A tiered conceptual framework for sustainable design and planning of large-scale development projects

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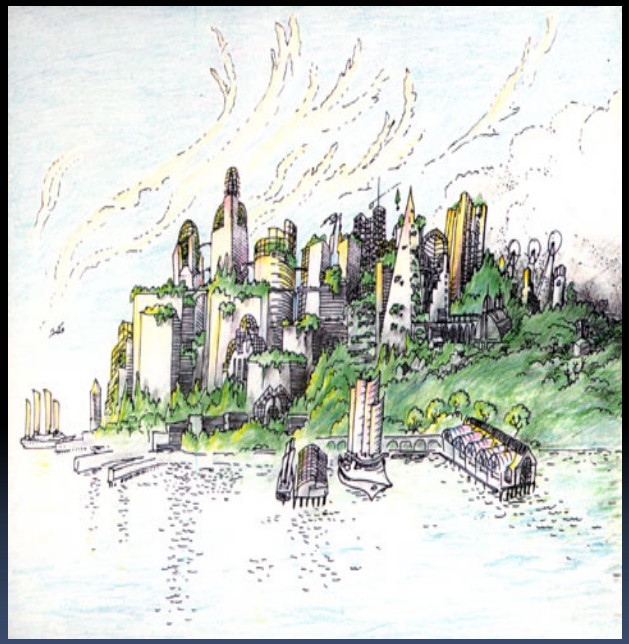
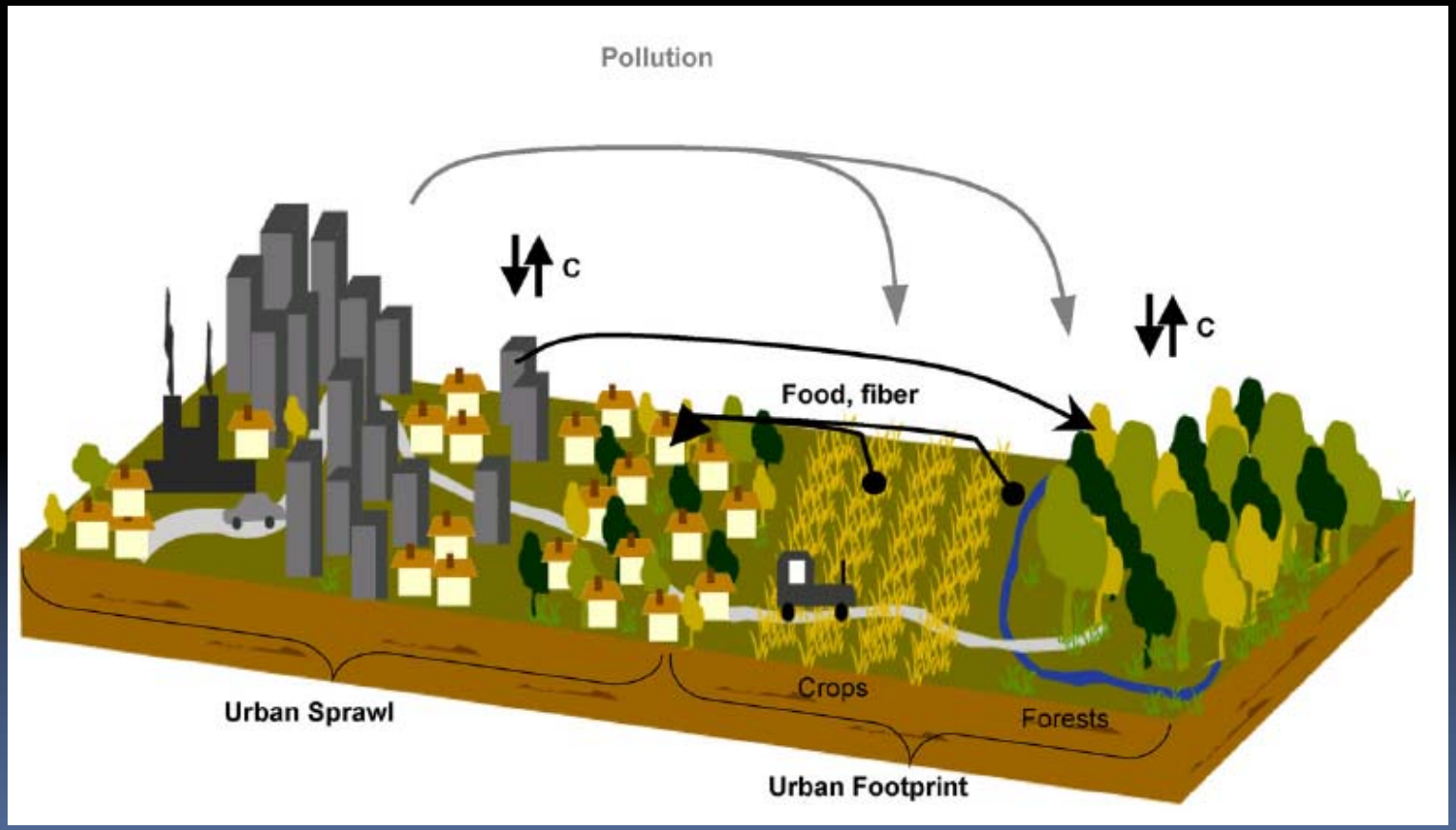
Urban sustainability

- Cities are the key to addressing these problems but urban sustainability can only be achieved through addressing the economic, environmental and social health of the city. What is needed then, is 'triple-bottom-line' accounting by decision makers –
- 'Sustainable Development"



Importance of the built environment



Churkina, 2008

Cities critical for Sustainable Development

- Adaptation: adjustments to the urban system to moderate impacts / cope with consequence….

- In cities there are **concentrations** of ***resources*** and ***expertise*** and the capacity to adapt the urban environment through appropriate planning and design responses.

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The starting point:

- Few practical examples of successful implementation of an integrated application of sustainability principles in the built environment
- All stages of development, including design, planning, construction, operation and de-construction phases and across building and city level impacts
- (Choguill 1996) suggests that the linking of infrastructure to the sustainability debate has rarely been made in the literature, and less so in practice.

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- The need for more ***comprehensive*** and ***holistic*** approaches
- These need to be integrated with specialised knowledge – for eg. Local planning systems
- A key problem is the complexity and multi-scaled nature of the challenges faced by decision makers

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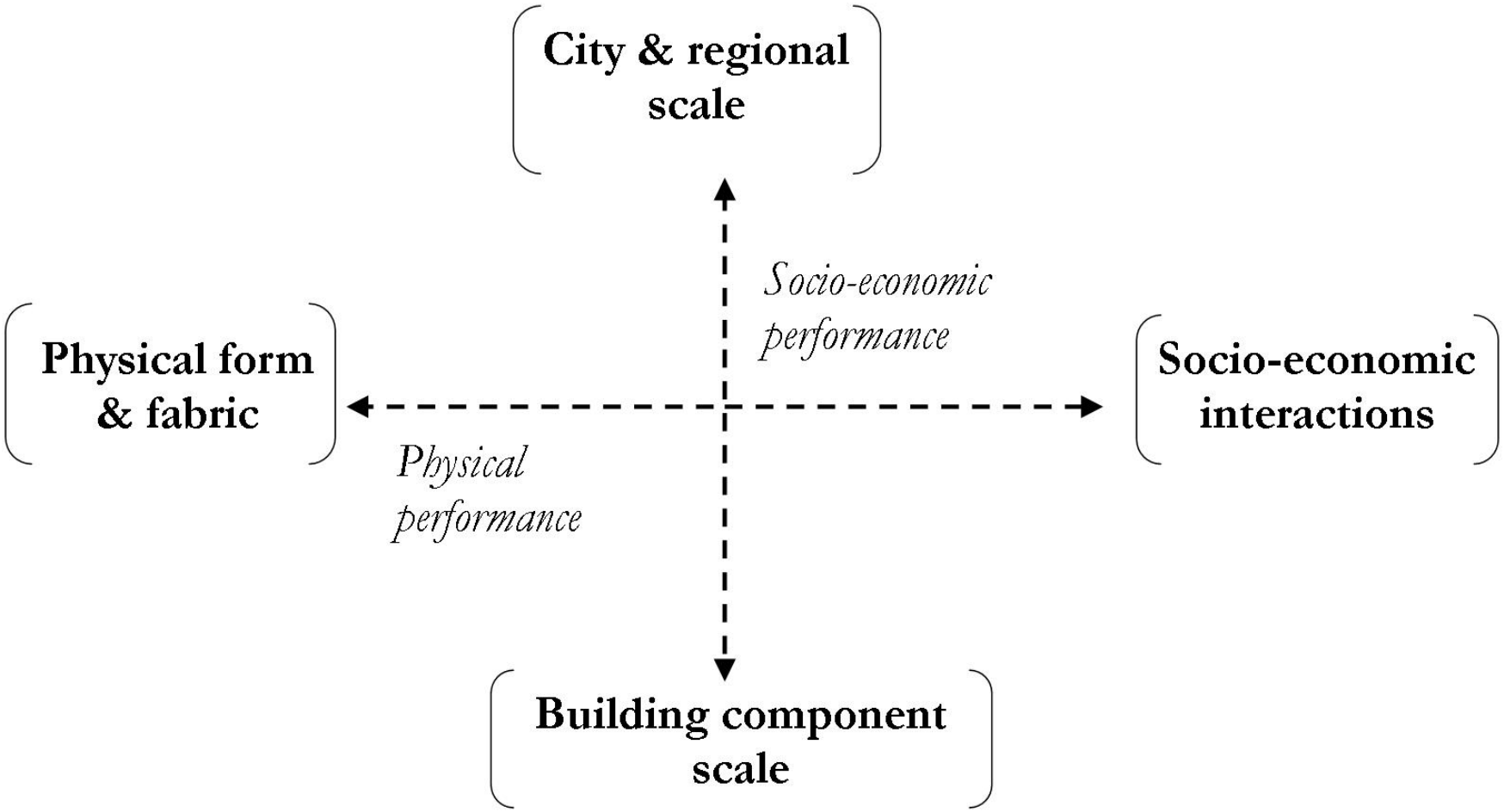

Complexity across scales

- There is a lack of tools for systematic assessment
  (and so)..
- Continuing uncertainty and complexity makes it hard for cities to act…

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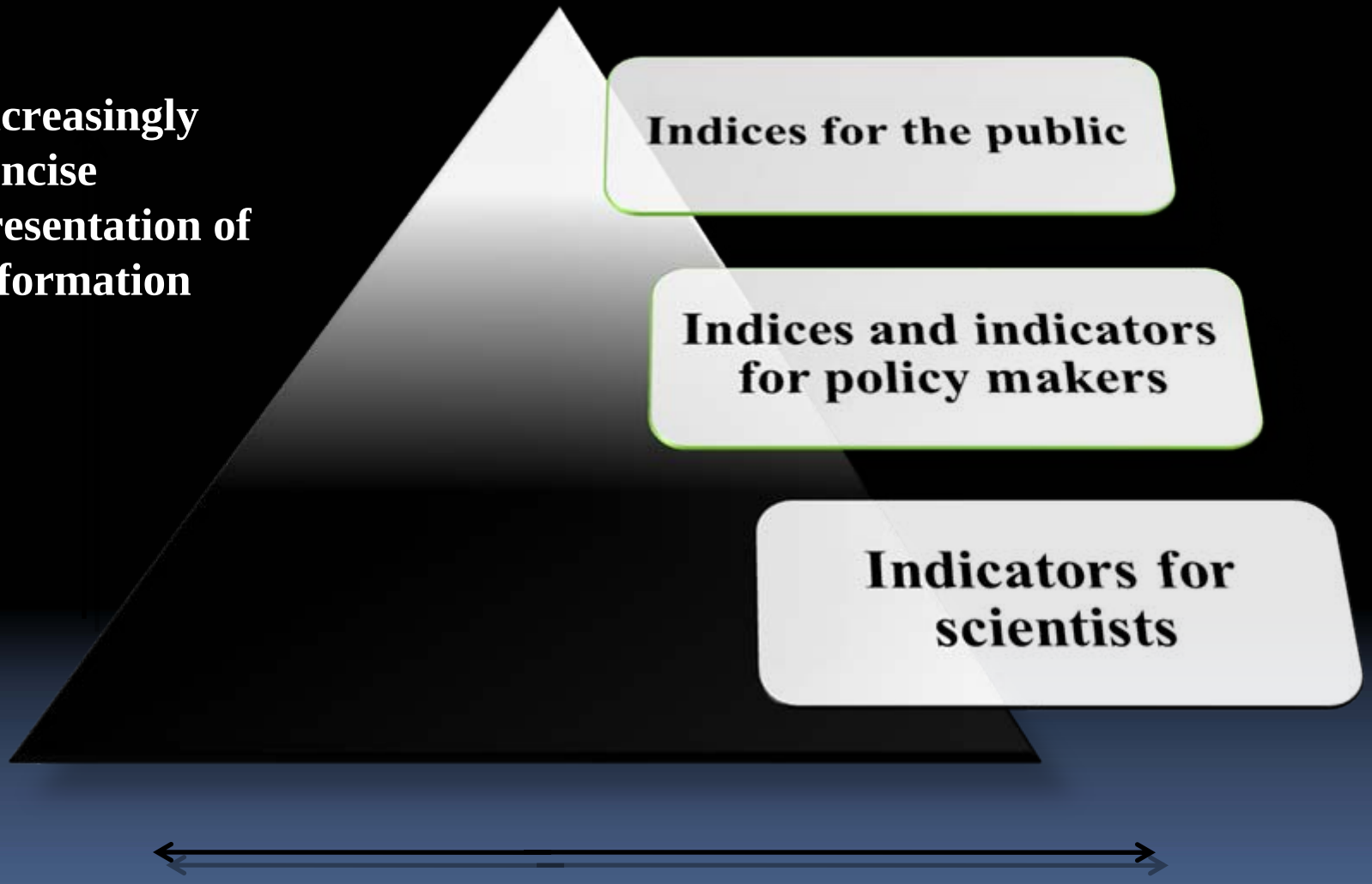
Increasingly concise presentation of information



Tool for Sustainability – The Ecological Footprint

- **What is an Ecological Footprint?**
  - Overall measure of environmental impacts
  - Measures land to provide resources and absorb wastes
  - Land required to absorb CO_2 large proportion
  - Can help individuals, households and companies to improve their environmental performance

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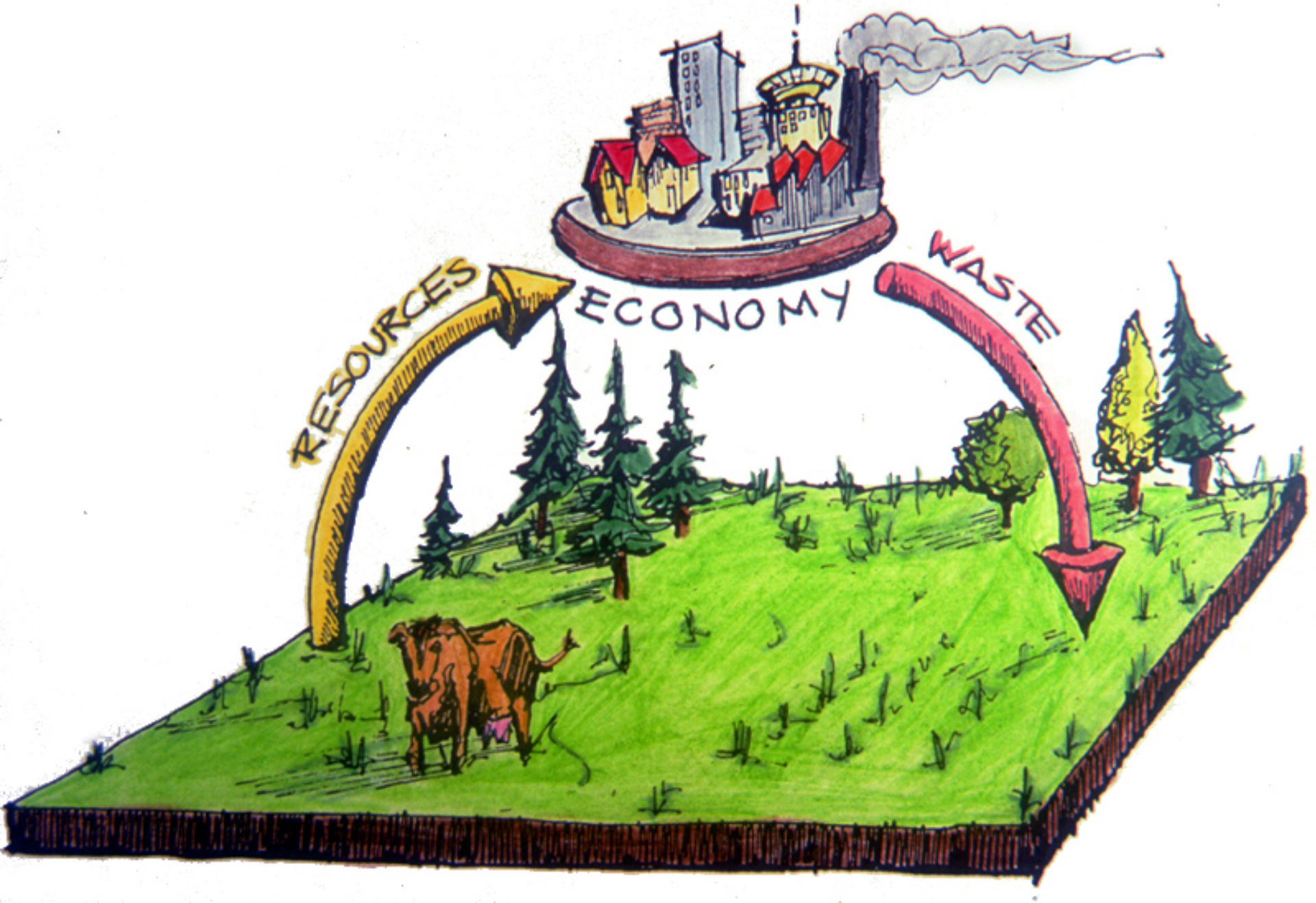
RESOURCES
ECONOMY
WASTE

Ecological Footprint Uses

- Both a **measurement** and a **communication** tool:
- Enables sustainability to be defined in **specific** and **measurable** terms
- Enables people to **understand** sustainability by linking their personal impact with global ecological capacity

Useful for decision making..

- based on **science** (ecological & thermodynamic principles) -is not an arbitrary index
- based on an **empirical data**

- measures our use of nature, aggregates impacts on biosphere into one figure –bio-productive space occupied exclusively by a human activity, expressed in **hectares**

Shortcomings of EF

- Aggregate indicator –
  - overly simplistic view of complex systems
  - methodological shortcomings
- Augment with other measures for eg. LCA

Other assessment techniques:

1. Cost Benefit Analysis
2. Life Cycle Costing
3. Scenario Analysis
4. Risk Assessment
5. Stakeholder Engagement

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Challenge:

- How can these techniques be optimally applied to address sustainability requirements of major infrastructure developments in the metropolitan context…

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Strategic Environmental Assessment

- Developed to complement the weaknesses of conventional EIA
- Broader scope of impacts
- "early intervention is the most cost-effective means of achieving sustainabilty"
- SEA - A means of incorporating sustainability principles through-out the decision-making process.

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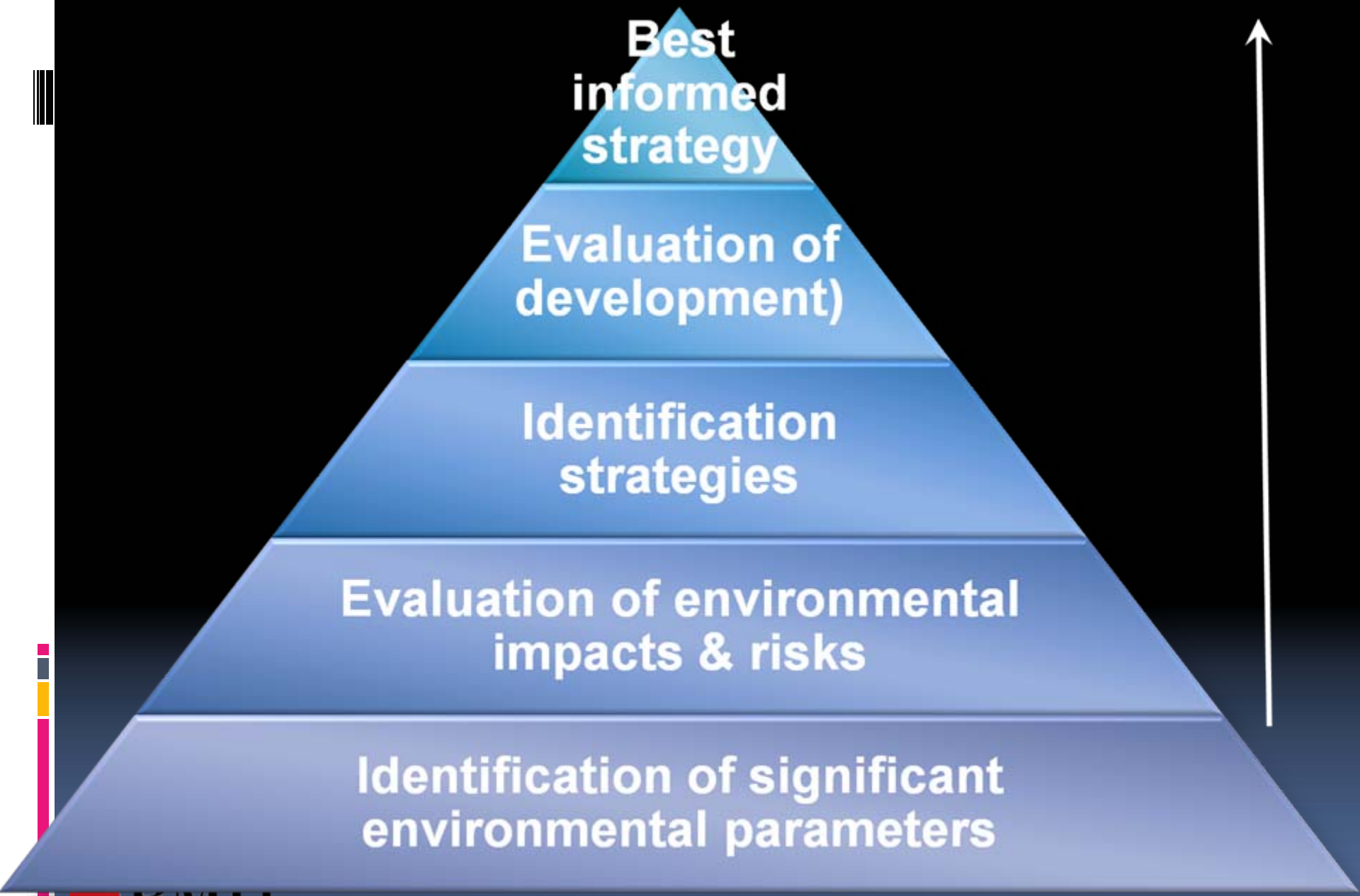

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How might this work in practice?

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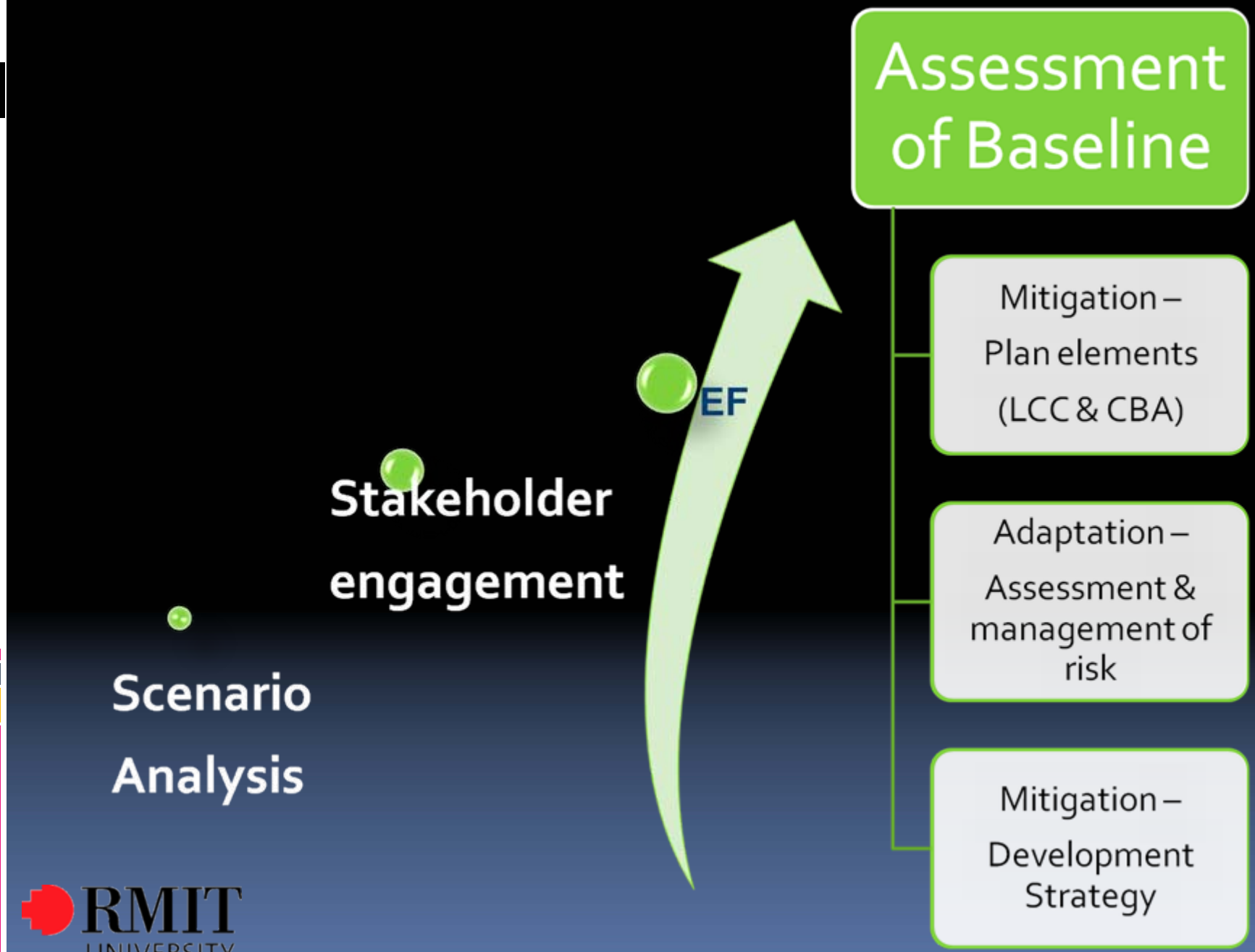

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Mitigation:

- New construction presents opportunities for best practice approaches to climate change mitigation

- For major infrastructure – two key elements

1. Design of the project specifics
2. Planning of optimal integration into metropolitan fabric

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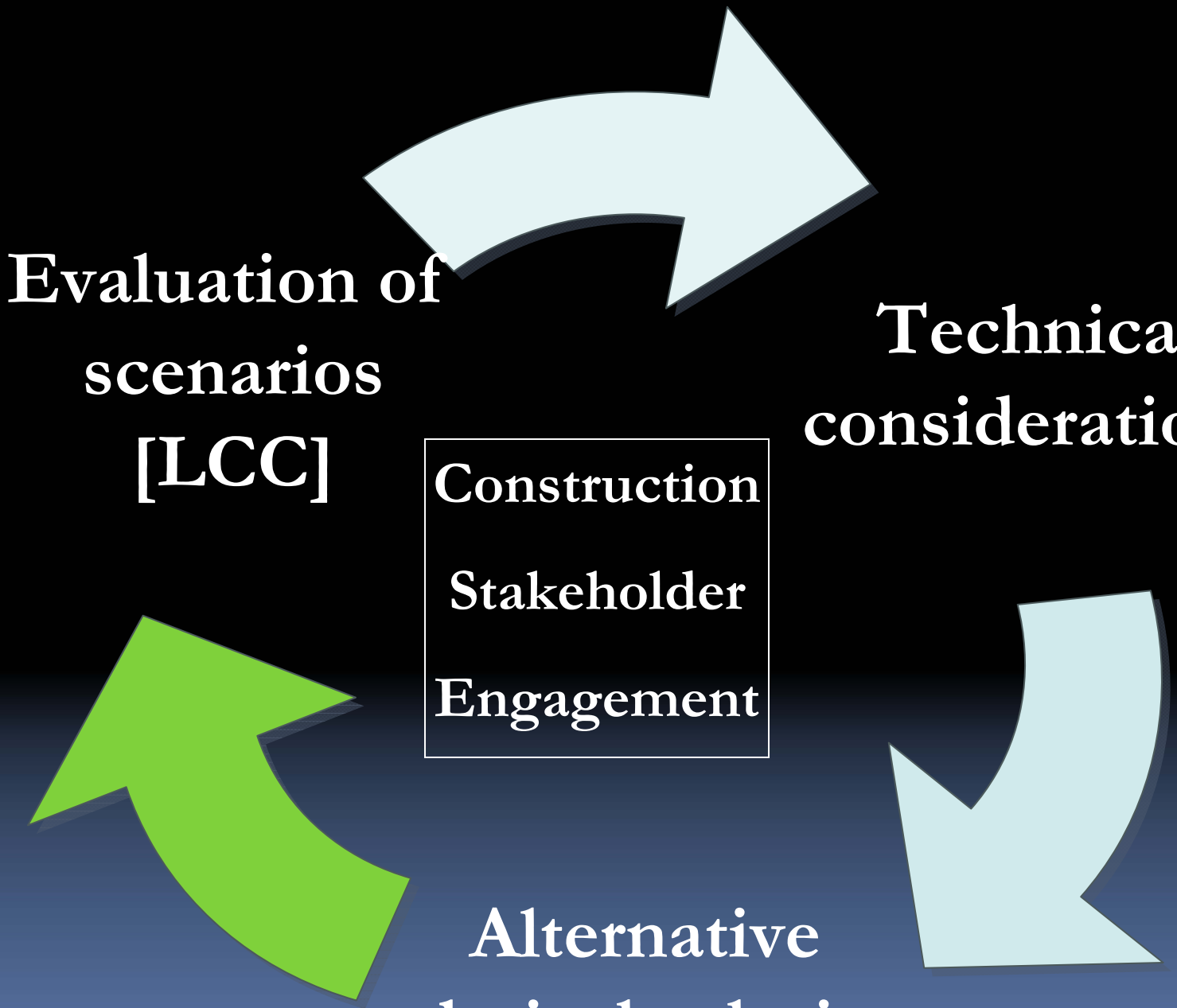
Evaluation of scenarios [LCC]
Technical considerations
Construction Stakeholder Engagement
Alternative technical solutions


Evaluation of scenarios [CBA]
Development strategy
Planning
Stakeholder
Engagement
Alternative development strategies
Local development context

Adaptation:

- Adaptation requirements are distinct to those of mitigation.
- 'Moving target'
- Key techniques:
  1. Scenario analysis
  2. Risk Assessment

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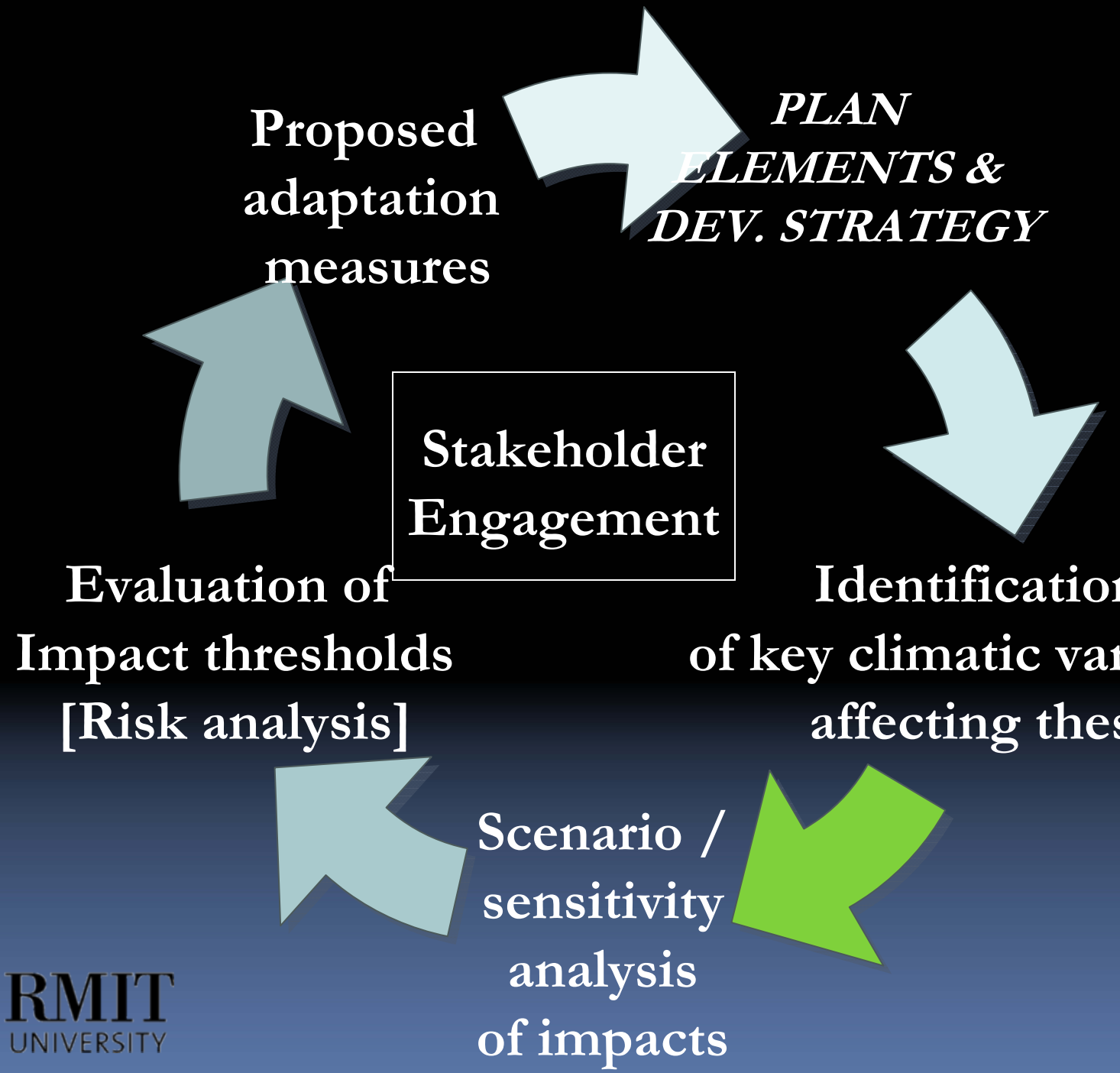

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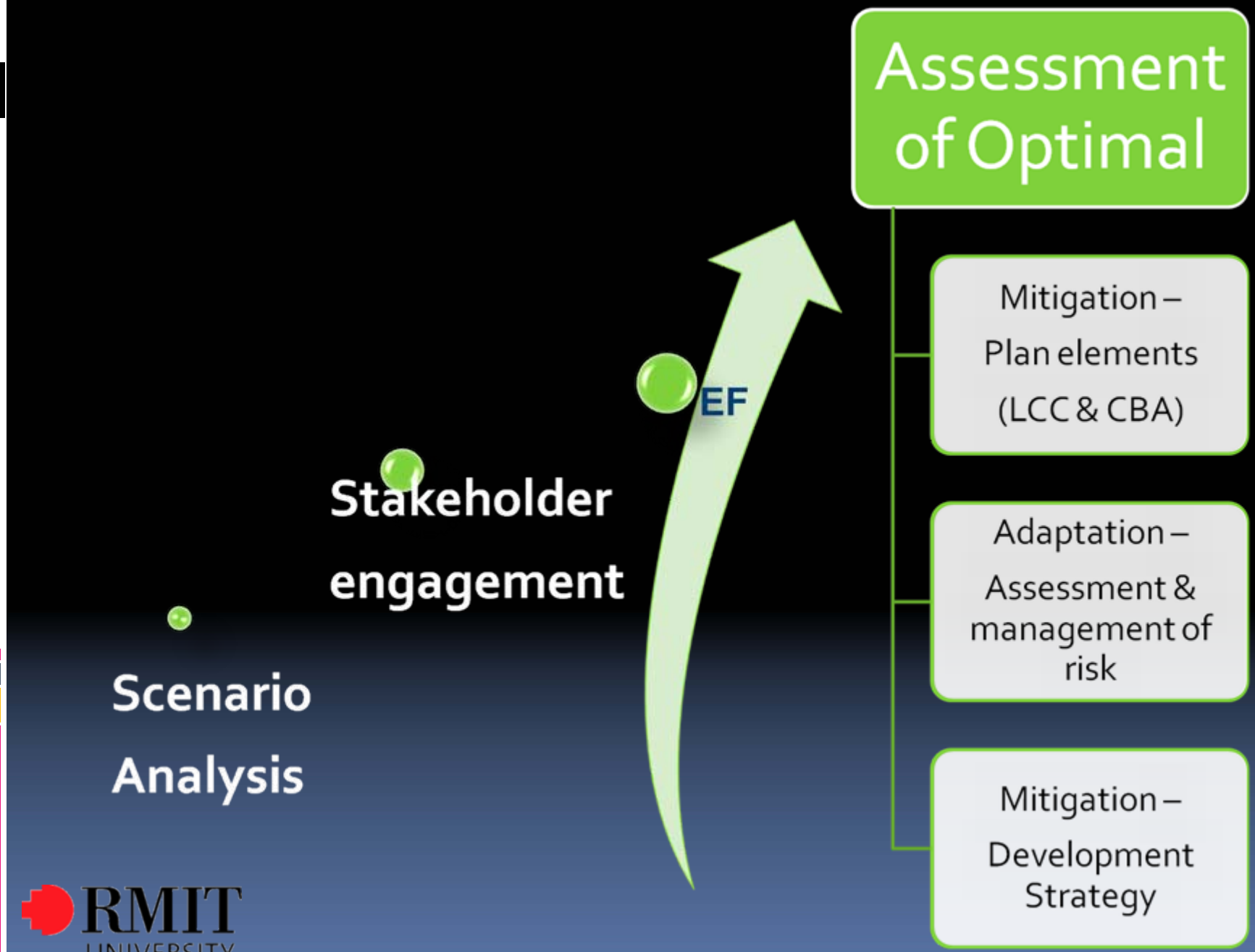

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Conclusions:

- Impacts can become 'scripted' at design, planning and construction stages.
- Life cycle impacts need to be considered – construction / operation; on-site & indirect.
- Climate change challenges: low impact & resilient infrastructure considering both mitigation and adaptation,

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Conclusions (2):

- SEA – appropriate tool for large scale infrastructure development
- Facilitate early and cost-effective intervention
- Proposed framework – sustainable design, construction and planning across both mitigation and adaptation dimensions
- Practical response to multi-dimensional challenges of sustainabilty

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Comments / Questions?

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