



# Agent based modeling (ABM) for analyzing the demand for recycled mineral construction material.

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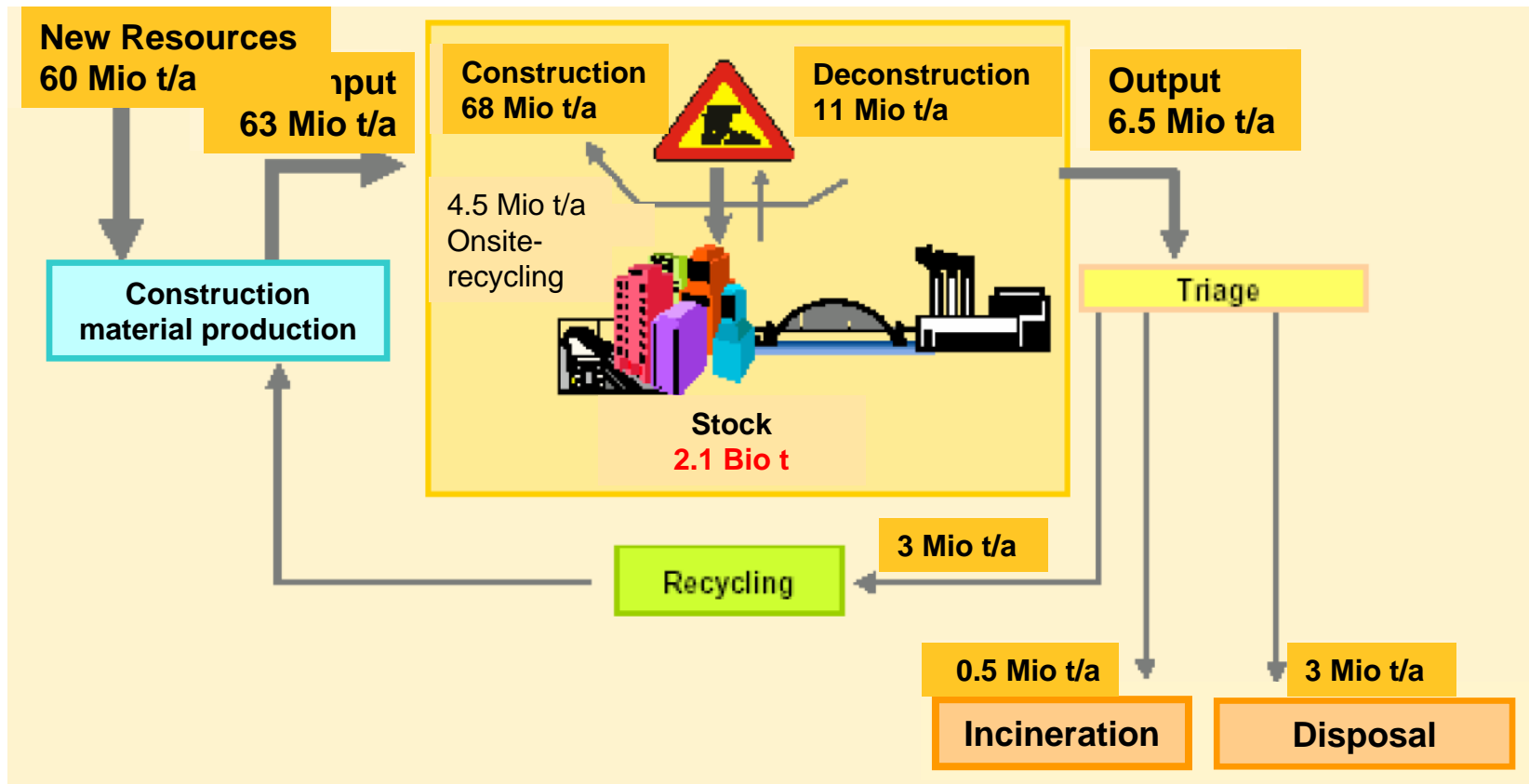
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# Introduction

## Construction sector material fluxes 2000



Source: (Moser, Bertschinger et al. 2004)

# Agent based modeling (ABM)

## What is ABM?

- Bottom-up simulation method
- Based on agents (stakeholder), their behavior and interaction

## When is ABM appropriate?

- Top-down approaches fail
- Emergent phenomena
- Agent interactions or
- Adaptive behavior affects the system output
- For decision-making in complex situations

Adapted from (Parker et al. 2003)

# Goal and research questions

1. How is the decision-making process in the construction material market structured?
2. On which criteria do the decisions depend?
3. How can these criteria be quantified?

## 1. System analysis

- Key system agents

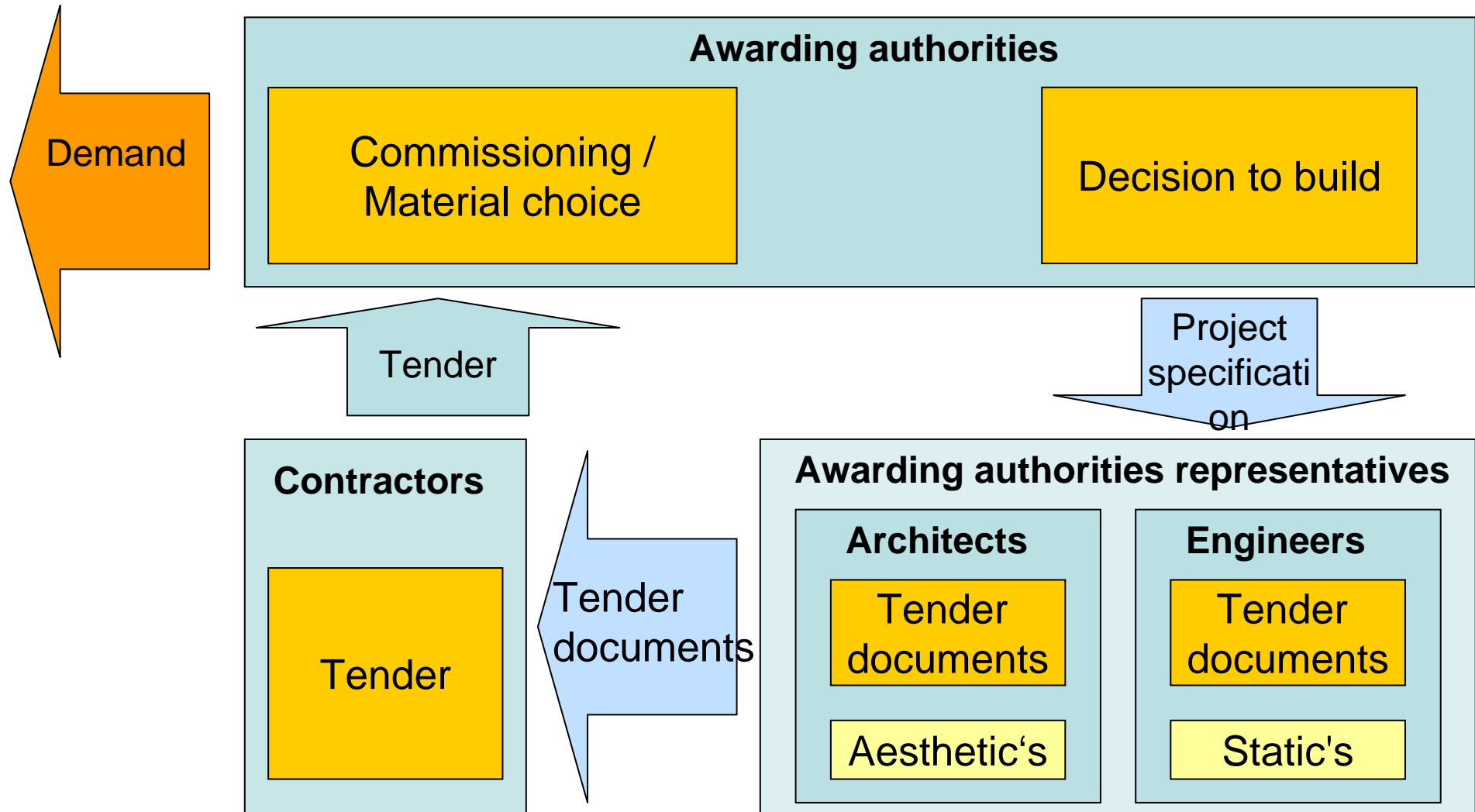
## 2. Expert interviews

- Decision structure and criteria

## 3. Analytical hierarchy process (AHP)

1. Criteria weighting
2. Material alternative weighting
3. Decision probability

# Decision-making process



# Single actor decision structure

## Commissioning of a private awarding authority

**Application:**

Indoor concrete wall

**Alternatives:**

1: Recycling concrete (recycling)

2: Conventional concrete (conventional)

**Criteria:**

Image of recycling materials

Tender documents

Tender prize

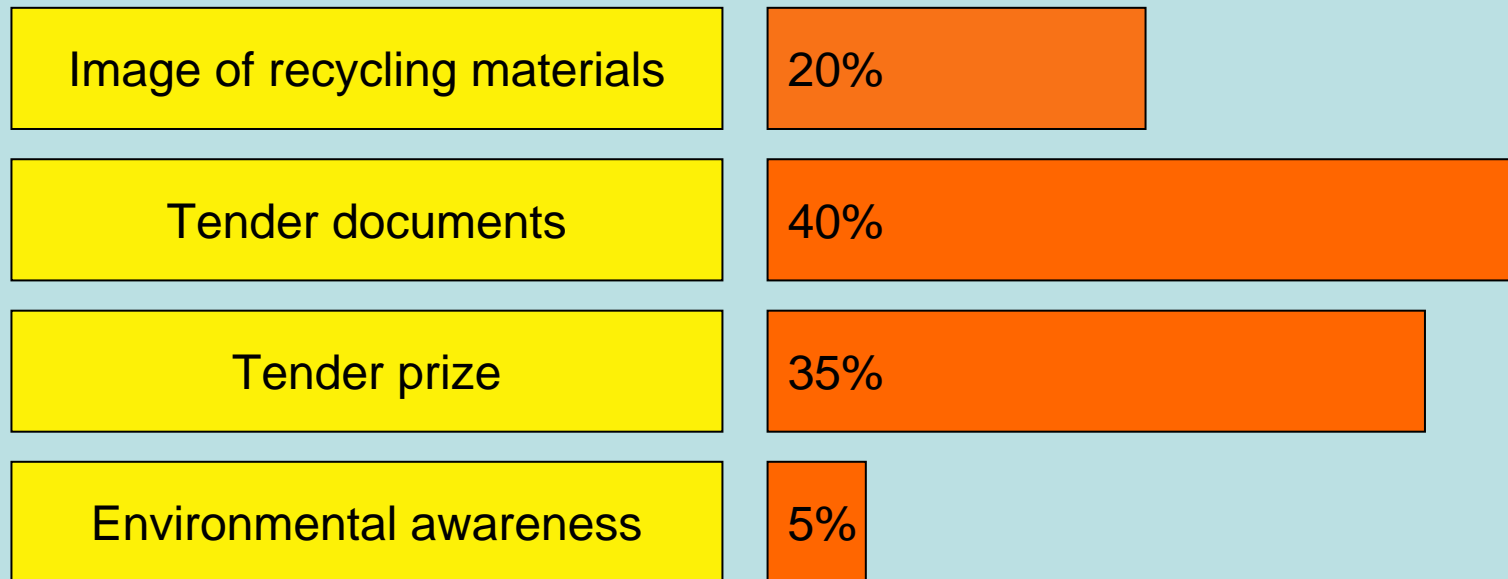
Environmental awareness

**Decision:**

**Demand:**

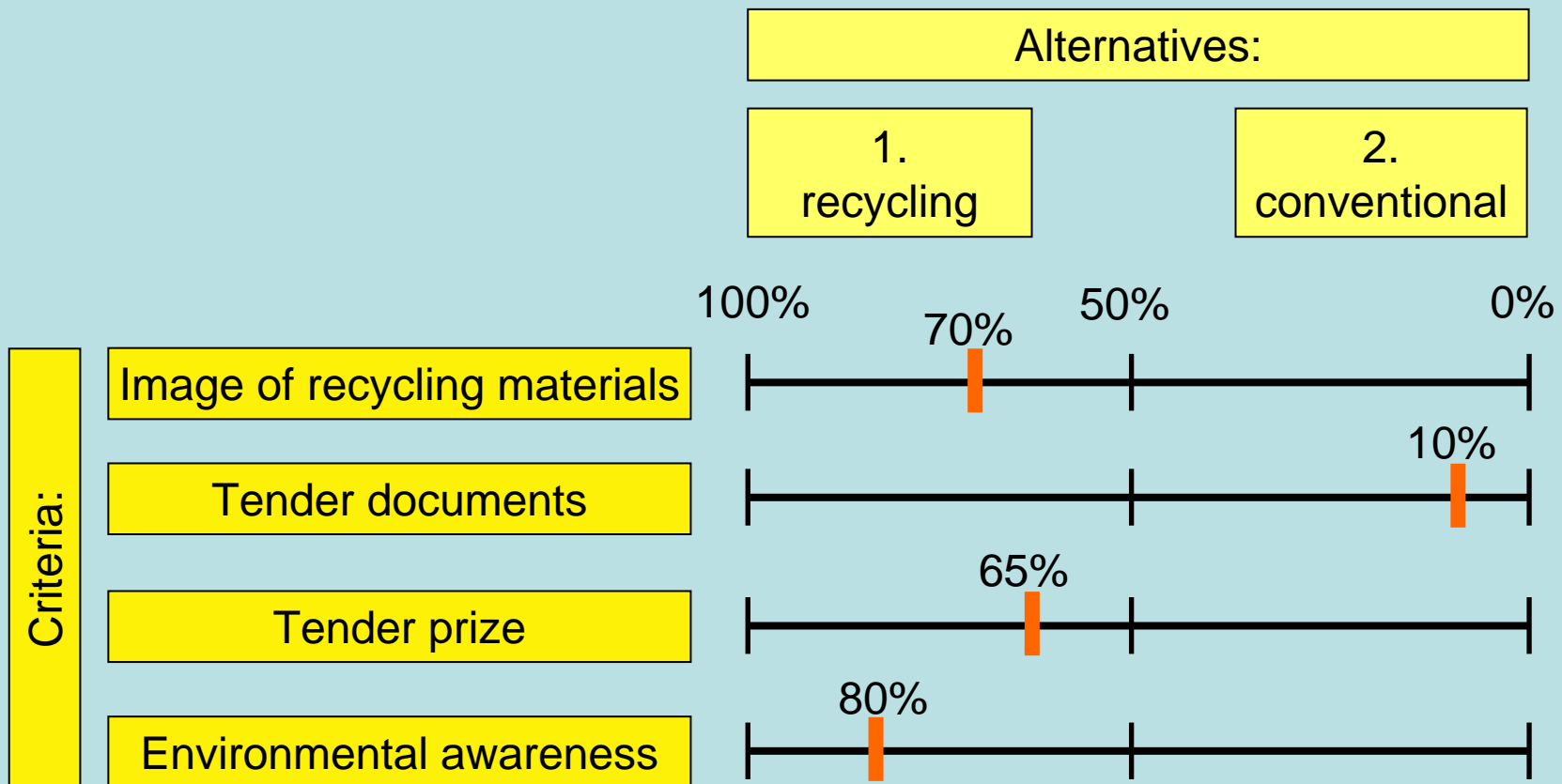
# Quantification of the decision parameters (AHP)

## Criteria weighting of a single private awarding authority



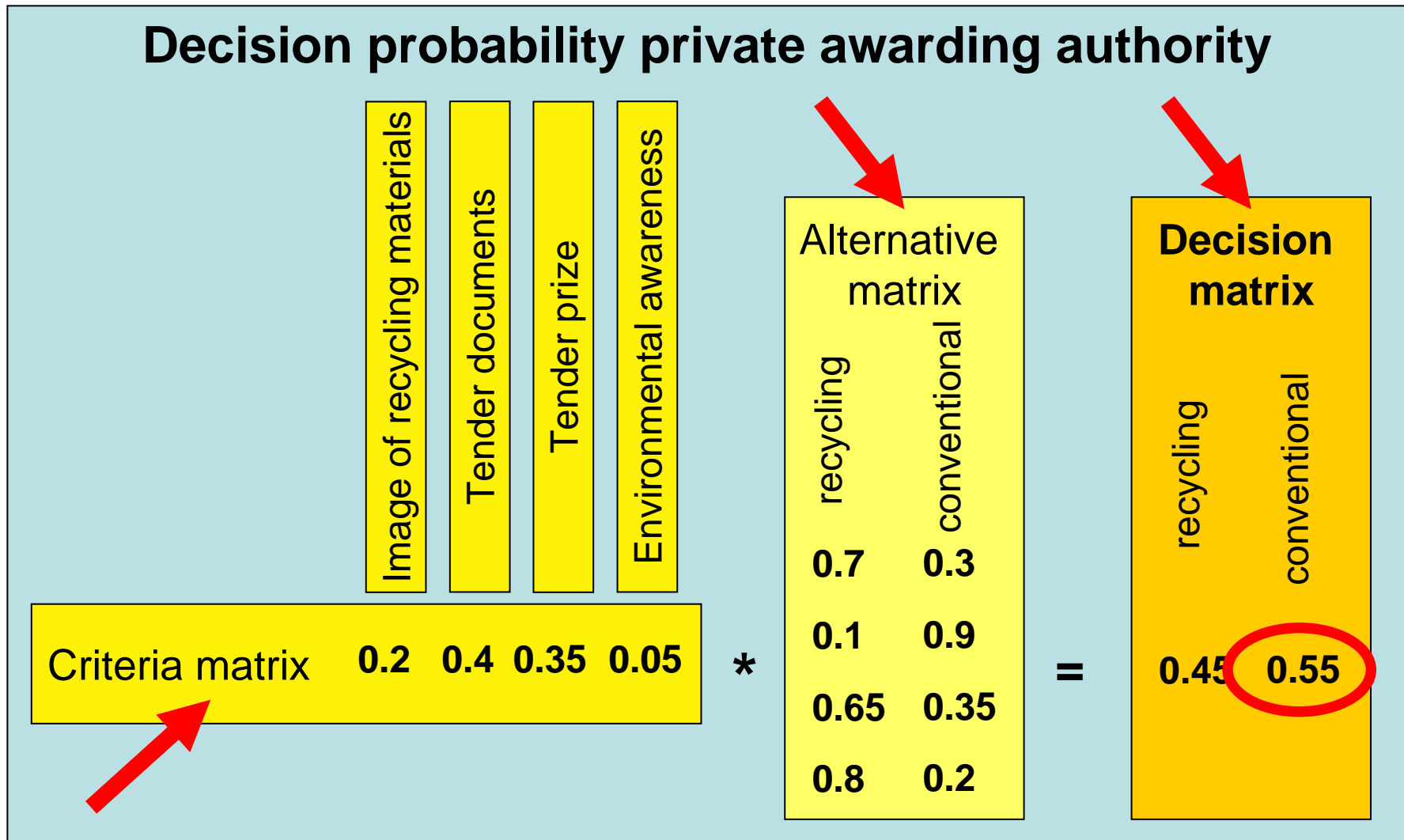
# Quantification of the decision parameters (AHP)

## Alternative weighting of a single private awarding authority

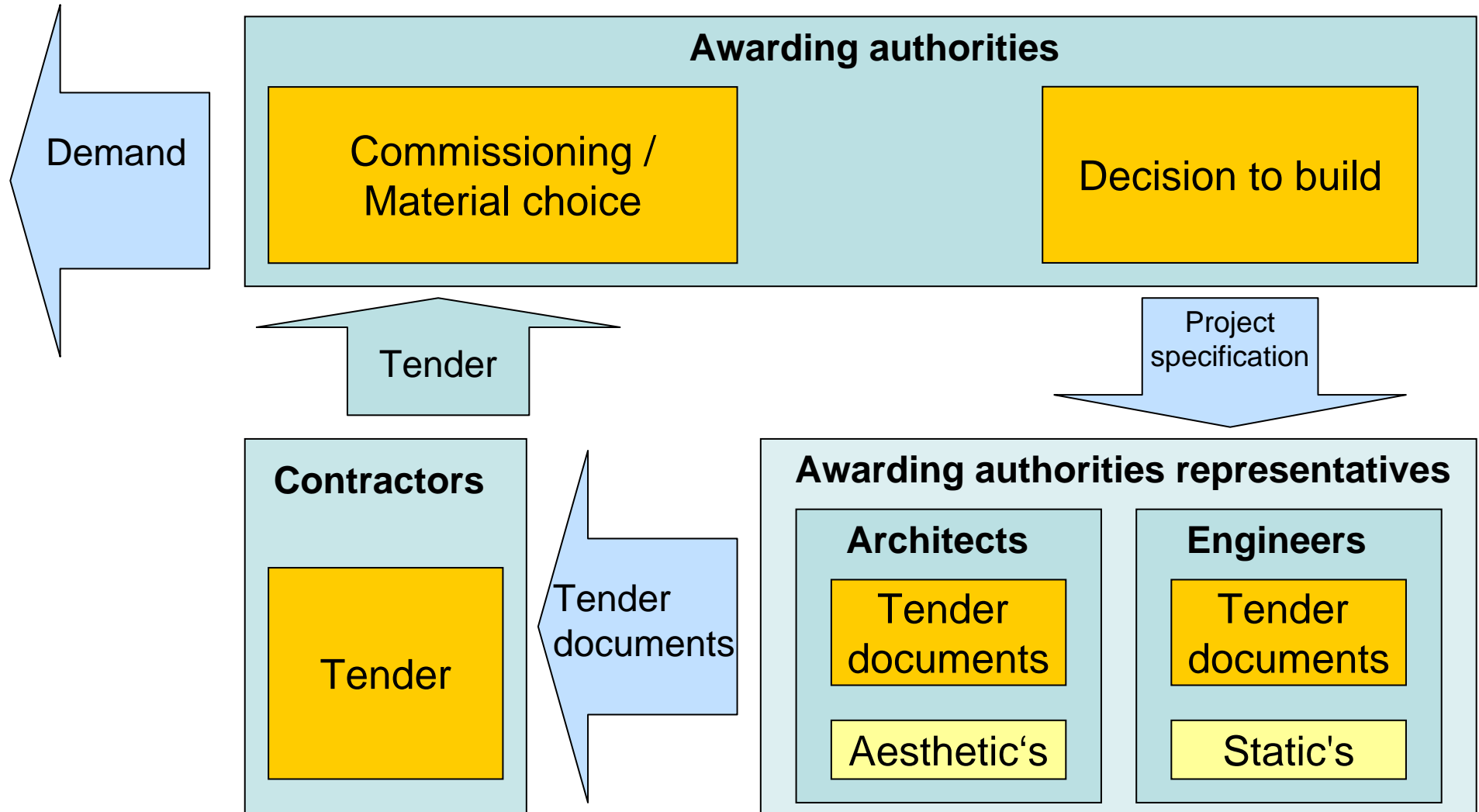


# Analytical hierarchy process (AHP)

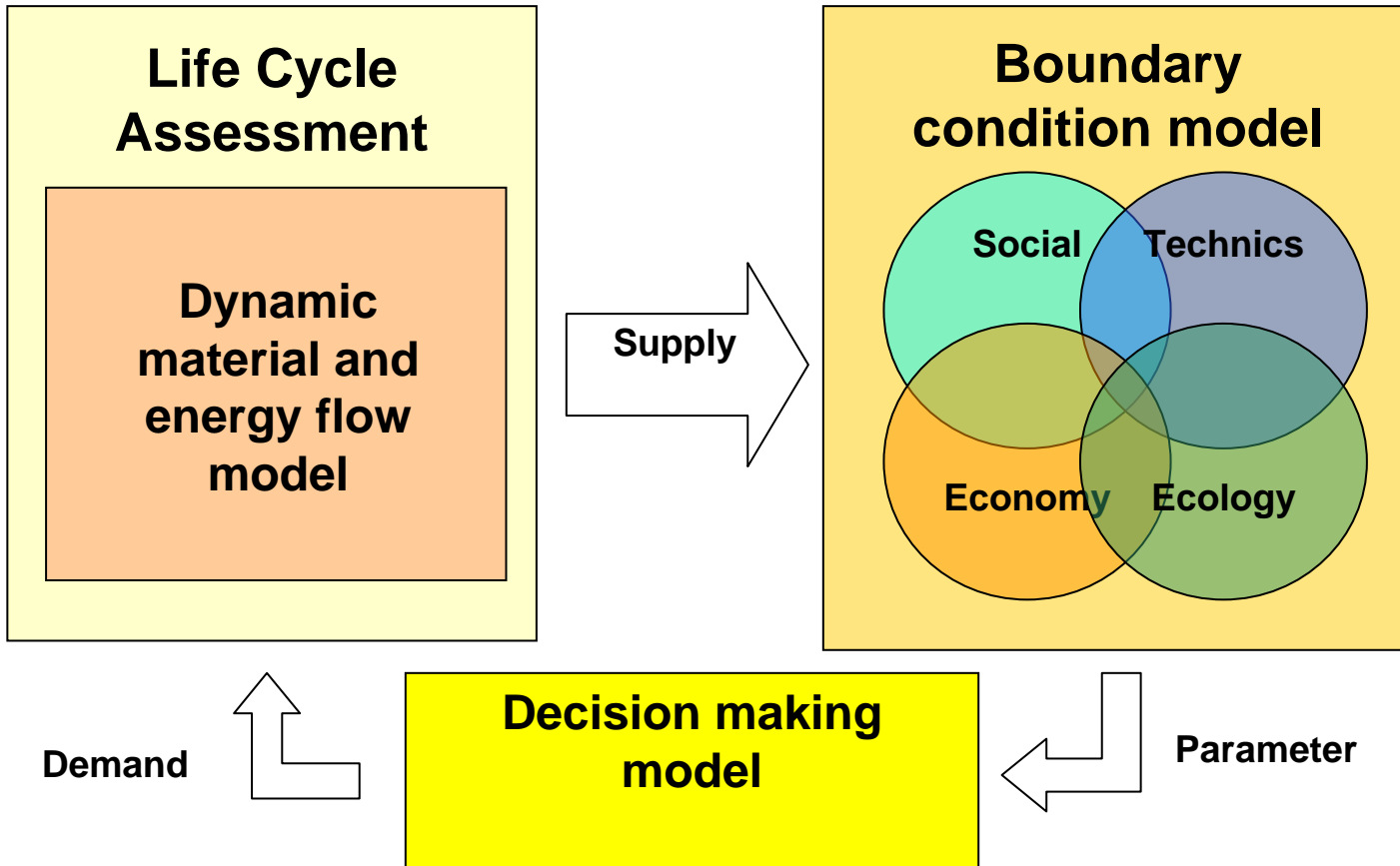
## Decision probability private awarding authority



# Actor and decision interaction



# Next steps



# Conclusion

1. The decision-making process in the Swiss construction material market is characterized by an interaction of different actors and their decisions.
2. The decisions depend on various internal and external criteria.
3. The analytical hierarchy process (AHP) is one possible way to determine and operationalize the decision structure of single actors.

