KATHOLIEKE UNIVERSITEIT
LEUVEN

An Integrated Risk Analysis Methodology For Construction Projects

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A Taste of Construction Industry Projects

- Construction industry consumes roughly 5% of GDP in the US
- Project diversity: Real-estate, roadwork, tunneling, bridge building, building of power plants, office buildings,…
  - Budget: <1M$ versus multibillion projects
  - Time: less than a month versus several decades
  - Scope: Bid-Build versus DBFOM (Design, Build, Finance, Operate and Maintain; PPP)
- Common divisor: an urgent need for Risk Management

Risk Management 101

- A risk is an event that occurs with a certain probability and that impacts the scope, duration and/or cost of a project.
- The purpose of risk management is to identify risks and to mitigate their impact on project goals (time, budget, scope)
- Risk mitigation includes: risk transfer (e.g. insurance), evaluating execution alternatives, …
- Risk Management methodology may be divided into:
  - Qualitative RM: Risk prioritization, …
  - Quantitative RM: Monte Carlo simulation, …

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⇒ **One should assess the cause of the risk, not the effect!**

⇒Assess:

- The probability of a risk occurring
- The impact of the risk (allowed to be a distribution)

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Mixing up Cause & Effect

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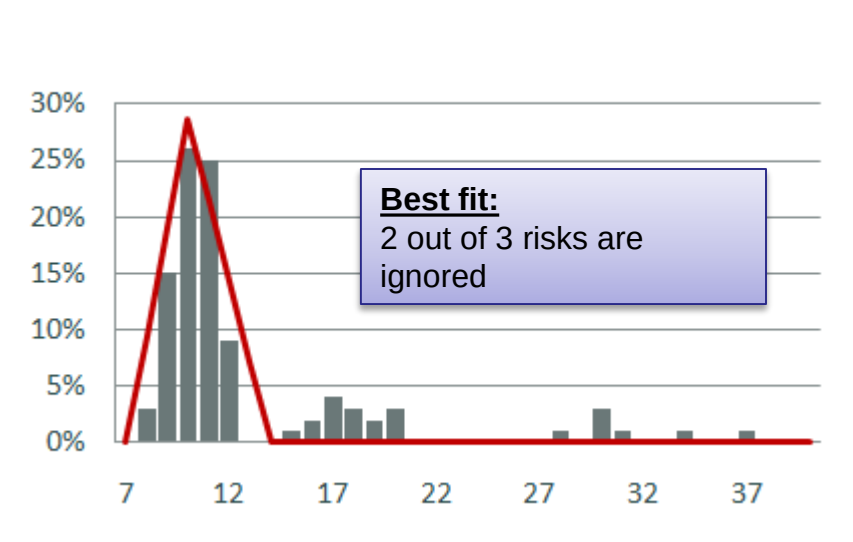
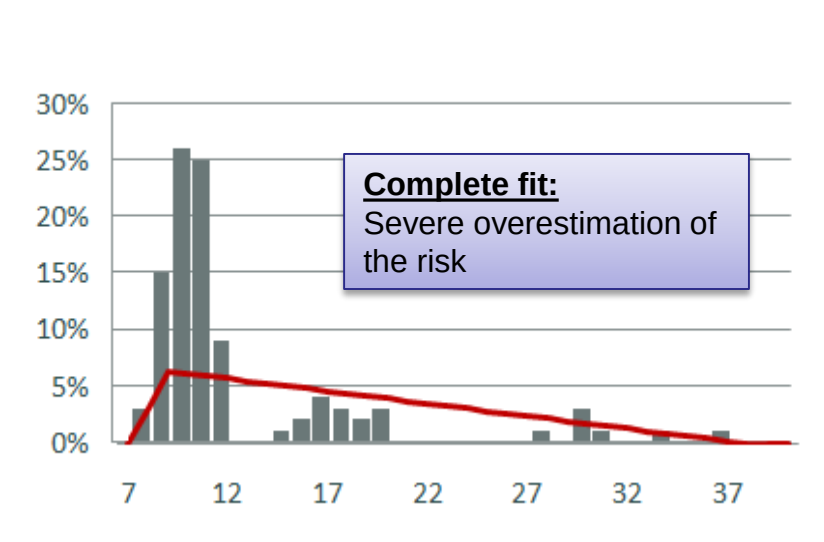
Often triangular distributions are used. However, empirical evidence shows that the distribution of activity duration (cost) is bimodal/multimodal





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    - ⟶**Assess risks, not duration/costs**
  - Ignoring **risk dependencies**

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Ignoring Risk Dependencies

- Risk interdependencies:
  - The order of risk impact is often ignored (e.g. the impact of “weather delay” on an activity “masonry” should be assessed after the impact of “faulty estimation of work content” has resolved because weather delay impacts the effective working time)
  - Correlations between risks are seldom taken into account

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⇒ **Risk analysis and project planning cannot be seen separate**

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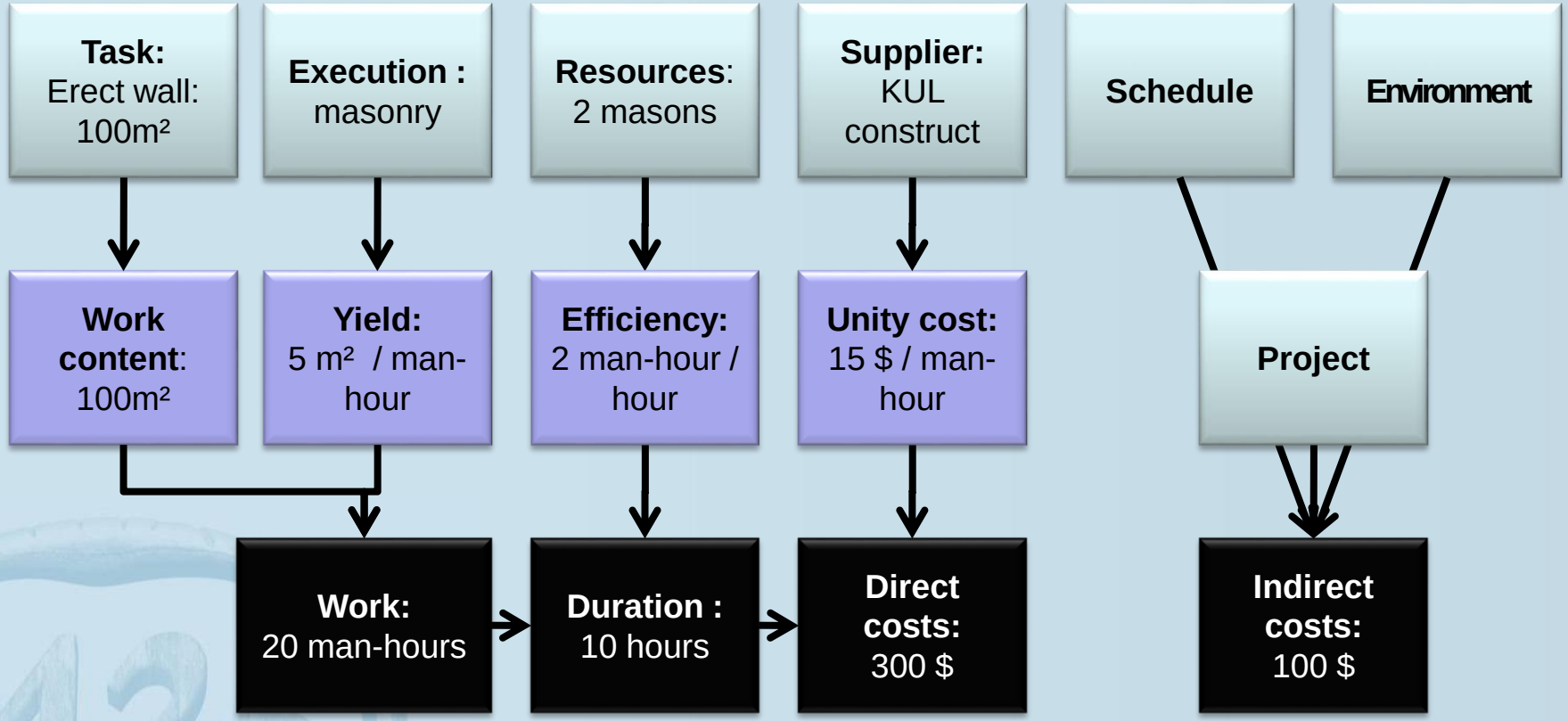
    - ⟶**Use of an integrated risk analysis**

ABC is the key:
Example



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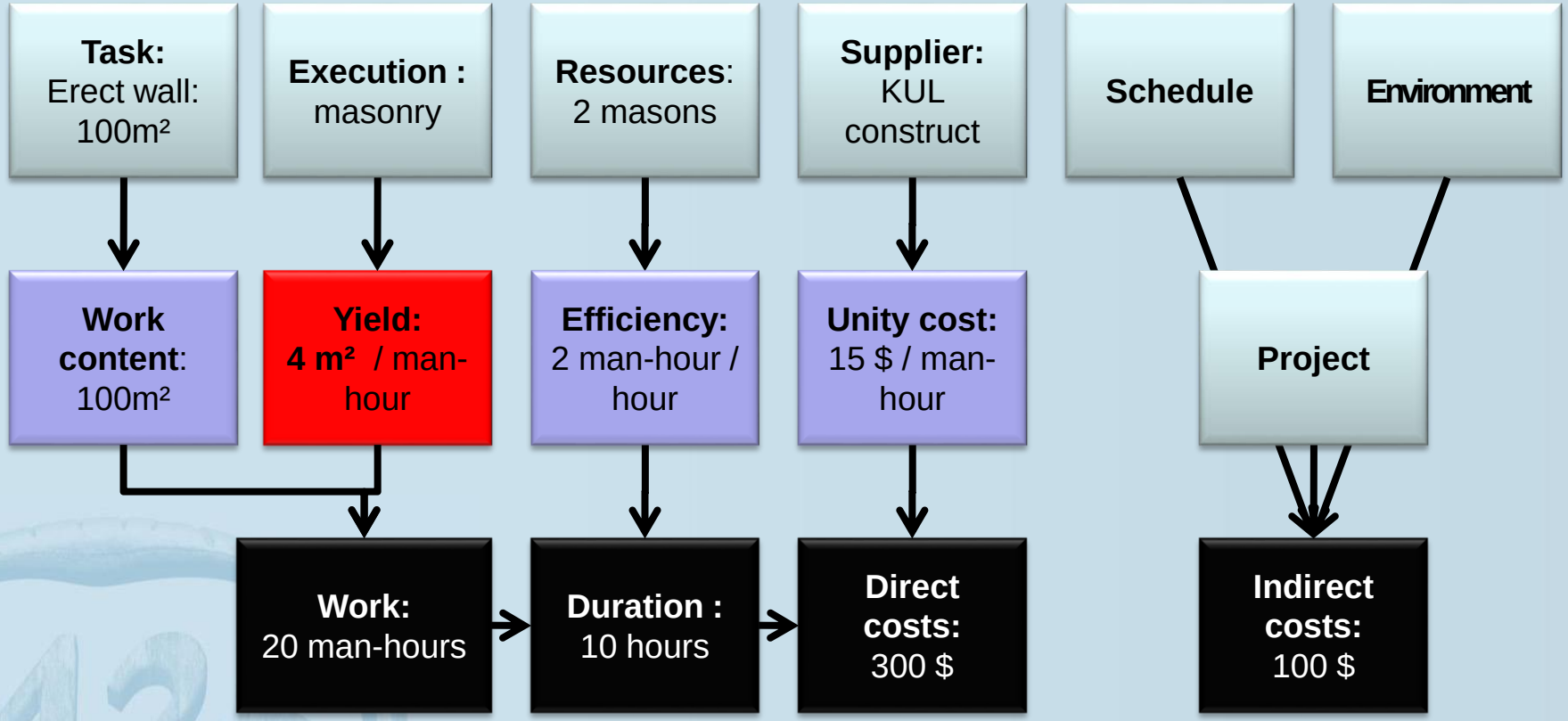
Faulty estimation of the yield



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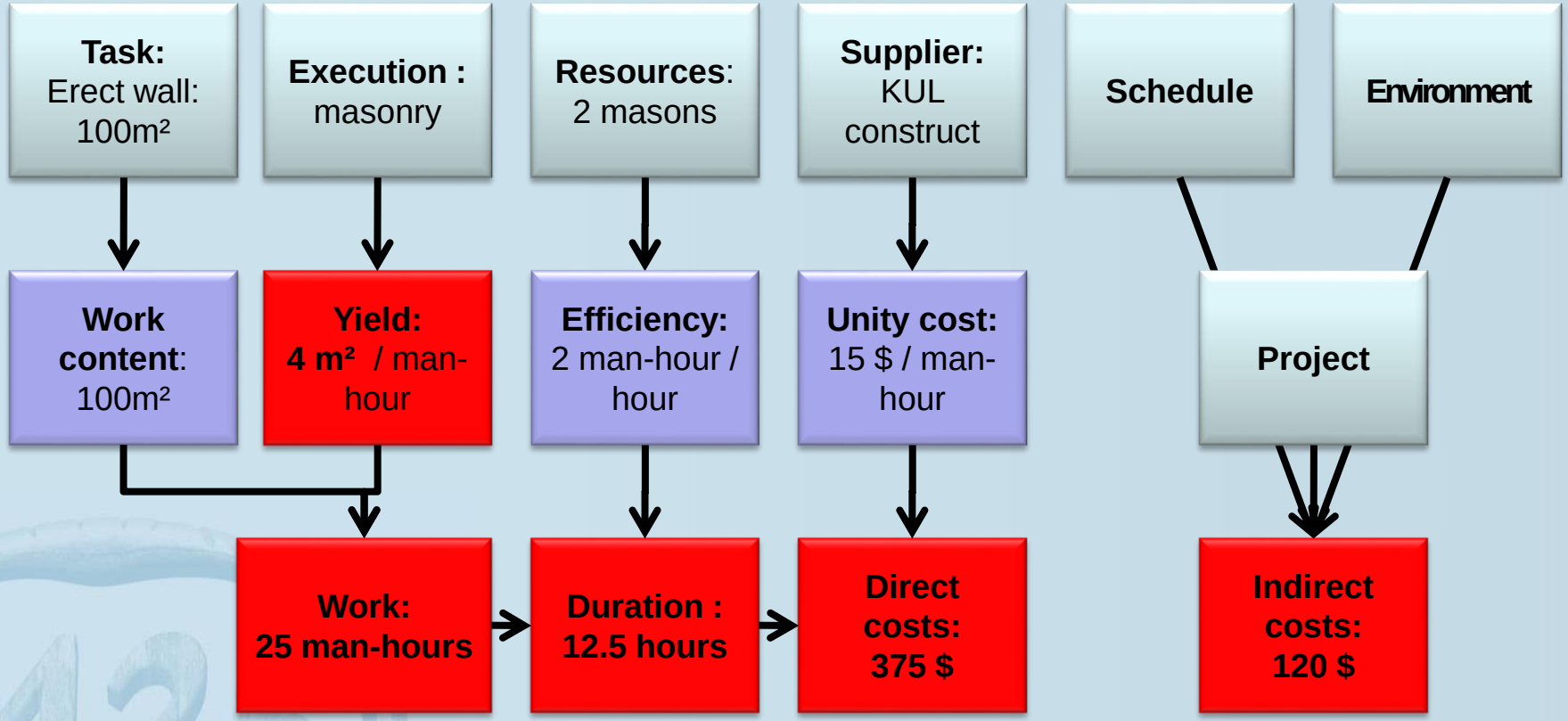

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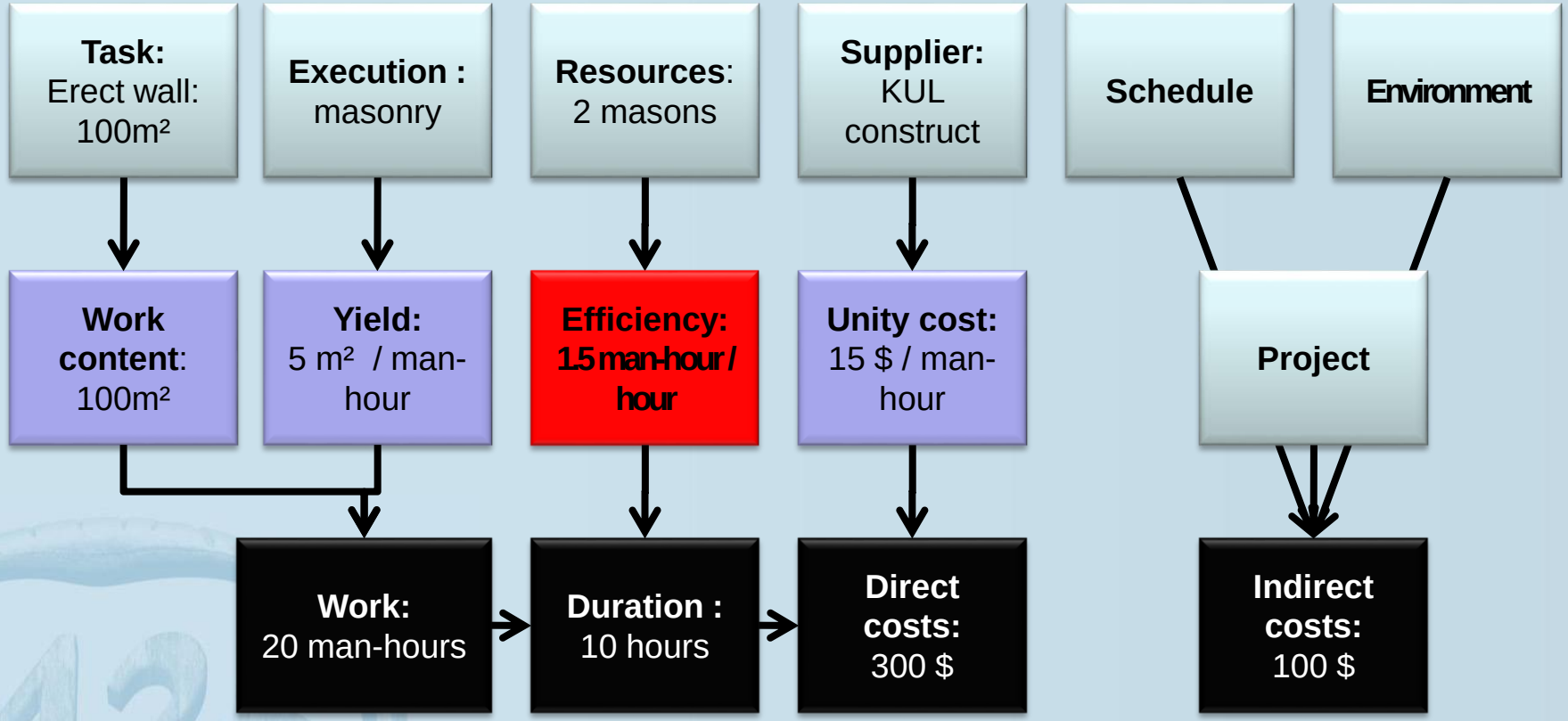

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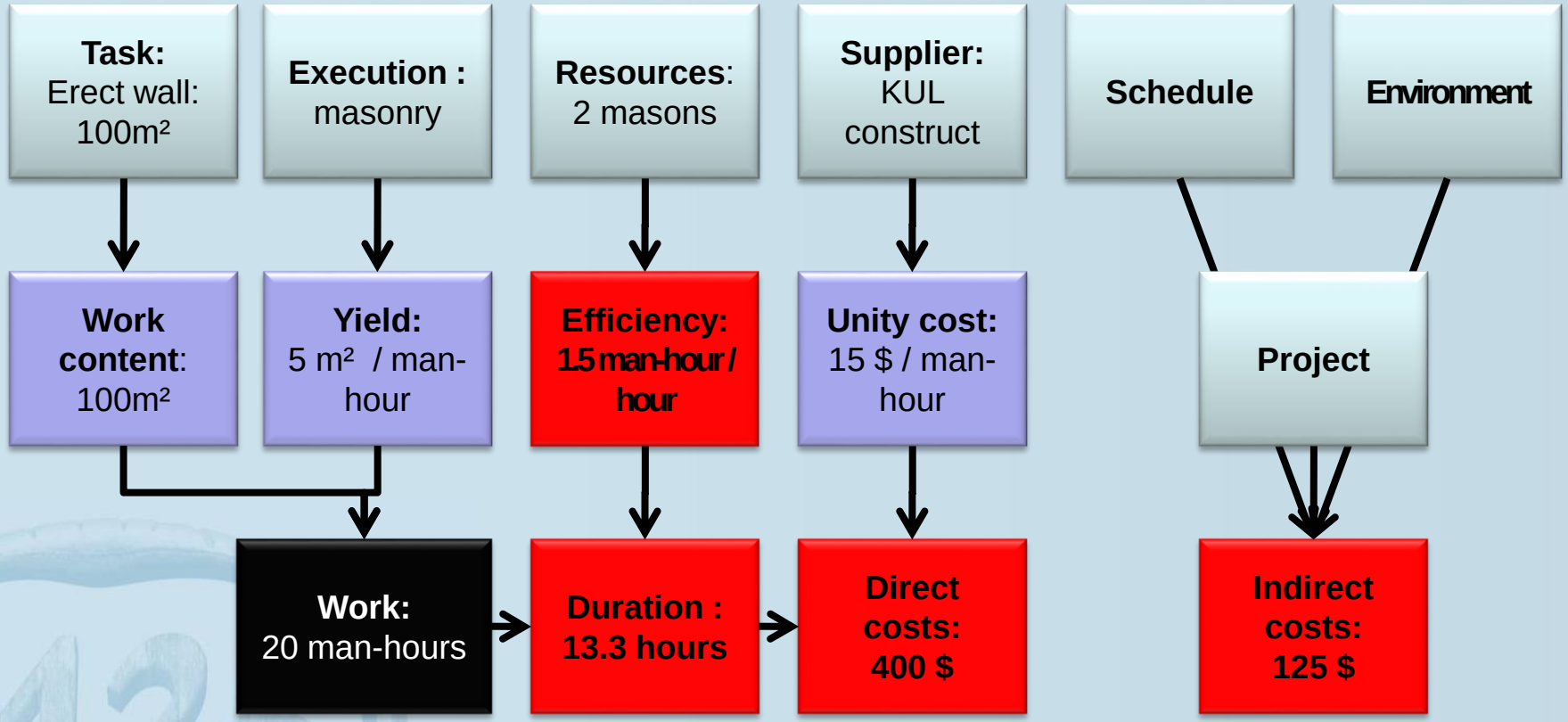

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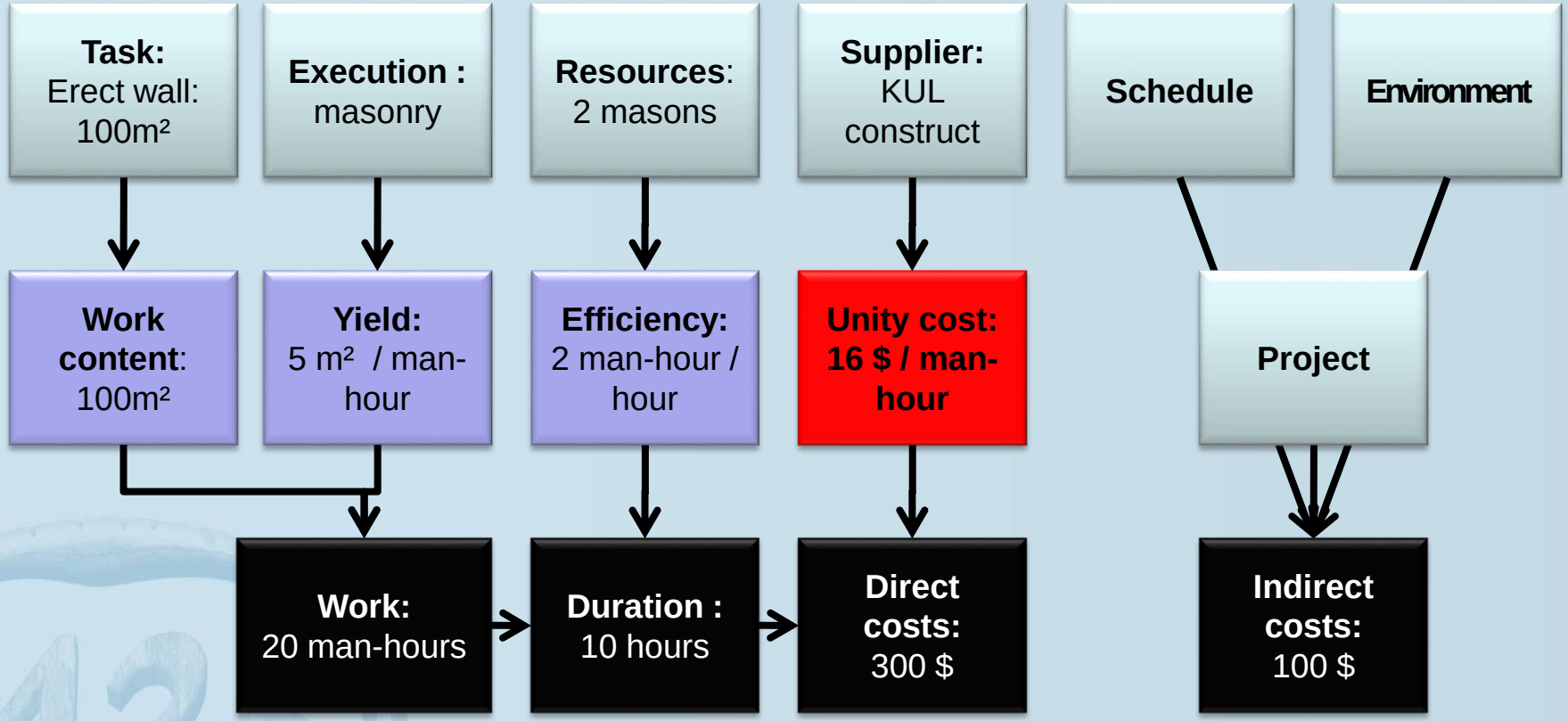

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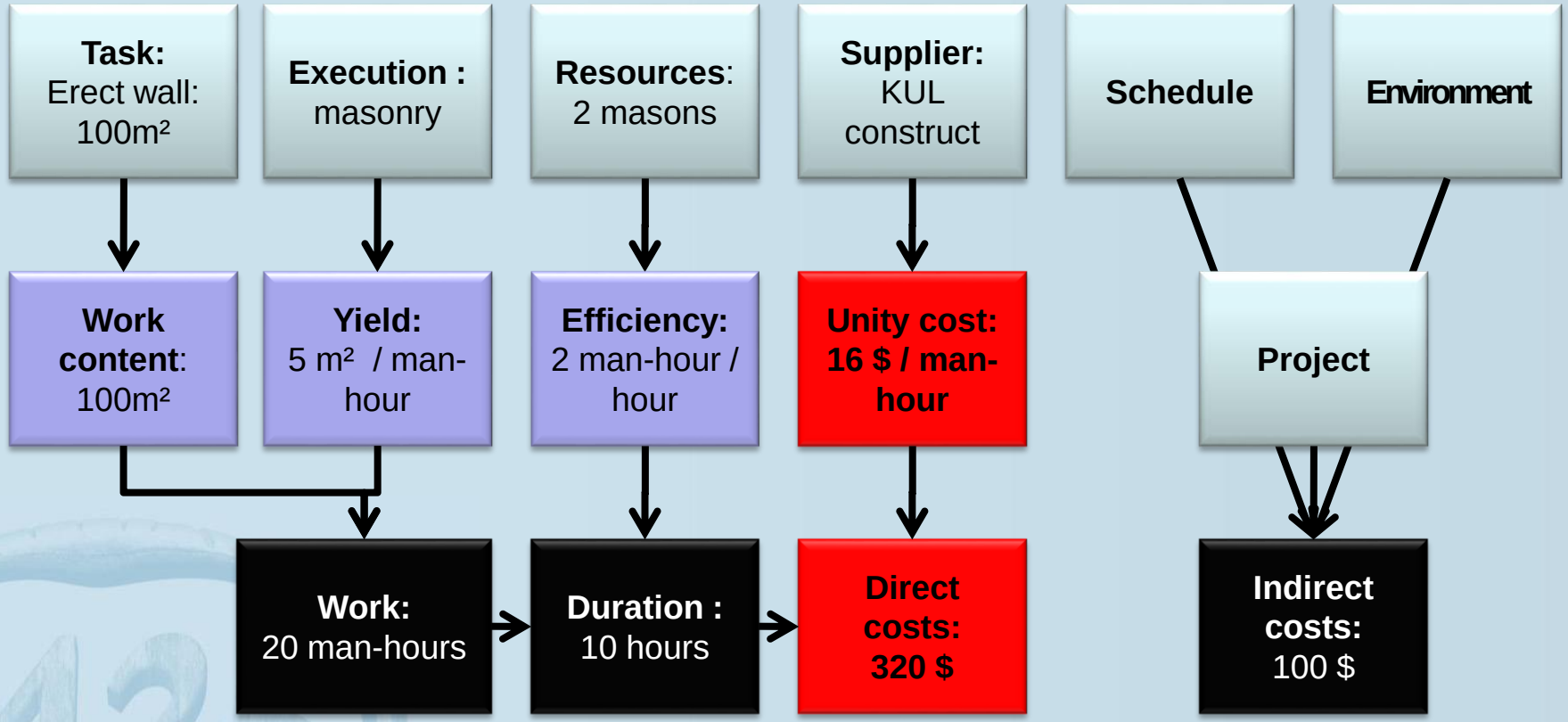

Output of Risk Analysis

	TIME 	DIRECT COSTS 	INDIRECT COSTS 
PROJECT	Probability the project finishes prior to a certain deadline	Probability the project exceeds a given budget	Probability of incurring a penality and/or additional overhead costs
RISK	Identifiaction of the most important risks that impact the timely completion of the project	Identification of the most important risks that impact the budget of a project	Identification of the most important risks that impact the indirect costs
TASK	Identification of those activities that need to be monitored closely in order for the poject to finish on time	Identification of the activities that pressure the budget of a project	Identification of the activities that contribute most to the indirect costs

Questions?