

# THE IMPACT OF LIMITED BUDGET ON THE CORRECTIVE ACTION TAKING PROCESS

Jie Song, Annelies Martens, Mario Vanhoucke / 21/04/2021

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## OUTLINE

1. Problem definition
2. Methodology
  - General idea
  - Control budget allocation models
  - Three versions
  - Take actions
3. Simulation model
  - Simulation procedure
  - Performance evaluation
4. Computational experiments
  - Experiment design
  - Results analysis

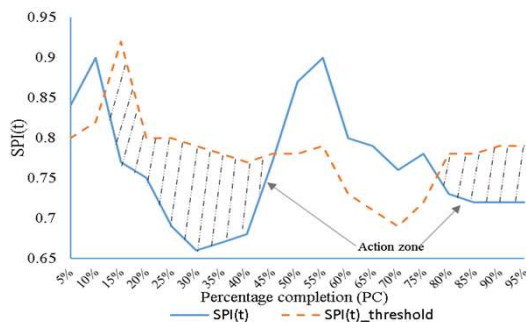
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## 1. Problem definition



Measure project performance → Set tolerance limits → Take actions (Activity crashing)

**Practice:** The budget for actions is always limited and gradually released during project execution.

**Literature:**

- Unlimited budget: Vanhoucke (2010, 2011), Hu et al., (2016)
- Limited budget: Martens and Vanhoucke (2019)

**Question:** How to allocate the limited budget to take corrective actions?

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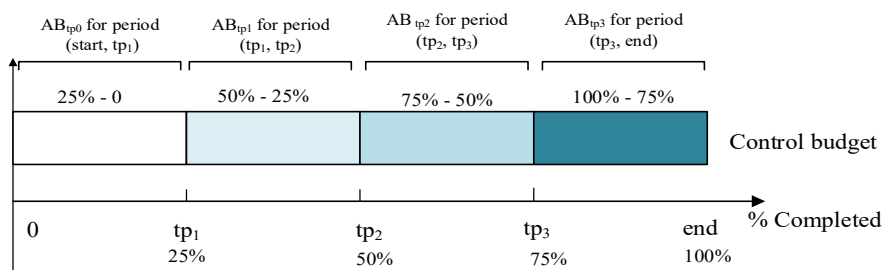
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## 2. Methodology - General idea

GENERAL IDEA

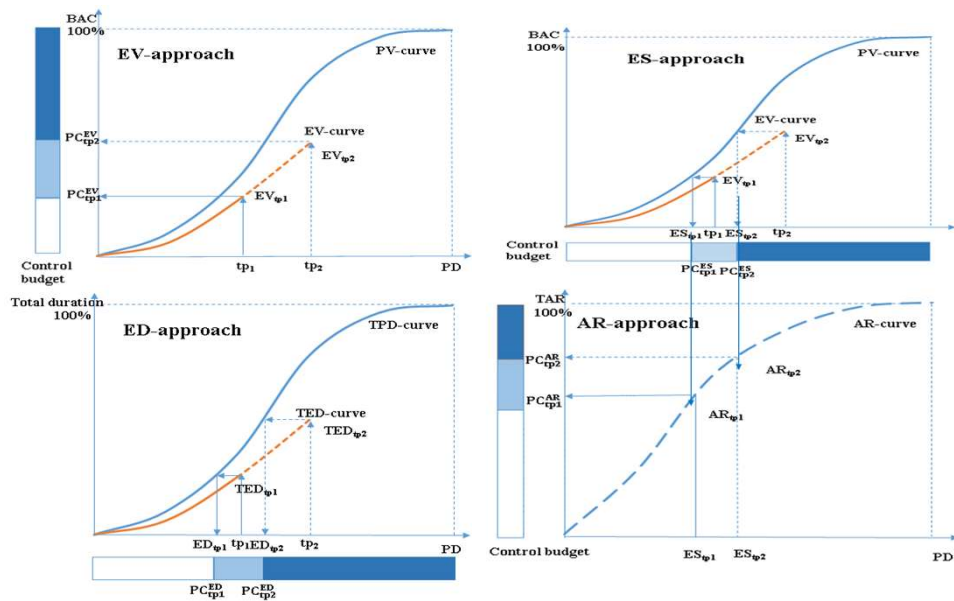
Allocate the budget according to the percentage completion (PC) of the project.



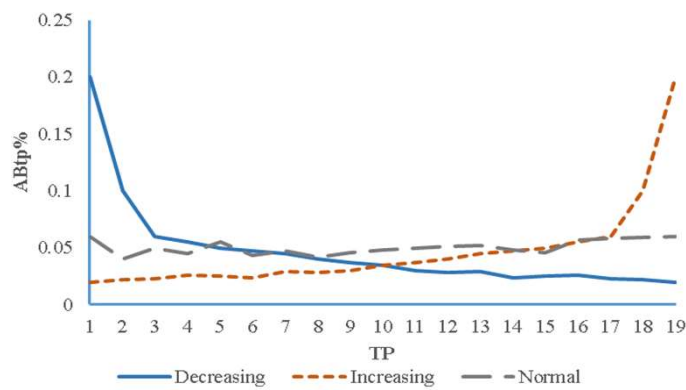
$$AB_{tp} = (PC_{tp+1} - PC_{tp}) \times \text{control budget}$$

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## 2. Methodology – Budget allocation models



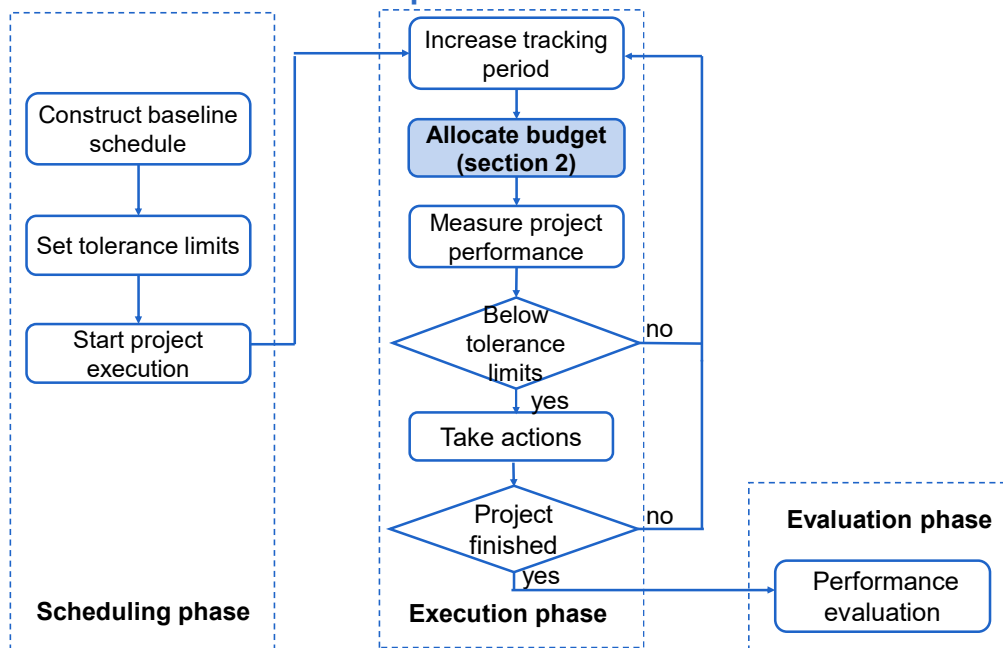
## 2. Methodology – Three versions



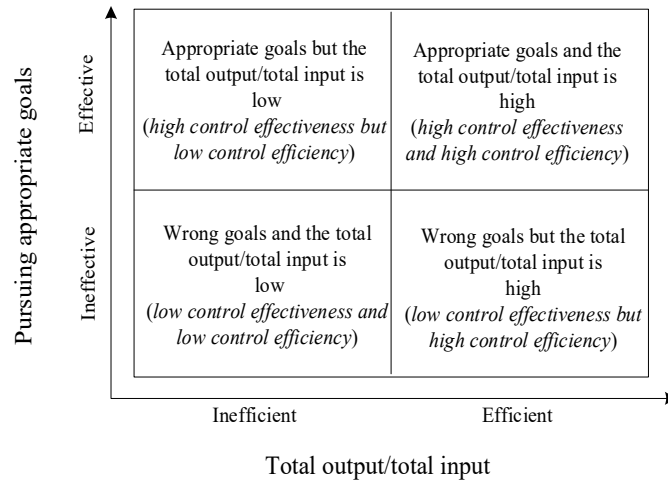
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### 3. Simulation model - Simulation procedure



### 3. Simulation model – Performance evaluation



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#### 4. Computational experiments – Experiment design

- Comparison of different approaches
- Comparison of three versions
- Impact of project networks
- Impact of buffer sizes
- Impact of corrective actions
- Impact of control budget

#### 4. Computational experiments – Results analysis

- The **ED approach** performs best in **top-down** project control, while the EV approach performs worst.
- The **increasing version** is preferred for top-down control with **limited budget**, while the **decreasing** version is recommended for the top-down control with **unlimited budget**.
- The **ED** approach improves the effectiveness in **parallel** projects.
- Frequent corrective actions with **small reduction** are suggested for top-down control with limited budget.

## Future work

- The proposed approaches should be implemented and tested on real-life projects to validate our approach, and to find a way to further improve our findings from the current research. Such an approach is promising, but not always easy, since finding enough information about corrective actions is not always practically possible.
- The budget allocation models should be extended by taking the limited availability of renewable resources into account.

## References

- Vanhoucke, M. (2010). Using activity sensitivity and network topology information to monitor project time performance. *Omega The International Journal of Management Science*, 38:359– 370.
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- Hu, X., Cui, N., Demeulemeester, E., and Bie, L. (2016). Incorporation of activity sensitivity measures into buffer management to manage project schedule risk. *European Journal of Operational Research*, 249:717–727.
- Martens, A. and Vanhoucke, M. (2019). The impact of applying effort to reduce activity uncertainty on the project time and cost performance. *European Journal of Operational Research*, 277:442–453.



Thank you for your attention.  
Questions?

[Jieson.Song@ugent.be](mailto:Jieson.Song@ugent.be)