EARNED VALUE:

TAKING THE NEXT STEP
WHEN SCHEDULE IS KING

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Project Management Governance & Control Symposium

University of NSW – Canberra

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PRESENTATION OUTLINE

1. INTRODUCTION
2. SCHEDULE IS KING
3. TENSION: CASH IN ADVANCE v CASH ON DELIVERY
4. HOW TRADITIONAL EVM IDENTIFIES PROJECT BADNESS
5. DEFICIENCIES IN EVM TREATMENT OF SCHEDULE
6. WHAT'S IN DEFENCE CONTRACTS
7. EARNED SCHEDULE AND WHAT IT DOES
8. IMPLEMENTING EARNED SCHEDULE
9. SUMMARY
10. CONCLUSION
11. QUESTIONS

SCHEDULE IS KING

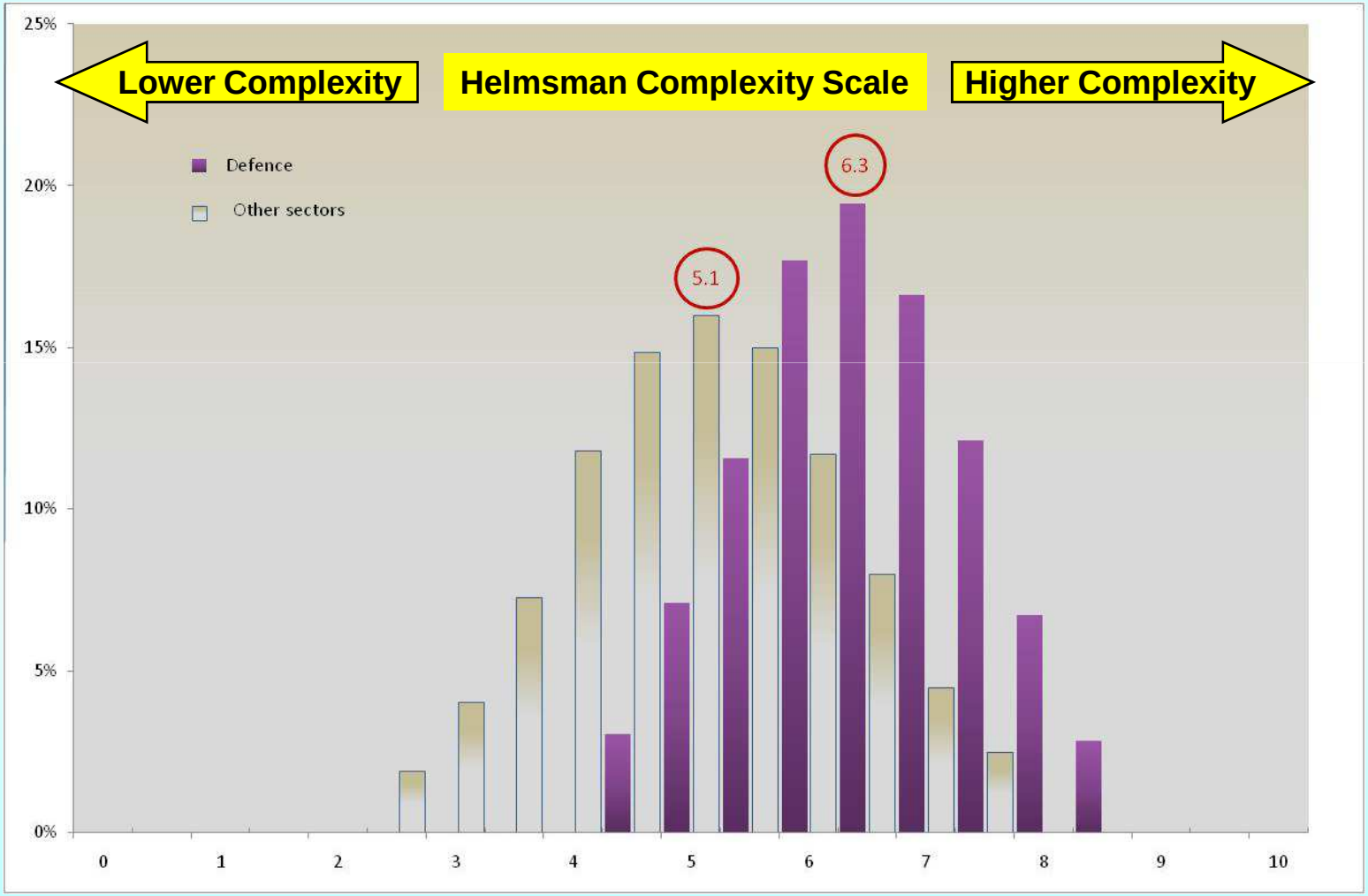
- **DMO IS THE LARGEST PROJECT ORGANISATION IN AUSTRALIA**
  - With budget of $9.7 billion in 2013–14, the DMO is managing over 180 major capital equipment projects and over 70 minor projects, and sustains and upgrades over 100 existing fleets of equipment.
  - The DMO will manage acquisition and sustainment worth over $43 billion over the Forward Estimates period, with around 55 per cent to be spent in Australia.
  - The latest Defence Capability Plan contains 111 projects, or phases of projects, worth around $153 billion.

GOODNESS 

BADNESS 

COMPLEXITY OF DEFENCE PROJECTS

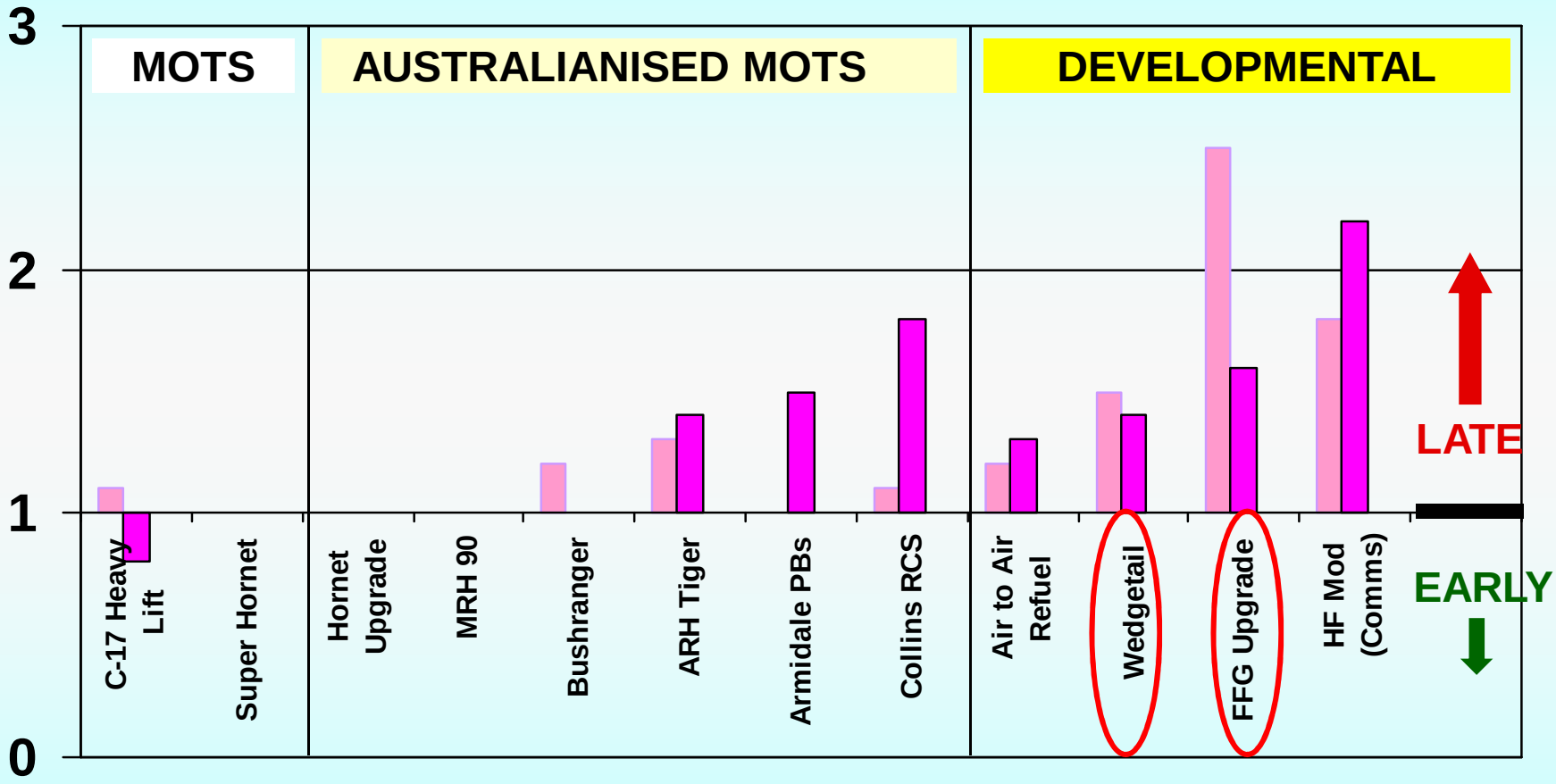
Defence Projects are a level more complex than those in other Australian organisations



SEA 1390 FFG Upgrade Project

Refer to Project website & Janes for description

Schedule Variance Factors by Project Type



Source: ***DMO 2008-09 Major Projects Report – ANAO Report No. 13 2009-10, pg 119***

CASH IN ADVANCE v CASH ON DELIVERY

- **Cash Flow**
- **Commercial Leverage**
- **Risk Exposure**
- **Trust**
- **Confidence**
- **(And a WHOLE BUNCH MORE)**

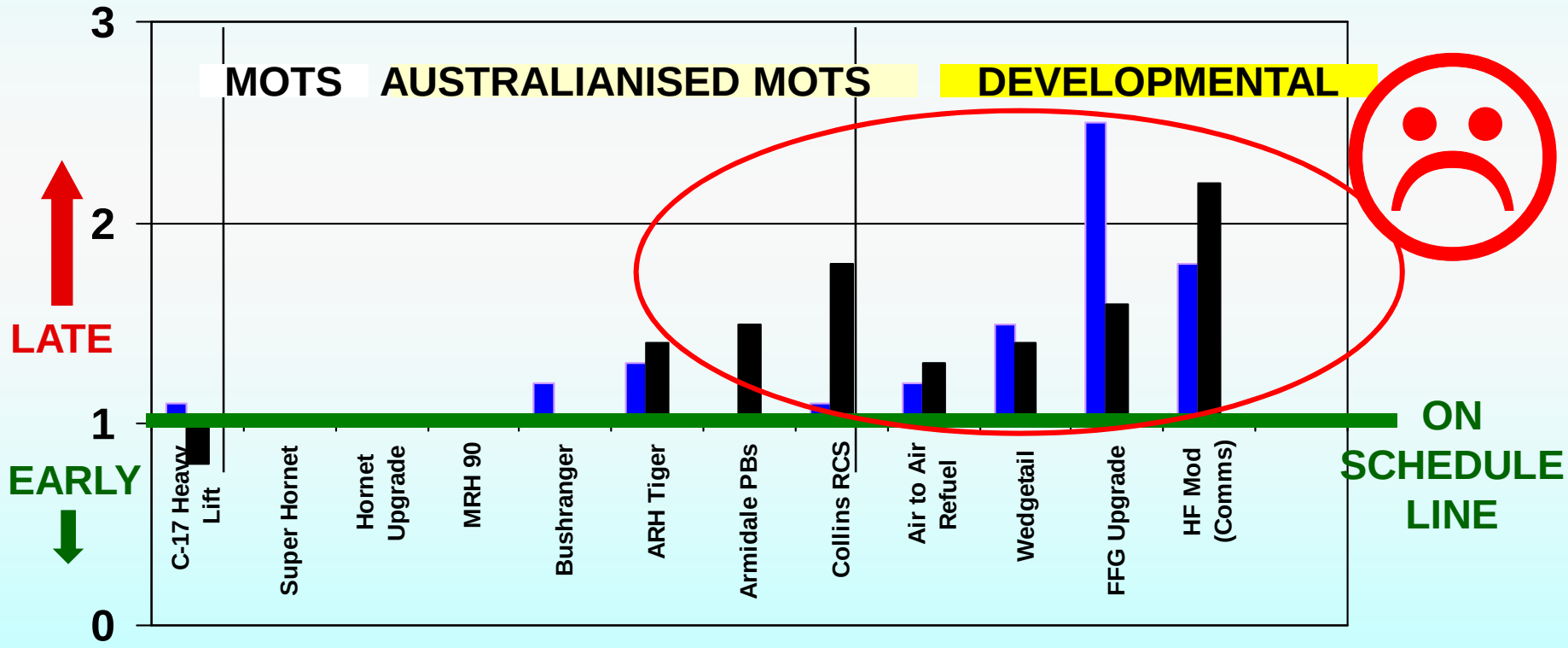
SO……. EARNED VALUE OR SIMILAR

IS HERE TO STAY

PROJECT BADNESS

DELAY IN MEETING:

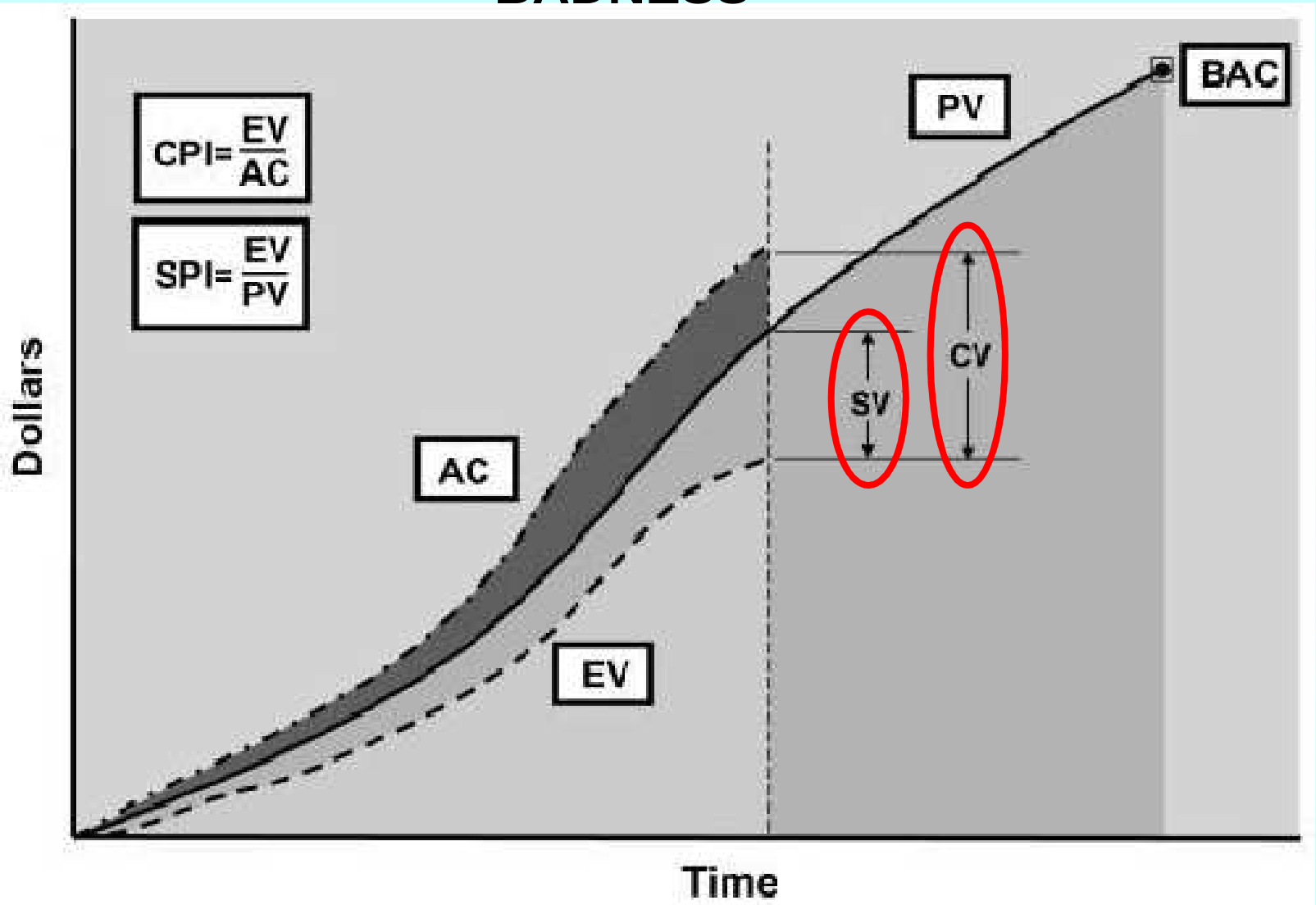
- **INITIAL OPERATIONAL CAPABILITY, AND**
- **FULL OPERATIONAL CAPABILITY**



PROJECT BADNESS
TYPICALLY DISTILLS INTO :

- **PRODUCT = TO SPEC (OR NOT)**
- **SCHEDULE = GONE WEST (OR NOT)**
- **COST = OVER BUDGET (OR NOT)**

HOW TRADITIONAL EV IDENTIFIES PROJECT BADNESS



(Source: Lipke W., Earned Value Basics 2003, p.2)

WHY ???

This behaviour is explained by looking at the Schedule Variance (SV) and the Schedule Performance Index (SPI) formulas.

These metrics consist of two parameters: EV and PV, and …..

…… at the end of the project, EV always equals the budget at completion (and thus equals the PV), it follows that the SPI always returns to one and the SV becomes zero !!!!

(Source: Lipke W., 2003, p.3)

Schedule Variance = Earned Value – Planned Value

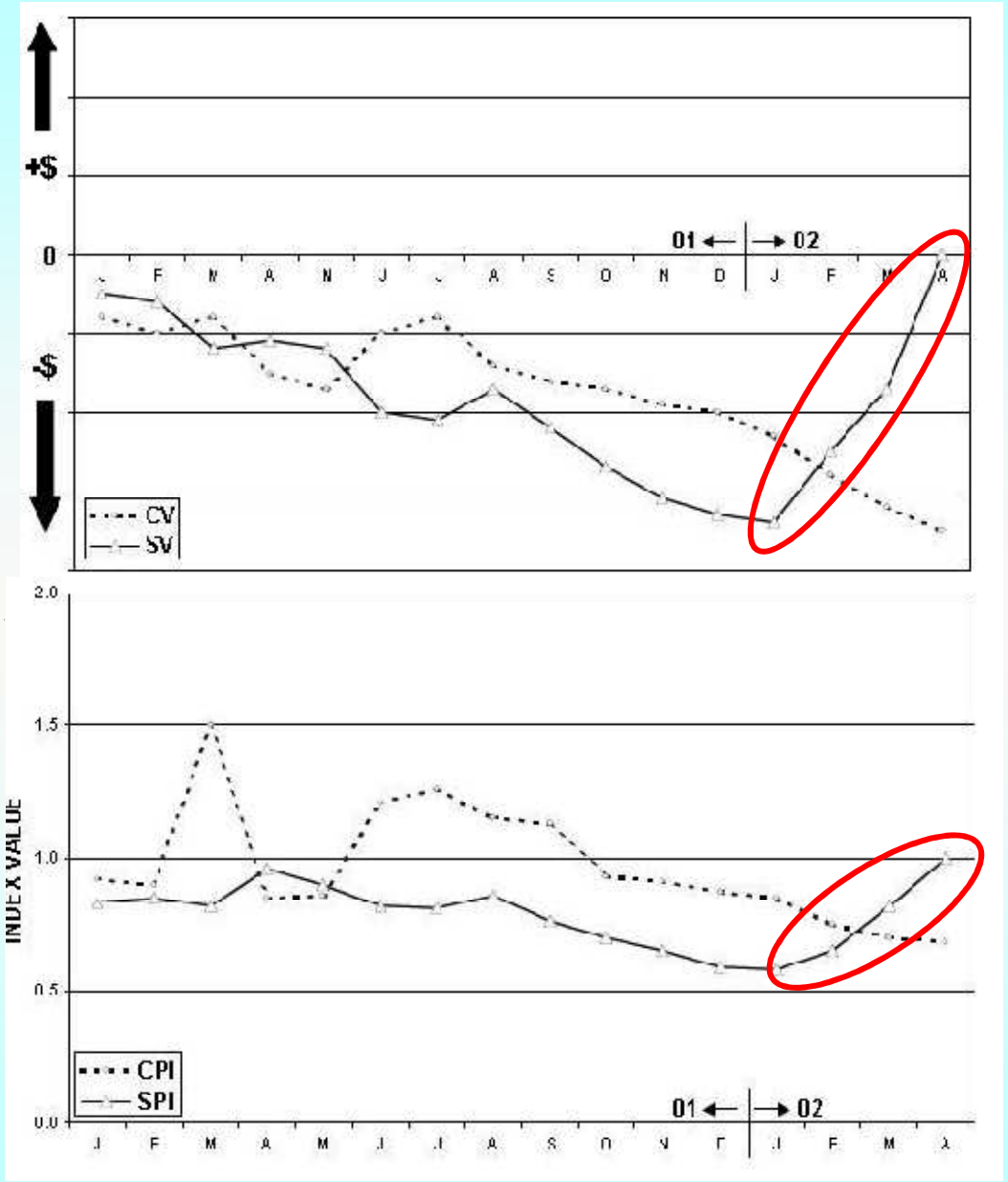
(= zero at completion)

Schedule Performance Index = $\dfrac{\textbf{Earned Value}}{\textbf{Planned Value}}$

(SPI) (= 1.000 at completion)

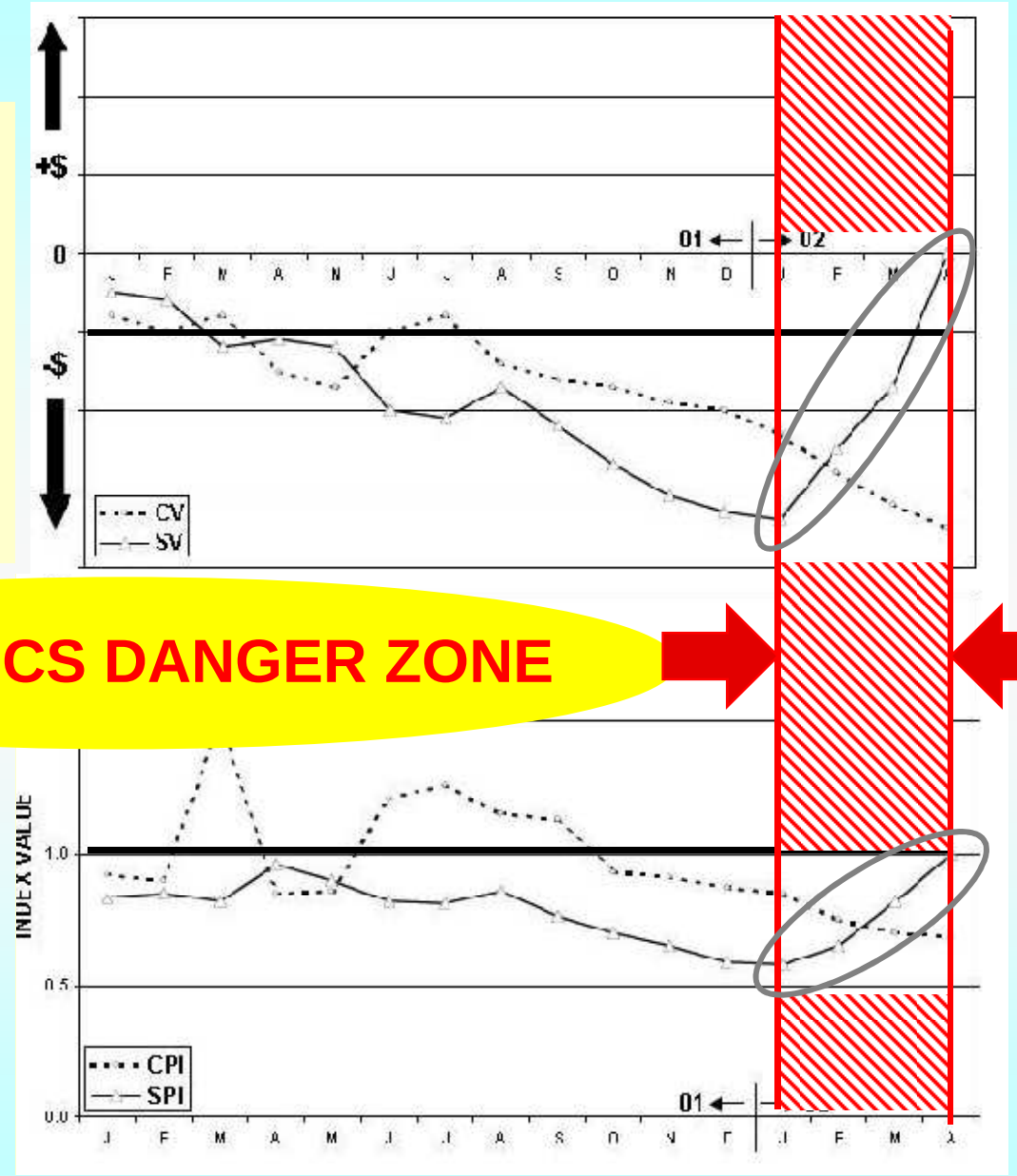
(Source: Def Sup AS 4817-2006)

DEFICIENCIES IN TRADITIONAL EVM SCHEDULE TREATMENT



(Source: Lipke W., 2003, p.3)

SCHEDULE UNDER TRADITIONAL EVM:



BEST SCHEDULE RELATED QUOTE:

"THE SCHEDULE IS VALID AND ROBUST,
HOWEVER WE DO ACKNOWLEDGE IT'S RUNNING
AN ELEVATED LEVEL OF COMPLETION RISK."

(Source: not MontyPython or Black Adder)

AND ABOUT THE PRODUCT:

"IT IS WHAT IT IS."

(Source: not MontyPython or Black Adder
nor John Cleese or Chee Ching Chong)

**"WE'RE HERE TO DELIVER A PRODUCT,
NOT RUN A COLLECTION OF
SCIENCE EXPERIMENTS FOR YOU"**

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**"WE'RE HERE TO DELIVER A PRODUCT,
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(Source: Acceptance Test Failure Review Meeting)

WHAT'S IN DEFENCE CONTRACTS ?

"ASDEFCON DID-PM-MGT-EVMP-V2.3."

"AS 4817-2006 Project performance measurement using Earned Value."

Defence Supplement to AS 4817–2006 –

- **Project performance measurement using Earned Value**
- **Integrated Baseline Review Handbook**
- **Earned Value Management System Review Handbook**

EVM PERFORMANCE REPORTING:

6.2.2.1 The EVMP shall provide a description of the Contractor's EVMS for meeting the requirements of the Contract, including:

a. previous experience in applying an EVMS in the management of a contract, including:
(i) contract title and description;
(ii) contract type;
(iii) contract value;
(iv) EVMS standards applied; and
(v) any formal recognition of the applied EVMS;

b. an overview of the EVMS, written around the 11-step earned value performance measurement process defined in AS 4817-2006, as amended by the Defence Supplement to AS 4817-2006 and the Contract, including:

(i) any deviations from the AS 4817-2006 and the Defence Supplement to AS 4817- 2006;
(ii)the procedures to be employed; and
(iii) the interfaces between the various information management systems that will be employed to meet the EVMS requirements of the Contract (eg accounting, material handling, scheduling, EVMS data accumulation and reporting systems);

c. identification of the EVMS-related organisational structure, including all key EVMS personnel (e.g. Project Manager, Control Account Managers, Functional Managers, Project Scheduler and EVMS controller);

d. how the Contractor will manage Subcontractor performance, including the integration of Subcontractor performance data into the Contractor's EVMS performance reporting; and

e. the interfaces between the EVMS program and the measurement program, if a measurement program is required under the Contract.

6.2.5.1 The EVMP shall describe the EVMS performance reporting processes used by the Contractor, including:
a. the reporting levels, structures and variance thresholds for the provision of EVPRs, including:
(i) blah blah blah
(ii) blah
(iii) blah
(iv) blah
(v) blah blah blah;
b. any variations to the reporting levels and variance thresholds as the Contract progresses or the risk profile changes; and
c. the electronic formats for the provision of EVMS data to the Commonwealth to facilitate data transfer and analysis.

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WHAT

EARNED SCHEDULE

DOES

Source Material: Henderson & Lipke

EARNED SCHEDULE SPEAK

(a near common language with traditional EVM)

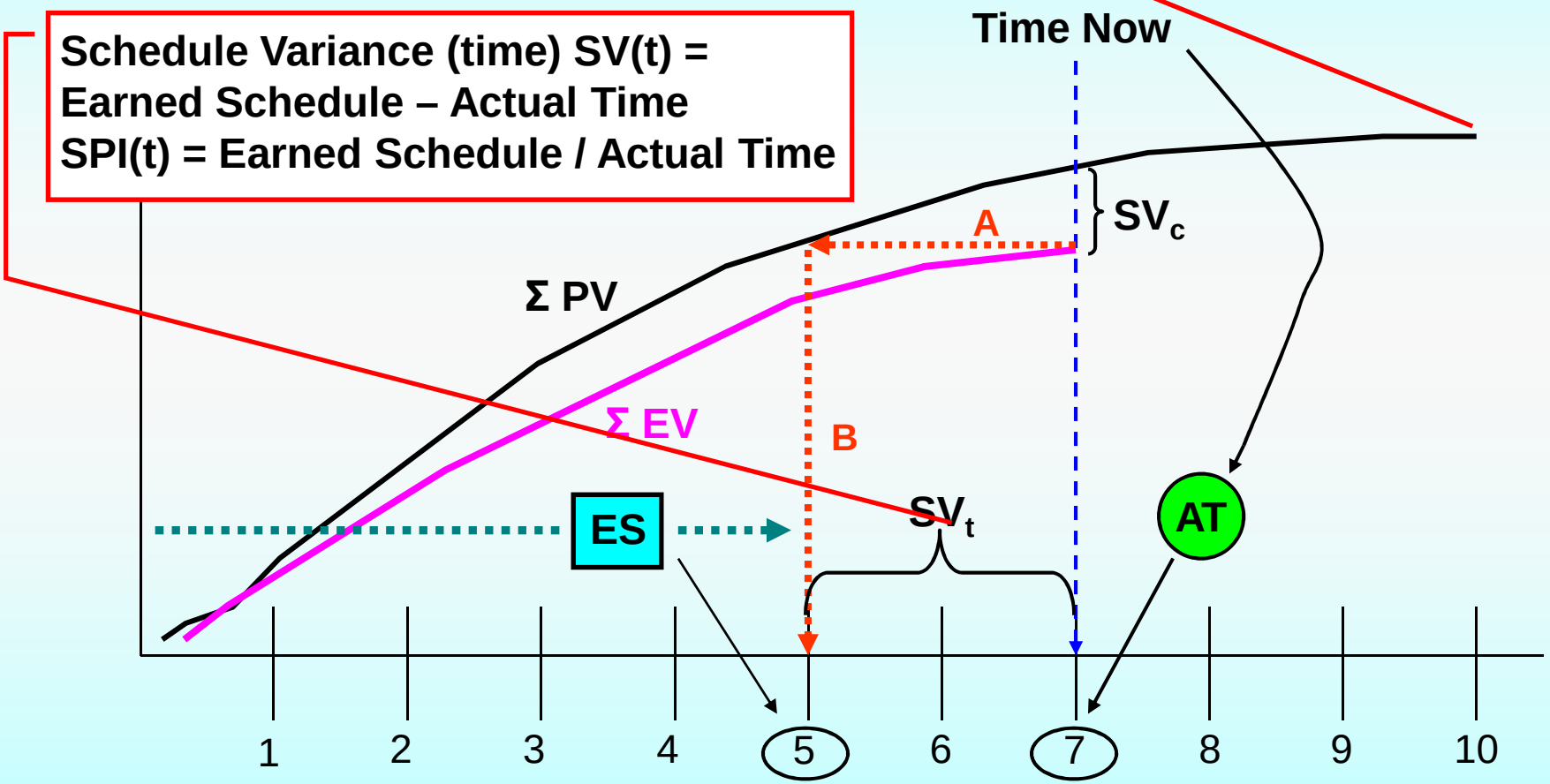
	EVM	Earned Schedule
Status	Earned Value (EV)	Earned Schedule (ES)
	Actual Costs (AC)	Actual Time (AT)
	SV	SV(t)
	SPI	SPI(t)
Future Work	Budgeted Cost for Work Remaining (BCWR)	Planned Duration for Work Remaining (PDWR)
	Estimate to Complete (ETC)	Estimate to Complete (time) ETC(t)
Prediction	Variance at Completion (VAC)	Variance at Completion (time) VAC(t)
	Estimate at Completion (EAC) (supplier)	Estimate at Completion (time) EAC(t) (supplier)
	Independent EAC (IEAC) (customer)	Independent EAC (time) IEAC(t) (customer)
	To Complete Performance Index (TCPI)	To Complete Schedule Performance Index (TSPI)

Earned Schedule Concept

(more Walt Lipke)

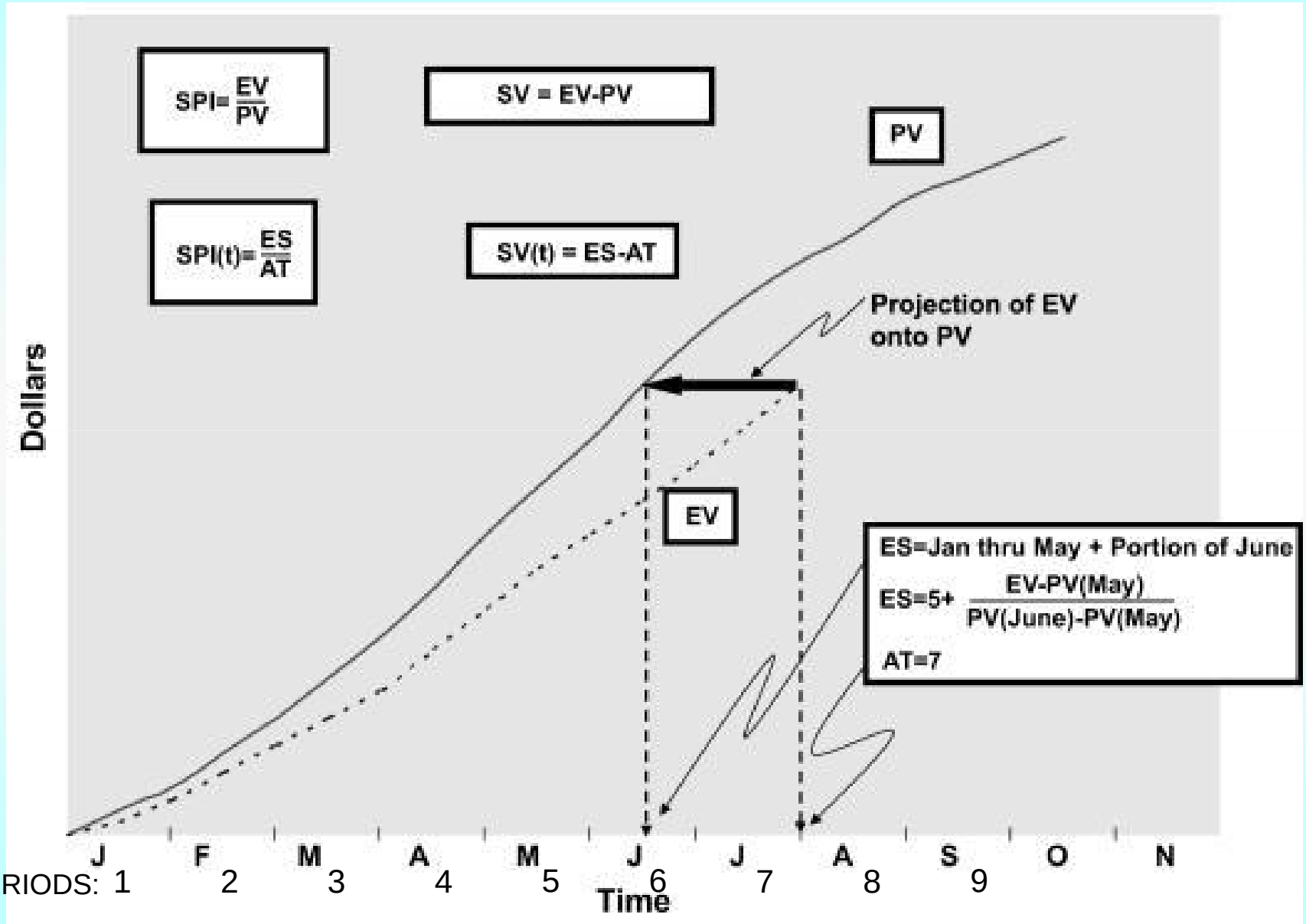
Statistically Predicted Project Duration = PD / SPI(t)

Schedule Variance (time) SV(t) = Earned Schedule – Actual Time
SPI(t) = Earned Schedule / Actual Time



For the above example, ES = 5 months …that is the time associated with the PMB at which PV equals the EV accrued at month 7.

EARNED SCHEDULE EXPLAINED

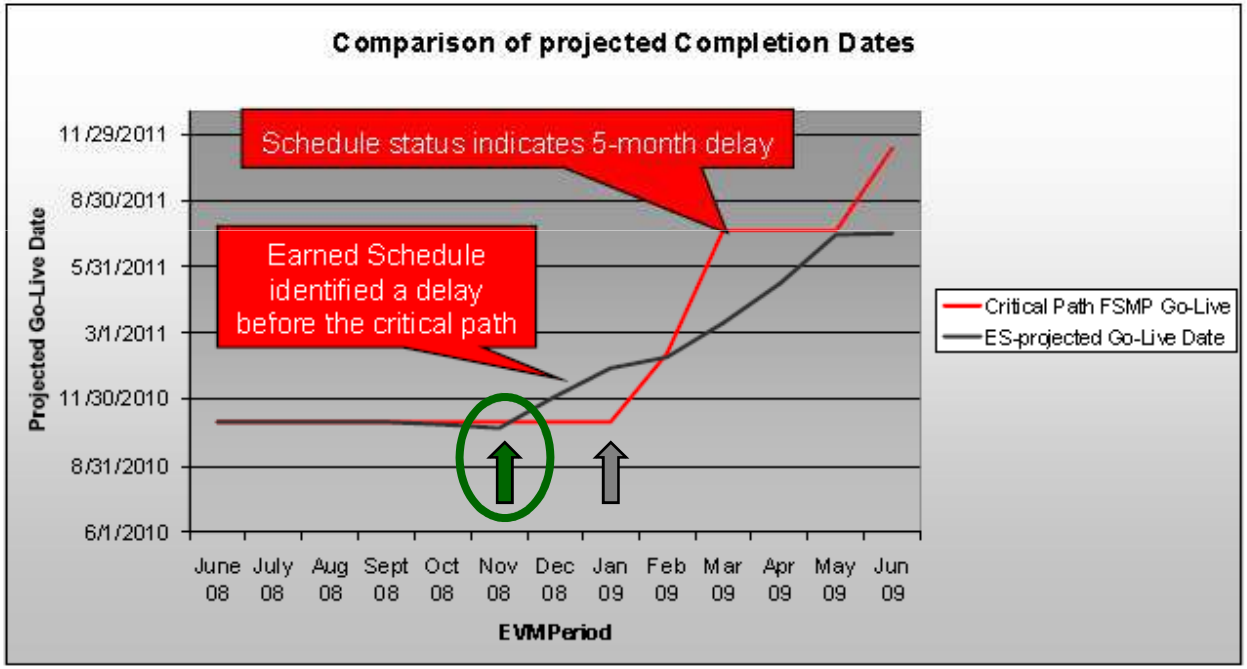


Earned Schedule Formulae

Metrics	Earned Schedule	ES_{cum}	ES = C + I number of complete periods (C) plus an incomplete portion (I)
	Actual Time	AT_{cum}	AT = number of periods executed
Indicators	Schedule Variance	SV(t)	SV(t) = ES – AT
		SV(t)%	SV(t)% = (ES – AT) / ES
	Schedule Performance Index	SPI(t)	SPI(t) = ES / AT
	To Complete Schedule Performance Index	TSPI	TSPI = (PD – ES) / (PD – AT)
			TSPI = (PD – ES) / (ED – AT)
Predictors	Independent Estimate at Completion (time)	IEAC(t)	IEAC(t) = PD / SPI(t)
			IEAC(t) = AT + (PD – ES) / PF(t)
	Variance at Completion	VAC(t)	VAC(t) = PD - IEAC(t) or ED

EARNED SCHEDULE
PREDICTIVE ABILITY COMPARED

Un-named US Federal Govt Agency Program Data



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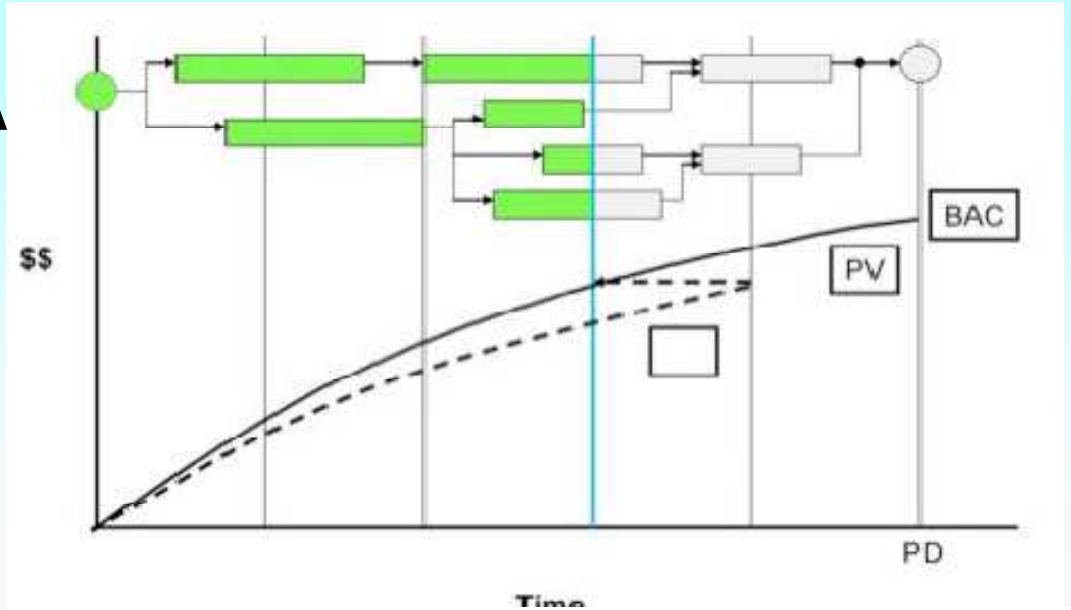
USA IPMC Conference 2009: Michelle Jones et. al.
(Booze Allen Hamilton data)

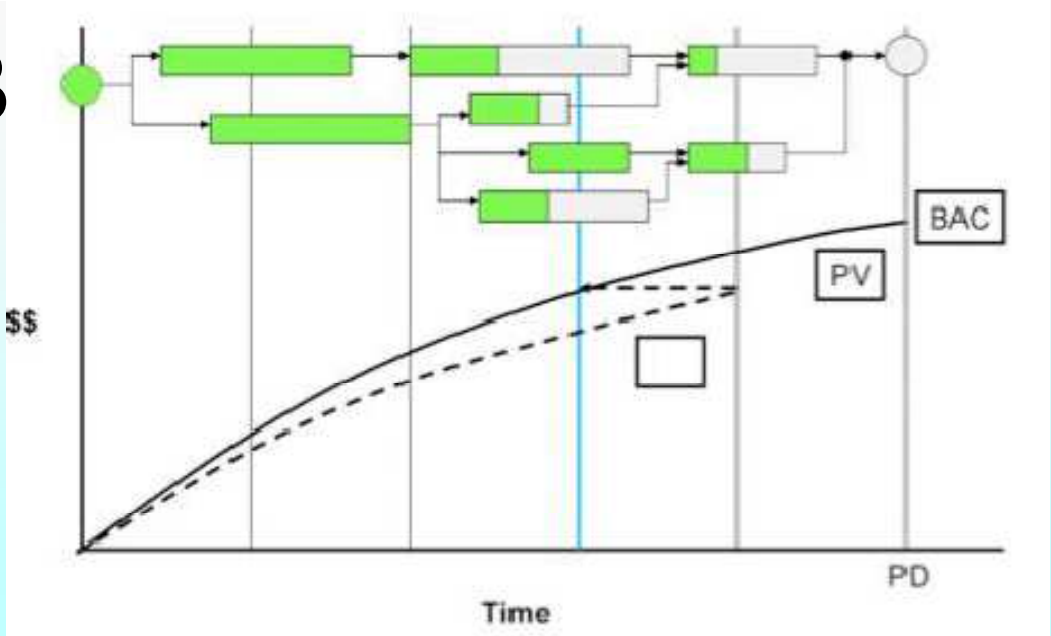
LIPKE'S "P" FACTOR

“P” FACTOR MEASURES SCHEDULE ADHERENCE

A



B



“P” FACTOR MEASURES SCHEDULE ADHERENCE

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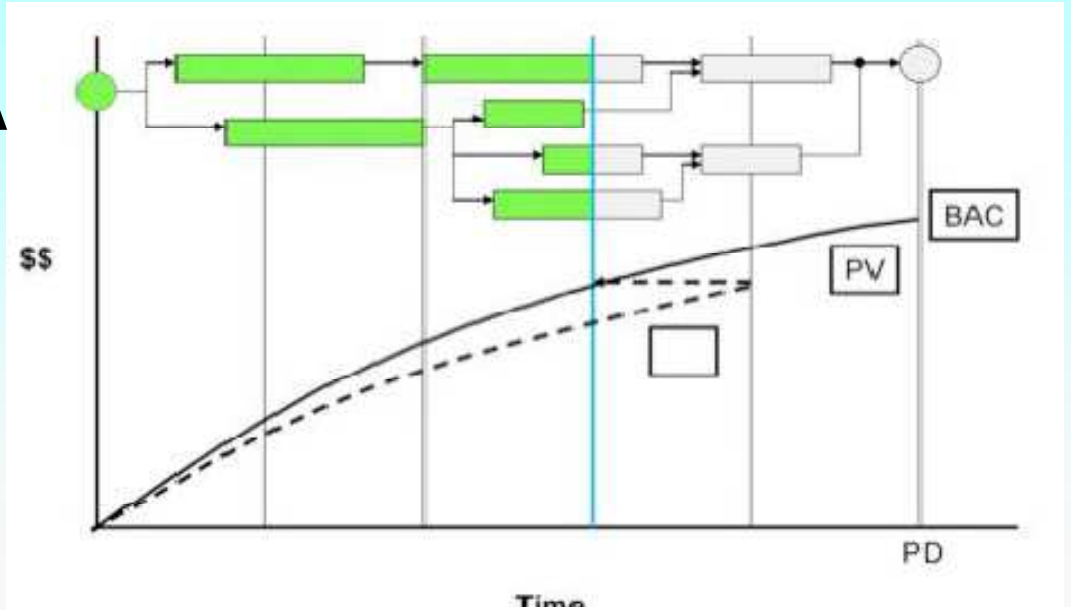

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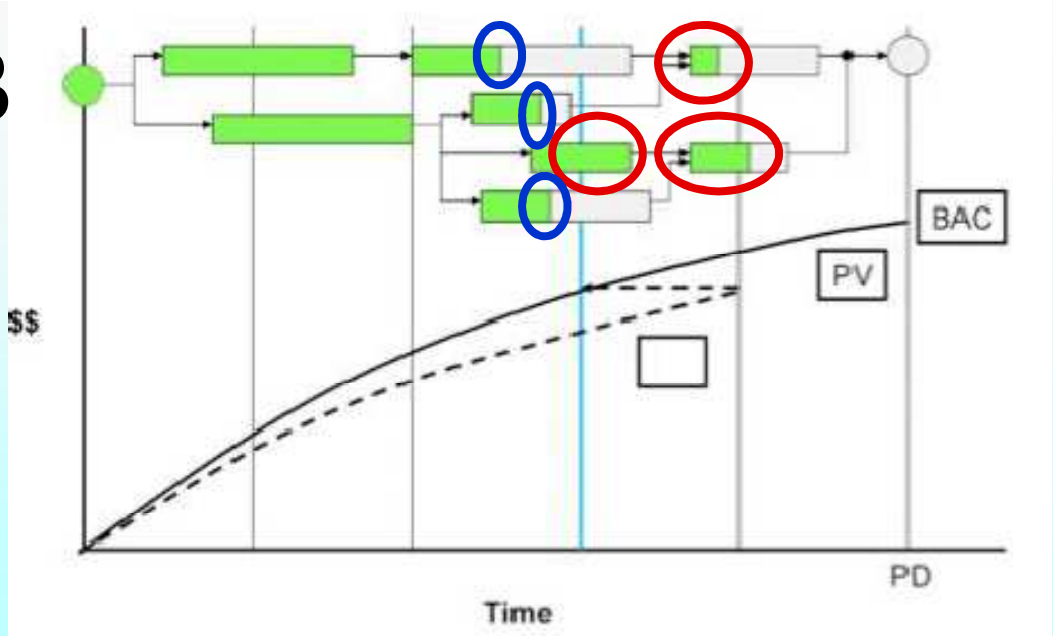


“Out of Sequence” Risk

“Blockage” Risk

IMPLEMENTATION: Beginning

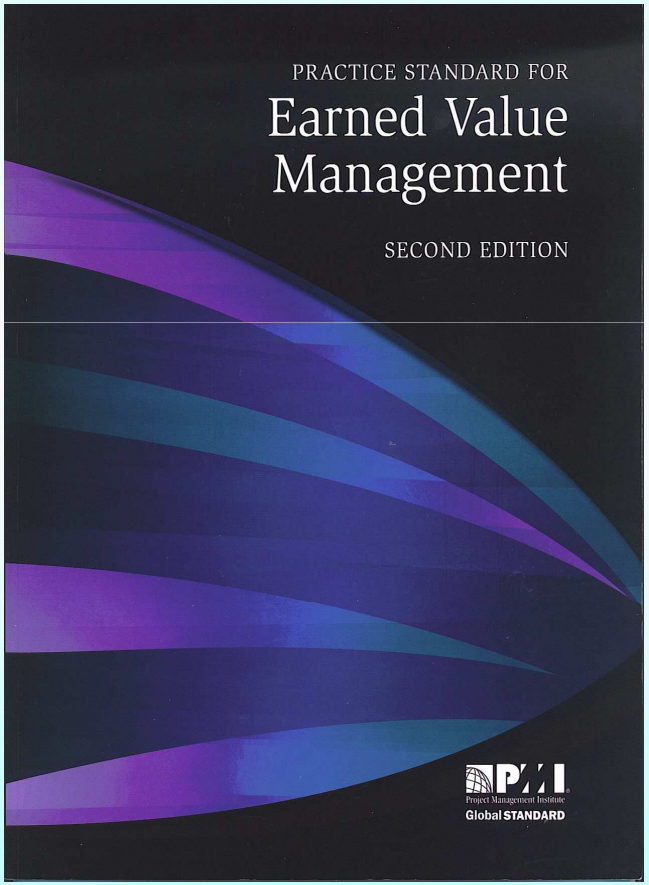
- Read articles *…to begin*
  - "Performance analysis of Earned Value Management in the construction industry"
  - "Schedule is Different"
  - "Further Developments in Earned Schedule"
- Explore the Earned Schedule website
  - www.earnedschedule.com
  - Papers, Presentations, Calculators, Terminology
- Scan the Calculators ……. and *experiment with them*
  - ES Calculator v1a
  - P-Factor Calculator
  - Statistical Prediction Calculator
  - SA Index & Rework Calculator

IMPLEMENTATION: Hard Documentation

PMI EVM Practice Standard

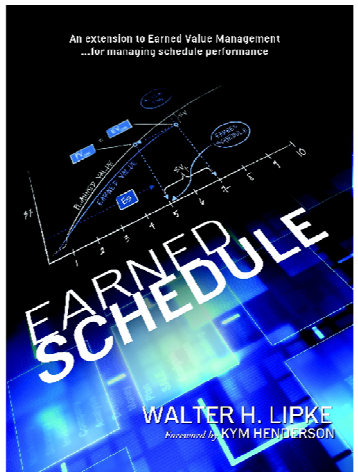
- Inclusion of *Earned Schedule* into PMI EVM Practice Standard, 2nd Edition (2011)

- Appendix D, “Schedule Analysis Using EVM Data,” provides ES theory and practical application to example project.



IMPLEMENTATION: Available Resources

- Earned Schedule Website
  http://www.earnedschedule.com/
- Wikipedia references Earned Schedule
  http://en.wikipedia.org/wiki/Earned_Schedule
- *Earned Schedule* book (English, Japanese, Spanish)
  - Print
  - ePub (Nook & iPad)
  - Kindle
  - PDF



IMPLEMENTATION: Strategy & Sequence

- If you're already using EVM
  … *take the next step to ES*
- Try it on archived project data
  … *check the ES analysis against what occurred*
  … *gain confidence*
- Prototype ES on a few projects
  … *get comfortable with the analysis*
- Train others in ES and expand the application in the organization
  … *discuss with analysts and managers*
  … *work out the problems*
- Integrate into organization's EVM application policy

IMPLEMENTATION: EVM-ES Tools

- Initially, augment the EVM tool in use
  - ES calculators
  - Henderson's spreadsheet set
- Research the available tools - *request a trial period*
  - Project Flight Deck
    - MS Project add-on, inexpensive yet includes advanced features
  - OR-AS
    - Sophisticated, research oriented, expensive
  - SuperTech – EV Engine
    - Basic EVM & ES …includes more financial analysis

PRESENTATION SUMMARY

1. SCHEDULE IS KING (STILL, BUT ….)
2. TENSION: PAY IN ADVANCE v CASH ON DELIVERY
3. HOW TRADITIONAL EVM IDENTIFIES PROJECT BADNESS
4. DEFICIENCIES IN EVM TREATMENT OF SCHEDULE
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CONCLUSIONS

1. **SCHEDULE IS KING**

   …… SO WE NEED TO METRIC IT BETTER

2. **ES IS EASY TO EXPLAIN AND IMPLEMENT**

   …… BECAUSE THE DATA IS ALREADY THERE

3. **ES HAS MUCH TO OFFER DMO/ DEFENCE**

   …… BECAUSE IT'S INTELLECTUALLY ROBUST

   (AND DOESN'T SKEW)

4. **ALL ES NEEDS IS TO BECOME KNOWN**

   ……. BECAUSE IT'S SO USEFUL IT SELLS ITSELF