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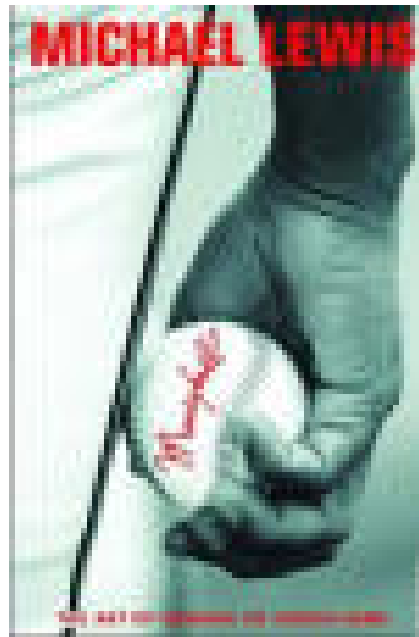
Moneyproject: Metrics, Baseball, and Project Management by Denise M. Guerin, PMP Attorney at Law

Apr 11, 2006

This seminar is presented solely for the attendees of the Apr 11, 2006, dinner meeting of the Central Massachusetts Chapter of the Project Management Institute. It builds on the new concepts and techniques in project management which were introduced in *Total Project Control*, published by John Wiley & Sons of New York in May 1999. No duplication, use or dissemination of this material or these concepts may be made without the express written permission of APM.

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Moneyball. . .



A management book about changing a culture.

Let's Talk Baseball!

Let's imagine that, at the end of the 2004 season,
Red Sox General Manager
Theo Epstein had \$3 million to
spend on a good-hitting second baseman.
Which had had a better season in 2004?

<u>NAME</u>	<u>B.A.</u>
X	.307
Y	.264

What Else Should We Consider?

Power?

Home runs?

Doubles?

Extra bases?

Slugging average?

Walks?

OBP?

X and Y's 2004 Figures

X

Games = 145

At Bats = 553

Batting average = .307

Doubles = 22

Triples = 3

Home runs = 5

Runs = 91

RBI = 38

Slugging average = .385

Walks = 36

OBP = .349

Tony Womack

Y

Games = 138

At Bats = 523

Batting average = .264

Doubles = 37

Triples = 3

Home runs = 17

Runs = 93

RBI = 82

Slugging average = .444

Walks = 88

OBP = .373

Mark Bellhorn

What Should Have Been Important to Theo?

Wins. **Losses.** **The difference between.**

What increases wins? **Scoring more runs.**

What decreases losses? **Conceding fewer runs.**

Is there a precise and measurable relationship?

Bill James' Pythagorean Formula

$$\text{Won-Loss \%} = \frac{(\text{Runs})^2}{(\text{Runs})^2 + (\text{Opponents' Runs})^2}$$

$$\left(\text{Won-Loss \%} = \frac{(\text{Runs})^{1.83}}{(\text{Runs})^{1.83} + (\text{Oppnts.' Runs})^{1.83}} \right)$$

2004 Boston Red Sox

$$\begin{aligned} \text{Projected Red Sox W-L \%} &= \frac{(949)^2}{(949)^2 + (768)^2} \\ &= \frac{900601}{1490425} \\ &= \boxed{.60426} \end{aligned}$$

$$\begin{aligned} \text{Actual Red Sox W-L \%} &= 98-64 \\ &= \boxed{.60494} \end{aligned}$$

If We Know How Many Runs. . .

. . . a team is likely to score,
we can predict how many games it will win.

So what causes a team to score runs?

Singles. Doubles. Triples. Homers. Walks.

But is there any sort of precise relationship between these offensive statistics and the runs that are scored?

Bill James' Runs Created Formula

$$\text{Runs} = \frac{(\text{Hits} + \text{Walks}) \times (\text{Total Bases})}{\text{At Bats} + \text{Walks}}$$

American League 2004

$$\begin{aligned} \text{Projected Runs} &= \frac{(21251 + 7486) \times (34106)}{78731 + 7486} \\ &= \boxed{11,368} \end{aligned}$$

$$\text{Actual A.L. Runs} = \boxed{11,358}$$

This formula works for each league, year after year.

It also works for each team, year after year!

New York Yankees 1961

$$\text{Projected Runs} = \frac{(1461 + 543) \times (6102)}{5559 + 543}$$

$$= 806$$

$$\text{Actual NYY Runs} = 827$$

$$\text{Variance} = 2.6\%$$

Player Runs Created

If James' Runs Created formula works consistently:

- At the league level, AND
- At the team level, . .

Then it must also work at the level of the individual player, even though we can't actually measure it!

Judging Individual Hitters

James' Runs Created formula allows us to measure hitters in terms of what really matters:

The runs they create for the team!

RC/27 Outs

Per 27 outs made, these second basemen created the following run totals for their teams:*

N.L.

1. M. Loretta, SDP: 7.30
2. R. Durham, SFG: 6.45
4. T. Walker, CHC: 6.04
5. J. Kent, HOU: 6.02
7. T. Womack, STL: 5.28

A.L.

1. M. Bellhorn, BOS: 6.15
2. A. Soriano, TEX: 5.70
3. J. Uribe, CWS: 5.34
5. M. Cairo, NYY: 5.14
6. R. Belliard, CLE: 5.13

* Source: ESPN.com

So What have All These Baseball Metrics To Do With Project Management?

1. It's important to measure the right things.

**2. In baseball, the right thing is winning games.
What is it on a project?**

**3. To win baseball games, we need to know how much each player contributes to winning.
What do we need to know about projects?**

4. If we use the wrong metrics, we'll wind up with Womacks.

What is a Project?

The PMBOK Guide Definition:

1. A temporary endeavor...
2. ...undertaken to create a unique product or service.

Surely something is missing?

Why do we do projects?

How Big Is Your Project?

“It’s got a ten month duration.”

“It’s got a million dollar budget.”

Great! But why are you doing the project?

“I’m Funding a \$1 Million Project...”

...that’s going to generate revenues of \$800,000!”

Would funding such a project ever make sense?

How about a project that saves \$1.2 million?

**How about one that generates \$800,000
and saves \$500,000?**

Which one is best (all else being equal)?

Every Project Is An Investment!

Why do we make investments?

To create greater value.

How do we measure and judge investments?

How much profit did it make?

Why do we measure and judge projects differently from ALL OTHER investments?

Metrics of Project Management

Are we on schedule?

Are we within budget?

***And, by the way, are we meeting the specs?**

So Which Result is Best/Worst?

Let's take five projects, each with a budget of \$1 million, and a planned duration of 12 months.

Project A: All orig. specs complete, on budget, 3 months late.

Project B: All orig. specs complete, for \$1.5 million, on time.

Project C: All orig. specs complete, for \$1.3 million, 2 months late.

Project D: 80% orig. specs completed, on time, for \$1M.

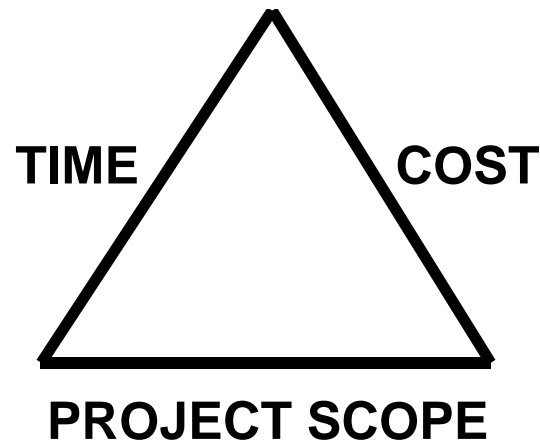
Project E: Cancelled after 3 months, \$0.2M spent.

We can only judge investments by profits and losses!

The Tools Are There...

...We just have to learn the right ways to use them!

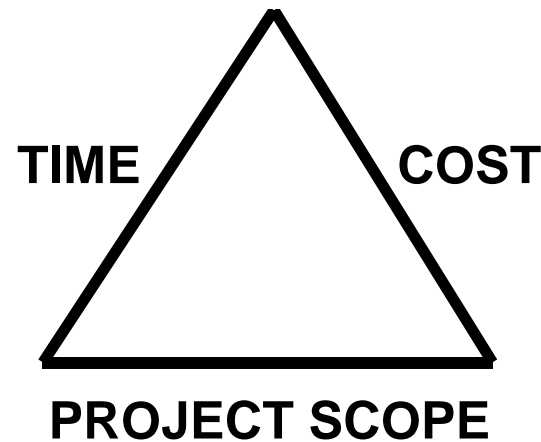
The Triple Constraint Triangle



Do we really understand it? And use it?

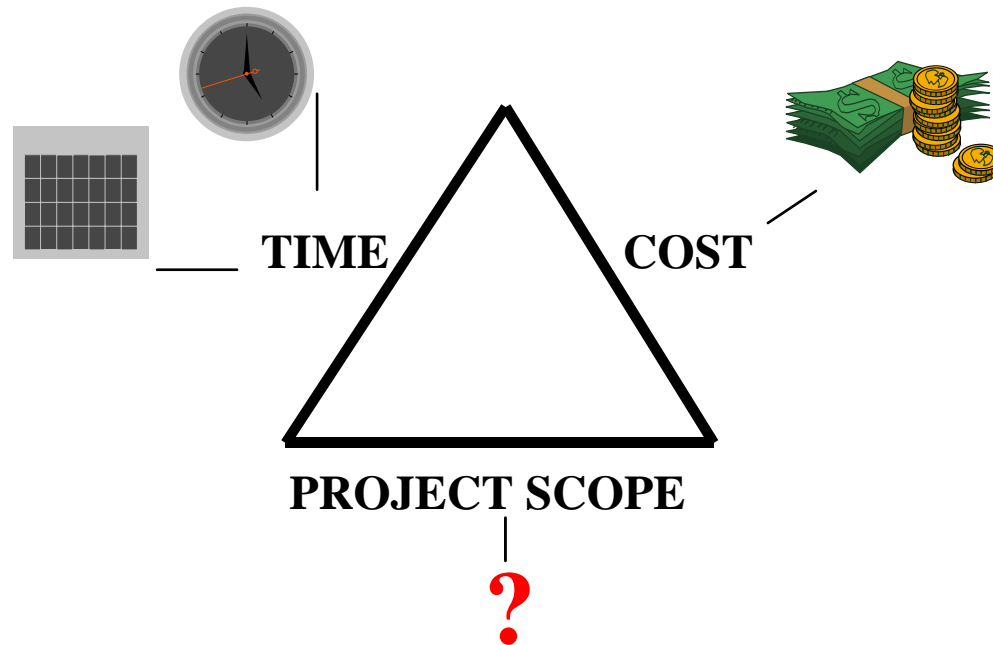
The Raison D'Etre of Every Project is...

The most important part of the Project Triangle!



So why do we fall into the trap of describing projects by their negatives.

...Because We Track What We Measure

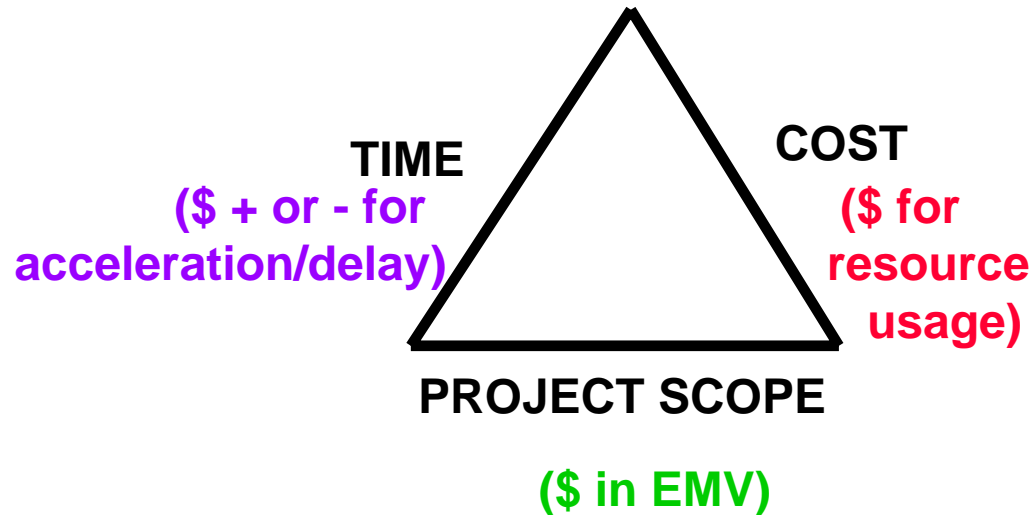


Traditional project management performs “cost/schedule integration.”

But even that is limited; how can /D/W/M be translated into \$?

And what about project scope, the most important side of the triangle?

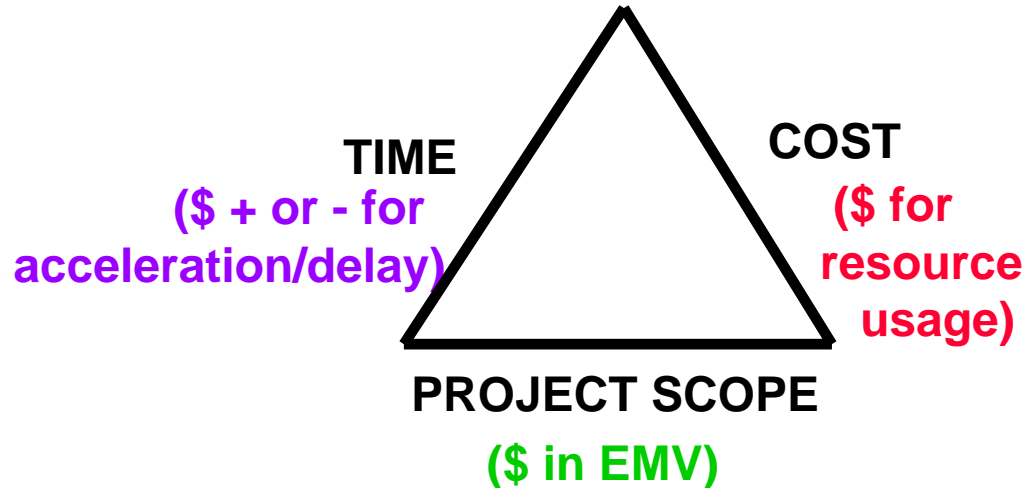
TPC Ties Project Metrics to Financial Goals!



EMV = expected monetary value

$$\text{PROJECT PROFIT} = \text{\$EMV} + \text{or - } \text{\$Acceleration/Delay} - \text{\$Resource Usage}$$

Indexing Project Profitability

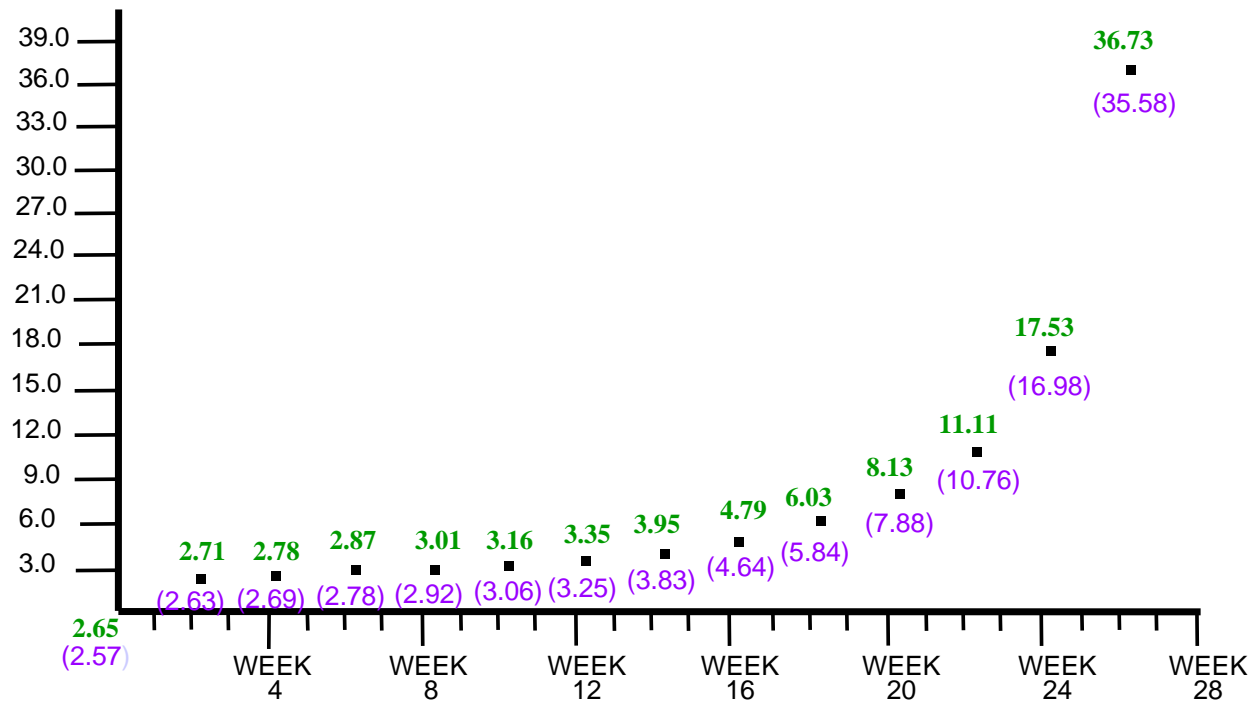


The job of project management is to use resources as profitably as possible. The index for measuring this is the DIPP*.

$$\text{DIPP} = \frac{(\$EMV + \text{or} - \$\text{Acceleration/Delay})}{\$ \text{Estimate-to-complete}}$$

*See “When the DIPP Dips,” Project Management Journal, Sep 1992

The DIPP Threshold



PLANNED DIPP IN BOLD.

(DIPP for 95% of projected profit margin in parentheses.)

A “threshold” can be built in on the DIPP if it falls below, say, 95% of its forecast level. Such a fall should trigger an escalation to senior management.

The DIPP Barometer Index

At Week 10

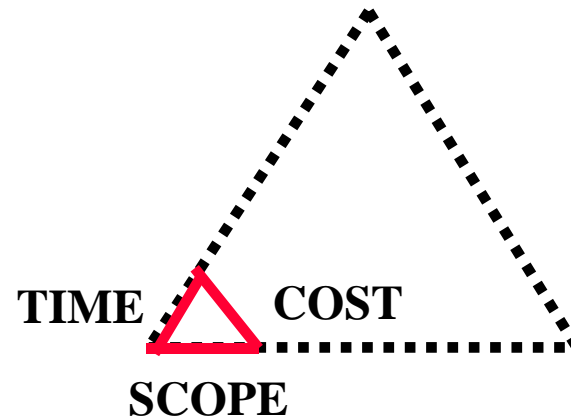
Planned DIPP = 3.16

Actual DIPP = 2.86

$$\begin{aligned} \text{DBI} &= \frac{\text{Actual DIPP}}{\text{Planned DIPP}} \\ &= \frac{2.88}{3.16} \\ &= \boxed{0.91} \end{aligned}$$

Optimizing Projects at the Activity Level

But what is an activity's triple constraint triangle?



What is its impact on project value?

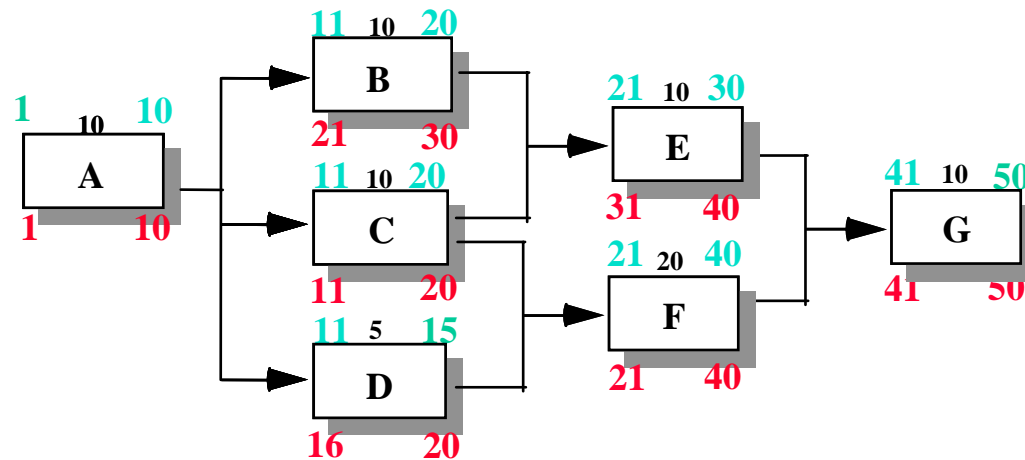
1. **Scope = Activity Value-added**

2. **Cost = Activity \$ ETC**  **True cost of an activity!**

3. **Time = DRAG Cost \$**

The Critical Path Method of Scheduling

1. Project management's greatest tool!
2. The Only Way to Schedule Project Work



- Traditional project management computes:**
- ◆ Project duration (50).
 - ◆ Critical path (ACFG).

What is an Activity's DRAG?

Traditional project management CPM computes:

Off the critical path

- ◆ Total Float
- ◆ Free Float

On the critical path

- ◆ Total Float = 0

TPC CPM also computes:

On the critical path

DRAG

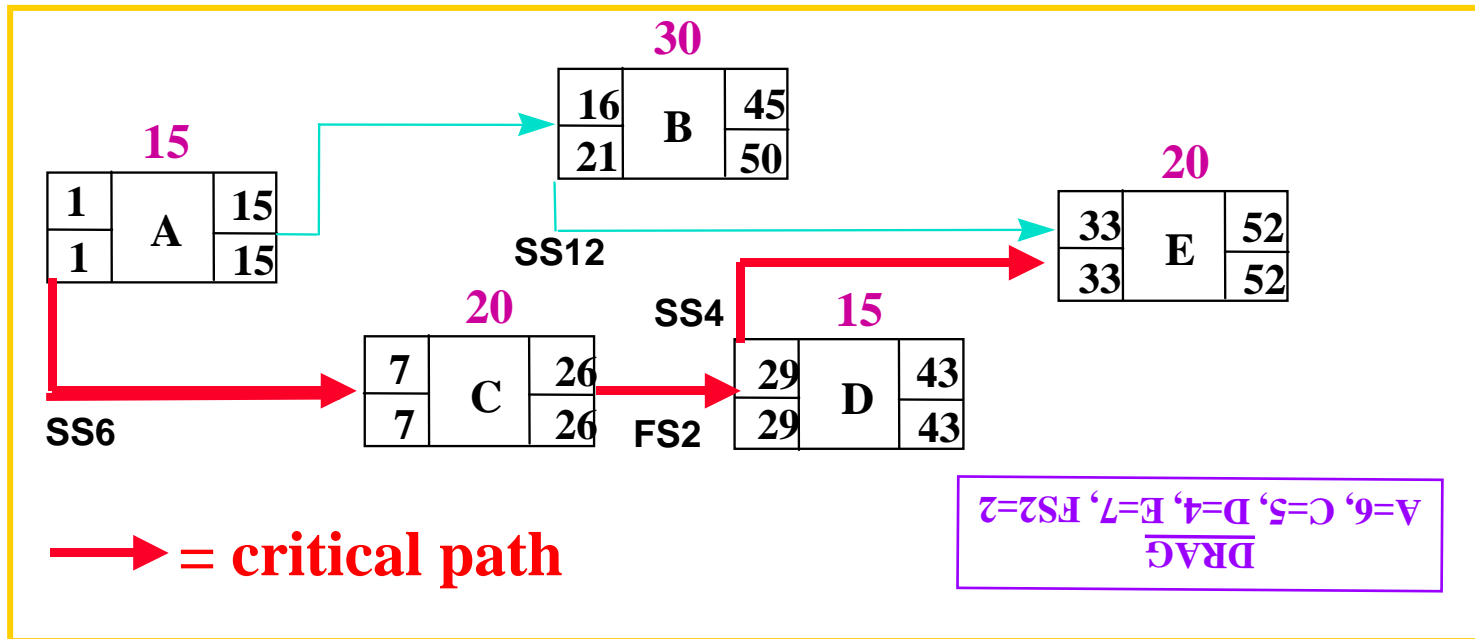
(Devaux's Removed Activity Gauge)

Q: How much time is each activity adding to the project duration?

Q: How much time could *potentially* be saved by reducing an activity's duration to zero?

It's Difficult to Compute DRAG...

...even in a VERY small network diagram!



If each unit of time results in a delay penalty of \$10,000, what is the DRAG Cost of each critical path activity?

But Computing DRAG is Important!

1. DRAG shows which activities will benefit the project most by being shortened – both up front and when things slip!
2. **DRAG Cost justifies resources** -- if an activity has a DRAG Cost of \$10,000 per week, that justifies \$30,000 to lessen its DRAG by three weeks.
3. Each good decision displays its worth by increasing the project profit and its barometer, the DIPP.

The Portfolio DIPP

Senior management of a project-driven organization should be receiving reports on the DIPP of each project, as well as tracking the multiproject portfolio DIPP, the barometer of organizational profitability.

Proj. Name	EMV (000)	As Of	Current Comp. Date	% Loss per Week Late	% Gain per Week Early	Cost ETC	Simple DIPP
A	\$1,000	Aug 1	Aug 1	5%	5%	\$200	5.0
B	\$2,000	Oct 1	Oct 1	10%	5%	\$1,000	2.0
C	\$5,000	Nov 25	Nov 25	20%	2%	\$2,000	2.5
D	\$10,000	Jan 30	Jan 30	10%	5%	\$3,000	3.3
TOTAL PORTFOLIO: Expected Monetary Value: \$18,000							
Cost ETC: \$6,200							
Expected Net: \$11,800							
Simple DIPP: 2.9							

For the moment, everything may seem copacetic, but...

Adding New Projects into the Portfolio

What happens when a new project gets proposed? Like a new, profitable, nine million dollar project?

Proj. Name	EMV (000)	As Of	Current Comp. Date	% Loss per Week Late	% Gain per Week Early	Cost ETC	Simple DIPP
E	\$12,000	Feb 10	---	20%	5%	\$3,000	4.0

Such a project is undoubtedly very attractive. But without access to the complete range of TPC data across the portfolio, adding such a new project is not only unjustified, it's dangerous!

The Portfolio DIPP After Multiproject Leveling

Even a highly profitable new project can result in lower profits, *if it sucks resources away from other projects!*

Proj. Name	EMV (000)	As Of	Current Comp. Date	% Loss per Week Late	% Gain per Week Early	New EMV	Cost ETC	Simple DIPP
E	\$12,000	Feb 10	Feb 10	20%	5%	\$12,000	\$3,000	4.0
A	\$1,000	Aug 1	Aug 29	5%	5%	\$800	\$200	4.0
B	\$2,000	Oct 1	Oct 29	10%	5%	\$1,200	\$1,000	1.2
C	\$5,000	Nov 25	Dec 16	20%	2%	\$2,000	\$2,000	1.0
D	\$10,000	Jan 30	Mar 13	10%	5%	\$4,000	\$3,000	1.3
TOTAL PORTFOLIO:			Expected Value: \$20,000	(+ \$2,000)				
			Total Cost ETC: \$9,200	(+ \$3,000)				
			Expected Net: \$10,800	(- \$1,000)				
			Simple DIPP: 2.2	(- 0.7)				

Remember, this is what would have happened anyway, only invisibly! The TPC data provide the portfolio with a barometer, that can be used to adjust individual projects and resources for maximum profitability.

The Optimized Portfolio Report

Proj. Name	EMV (000)	As Of	Current Comp. Date	% Loss per Week Late	% Gain per Week Early	New Exp. Value	Cost ETC	Simple DIPP
E	\$12,000	Feb 10	<i>Jan 13</i>	20%	5%	\$14,400	\$3,500	4.1
A	\$1,000	Aug 1	<i>Sep 12</i>	5%	5%	\$700	\$200	3.5
B	\$2,000	Oct 1	<i>Oct 15</i>	10%	5%	\$1,600	\$1,000	1.6
C	\$5,000	Nov 25	<i>Nov 25</i>	20%	2%	\$5,000	\$2,000	2.5
D	\$10,000	Jan 30	<i>Feb 27</i>	10%	5%	\$8,000	\$4,000	2.0
TOTAL PORTFOLIO: Expected Value: \$29,700 (+ \$9,700) Cost ETC: \$10,700 (+ \$1,500) Expected Net: \$19,000 (+ \$8,200) Simple DIPP : 2.8 (+ 0.6)								

Thus TPC provides quantified justification not only for the additional resources that the project needs, but for project management itself!

The Conclusions. . .

1. The essence of EVERY endeavor is its fundamental intent. Metrics which do not reflect such intent can distort the endeavor and lead to misguided decisions.
2. The fundamental intent of EVERY project is to create, through work, more value than it costs.
3. Every project is therefore, fundamentally, an investment, and must be planned and measured like every other investment.
4. Metrics that ARE grounded in \$gained/lost should be planned and tracked as the *primary operating metrics* of both project portfolio, and used in all decision-making.