

Nature's Unifying Patterns (NUP) - Worksheet

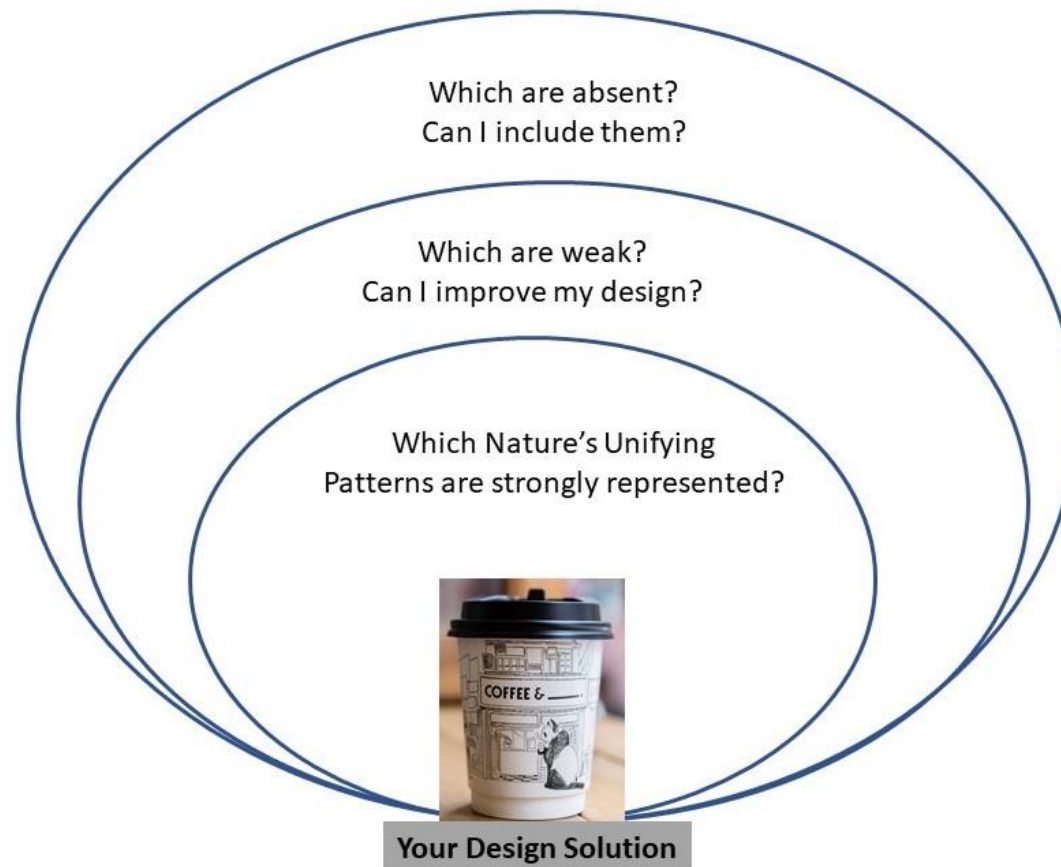
This worksheet accompanies the Natural Entrepreneurs Learning Journey Create Phase (Nature's Unifying Patterns).

In the Define Phase you selected the NUPs which you thought will help in your Challenge. Now you have created your Design Solution, it is helpful to reflect on how these NUPs have helped and if you can improve on your Design Solution in the future.

Make use of the table on the next page to refresh your understanding of the NUPs.

- Read the table including the definitions and recall the NUPs you selected in the Define Phase.
- Use the questions to help reflect on how useful each of your selected NUPs have been and if you can make improvements.
- Use the reflection 'circles' in the diagram below to help you think if other NUPs can also help improve your Design Solution.
- Add your conclusions to the TASK: Measure on the NatEnt platform.

Remember, you can use these reflections to go back and improve on your Design Solution if you wish.



Pattern (NUP)	Definition	Question
Nature uses only the energy it needs and relies on freely available energy.	Life on earth is powered by the sun, as well as residual energy from the earth's core. Energy is cycled throughout earth's systems and the optimal amount utilised for nature's needs.	Where does the energy come from to power/generate/run your product/service? How is energy use minimised? Are materials made with minimal energy?
Nature recycles all materials.	As well as energy, minerals and gases are in continuous cycles within earth's systems. Some of these cycles occur daily (e.g., respiration), while others occur over millennia (such as the rock cycle). There is no such thing as a waste product.	What happens at the end of the products life? Is there any waste and how do you deal with it? Are materials biodegradable? Does waste become a resource something else?
Nature is resilient to disturbances.	Shocks and disturbances are common on our planet, but nature is remarkably able to respond to upheaval by adapting through strategies developed since the beginning of life on earth.	How does your product/service respond to disruption – can it find alternatives, self-repair? Does your product/service rely on centralised or decentralised inputs?
Nature tends to optimize rather than maximize.	Nature seeks a balance between the required resources for growth, and overdevelopment. Structures are optimised to be efficient and agile.	Can you make your product more efficient and reduce the material resources used? Is your product/service needed?
Nature provides mutual benefits.	Competition in nature occurs when it is impossible to avoid as it is very costly in terms of energy. Nature favours cooperation because it maintains the health of the whole system.	How does your product or service work alongside others, or as a part of a functioning system? Can your product/service have multiple benefits? Is your product/service available/accessible for all?
Nature runs on information.	Organisms sense their environment and make use of rapid information to respond. Some organisms can only survive in very particular conditions and heavily rely on environmental information not to stray from these parameters.	How does your product adapt when local conditions/situations change? Are feedback loops designed into your product?
Nature uses chemistry and materials that are safe for living beings.	Because chemical reactions are fundamental to cellular processes, it is vital that the raw materials for these processes are not only readily available but also not harmful to the life of the organism. Toxins are also produced but require careful cellular management and degrade rapidly.	Do all materials safely break back down (biodegrade) and can you minimise the chemical elements used?
Nature builds using abundant resources, incorporating rare resources only sparingly.	Nature makes use of the most basic materials to create what it requires in the given situation- namely carbon, nitrogen, hydrogen, and oxygen. The Caddis fly larvae build their shells from whatever debris exists in their environment at the bottom of lakes and rivers. Termites build exquisite homes from soil.	Is your product/service made using only local and abundant resources? Does your product/service do just enough?
Nature is locally attuned and responsive.	The survival of organisms depends on them being able to make use of locally available resources and optimising for the conditions where they live.	Does your product/service use local skills and resources and is it adapted to suit local conditions? Is there a better local alternative?
Nature uses shape to determine functionality.	Nature makes use of form rather than excess material to increase strength and bolster functionality, thus enabling efficient use of resources.	Have you considered whether a different shape can be used to achieve the same function (with less materials)?