Interface®

BIOMIMICRY FOR THE BUILT ENVIRONMENT







What can ***3.8 billion*** years of R&D teach us about designing for resilience, efficiency, circularity, and human well-being?





In 2025, we gathered a curated cohort of customers and partners in Playa del Carmen, Mexico, where mangroves, reef waters, and coastal ecosystems thrive.

This Biomimicry Leadership Retreat wasn't a meeting; it was a reset.

OUT OF BUSINESS AS USUAL. INTO NATURE'S PLAYBOOK.

The Biomimicry Leadership Retreat, hosted by Interface and led by Biomimicry 3.8, was designed to do one thing: break out of business as usual. We stepped away from the familiar and into nature's playbook to uncover new tools and ways of thinking that help us design for resilience, regeneration, and systemic change.

Our purpose was clear:

- Challenge conventional approaches and embrace regenerative design.
- Learn from nature's genius to create conditions conducive to life.
- Build a cohort of leaders committed to collaboration and systemic change.

What defined our time together? These big ideas:

Resilience looks different for every organization.

It's not about avoiding disruption; it's about how quickly you can rebound, reorganize, and evolve. Nature teaches us that adaptability is strength. And that cycles of growth, conservation, release, and renewal aren't failures, but essential steps forward.

We come at problems from different perspectives.

That diversity is an asset. To create real change, we need to learn from each other and build conditions where ideas can cross-pollinate and evolve. Just like ecosystems do.

A thriving world centers on collaboration – not competition.

Competition threatens progress. That's why nature embraces cooperative relationships that maximize resource sharing across species. Industry-wide collaboration is how we solve our biggest challenges.

> "The level of transparency and dialogue we experienced was remarkable — senior leaders from across industries, being genuinely honest about the challenges they face. That kind of conversation is rare. And it's exactly what the built environment sector needs right now: the willingness to think differently, to learn from nature's genius, and to show up as true agents of regenerative change."



Nicole Miller, Chief Executive Officer of Biomimicry 3.8

CORE CONCEPTS & FRAMEWORKS, MADE PRACTICAL

Biomimicry Defined

Biomimicry is learning from and then emulating nature's genius to solve human challenges. It can be applied not only to products and materials, but to processes, teams, supply chains, and business models.

Three Pillars of Biomimicry

The practice of biomimicry includes three essential elements, all of which attendees experienced during the retreat. They are:

- **Ethos:** Reflects our deep desire to fit in on Earth; Requires respect and humility toward nature.
- **(Re)connect:** Discovery of life's genius; Helps to deepen awareness of our interdependence.
- **Emulate:** Apply nature's strategies to innovate forms, processes, systems, and more.

Nature as Mentor, Measure & Model

How can we incorporate the three pillars of biomimicry into our lives? By thinking of nature in three different ways:

- **Mentor:** Design for nature. Learn from nature, instead of extracting from it. Treat nature as our wise teacher.
- **Measure:** Design with nature. Use ecological performance, not just financial or carbon metrics, to evaluate success.
- **Model:** Design from nature. Borrow strategies. Ask how we can design solutions like nature would.

Life's Principles

Nature has been solving design challenges for 3.8 billion years. Life's Principles reflect those strategies. They teach us to optimize, adapt, and create conditions conducive to life. By applying them, we can design smarter systems, measure success against nature's benchmarks, and let nature – the ultimate innovator – be our mentor.

Life's Principles



Evolve to Survive.



Adapt to Changing Conditions.



Be Locally Attuned and Responsive.



Use Life-Friendly Chemistry.



Be Resource Efficient.



Integrated Development with Growth.

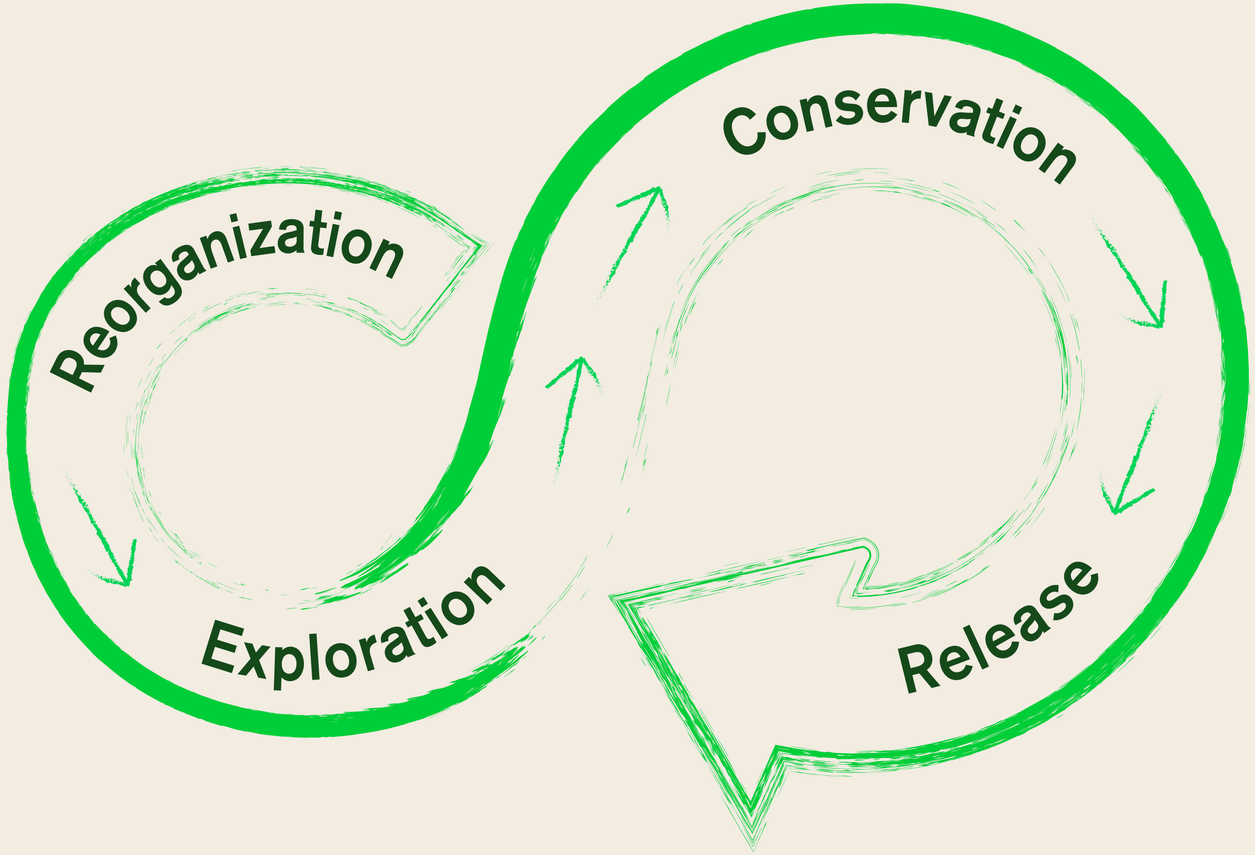
The Adaptive Cycle

The Adaptive Cycle is nature's blueprint for how systems grow, stabilize, break down, and renew. Ecologist C.S. Holling introduced it as a way to understand the deep patterns of change in ecosystems. And it can be applied to businesses, projects, and organizations, too.

Think of it as an infinity loop that never stops moving. Instead of a straight line of growth, nature works in four repeating phases:

- **Growth:** Rapid expansion, innovation, resource capture, etc. Energy flows fast and results in more opportunity.
- **Conservation:** Things stabilize. Resources and energy get locked in. Efficiency rises, but flexibility drops.
- **Release:** When disruption hits, like a fire, a drought, or a market shock, the system breaks open, releasing stored energy and resources.
- **Reorganization:** Chaos becomes creativity. Freed resources recombine in new ways. Innovation sparks. The system adapts to current conditions and begins a new growth cycle.

The cycle helps us realize that release (letting go) isn't failure. It's making space for renewal. Resilience isn't about resisting change. It's about moving through it. Because release and reorganization are where breakthrough innovation happens.



Panarchy

Nature works in layers. And so do we. Panarchy shows how systems at different scales interact to create resilience.

- Fast loops (experiments, pilots) = quick learning and innovation.
- Slow loops (corporate standards, governance) = stability and memory.

When the loops connect:

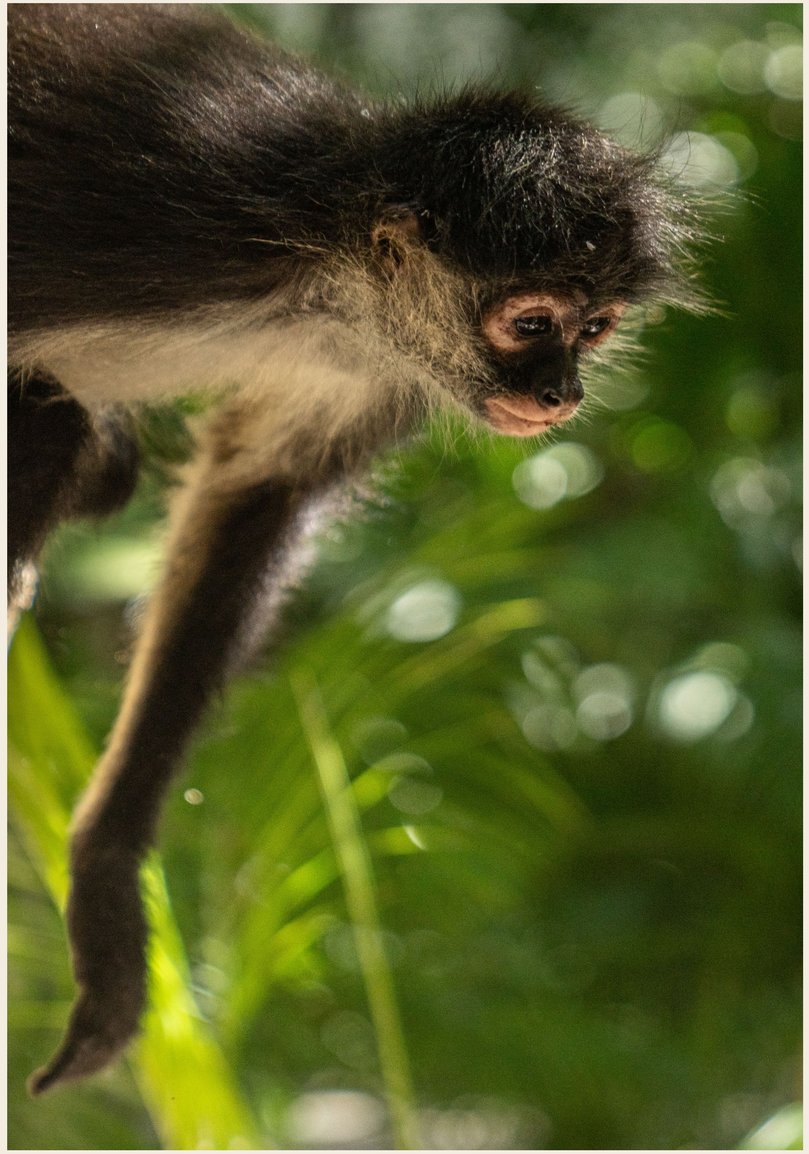
- **Revolt:** Small ideas scale up and spark big change.
- **Remember:** Big systems share resources and knowledge to help smaller ones recover and adapt.

Why it matters:

- Avoid rigidity traps. These are big systems that resist change.
- Avoid poverty traps. These are small, adaptive systems that get cut off from support.
- Prioritize coordination between scales so pilots can scale, and governance can flex.

Resilience isn't just bouncing back. It's about bouncing forward, together. When the fast and slow loops stay in sync, we can experiment without chaos and govern without becoming stagnant.





BIOMIMICRY IN PRACTICE

Observation unlocks innovation. When we pause and look to nature – not as a resource, but as a mentor – we find strategies that solve complex human challenges. These case studies show how looking to nature can turn into breakthroughs for design, performance, and sustainability:

Shinkansen Train

The challenge? Japan's high-speed Shinkansen trains were making a loud boom when going through tunnels. Engineers turned to nature to help fix this. The kingfisher's long, pointed beak allows it to dive into water without making a splash. By reshaping the train's nose to mimic the kingfisher's beak, the team reduced noise pollution, improved aerodynamics, and improved energy efficiency.





i2™ Carpet Tile

How would nature design a floor? The answer: nature is random. No two things are the same. There are similarities in the colors of leaves or bark, but nothing is identical. That's why Interface created its i2 carpet tile styles that are made to blend effortlessly, rather than match exactly. These styles reflect the wonderful randomness of nature, which helps simplify installation and reduce waste.





The Gherkin

What can a sea sponge teach us about architecture? London's iconic Gherkin building borrows its lattice structure from the Venus' flower basket sponge, a type of glass sponge that combines strength with lightness. The sponge is able to survive in the deep sea because of its exoskeleton and round shape that allows it to bend to absorb stress and support water flow. The Gherkin's design mimics the shape of the sponge. This helps reduce material use while optimizing airflow for passive cooling. It delivers performance and comfort without excess energy.





SIGNALS FROM THE RETREAT: WHAT WE LEARNED

The conversations got real. We named friction points that slow progress. And the openings that make change possible. These insights point to our evolution: from silos to networks, from competition to cooperation.

Biggest Challenges

Communication Gaps: Too many one way messages, not enough feedback loops. We need clear signals, shared vocabulary, and regular touchpoints so teams can sense, respond, and adapt in real time.



What We Can Do: Stand up regular forums and always-on communications channels that invite knowledge-sharing and invite dialogue.

Siloed Decision-Making: Design intent gets lost across stakeholders, regions, and handoffs. Without shared ownership and cross-functional alignment, ideas weaken as they move through the system.



What We Can Do: Use cross-industry councils with explicit roles and run focused pilots that can be codified into standards.

Fragmented Circular Processes: Great intent, broken pathways. Without modularity, disassembly plans, and predictable reverse logistics, momentum stalls.



What We Can Do: Build regional recovery capacity and align procurement standards to reward total performance so reuse and take-back become the norm.

Opportunities

Radical Collaboration: Cross-industry councils, open-source data, and shared solutions cut costs and speed learning. Connection beats competition when the goal is system-level performance. Councils can publish shared playbooks so others can replicate pilots regionally.

Leveraging Nature's Strategies: Use Life's Principles as practical design criteria. Optimize, diversify, attune locally, cycle resources. Nature's playbook turns complexity into resilience and efficiency.

Localized Infrastructures: Build regional hubs for sort/reuse/remanufacture so materials loop close to home. Local capacity shrinks footprints, accelerates turnaround, and makes circularity tangible.

What's Next

Shift from Competition to Collaboration: Treat partners – competitors, suppliers, customers, etc. – like an ecosystem with shared roles, rewards, and accountability. Collaboration is faster and cheaper than going it alone.

Build Trust & Transparency: Put it all on the table, including data, failures, successes, and more. Trust grows when performance is visible, and decisions are explained.

Engage Industry Bodies for Policy-Level Change: Move pilots into standards. Work with AIA, IIDA, and peer groups to codify what works so adoption scales.





CHALLENGES WE IDENTIFIED
(AND HOW NATURE INFORMED SOLUTIONS)

Turning barriers into breakthroughs. At the retreat, we asked: **What if we let nature guide us through our biggest challenges?**
By studying how nature works, we uncovered strategies to transform friction points into new opportunities.

Challenge A: Material Reuse & Take Back

Barrier: Reuse programs are fragmented and hard to scale. Take back commitments vary by vendor, region, and scope. No standard loop.

Nature's Model: In a symbiotic relationship, the pistol shrimp and goby fish share a burrow and co-manage risk: the shrimp excavates and maintains the home; the goby stands guard. Their partnership works because roles are clear, incentives align, and accountability is mutual. Two species, one shared outcome.

Nature-Inspired Idea: Establish multi-party social contracts and regional recovery hubs for sorting, remanufacturing, and re-entry. The goal is a predictable loop: materials leave the site, hit a local hub, and re-emerge as new inputs. It makes take-back a relationship, not a one-off transaction.



Challenge B: Knowledge Sharing Across the Industry

Barrier: Expertise is trapped in silos. Information moves one way. Specs and directives flow top-down, but learning from jobsites, maintenance teams, and reuse pilots rarely finds its way back into standards.

Nature's Model: Forest mycelium networks are dense, distributed, and omni-directional, connecting many different species. They help exchange nutrients, send stress signals, and route support where it's needed. The forest thrives because information and resources flow precisely where they are needed.

Nature-Inspired Idea: Create a living knowledge commons that provides:

- Open library for specs, performance data, reuse pathways, and case details.
- Two-way forums to share wins and failures.
- Signal dashboards that make carbon, health, durability, and circular outcomes visible in real time.

Treat knowledge like a shared resource. When the network is alive, it is asking, sharing, signaling. And the whole system adapts faster.



Challenge C: Manufacturing Samples

Barrier: Sample programs carry high footprints from shipping, waste, etc. And they miss local realities with wrong formats and off spec finishes.

Nature's Model: The honeybee "wiggle dance" uses precise signaling with clear data about distance, direction, and quality of resources. That helps the colony make smart resource decisions.

Nature-Inspired Idea: Shift to local micro production (e.g., regionally 3D printed samples or small batch prototyping) guided by standard signal sets: size, finish, carbon footprint, lead time. Pair this with local sourcing attuned to regional constraints so samples arrive right sized at the right time. When we tighten the loop between need and supply, samples become fit for purpose. Lower carbon, higher relevance, faster decisions.



VOICES FROM THE *Cohort*

What stayed with us? Simple, powerful truths that challenge business as usual. They capture the mindset change underway: we need to design for life, embrace change, and choose connection over competition.



> *Nature doesn't maximize; it optimizes.*

> *Nature has multiple strategies – not just one way of surviving.*

> *Goal setting is obsolete in nature. Success means creating conditions conducive to life.*

> *Competition is expensive; thriving comes from connection and reciprocity.*

> *Change is constant. Our failure is not being open to it.*

> *When you know better, you do better.*

> *It's good business to be a good neighbor.*

> *We are a very young species. Why reinvent the wheel when nature has 3.8 billion years of R&D?*

FROM RETREAT TO REALITY: OUR ACTION PLAN

Good ideas are only powerful when they drive real action. We turned insights into action – aligning on clear steps to scale collaboration, embed biomimicry into our work, and design systems that can adapt and thrive. Here's where we go from here.

1. Prioritize Cross-Industry Collaboration

Nature thrives on reciprocity. Look at coral reefs. They are dense communities where many species share resources and roles to keep the system alive. Our industry can mirror that logic.

What this looks like:

- Brainstorm a pathway toward take-back ecosystems, shared data standards, and localized infrastructure pilots.
- Identify potential next steps and make roles explicit so accountability is mutual, not optional.



2. Set Regular Touchpoints

Healthy ecosystems run on feedback signals that help them sense, adjust, and keep moving. Our work needs the same rhythm.

What this looks like:

- Host check-ins to surface what's working and what needs help.
- Keep regular communication channels open and engaged

3. Advocate for Standards that Reward Performance

If we only measure reduction, we forget about the power of regeneration. Nature's benchmark: create conditions conducive to life. That means measuring performance based on environmental impacts, durability and ease of maintenance, health and well-being, etc.

What this looks like:

- Push for standards that support biodiversity, human health and well-being, alongside climate action.
- Align specs and procurement to recognize total performance.



4. Apply Biomimicry (Beyond Materials)

Biomimicry is a mindset. It belongs in how we buy, operate, communicate, and govern.

What this looks like:

- Use Life's Principles in procurement (optimize, not maximize), communication design (feedback loops), and governance (cycling and renewal).
- Treat teams like adaptive systems – modular, diverse, responsible to local context – and understand where they are on the cycle.

5. Prototype Fast, Govern Smart

Nature balances fast loops (invention) with slow loops (stability). That's how ecosystems avoid chaos and stagnation. We can, too.

What this looks like:

- Run small pilots to test new ideas.
- When a pilot works, codify it into standards and policies with versioning to support ongoing adaptation.



RESOURCES FOR MORE INSPIRATION

Life's Principles & Biomimicry DesignLens: Created by Biomimicry 3.8, a collection of diagrams that visually present the foundations of its design approach. It includes the core components of DesignLens: Essential Elements, Life's Principles, and Biomimicry Thinking.

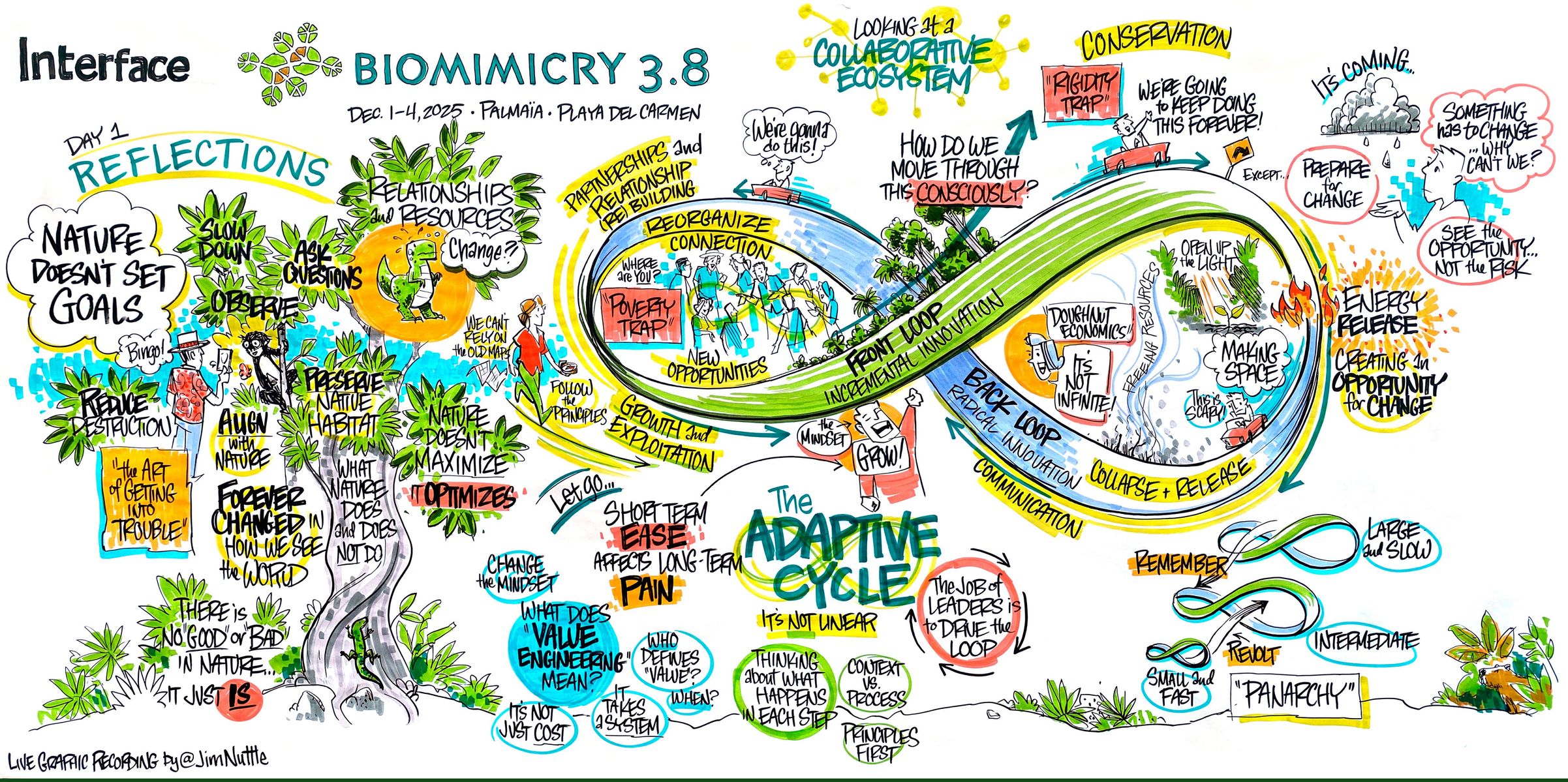
Project Positive: Led by Biomimicry 3.8, a group of change agents dedicated to raising the bar on what acting sustainably means. They are driven by a sense of urgency to move beyond arbitrary reduction goals, to science-based targets and actions that are actually generous to the ecosystems, employees, and communities in which we operate.

Biomimicry Institute: A non-profit organization on a mission to solve humanity's biggest challenges through the adoption of biomimicry in education, culture, and industry.

AskNature: An open-source database of deep biological knowledge created by Biomimicry Institute, presented in accessible language to inspire and guide anyone working to develop regenerative solutions for today's most pressing issues.

- AskNature Chat: AI-powered naturalist trained to reveal how living organisms solve problems and how we can learn ways from them to do the same.




Interface
BIOMIMICRY 3.8
DEC. 1-4, 2025 · PALMAÏA · PLAYA DEL CARMEN
DAY 1
REFLECTIONS
NATURE DOESN'T SET GOALS
SLOW DOWN
OBSERVE
ASK QUESTIONS
Bingo!
REDUCE DESTRUCTION
"the ART of GETTING into TROUBLE"
ALIGN with NATURE
FOREVER CHANGED in HOW WE SEE the WORLD
RESERVE NATIVE HABITAT
WHAT NATURE DOES and DOES NOT DO
THERE is NO "GOOD" or "BAD" in NATURE... IT JUST IS
RELATIONSHIPS and RESOURCES
Change?
NATURE DOESN'T MAXIMIZE IT OPTIMIZES
WE CAN'T RELY ON the OLD MAPS
FOLLOW the PRINCIPLES
LOOKING at a COLLABORATIVE ECOSYSTEM
We're gonna do this!
PARTNERSHIPS and RELATIONSHIP (RE) BUILDING
REORGANIZE
CONNECTION
WHERE are YOU?
"POVERTY TRAP"
NEW OPPORTUNITIES
FRONT LOOP
INCREMENTAL INNOVATION
GROWTH and EXPLOITATION
Let go...
SHORT TERM EASE AFFECTS LONG-TERM PAIN
CHANGE the MINDSET
WHAT DOES "VALUE ENGINEERING" MEAN?
WHO DEFINES "VALUE"?
WHEN?
IT TAKES a SYSTEM
IT'S NOT JUST COST
the MINDSET
GROW!
The ADAPTIVE CYCLE
IT'S NOT LINEAR
THINKING about WHAT HAPPENS IN EACH STEP
CONTEXT vs. PROCESS
PRINCIPLES FIRST
The JOB of LEADERS is to DRIVE the LOOP
HOW DO WE MOVE THROUGH THIS CONSCIOUSLY?
CONSERVATION
"RIGIDITY TRAP"
WE'RE GOING to KEEP DOING THIS FOREVER!
EXCEPT...
DOUGHNUT ECONOMICS
IT'S NOT INFINITE!
FREEING RESOURCES
OPEN UP the LIGHT
MAKING SPACE
This is SCARY!
BACK LOOP
RADICAL INNOVATION
COLLAPSE + RELEASE
COMMUNICATION
ENERGY RELEASE
CREATING an OPPORTUNITY for CHANGE
IT'S COMING...
PREPARE for CHANGE
SOMETHING has to CHANGE ... WHY CAN'T WE?
SEE the OPPORTUNITY... NOT the RISK
REMEMBER
LARGE and SLOW
INTERMEDIATE
REVOLT
SMALL and FAST
"PANARCHY"
LIVE GRAPHIC RECORDING by @JimNuttle