BALANCING CREATIVITY AND PERFORMANCE ANALYSIS

an algorithmic design approach

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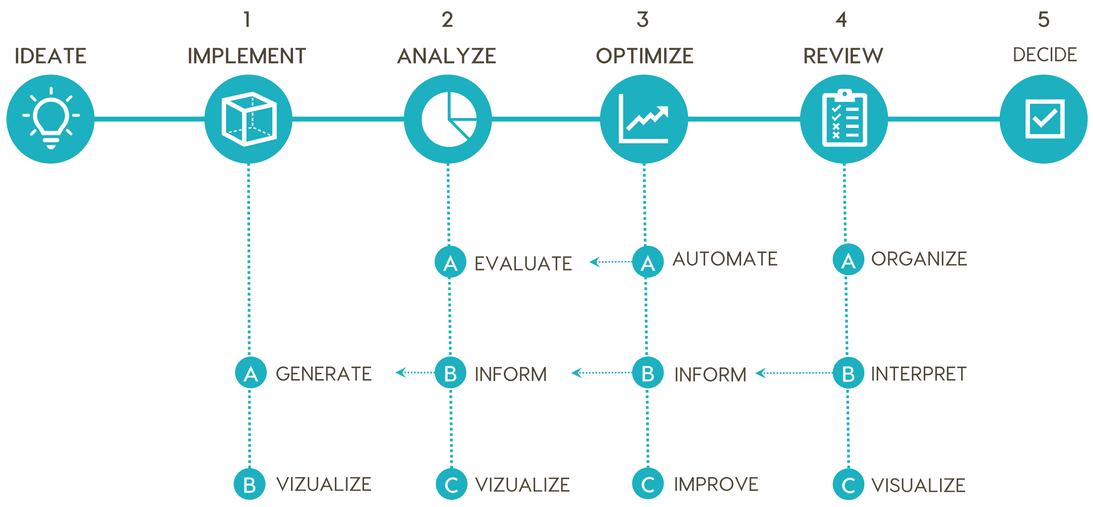
PROBLEM

Performance simulation and optimization **postponed to later design stages**.

Changes to the design are **more expensive.**

Creativity is disregarded to favour better performance.

METHODOLOGY



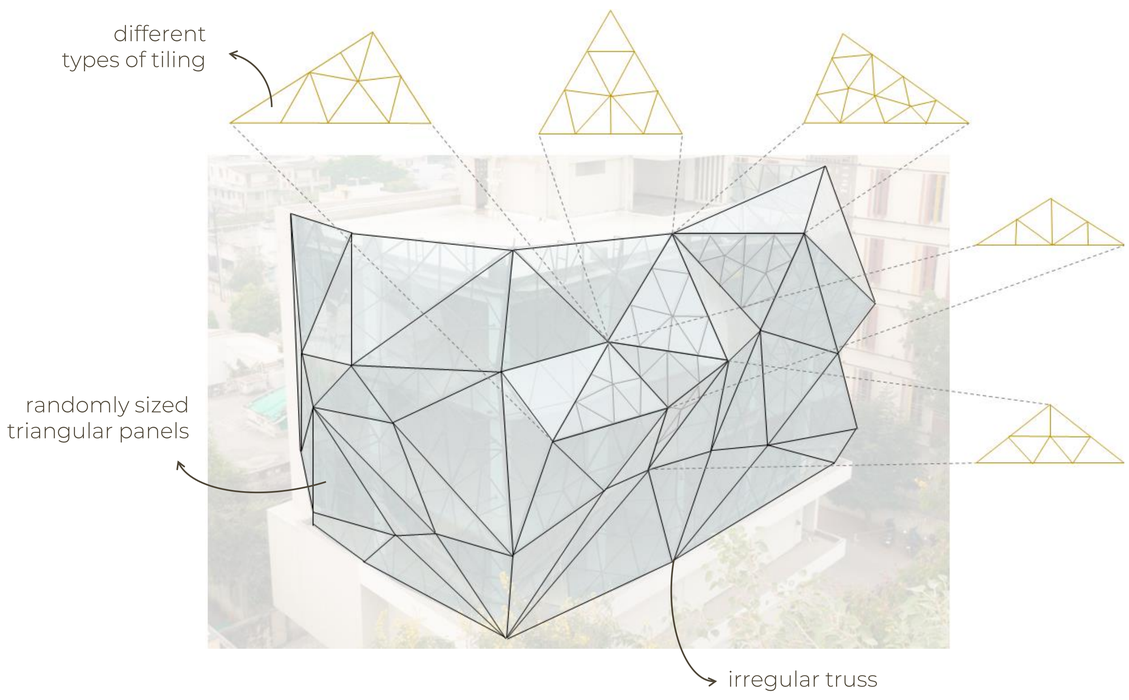
IMPLEMENTATION

Create design's algorithmic description

- Create the **parametric algorithm**.
- Decide the **degrees of freedom**.

Case Study

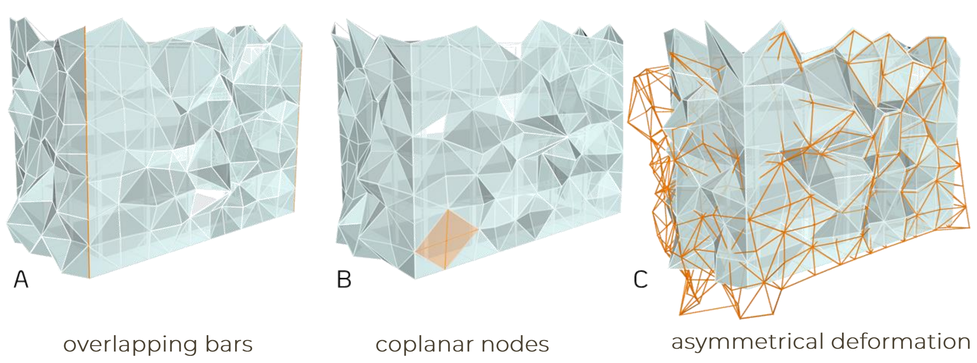
Blue Crystal building, India, by KPA Deesign Studio



ANALYSIS

Structural simulation

- **Identify inconsistencies** in the design.
- **Adapt** the algorithmic design.



overlapping bars | coplanar nodes | asymmetrical deformation

OPTIMIZATION REVIEW

Find solutions

- that are **better-performing**.
- that best meet the **design intent**.

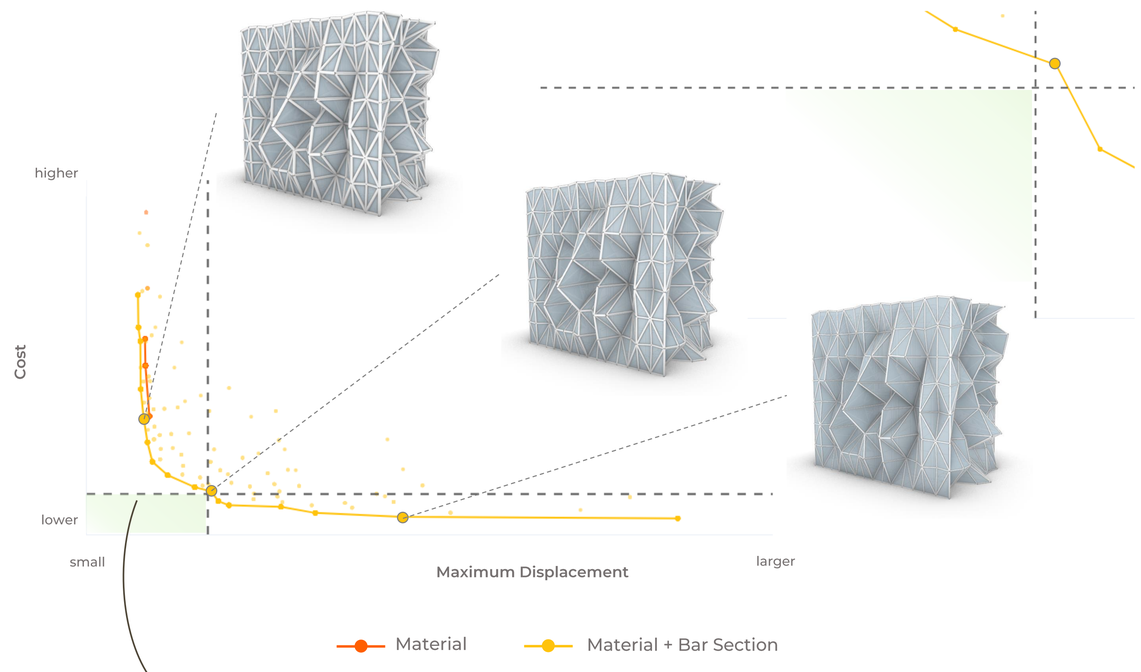
Optimization Objectives

- Minimize maximum displacement
- Minimize the structure's cost

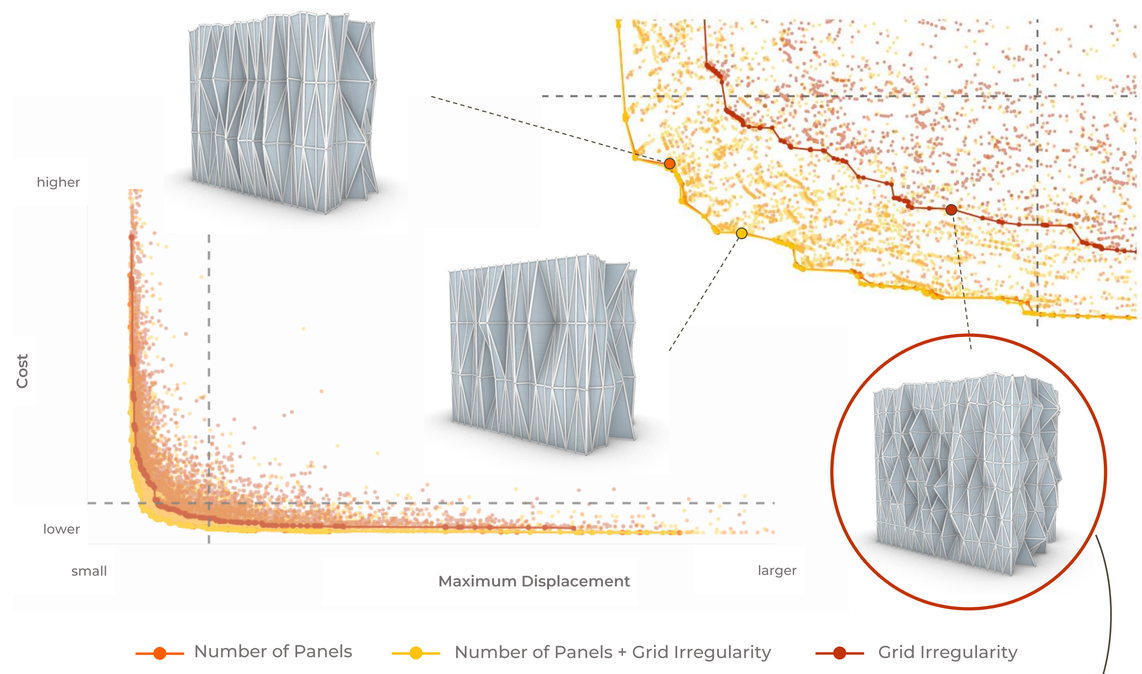
Variables

- Iteratively add new ones or update their range

Optimization results for the 1st and 2nd iterations of the optimization



Optimization results for the 6th, 7th and 8th iterations of the optimization



Final solution

Best trade-off between performance and design intent.

CONCLUSIONS

Enhanced design exploration.

Integration of creative preferences.

Environmentally-conscious designs.

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