If time is money, accuracy pays!

An Overview of Past and Future Project Management Research

EVM World™ 2012

THE PROJECT PERFORMANCE MANAGEMENT CONFERENCE

28th Annual International Conference

May 30 - June 1, 2012 • Naples, Florida

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Academic career: Ghent University (Belgium) and University College London (UK)

Vlerick Business School (Belgium, Russia, China)

Professional career: Director EVM Europe

Partner OR-AS (Belgium)

The academic world — **The real world**

RESEARCH — **PRACTICE**

Ghent University University College → **Vlerick Business School** → **EVM Europe** → **Company Training** → **My own consultancy company**

RESEARCH meets PRACTICE

The academic world — The real world

RESEARCH

Ghent University
University College

Vlerick
Business School

EVM Europe

PRACTICE

Company
Training

My own consultancy
company

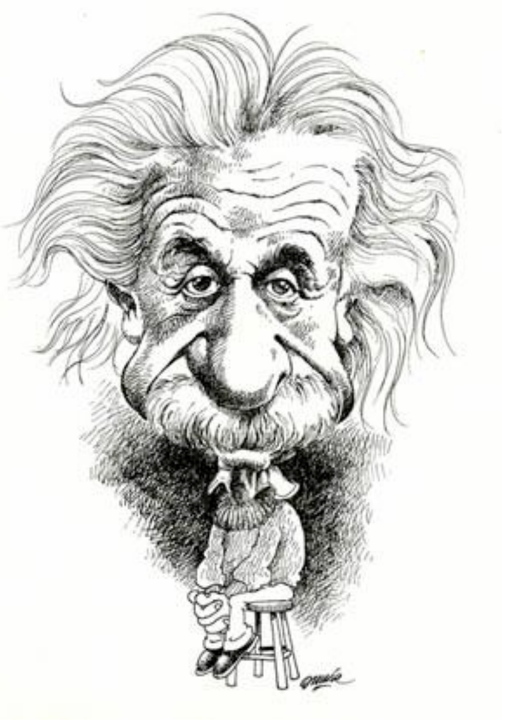
Why do we need research?

QUOTE

...

"To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science."

...



...

Albert Einstein
Scientist
Maybe also a Project Manager

Why do we need research?

QUOTE

...

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

Presentation: “Research meets Practice”

Outline

Fasten your seatbelts

Overview of research

- Published in “Measuring Time”
- Four EVM hypotheses

Quick preview of future research

- The 1 mio € project
- Further integration

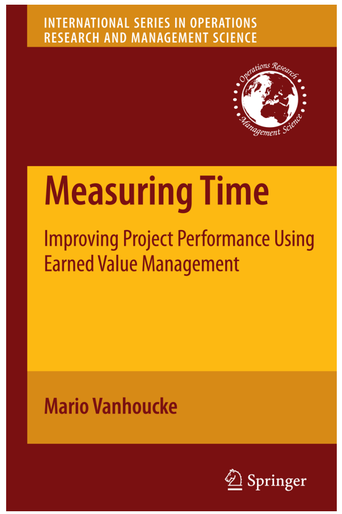
Overview of projects

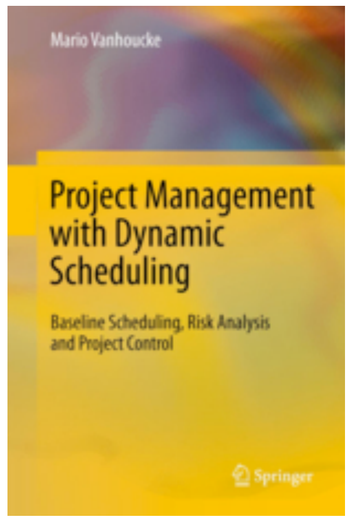
- Used in the research
- Different sectors

Quick preview of future work

- EVM Europe
- Further collaboration

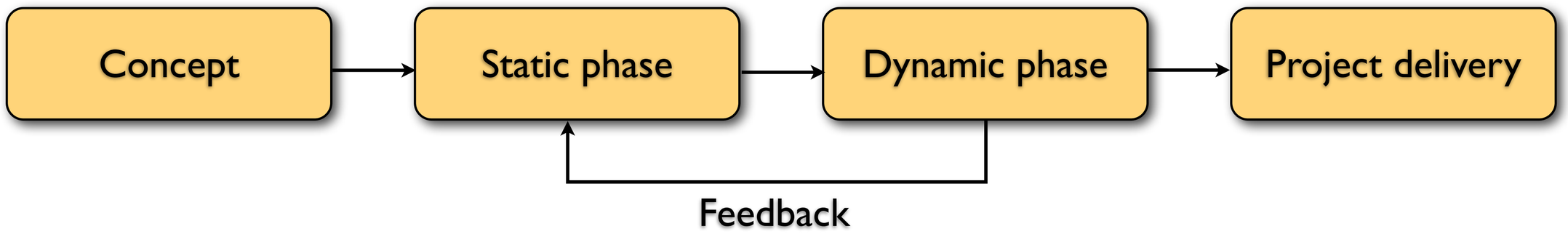
Assumptions





- Main focus on controlling time
  - Four studies
- Known
  - Earned Value Management is quirky
  - Earned Schedule is not quirky
  - Schedule Risk Analysis
- Refresh
  - Project life cycle

Project Life Cycle



Project Life Cycle

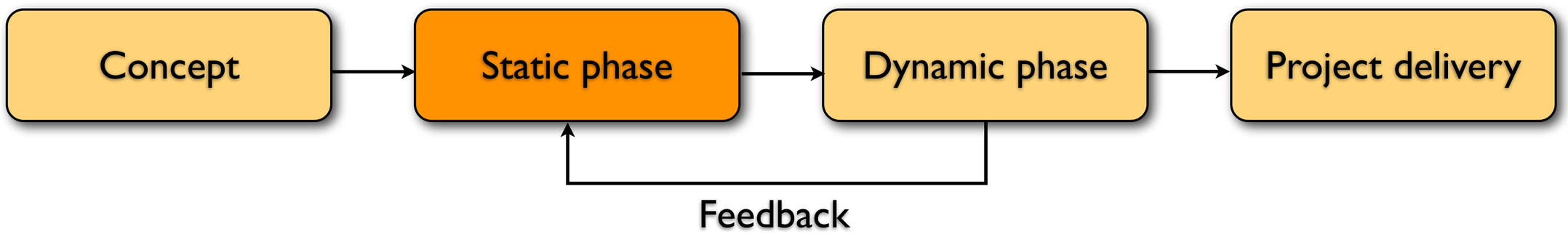
Baseline Scheduling

Dynamic Scheduling

Schedule Risk Analysis

From simple PERT/CPM to advanced resource leveling

Project Control



Project Life Cycle

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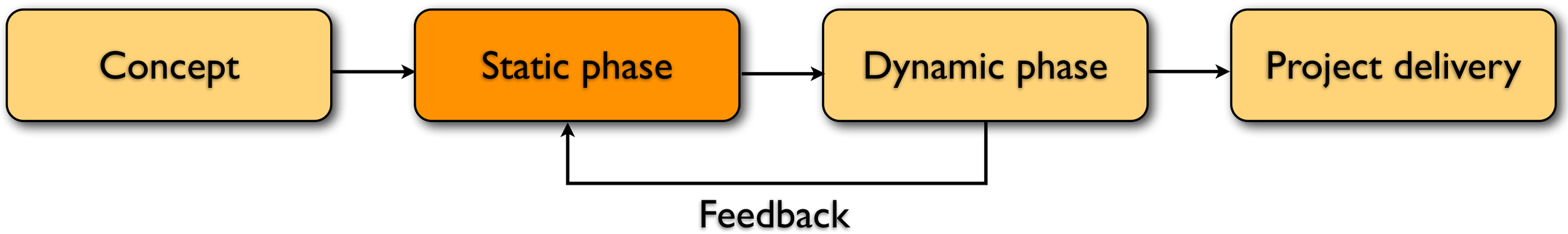
Dynamic Scheduling

Schedule Risk Analysis

From basic simulations to advanced risk profiles

Project Control



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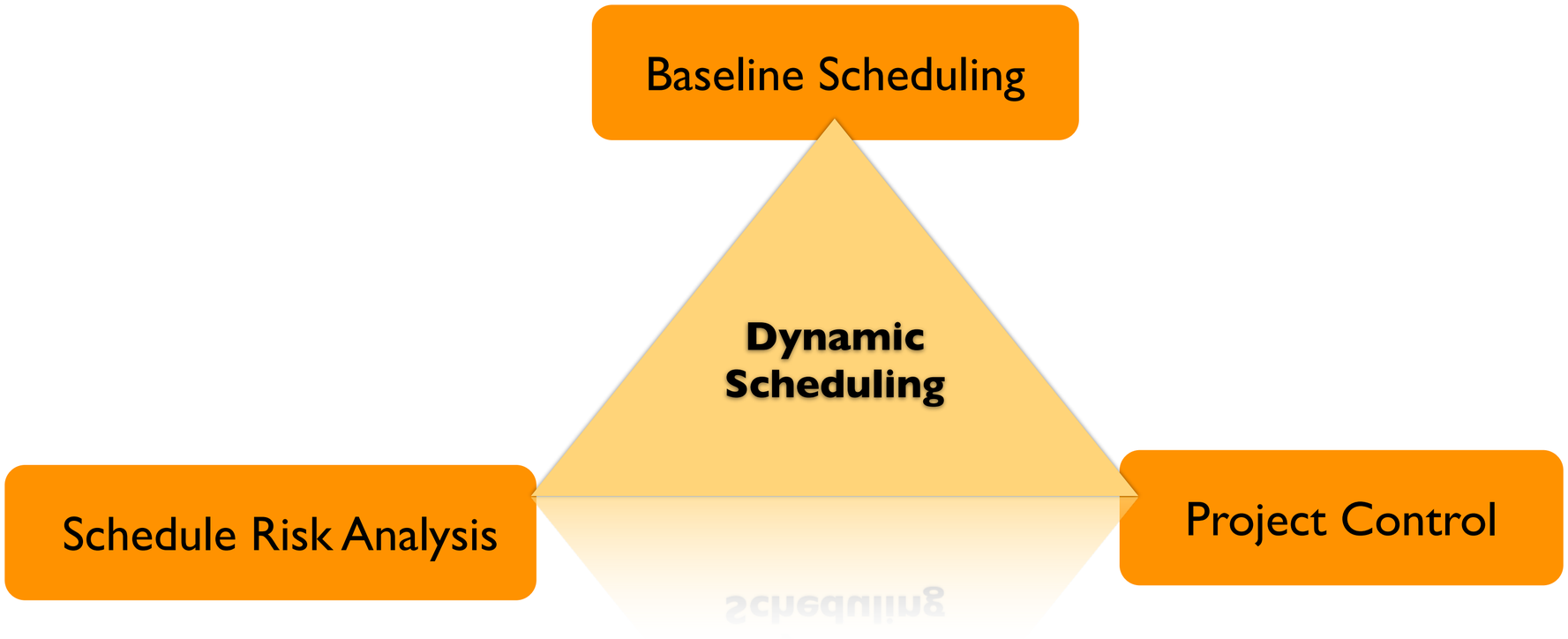

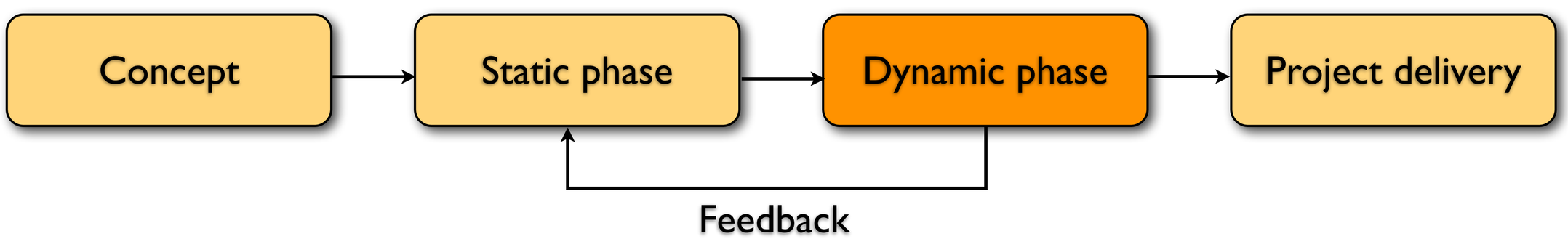

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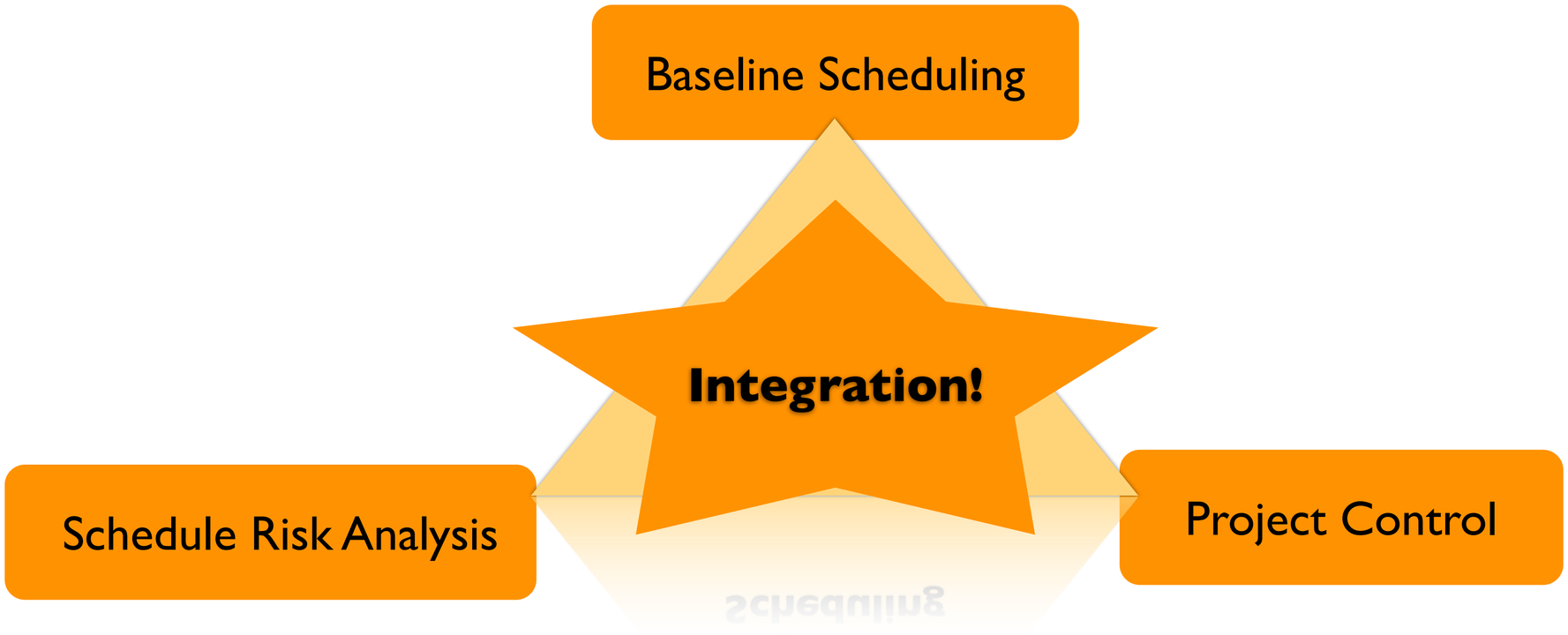
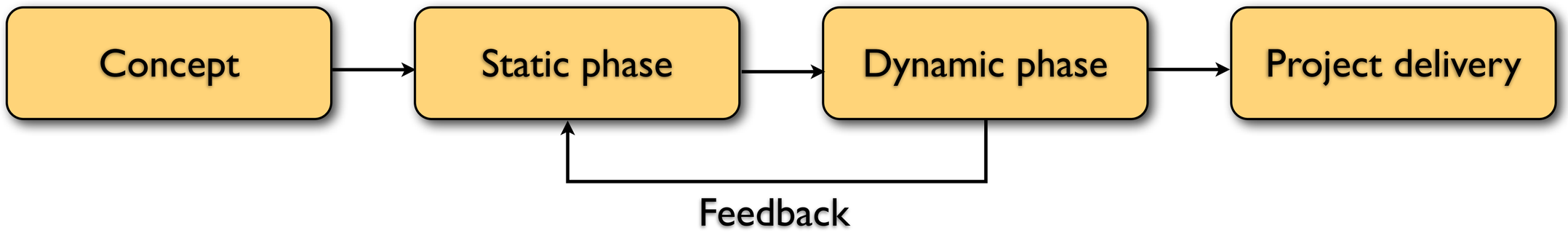


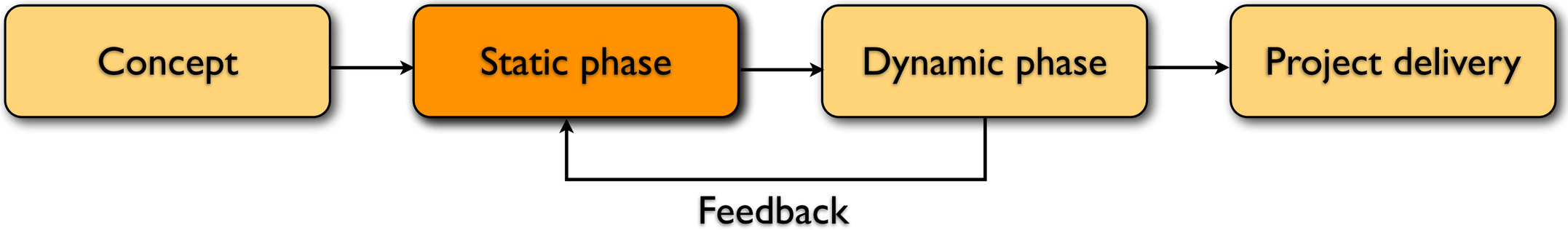


Study 1

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

Study 1

static EVM **measurement** study

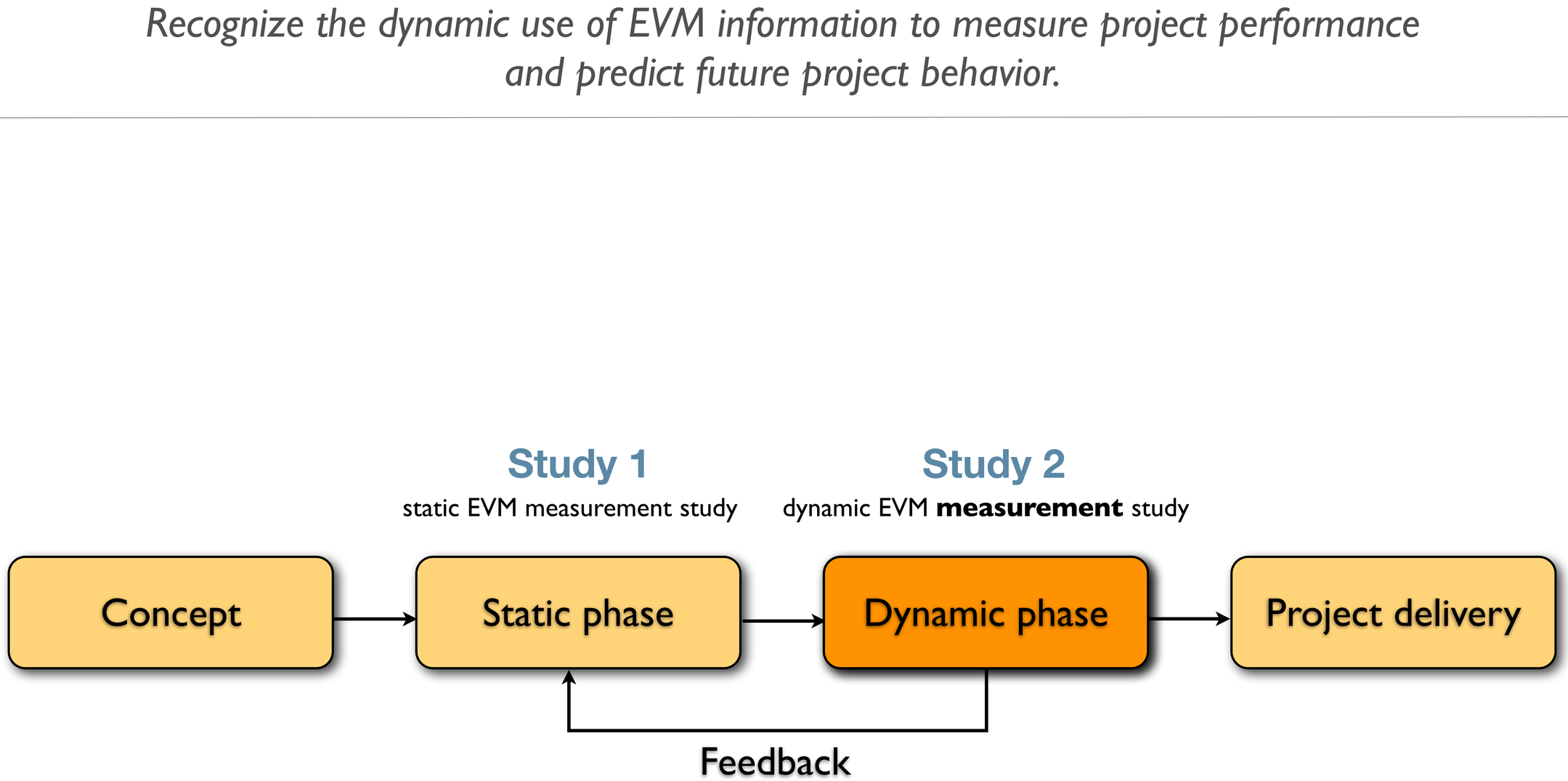


Study 2

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

Study 1
static EVM measurement study

Study 2
dynamic EVM **measurement** study



Study 3

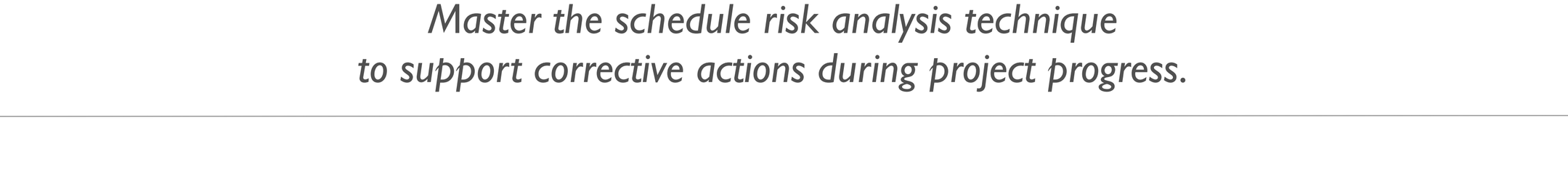
Master the schedule risk analysis technique
to support corrective actions during project progress.

Study 1

static EVM measurement study

Study 2

dynamic EVM measurement study



Study 3

dynamic project **control** study

Study 4

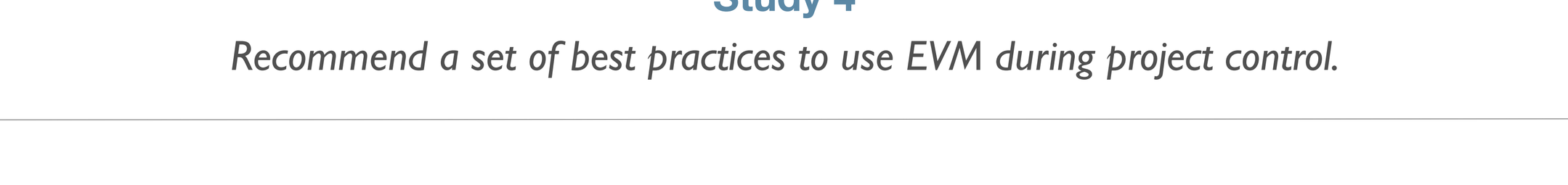
Recommend a set of best practices to use EVM during project control.

Study 1

static EVM study

Study 2

dynamic EVM study



Study 3

dynamic project control study

Study 4

best practices

The results

Study 1

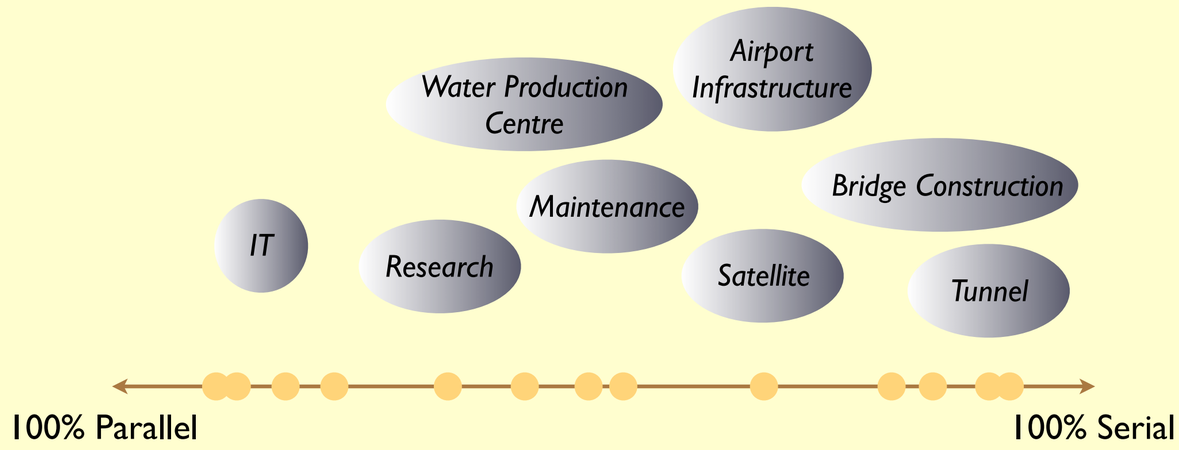
Understand why EVM works so well in some cases and fails so miserably in others.

Which technique *for* ***which project****?*

Forecasting methods

Future assumptions

	Planned Value Method	Earned Duration Method	Earned Schedule Method
Future = Plan			
Future = SPI			
Future = SPI x CPI			



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Future = SPI	☹	☹	☹
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Accuracy along the completion stage (early, middle or late)

Early stages
Low accuracy for all methods

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

Which technique *for* ***which project****?*

Forecasting methods

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Future = SPI	☹	☹	☺
Future = SPI x CPI	☹	☹	☺

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

Early stages
Low accuracy for all methods

Middle/late stages
ES method is the best

Mistake starts from
From 50% to 60% completion

Study 1

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

Which technique *for* ***which project****?*

Forecasting methods

Future assumptions

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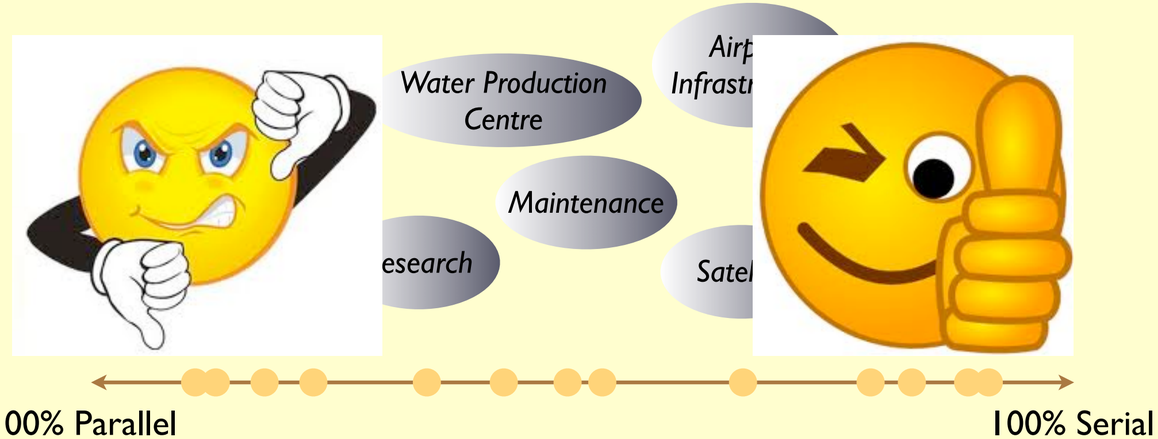


The network structure has an impact on the accuracy

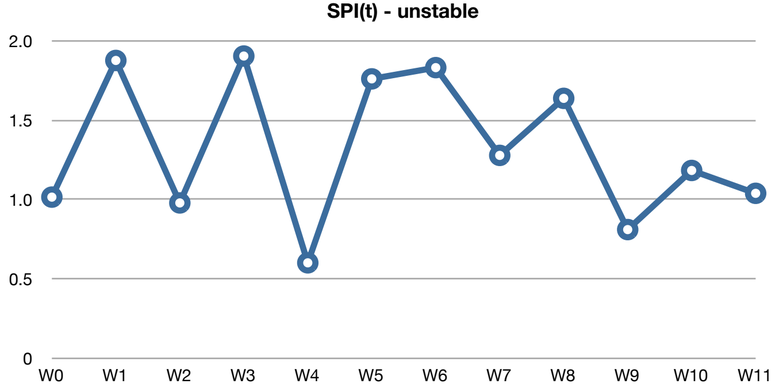
Close to parallel
EVM won't work

Close to serial
EVM performs very well

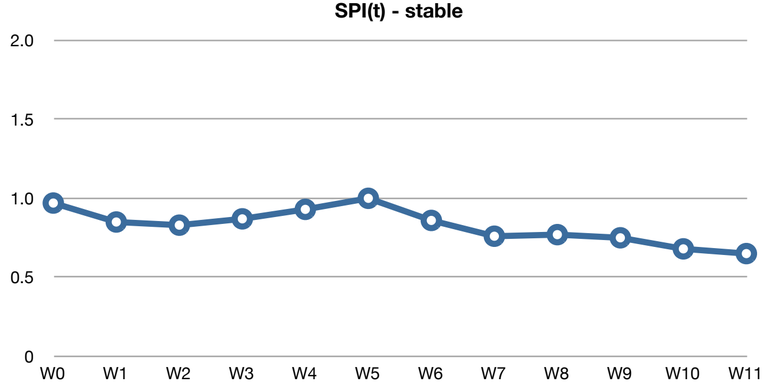
Study 2

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

On time!



Late!

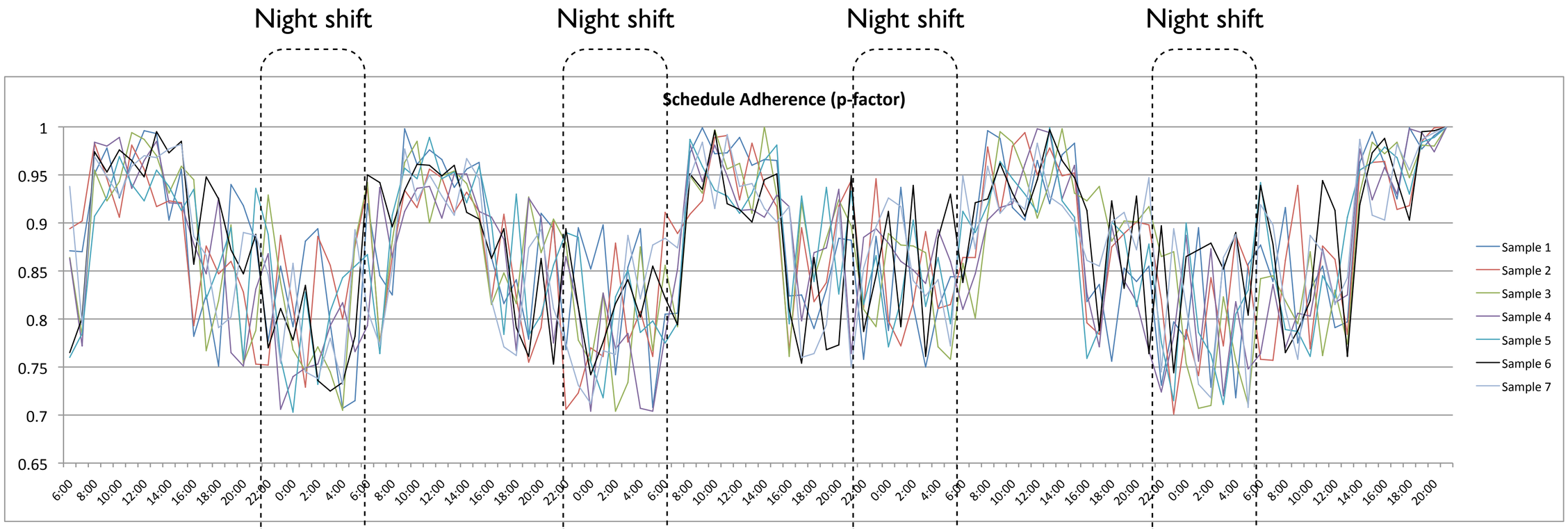


Accuracy ≠ Stability

p-factor - schedule adherence

Study 2

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



Accuracy (EVM) versus stability (p-factor)

EVM
Average accuracy

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

Effort
The lower the better

Results
The higher the better

Study 3

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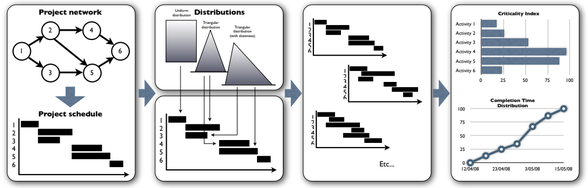
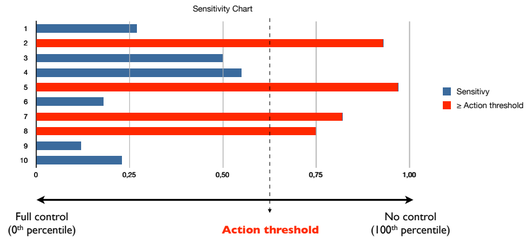
management focus versus ***accurate response***

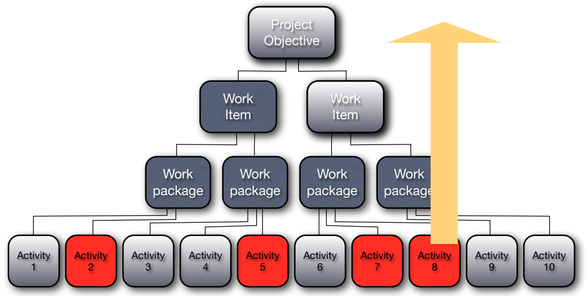
Schedule risk analysis



Management focus



Accurate response



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management focus *versus* ***accurate response***

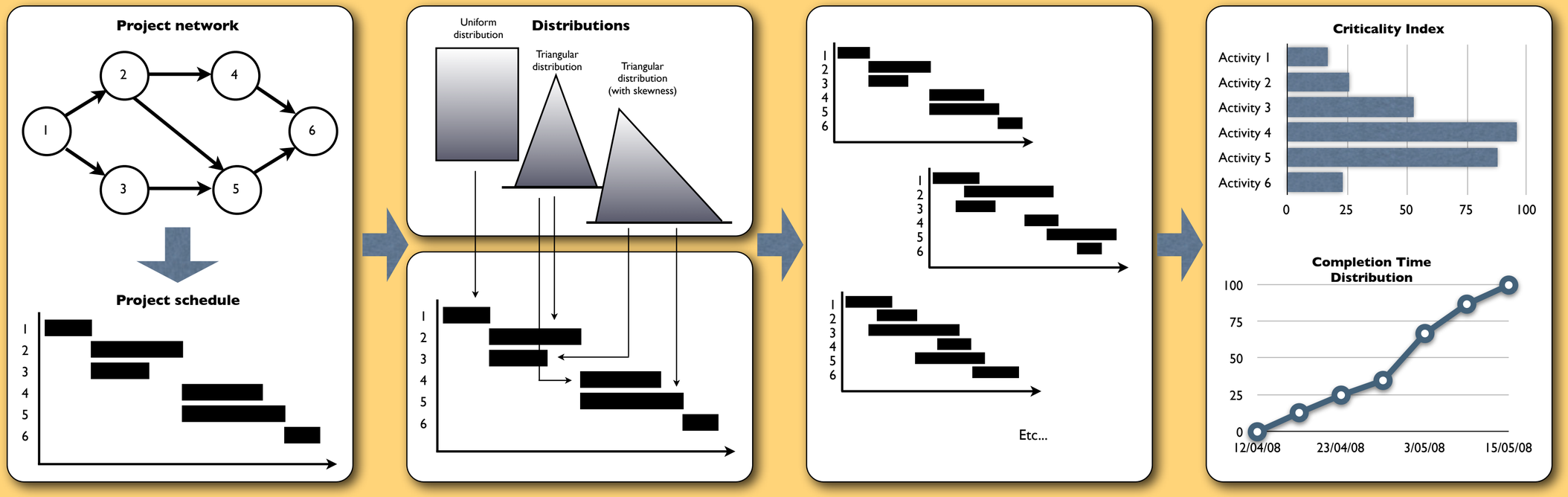
Schedule risk analysis

Baseline schedule

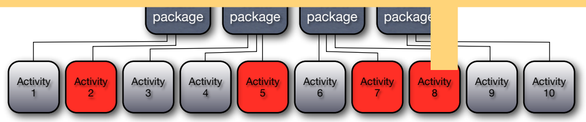
Uncertainty

Monte-Carlo simulation

Simulation output



Criticality index, sensitivity index, cruciality index, schedule sensitivity index, ...



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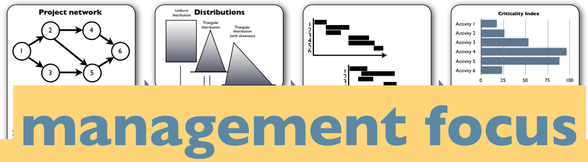
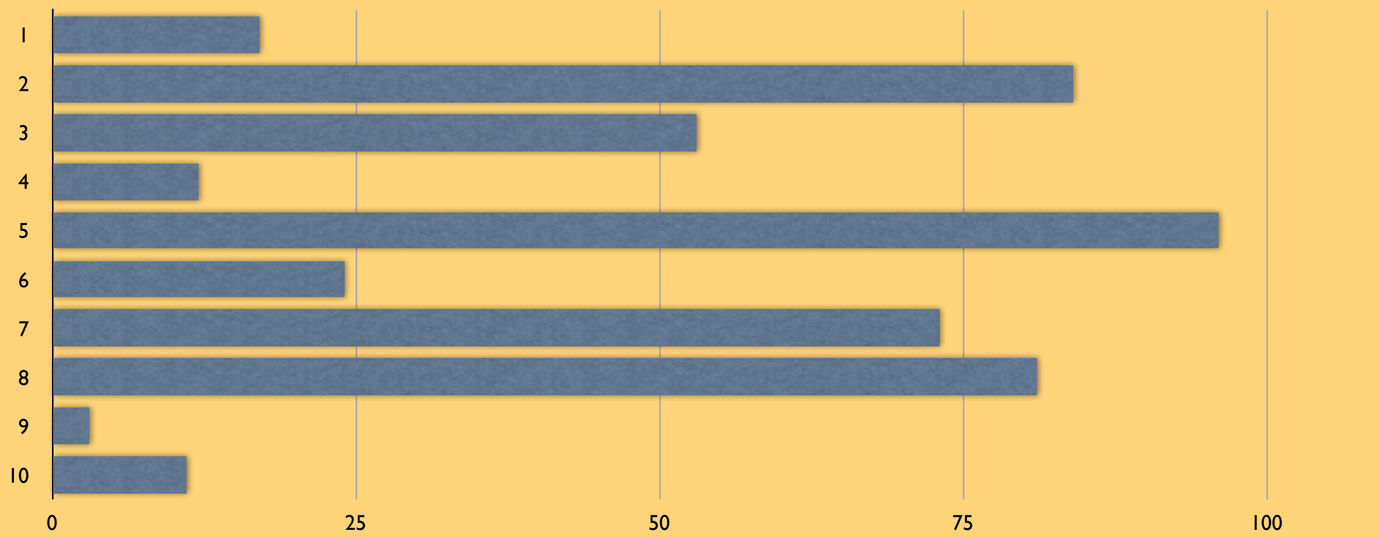
management focus *versus* ***accurate response***

Schedule risk analysis

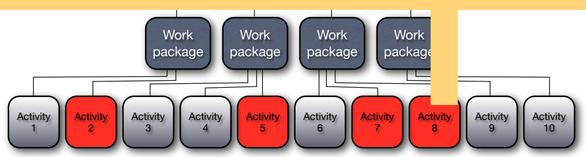


management focus



low impact
= safe

High impact
= dangerous



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management focus *versus* ***accurate response***

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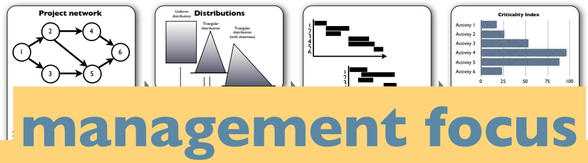

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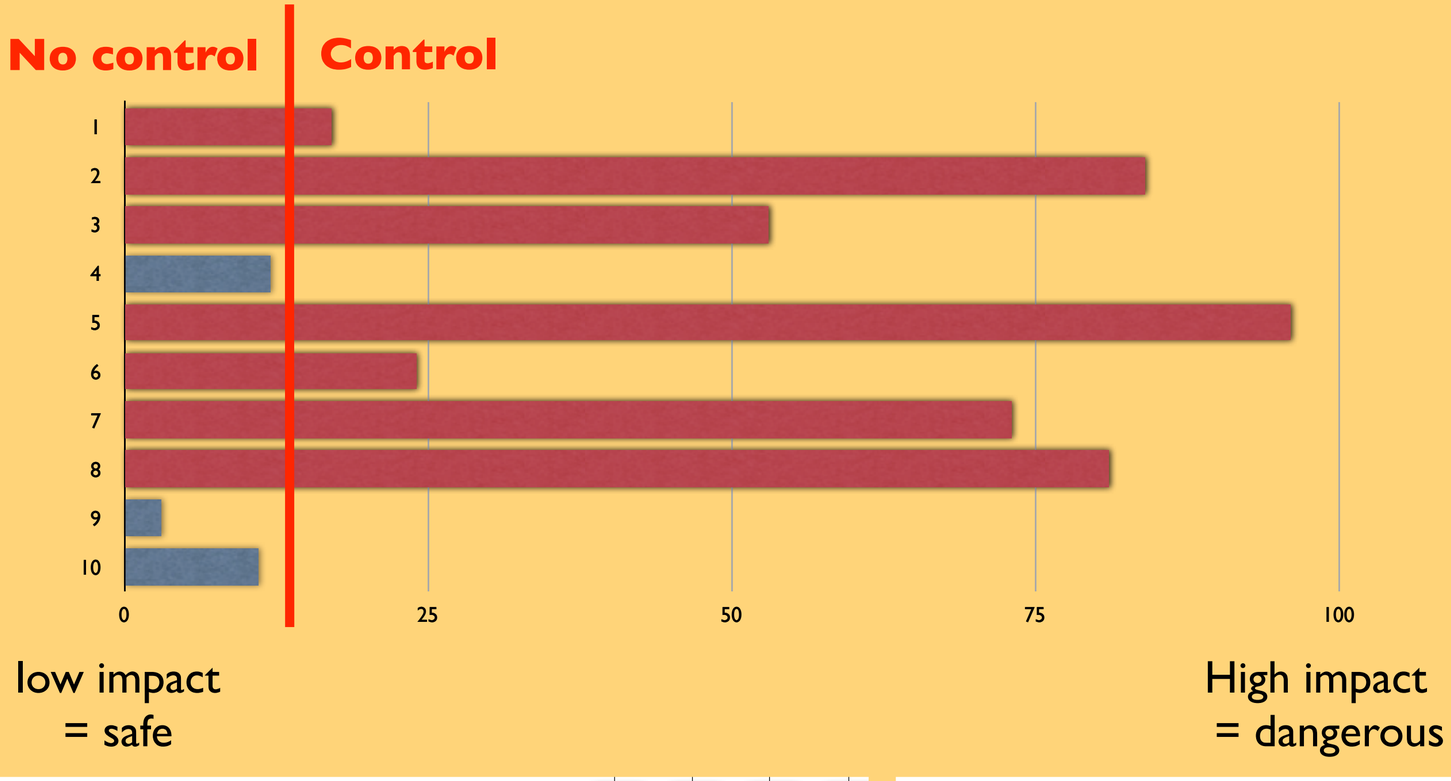

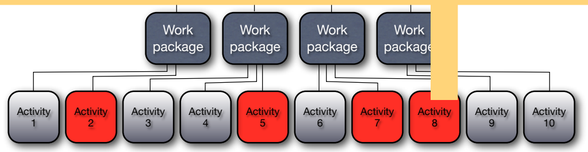

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management focus *versus* ***accurate response***

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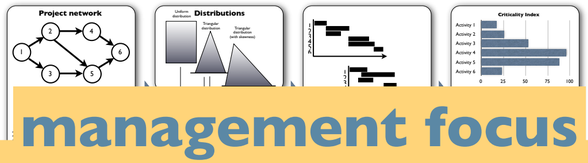

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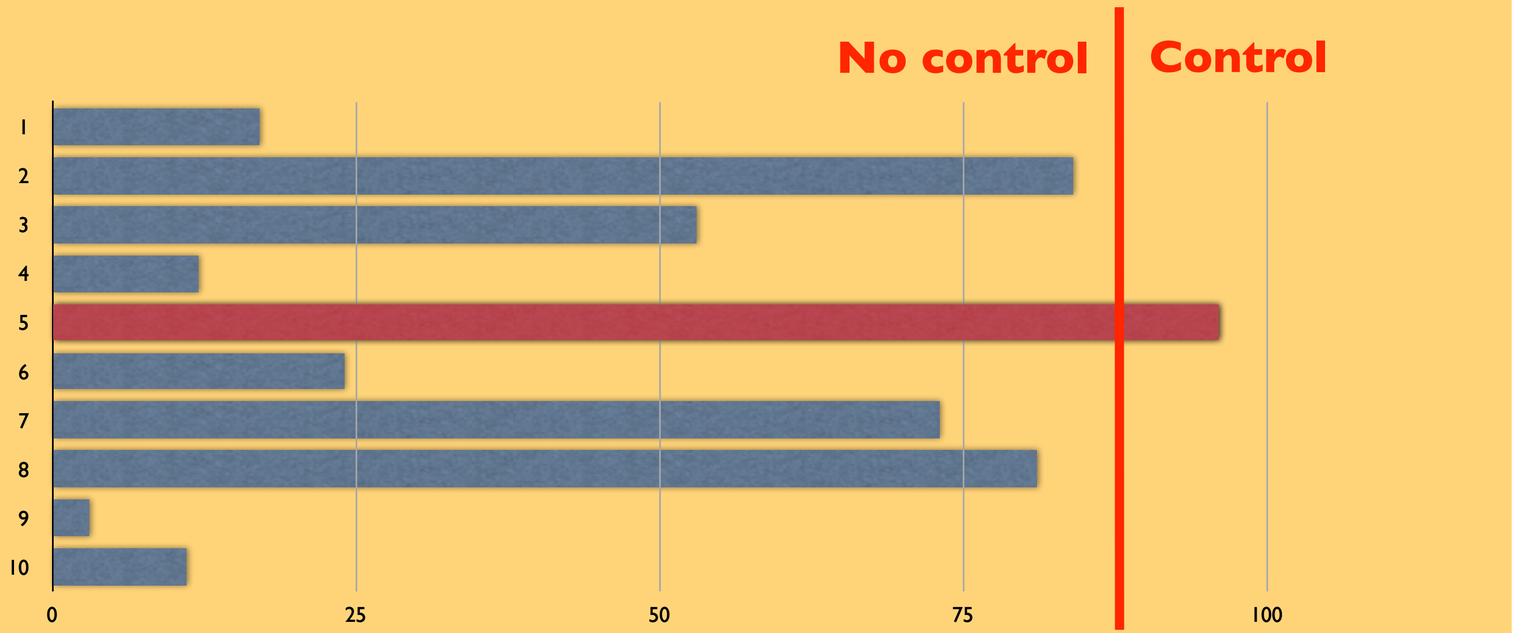

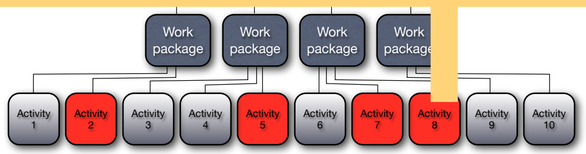

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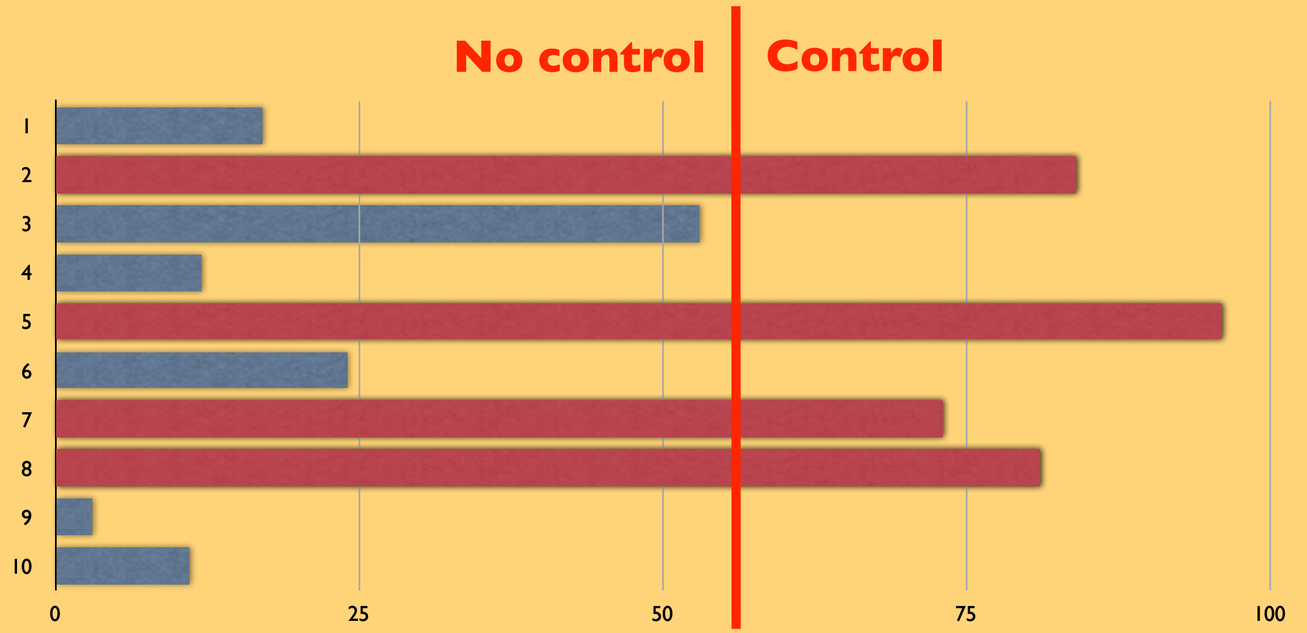
management focus *versus* ***accurate response***

Schedule risk analysis

management focus



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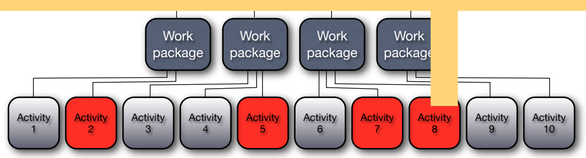

Mario Vanhoucke - Ghent University

Study 3

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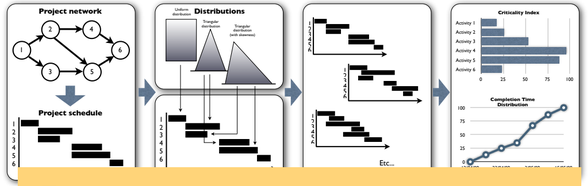
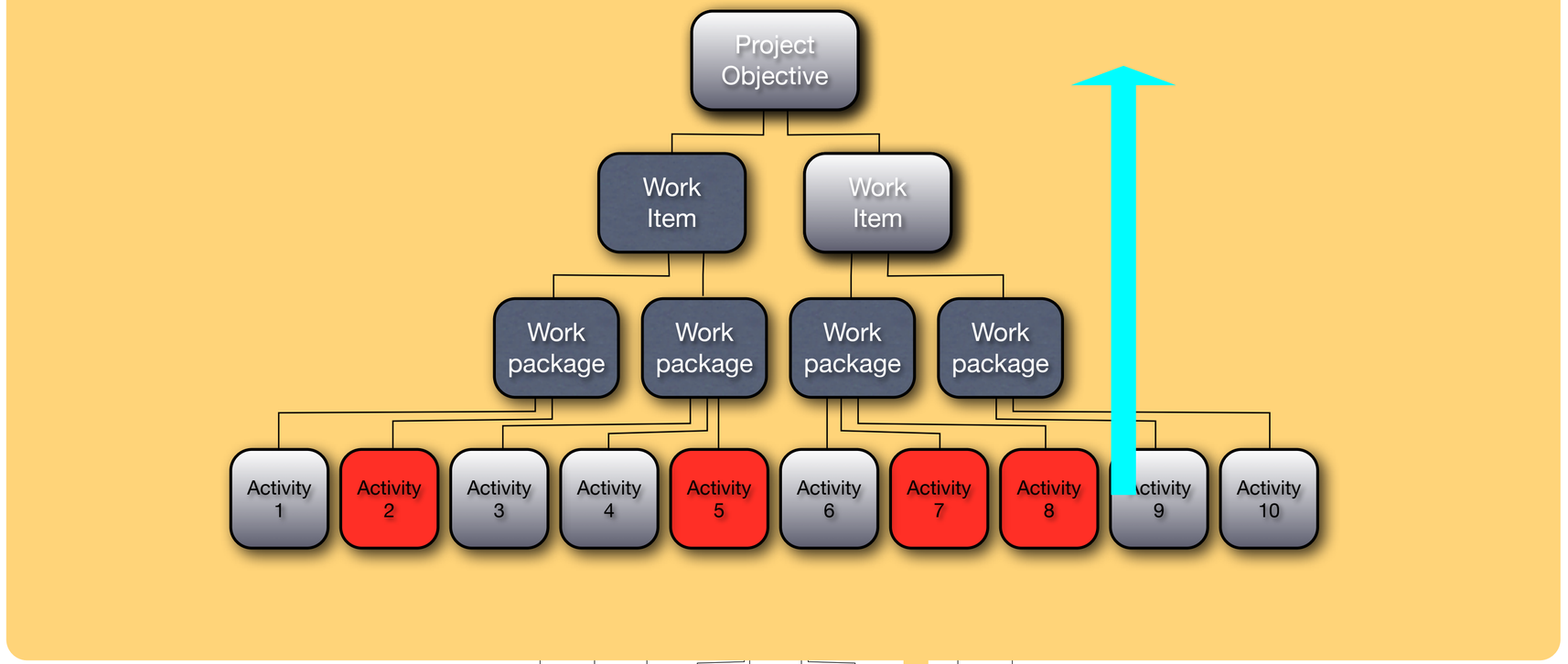
management focus versus ***accurate response***

Schedule risk analysis



Accurate response



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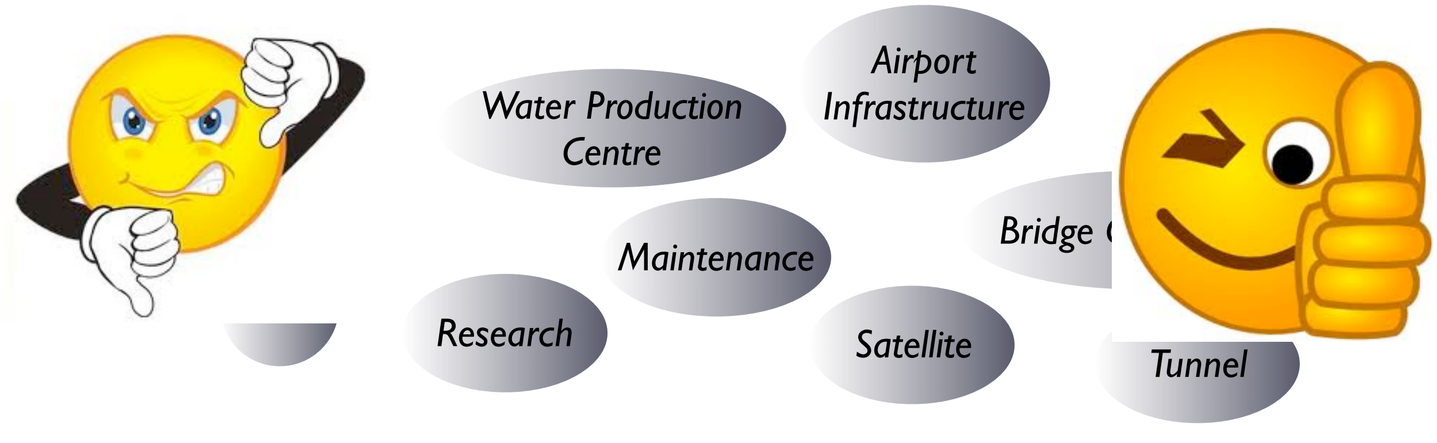

The network structure has an impact on the EVM accuracy

Close to parallel
EVM won't work

Close to serial
EVM performs very well

Study 3

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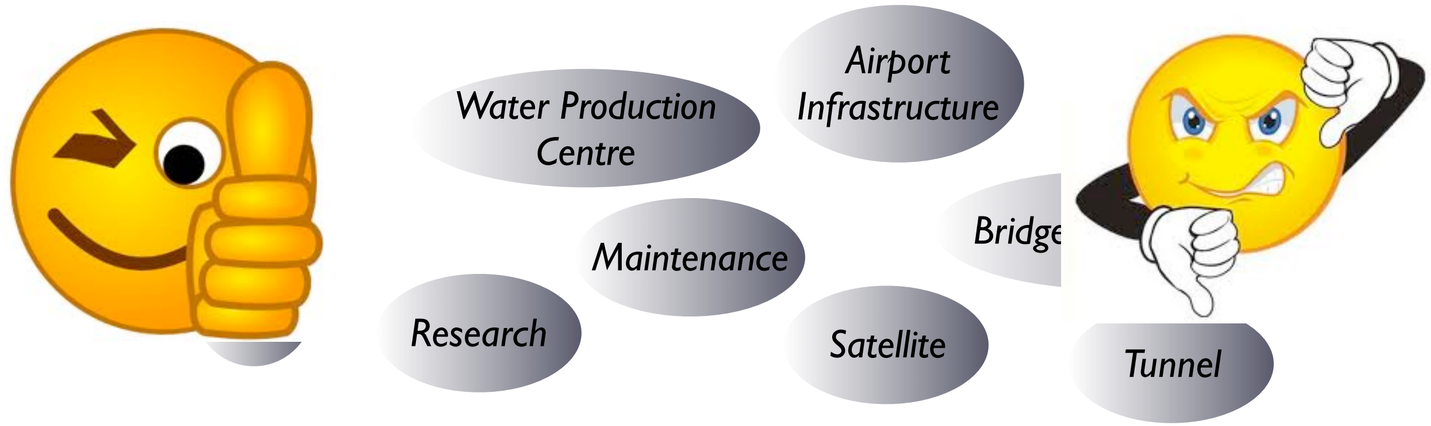

low effort / high results

high effort / low results

The network structure has an impact on the SRA accuracy

Close to parallel
Low effort → high results

Close to serial
High effort → low results

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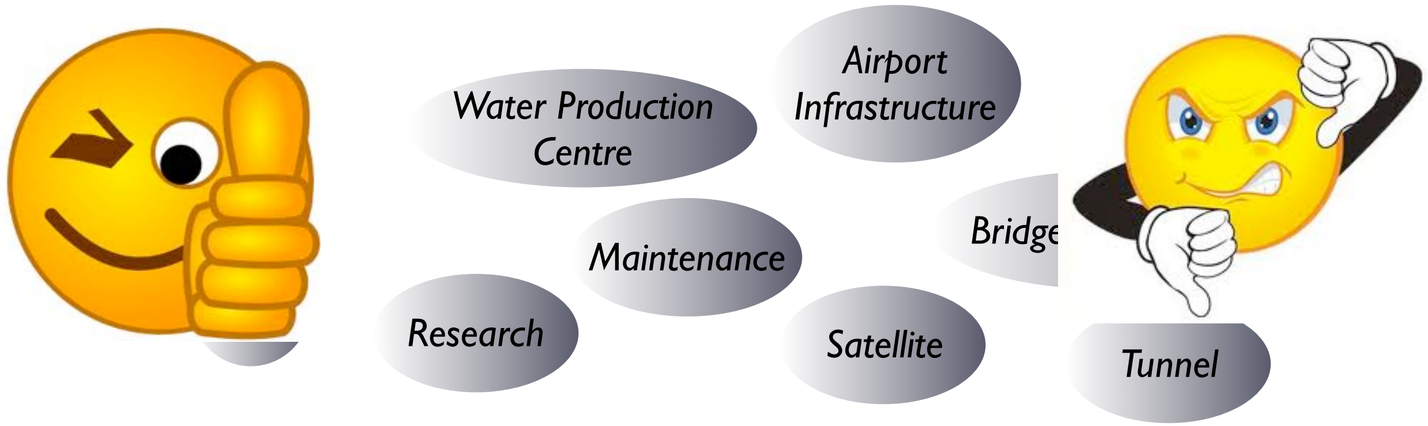


100% Parallel — 100% Serial

low effort / high results

high effort / low results

CI	SI	SSI! PMBOK	CRU(r)	...

Study 4

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

WBS levels

Project

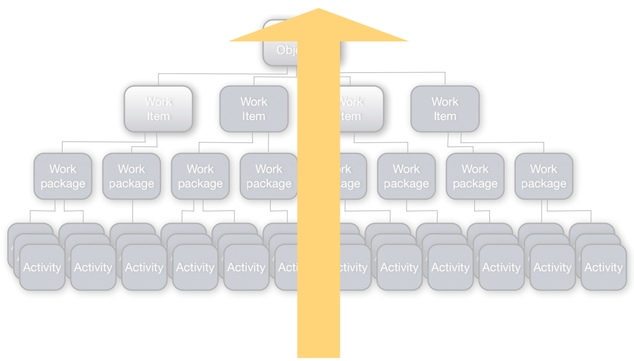
Work item

Work package

Activities

SRA: bottom-up

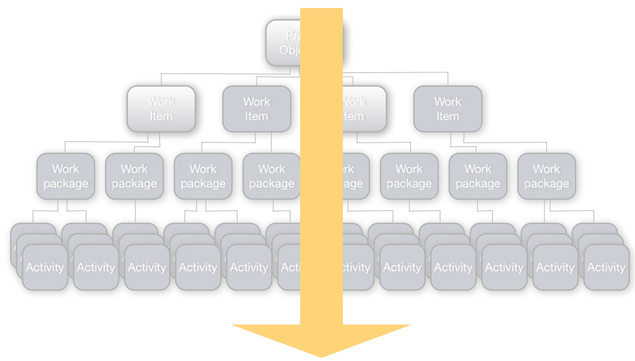
Negative effect on project performance?



Highly sensitive activities in trouble!

EVM: top-down

Project performance problem!

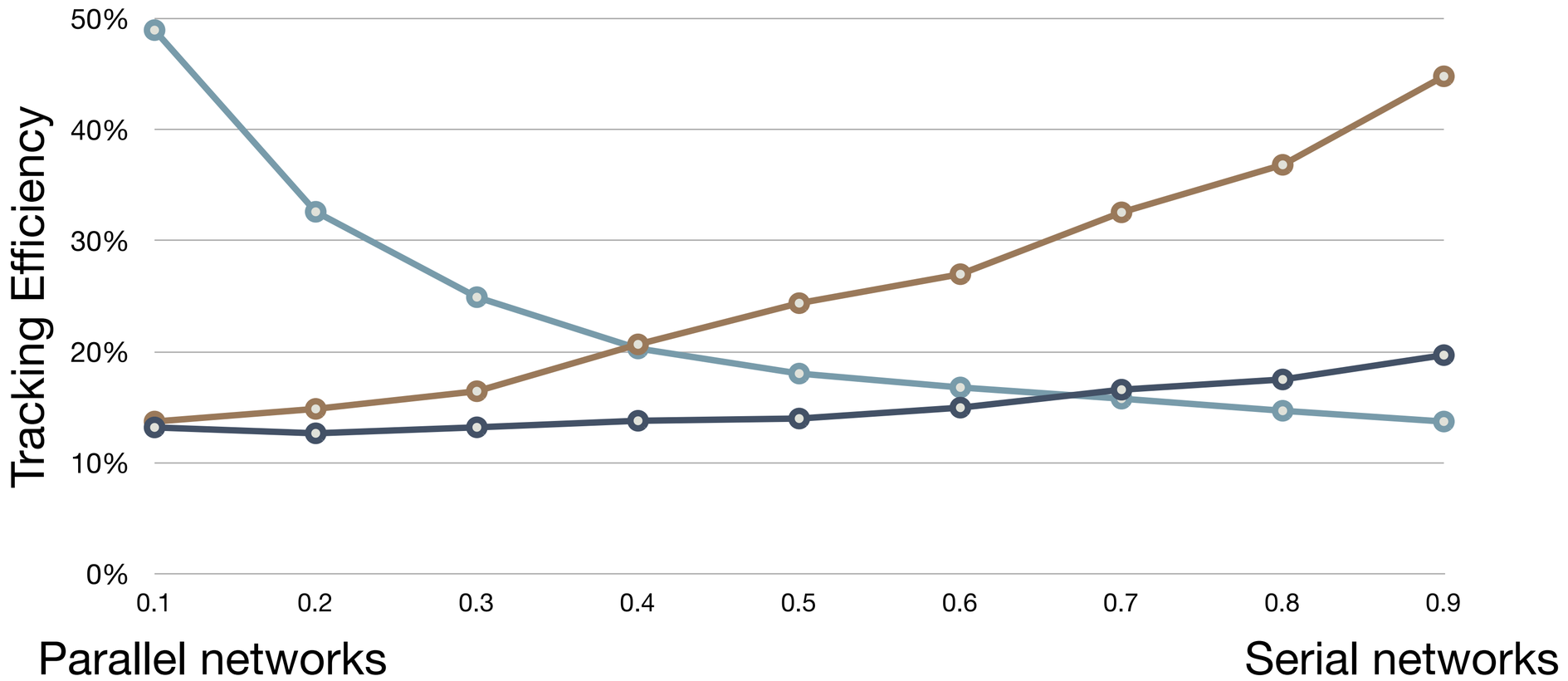


Which activities are critical and responsible for the problem?

Study 4

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

If time is money, accuracy pays!



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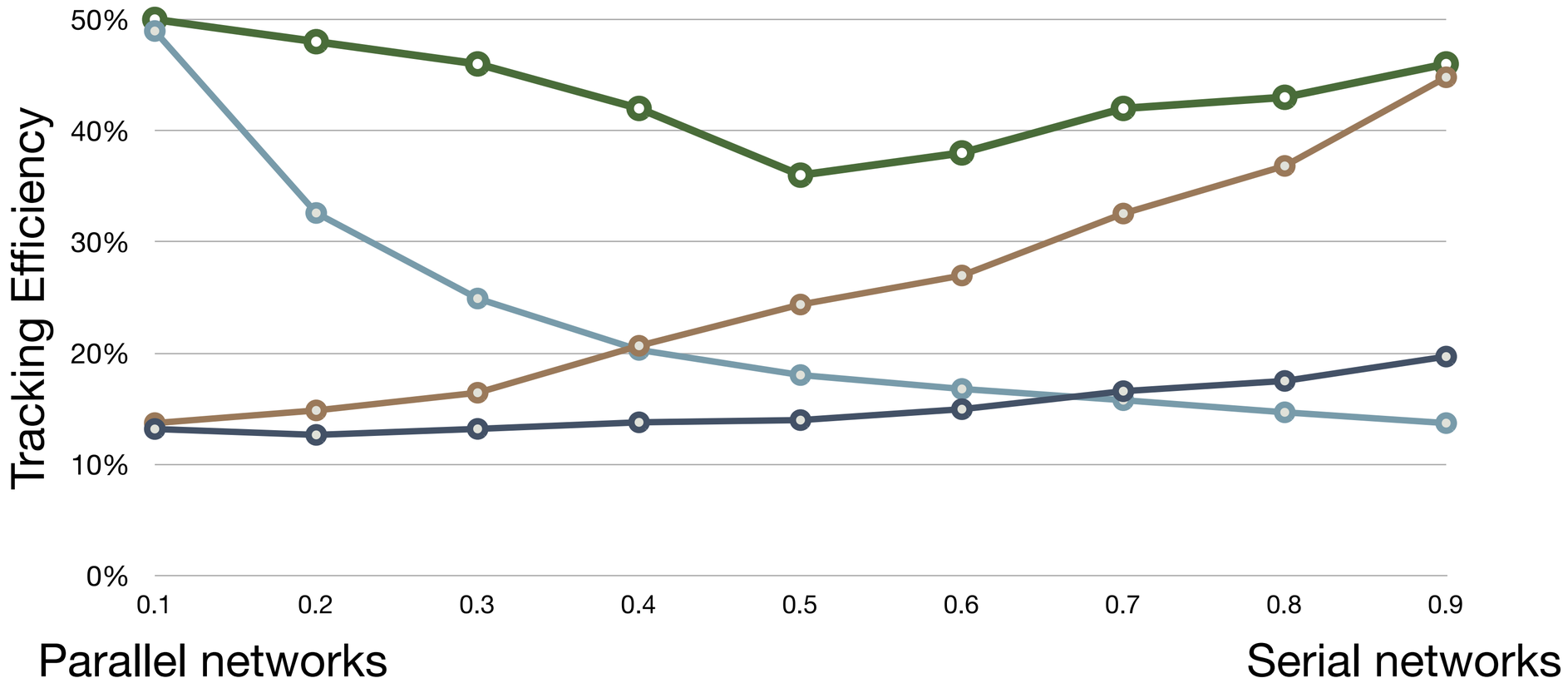
Recommend a set of best practices to use EVM during project control.

If time is money, accuracy pays!



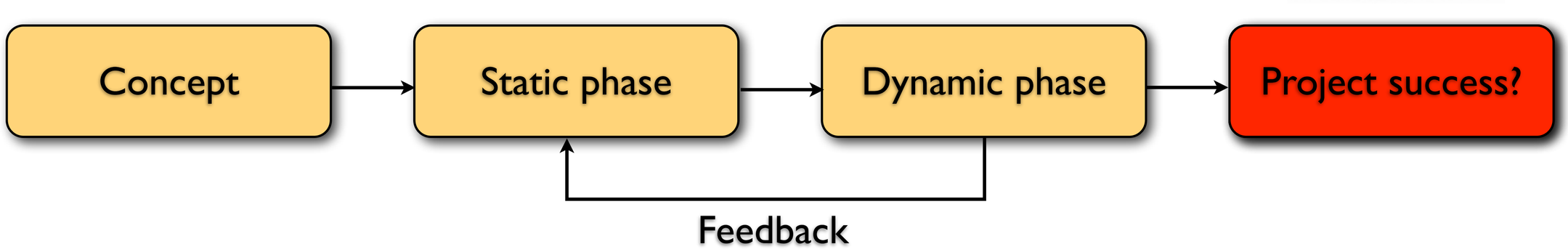
Research study 1
= *accuracy study*
Integration of dynamic scheduling

Awarded by
IPMA (Rome, Italy)
PMI (Brussels, Belgium)
American Accounting Association (Denver, US)

Research study 2
= *project success study*
Integration of project life cycle

Future research

- The *more than a million euro* research project



“In projects, there is no substitute for delivery”

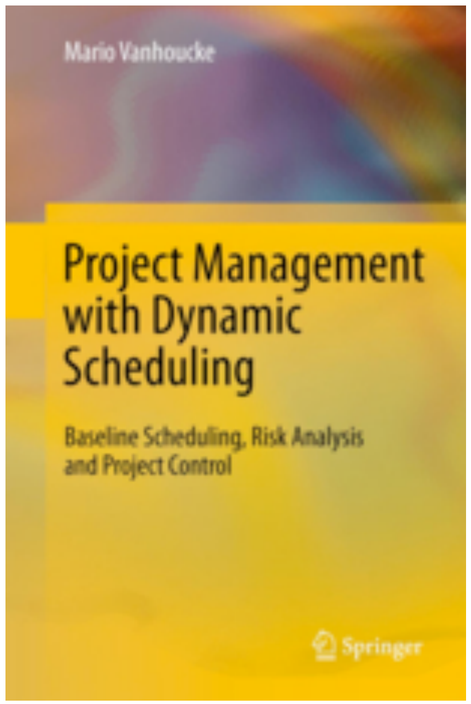
Kym Henderson

Future research

- Searching for static and dynamic project drivers to predict and control the impact of management/contingency reserve on a project's success

  - Over a million euro project funded by the Flemish Government
  - Synergy between Ghent University (Belgium), University College London (UK) and George Washington University (USA)
  - Scope
    - Further integration
    - Further validation (Stephan Vandevoorde)
    - Further commercialization (www.ProTrack.be en www.p2engine.com)

Future research



Results (Phase 1)

New book — "Project Management with Dynamic Scheduling" available at Springer
See: www.or-as.be/bookstore

Preliminary results (Phase 2)

Wednesday presentation — "An integrated project control process for research and practice"
Jeroen Colin and Mario Vanhoucke

Share your ideas for all other phases!

@ORASTalks

In collaboration with our partners:

Presentation: “Research meets Practice”

Outline

Overview of research

- Published in “Measuring Time”
- Four EVM hypotheses

Quick preview of future research

- The 1 mio € project
- Further integration

Overview of projects

- Used in the research
- Different sectors

Quick preview of future work

- EVM Europe
- Further collaboration

Research Meets Practice!

How relates the research with the real world?

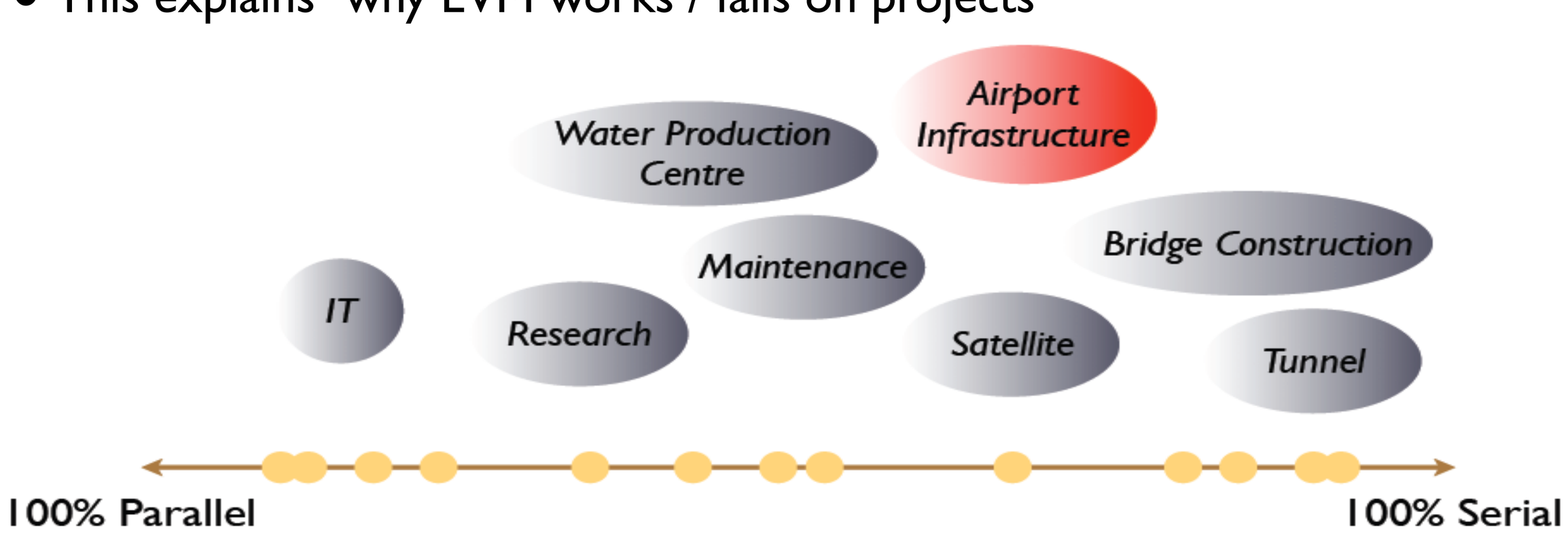
- 2007-2010: students collected real life data

- 8 different Belgian companies

- Total 48 projects types

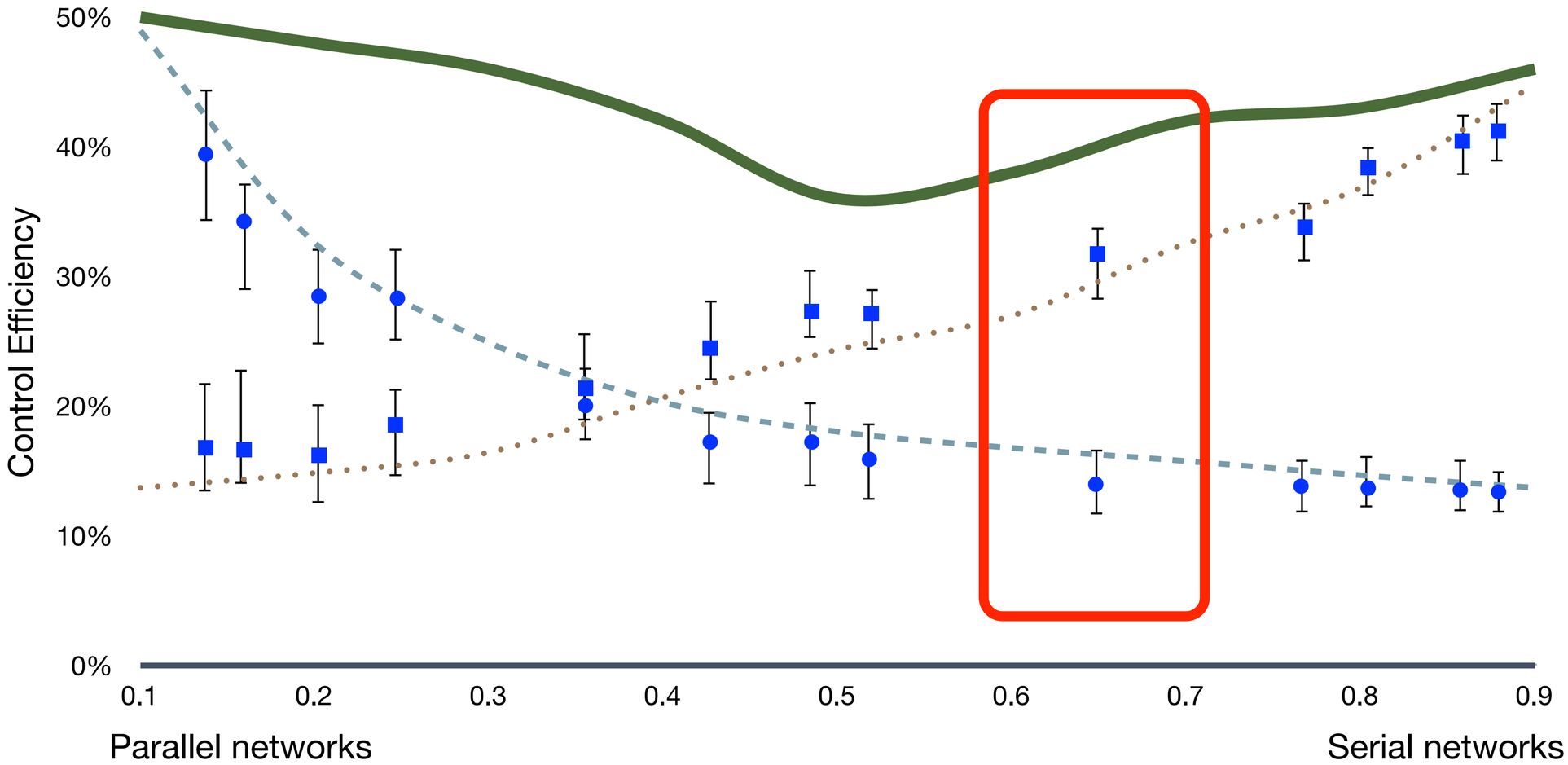
Research Meets Practice! Finding 1

- Schedules sorted by SP Indicator
- Each sector has a proper network structure
- This explains "why EVM works / fails on projects"

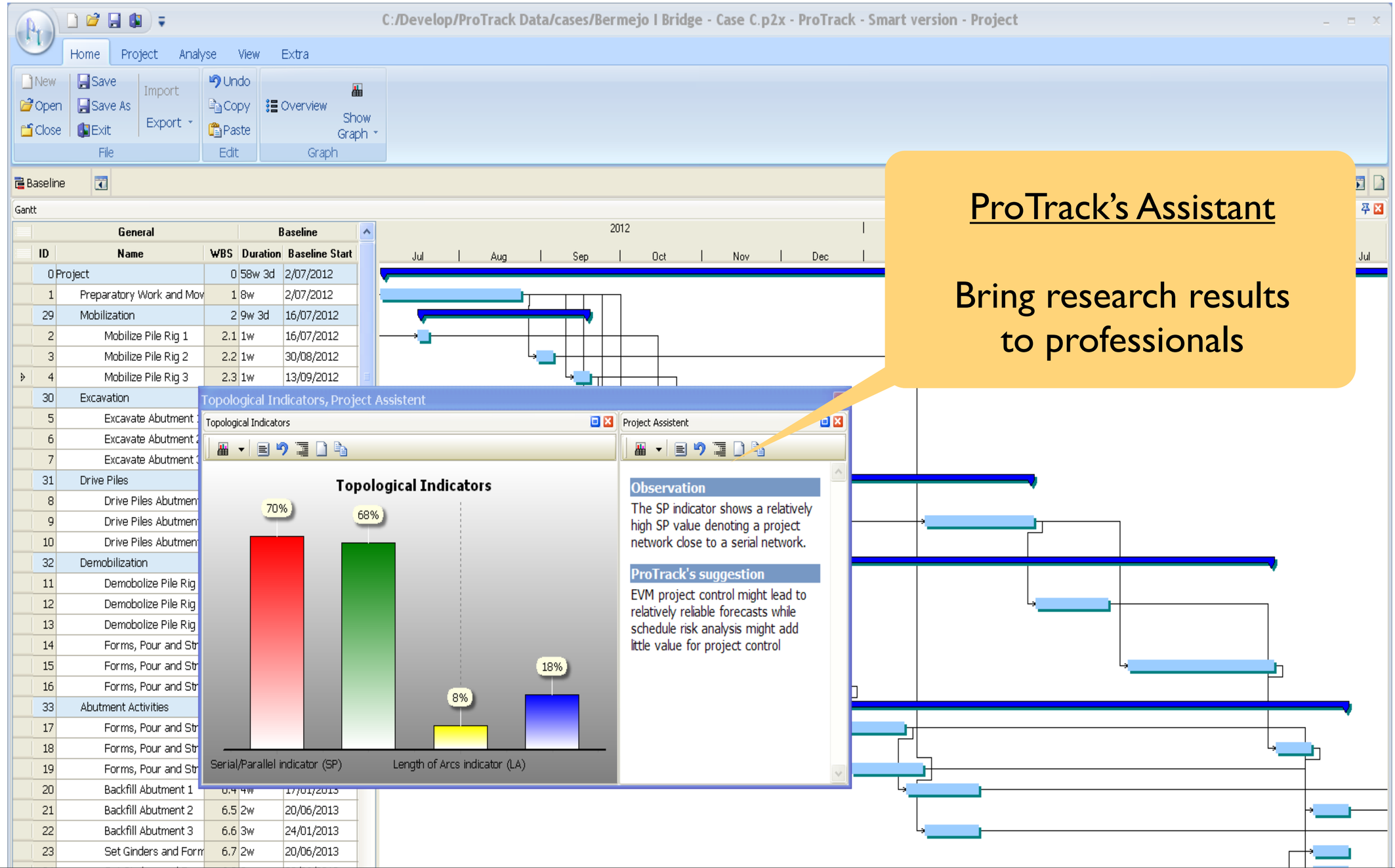


Research Meets Practice! Finding 2

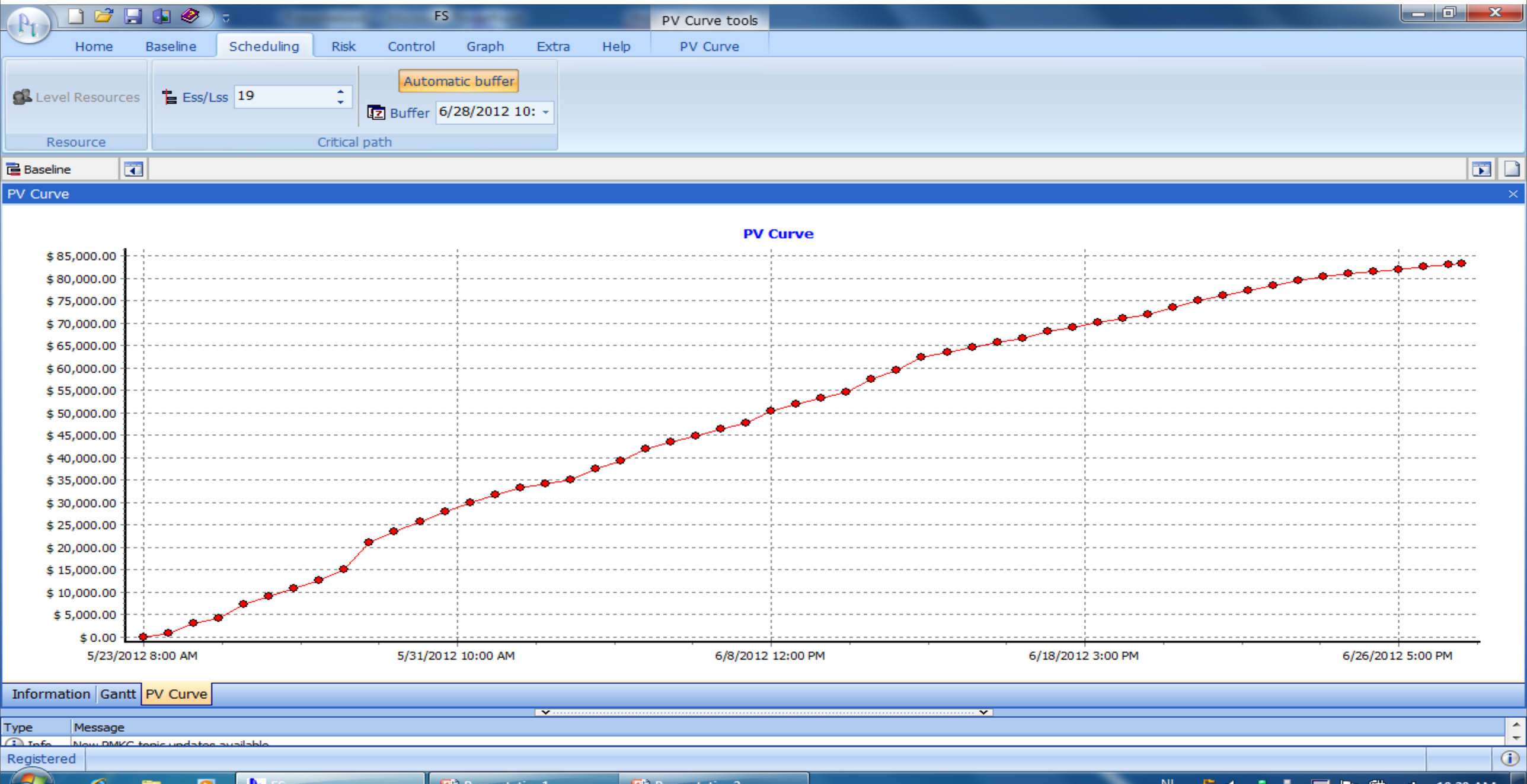
- Which control method is the best?



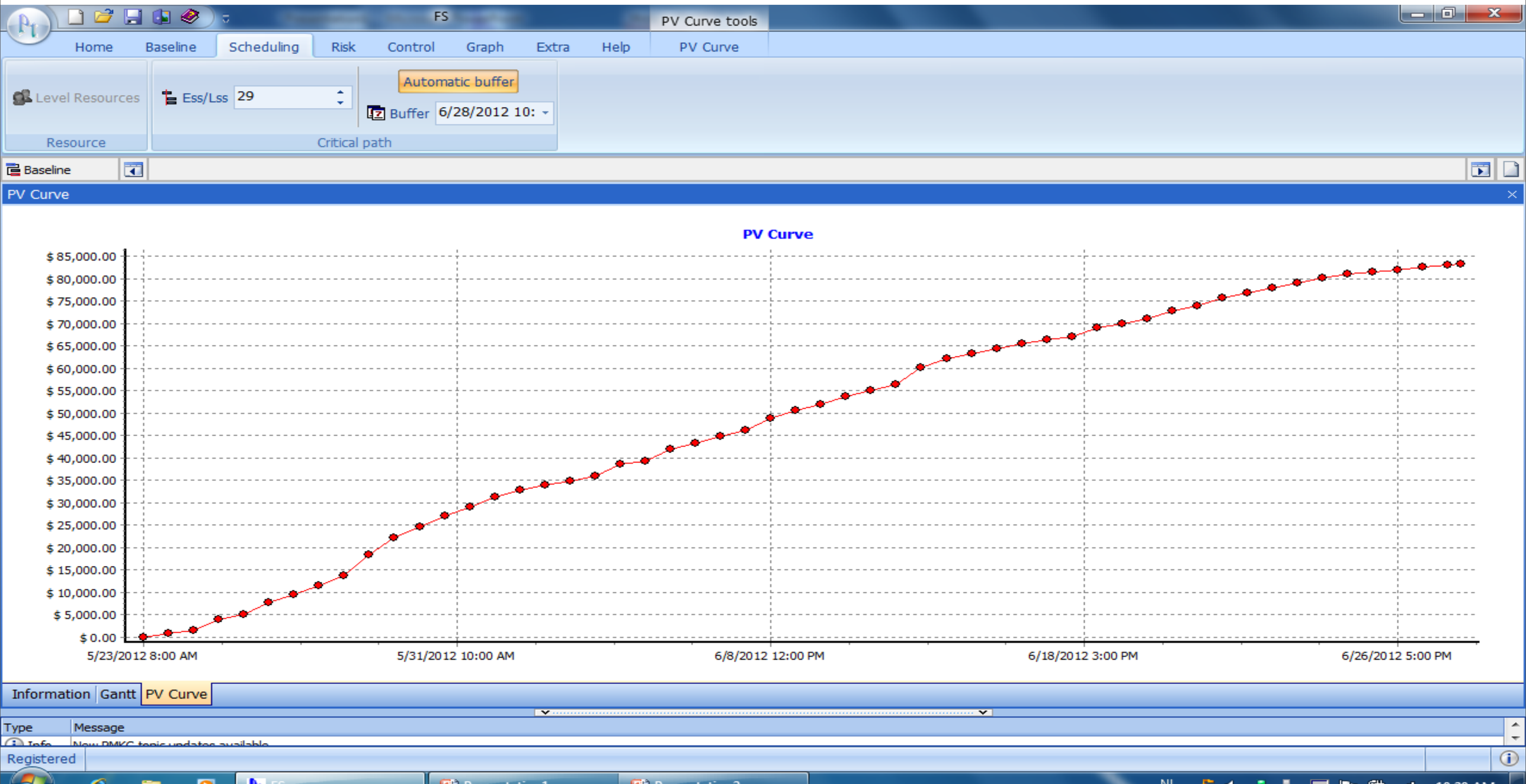
Detailed Schedule



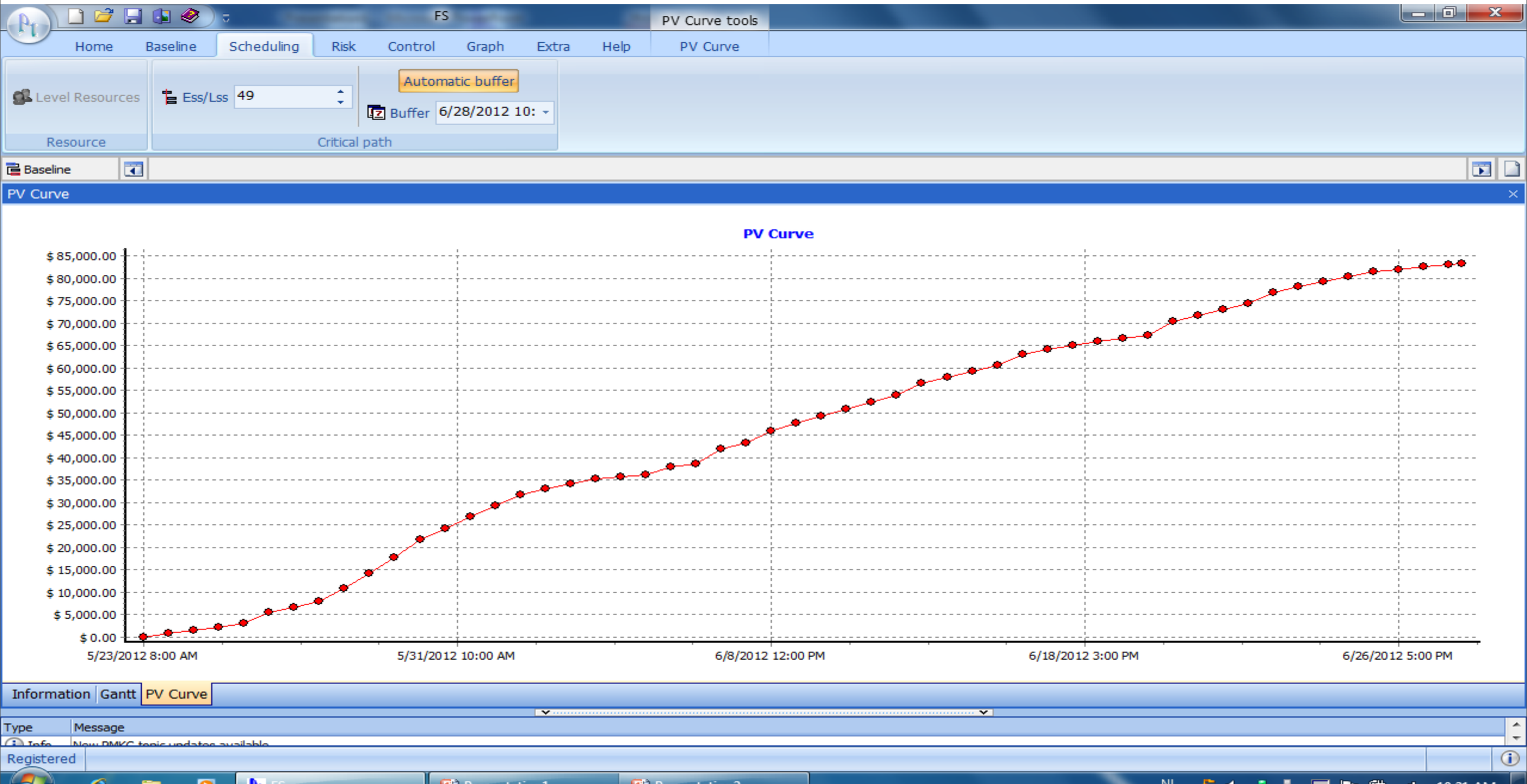
Cashflow Modelling – AD = 19%



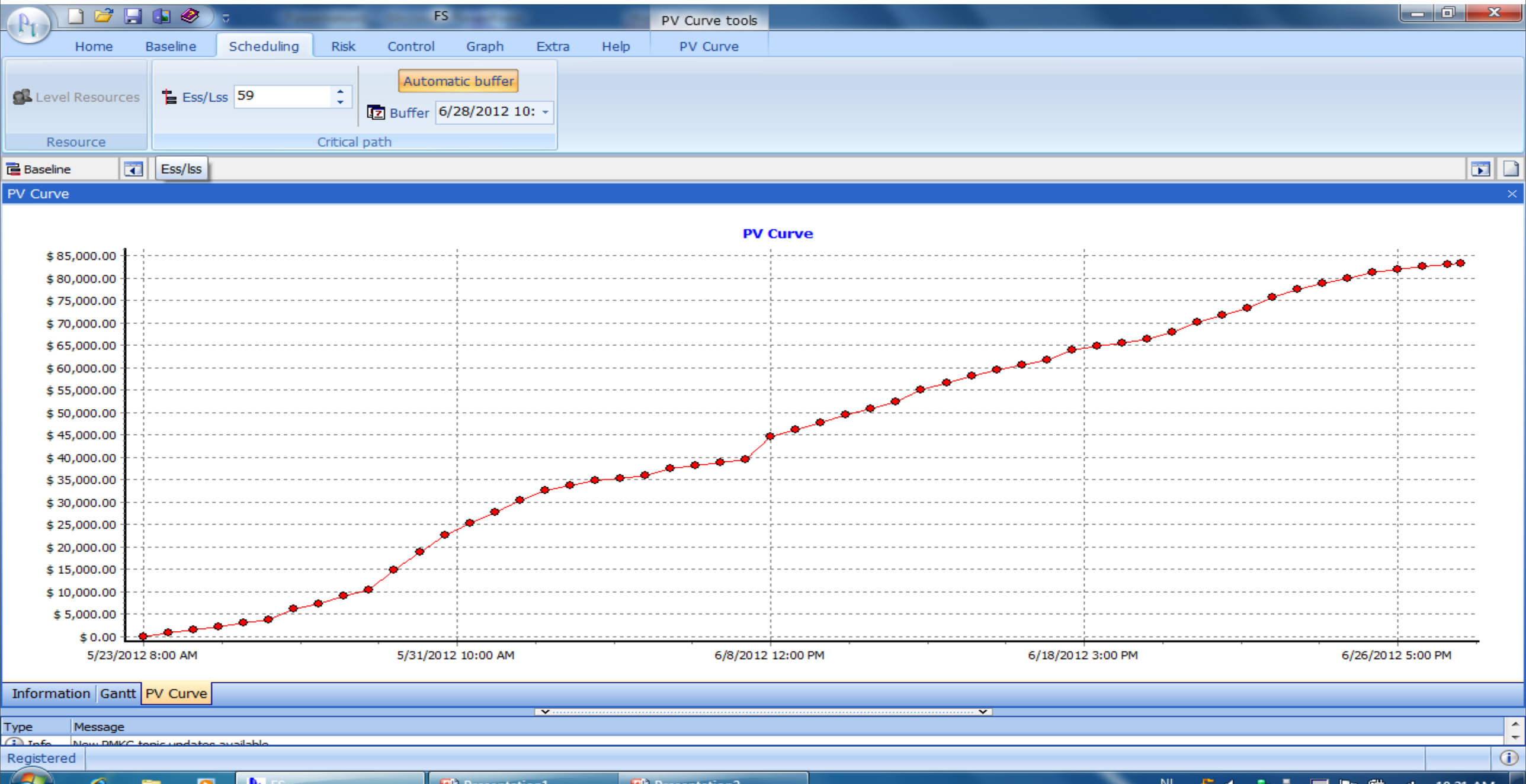
Cashflow Modelling – AD = 29%



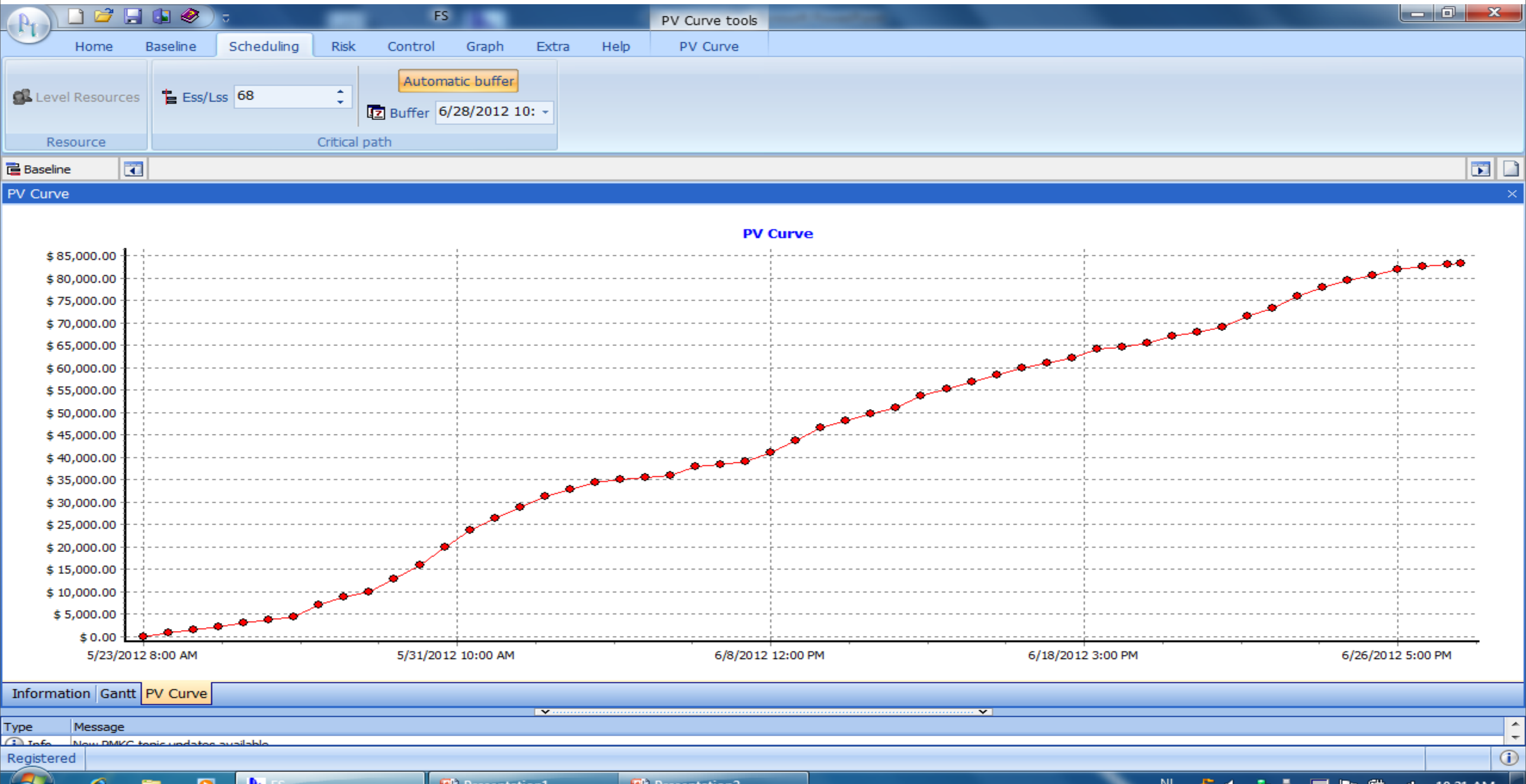
Cashflow Modelling – AD = 49%



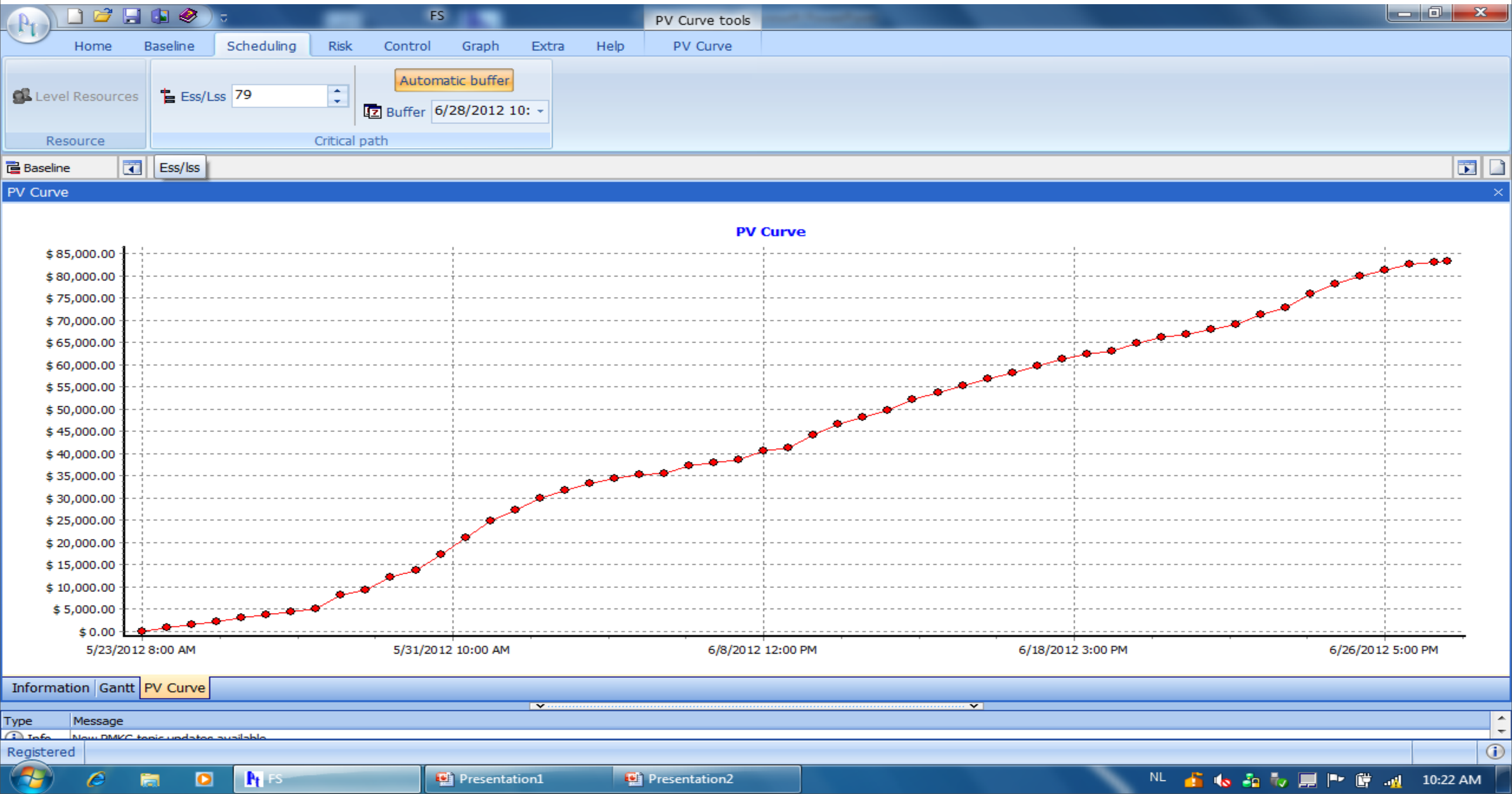
Cashflow Modelling – AD = 59%



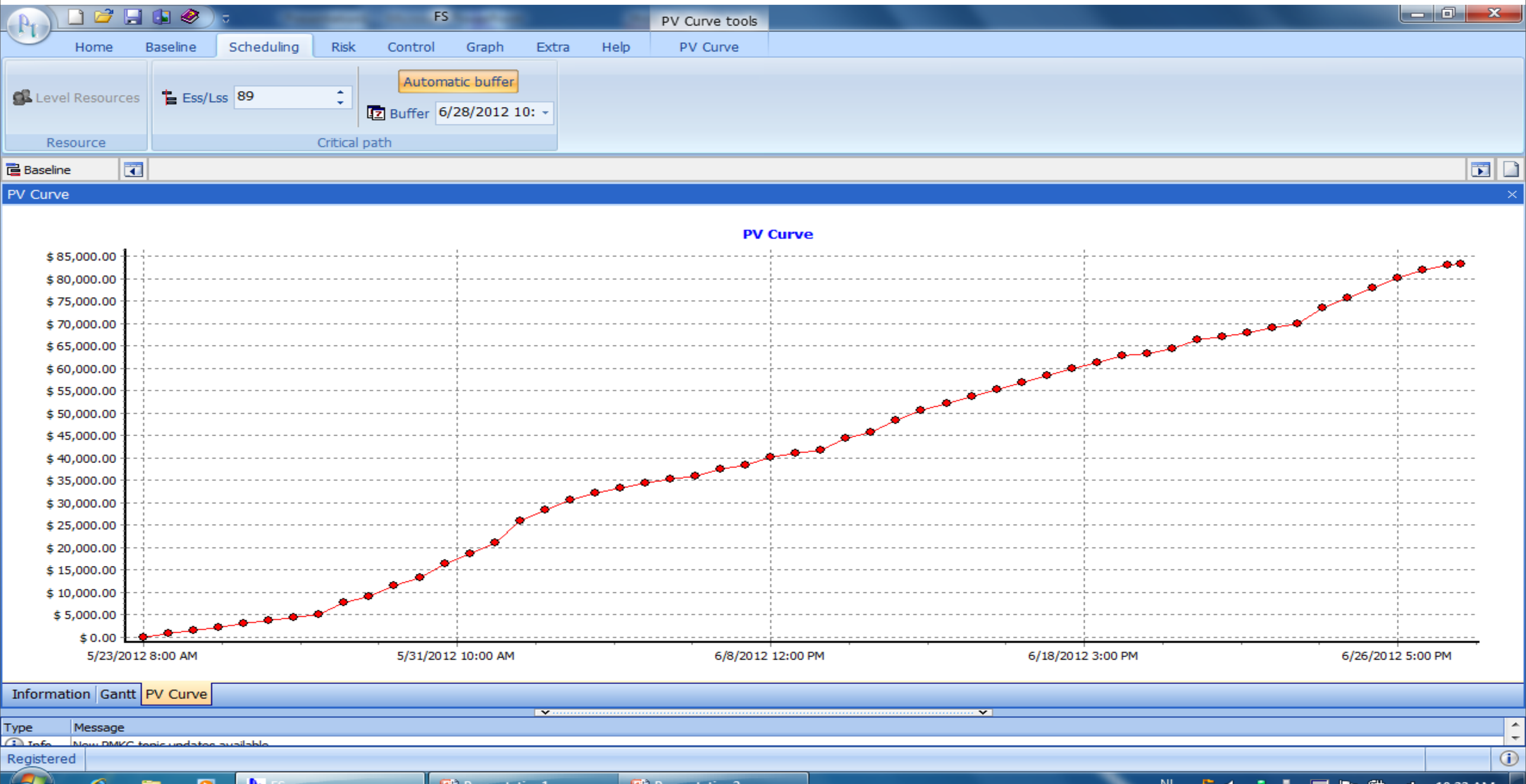
Cashflow Modelling – AD = 68%



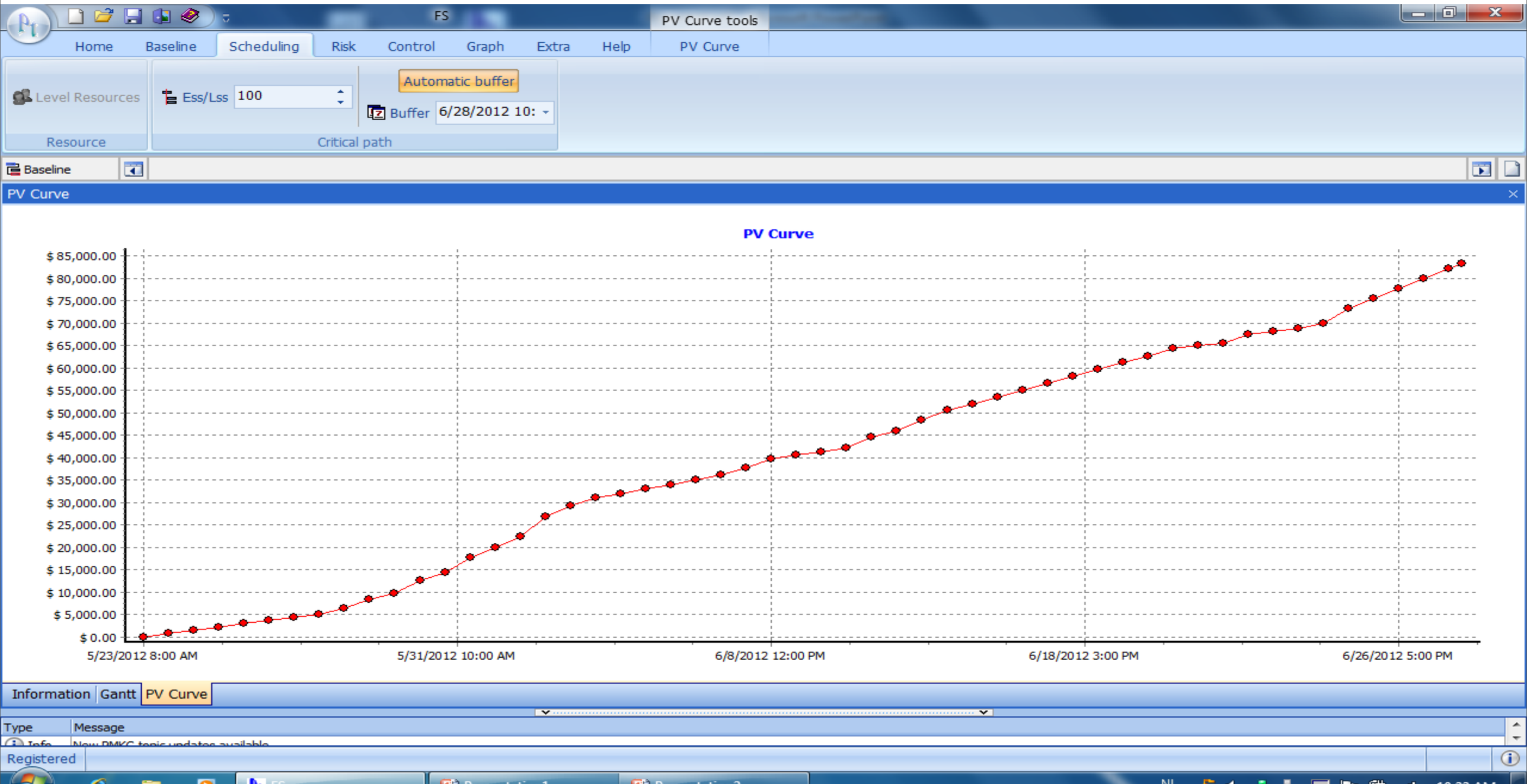
Cashflow Modelling – AD = 79%



Cashflow Modelling – AD = 89%



Cashflow Modelling – AD = 100%



How It Started

- Up to 2003
  - Lots of EV Research done mainly in U.S.
  - But only cost related

- 2003 – 2004 The Measurable News
  - March 2003, Forecasting Project Schedule Schedule is Different, Walt Lipke
  - March 2003, Completion with EV Metrics, D.S. Jacob
  - Spring 2004, Further Developments in Earned Schedule, Kym Henderson

- 2005 – 2006
  - Discussions in London about time related EV Research with CPM members Walt Lipke & Kym Henderson
  - First Academic Publications on "EV Time Related Research"

How It Started

- 2007 PMI Belgium Chapter Event: EV / ES
  - Speakers: CPM Members Walt & Kym
  - Mario received Research Collaboration Fund of 5.000 €

EVM Landscape in Europe

- No real statistics / research available

- Some sensitivity to sharing information
  - Companies using see EVM as part of their competitive advantage

- No imposed EVMS guidelines (apart from MOD / UK)

- Evidence of increased intrest / usage of EVM across many countries:
  - CERN, (no EVM regulatory mandate)
  - General Dynamics Land Systems Europe (Required to follow US ANSII and Australian EVM standards, sometimes Concurrently)

- Google: EV papers from many european countries

EVM Europe

- A growing need to bring "European EV users" together

- Summer 2008: London
  - CPM Member Kym Henderson called in a meeting
  - Decision to create "EVM Europe Association"

- Spring 2009: EVM Europe officially created

- Mission:
  - to promote EVM usage in continental Europe
  - to combine academical / practitioners experiences
  - to collaborate with other organisations such as CPM

Research meets practice!

1. Yearly Conference

- Conference to be hosted with Universities / Colleges

- A dedicated academical track unique for EVM conferences

- So far:

2009: Geneva, Switserland – University of Geneva / Lausanne

2010: Ghent, Belgium – Ghent University

2011: Valencia, Spain – Polytechnical University of Valencia

2012: Twente, The Netherlands – Twente University

2010 Ghent Conference

- Working session on the PMI PS EVM 2nd Ed.
  - Chaired by P.M. Greg Schmidt
  - "Europeans" advocated strongly on inclusion of ES Method as an extension to EV
  - Accepted by the committee
- Global standard which will benefit European users and promote adoption of EVM in Europe

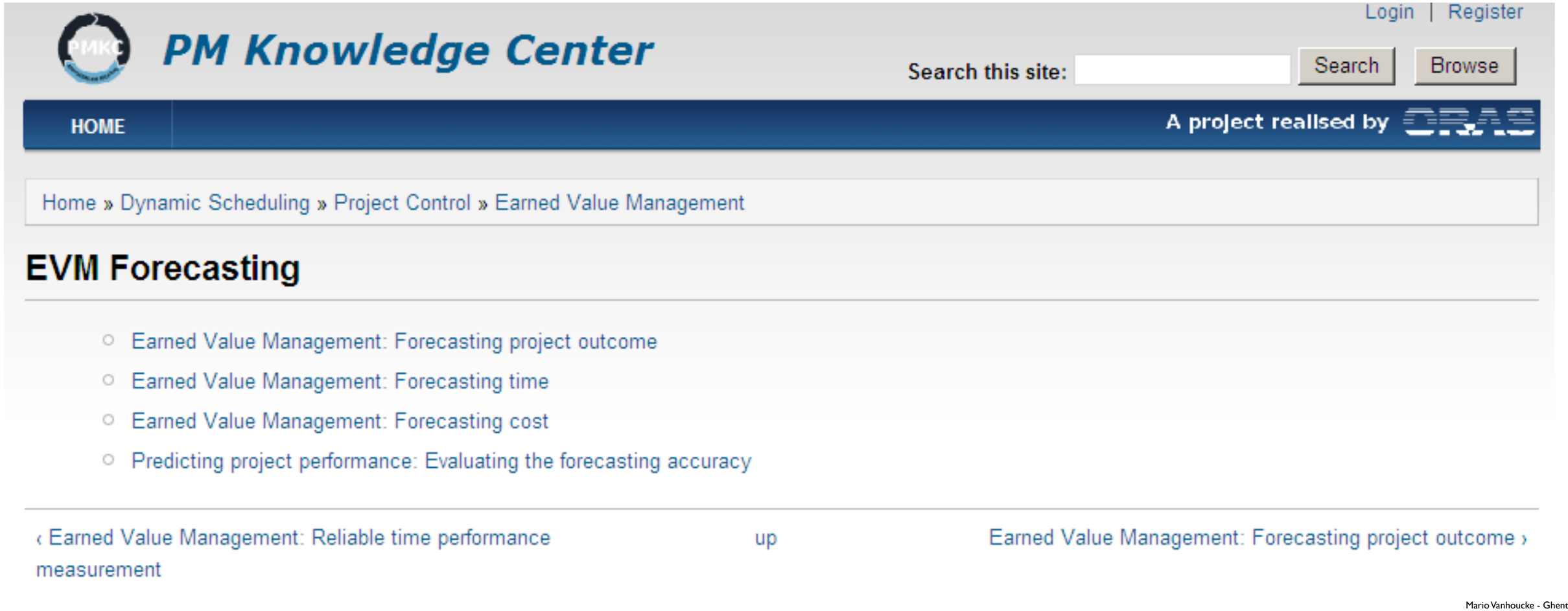
2. Student Involvement

- Student presentations at all EVM Europe Conferences
  - European student presentation at this EVM World Conference
  - PS-10 An Integrated Project Control Process For Research and Practice *Ir. Jeroen Colin*

- 2011 PMI Belgium Best PM Dissertation Price (University Contest)
  - Using EVM and Earned Schedule to assess project maturity in Belgian companies.

3. PM Knowledge Center

- Spread the message: www.pmknowledgecenter.com
  - Free online information tool
  - Can readily be used in courses



4. Practitioner Review Committee

- GOA Research Project
  - September 2012: kick off
  - September 2014: 1st review, topflag academic publications.
  - September 2016: 2nd review, topflag academic publications, a project control book.
  - September 2018: 3th review, academic paper, implementation in ProTrack.
  - September 2019: final review, delivery of PhDs and ProTrack and P2 Engine.

- January 2012: decision to form a P.R.C.
  - Chaired by Prof. Pierre Bonnal, founder & director of EVM Europe
  - To translate, publish and present the research findings to the practitioners

- Stay tuned with Twitter: @ORASTalks

Thank You CPM

- For publishing "The Measurable News"
- For bringing the Europeans together
- For continuously supporting the EVM Europe Initiative
- For having us here

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EUROPE ASSOCIATION

The Netherlands, November 2012

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