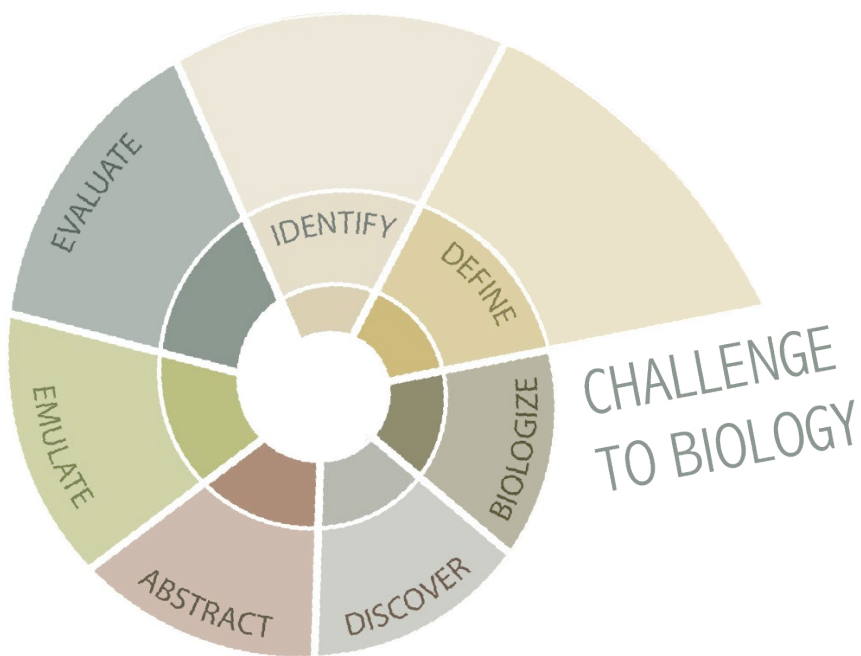


BIOMIMICRY DESIGN SPIRAL

Challenge to Biology

The Biomimicry Design Spirals are visual aids that illustrate the biomimicry design process.* The Challenge to Biology spiral is a helpful tool when you have identified the design problem or opportunity (the "challenge") that you wish to solve and want to look to biology for inspiration.

NOTE: It's important to remember that the Design Spirals are a simplified version of what is in reality a somewhat messy and iterative process. Although the steps are listed sequentially you should expect to revisit earlier steps and revise your work along the way as new discoveries lead you to rethink previous conclusions. There's a reason it's a spiral, not a straight line.



1. IDENTIFY

Function

2. DEFINE

Context

3. BIOLOGIZE

Challenge

4. DISCOVER

Natural Models

5. ABSTRACT

Design Principles

6. EMULATE

Nature's Strategies

7. EVALUATE

Against Life's Principles

**The Design Spirals were produced in collaboration between the Biomimicry Institute and Biomimicry 3.8 (formerly the Biomimicry Guild).*

Challenge to Biology Methodology

Adapted from the Biomimicry Resource Handbook, co-published in 2011 by the Biomimicry Institute and Biomimicry Guild (now Biomimicry 3.8).

Identify...

- The challenge
- Relevant function(s)

Focus not on what you want to design (e.g. "an air conditioner", but rather what you want your design to do (e.g. "make people feel cooler").

Define...

- Context / operating parameters
- Sustainability goals based on nature's unifying patterns or Life's Principles

Context may include:

- Environmental conditions (wet, dry, hot, cold , etc)
- Resources (nutrient rich/poor, economics, materials)
- Social conditions (competative or cooperative)
- Temporal conditions (static, growing, dynamic, ageing)z

Biologize...

- The challenge / design question

Reframe your design challenge (function plus context) in biological terms
e.g. "How does nature stay cool in hot conditions?"

Ask the opposite, or variations on, the design question:
e.g. "How does nature manage temperature?"

Discover...

- Natural models / biological strategies

Using your biologized design question(s) as a guide, learn as much as you can about how (strategies) organisms and living systems accomplish the function(s) you are interested in. Spend time outside observing nature with your design question(s) in mind. Research the scientific literature and talk with biologists and naturalists. Consider metaphorical models where appropriate.

Abstract...

- Design principles / Design strategies

Once you have found some inspiring biological strategies, 'abstract' or translate the core principle of the strategy (how the function is achieved) into design terminology. How can you explain the strategy without referencing the organism or biological components?

e.g. "a collapsible permeable layer, sandwiched between two rigid layers."

Emulate...

- Nature's strategies / apply abstracted design strategies

Brainstorm and develop design concepts that utilize what you have learned from nature. Consider "chimera" designs that incorporate strategies from multiple organisms into one design. Consider all levels of emulation: form, process, and system. Make sure you are keeping context in mind and applying nature's strategies at the appropriate scale (e.g. nano-scale likely won't work at a larger scale). Consult biology experts as needed.

Evaluate...

- Against nature's unifying patterns / Life's Principles

The goal of biomimicry is to create designs that meet nature's stringent standards for life-friendly, sustainable design. Assess your design with this goal and nature's unifying patterns in mind. Look for ways you can improve your design to make it more life-friendly.