National Defense Industrial Association

Integrated Program Management Division

Fundamentals of
Earned Schedule

Yancy Qualls

yancy.qualls@humphreys-assoc.com

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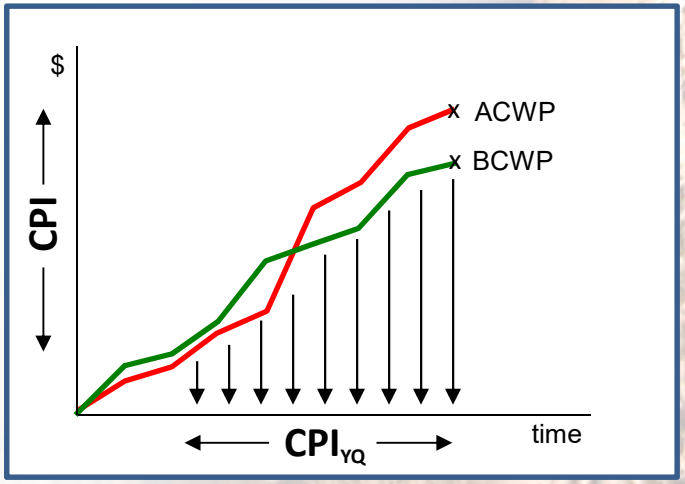
But 1st.....

New breakthrough in Cost Performance Measurement!

- Fresh New perspective on CPI
- Uses exact same BCWP and ACWP plots as CPI
  - Except CPI_{YQ} uses the "time" axis data as input
  - No additional data gathering

I call it:

CPI_{YQ}



CPI_{YQ} "Features"

Cost efficiency (CPI_{YQ}) is a <u>NOT</u> a ratio of costs

$$CPI_{YQ} = \frac{BCWP(t)}{ACWP(t)} = \frac{14.6 \text{ months}}{16 \text{ months}} = 0.92$$

But instead is a ratio of time (or durations)

CPI_{YQ} "Features"

Cost Variance (CV_{YQ})
is intuitively communicated in units of time

CPI_{YQ} "Features"

To-Complete Cost Performance Index ($TCPI_{YQ}$)

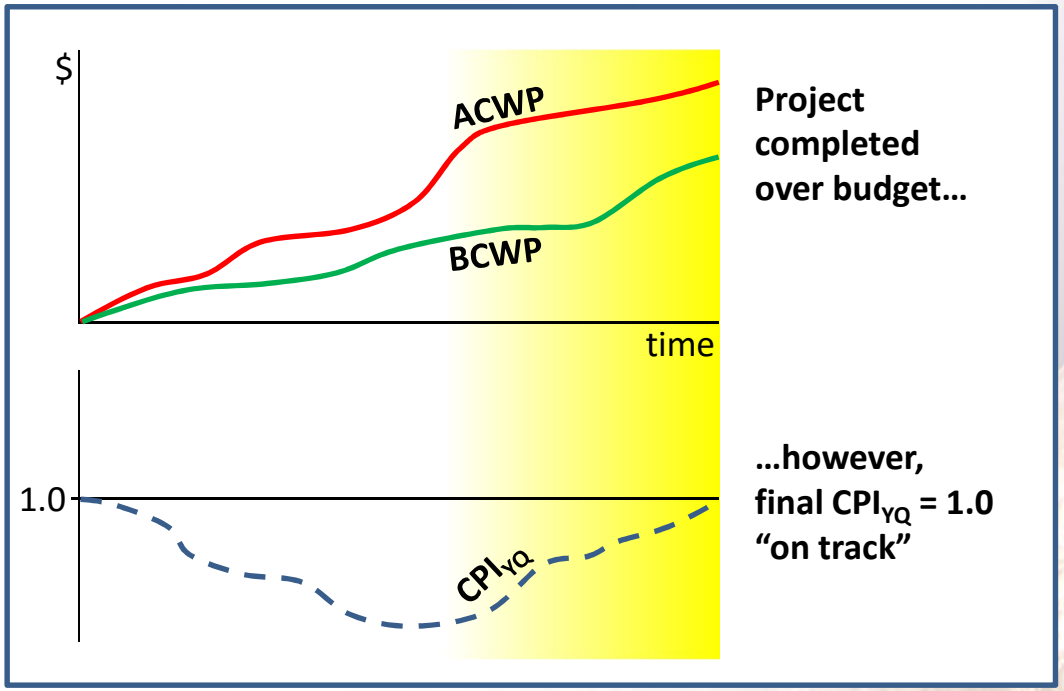
is not a mathematically valid measure

Past performance cannot be used
to validate future projections

CPI_{YQ} "Features"

No matter what the actual cost,

when the project is complete, CPI_{YQ} will be 1.0



CPI_{YQ} fails to be an accurate predictor later in programs

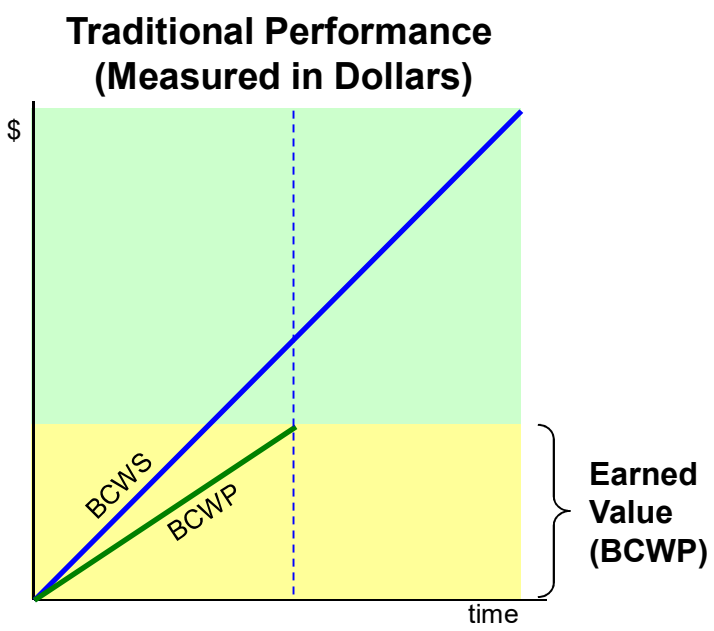
CPI_{YQ} and SPI

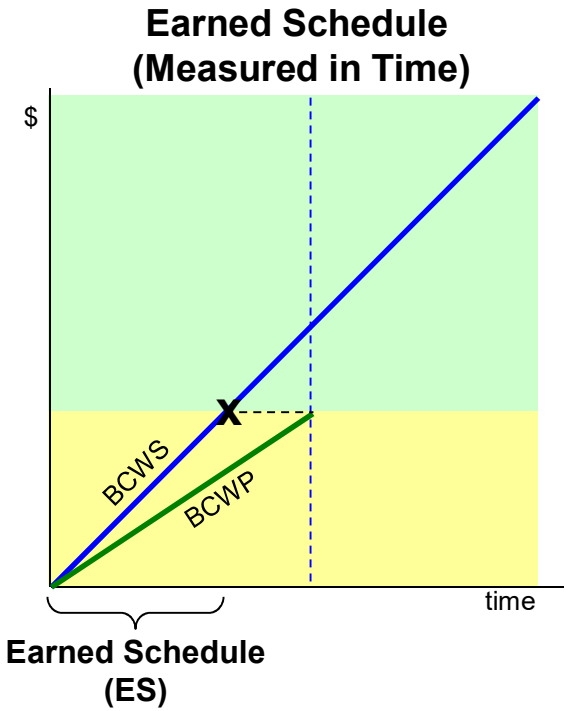
CPI_{YQ}	SPI
Cost metric that is NOT measured or reported in terms of cost	Schedule metric that is NOT measured or reported in terms of time
Estimate of future cost efficiency cannot be calculated	Estimate of future schedule efficiency cannot be calculated
Cost efficiency will always be perfect at the end of the project	Schedule efficiency will always be perfect at the end of the project

In the same way CPI overcomes the CPI_{YQ} "features", Earned Schedule addresses shortcomings of SPI

Earned Schedule

Earned Schedule





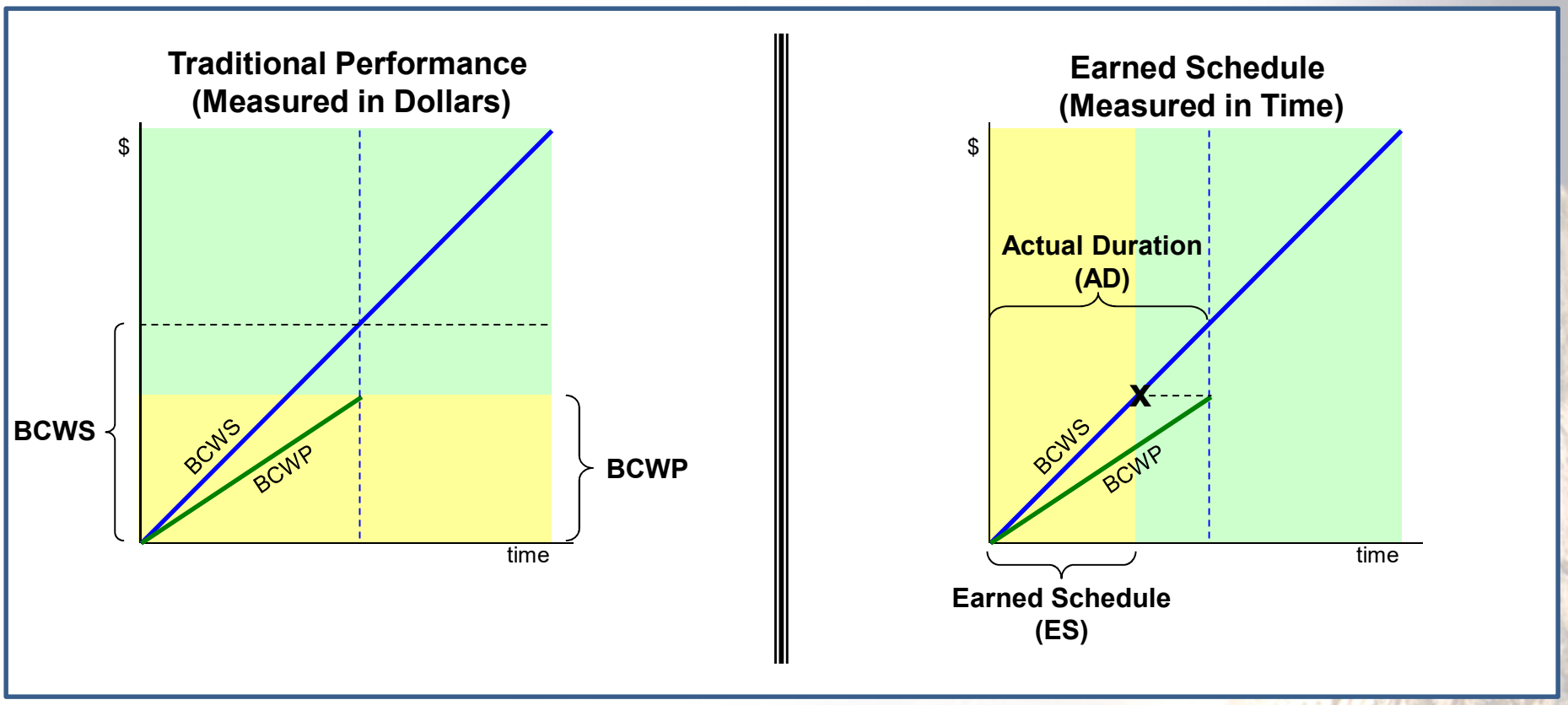
ES = Duration it was planned to have taken to earn our current BCWP

SPI_t

Time –based

schedule efficiency demonstrated to date

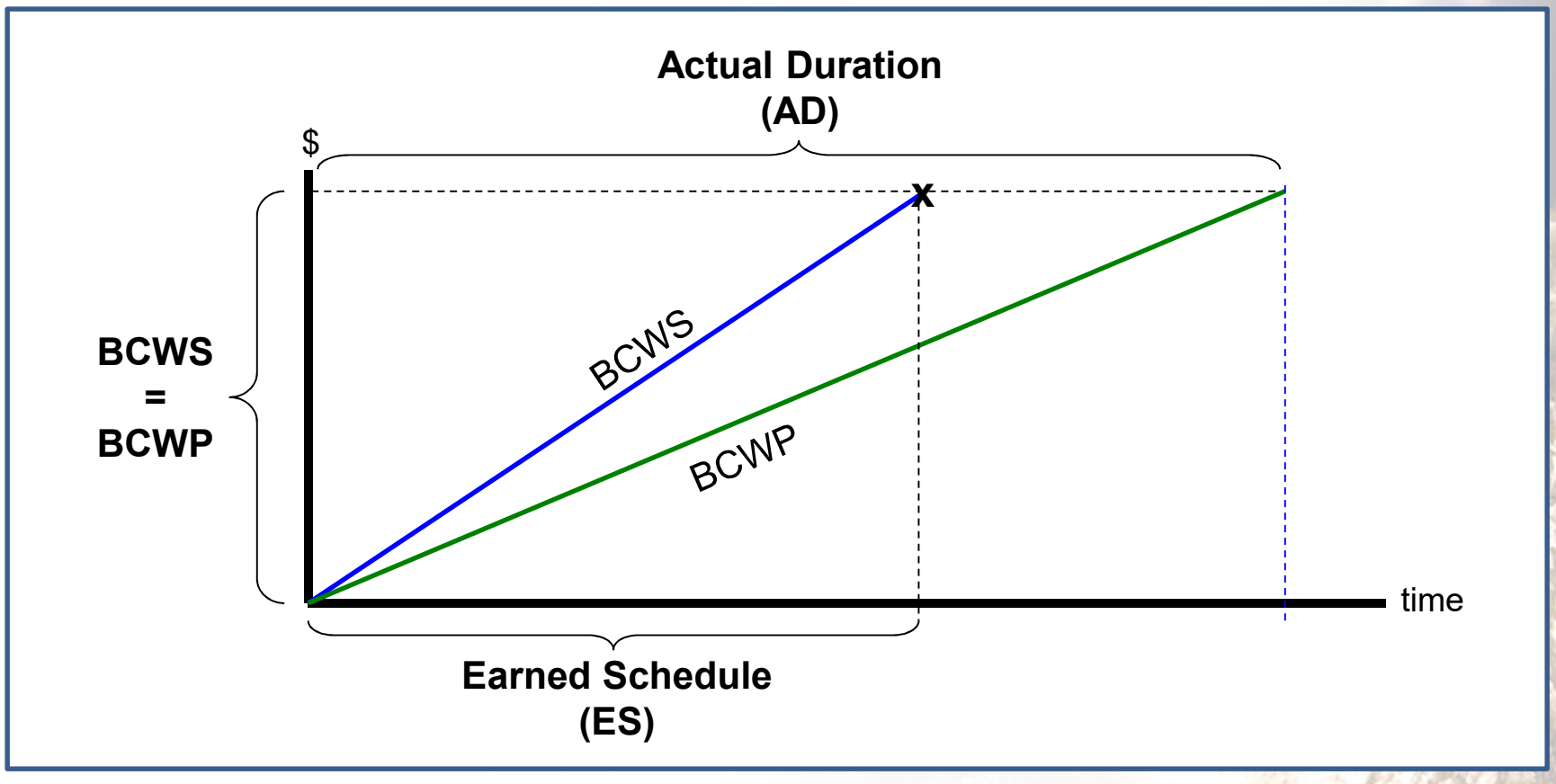
SPI_t (Time-based Schedule Performance Index)



$$SPI = \frac{BCWP}{BCWS}$$

$$SPI_t = \frac{\text{Earned Schedule}}{\text{Actual Duration}}$$

Final SPI and SPI_t



While the $ value of BCWP and BCWS will always be equal after project completion…

SPI = 1.0

…the time values of BCWP and BCWS provide meaningful insight into overall schedule performance.

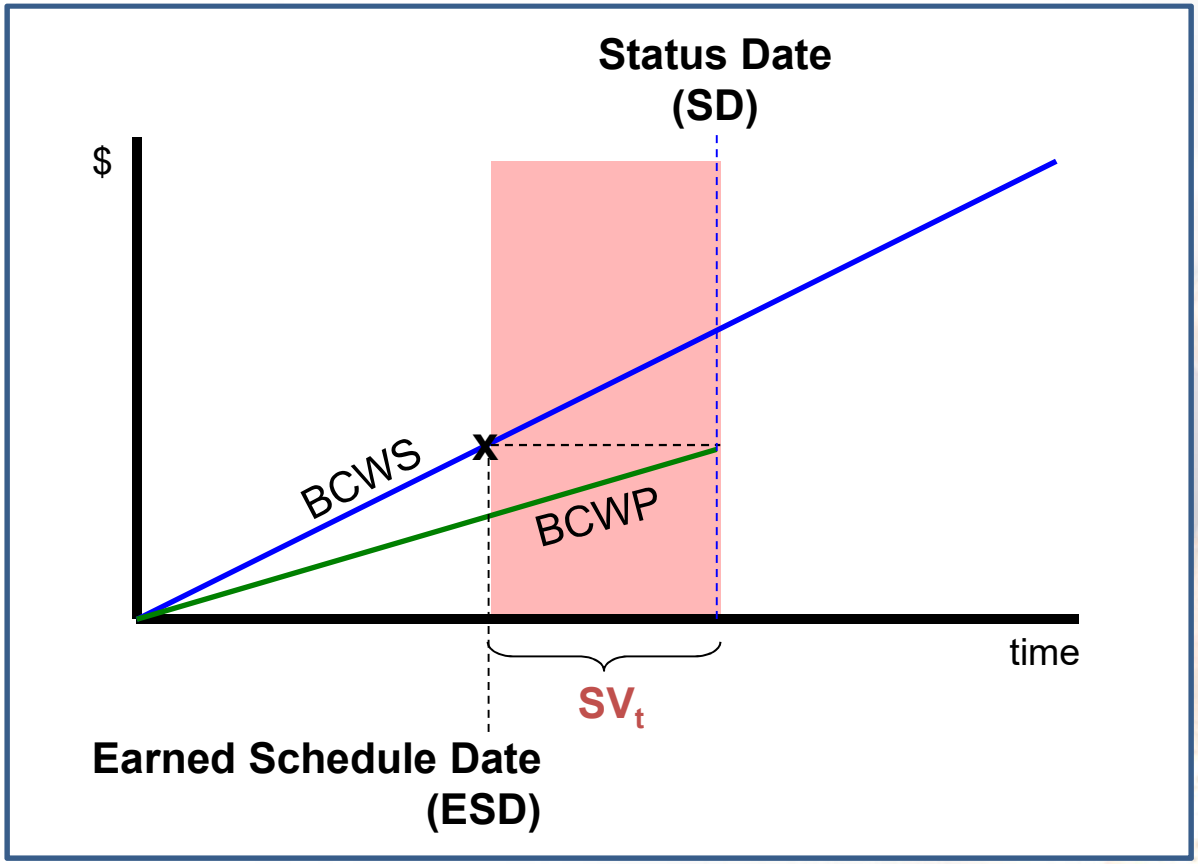
SPI_t = 0.7

SV_t

Time –based

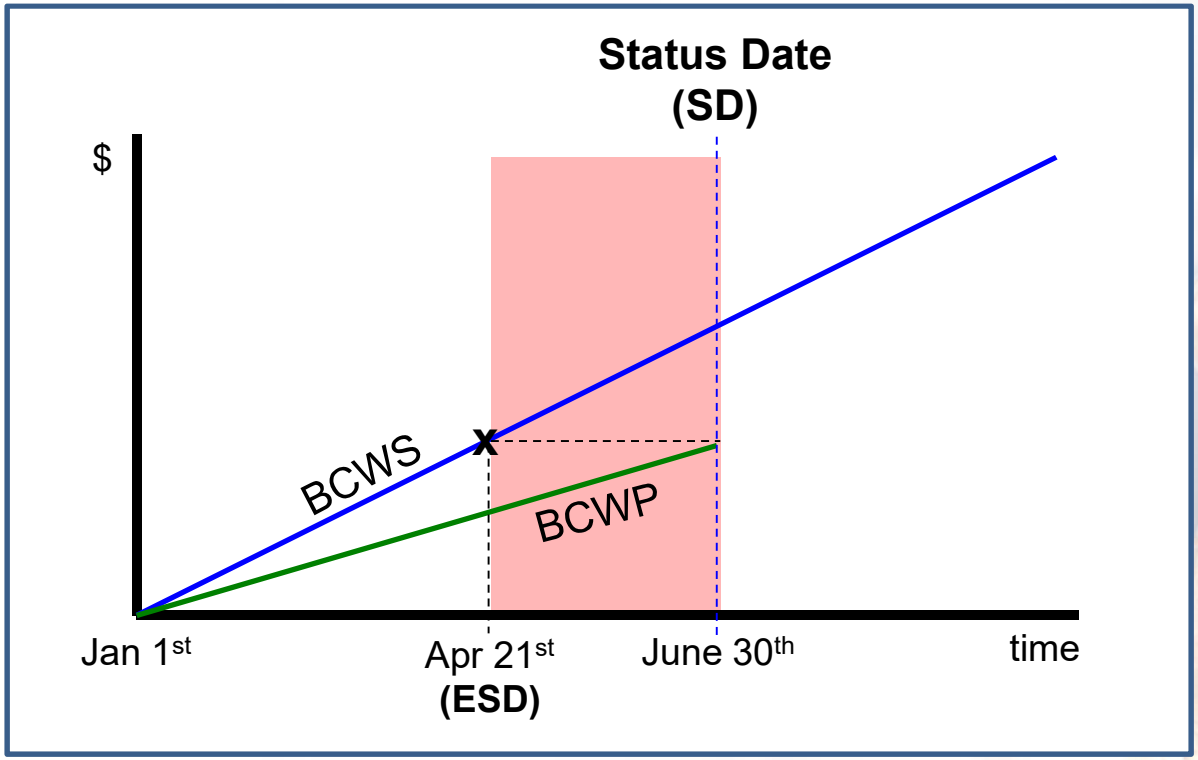
Schedule Variance to the baseline plan

SV_t (Time-based Schedule Variance)



SV_t = (Date we should have earned our current BCWP) - (Date we actually earned our BCWP) = ESD - SD

SV_t (Time-based Schedule Variance)



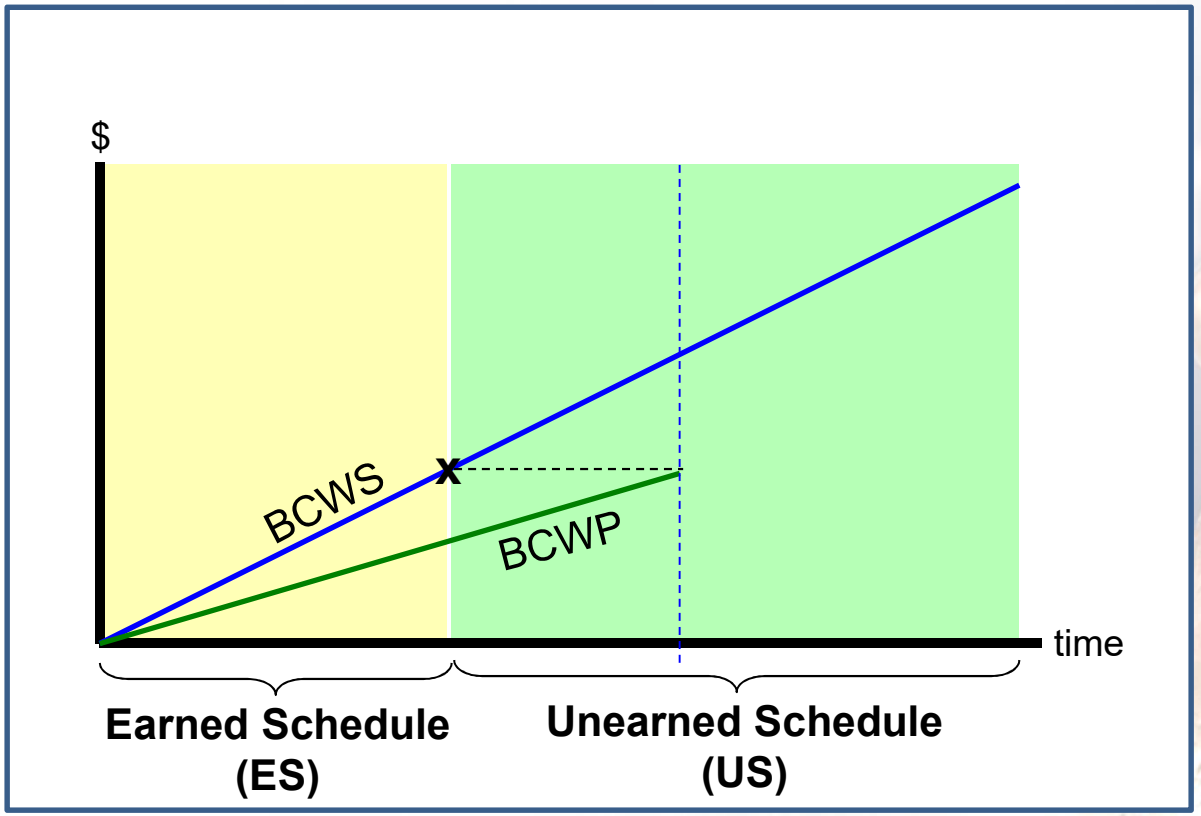
ESD = (Apr 21st) **SD = (Jun 30th)**

SV_t = (Apr 21) – (June 30) = -50 working days

TSPI

Schedule Efficiency that will be needed to meet the currently forecasted completion date

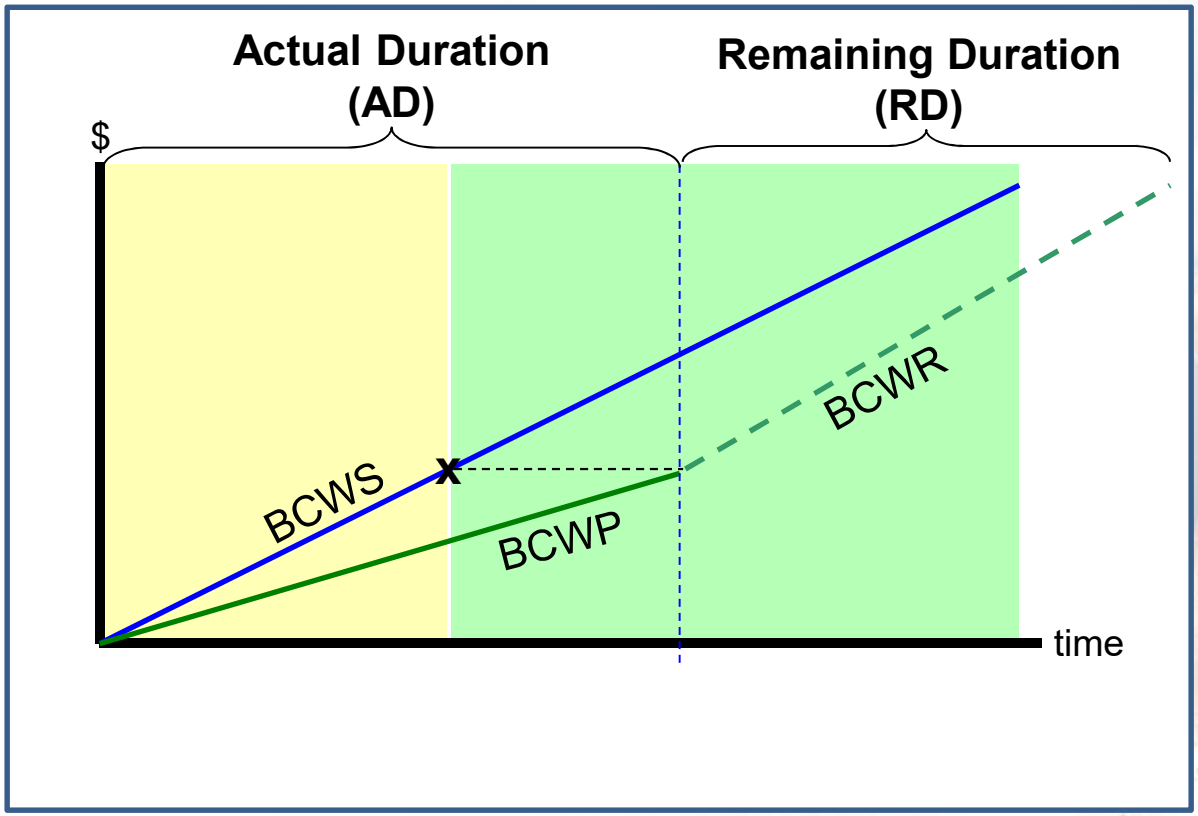
TSPI (To-complete Schedule Performance Index)



US = Duration it was planned to have taken to earn our remaining budget

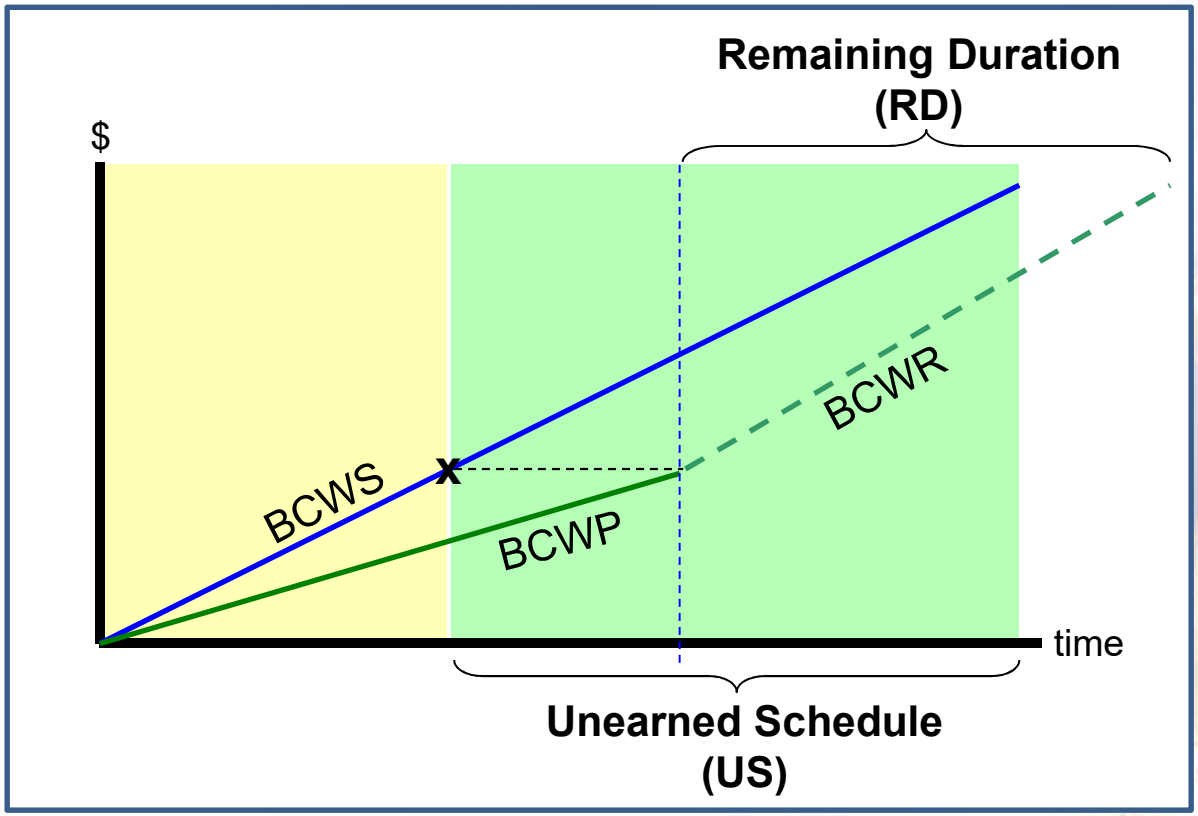
a.k.a PDWR = Planned Duration for Work Remaining

TSPI (To-complete Schedule Performance Index)



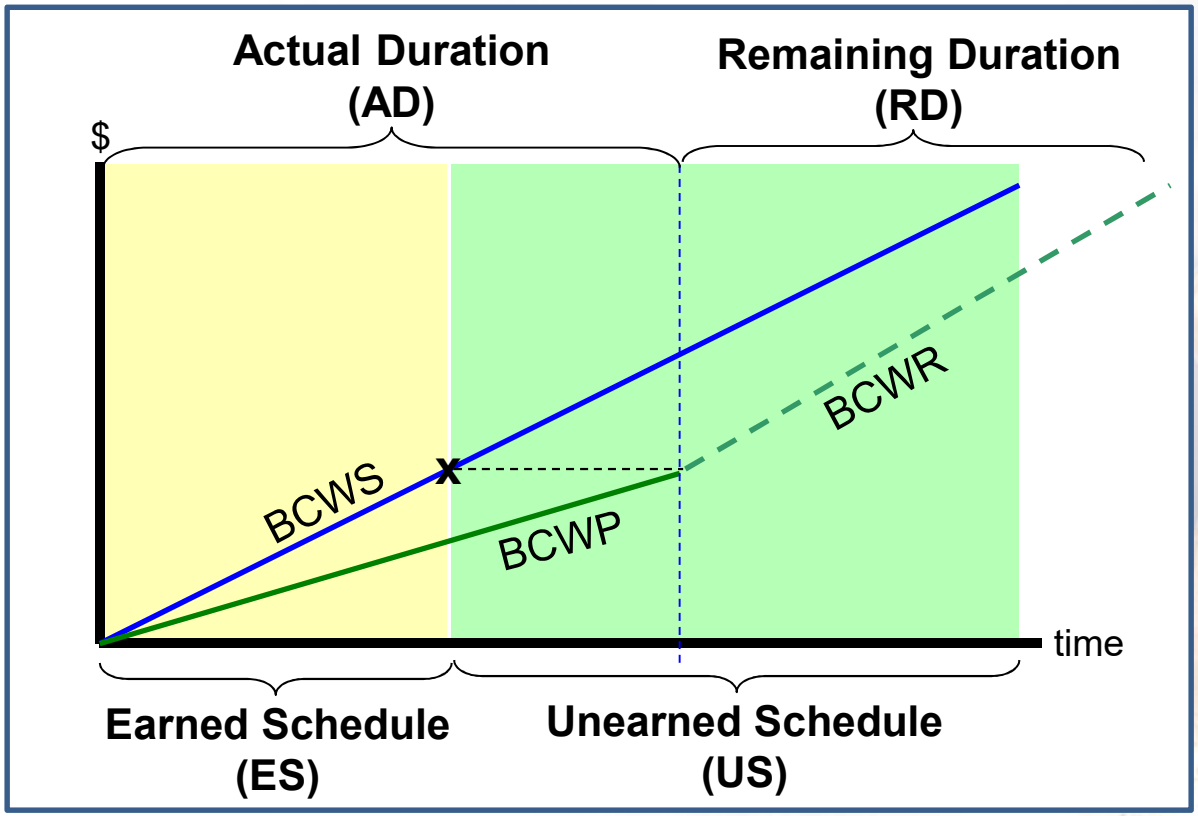
RD = **Duration forecasted to complete the remaining budget**

TSPI (To-complete Schedule Performance Index)



$$\text{TSPI} = \frac{\text{Unearned Schedule}}{\text{Remaining Duration}}$$

SPI_t vs. TSPI



$$SPI_t = \frac{\text{Earned Schedule}}{\text{Actual Duration}}$$

$$TSPI = \frac{\text{Unearned Schedule}}{\text{Remaining Duration}}$$

SPI_t vs. TSPI

SPI_t	TSPI
• Past schedule efficiency demonstrated to date	• Future schedule efficiency needed to make the forecasted completion date

Similar to CPI vs. TCPI,

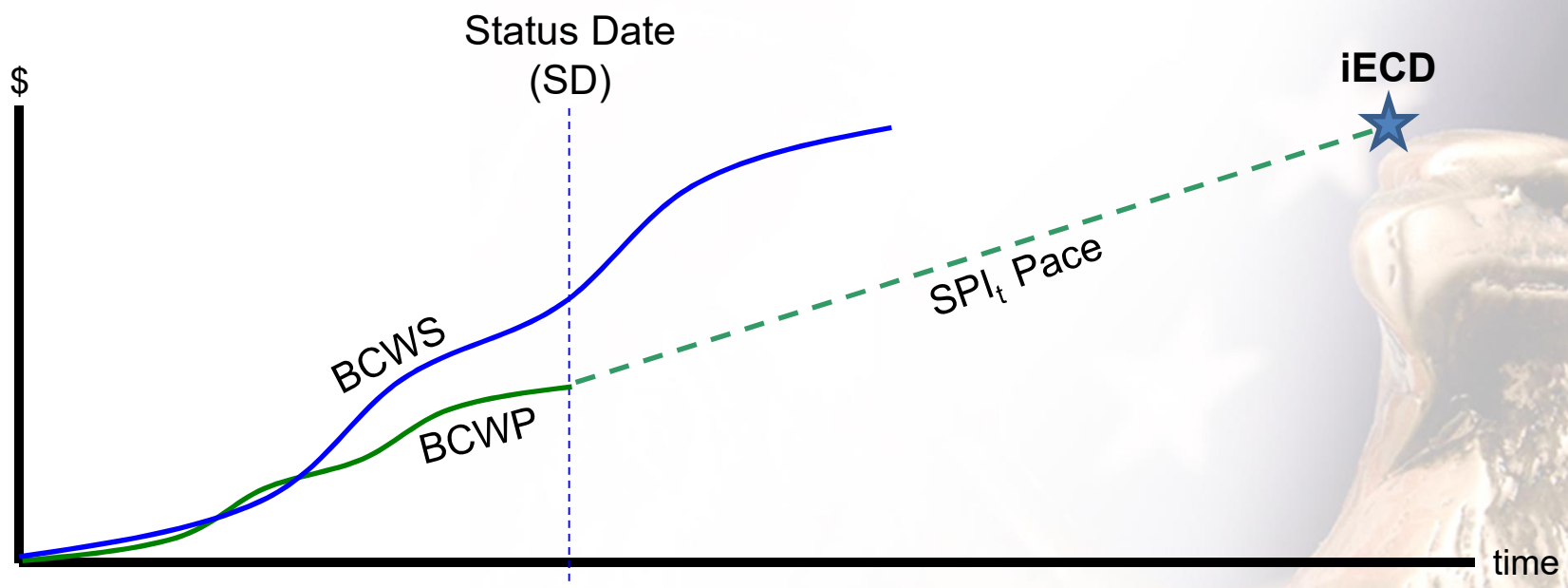
if TSPI varies significantly from SPI_t ,

what will we be doing differently to warrant the change?

iECD

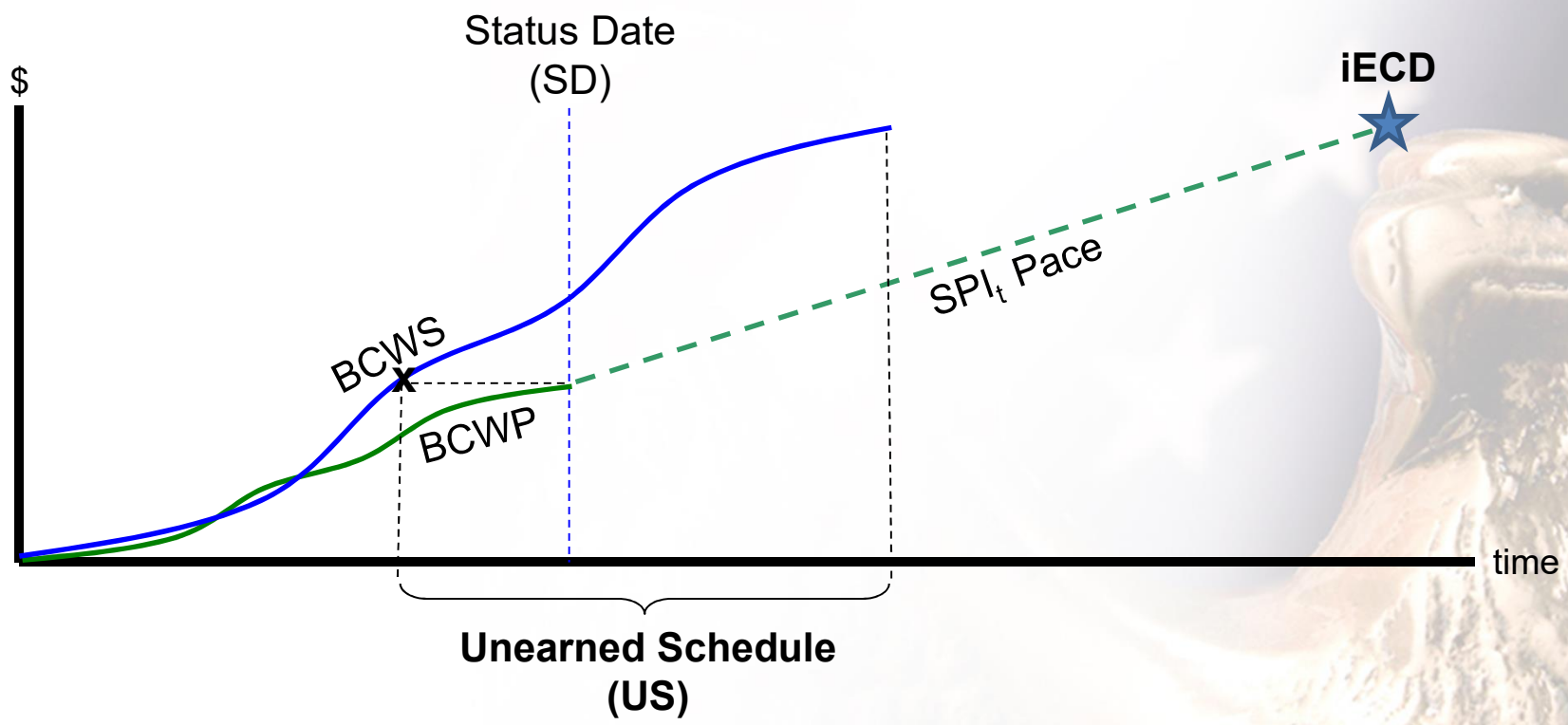
Independently calculated completion forecast based on past schedule efficiency

iECD (Independent Estimated Completion Date)



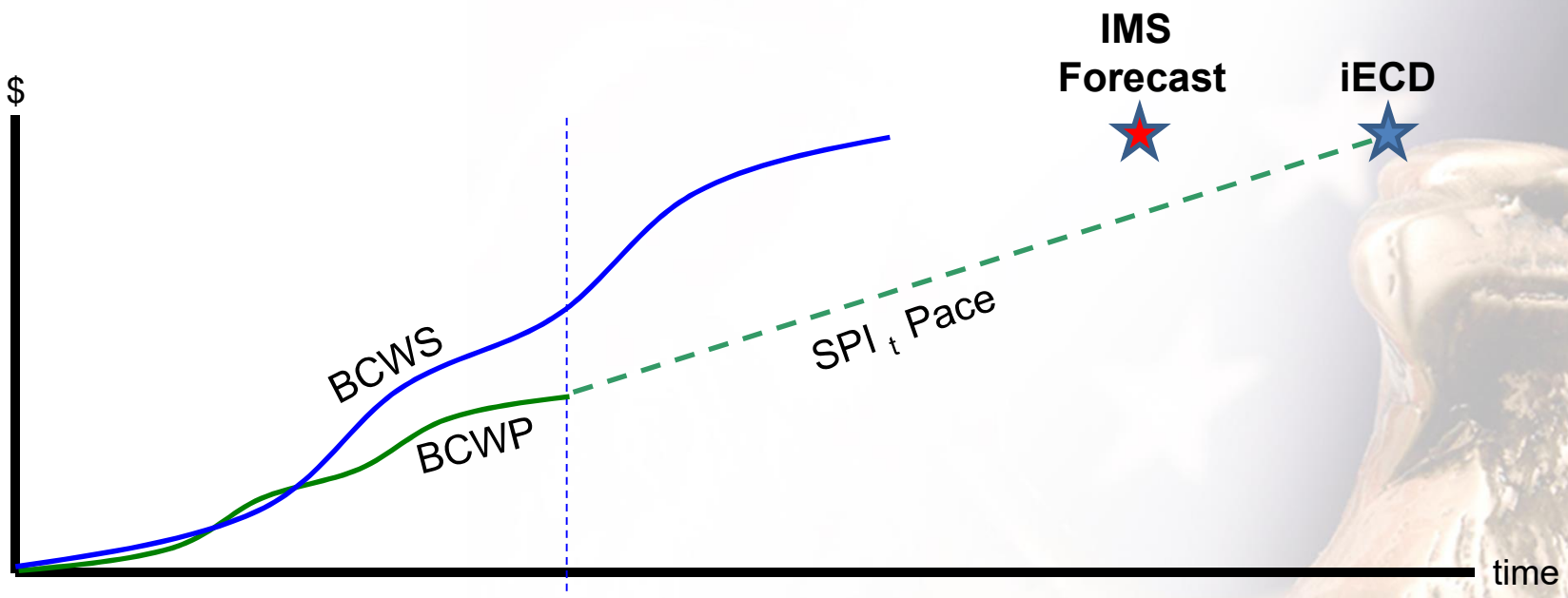
If we continue to perform at our current SPI$_t$
(i.e. taking 1.3 days to earn what was planned for 1 day),
when will we complete the project?

iECD (Independent Estimated Completion Date)



iECD = (Past schedule efficiency applied to remaining effort) = SD + (SPI$_t$ x US)

iECD (Independent Estimated Completion Date)



Does the iECD base on demonstrated performance align with the forecast from the IMS?

(same concept as EAC vs. iEAC)

Earned Schedule Advantages

EV	ES
"Schedule" indices calculated and reported in terms of "Cost"	"Schedule" indices calculated and reported in terms of "Time"
Estimate of future schedule efficiency is not mathematically viable	Earned Schedule allows for the To-complete Schedule Performance Index (TSPI)
SPI will always be perfect at the end of the project	SPI_t will consistently reflect favorable or unfavorable performance

Earned Schedule Cautions

- **Not an EV replacement**
  - supplement to SPI
  - There is no ES without EV
- **Not a substitute for a sound Critical Path**
  - or Schedule Risk Assessments
  - SPI_t is an “average” metric (just like SPI)
- **Can be evaluated at lower levels** (i.e. CA or WP)
  - But results can vary depending on implementation

Questions?