



College of Performance Management

EVM World 2012 Conference

# An Integrated Project Control Process for Research and Practice

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# An integrated project control process for research and practice

- Exploring EVM performance
  - Individual metrics
  - Overall EVM
- Time is of the essence
- Most basic to basic
  - Project examples/ execution mode
- General remarks / take-aways
- Future research

# Project Control

- Effective project control detects:

*Departures from baseline schedule*

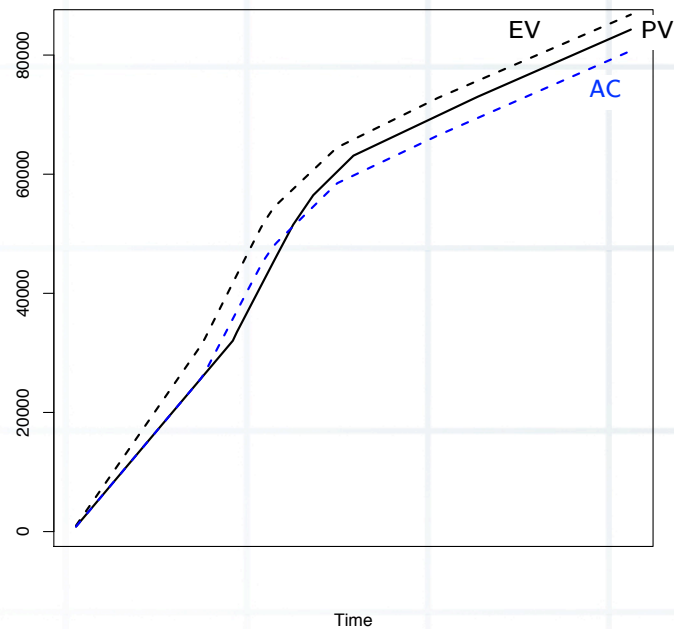
- Trigger timely corrective actions if needed
- Indicate potential openings (opportunities) in the schedule

- Activity level - monitoring “is an burdensome and often disruptive task” (Lipke, Zwikael, Henderson and Anbari (2009), IJPM

*Activity level performance with project level effort*

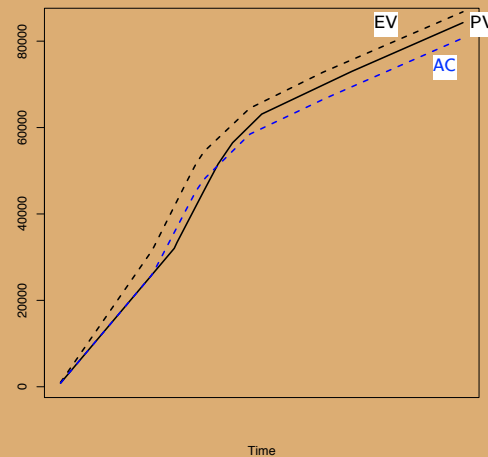
## Quantify performance: for Research and Practice

- Compare the *Earned Value* against the *Planned Value*



*Performance Measurement Baseline*

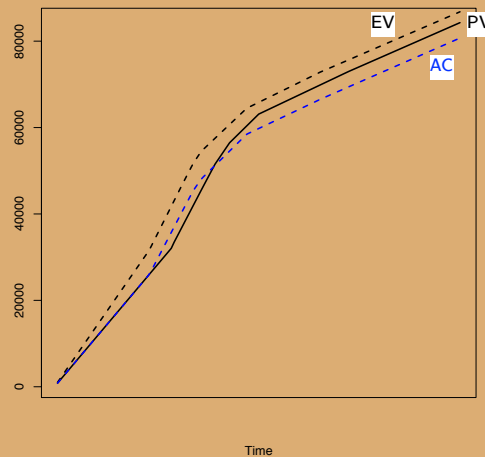
# Quantify performance: for **Research** and Practice



EVM (**overall**) performance to detect departures from baseline:

- Rules of Thumb
- Control limits

# Quantify performance: for **Research** and **Practice**



EVM (**overall**) performance to detect departures from baseline:

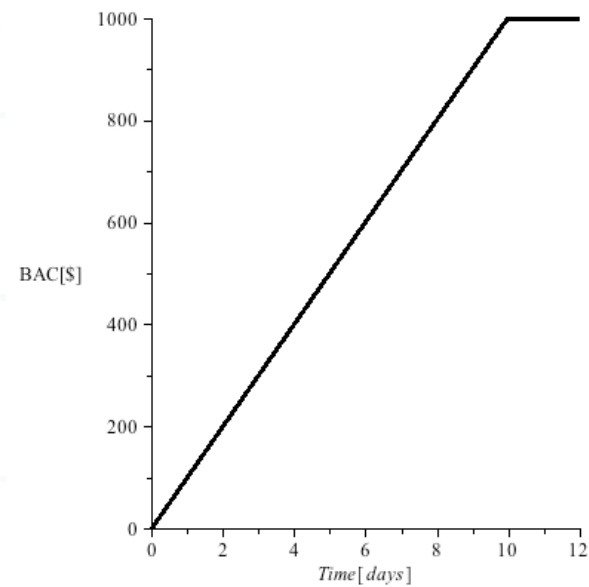
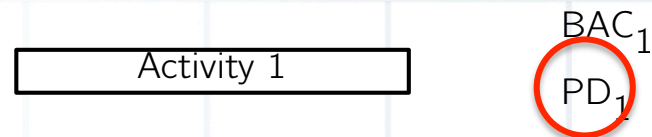
- Rules of Thumb
- Control limits

EVM to assess a **project's** performance

- Rules of Thumb
- Control limits

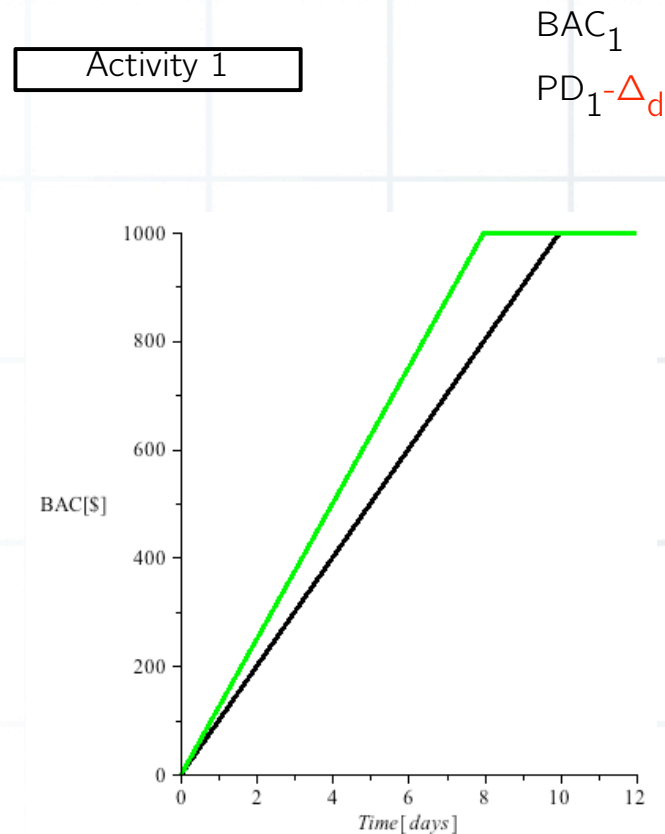
# Quantify EVM performance

- Simplest project imaginable:



# Quantify EVM performance

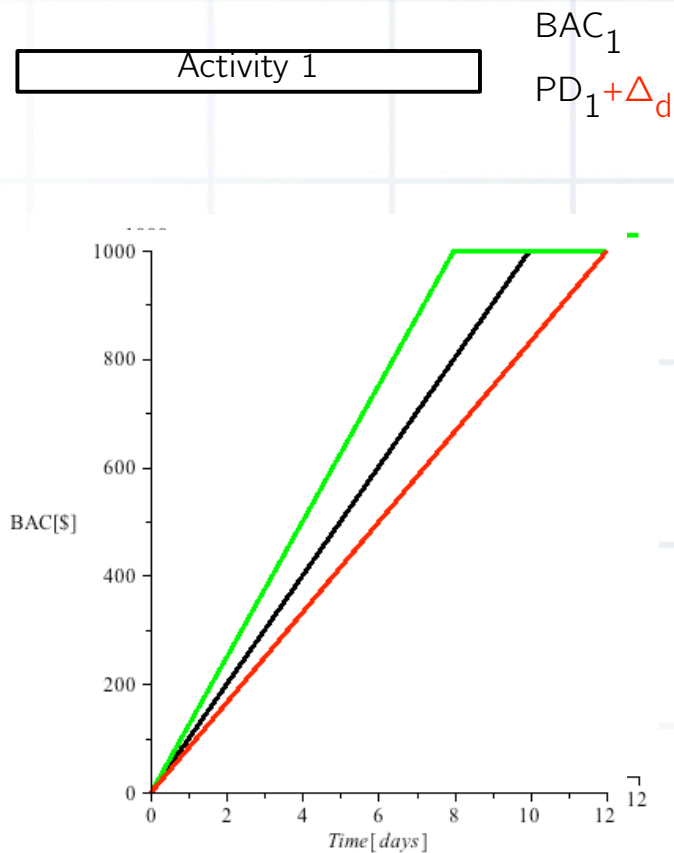
- Simplest project imaginable:





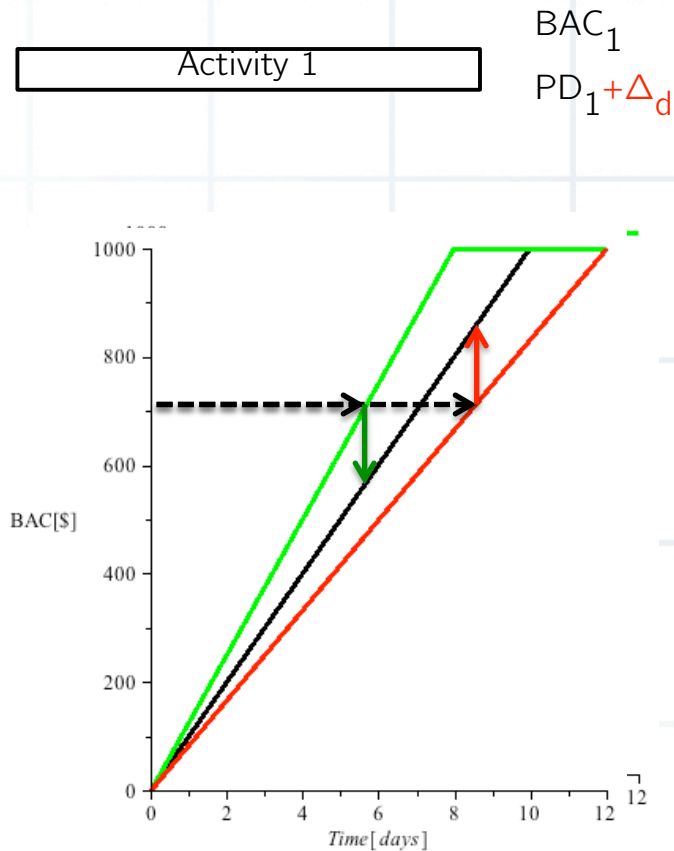
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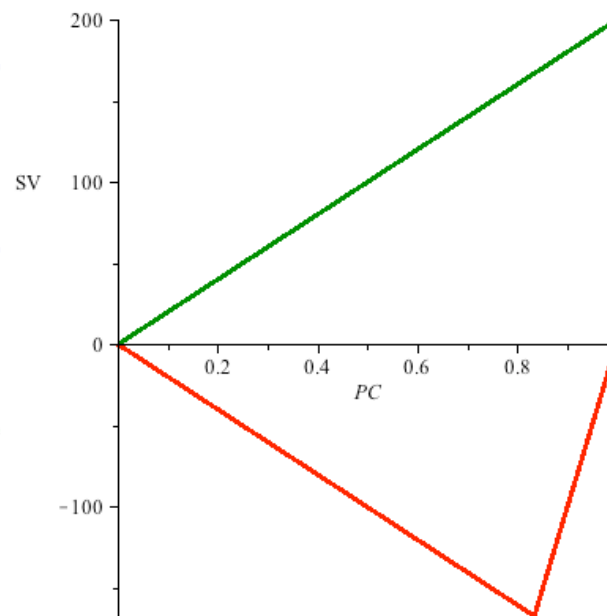


- Simplest project imaginable:

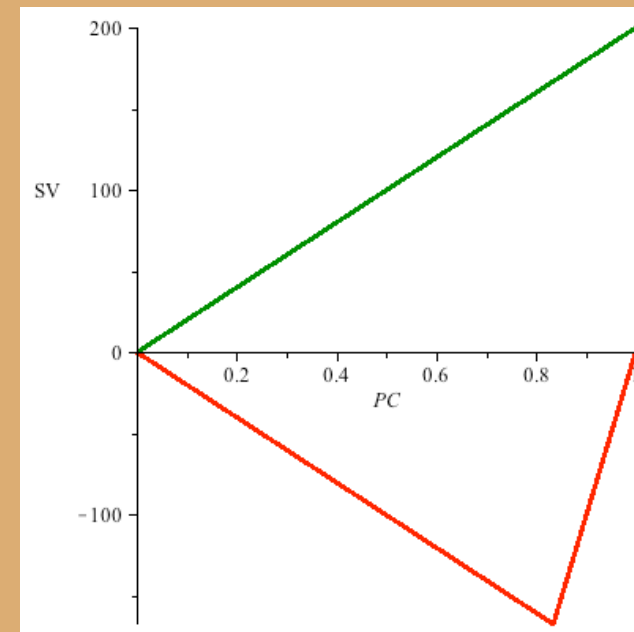
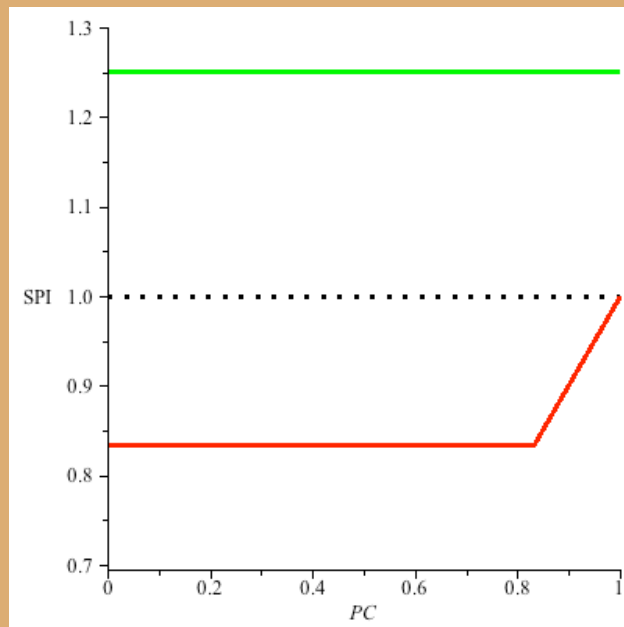
Activity 1

$BAC_1$   
 $PD_1 \pm \Delta_d$

- Produces simple EVM graphs:

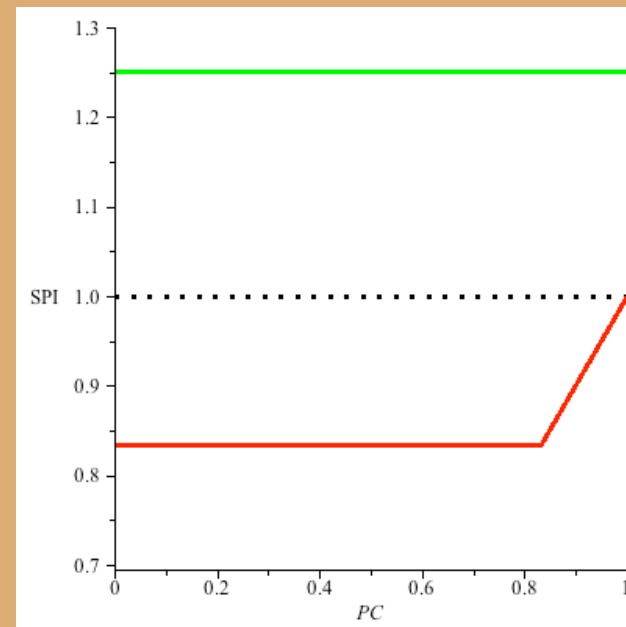
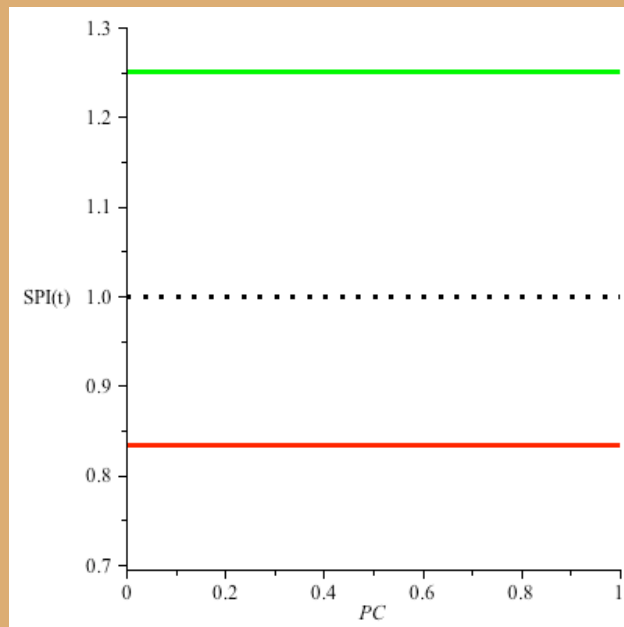


- EV based metric show quirky towards the end for late projects.
- ES based metrics don't



SPI and SPI(t) does **not** behave symmetrically with respect to deviations in baseline duration

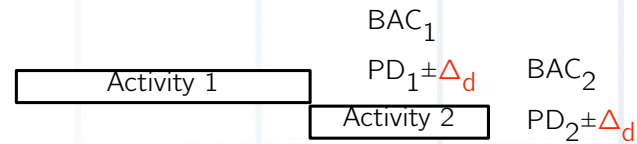
- Are we more averse to time-overrun than we are *inclined* to detect opportunities?
- Fixed x% control limits detect more opportunities than project overrun, relatively speaking



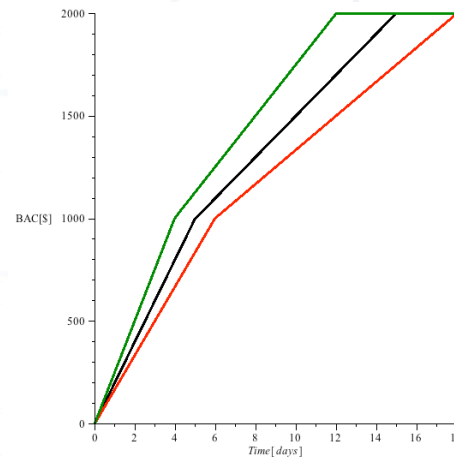
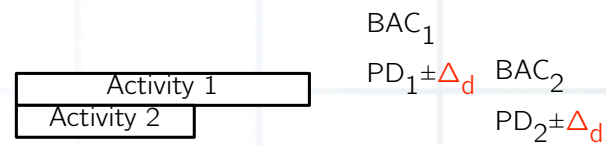
To evaluate problems and opportunity evenly, we need to assign uneven control limits

- Project example with two activities:

- In series

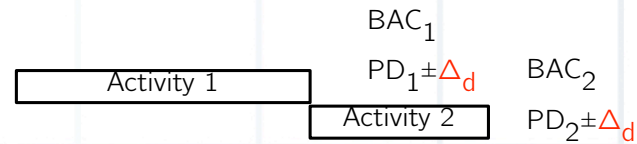


- In parallel

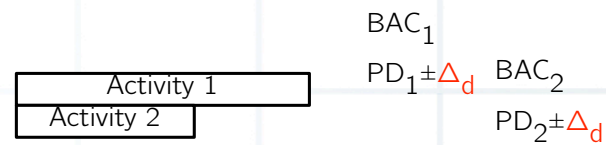


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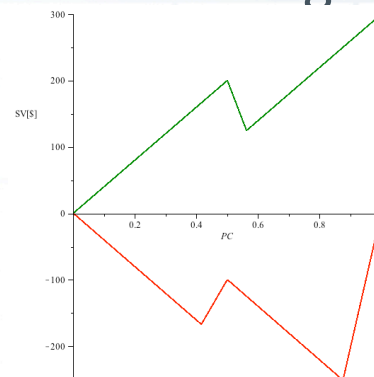
- In series



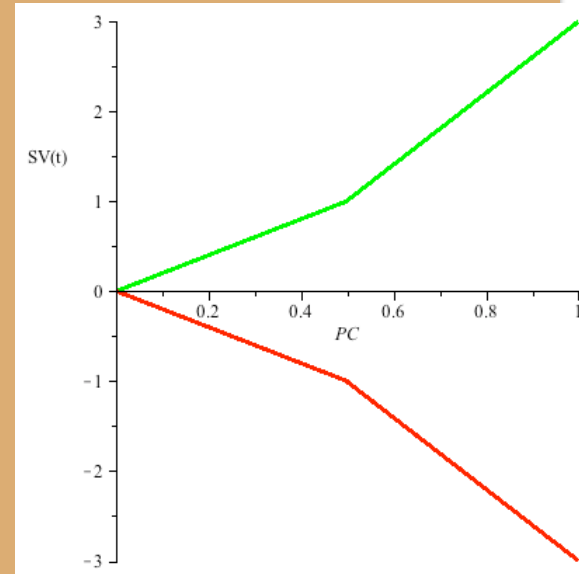
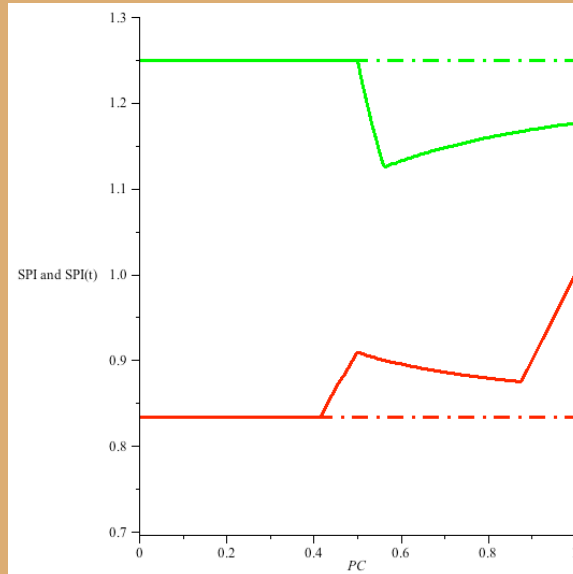
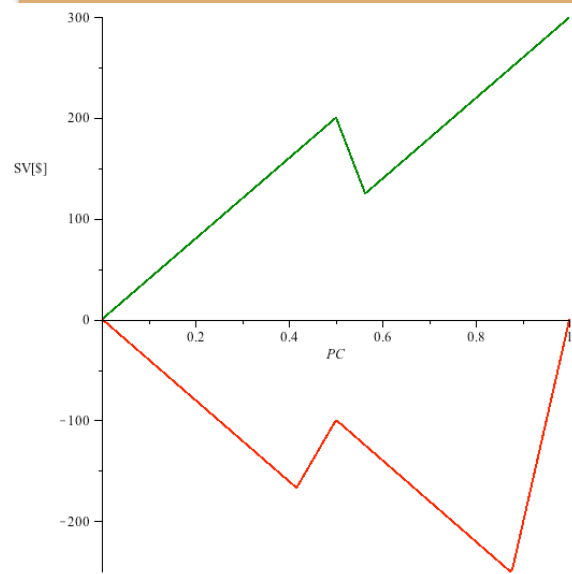
- In parallel



- Produce more difficult EVM graphs:



- SPI and SV graphs become increasingly difficult to understand

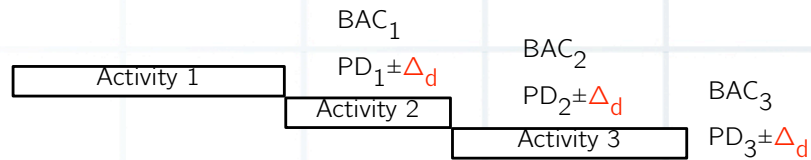


- SPI(t) and SV(t) are more intuitive! Easier to understand.

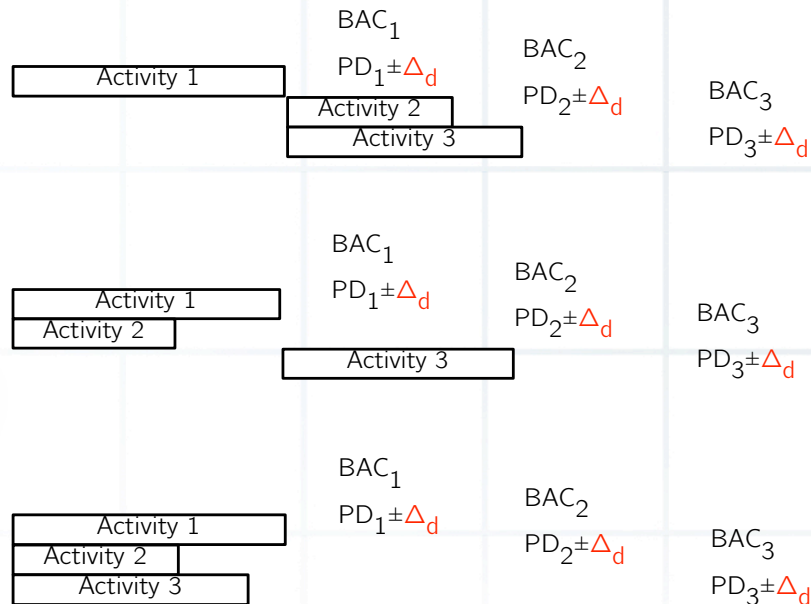


- Project example with three activities:

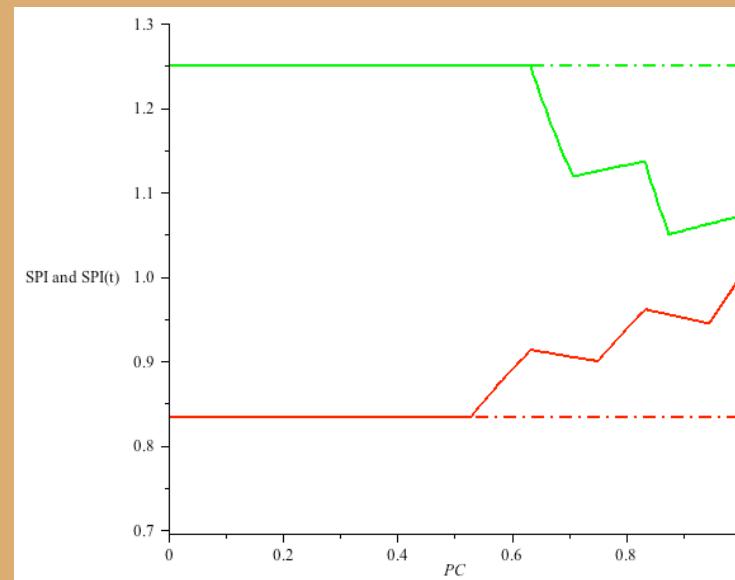
- Serial



- Parallel



- SPI, SV and SPI(t) and SV(t) graphs don't change much, but the analytical expression becomes increasingly more difficult:



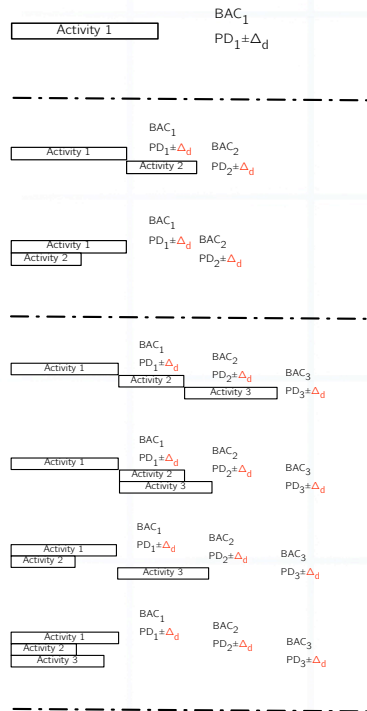
- We need a different strategy to obtain EVM charts to visualize a project's EVM dynamics!

## Simulation

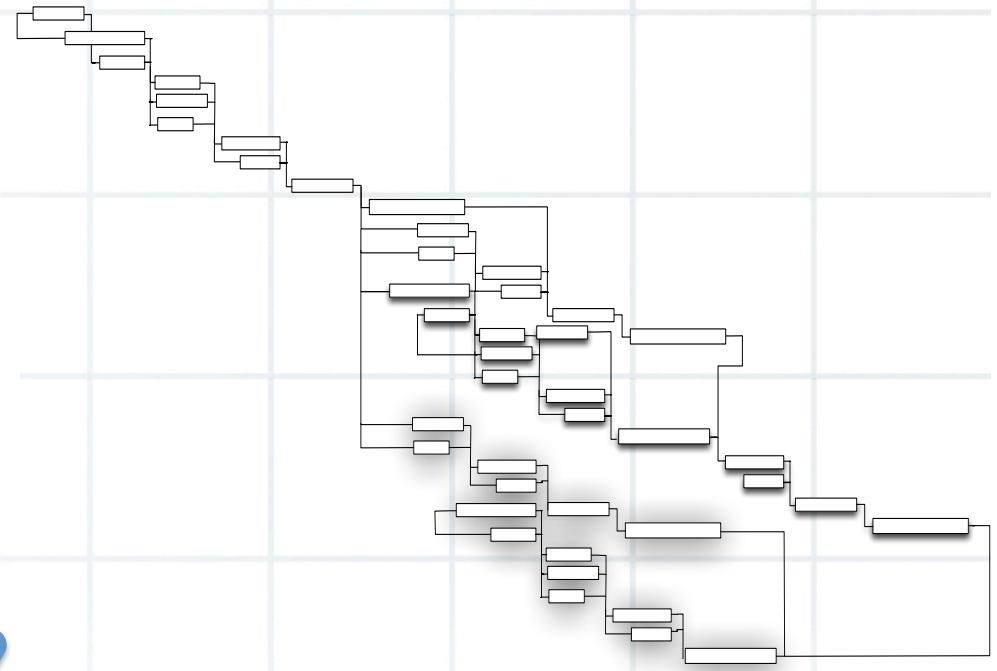
## Analysis Pen and paper

## Simulation p2engine

Size

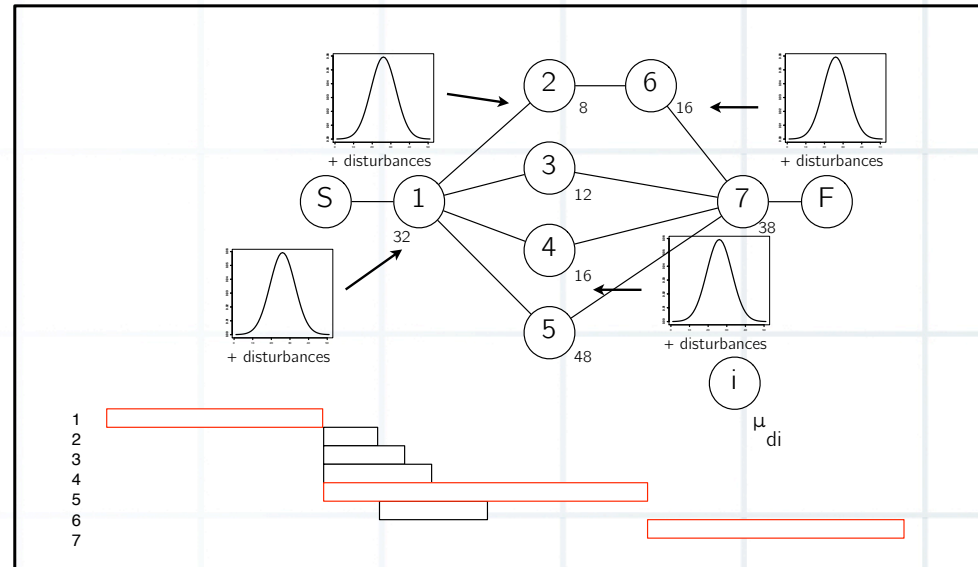


Effort



- Add PERT-like estimates
- Give sense of Possibilities

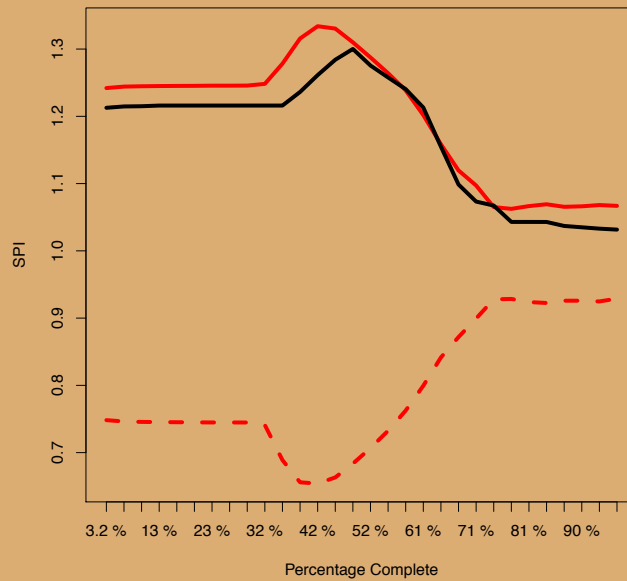
# A Simulation example



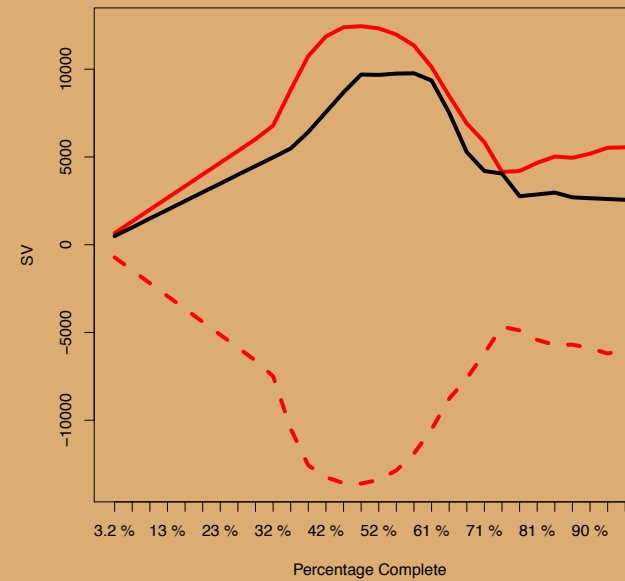
- Produce EVM graphs
  - Add (PERT-like) probabilities
  - “To get a sense of the possibility for these extremities to occur”
  - Analyze the dynamics of EVM metrics
  - Shewhart-like charts

Shown are the  $\pm 3\sigma$  limits for:

SPI



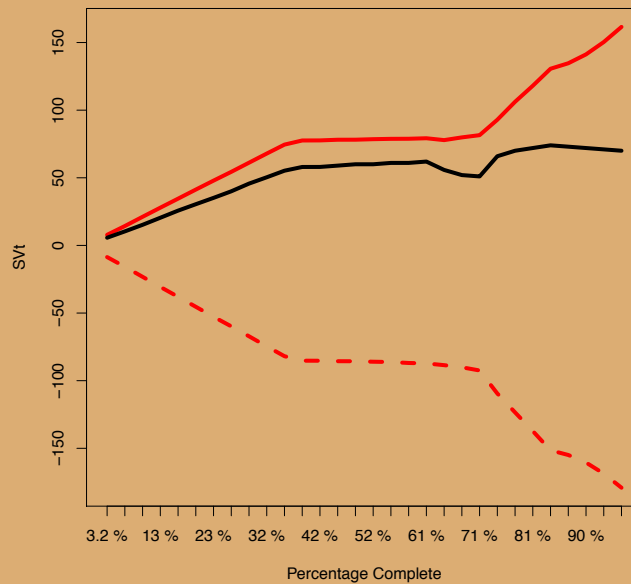
SV



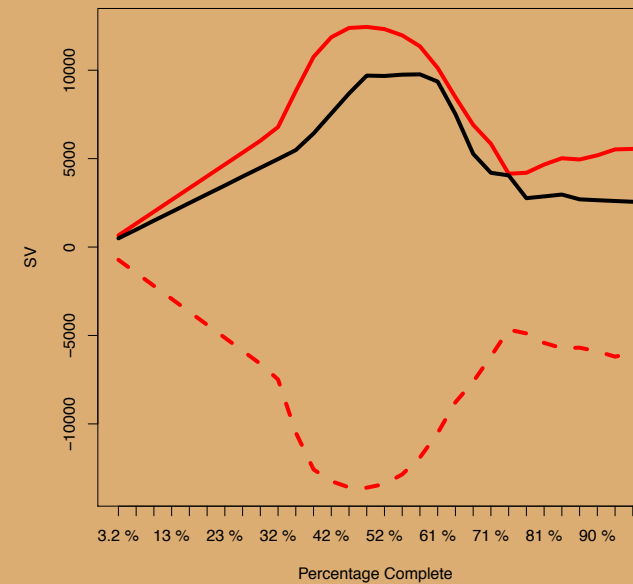
- Variance and Index measure exhibit completely different dynamics
- Generally, EVM guidelines don't stress this difference

Shown are the  $\pm 3\sigma$  limits for:

SV(t)



SV



- Earned Schedule metric (SV(t)) is stable and represents better the real schedule risk (i.e. 1 dominant activity)
- SV unstable and difficult to comprehend

# Simulation for **Research** and Practice

- Procedure can be generalized for all projects
- Shows how uncertainty/risk on the activity level is translated in EVM
- Shows relevance of general 'EVM guidelines' — rules of thumb

# Simulation for **R**esearch and **P**ractice

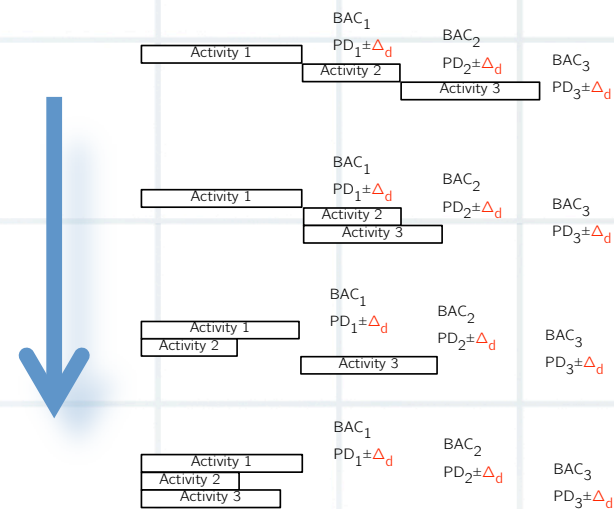
- Procedure can be generalized for all projects
- Shows how uncertainty/risk on the activity level is translated in EVM
- Shows relevance of general 'EVM guidelines' — rules of thumb

- Prior to execution:
  - EVM dynamics can be analyzed carefully
  - It is relevant to obtain as much of this information as possible
- Project control:
  - Compare EVM metrics to  $\pm 3\sigma$  limits



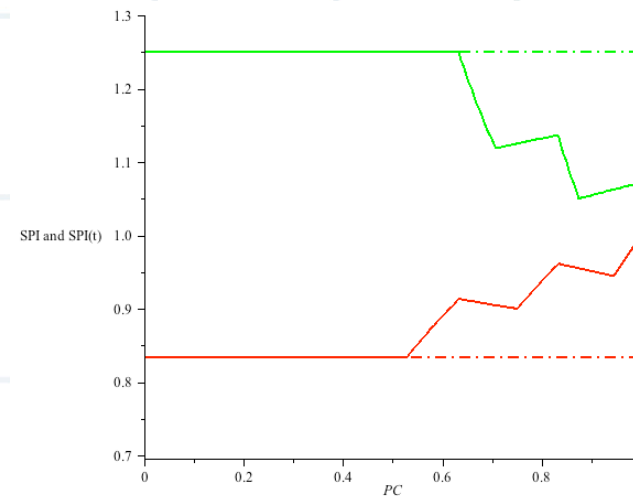
# Future research

- ‘Statistical project control’ enhancements:
  - Network Information



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  - Incorporate analytical lessons



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- ‘Statistical project control’ enhancements:
  - Network Information
  - Incorporate analytical lessons
  - Multivariate (batch) process control

# An integrated project control process for **Research** and **Practice**

- We'll do the **research**
  - Friday's keynote speech
  - Concerted research action
  - Over 1M € research project
- We invite you to do the **practice**
  - Challenge our findings
  - P2engine — [www.p2engine.com](http://www.p2engine.com)
  - ProTrack — [www.ProTrack.be](http://www.ProTrack.be)