Implementing Circular Economy In Building Construction-From Theory To Practice

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A brief history of construction evolution

Thatched mud house of the first indian immigrants

- Not durable and of a temporary nature
- Insignificant impact on soil properties such as absorption,etc..
- Use of natural organic material
- Environmental friendly
- The question of recycling did not arise

A brief history of construction evolution

Case Creole

- More durable in time
- Has an impact on soil properties such as absorption, etc..
- Use of natural organic material
- Not so much environmental friendly

A brief history of construction evolution

Concrete Buildings

- Still more durable in time
- Such construction proliferated after cyclone Carol 1960
- Has a profound impact on soil properties such as absorption, etc..
- Use of natural non-organic materials, depleting the environment of its resources
- Large construction costs
- Really so much environmental friendly

The Previous Practice in Construction-Basic Linear Economy Model

Basic Linear Economy Model consisted of

1. Extract-large amounts of raw materials inputs and non-renewable resources
2. Use and
3. Landfill-generates large amount of non-degradable wastes

It is innovative practice to foster sustainability in a systematic way and moved away from a basic linear economy model to a circular economy (CE)

The 3R's Priciple

Reduce-action of minimising inputs and outputs of raw materials and wastes
Re-use – the operation of using a product again for the same purpose when it reaches its end of life and
Recycle-the process of recovering waste to manufacture a new product

Innovative Practice in Construction

Moving from the 3R's principle to a 9R's framework

1st strategy aims at better product manufacturing

Refuse-Depreciate a product with negative impacts and proposing a different one with identical or even better functions and fewer impacts
Rethink-Intensify the product use and use of products with multiple functions
Reduce-Decrease the use of raw materials and energy consumption while enhancing efficiency

Innovative Practice in Construction

Moving from the 3R's principle to a 9R's framework

2nd strategy is to encourage product life span

Reuse-reuse a discarded product that keeps the same functions by another user
Repair-Fix a damaged product to give back its initial performance
Refurbish-Renovate an outdated product to make it as a new one
Remanufacture-Make a product using parts from a damaged product that has a different functions
Repurpose-Make a product using parts from a damaged product that had different functions

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Moving from the 3R's principle to a 9R's framework (Cont)

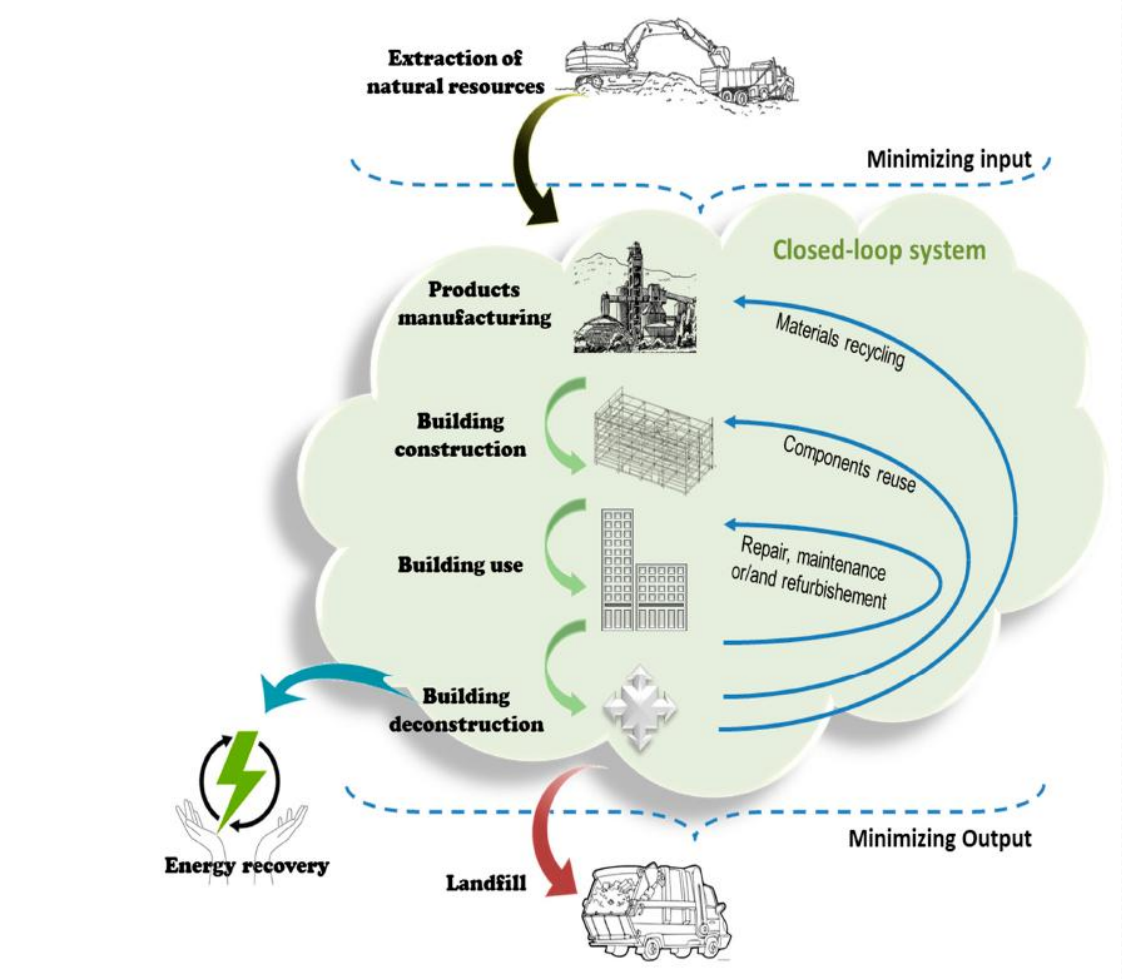
3rd strategy-last and least favoured

Recycle-Include , into the manufacturing process of a product, materials that reached their end-of-life use to make materials with either

1. Same qualities
2. Higher qualities-Upcycle
3. Lower qualities-Downcycle

Recover-The process of retrieving heat, electricity or fuel from non-recyclable materials by incineration.

Closing the Material Loop in Construction



Nearly Zero-Energy Buildings-NZEB

A building's life cycle consumes substantial amount of energy:

1. From material extraction
2. Processing of materials into products
3. Building construction
4. Operation of buildings
5. Demolition/reconstruction phases

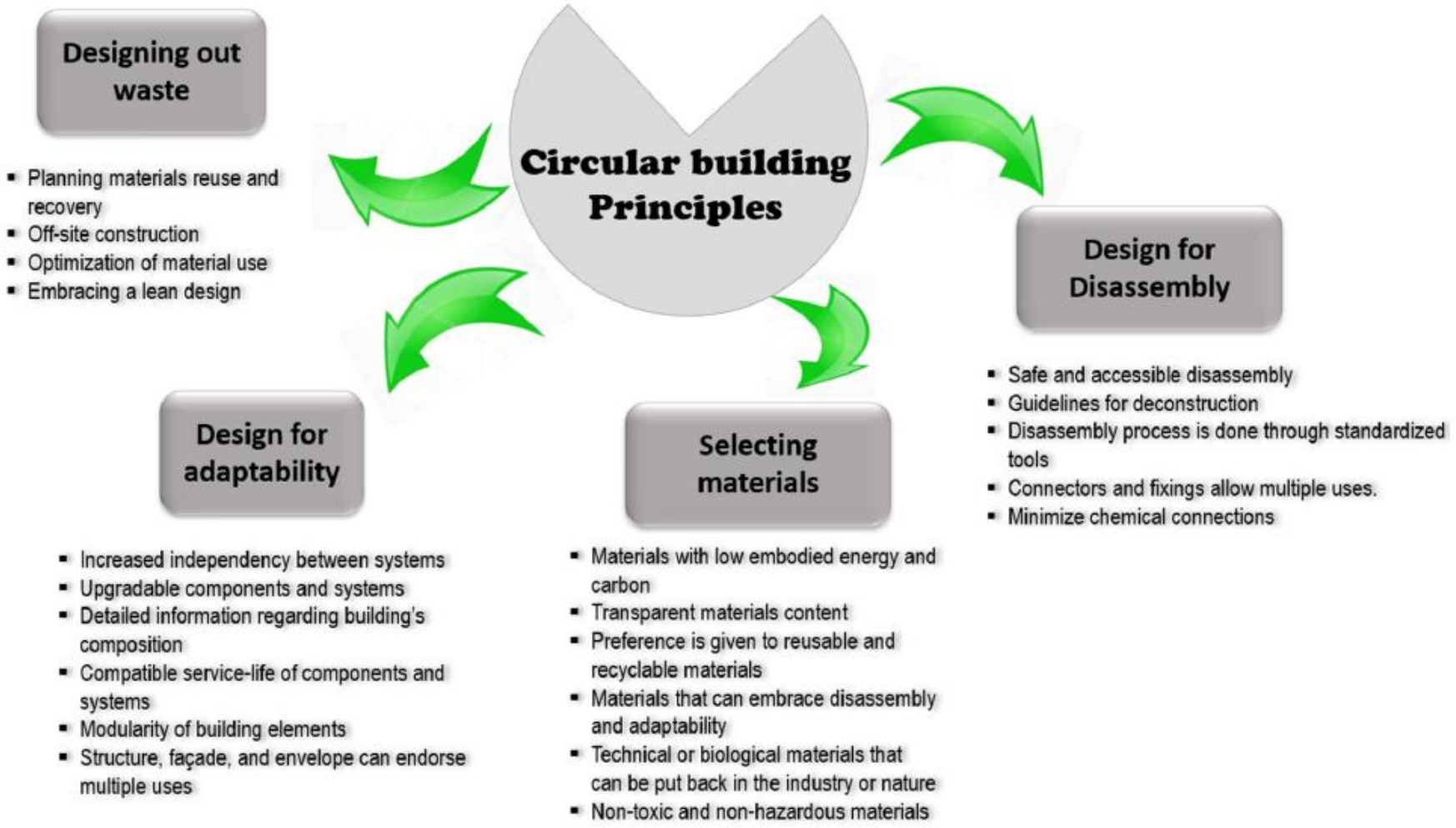
The challenge to practitioners in the construction industry is to produce buildings with high energy efficiency or the NZEB

Circular Buildings

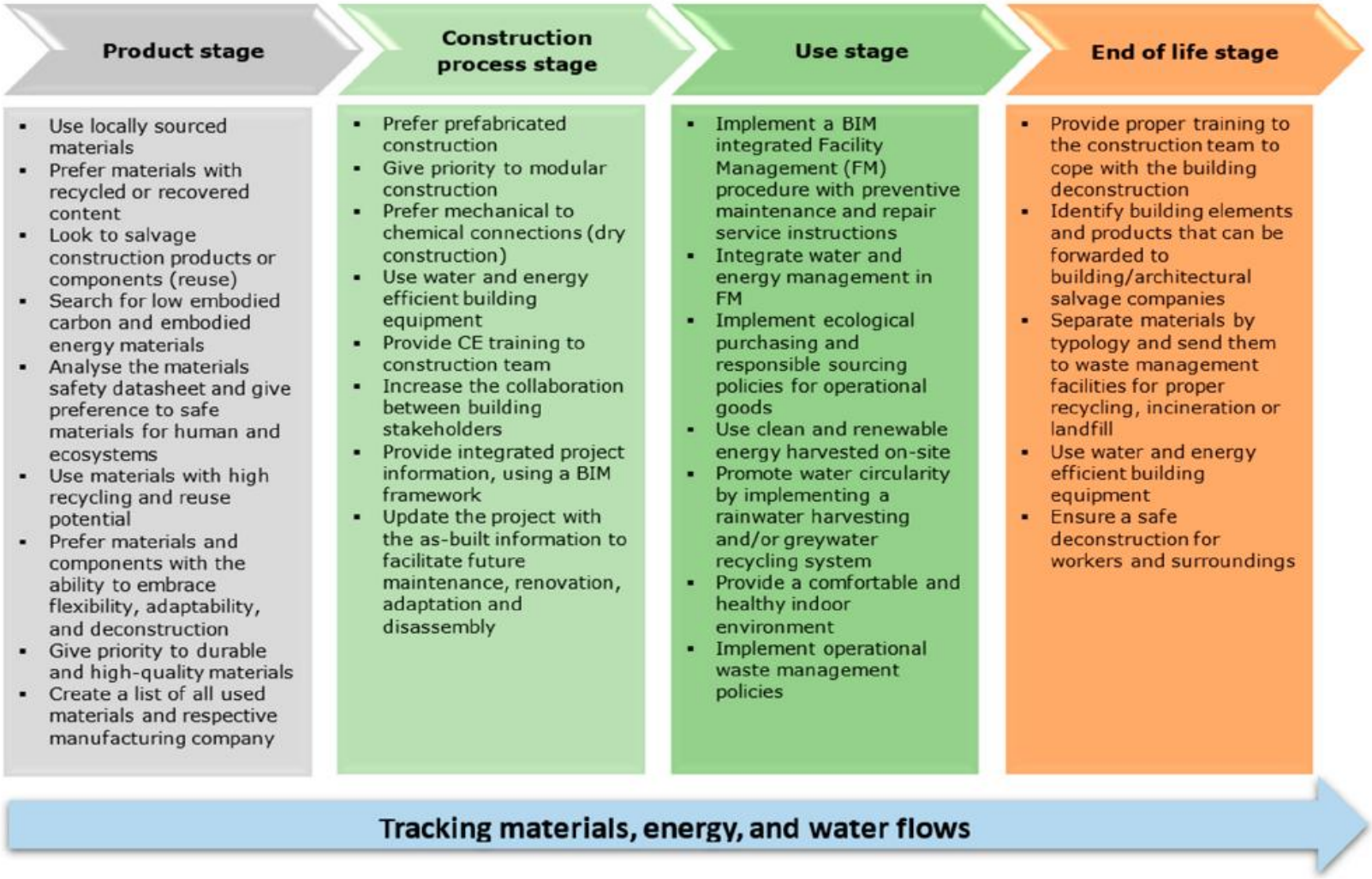
Circular buildings can:

1. Achieve energy neutrality-carbon footprint through judicious use of innovative materials
2. Produce an excess of energy through design and on-site renewable energy production
3. Reduce overall energy consumption allocated to building operations-New biodegradable materials to provide necessary services and thermal comfort to users
4. Reduce building water footprint-Similar to energy water is most consumed during construction and operation.

Circular Building Priciples



A framework for implementation throughout a building's life stages

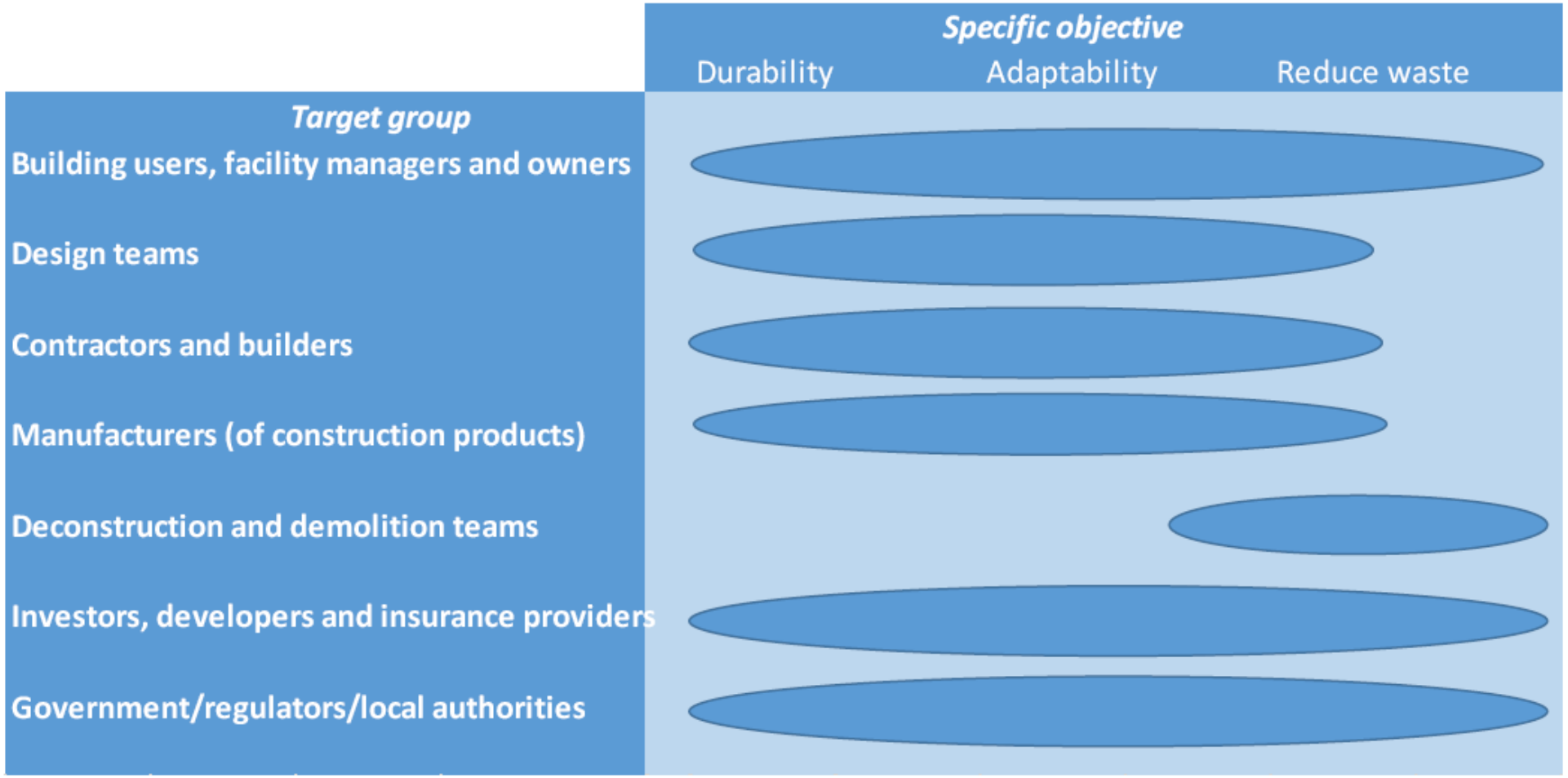


CE Target Groups in the Construction Sector

The circular economy target groups include economic operators in the value chain, policy makers, legal and technical actors:

1. Building users, facility managers and owners
2. Design teams (architecture and engineering of buildings)
3. Contractors and builders
4. Manufacturers of construction materials and products
5. Deconstruction and demolition teams
6. Investors, developers and insurance providers
7. Government/Regulators/Local authorities.

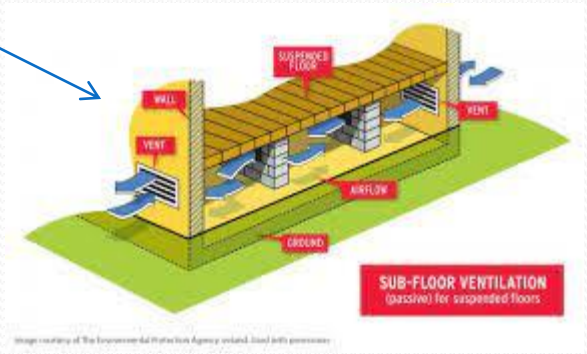
Objective by Target Group



The Challenge for Mauritius

The challenge s for Mauritius

1. Timid attempts at implementing CE
2. Technical actors have barely even environmental friendly in their concept design of infrastructure.
3. Resources are depleting fast, e.g. rocks. Sand is already banned since long.
4. There is need to develop new construction materials.
5. Research, Design and Innovation are required.
6. Paradigm shift in design philosophy and methodology.
7. Etc..




thank you

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Questions and Answers

[Short Questions are expected.]