



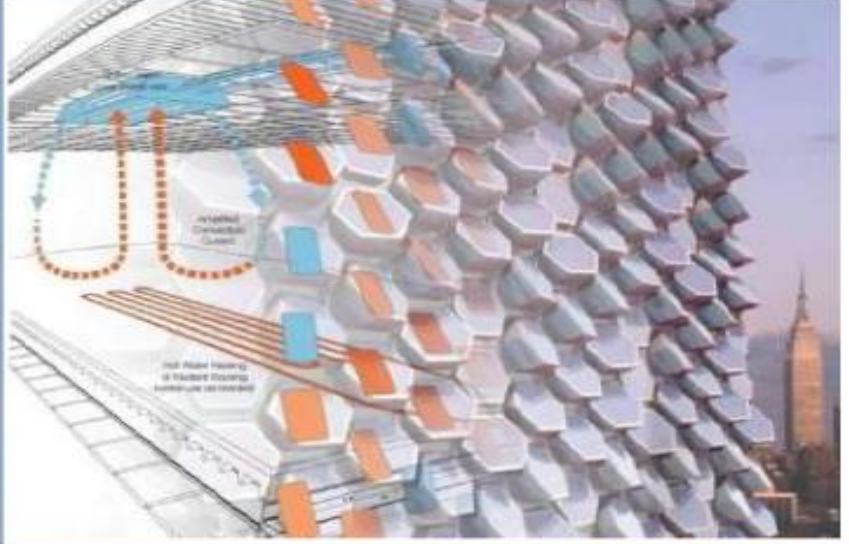
Shift In Architecture from Bioinspiration to Biomimicry: Trends and Perspectives

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INTRODUCTION & AIM

- It refers to **efficient and sustainable technology** that nature has developed over the course of **3.8 billion years** and was **first used by Janine M. Benyus in 1997**. The **architectural community** is shifting towards a **circular economy**, focusing on **natural design systems** and processes, to **increase sustainability** and **develop a restorative approach**, as **practitioners and academics shift from a linear economy to a circular one**.

Biomimicry for Form-Finding	Biomimicry for Sustainability
 	
<ul style="list-style-type: none"> - Mimicking Honeycomb (Static Form) - Using technologies for Form-finding - This design looks like nature does not work as nature 	<ul style="list-style-type: none"> - Mimicking Honeycomb (Kinetic system) - This sustainable design can face climate change and (Works Like Nature).

Research Problem/Gaps

- Biologists are not well-versed in design**, a knowledge gap that may be filled with beginning **biology instruction**.
- In **mapping parallels and abstracting biological systems**, **transition gaps** occur because **comprehensive models** are not necessary; designers only need **partial inspiration from natural things**.

Aim/Objective

- The principal objective is to **showcase new technology tools utilized** in the architecture field while **creating a methodological framework for designing behavior systems based on natural design principles**.
- Through the use of a **scaled-down responsive facade unit prototype**, the research seeks to assess the applicability of a design framework by concentrating on the design and manufacturing procedures rather than the actual design of the unit.

METHOD

- The study focused on **biomimicry, bio-inspired, thermoregulation, energy efficiency, and facade** while analyzing **trends in biomimicry between 2005 and 2024** from the WoS database.

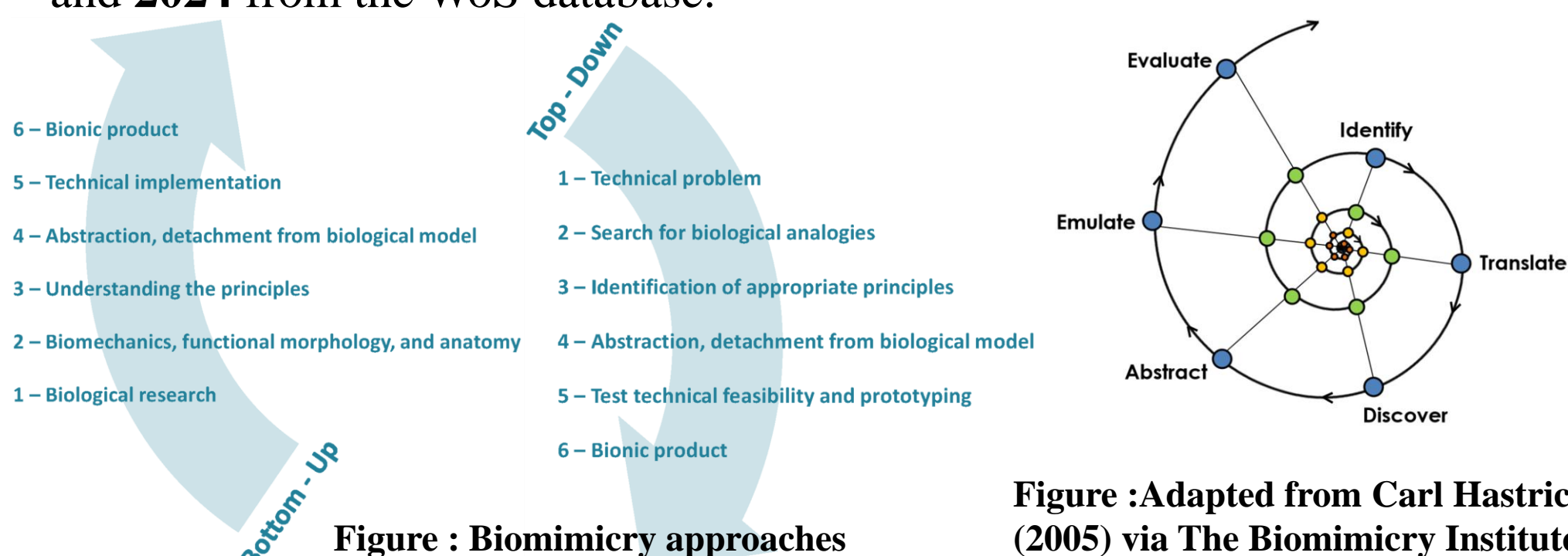


Figure : Biomimicry approaches

Figure :Adapted from Carl Hastrich (2005) via The Biomimicry Institute.

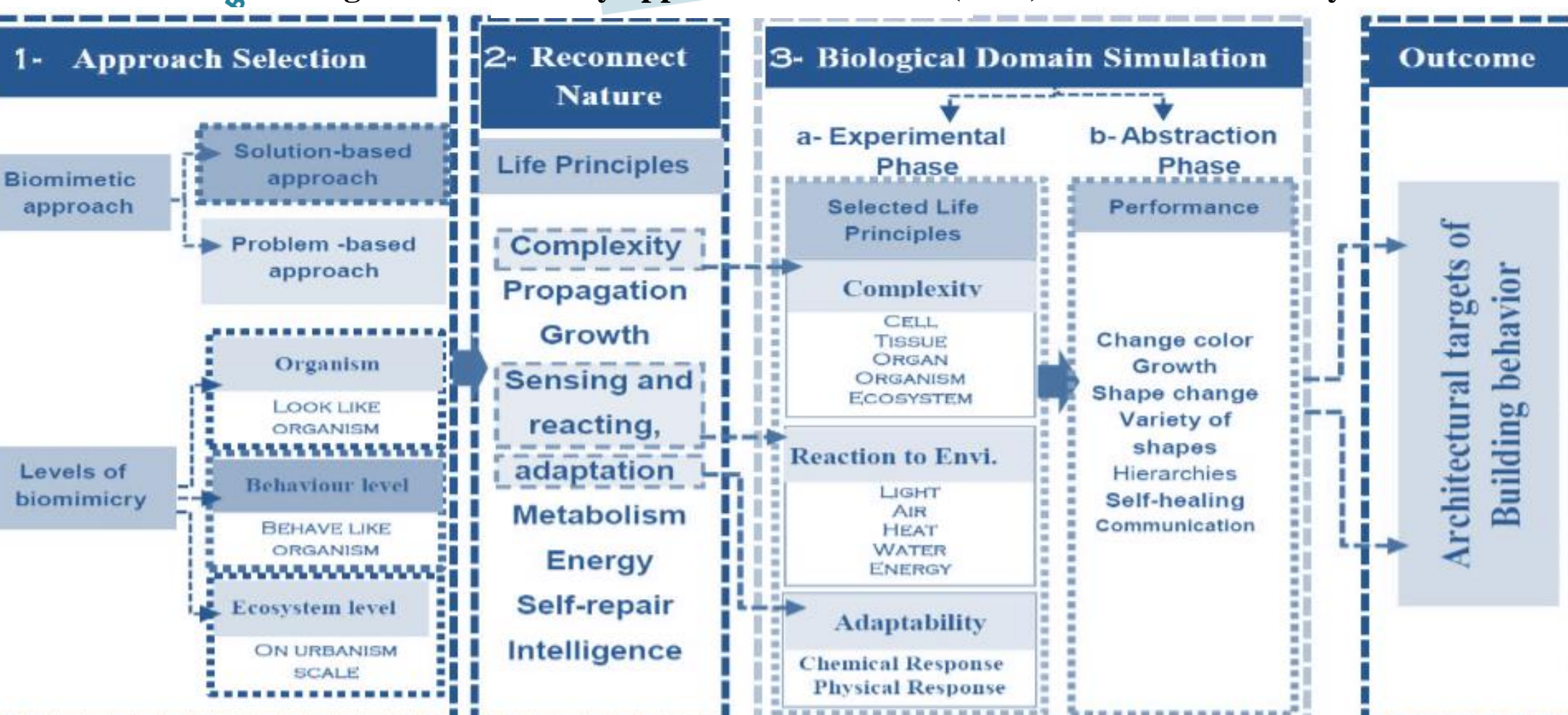


Figure :Lifecycle variables including colour, improvement, form, multiple shapes, structures of authority, self-healer and interactions are part of the biomimetic design methodology.

RESULTS & DISCUSSION

- Using **biological role models**, **architecture behaviour development** is made simpler by biomimicry. The essay defines architectural goals as **biological challenges** using a **problem-based methodology**. There are phases in the biological realm, and then there is abstraction, where particular performance is applied to aspects such as envelopes, structures, and materials. Using a **biological role model**, **simulation is used in the experimental phase**.

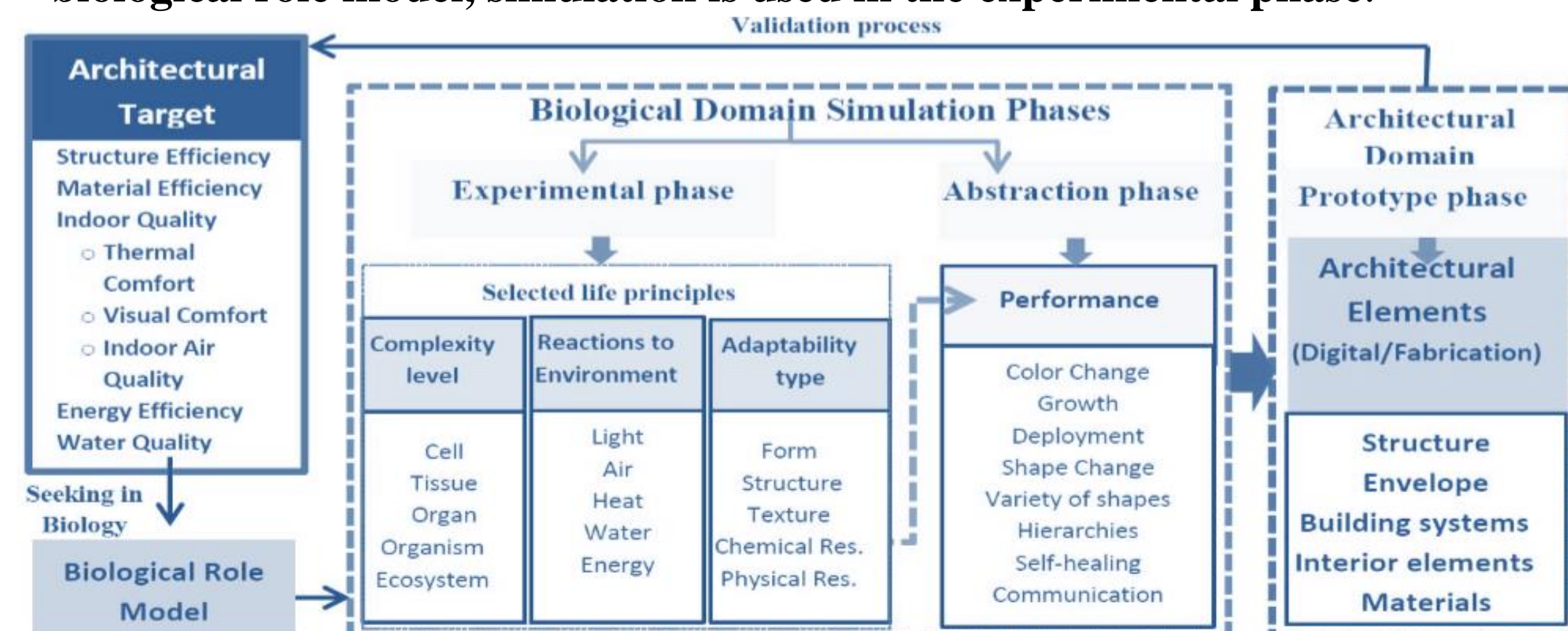


Figure :Architectural aspect, the issue based approach is being used to explore potential methods in the architectural domain.

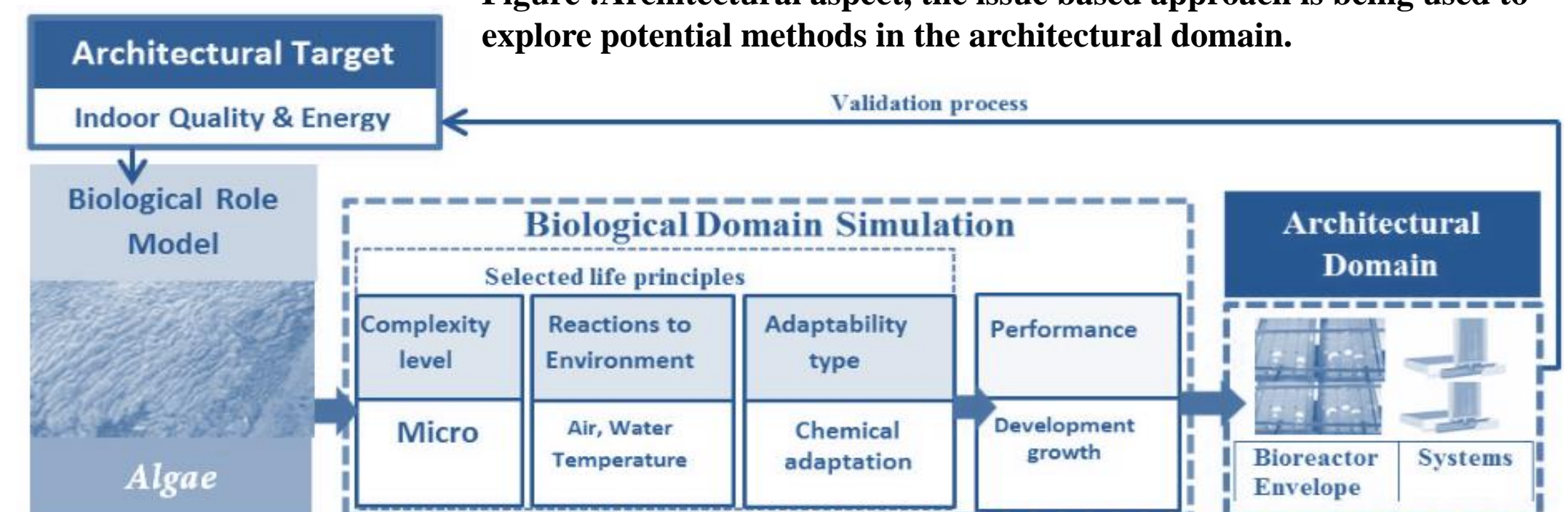


Figure : Using abstracted principles, algae function at the micro-level of complexity, serving as a biological role model.

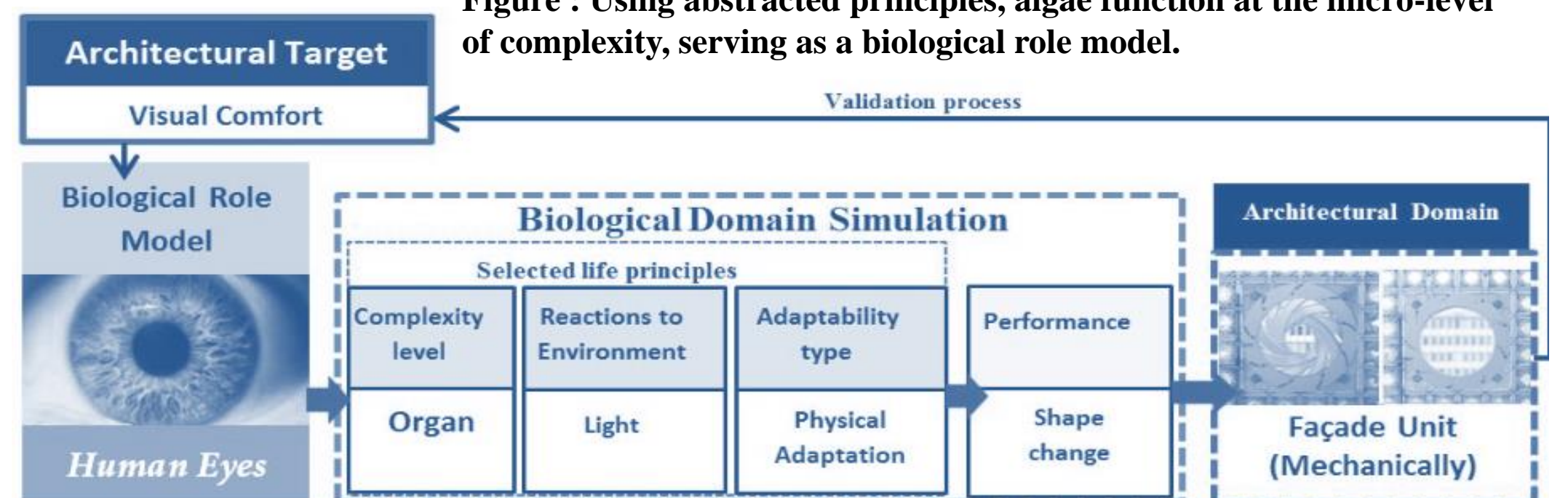


Figure : As abstracted principles, the eye is an organ that functions at a highly complex level.

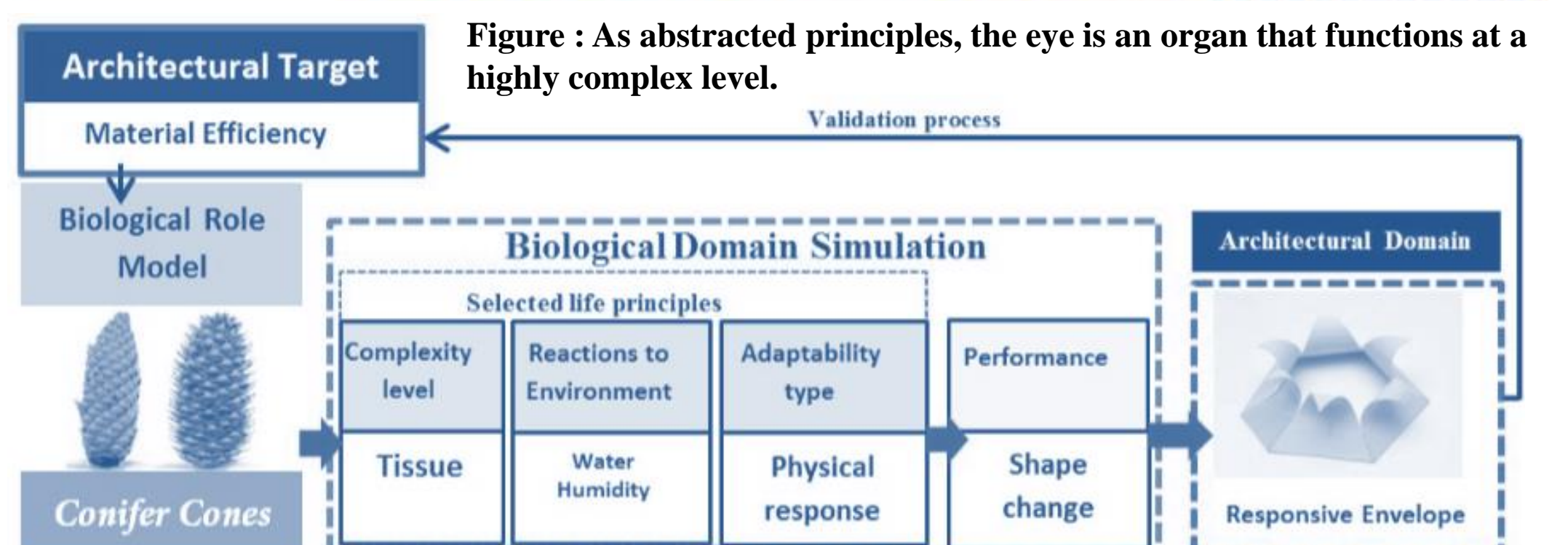


Figure : The Biological Function Of Cones During The Abstraction Stage

CONCLUSION

- In discussing the biomimetic method to interacting with nature, this study focuses on two strategies: **using natural solutions and reaping their benefits**, and **utilising architectural challenges to identify natural solutions that benefit them**, employing a problem-based strategy for building behaviour issues. The results are abstracted in the second stage, and then they are applied to design and technology in the third.

FUTURE WORK / REFERENCES

- Janine Benyus, "Biomimicry: Innovation inspired by nature", USA: Perennial, 2002
- M. Iman, M. Donn, "Bio-inspired Materials", Springer Nature, Switzerland, 2019
- Goel, A.K., Vattam, S., Wiltgen, B. and Helms, M., "Information-Processing Theories of Biologically Inspired Design", Biologically Inspired Design, Springer, London, 2014