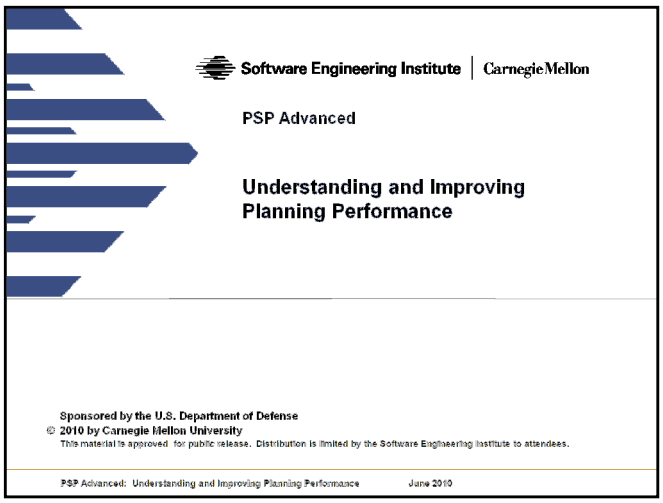
Software Engineering Institute | Carnegie Mellon
PSP Advanced
Understanding and Improving Planning Performance
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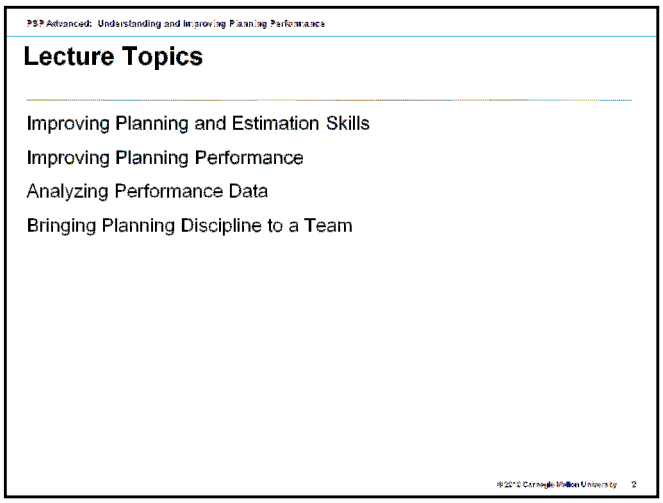
PSP Advanced: Understanding and Improving Planning Performance
June 2010


PSP Advanced: Understanding and Improving Planning Performance
Lecture Topics
Improving Planning and Estimation Skills
Improving Planning Performance
Analyzing Performance Data
Bringing Planning Discipline to a Team
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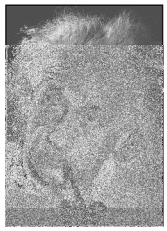
Improving Performance

"One definition of insanity is doing the same thing over and over again and expecting different results." - Albert Einstein and others



To improve performance, the process must change…

Performance Improvement Steps

Characterize and analyze current performance

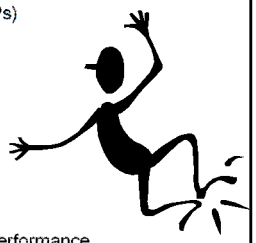
Generate Process Improvement Proposals (PIPs)

Set performance goals

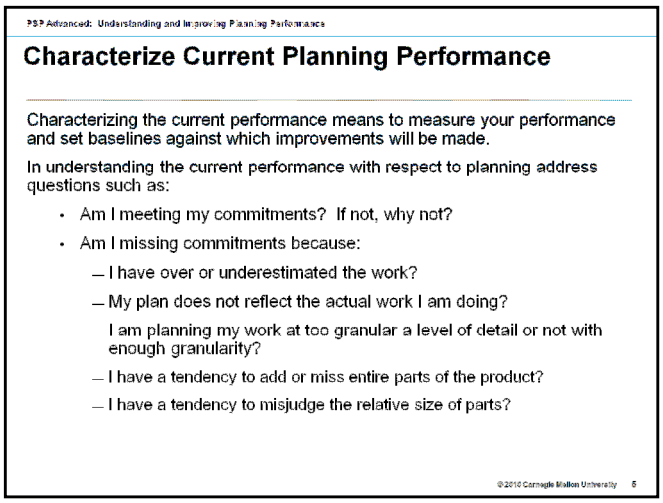
Evaluate and select PIPs for implementation

Implement PIPs

Gather more data and evaluate the results



Let's apply these steps to improving planning performance…



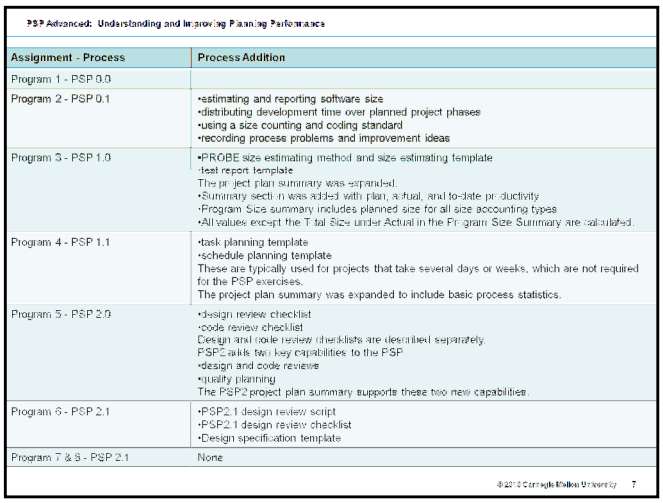
According to my past performance, how likely is it that my next effort actual will be within 10% of

Analyze Current Planning Performance

To understand current effort estimating performance the following questions must be answered.

- How stable was the productivity (for example LOC/Hour)?
- If there was significant variance in productivity, what were the contributing factors?
- How much was the accuracy of the time estimates were affected by the accuracy of the size estimates?
  - Are the over and under estimates balanced?
  - What were the contributing factors to misestimates?
  - According to past performance, how likely is it that the next size actual will be within 10% of the size estimate?

Let's look at a student's data!



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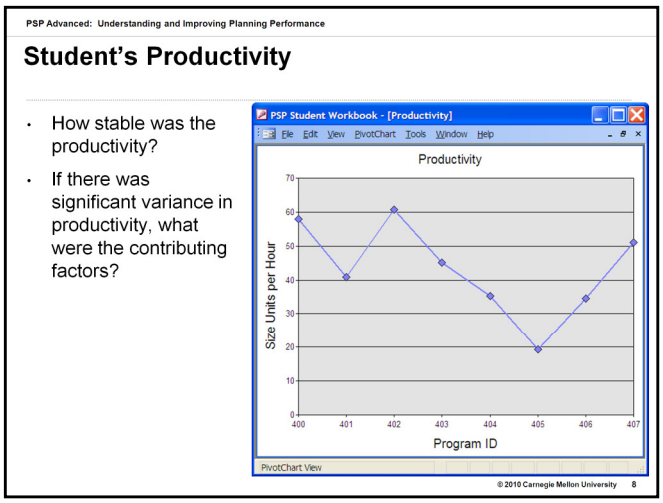
Assignment - Process	Process Addition
Program 1 - PSP 0.0	
Program 2 - PSP 0.1	•estimating and reporting software size •distributing development time over planned project phases •using a size counting and coding standard •recording process problems and improvement ideas
Program 3 - PSP 1.0	•PROBE size estimating method and size estimating template •test report template The project plan summary was expanded. •Summary section was added with plan, actual, and to-date productivity •Program Size summary includes planned size for all size accounting types •All values except the Total Size under Actual in the Program Size Summary are calculated.
Program 4 - PSP 1.1	•task planning template •schedule planning template These are typically used for projects that take several days or weeks, which are not required for the PSP exercises. The project plan summary was expanded to include basic process statistics.
Program 5 - PSP 2.0	•design review checklist •code review checklist Design and code review checklists are described separately. PSP2 adds two key capabilities to the PSP •design and code reviews •quality planning The PSP2 project plan summary supports these two new capabilities.
Program 6 - PSP 2.1	•PSP2.1 design review script •PSP2.1 design review checklist •Design specification template
Program 7 & 8 - PSP 2.1	None

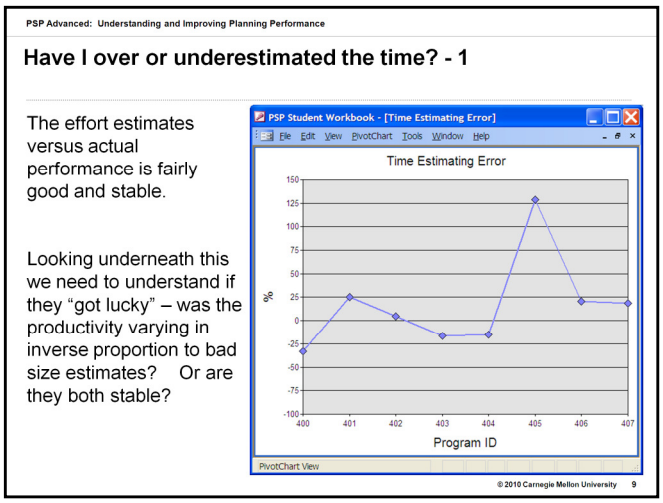
 7

Process used in generating the following Student #4 data. This student took the traditional PSP 1 and 2 courses, which may very slightly from the PSP Fundamental and Advanced programming assignments, thus this slide is included in helping the instructor and students interpret the data.



The student's productivity is pretty stable. The variance in the productivity can be contributed to the learning curve associated with the process changes. This shows that the productivity is stabilizing around initial productivity before applying PSP, even with all the extra process steps. Instructor can make the point that "Quality is free", with will be reinforced with the same student's data during the quality modules.

NOTE: The 405 data point corresponds with the introduction of the Design Templates and Design Verification, which is probably due to the learning curve.

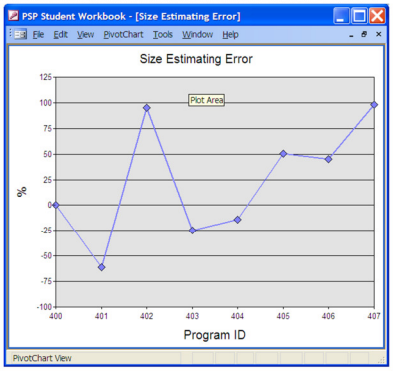


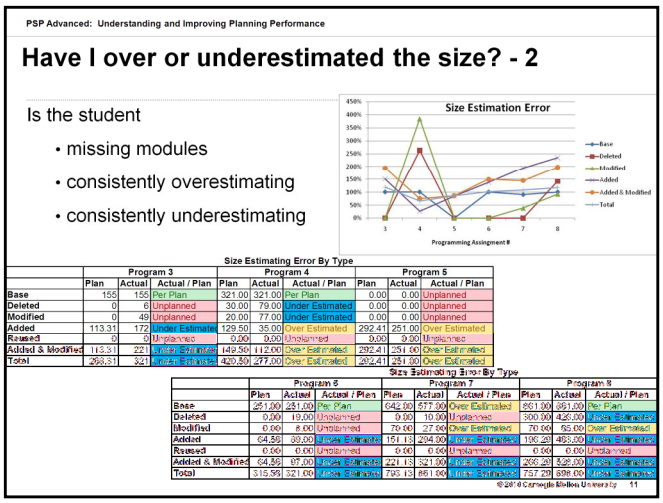
We don't have the data, or understanding of the data, needed to understand if she "got lucky." If this was your personal data you would.

NOTE: The 405 data point corresponds with the introduction of the Design Templates and Design Verification, which is probably due to the learning curve.

Have I over or underestimated the size? - 1

How much was the accuracy of the time estimates affected by the accuracy of the size estimates?





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Have I over or underestimated the size? - 2

Is the student

- missing modules
- consistently overestimating
- consistently underestimating

Size Estimating Error By Type

	Program 3			Program 4			Program 5		
	Plan	Actual	Actual / Plan	Plan	Actual	Actual / Plan	Plan	Actual	Actual / Plan
Base	155	155	Per Plan	321.00	321.00	Per Plan	0.00	0.00	Unplanned
Deleted	0	6	Unplanned	30.00	79.00	Under Estimated	0.00	0.00	Unplanned
Modified	0	49	Unplanned	20.00	77.00	Under Estimated	0.00	0.00	Unplanned
Added	113.31	172	Under Estimated	129.50	35.00	Over Estimated	292.41	251.00	Over Estimated
Reused	0	0	Unplanned	0.00	0.00	Unplanned	0.00	0.00	Unplanned
Added & Modified	113.31	221	Under Estimated	149.50	112.00	Over Estimated	292.41	251.00	Over Estimated
Total	268.31	321	Under Estimated	420.50	277.00	Over Estimated	292.41	251.00	Over Estimated

Size Estimating Error By Type

	Program 6			Program 7			Program 8		
	Plan	Actual	Actual / Plan	Plan	Actual	Actual / Plan	Plan	Actual	Actual / Plan
Base	251.00	251.00	Per Plan	642.00	577.00	Over Estimated	861.00	861.00	Per Plan
Deleted	0.00	10.00	Unplanned	0.00	10.00	Unplanned	300.00	426.00	Under Estimated
Modified	0.00	8.00	Unplanned	70.00	27.00	Over Estimated	70.00	65.00	Over Estimated
Added	64.56	69.00	Under Estimated	151.13	284.00	Under Estimated	196.29	468.00	Under Estimated
Reused	0.00	0.00	Unplanned	0.00	0.00	Unplanned	0.00	0.00	Unplanned
Added & Modified	64.56	87.00	Under Estimated	221.13	321.00	Under Estimated	266.29	533.00	Under Estimated
Total	315.56	321.00	Under Estimated	795.13	861.00	Under Estimated	757.29	894.00	Under Estimated

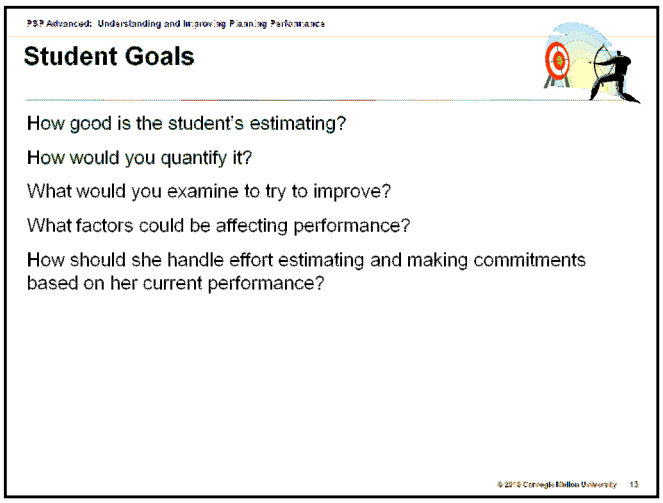
This is a busy slide. The point of this slide is to show that you can take the data and look at it by type and not just the total size data (previous slide). This allows one to determine if they are consistently under, over or not estimating certain aspects of the size estimate. Note Programs 6 – 8 the student is consistently underestimating Added. Now the student could look at their methods for estimating Added and determine if there is a part of the process that could be improved, such as add a little more detail to the conceptual design.

Note only programs 3 – 8 are shown because prior to using PSP 1.0 (programs 1 & 2), PROBE was not used.

Set Effort and Size Estimating Goals

At this point, it is possible to set effort and size estimating goals.

- Identify the highest-leverage opportunities for improving performance.
- Establish quantitative, measurable goals.
- Describe the specific actions (e.g. process changes) that will be taken to achieve these goals



It is pretty clear that this student is a fairly good estimator. On average her estimates are within +/- 25% variance.

However looking at her size estimation data. It may be possible to put a little more work into her conceptual designs in order to improve her accuracy. In order to determine which parts are being overestimated, underestimated, or omitted, she will perform an analysis of her completed Size Estimating Templates.

Other areas of her performance may also be effecting her estimations, such as quality, productivity, etc. She may wish to do further analysis of all her data in order to focus her improvement efforts.

Student PIPs

After analyzing her completed Size Estimating Templates. The following PIPs were generated:

- Review base code to identify areas that require modification, addition and deletion, prior to making Base estimate.
- Once conceptual design is complete. Compare design with requirements, then review conceptual design with a peer to reduce the number of missed parts.
- Review final estimate with a peer for completeness.

Student's new estimating goal

The student has set a goal of making time estimates within a +/- 15% variance, by implementing the following PIPs:

- Review base code to identify areas that require modification, addition and deletion, prior to making Base estimate.
- Once conceptual design is complete. Compare design with requirements, then review conceptual design with a peer to reduce the number of missed parts.

Gather more data and evaluate the results

Once the PIPs are implements. The final step is to gather more data points to determine the effectiveness of the PIP implementation in meeting your performance goals.

If the PIP does not result in helping you to meet your improvement objectives, then discontinue using the PIP implementation.

"All change is not growth as all movement is not forward."

Ellen Glasgow

Other Factors in Estimating Problems

The following are other factors in size and effort estimating accuracy.

- Incorrect size proxies
- Incorrect usage of historical data
- Not adjusting for outliers
- Inconsistent or inaccurate time tracking
- Quality problems leading to variance in productivity

How Do You Bring Planning Discipline to a Team?

By establishing and executing team roles for sharing responsibilities for managing the project:

Planning Manager	Design Manager
Quality Manager	Test Manager
Process Manager	Customer Interface Manager
Support Manager	Implementation Manager

When team members execute their role responsibilities, follow defined processes, and meet their goals and commitments, the team performs efficiently and effectively.

Planning Manager Goals

The Planning Manager's goals are to:

- help the team run a well-planned and tracked project
- help the team members with their personal planning and progress tracking
- regularly track and report the team's status against plan

Leads the Team's Planning

The Planning Manager:

- ensures that the team is always working to a defined and documented plan
- assists the engineers in generating their personal and team estimates and plans
- ensures that plans are revised at every team launch and relaunch or whenever the project schedule or resources change substantially
- helps the team maintain a balanced plan at all times

Tracks Team Progress

The Planning Manager:

- tracks team progress against the plan and reports to the team weekly on project status
- supports the Team Leader in tracking project issues and risks
- maintains an updated ***Project Plan Summary*** for the system and each of its parts
- keeps the team ***TASK*** and ***SCHEDULE*** plans updated and ensures that each team member updates their personal ***TASK*** and ***SCHEDULE*** plans.

Reporting

In addition, the Planning Manager:

- ensures that team members report data on their progress in time for the weekly team meeting
- produces a composite report of team status against plan and distributes it at or before the weekly team meeting
- based on the rate of schedule and resource progress, keeps the team and management informed of likely phase and project completion dates
- supports the Team Leader in producing weekly management and customer status reports
- maintains the data to produce the schedule, resource, size, and productivity sections of the project report during the phase and project postmortems

Questions to ask as Planning Manager

Is each team member's plan sufficiently detailed?

Do these plans accurately represent the work that the team members are currently doing?

If any of the team members' plans do not represent their current work, what actions do you recommend?

Is the team's workload reasonably well-balanced? If not, what actions do you recommend?

Is the workload with any cooperating group or team reasonably well balanced? If not, what actions do you recommend?

Are dependencies within the team and with other related groups known and tracked?

Are there any other planning issues that the team should be aware of?

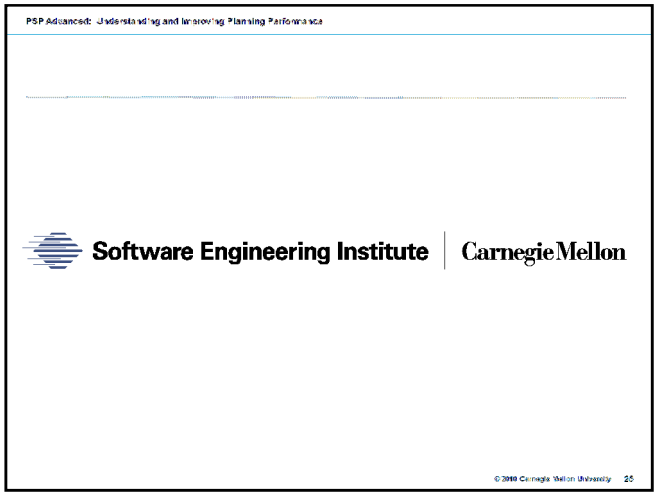
Messages to Remember

You cannot know your current plan performance without doing plan estimates and detailed tracking of actual data.

Effort estimating accuracy is largely based on the accuracy of size estimating and the stability of productivity.

Understanding the causes behind misestimates can lead to many ideas for process changes.

You can improve performance by learning from your data and trying new process ideas.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