IDEO IN COLLABORATION WITH BIOMIMICRY 3.8

DESIGN
FOR
LIFE

DESIGN FOR LIFE

Nature offers countless examples of evolutionary strategies at work fostering conditions conducive to life.
These cards are intended to reveal a few of these often hidden events that we have found relevant to design challenges. We hope you too will find inspiration for your project.

ADAPTATION
Design *for* Change

Selective Pressures
Slippery Genes
Dispersal or Devotion
Active Form

ENDURANCE
Design *for* Uncertainty

Efficiency or Resilience
Ecological Succession
Dynamic Structure
Living Layers

RELATIONSHIPS
Design *for* Systems

Keystone Species
Mutualism
Autogenic Engineer
Allogenic Engineer
Surge Strategy

COMMUNICATION
Design *for* Emergence

Simple Rules
Emergent Networks
Contextual Signals
Passive Indicators

GETTING STARTED

There's no prescription, but here are a couple of things you might try.

Think about your design challenge. Is it related to Communication? Environment? Service? Organization? Packaging? Manufacturing? Technology Integration? Review the 4 categories for the most intuitive connections. Adaptation could be a good place to start for a manufacturing project that faces a dynamic environment. For organization design, perhaps start with Relationships or Communication.

Or deal the cards to your team and have each person browse them with the challenge in mind. Some will pique your interest in a new topic, inspire you to delve deeper, or spur an idea. They might even stir you to get out of your project space to experience nature!

RELATIONSHIPS
Design *for* Systems

Every system–ecological and otherwise–
is defined by the relationships that
go on inside it. Nothing does anything
that doesn't affect everything.

Create conditions that allow others to thrive...

RELATIONSHIPS

RELATIONSHIPS

Autogenic Engineer

Some organisms dramatically alter their own shape over time, creating a more diverse habitat and opportunities for a greater diversity of species.

As trees grow, their trunks and branches create habitats for many other living things. In the rainforest there are species that live and move exclusively within the canopy provided by trees, living on insects, fruits, and seeds from the trees and from epiphytes growing within their branches.

YOU MIGHT ASK

What opportunities exist for us within the structure of other places or organizations?

As we grow and develop, might the changing conditions allow for new behaviors or new populations to thrive?

DIVERSIFIED HABITAT

To connect better with 18 to 35-year-olds, a long-established insurance company created a non-traditional environment—a café serving cappuccinos alongside free life coaching and financial advice.

Create a change that increases opportunities...

RELATIONSHIPS

RELATIONSHIPS

Allogenic Engineer

Some organisms transform materials or flows in a system, creating a diversity of opportunities for species to engage.

Beavers are archetypal allogenic ecosystem engineers. They disrupt the environment by cutting areas of woodland and damming streams. The region of the dam transformed by the beaver provides a suitable habitat for different species of plants, fish, and other creatures to thrive.

YOU MIGHT ASK

Are we part of a habitat that could benefit from disruption?

How might we slow down or speed up flows to allow new opportunities?

DIVERSIFIED HABITAT

IDEO often introduces design thinking to organizations, transforming their innovation process and allowing new ideas to thrive in this altered habitat.

Change a system with one key element...

RELATIONSHIPS

Keystone Species

Some species play a disproportionately critical role in maintaining the structure of an ecological community.

Sea otters keep sea urchin numbers in balance, allowing kelp beds to thrive.
Without sea otters, sea urchin populations grow very quickly and eat up entire kelp beds, displacing the many fish species that spawn there.

YOU MIGHT ASK

Are there keystones—people, places, or things—in our systems?

What might we do to augment their effect?

How do they stabilize other elements in the system?

COMMUNITY CATALYSTS

The US Green Building Council structured communication in its chapter organization around "keystone experts" who invite participation, foster relationships, and share content across the organization.

Turn competitive relationships into a benefit...

RELATIONSHIPS

Mutualism

Competitive relationships in nature tend not to last. Mutually beneficial relationships between species, on the other hand, tend to endure, fostering a more stable and sustainable system.

Mistletoe is defined as a parasite because it lives on the juniper tree and would perish without it. But over time, a juniper afflicted with mistletoe attracts significantly more seed-eating birds, promoting wider seed dispersal and propagating the juniper's offspring.

YOU MIGHT ASK

Can we identify mutual benefits in an apparently competitive situation?

Will any useful by-products emerge from our design?

Might a short-term relationship become longer-term?

SYMBIOTIC PRODUCTION

The plastic for Stonyfield's yogurt cups is developed by Preserve, who, after use, recovers the cups to create toothbrushes and other products from a predictable supply of high-grade recycled material.

Disrupt a competitive balance in your favor…

RELATIONSHIPS

Surge Strategy

Some preyed-upon organisms have evolved strategies for overcoming predators by producing an oversupply of offspring, making it impossible for predators to eat them all.

Every dozen or so years, oak trees produce an acorn surge, called a "mast." Squirrels and other predators are able to consume only so many, leaving plenty to germinate. In the following year the oaks produce few or no acorns, causing the predator population to drop.

YOU MIGHT ASK

How might overabundance or scarcity affect us?

Could we design to create a surge, and what impact might that have?

What effect would timing have for a surge cycle?

CYCLIC AVAILABILITY

The sneaker industry periodically offers limited-quantity re-issues of popular models from years prior. "Sneakerheads" clamor to buy a pair or two to add to collections or re-sell in the aftermarket for profit.

ADAPTATION
Design *for* Change

Life exists in a dynamic world.
The most successful organisms are
able to adapt to assorted forces
and evolve over time.
The processes, strategies, and mechanisms
may differ from one species to the next.
But the goal is to survive and thrive.

Enable changes that better fit a context…

ADAPTATION

ADAPTATION

Selective Pressures

Factors such as food supply and climate contribute to natural selection, with species adapting to shifts over generations to better fit a dynamic environment.

Darwin observed that several different species of finches evolved from a single ancestor, each with a distinctive beak shape and size suited to a particular food type that was available on the Galapagos Islands.

YOU MIGHT ASK

What are the selective pressures on our product, organization, or process?

What is its niche?

How might our solution “fit” or adapt to other contexts?

DISTINCTLY DIFFERENT

In stark contrast to OXO’s successful iconic black-handled Good Grips, swiss kitchen gadget-maker Zyliss launched its new line in the USA with glossy white handles, each uniquely shaped for the task at hand.

Express your essence in diverse ways...

ADAPTATION

ADAPTATION

Slippery Genes

A species' genome is referred to as "slippery" when specific DNA sequences for traits are copied with low fidelity, resulting in large physical differences between individuals.

Dogs are a species with a "slippery genome," which explains how a vast range of physical traits can vary over the brief period of their domestication, yet still at heart be a dog. Within a few generations, it's possible to select for entirely new specialized breeds, such as the Sulimov dog for detecting explosives.

YOU MIGHT ASK

How slippery is the DNA of your brand?
How flexible is its expression for future conditions?

How might your design principles support variation in expression?

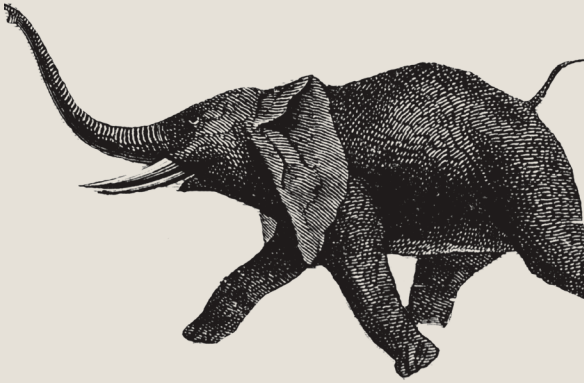
BRAND FLEXIBILITY

Converse's retail design strategy was based on its brand as a platform for creative expression. For each US store, employees, customers, and local artists contributed to a unique, local character that varied yet maintained brand identity.

IDEO + BIOMIMICRY 3.8

Invest strategically based on context...

ADAPTATION



ADAPTATION

Dispersal or Devotion

Organisms can span reproductive strategies. r-type organisms produce large quantities of young, usually in conditions that change unpredictably. K-type organisms produce few offspring, usually in more stable conditions.

Sea turtles are typical r-type organisms, they lay hundreds of eggs that give rise to tiny turtles, many of which don't survive. Elephants, in contrast, gestate nearly 2 years for a single calf that matures slowly and suckles its mother's milk for several more years.

YOU MIGHT ASK

Do current conditions suggest we disperse a large number of options, or commit to one well-tended idea?

What level of commitment will be required of our design?

How might our design fend for itself?

DISTRIBUTED CHOICE

The US Green Building Council redesigned their top-down system for defining yearly initiatives. Now they select from a massive number and allow local priorities and promising ideas to reveal themselves.

Address multiple functions with one solution...

ADAPTATION

ADAPTATION

Active Form

Forms in nature evolve and improve their functionality. The continued development helps in performing multiple tasks, and over time it makes an organism better suited to its natural habitat.

The shape of the kingfisher's beak has been honed to catch fish.
As it dives from the air at speeds up to 25 mph, the unique profile of its beak breaks the water surface and distributes the pressure waves away from the front so it can grasp the fish.

YOU MIGHT ASK

How might we achieve double duty (or more) with a design feature?

How might our design be responsive to the needs placed upon it?

MULTIFUNCTIONAL FORM

The Zyliss kitchen whisk has identical wires, each looped separately without crossing at the top. This helps cleaning, whisking, and manufacturing, as there is no need to nest or assemble different loop lengths.

ENDURANCE
Design *for* Uncertainty

Over time, biological processes, mechanisms, and strategies have emerged that enable organisms and ecosystems to cope with unexpected changes. They have evolved to endure.

Choose whether to be efficient or resilient...

ENDURANCE

Efficiency or Resilience

A system is efficient if it uses minimum energy to accomplish a task. It is resilient if it uses redundancy, diversity, and decentralization to perpetuate itself.

A native prairie is resilient: its diverse grasses hydrate the soil at different levels, sustaining it through unpredictable conditions. The Yucca moth and the Yucca tree have an efficient relationship. The tree provides habitat for the moth, while the moth pollinates the tree. Without one, the other will die.

YOU MIGHT ASK

Are we in a stable or unpredictable condition?

Might our system benefit from decentralization, diversity, and redundancy to increase resilience?

FLEXIBLE STRATEGY

A beverage company, anticipating a need to cope with undependable material sources and fickle markets, creates a network of supplier relationships, reducing efficiency but increasing resiliency.

Decide whether to collaborate or go it alone...

ENDURANCE

ENDURANCE

Ecological Succession

Following disruption, one type of habitat is steadily replaced by another. Healthy ecosystems often go through cycles of destruction and re-colonization.

Soon after a woodland fire, "pioneer" species begin to appear. Quick-growing grasses and small plants that absorb the freely available nutrients appear at first. But soon, networks of species that cycle nutrients with each other will grow, which can last hundreds or thousands of years.

YOU MIGHT ASK

Might changes in the landscape be an opportunity to seed new behaviors or new offers?

How might our launch affect the current ecosystem?

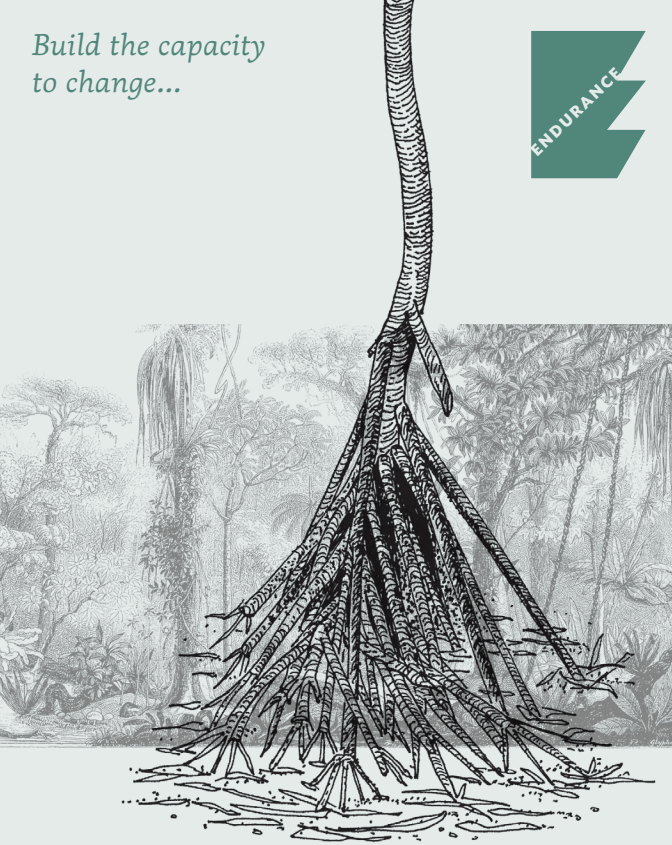
Are we an early-phase grass or later-stage species?

RENEWED RELEVANCE

As e-commerce and e-readers threaten most local bookstores, one in Cambridge is actually growing its business by printing books on-demand, events, and services that engage customers in new ways.

Build the capacity to change...

ENDURANCE



ENDURANCE

Dynamic Structure

Nature's forms are able to react, respond, and adapt to local conditions while retaining their strength and integrity.

The "walking" palm in Latin America, *Socratea exorrhiza*, is able to gradually move from shade toward a sunlit spot by growing new stilt roots in that direction and letting older roots die off.

YOU MIGHT ASK

How might our structure adapt to changing conditions?

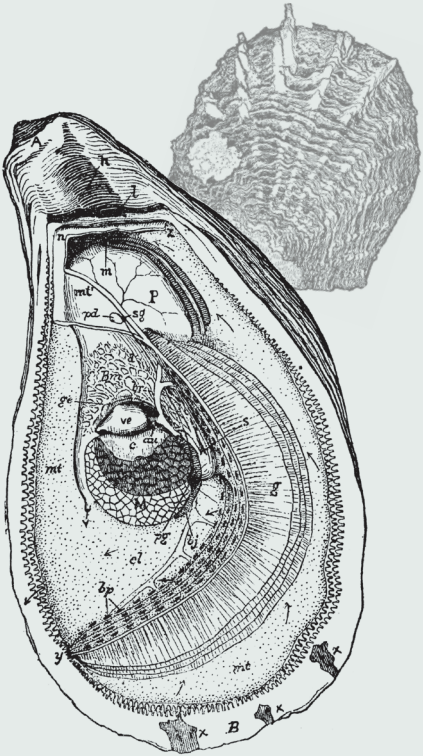
Might we simultaneously stay rooted and move?

AGILE EATS

Food trucks with Twitter accounts allow new epicurean entrepreneurs to succeed in competitive urban markets. Mobile kitchens keep overhead low and readily adapt to local patterns of demand.

Distribute failure and encourage growth...

ENDURANCE



ENDURANCE

Living Layers

Natural structures often grow or assemble as layers that together provide higher performance than they would alone.

The oyster shell grows as nacre exudes from a thin tissue mantle on the soft body. Inside the shell, the oyster entombs parasites and debris in smooth iridescent layers of new nacre. Outside, the shell is typically rough, conforming to the surface it grew on.

YOU MIGHT ASK

Might layering enhance performance?

Might we design from the inside out?

How might our product protect itself?

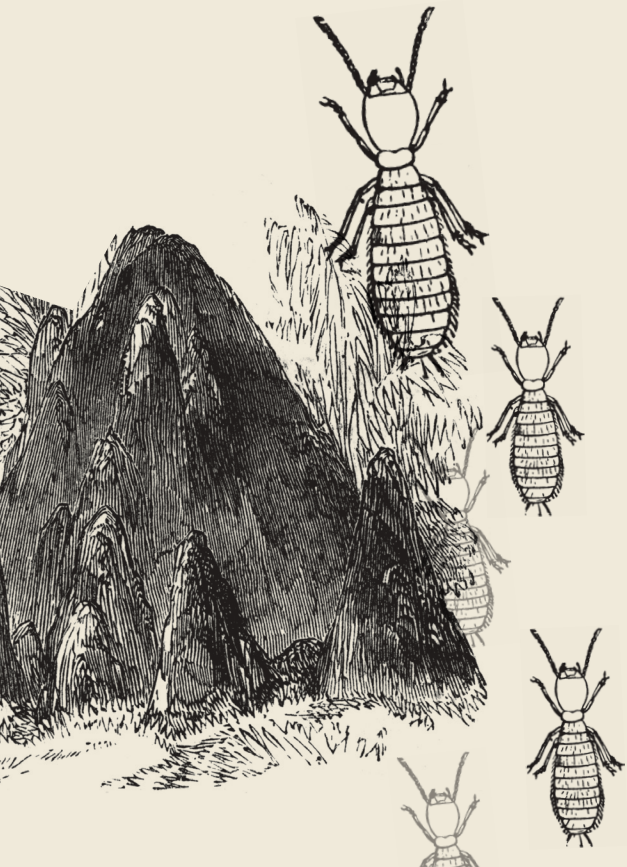
ELEGANT DELIVERY

Foil pouches for tea bags typically open with a messy tear strip. To provide a more graceful revelation, designers explored self-contained layered structures and color on the pouch interior.

In nature, good communications are those strategies that allow responsive behaviors to emerge.

Create and collaborate without a blueprint…

COMMUNICATION



COMMUNICATION

Simple Rules

Simple rules allow coordinated action, or "swarm intelligence," to emerge from a community of individuals. The group self-organizes without top-down control.

Termites are able to build large complex structures in a coordinated way by following a few simple rules:

1. Sense high CO^2 level, pick up a grain of sand.
2. Walk around.
3. Sense low CO^2, glue it down.

YOU MIGHT ASK

Are there "simple rules" that could make this community smarter, more coordinated, or more effective at communication?

How might we harness "swarm intelligence"?

CONNECTED COMMUNITY

Simple rules connected volunteers in a networked community. Members shared information with two assigned "buddies" in other cities, creating an emergent communication system that spanned the nation.

Create effective networks...

COMMUNICATION

COMMUNICATION

Emergent Networks

Nature's systems for distributing matter or information develop over time in response to circumstance, rather than a pre-ordained plan.

The single-cell slime mold *Physarum polycephalum* grows as a mesh in search of nutrients. Over time, it refines a network of tubes to deliver nutrition to its cell body in the most direct way. For example, if food is placed around the mold in the pattern of the cities on a map, its growth will match the map of an optimized rail system.

YOU MIGHT ASK

What tools might we use to create more optimized systems?

How might we design effective channels of communication or distribution that adapt and reinforce themselves?

OPTIMIZED ROUTING

Toronto-based Regen Energy uses distributed feedback to manage energy networks for systems such as heating and ventilation in large buildings, successfully reducing peak electrical demand.

Create a rapid response to dynamic situations...

COMMUNICATION

COMMUNICATION

Contextual Signals

In daily life, organisms tend to communicate and guide behavior through simple signals that derive meaning through context.

Meerkat sentries guard their group using alarm calls to indicate predator type and urgency. Others in the group then take appropriate action, heading into nearby burrows for aerial attacks or climbing trees to avoid snakes.

YOU MIGHT ASK

What simple signals might we use to trigger specific behaviors?

What is most relevant to know in this context?

What sensory modes might be most effective?

MEANINGFUL TRIGGER

Every evening at dusk, residents of a Japanese elder community place a small white flag on their porch. If someone notices a missing flag, a staff member will investigate to ensure everything is okay.

Link actions to communication…

COMMUNICATION

Passive Indicators

Information can often be inferred directly from the appearance of an organism.

Flamingos feed on brine shrimp that inhabit their salty lake habitat. Beta carotene in the shrimp results in pink feathers. In the wild, vibrantly pink flamingos signal healthy diet and abundant supply of shrimp; with no shrimp, the flamingos pale.

YOU MIGHT ASK

How might system status or health be communicated automatically?

What are the "brine shrimp" in our system?

Are there any passive indicators in our system?

PRIORITY GAUGE

For a patient awaiting emergency medical attention, it's helpful to know who might be next in line. At one facility, patients sit in a color-coded section designating their medical urgency and priority in the system.

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