

If time is money, accuracy pays!

Mario Vanhoucke & Tom Van Acker

Ghent University
Vlerick Leuven Gent Management School
OR-AS Operations Research - Applications and Solutions
www.or-as.be
www.protrack.be
Brussels - March 10, 2010



Target

- Research objectives
- Research results
- Commercial spin-offs

Target

- Research objectives
= *Theory meets practice!*
- Research results
= *Guidelines, tips, tricks and hints!*
- Commercial spin-offs
= *Software tool as a learning experience!*

Mario Vanhoucke - Ghent University

Outline

- Research objectives

...
Professor Vanhoucke's summary chapter in his new book "Measuring Time: ..." provides an interesting twist to this discussion.

...
Professor Vanhoucke's work is shedding a new light on using EVM for me. In retrospect, this has helped me understand better why EVM worked so well in some cases and failed so miserably in others.



...
Tony Barrett
Professional Engineer (PE),
Earned Value Professional (EVP),
Project Management Professional (PMP).

LinkedIn Earned Value Management discussion

Mario Vanhoucke - Ghent University

Outline

- Research results

...

The IPMA Research Awards are presented to the most excellent researchers within project management. The aim of the award is to advance project management and support the development of project work.

...

IPMA

International Project Management Association

www.ipma.ch



IPMA » international
project
management
association

Mario Vanhoucke - Ghent University

Outline

- Commercial spin-offs

...

ProTrack (acronym for Project Tracking) is a project scheduling and tracking software tool developed by OR-AS to offer a straightforward yet effective alternative to the numerous project scheduling and tracking software tools.

...

based on the results of various award winning research studies and many discussions with practitioners using earned value management.

...

based on the current best practices of earned value management and novel concepts.

...

OR-AS

Operations Research - Applications and Solutions

www.or-as.be

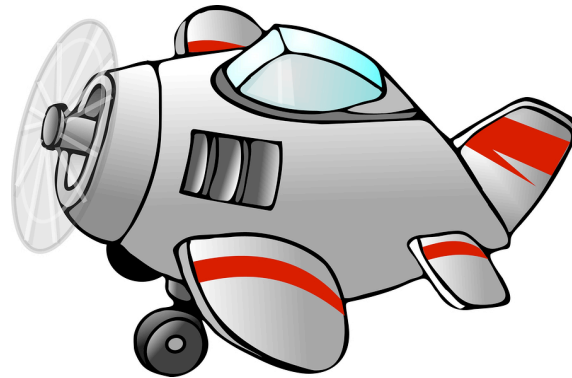
www.protrack.be



Mario Vanhoucke - Ghent University

An overview...

PLEASE FASTEN YOUR
SEAT BELTS AS WE
PREPARE TO DESCEND



Mario Vanhoucke - Ghent University

Measuring Time...

An EVM introduction



The EV terminology



A case study



The research project



Static drivers of forecast accuracy

Dynamic drivers of forecast accuracy

Time sensitivity and corrective actions

Top-down or bottom-up project tracking

The software



Mario Vanhoucke - Ghent University

Measuring Time...

An EVM introduction



The EV terminology



A case study



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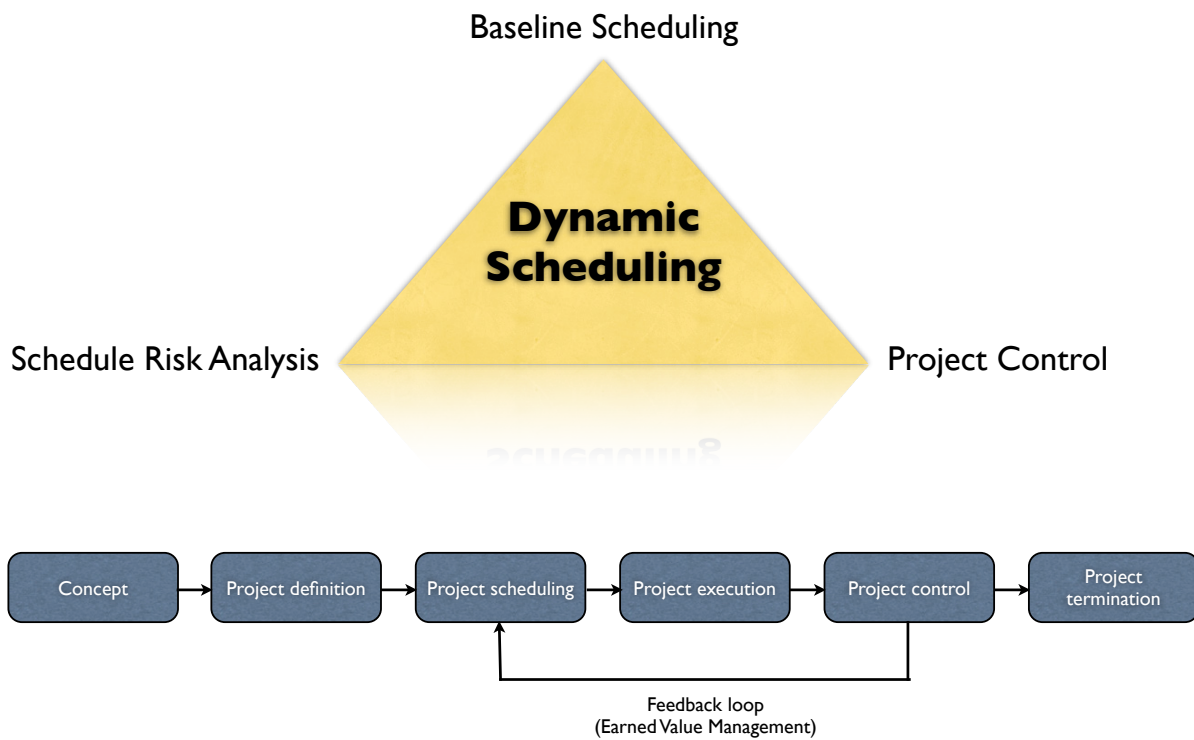
Top-down or bottom-up project tracking

The software

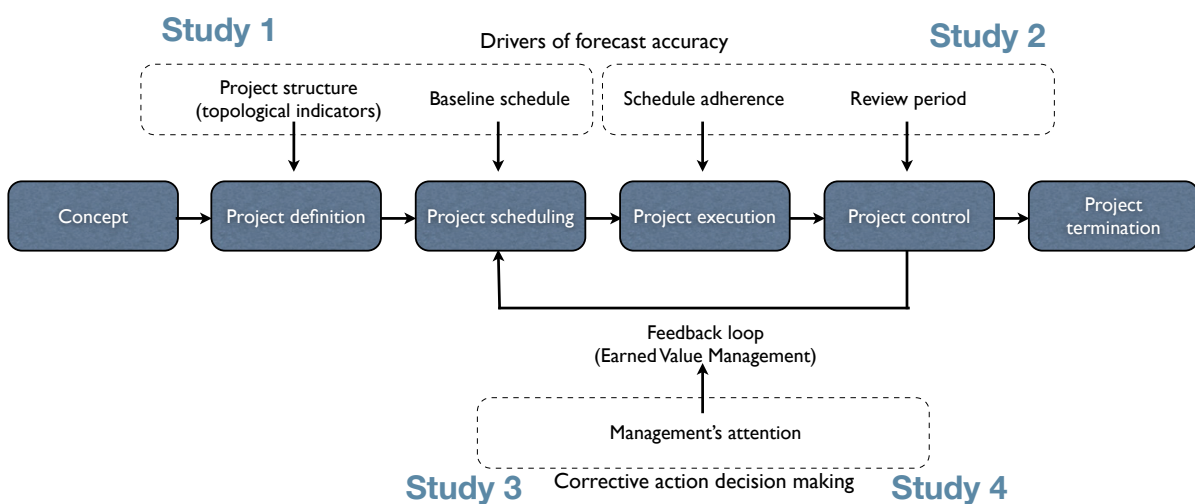


Dynamic Scheduling

Research study



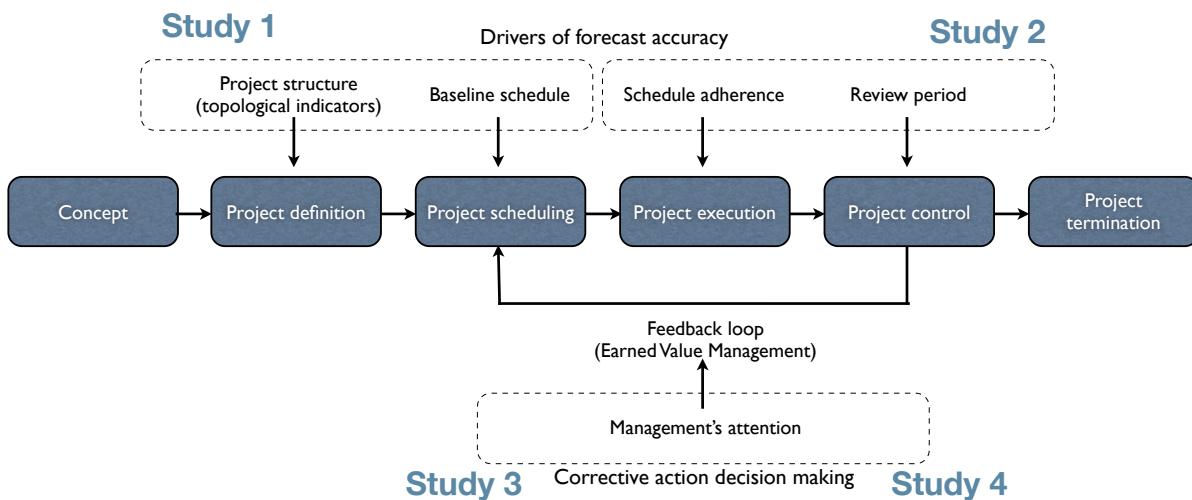
Research study



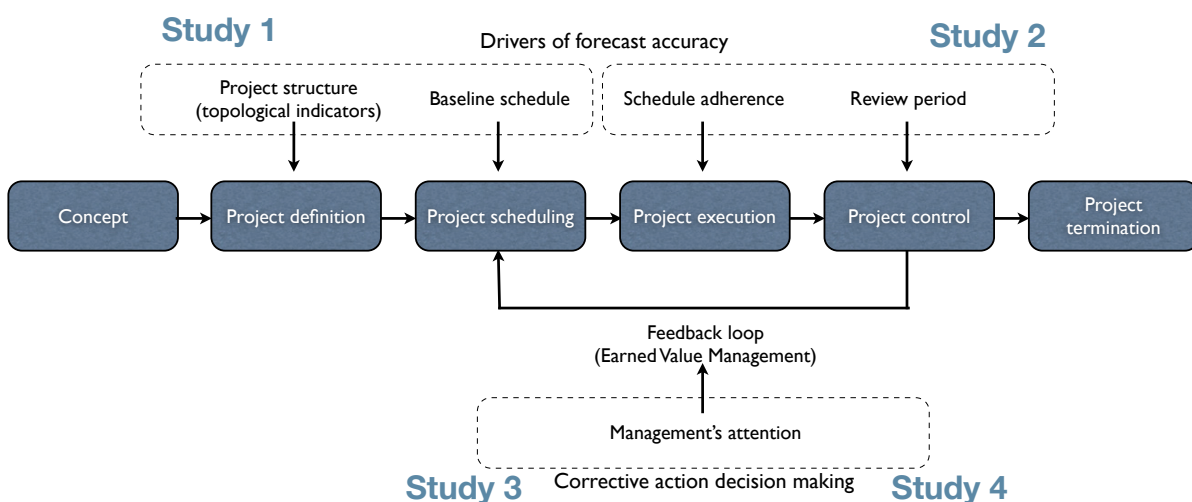
Research study

Study 1

Understand why EVM works so well in some cases and fails so miserably in others.



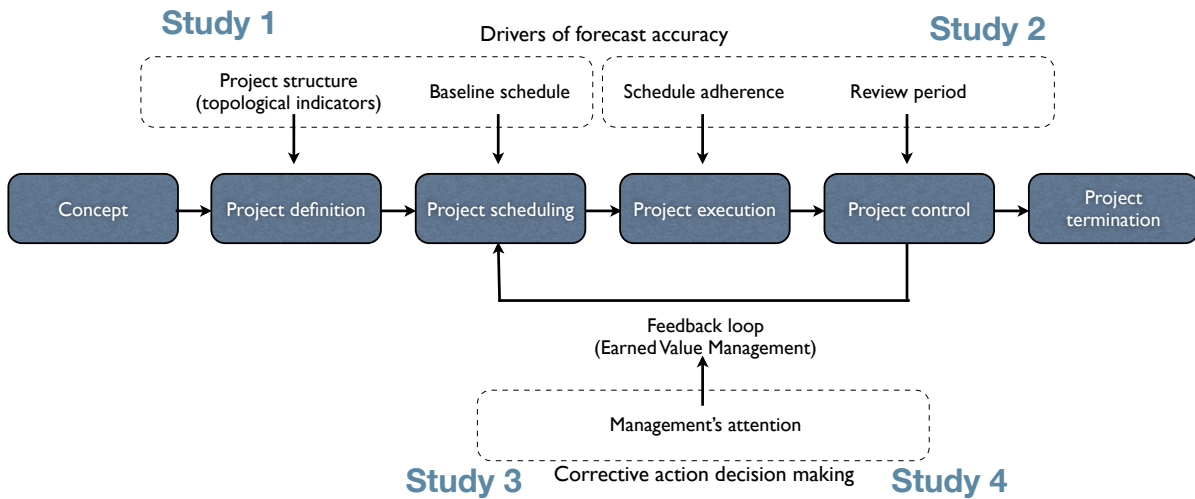
Research study



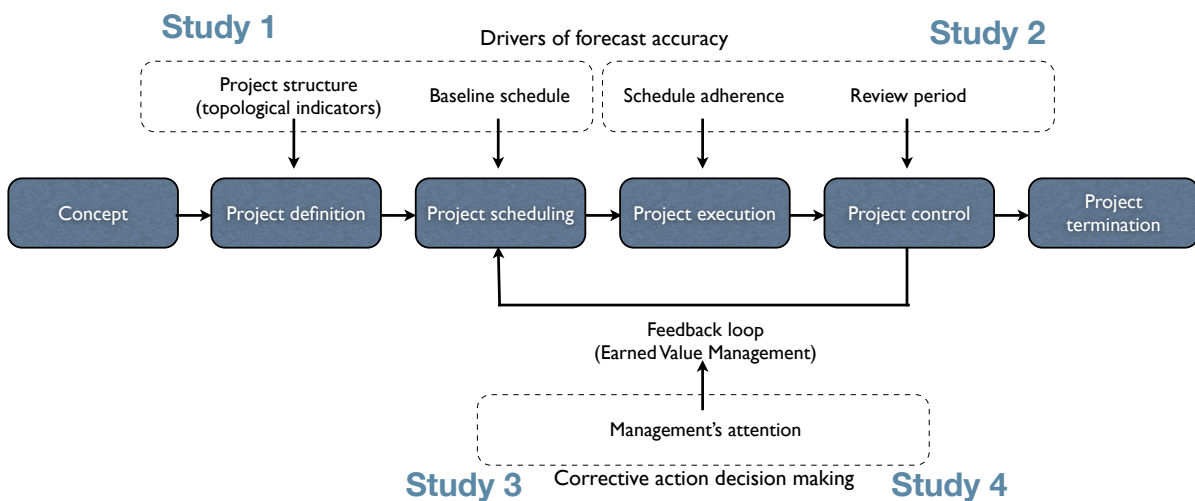
Research study

Study 2

Recognize the dynamic use of EVM information to measure project performance and predict future project behavior.



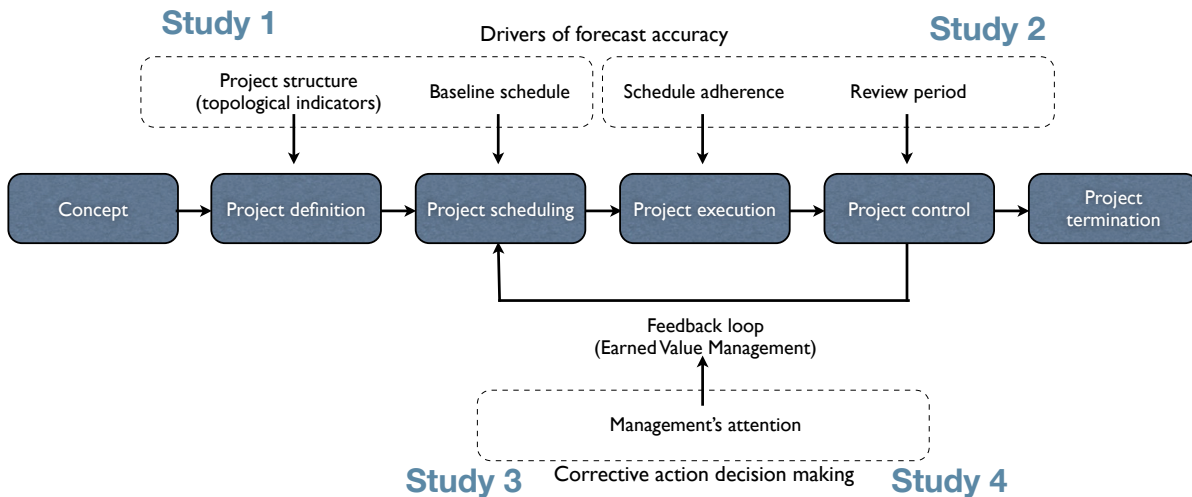
Research study



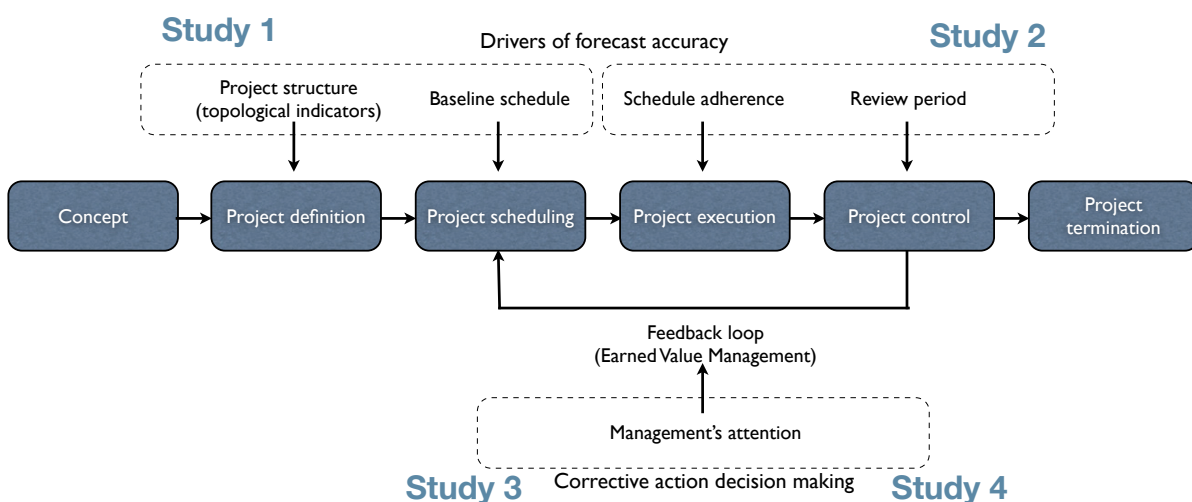
Research study

Study 3

Master the schedule risk analysis technique to support corrective actions during project progress.



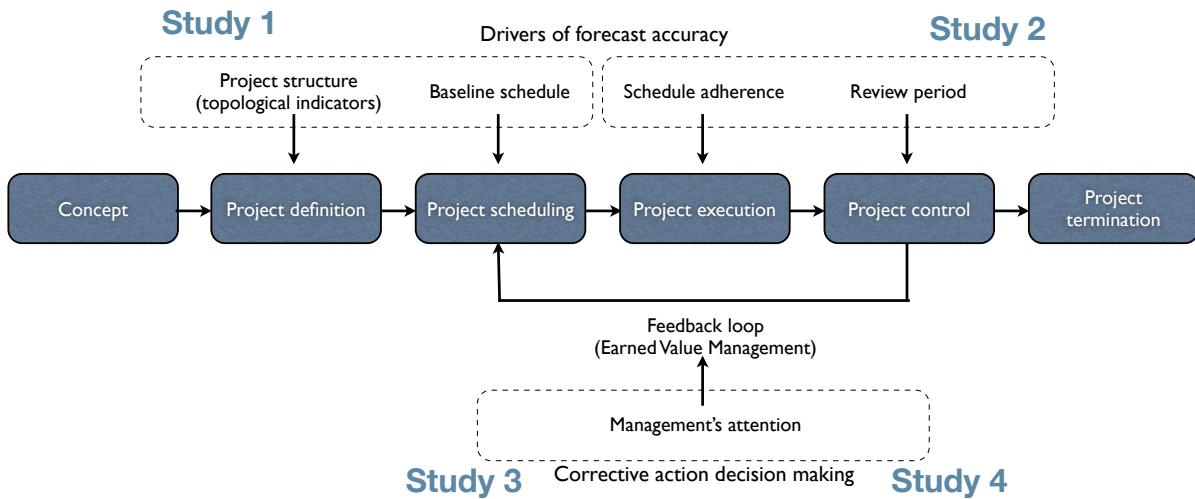
Research study



Research study

Study 4

Recommend a set of best practices to use EVM during project control.



Study 1

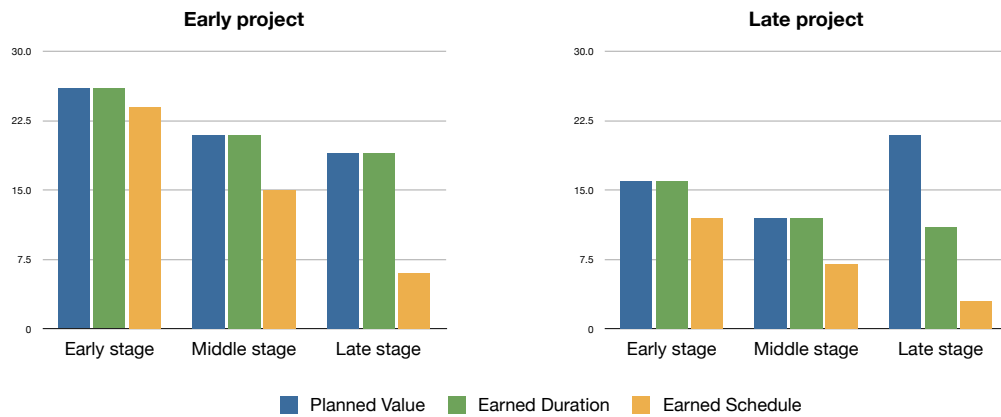
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Which technique for **which project**?

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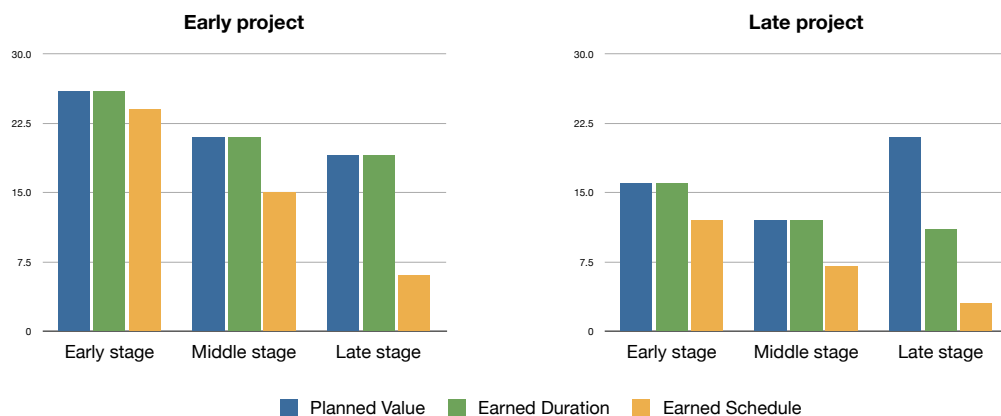
Which technique for which project?



Study 1

Understand why EVM works so well in some cases and fails so miserably in others.

Which technique for which project?



Accuracy along the completion stage (beginning, middle or late)

- * All forecasting methods have a relatively low accuracy at the project start. So what?
- * The earned schedule method outperforms the other methods from the beginning of the project
- * All other methods make the quirky mistake from the 50% à 60% percentage completed

Study 1

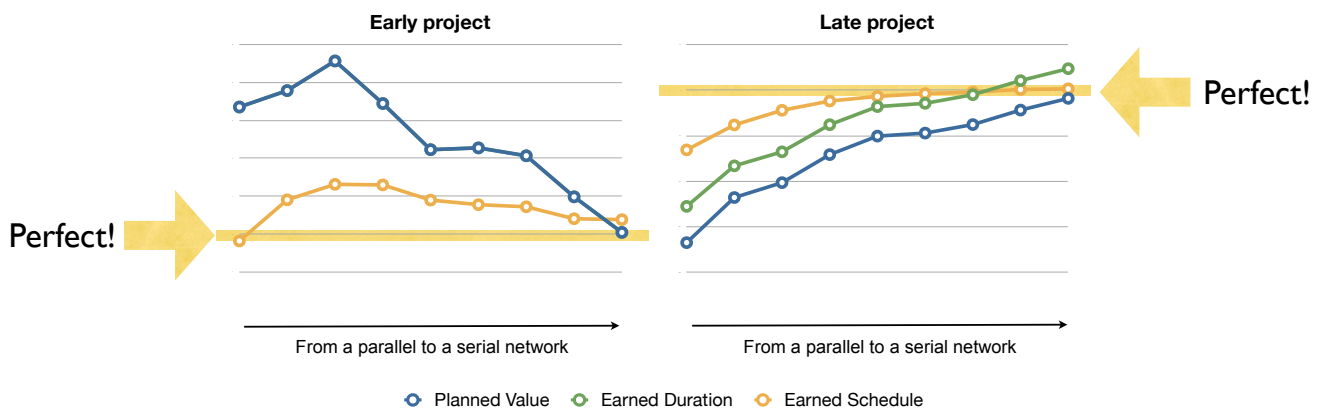
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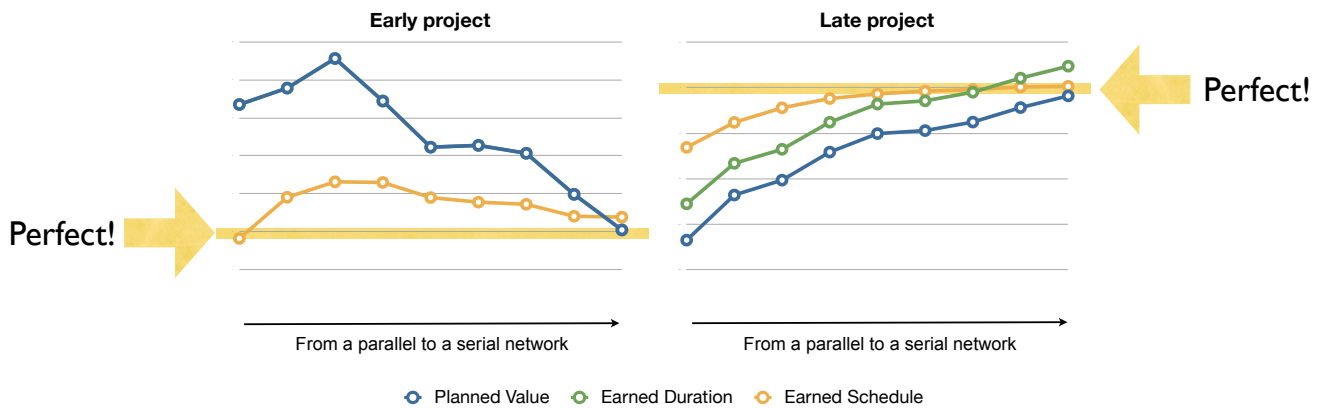
Which technique for **which project?**



Study 1

Understand why EVM works so well in some cases and fails so miserably in others.

Which technique for which project?



The network structure has a clear influence on the forecast accuracy

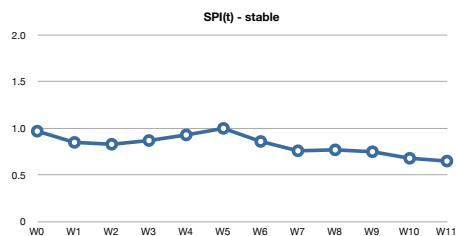
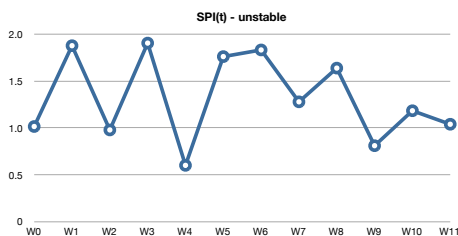
- ★ EVM works extremely well in "serial" schedule networks
- ★ You need to use an alternative to EVM in "parallel" schedule/WBS network topologies

Study 2

Recognize the dynamic use of EVM information to measure project performance and predict future project behavior.

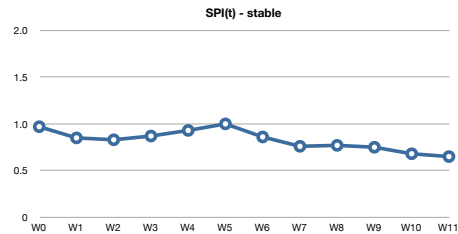
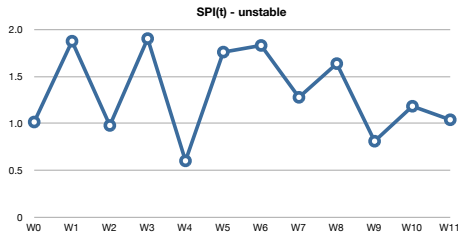
 **On time!**

 **Late!**



Study 2

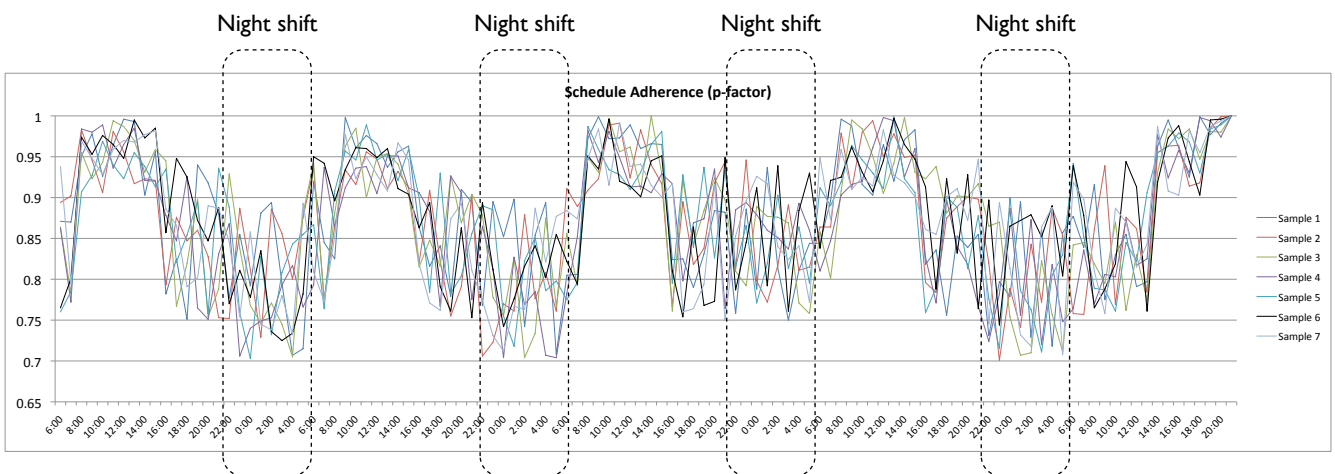
Recognize the dynamic use of EVM information to measure project performance and predict future project behavior.



Accuracy \neq Stability

Study 2

Recognize the dynamic use of EVM information to measure project performance and predict future project behavior.



Accuracy \neq Stability

p-factor - schedule adherence

Study 3

*Master the schedule risk analysis technique
to support corrective actions during project progress.*

*When management has a certain feeling of the relative sensitivity of the various activities on the project objective, a better **management's focus** and a more **accurate response** during project tracking should positively contribute to the overall performance of the project.*

Mario Vanhoucke

Omega - International Journal of Management Science

Mario Vanhoucke - Ghent University

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management focus versus **accurate response**

Mario Vanhoucke - Ghent University

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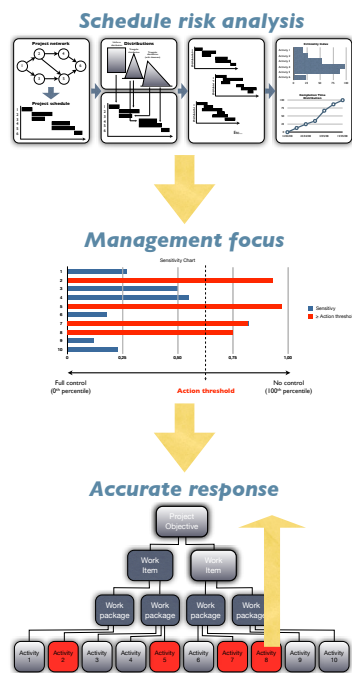
management focus versus accurate response



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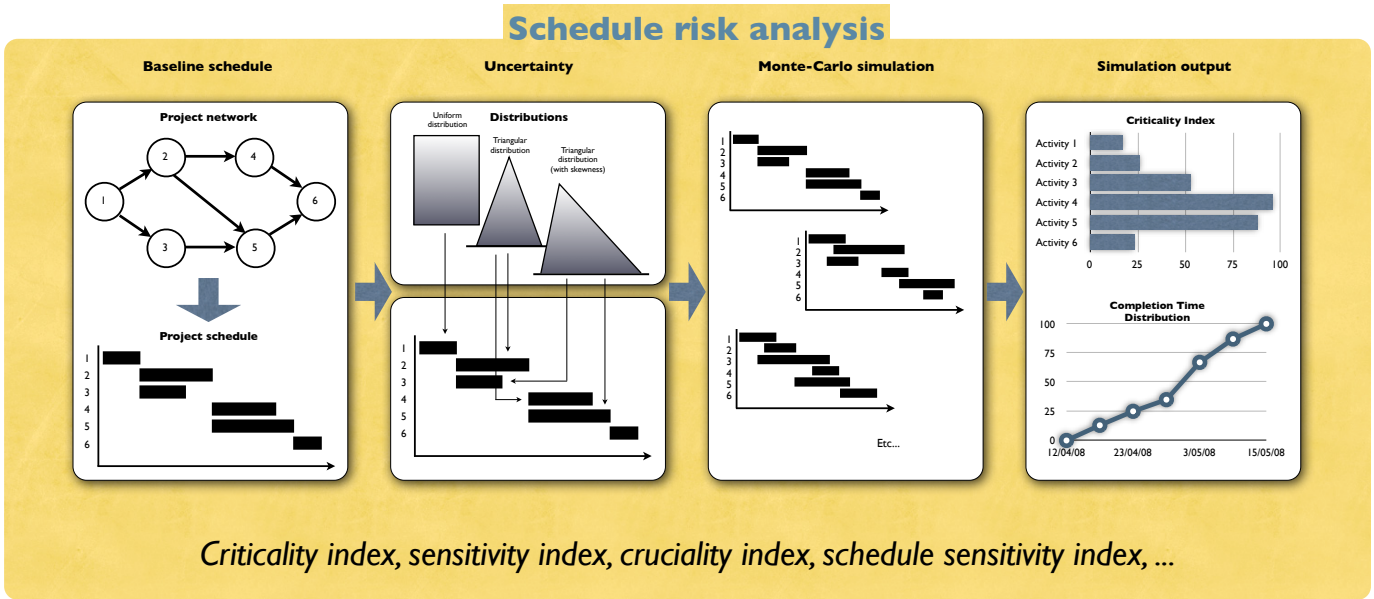
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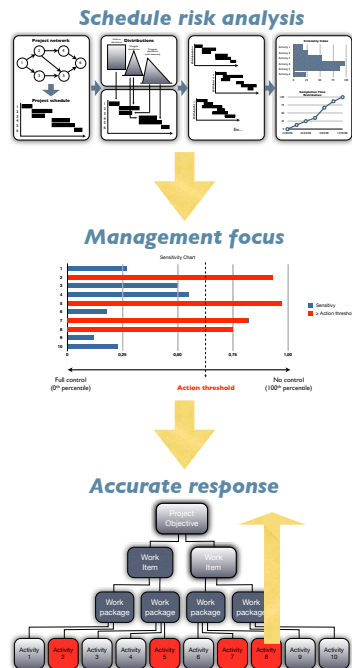
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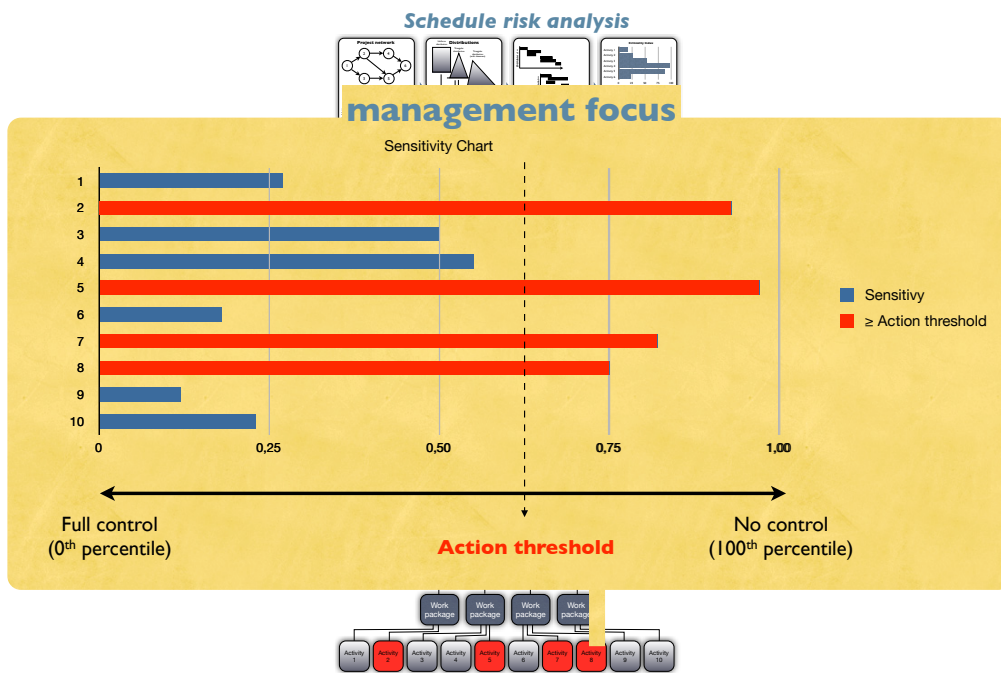
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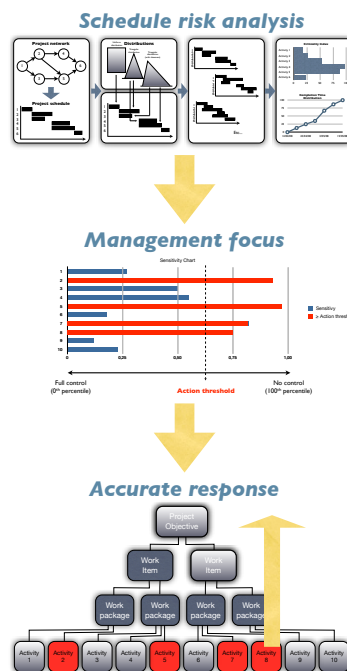
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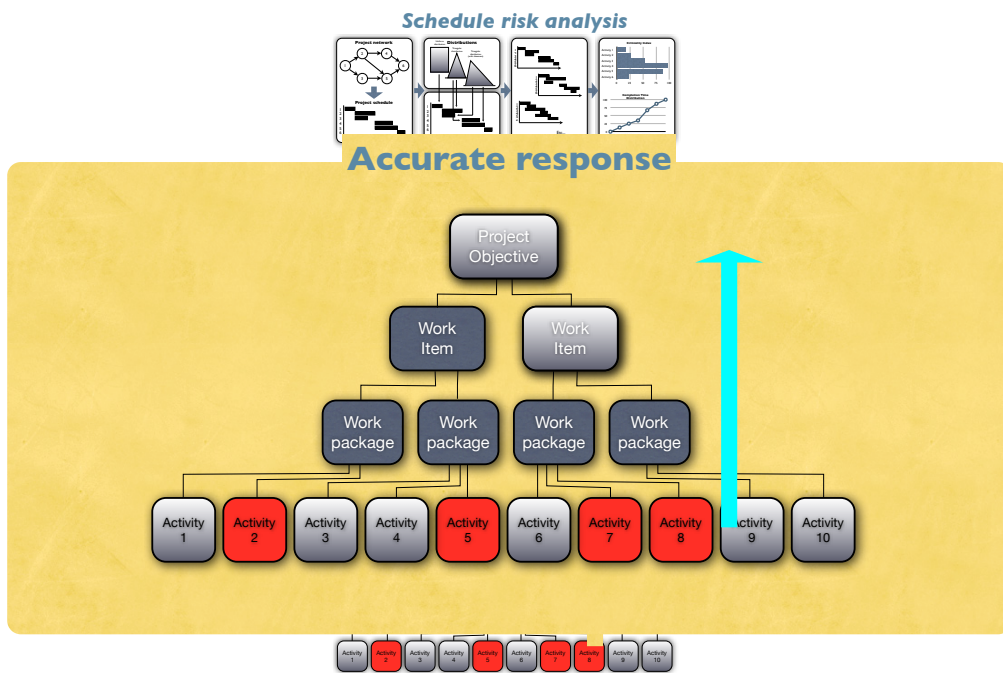
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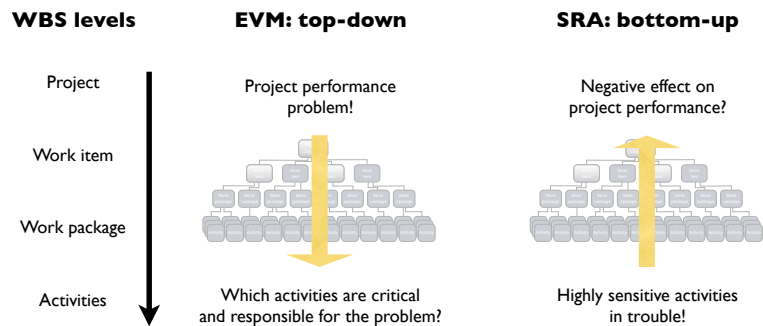


The network structure has a clear influence on the risk analysis accuracy

- Parallel networks: Average level of management focus leads to positive responses (SSI on top!)
- Serial networks: High levels of management focus with poor responses (sometimes useless!)

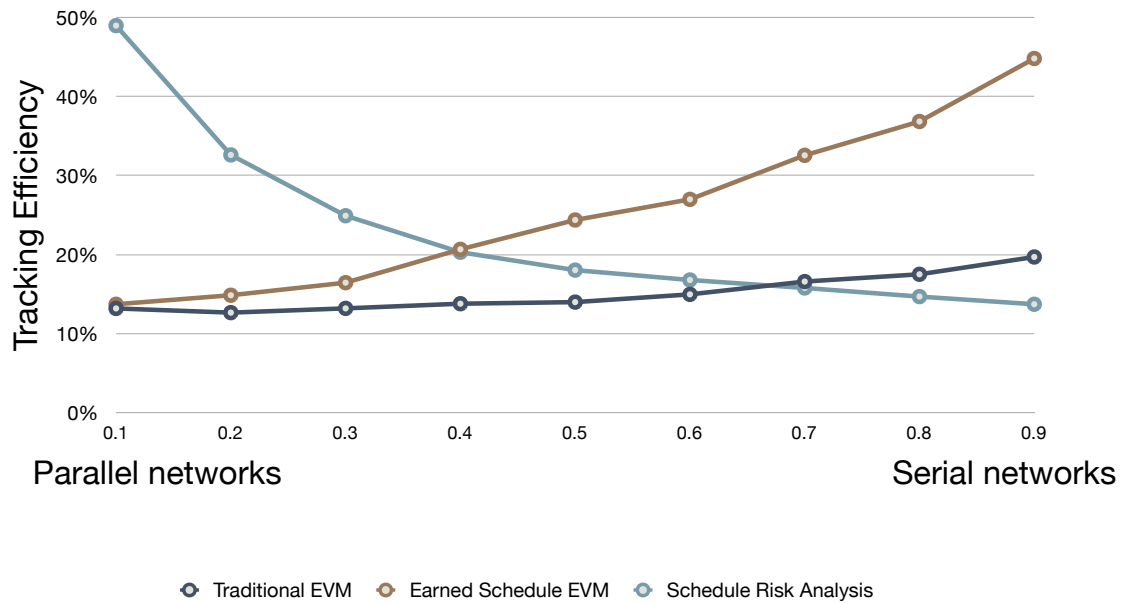
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Recommend a set of best practices to use EVM during project control.



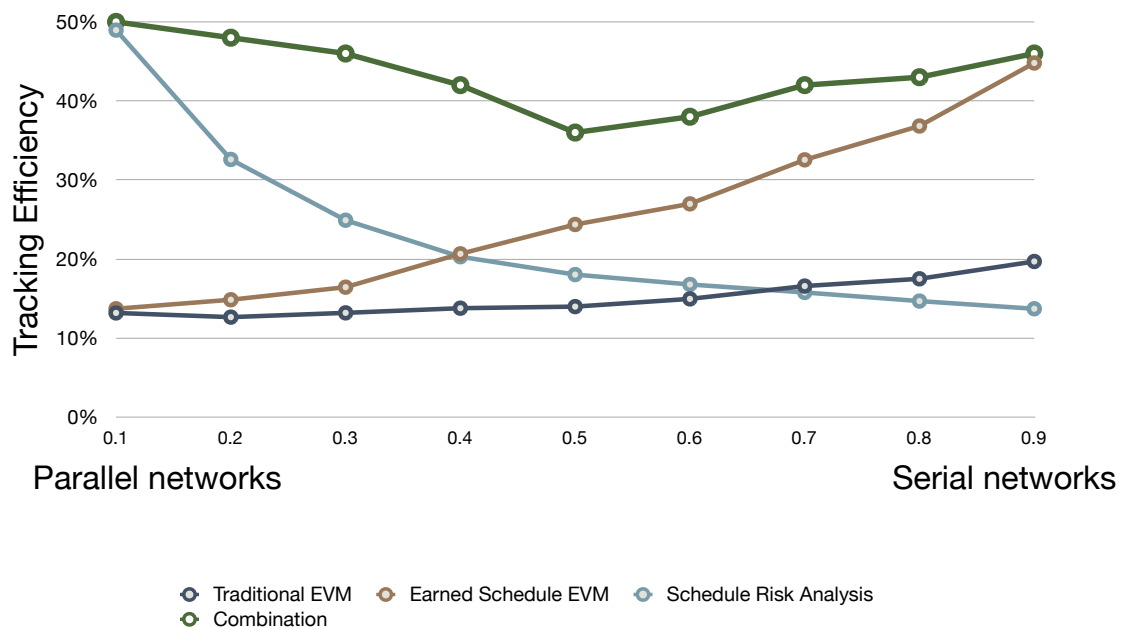
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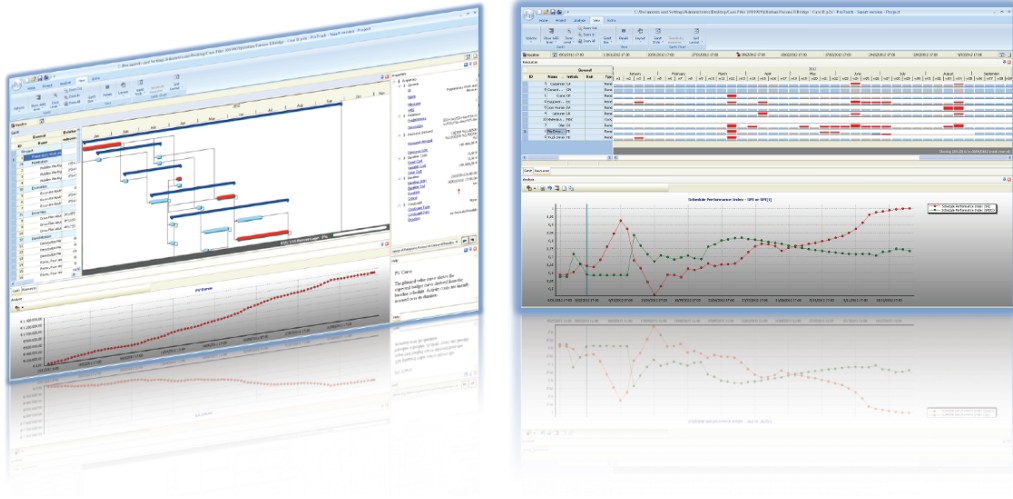
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ProTrack 2.0

Dynamic Scheduling on your Desktop



ProTrack 2.0

Dynamic Scheduling on your Desktop



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 Relevant information about your project

ProTrack 2.0

- ✓ Relevant information about your project
- ✓ Dynamic scheduling on your desktop

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- ✓ Relevant information about your project
- ✓ Dynamic scheduling on your desktop
- ✓ Use of sound and state-of-the-art methodology

ProTrack 2.0

- ✓ Relevant information about your project
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- ✓ A great tool for learning

ProTrack 2.0

- ✓ Relevant information about your project

Project Network

Resource Scarceness

ProTrack 2.0



Relevant information about your project

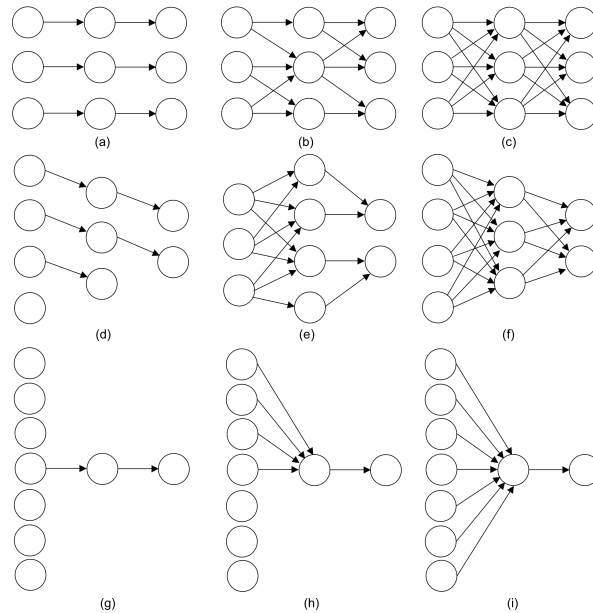
Project Network

Serial/Parallel (SP)

Activity Distribution (AD)

Length of Arcs (LA)

Topological Float (TF)



ProTrack 2.0



Relevant information about your project

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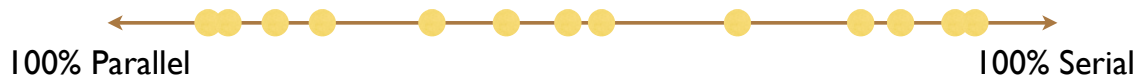
Resource Strength (RS)

Resource Constrainedness (RC)

Resource Use (RU)

ProTrack 2.0

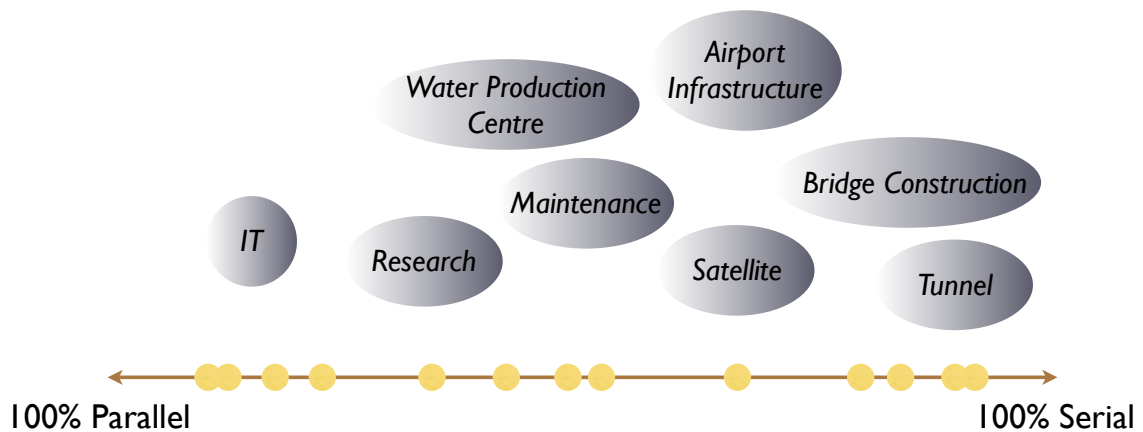
✓ Relevant information about your project



Research meets practice!

ProTrack 2.0

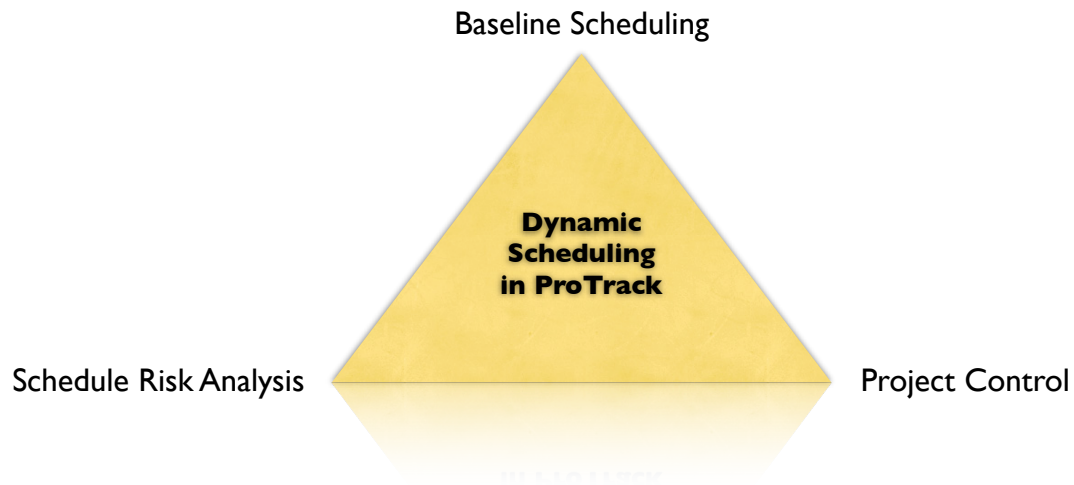
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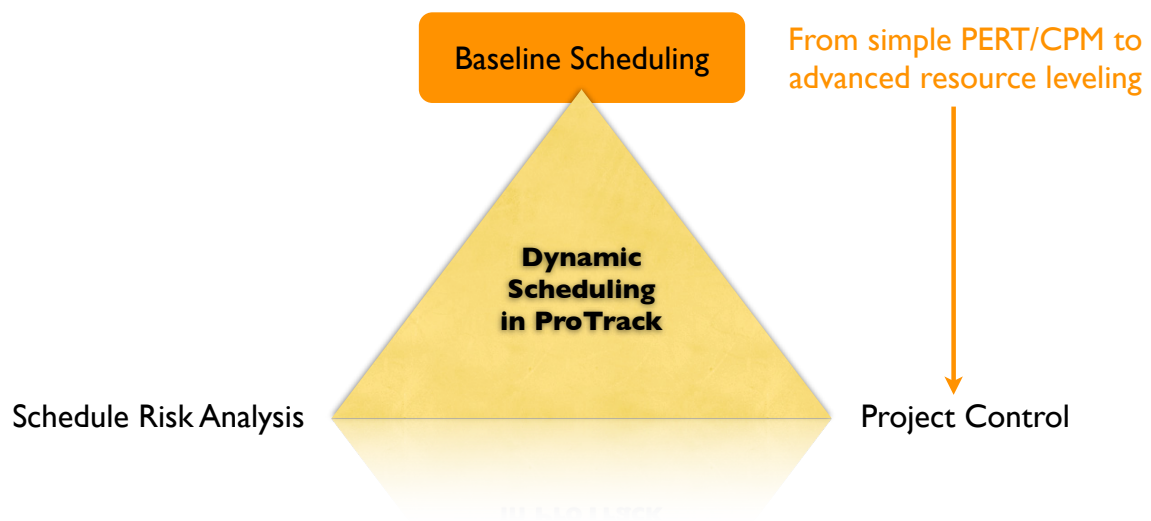
ProTrack 2.0

✓ Dynamic scheduling on your desktop



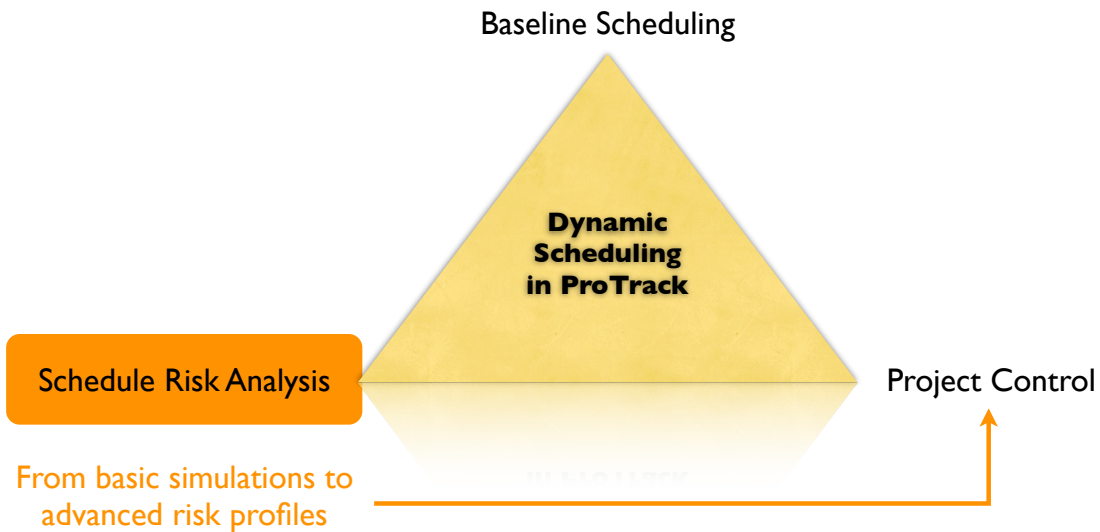
ProTrack 2.0

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ProTrack 2.0

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ProTrack 2.0

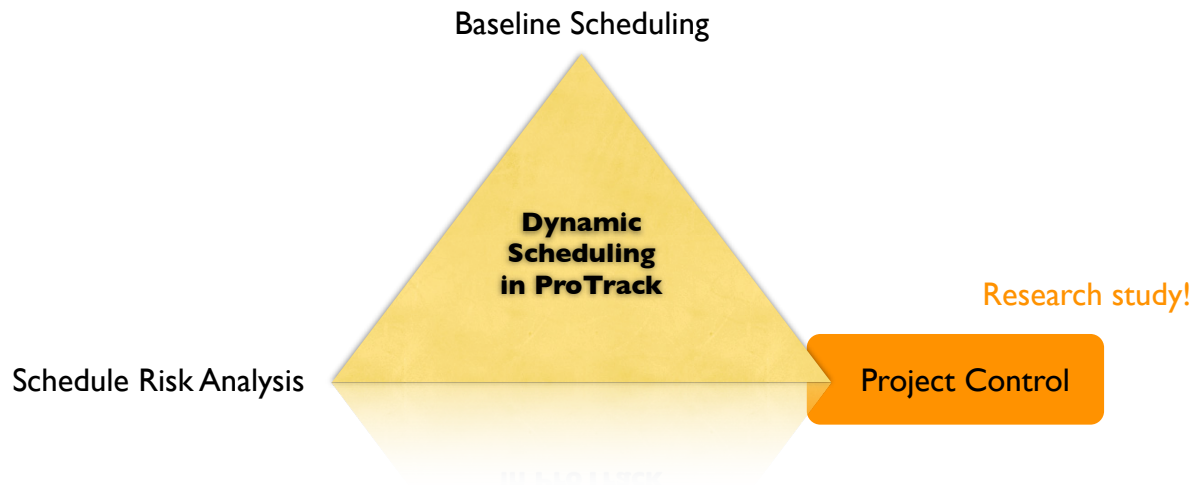
✓ Dynamic scheduling on your desktop

		Critical activities		
		-	0	+
Non-critical activities	-	1. $SPI(t) > 1$ $RD < PD$	4. $SPI(t) > 1$ $RD = PD$	7. $SPI(t) > 1$ $RD > PD$
	0	2. $SPI(t) > 1$ $RD < PD$	5. $SPI(t) = 1$ $RD = PD$	8. $SPI(t) < 1$ $RD > PD$
	+	3. $SPI(t) < 1$ $RD < PD$	6. $SPI(t) < 1$ $RD = PD$	9. $SPI(t) < 1$ $RD > PD$

ProTrack's simulation engines: standard en advanced

ProTrack 2.0

✓ Dynamic scheduling on your desktop



ProTrack 2.0

✓ Use of sound and state-of-the-art methodology

ProTrack	Literature
Network Structure	RanGen Journal of Scheduling paper
Resource Scarceness	Many papers, PhD's and books
Resource Leveling	Computer Science Algorithmic Design
EVM	Award winning book

Never ending stream of research projects!

ProTrack 2.0

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WORK = DURATION x DEMAND

Priority rule based scheduling
= *quick and easy*

Meta-heuristic based scheduling
= *Powerful and CPU intensive*

Never ending stream of research projects!

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ProTrack 2.0

 A great tool for learning

Real-life scenarios

With **case-based teaching**, students develop skills in analytical thinking and reflective judgment by reading and discussing complex, real-life scenarios.

Carefully designed problems

Problem-based learning is both a teaching method and an approach to the curriculum. It consists of carefully designed problems that challenge students to use problem solving techniques, self-directed learning strategies, team participation skills, and disciplinary knowledge.

No teaching without research!

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Information on your project!

+

Hints and guidelines

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View tracking loop

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Fictitious projects under controlled design

=

project/resource/tracking generators

+

Fictitious project progress

No teaching without research!

Mario Vanhoucke - Ghent University

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the book, the software or future research results...?

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Measuring Time

Improving Project Performance using Earned Value Management

The only reason for time is so that everything doesn't happen at once

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