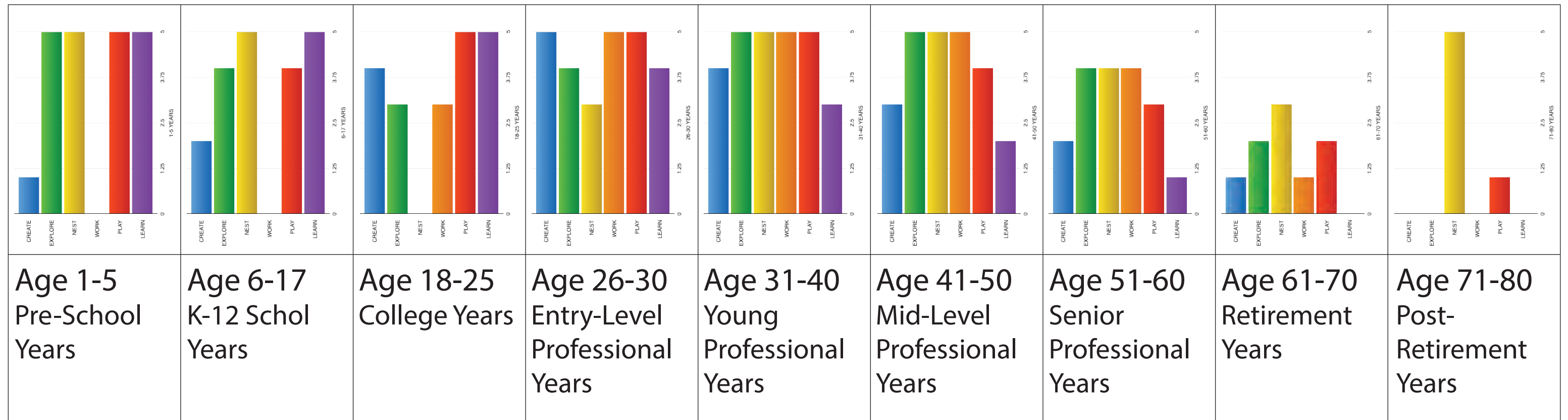
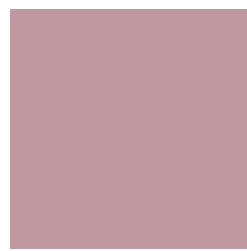
Though it is challenging to evaluate the material impacts of a person's life cycle, the following analyses may help designers **bring nature-inspired balance and vibrancy back to their lives**.



The boundaries for a designer's life cycle begin with the following stages:

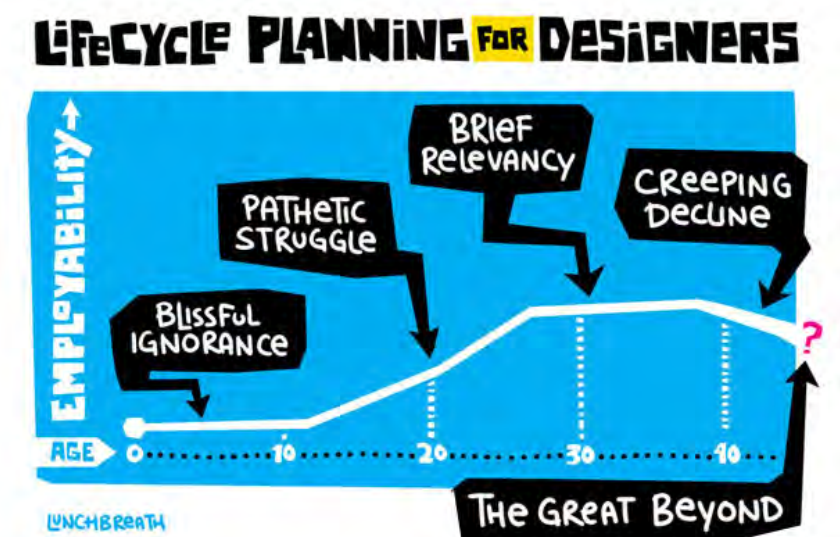
1. Create
2. Learn
3. Play
4. Work
5. Nest
6. Explore

These stages are based on activities or tasks which are aligned with values. They possess temporal quantities measured in time, and spatial qualities measured graphically.



LEGEND	
	Create
	Explore
	Nest
	Work
	Play
	Learn

This exercise mapped various life stages related to a designer's educational and professional years. Psychiatrist Carl Jung proposed 4 key stages of life: Childhood, Adolescence & Early Adulthood, Adulthood & Mid Life, Maturity & Wisdom. In this analysis, the post-educational years are marked by decades, while the educational years are marked by type of education. These are estimates and generalizations based on typical education and career stages for an architectural design professional. It is interesting to see how these career stages relate to the stages in the designer's work day. Mapping the lifespan stages along the work day stages yields a 4-dimensional understanding of how values and activities change over time.





Definition:

Life Cycle Assessment (LCA) is, in theory, a tool for evaluating the use of natural resources with the goal of managing materials and ecological habitats. (www.okala.net)

This theoretical framework can be used to evaluate the material resources and ecological impacts in a designer's day and life.

A designer's most valuable resources include expertise, tools and technology, and creative work space.

Life cycle assessment (LCA) is objective (based on quantified measurements) and comprehensive (including the entire lifecycle of the system and including most impacts categories).

Source: The Okala Practitioner

This definition can help create a dialogue for designers and sustainability professionals to evaluate material and process impacts.

Boundaries:

The boundaries of a designer's work day are far-reaching. The knowledge base, tools and physical resources involved impact all systems and overlap all other professions and industries.

Assumptions:

Balance evokes equilibrium. Priority creates hierarchy.

Limitations:

For the sake of a clear and beneficial analysis, the Okala Impact Assessment will be used to evaluate materials for creative workspaces. Modular systems are the most efficient and flexible.

Impacts:

Materials impact the environment, users, and the bottom line.

Interpretation:

Quantitative LCA can help create the best solutions. Qualitative LCA can help change thought.



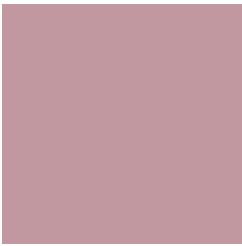


Table 1

Okala Impact Assessment for Alki BioPlastic Chair compared to Eames Polypropylene Chair											
Step 1	Lifetime is assumed by interior renovation of offices every 5 years. Functional unit is hour of use. Bioplastic is assumed equal parts potato starch, corn starch and sugar cane.										
Define lifetime,	8 hours per day	5 days per week	50 weeks per year	250 hours per year	5 years	1250 hours per life					
functional unit &											
system boundary											
		Alki BioPlastic Chair	Amount	Okala Factor	Impact Points	Okala Points	PP Eames Chair	Amount	Okala Factor	Impact Points	Okala Points
Step 2	Materials	Potato Starch	2 lb	2.6 lb	4.2 lb		Materials	Primary PP	4.3 lb		
Make Bill of		Sugar Cane	2 lb	0.54 lb	1.08 lb			Steel legs & fasteners	5.6 lb		
Materials		Corn Starch	2 lb	1.3 lb	2.6 lb			Corrugated cardboard	4.6 lb		
		Oak (hardwood) legs	6 lb	0.011 lb	0.066 lb						
	Manufacturing	Bioplastic primary	6 lb	varies (see above)	7.88		Manufacturing	PP primary	4.3 lb	1.9 lb	8.17
		Injection mold bioplastic	6 lb	0.72 lb	4.32			Injection mold PP	4.3 lb	0.72 lb	3.1
		Oak (hardwood) primary	6 lb	0.011 lb	0.066			Steel Primary	3.6 lb	3.5 lb	12.6
		Cut and sand hardwood	6 lb	?				Extrude steel	3.6 lb	1.1 lb	3.96
								Nickel Plate on steel	112 sq. in.	0.57 sq in	0.44
	Transport	Truck 28T	5 ton-mi	0.32 / ton-mi	1.6		Transport	Truck 28T	5 ton-mi	0.32 / ton-mi	1.6
	Disposal	Controlled Landfill bioplastic	0.22 lb	6 lb	1.32		Disposal	Landfill PP	4.3 lb	0.26 lb	1.12
		Controlled Landfill wood	0.14 lb	6 lb	0.84			Landfill Steel	3.6 lb	0.02 lb	0.08
					16.026						31.07
Step 3 Calculate	Okala Points x 1 / lifetime hours = 16.026 points x 1 / 1250 lifetime hours = 0.0128208 Okala points per hour used					Okala Points x 1 / lifetime hours = 31.07 points x 1 / 1250 lifetime hours = 0.024856 Okala points per hour used					
Impact & Make											
Baseline Chart											



Eames Polypropylene Chair vs. Alki Bioplastic Office Chair



Eames Ploypropylene Office Chair
Impact Summary
0.024856 Okala points per hour used

PP primary	8.17
Injection mold PP	3.1
Steel Primary	12.6
Extrude steel	3.96
Nickel Plate on steel	0.44
Truck 28T	1.6
Landfill PP	1.12
Landfill Steel	0.08

Alki Bioplastic Office Chair
Impact Summary
0.0128208 Okala points per hour used

Bioplastic primary	7.88
Injection mold bioplastic	4.32
Oak (hardwood) primary	0.066
Cut and sand hardwood	
Truck 28T	1.6
Controlled Landfill bioplastic	1.32
Controlled Landfill wood	0.84

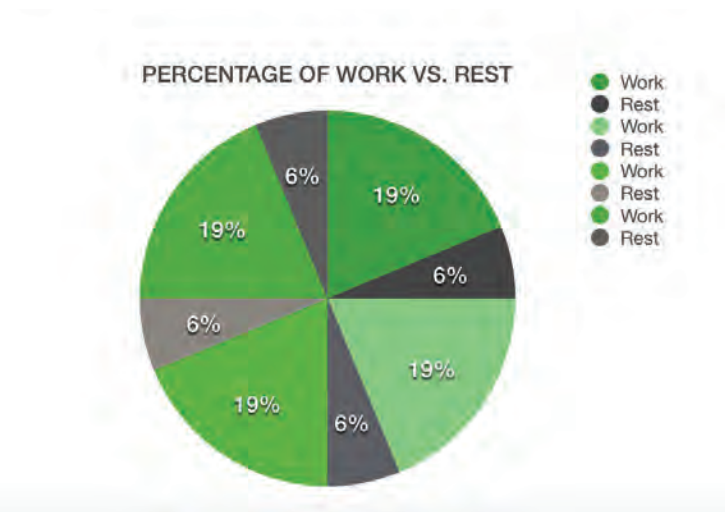
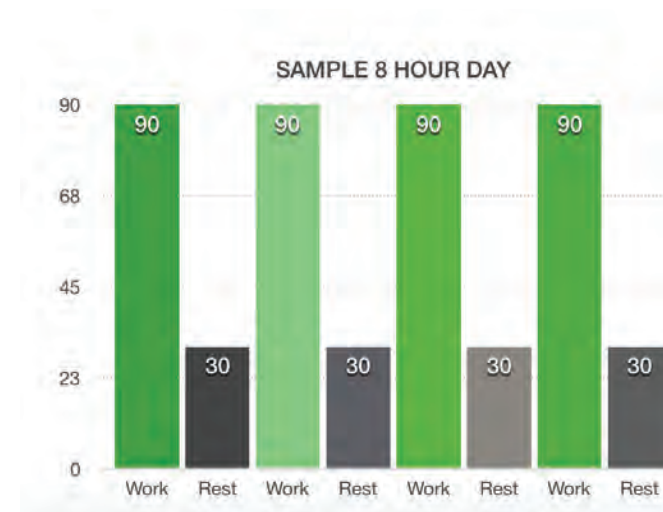
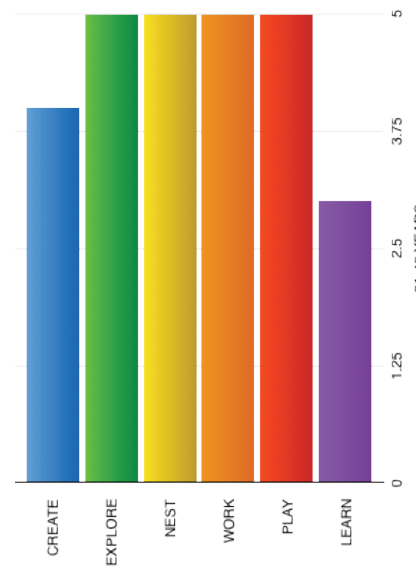
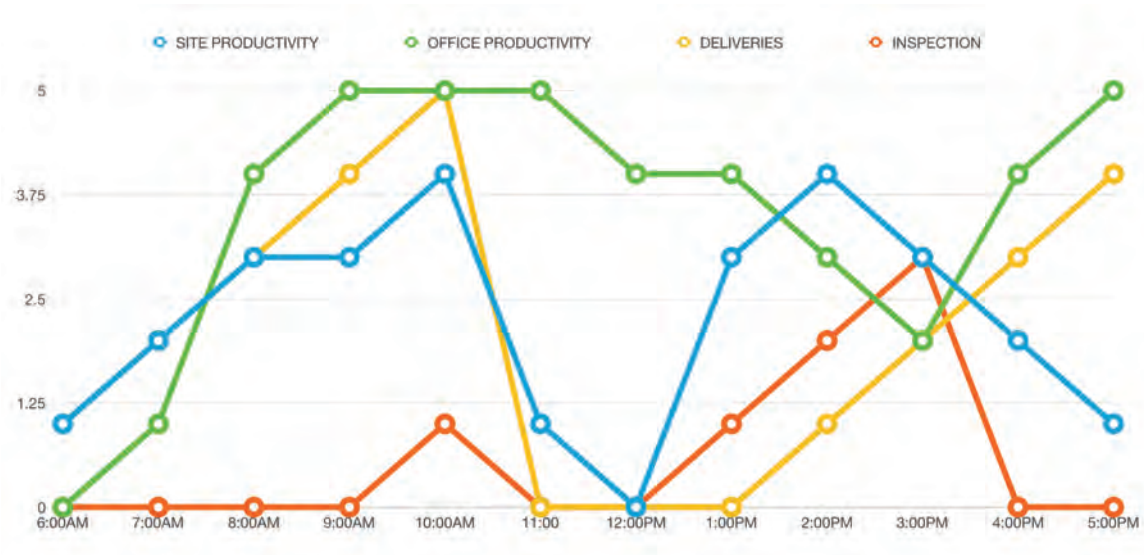
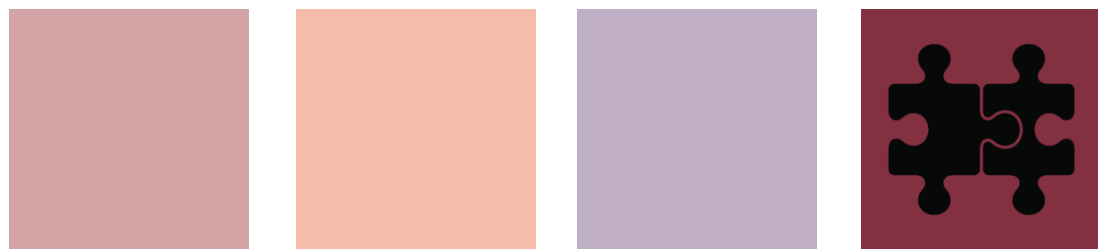


Based on structural properties of materials and material impacts of various design decisions can be made to optimize materials, achieve performance goals, and reduce impacts. Hardwood has an Okala Impact Factor of 0.011 per pound while bioplastic materials vary from 0.54 to 2.6 per pound. A designer could assume that bioplastics are best used for smaller parts where substituting wood simply will not do. For example, wheels and other curved or flexible pieces could benefit from bioplastic use. The amount required for an assembly like the office chair previously examined would create an additional impact, but this impact may be less than those of its metal counterparts - as steel has an Okala Impact Factor of 5.6 per pound, not including manufacturing processes.

Designers can assume that using materials inspired by nature and closest to their natural state can help reduce resource use and additional resource-heavy manufacturing and transportation processes.

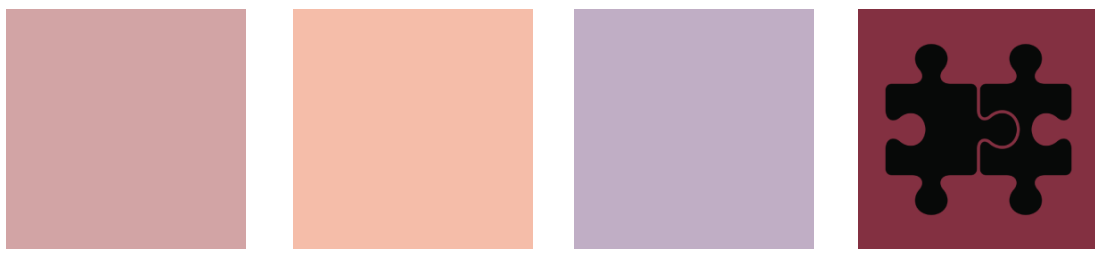
“New research supports measureable, positive impacts of biophilic design on health, strengthening the empirical evidence for the human-nature connection and raising its priority level within both design research and design practice...” - Terrapin Bright Green

“The biophilia hypothesis suggests that humans possess an innate tendency to seek connections with nature and other forms of life.” - Edward O. Wilson



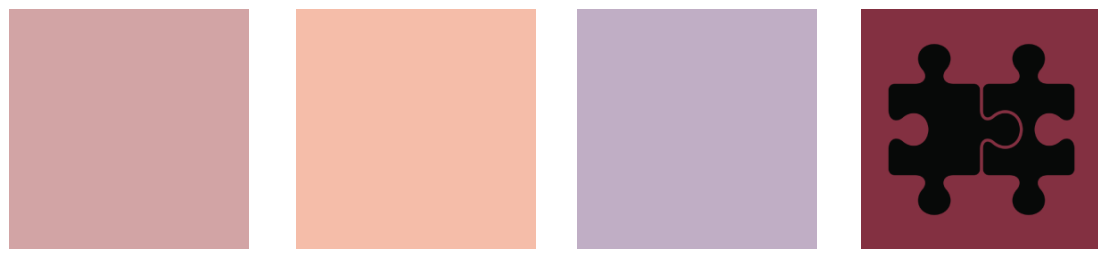
Identifying patterns in our work life helped us to begin a conversation about balance and priorities. Some patterns were seen in allocation of time and stages of life. We then expanded this view to look at allocation of time throughout a work day, and finally throughout stages of life.

Changing the scale from a day to a lifespan revealed ways these patterns can further change over time. Patterns can be seen in nearly every man-made and natural event. Various patterns have unique qualities, and looking at some of these qualities may help us understand ways in which we can better program and use spaces.



Nature is full of patterns as well. These patterns are seen in moments like bubbles formed at the edge of water systems. These patterns are also seen over time in processes like rock formation and seismic movement, that shape land, creating communities and defining entire regions. When grouped together, as with rock formation and seismic movement, these patterns begin to communicate processes like a landscape and boundaries like an ecological habitat.

We also see mathematical patterns in nature. For example, the snowflake, quantified geometrically by the mathematician Helge von Koch, can be seen at a microscopic scale as several water molecules, and as large as a snow covered mountain. Again, these patterns are both quantitative and qualitative.



A Pattern Language - A Primer

A **Pattern Language** is an architecture theory book written by Christopher Alexander and published in 1977. It identifies universal qualities that generate patterns. Patterns can be found everywhere, in spaces, events and even connections. As an architect, Alexander looks at patterns in towns, buildings and construction.

These patterns, when combined, can create languages. Some examples of pattern languages from Alexander's work include:

Network of Learning

Adventure

The Family

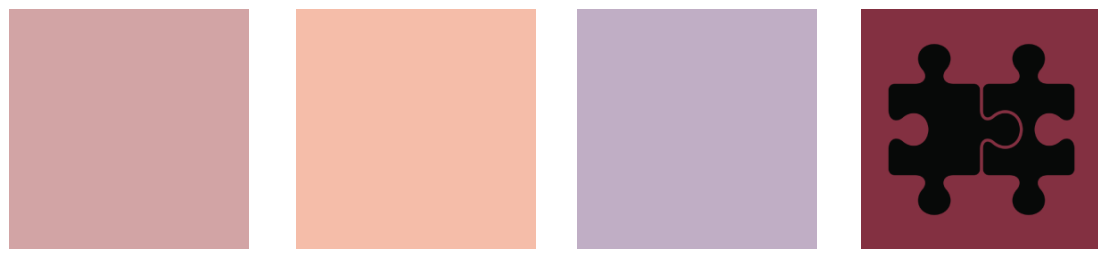
"...people should design for themselves their own houses, streets and communities."

"...most of the wonderful places of the world were not made by architects but by the people."

What pattern languages can be created to promote opportunities for flexible work spaces?

6 Design Strategies to Bring Nature Back into Buildings:

1. Make Adaptive Workspaces
2. Utilize Barriers
3. Support Varied Schedules
4. Incorporate Restful Spaces
5. Connect to the Community
6. Leave Room for Adventures



Problem:
Temporary, limited lifecycle work
spaces

Solution:
Multi-use, cooperative environments
that are flexible, adaptive, and con-
nected

Alexander's Patterns:
Home Workshop
Flexible Office Space
Zen View

**Nature can be...
Adaptive.
It can evolve.
It can be efficient.
It utilizes all
materials and
creates no waste.**

Pattern 1
Tidepools

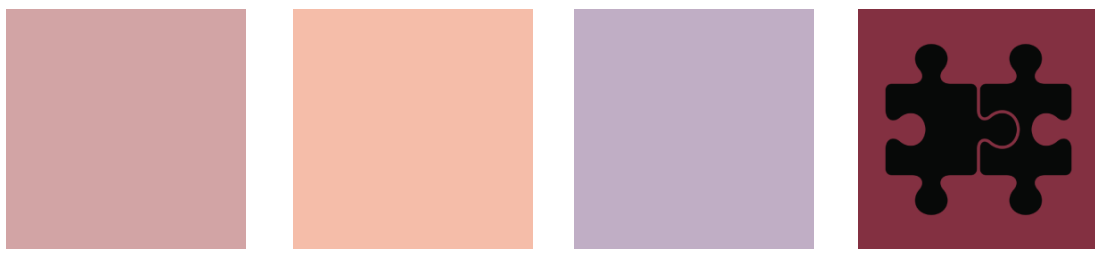


Pattern 2
Caves



Pattern 3
Coral Reef





Problem:
Temporary, limited lifecycle work
spaces

Solution:
Multi-use, cooperative environments
that are flexible, adaptive, and con-
nected

Pattern 1
Tree Canopy

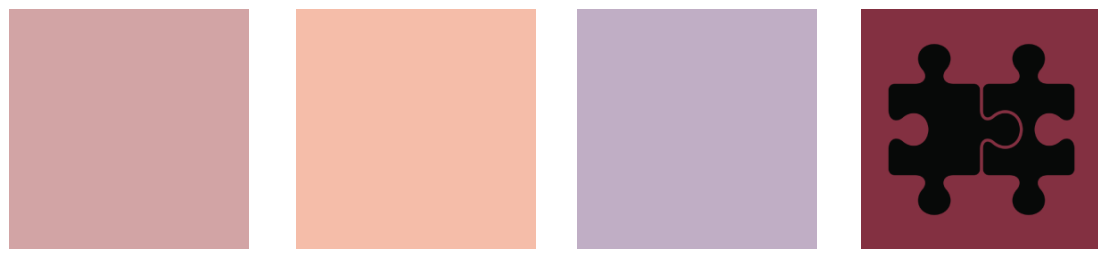


Alexander's Patterns:
Garden Wall
Sunny Places
Outdoor Room
Connection to Earth

Pattern 2
Wild Garden



**Nature can be...
Alive.
It can be dirty.
It can provide
shelter but is not
always contained.
Structure can be
created from
natural elements.
Barriers can
become
opportunities.**



Problem:
Archaic, industrialized or mechanical
work schedules

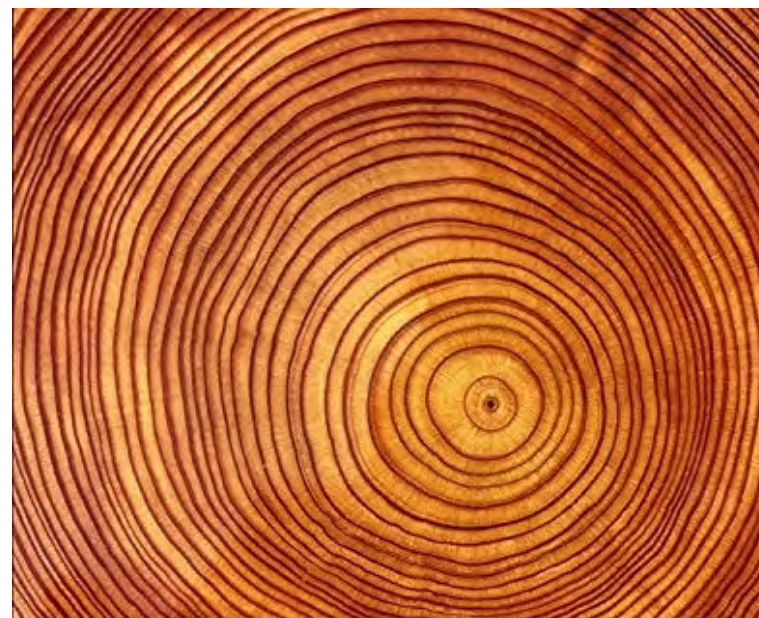
Solution:
Flexible work schedules

Alexander's Patterns:
Network of Learning

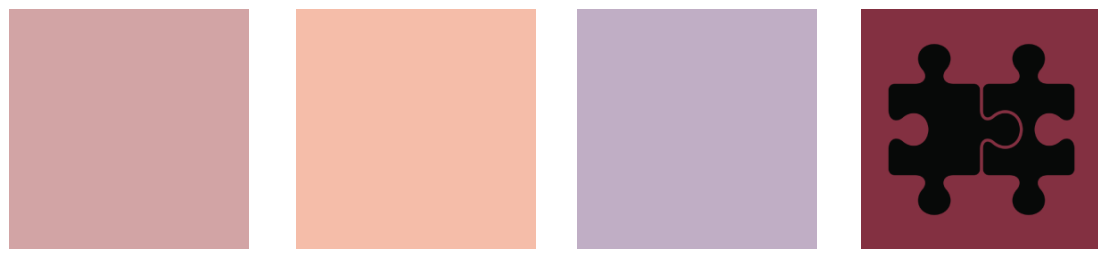
Pattern 1
Geological Sedimentary Strata



Pattern 2
Redwood Tree Rings



**Nature can be...
Flexible.
It can be resilient.
It can resist
destruction.
People evolve.
Allow for spaces
and functions to
evolve over time.
Program spaces for
multiple life cycles
and stages.**



Problem:
Repetitive, single use desks and
furniture

Solution:
Flexible work spaces

Alexander's Patterns:
Small Work Groups
Opening to Street
Light on Two Sides

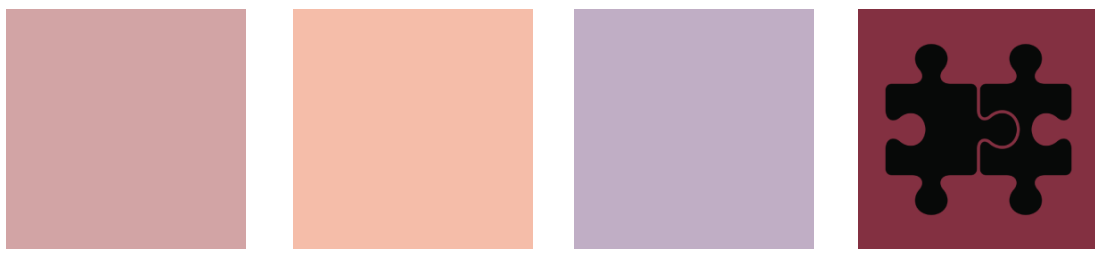
Pattern 1
Argan Trees



Pattern 2
Windblown Trees



**Nature can be...
Organic. It can
flow. It is modular.
It may be fractal,
but it is not always
recti-linear.
Promote flexible
usage of space
with open plans
and strategic use
of furniture and
barriers.**



Problem:
Disconnection from values

Solution:
Providing opportunities to nest:
recover, reflect, rest and connect

Alexander's Patterns:
Family

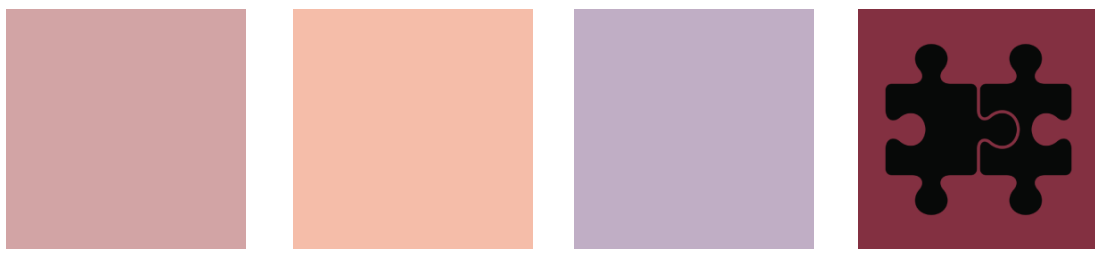
Pattern 1
Muircat Social Hierarchy



Pattern 2
Ants



**Nature can be...
Balanced.
It can be still.
There are seasons
at various scales
for many different
natural processes.
Nature can give;
nature can take.
Things die and
things are re-born.
Allow for rest.**



Problem:
Isolation and disconnect from loved ones

Solution:
Connection, grounding, and inter-dependence

Alexander's Patterns:
Connections

Pattern 1
Spiderweb



Pattern 2
Tree Roots



**Nature can be...
Connected.
It can be inclusive.
Natural systems
can be
inter-dependent
and connected.
Connect people
with each other,
and with their
community.**

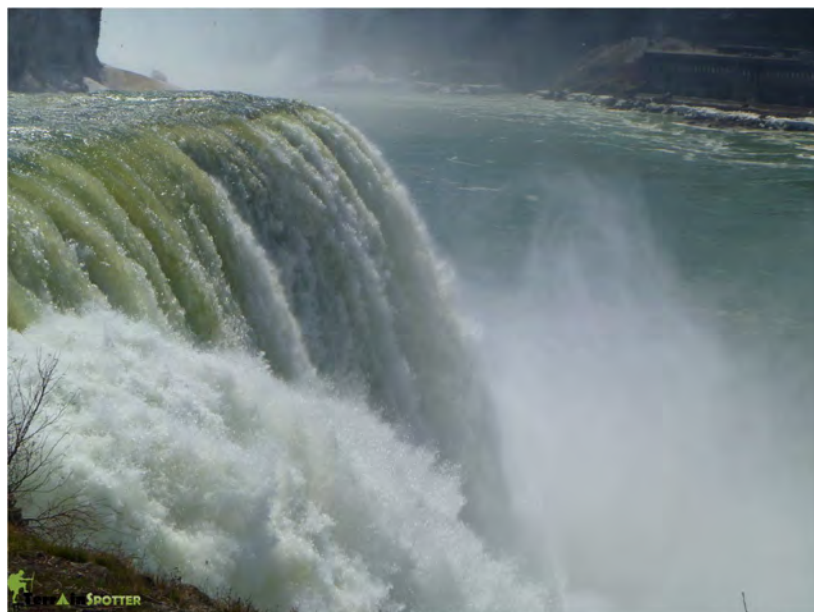


Problem:
Stagnation, lack of growth, getting too comfortable

Solution:
Challenge, new ideas, new cultures, learning

Alexander's Patterns:
Adventure

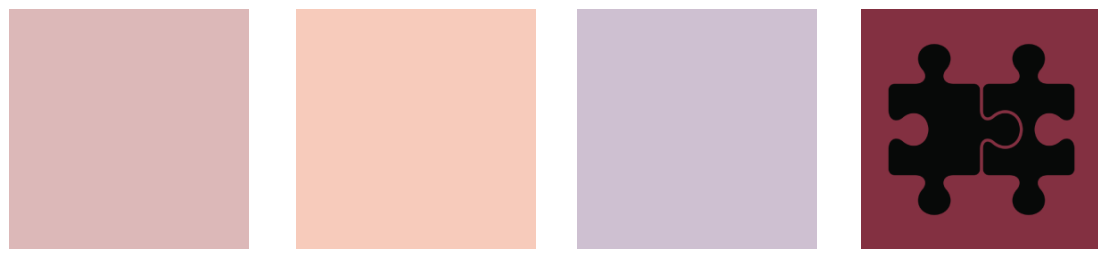
Pattern 1
Niagra Falls



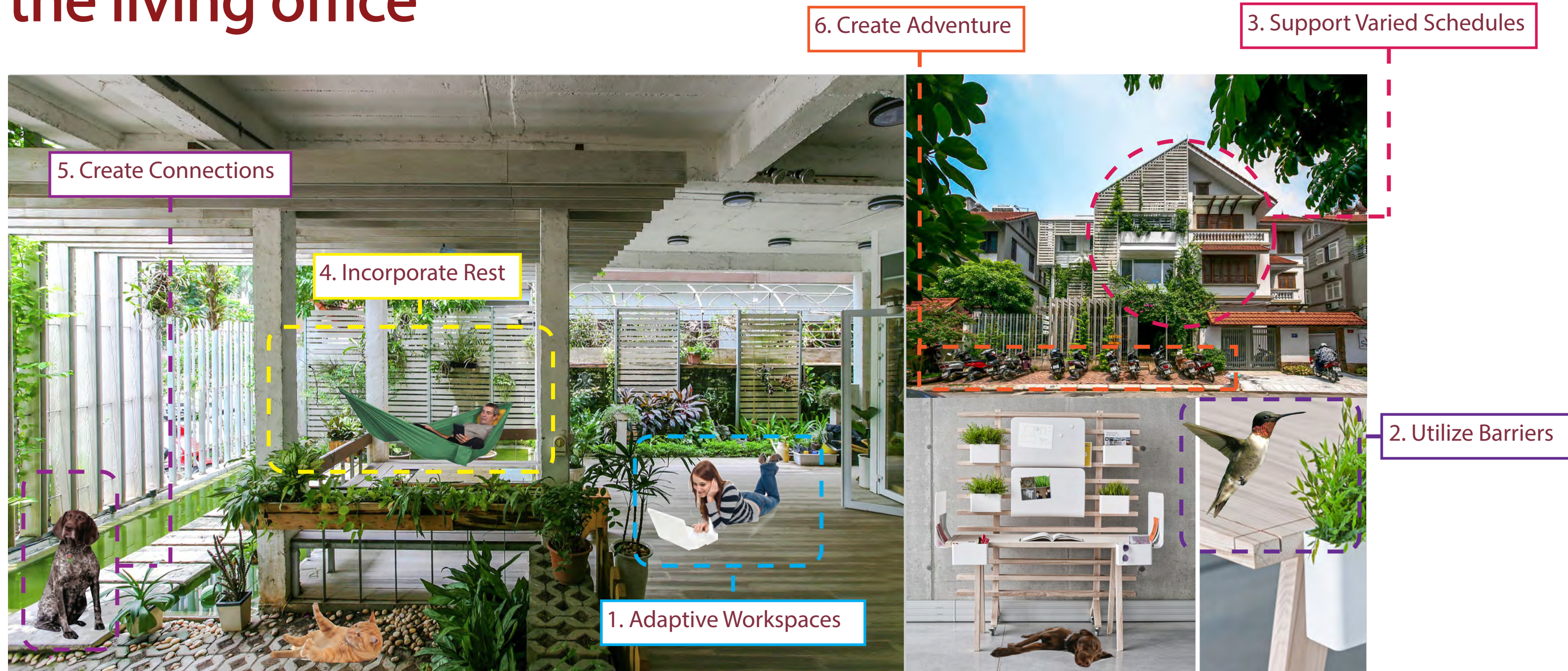
Pattern 2
Mount Everest

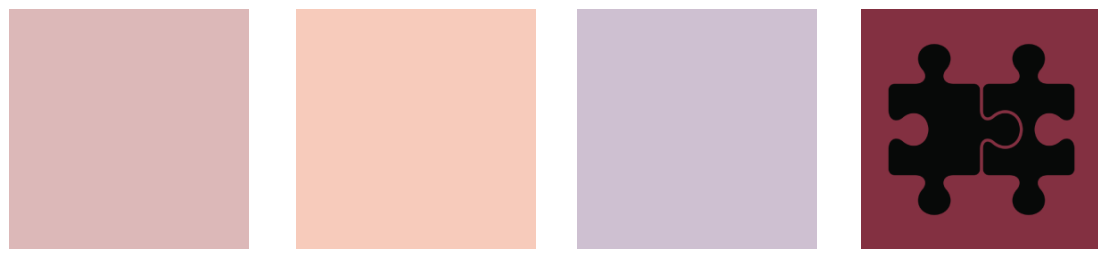


**Nature can be...
Wild.
It cab be active.
Nature can be
vibrant and can
grow.
It can move, act,
and react.
Bring in some
wilderness.**

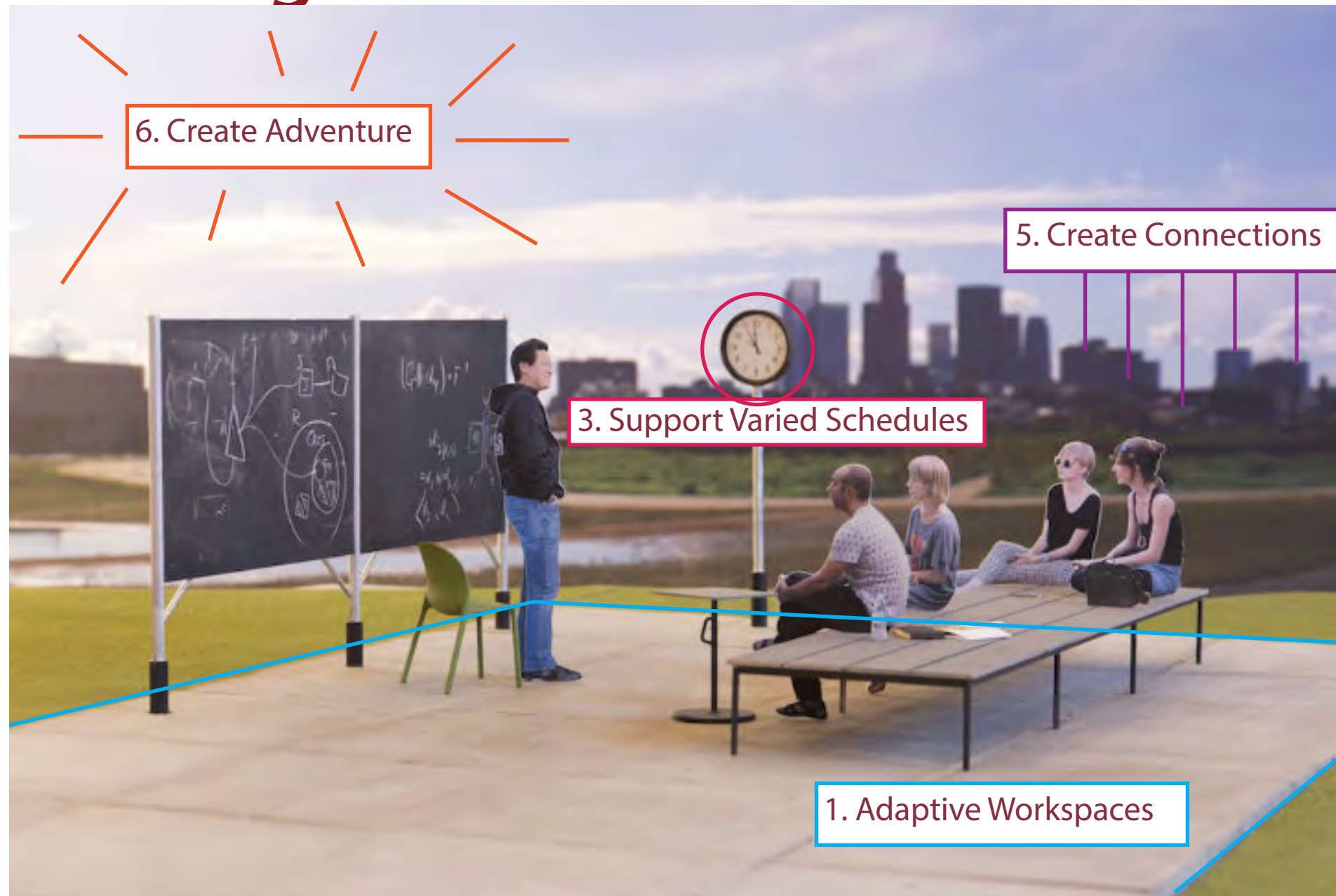


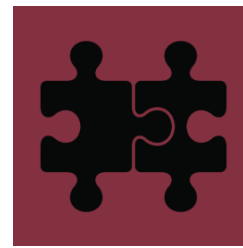
the living office





working in the outdoors





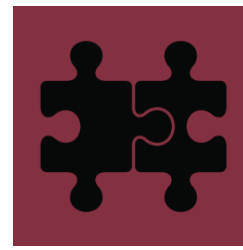
“People perform a range of different tasks and have different needs: sometimes to be alone, sometimes to be with others. A range of spaces that offer different things works best. It all comes down to the people-environment fit.” - Dr. Birgitta Gatersleben, Environmental Psychology, Surrey University

The EPA estimates that people spend up to ninety percent of their lives inside buildings.

Thus, it is my opinion that it is important for designers to be aware of, and continually evaluate, the way we inhabit buildings. Architects can leverage several tools to improve the way people inhabit buildings by bringing some balance into time and space. Providing opportunities to shift focus from work to rest to play could be one way we do so. Bringing natural elements inside, and strategically creating or removing barriers from the outside, could be another. Creating opportunities for the unknown, for adventure, and unconventional uses could allow for innovation and perhaps even evolution. Looking to natural systems and patterns for possible strategies can provide a toolkit for architects and other designers to pull from.

Building on work by psychologists, architects, and personal research, I explored existing patterns and opportunities for improved conditions. Flexibility and opportunity are the two most intelligent themes I will take away from this work. The sustainability challenge seeks to balance impacts to people, the planet and the bottom line. By bringing balance into the work life of a designer, there is the possibility that the designer's projects will reflect this balance in a new way. The ultimate success would be to avoid meltdown and burnout, and improving productivity, but balance and flexibility could yield other, yet unknown benefits.

“While mechanistic science concentrates on reducing things to basic material building blocks, the emerging holistic paradigm recognizes that systems are integrated wholes whose properties cannot be reduced to those of smaller units.” - David Pratt



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Page 12: WorkNest Office Furniture and Alki Furniture

Page 16: Martin Grand Jean, Digital Map of Airports. URL: <http://www.martingrandjean.ch>

Page 26: Studio 102, Growing Green Office. URL: <http://www.archdaily.com/773793/growing-green-office-studio-102>

Page 27: Lauck Group, Dieter Working Outside - www.v2.nl

Works Cited:

Barry Schwartz - The Way We Think About Work is Broken

Barry Schwartz - Why We Work

Walter Chen - The Science Behind What Motivates Us to Get Up for Work Every Day

Leo Widrich - The Origin of the 8-Hour Work Day and Why We Should Rethink It

Bureau of Labor Statistics American Time Use Survey 2014

Boyd Varty - What Wisdom Can We Gain From Nature?

RSA ANIMATE and Dan Pink - Drive: The surprising truth about what motivates us

Catherine S. Dauss, Chapter 6: Consequences of Alternative Work Schedules, from International Review of Industrial and Organizational Psychology, 1998

Terrapin Bright Green, Patterns of Biophillic Design

David Pratt - Theosophy and the Systems View of Life