College of Performance Management

EVM World 2014 Conference

How to Use Earned Schedule on Agile Projects

Name of Presenter: Robert Van De Velde, Ph.D., P.M.P., C.S.M.

Contact: Robert.VanDeVelde@ProjectFlightDeck.com

Date: 22 May 2014

Context

Over the past decade, Earned Schedule has been elaborated, empirically verified, and adopted by diverse industries

During the same period, the Agile framework has become widely used, especially in engineering and technology projects

Earned Schedule for Agile projects (AgileES) combines the speed and responsiveness of Agile with the accuracy and insight of Earned Schedule

Here is the road map for today's session

Agenda

Agile (Scrum) Definitions

Product Backlog

Prioritized list of requirements

Release Point

Numerical value of work required to produce a backlog item

Velocity

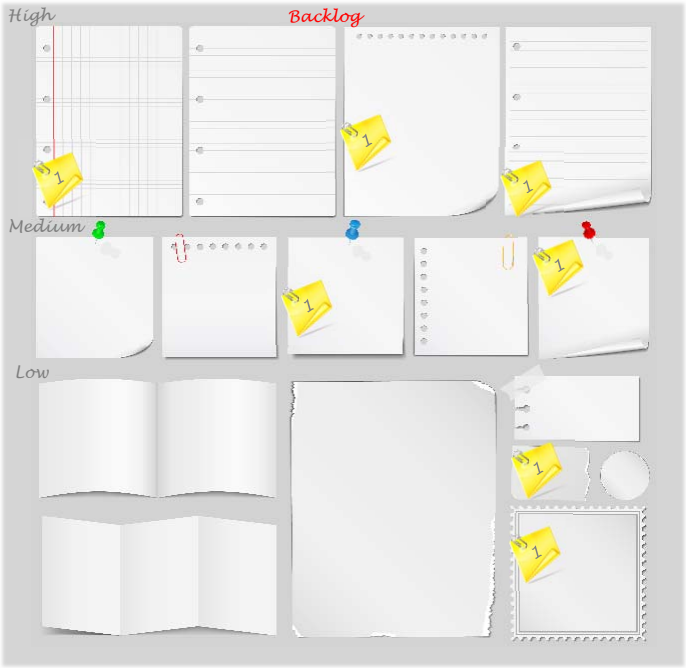
Planned productivity per sprint

Sprint

Basic unit of Agile delivery, usually 1-4 weeks in length

Release Plan

Roadmap of sprints that achieve project goal



Earned Schedule Definitions

Planned Value (PV, BCWS)

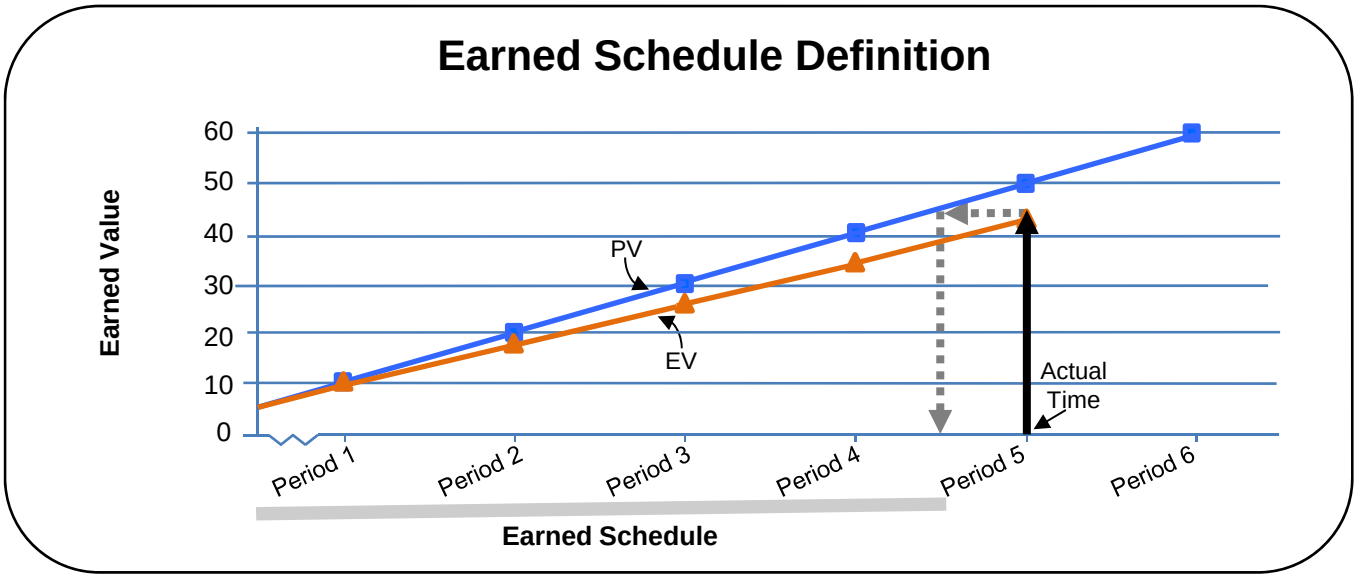
Value of work planned

Earned Value (EV, BCWP)

Value of work completed

Earned Schedule (ES)

"The amount of time earned on a project is the time at which the value currently earned should have been earned. " (Lipke, *Measurable News*, 2003)



Earned Schedule Calculation

Given that

- 6 sprints, 2 weeks per sprint
- $10K of Planned Value per sprint
- $45K of Earned Value at Actual Time (AT)

Calculate amount of Earned Schedule

- EV at Actual Time versus PV at end of each sprint
- Count the sprints in which the $EV_{AT} > PV_i$
- Add in any fractional amount ($50K - $45K)/($60K - $50K) = .5
- Result is 4.5 periods (9 weeks) of Earned Schedule

AT
$45K

Sprint	1	2	3	4	5	6	Equation	ES
PV_i (K$)	10	20	30	40	50	60	$ES = \sum_{i=1}^{j} (EV_{AT} \geq PV_i) + \frac{EV_{AT} - PV_i}{PV_{i+1} - PV_i}$	4.5
EV_{AT} (K$)	45	45	45	45	45	45		

Agile Metrics

Burndown Chart

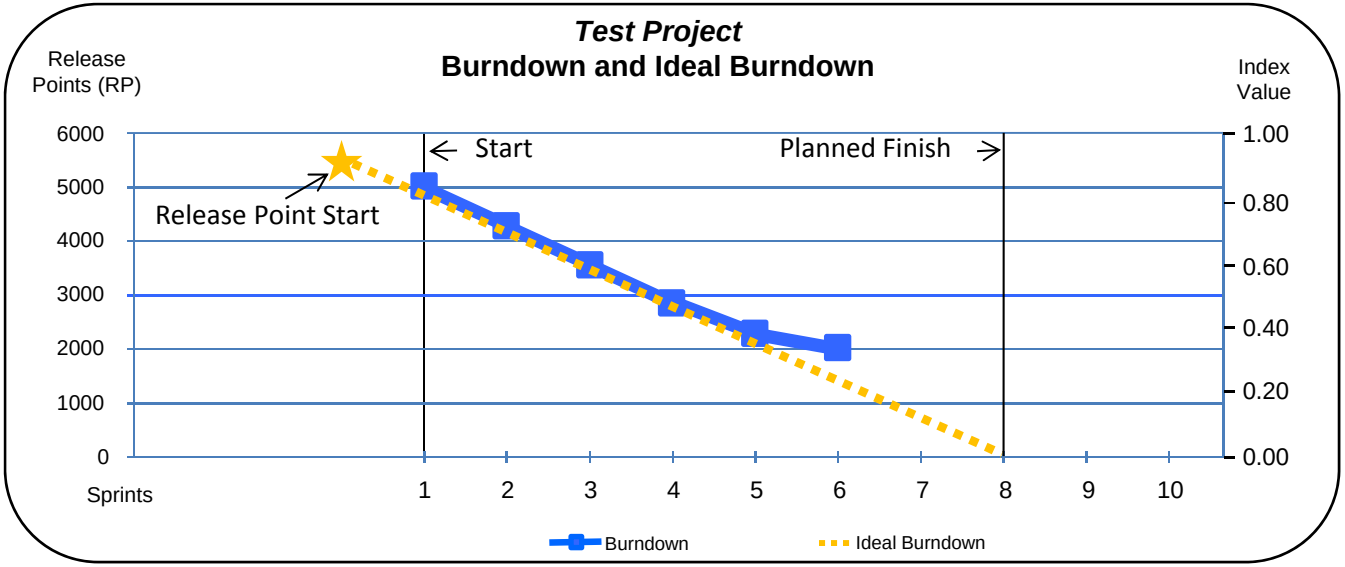
Shows the number of release points remaining and, thus, the number finished

Ideal Burndown Line

Shows the number of release points that should have been completed from the first sprint to the last planned sprint, given the mean velocity

Schedule Status

Burndown above Ideal = late and Burndown below Ideal = early



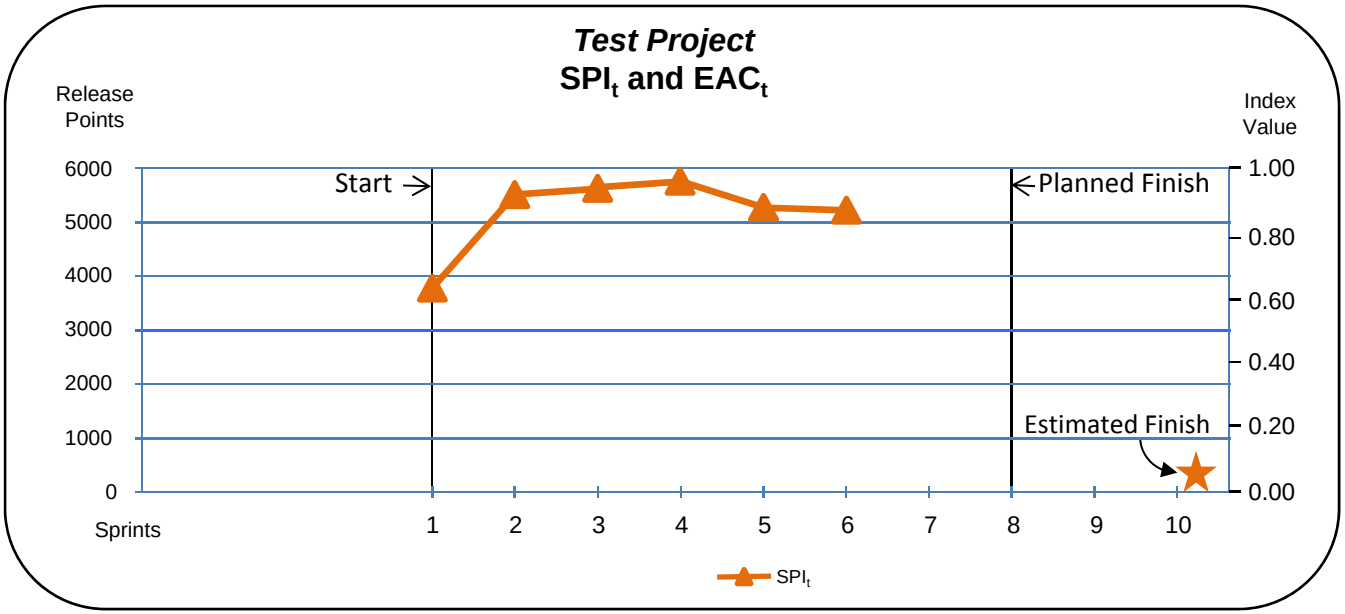
Earned Schedule Metrics

Schedule Performance Index for time (SPI_t)

The ratio of the time earned to the actual time, i.e., the efficiency of time utilization on the project (Lipke, *Measurable News*, 2003)

Estimate at Completion for time (EAC_t)

Unlike standard EVM, ES offers an estimate at completion *for time*, i.e., the estimated duration of the project given the ratio between the Planned Duration and the SPI_t (Henderson, *Measurable News*, 2004)



Schedule Performance Efficiency Example

Burndown shows steady decline

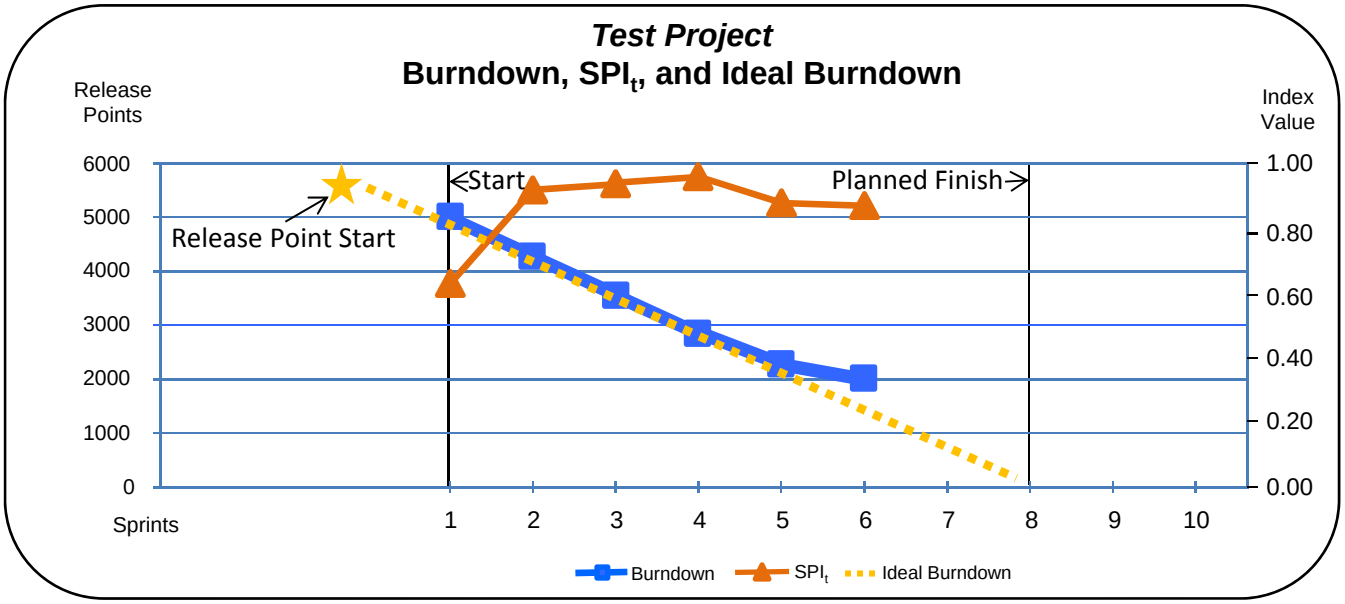
Initially, Burndown on or slightly above the Ideal line = on or slightly behind schedule

Then, Burndown jumps above the Ideal line = definitely behind schedule.

SPI_t clarifies what was happening

Initially, schedule performance efficiency improves but then declines after Sprint 4

Root cause analysis of the delay should start at Sprint 4, rather than later



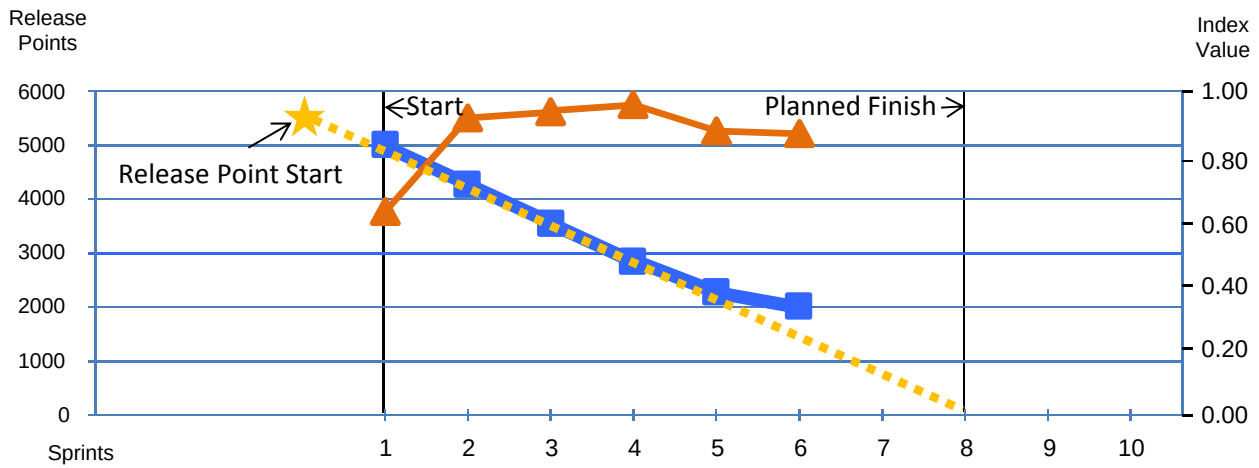
Schedule Performance Efficiency Explanation

Burndown shows relationship between elapsed time and Release Point completion

SPI_t shows relationship between elapsed time and earned time

SPI_t quantifies how well or poorly time is being used on the project

Threshold values mark boundaries between project status



Sprint	1	2	3	4	5	6
SPI_t	.63	.92	.94	.96	.88	.87

SPI Correction

Schedule Performance Index (SPI)

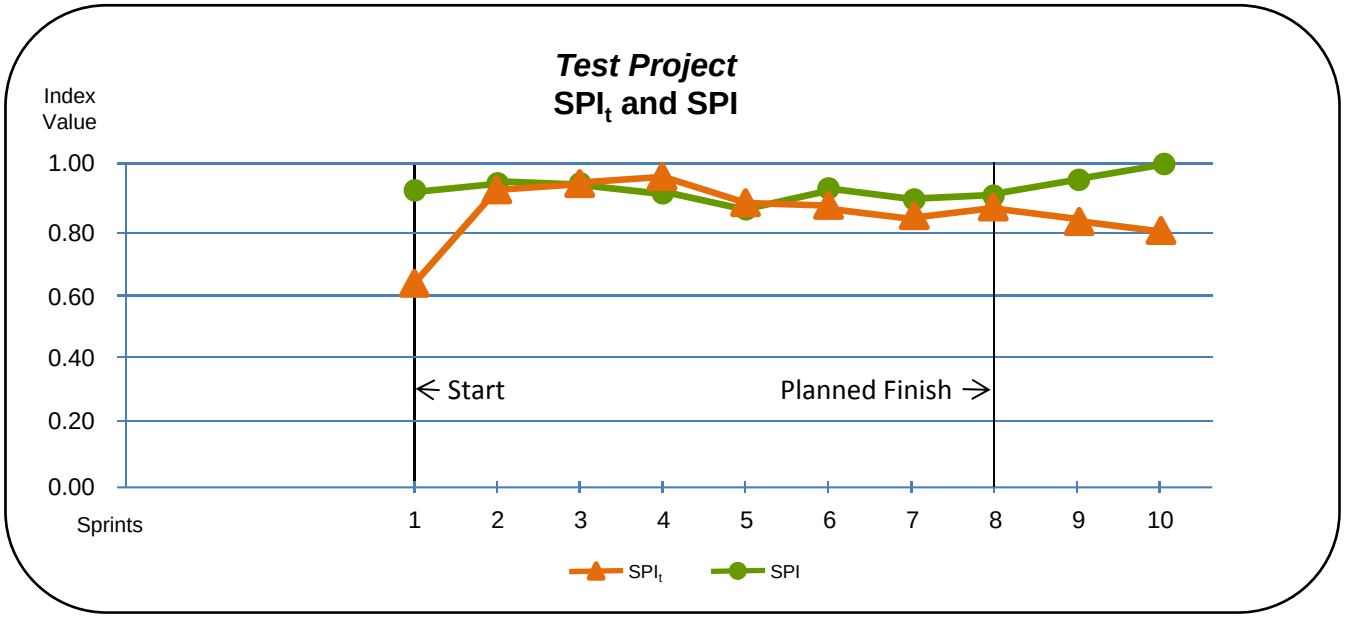
Standard Earned Value metric for schedule performance equals the ratio between Earned Value and Planned Value

SPI Problem

At the end of a project, the ratio equals 1—even late projects end with a perfect SPI

AgileES Solution

SPI_t accurately reflects performance throughout project life cycle



From Theory to Practice

Show how Earned Schedule is used to manage Agile projects

Components commonly associated with schedule performance management on plan-driven projects

- Baseline schedule
- Schedule performance data
- Schedule performance metrics
- Threshold values
- Re-baselining

Same components are used on Agile projects but with a uniquely Agile interpretation

Agenda

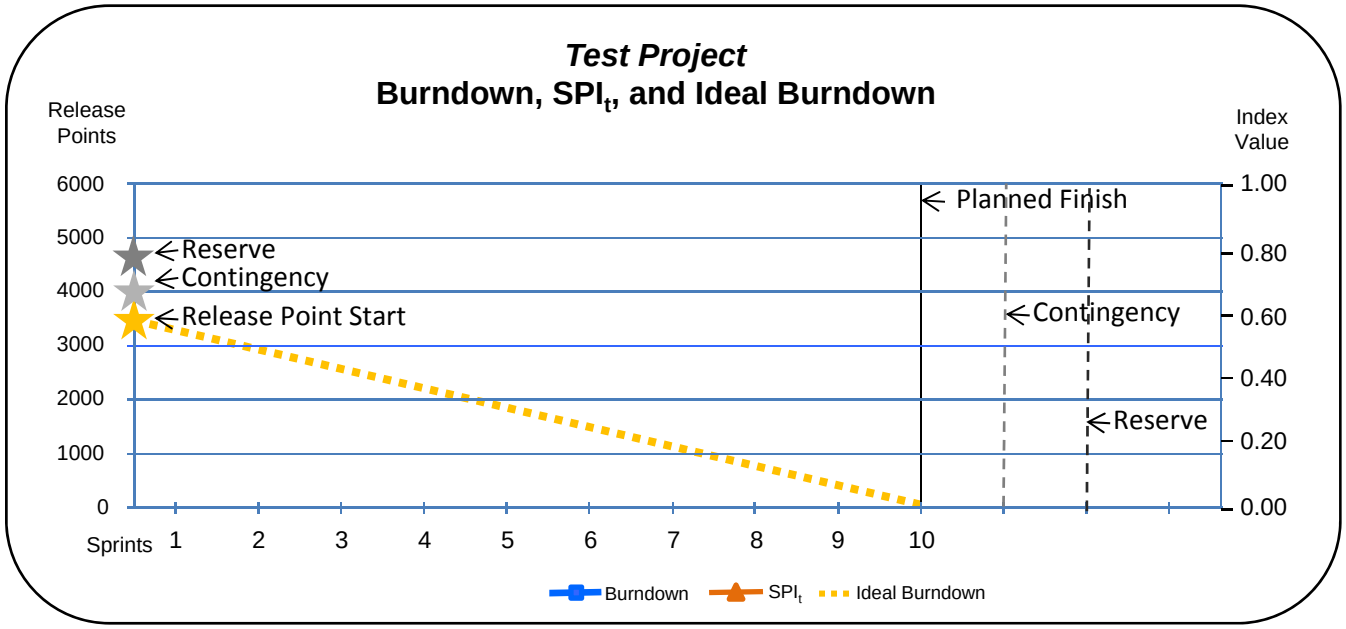
Set the Baseline Schedule

From number of Release Points, use velocity to set total Sprints and Planned Finish

From number of Release Points and Planned Finish, set the Ideal Burndown line

From risk analysis, determine the contingency for Release Points and timeline

Add product owner reserve (aka, management reserve)



Capture the Data

AgileES uses the same data that is ordinarily collected on Agile projects, minimizing the overhead for Agile teams

Count Release Points that have been completed

Add new Release Points not already included in the total

Remove Release Points that are no longer required from the total

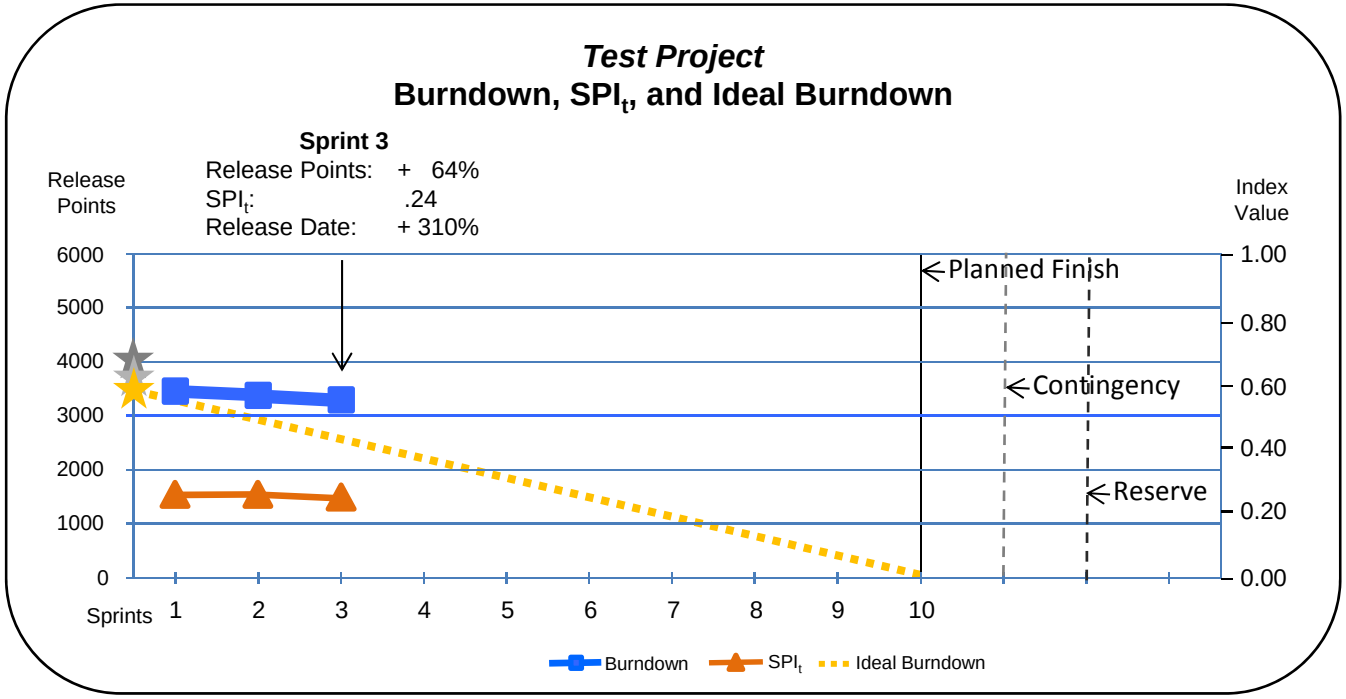
Start Date	~~1/14/2013~~	2/25/2013		As of:	Base 2, Sp 6		
Sprint Length	2 weeks	**Baseline 1**		**Baseline 2**			
Actual cost	$450,000						
Sprint	1	2	3	1	2	8	Base2 Tot
Mean Planned Rel Pts	352	352	352	780	780	780	6,240
Release Pts Completed	88	80	128	424	848	0	4,081
% Complete	0.03	0.05	0.08	0.07	0.20	0.65	0.65
Earned Value	8,800	8,000	16,800	42,400	127,200		408,100
Earned Schedule	5.23						
SPI_t	0.87						
EAC_t	9.17						
EAC_t/AT	1.53						
Release Date	7/15/2013					Source: 9zzz	

Calculate the Metrics

Ratio of current total of Planned Release Points to baseline total

Earned Schedule → Schedule Performance Index for time

Ratio of current estimated Release Date to baseline Release Date



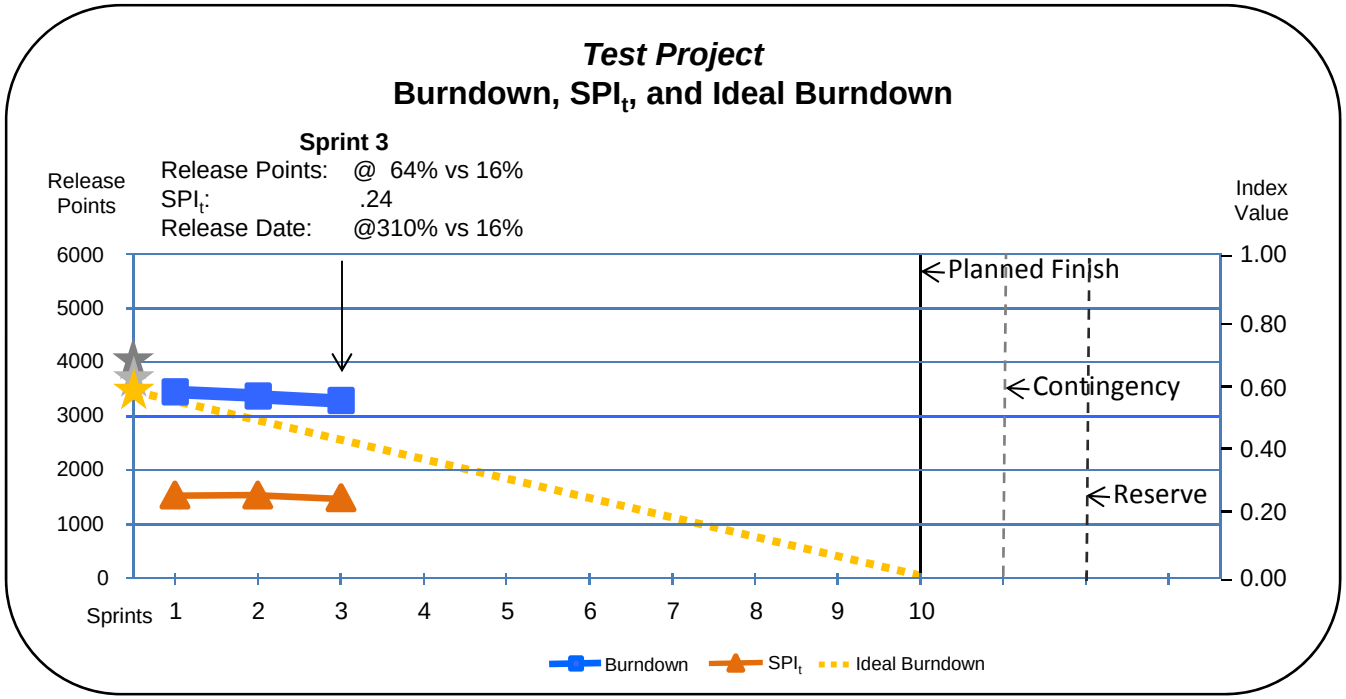
Analyze and Respond to Results

Thresholds

- Total of Release Points varies from contingency + reserve
- SPI_t less than .8
- Estimated Release Date varies from contingency + reserve

Is a new baseline schedule required?

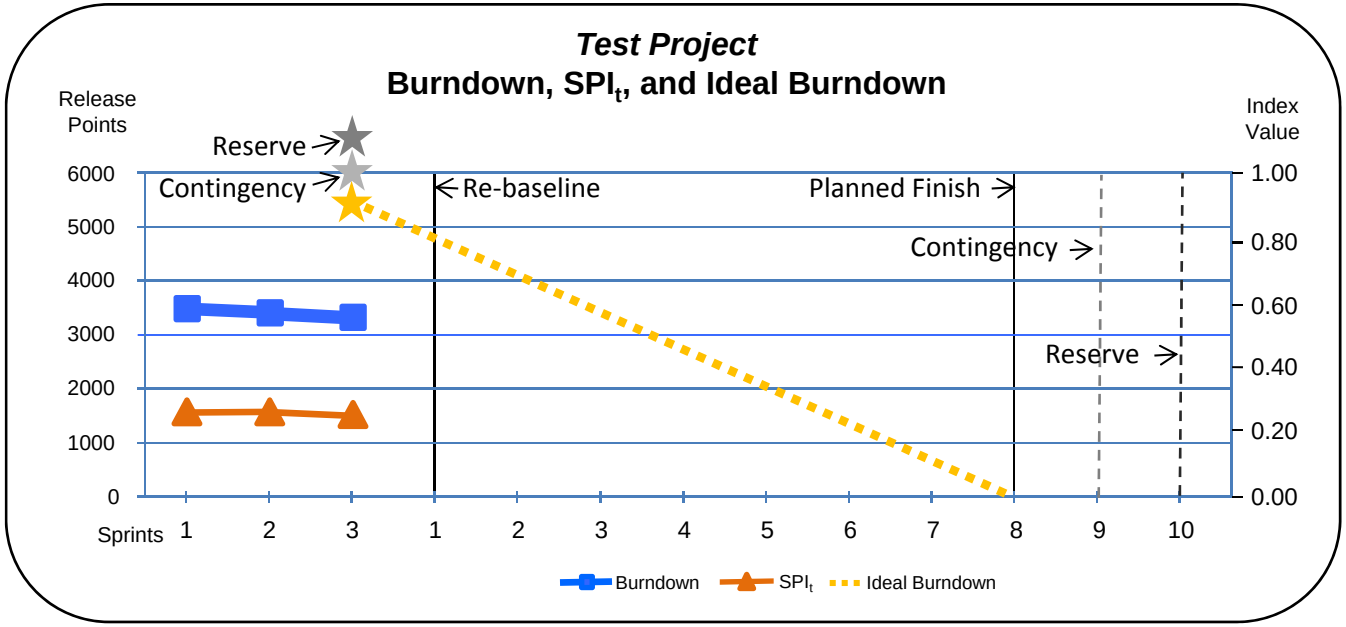
- No: within thresholds
- Yes: 3 consecutive threshold breaches in same, worsening direction (Kesheh and Stratton, *Measurable News*, 2014)



How to Re-baseline the Schedule

New baseline, new project

- Freeze completed sprints
- Move unfinished Release Points to new sprint(s) and re-set total and velocity
- Re-set the Start Date, Planned Finish, and the Ideal Burndown
- Re-set sprint numbers and total sprints
- Re-set contingency and reserve



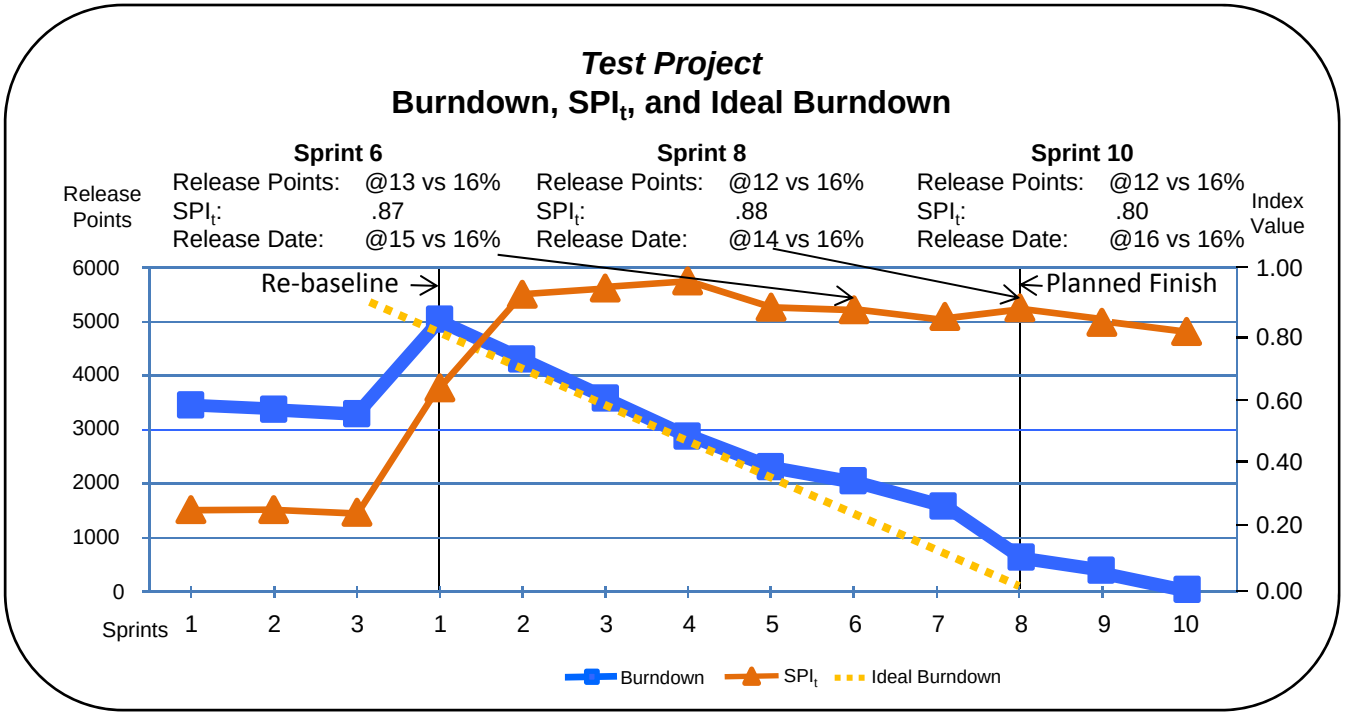
After a Schedule Re-baseline

Return to normal data capture and analysis and response activities

Release contingency without a re-baseline if within thresholds

Release of owner reserve often requires re-baseline

Importance of estimated Release Date increases late in project



New Approaches

Earned Schedule is a robust concept that offers new approaches for Agile projects.

Earned Schedule makes possible the Schedule Burndown, a whole new metric for Agile projects.

There is also an opportunity to integrate Earned Schedule into EVM practices currently being applied to Agile projects for cost management.

Agenda

Schedule Burndown

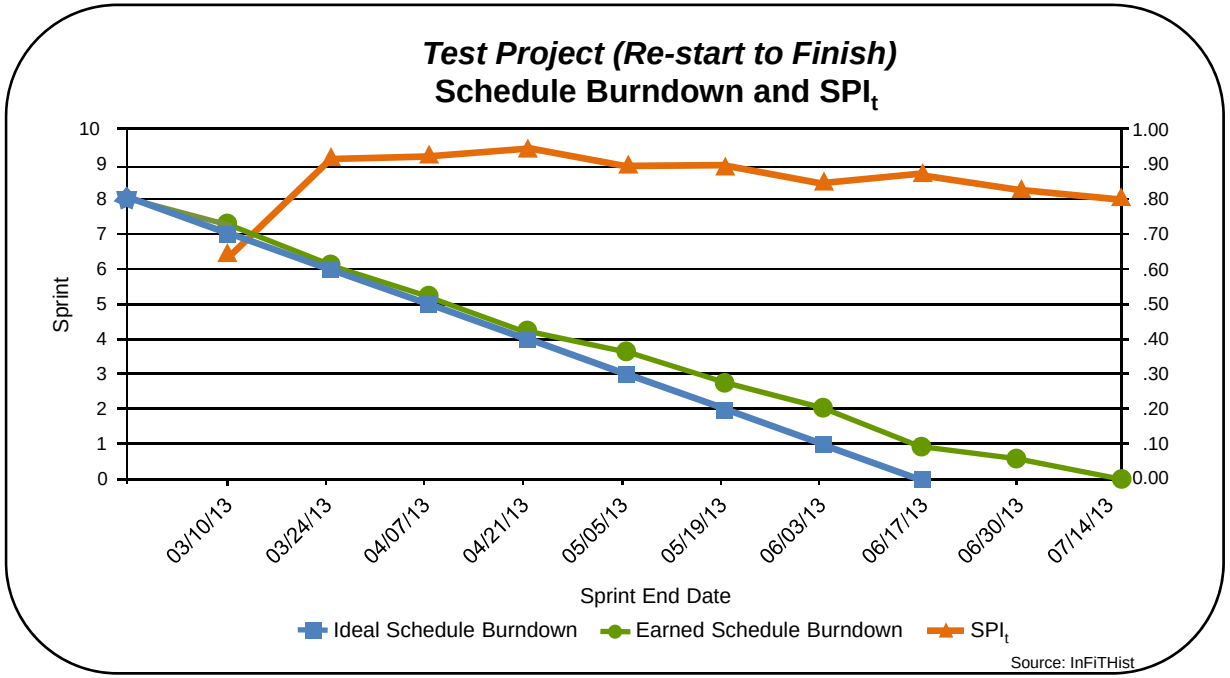
Time earned vs. ideal time line rather than points completed vs. ideal velocity line

The Ideal Schedule Burndown line runs from first to last planned sprint

ES Burndown decrements sprint total by amount of Earned Schedule per sprint

ES Burndown above Ideal line = late and ES Burndown below Ideal line = early

Plot SPI_t on same chart for more complete picture of schedule performance

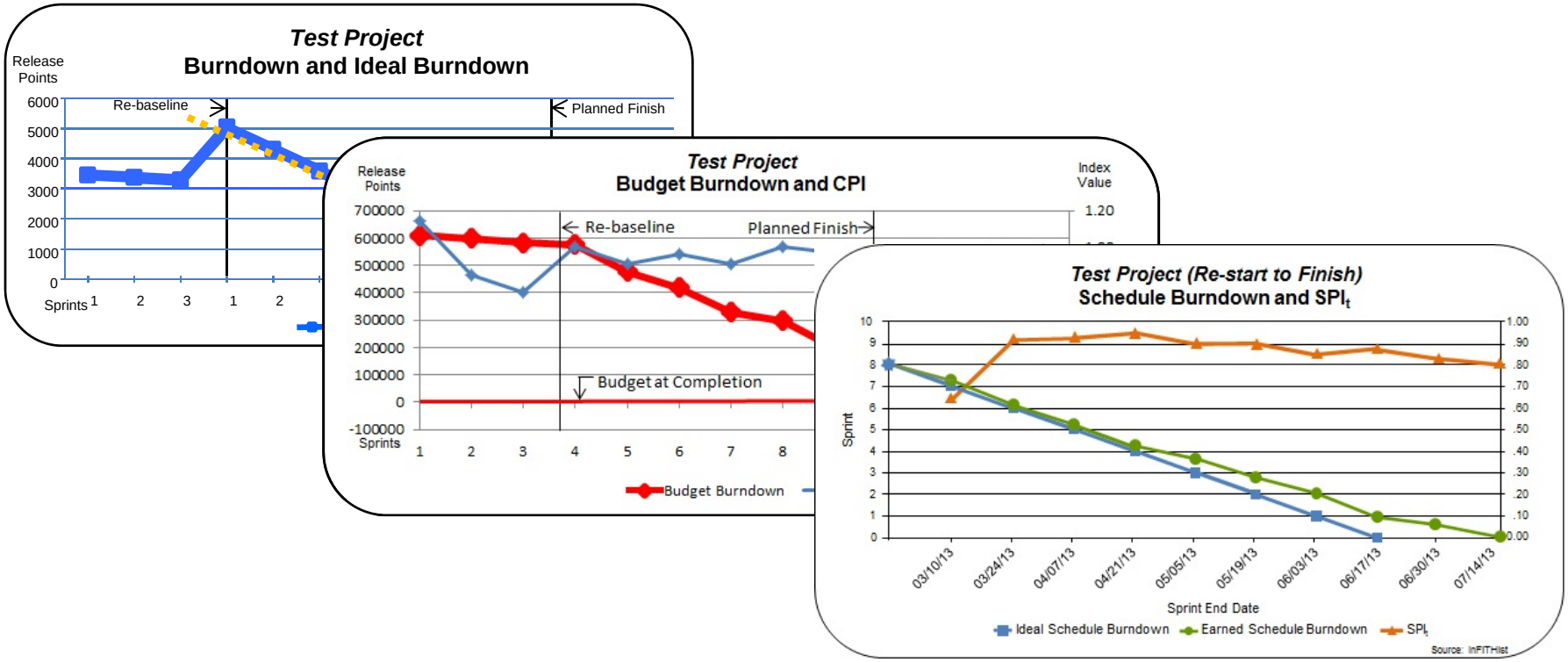


AgileEVM + AgileES

AgileEVM successfully applies EVM to Agile projects for cost management

AgileES corrects the problem with SPI and offers improved schedule management

Integration of the two offers Agile teams a powerful tool for enhancing their project management



Summary

- AgileES combines Earned Schedule and Agile project management
- AgileES adds value to familiar Agile schedule management techniques
- To implement AgileES on your project, you need a baseline, actuals, metrics, and know when and how to re-baseline
- AgileES offers a springboard to further innovation in the future

AgileESM© Calculator

Here are the steps for downloading the Excel™ Calculator:

1. Go to www.AgileESM.com
2. Select Members tab
3. Enter Username: CPM1
   Password: CPM1
4. Download Calculator—instructions for use are included in the file

Contact: Robert.VanDeVelde@ProjectFlightDeck.com

References

Henderson, K. (2004). Further Developments in Earned Schedule. *The Measurable News, Spring*.

Kesheh, M.Z. and Stratton, R. (2013) Taking the Guessing out of When to Rebaseline. *The Measurable News, 4, 31-34*.

Lipke, W. (2003). Schedule is Different. *The Measurable News, Summer*.

Sulaiman, T., Barton, B., & Blackburn, T. (2006). AgileEVM—Earned Value Management in Scrum Projects. *Agile '06: Proceedings of the Conference on AGILE 2006* (pp. 7-16). IEEE Computer Society.

Van De Velde, R. (2013). AgileESM: Earned Schedule for Agile Projects. http://www.projectflightdeck.com/media/AgileES_Full_Length_Proof.pdf

Van De Velde, R. (2014). Earned Schedule for Agile Projects. *The Measurable News, 1, 29-35*.