

| | | <u>Stages</u> | <u>Input</u> | <u>Maria O'Farrell's Contribution</u> | <u>Client Contribution</u> | |
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| Phase I | Scoping Phase | 1 | Identify Core Function | Determine core functions that product must accomplish - identify what the product should do (verb), as opposed to what the product should be (noun) | Work with client to uncover actual design function based on what the design should "do" not what the design should "be". Introduce biomimcry taxanomy (chart organizing biology functionally) and help to identify which of these functions align with the design functions | Input on functional needs of design |
| | From several weeks to one/two months to fill in taxonomy | 2 | Define Context | Outline importance of context- what the deisgn must do functionally under what constraints | Introduce the role of context and what possible contextual considerations (for the product itself and the larger stakeholder ecosystem) the client should examine | Input on stakeholder requirements/ determine under what conditions,circumstances, constraints, laws, budgets etc.the solution must meet in its design function. The extent of this piece will be determined by the client. |

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| | | 3 | Life's Principles | Introduction of Life's Principles (L.P.) - lifes operating manual- rules by which all Life's designs operate | Define and give examples of all of Life's Principles | Identify aspirational goals- which of the set of Life Principles the client aspires to align product design with |
| Phase 2 | Discovering Phase | 1 | What are the champion biological models? | Comprehensive understanding of design solution functions and context . Biologize the question- "How Would Nature (Function X)in (Context Y)?" | Using the identified functions and the biologized question undergo an extensive search throughout the biological spectrum using several different biological lenses or search filters/patterns: 1.) functional lens- used to search for a particular functional need 2.) operating condition lens - used as search tool when design must accomodate or manage a certain environmental condition | Provide any information as it comes up that can guide or inform MO's search |

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| | | Selection Process | Examination of Biological Champions and the spectrum of strategies | Presenation of a wide spectrum of organisms and their strategies - an organism/strategy taxonomy - at a cursory level | Feedback on initial taxonomy-decipher which organisms/strategies are the most in alignment with the functional and contextul design considerations and goals of the client |
| | | 2 Deep dives into primary literature | 2-8 "Champion biological models" identified that will be used to do a deep biological dive to understand biological strategy | Deep dives into the primary biological literature to uncover biological strategy and underlying mechanisms . Gain an understanding of the dense biology and put out a simplified, digestible version of the strategy to the client | Feedback on different strategies - determine which one(s) should be focused on to abstract design principles from |

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| | | 3 | Abstract the design principles from the biology | Simplified biological strategies of natural champion models | Distill design principles from biology leaving out the biology and keeping only the abstracted design principles. | Feedback and input from the client on their interpretation of abstracted design principles |
| Phase 3 | <u>Creating Phase</u> | 1 | Brainstorming from abstracted principles to a product (Bio inspired ideas) | Abstracted Design Principles | To the extent determined by the client , brainstorm design solutions based on abstracted principles | Brainstorm potential design solutions |
| | | 2 | Emulate the design principles in the product | Brainstormed design solutions | N/A | The client's internal teams |

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| Phase 4 | <u>Evaluating Phase</u> | 1 Measure the product against life principles | New Product | After initial product beta, reintroduce Life's Principles to assess the products alignment with L.P.s | Assess alignment with L.P.'s and determine if more aspirational goals need to be met |
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| Output | Timeframe | Notes | Material/Education? |
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| Core design function(s) and biologized question(s) identified | 1-3 hours | Keep in mind throughout this process that much like nature itself this process is not linear. It is organic and iterative and undoubtedly as the process unfolds there may be a need to circle back to previous stages and out again. | Biomimcry taxonomy |
| All pertinent contextual parameters of design's function identified. Biologized question(s) identified - these questions serve to incorporate function and context and act to inform biological search in the Discovering Phase. | 1-3 hours | The client really determines how much time spent here | The client provides insight into it's larger stakeholder ecosystem and how this may inform design criteria |

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| <p>Understanding of Life's Principles and identify which of the L.P.'s will be aspirational goals for the design</p> | <p>1-6 hours</p> | <p>The client really determines how much time spent here</p> | <p>Life Principles</p> |
| <p>Identification of wide array of possible biological solutions - solutions taxonomy. 8-20 Biological Champions/Models- those organisms that optimally accomplish functions that meet the desired functional needs of the design in context</p> | <p>25-100 hours</p> | <p>At this stage the net is cast very wide so here there is only a cursory understanding of the biological strategy. At a later stage, once champions are identified there will be a deep dive into strategy in order to understand mechanism</p> | |

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| Determination of top 2 8 natural champions to explore as a deep dive in the next stage | 1-5 hours | Most time intensive | Organism/Strategy taxonomy - based on this design challenge |
| An understanding of how the strategies work, which is how function is achieved, and an understanding of the underlying mechanisms, which is how the strategy works. | 25-125 hours | Most time intensive | Primary Literature/Scientific Journals |

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| <p>Abstracted design principles that are context and audience appropriate- to hand off to designers. An organism/deep principle taxonomy chart that synthesizes the abstracted design principles collectively and highlights deep patterns across organisms</p> | <p>20-100 hours</p> | <p>Most time intensive</p> | <p>Primary Literature/Scientific Journals</p> |
| <p>Potential design solutions</p> | <p>10-50 hours</p> | <p>The client determine how much time spent here if any or if this will be an internal process handled by the client</p> | |
| <p>New product</p> | <p>Unlimited</p> | <p>Hand off</p> | |

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| Product assesment - determination of the extent of alignment with Life's Principles and determine opportunitites for improvement - furher inclusion of Life's Principles in future design iterations | 2-3 hours | 1st attempt is alignment with as many Life Principles as is feasible | Life's Principles |
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