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Software Engineering Institute**

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# **A Star is Made**

## **TSP Symposium**

### **September 21-23, 2009**

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The Software Engineering Institute  
Carnegie Mellon University**



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## **Presentation Topics**

Where does excellent performance come from?

What is deliberate practice?

How does deliberate practice relate to software?

How can deliberate practice help solve TSP/PSP problems?

Conclusions

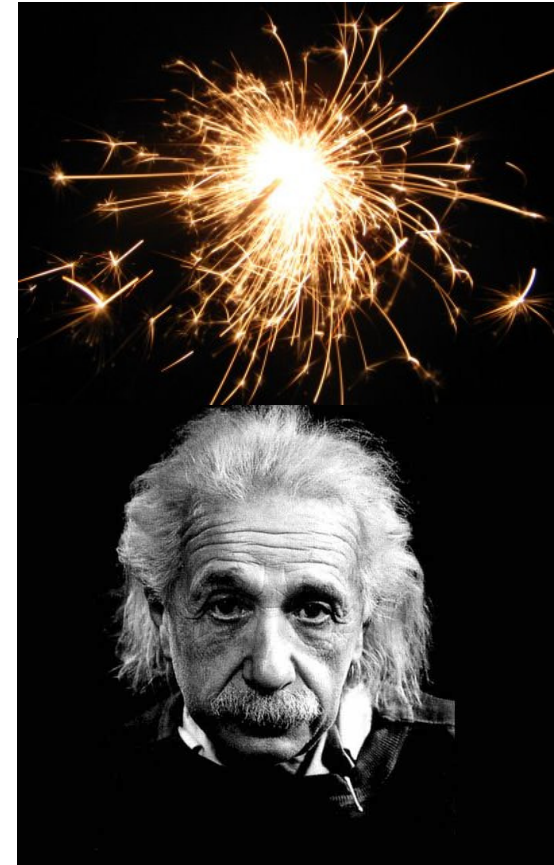


## Whence Star Performance?

Conventional wisdom says star performance comes from innate talents, skills, or abilities – a “spark of genius.”

Modern research suggests star performance comes from

- sustained, disciplined practice
- working to achieve continuous, incremental improvements
- focusing as much (or more) on the process of performing as on outcomes





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## **Deliberate Practice**

Deliberate practice is “an individual’s prolonged efforts to improve performance while negotiating motivational and external constraints.”

- *K. Anders Ericsson*, 1993

Deliberate practice is “activity that is explicitly intended to improve performance, reaches for objectives just beyond one's level of competence, provides feedback on results, and involves high levels of repetition”

- *Fortune Magazine*, 2006



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## **Elements of Deliberate Practice**

Place equal emphasis on techniques and outcomes

Set specific and measurable goals

Receive immediate, meaningful feedback

Maintain a disciplined approach to practice

Have a supportive environment

Possess a passion for the domain



## **Equal Emphasis on Technique and Outcome**

Master performers

- concentrate effort on changing the performance techniques/processes to achieve desired improvements
- identify and isolate specific performance aspects for improvement; work on one performance element at a time
- practice what is *not* done well
- strive to reach performance level just beyond current abilities
- never stop trying to improve





## Specific and Measurable Goals

“Deliberate practice is about setting new goals and straining yourself to reach a bit higher each time. It involves you deciding to improve something and setting up [the needed] conditions to attain the skill.”

– *K. Anders Ericsson, 2006*



Goals must be

- very specific (one performance element)
- measurable (quantitative AND qualitative)
- tangibly assessable (specific feedback)
- challenging (improve level of performance)





## **Immediate and Meaningful Feedback**

Feedback must be immediate.

- internal feedback (self-talk) most immediate
- external feedback (coach, teacher) most objective

Feedback must be meaningful.

- specific to what is being practiced
- precisely pinpoint needed improvements

Feedback must be used to improve performance.

- identify shortcomings
- provide remediation





## **Disciplined Approach to Practice**

Expert performance requires regular schedule of over long period of time.

- minimum of 10,000 hours
- approximately 10 years

High repetition enables automaticity of essential performance skills.

- enables creativity
- better performance under stress



Practice makes permanent; deliberate practice makes perfect.



## Supportive Environment



Disciplined practice requires intense concentration and focus.

- mental strain often more tiring than any physical demands
- encouragement / empathy from peers or teammates provide motivation

Coaches, mentors, and teachers, while tough and demanding, are important sources of support.

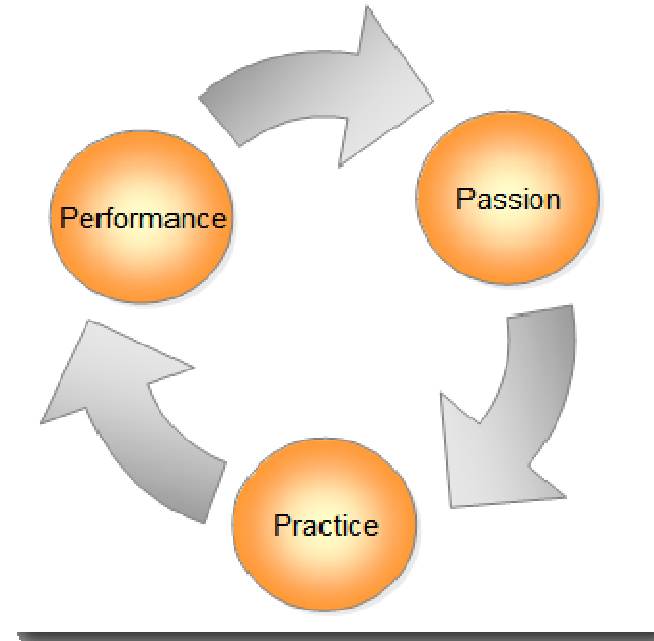


## Passion for the Domain

Most people don't like to do things at which they aren't already competent.

People who don't love what they do are not likely to put in the time needed for mastery.

Passion provides the needed motivation for rigorous practice.





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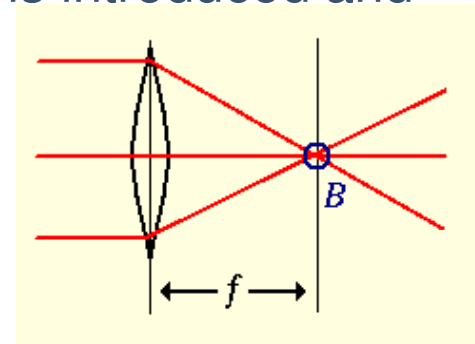
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## **PSP and TSP *Require* Focus on Techniques/Processes as Much as on the Outcome -1**

Focus on technique/process: PSP is introduced and refined in increments.

- Use the scripts.
- Add size measures.
- Develop and use checklists.
- Follow standards.



Focus on outcome: PSP's ideal outcome is zero-defect components and products.

Following a disciplined process changes the way you think about your work *and* improves your performance.



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## **PSP and TSP *Require* Focus on Techniques/Processes as Much as on the Outcome -2**

TSP specifically includes the role of Process Manager.

TSP teams define the processes they will use.

Team meetings and inspections follow scripts.

Process improvement Proposals (PIPs) are collected and reviewed.

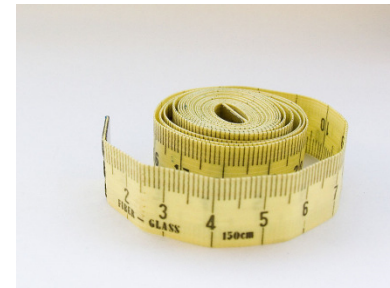
It isn't that performance is unimportant, but rather, improving performance requires first following, then improving, a process.



## **PSP and TSP *Require* Setting Specific and Measurable Goals -1**

### Goals

- zero defects
- on time
- on budget



### PSP students

- measure baseline performance.
- establish achievable performance improvement goals.





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## **PSP and TSP *Require* Setting Specific and Measurable Goals -2**

The TSP launch includes a meeting to set goals that can be quantified.

Plans are made in launch meetings 4 through 6 to achieve those goals.

The quality meeting quantifies how to achieve quality goals.

TSP team meetings review goals periodically.



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## **PSP and TSP Users Receive Immediate and Meaningful Feedback -1**

Practitioners use the feedback to improve technique.

Data is gathered on performance.

- task hours and earned value
- defect densities and phase yields
- production rates
- tasks completed





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## **PSP and TSP Users Receive Immediate and Meaningful Feedback -2**

Because of the data, self-coaching is possible.

TSP also specifically provides the role of coach.

The coach

- is a process expert
- helps to analyze data, process, and performance
- provides feedback based on the data



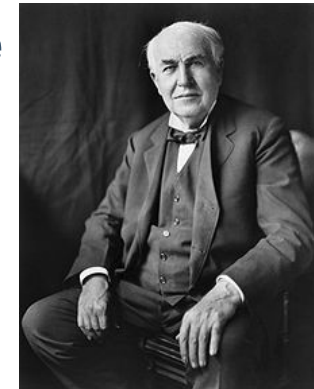


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## PSP and TSP Provide a Disciplined Approach

“Genius is one percent inspiration, ninety-nine percent perspiration.”

– *Thomas Edison*



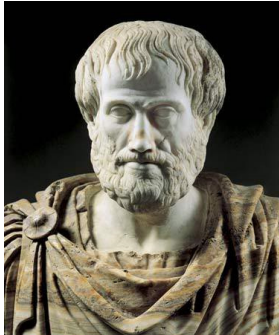
PSP and TSP practitioners

- use scripts
- collect data
- refine processes based on data
- make plans based on data



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## **TSP Creates a Supportive Environment -1**



“Good character is not something that we can achieve by ourselves. We need an environment that supports the conditions.”  
– *Aristotle*

The reason TSP was developed is that PSP is so hard to realize in isolation.



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## **TSP Creates a Supportive Environment -2**

Executive training, management support

Coach

- encouragement
- motivation
- corrective feedback

Group of supportive peers

- team meetings
- role teams
- commitments to the team
- peer inspections
- the launch





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## **PSP and TSP Foster a Passion for the Domain**

TSP assumes people want to do good work.

- commitment to excellence
- passion for the work

When people have used disciplined methods, they often don't want to work any other way.



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## **Performance Plateaus**

Why do individuals and teams  
stop improving?





## What if Something is Missing?

### Element

Focus on process

Specific goals

Feedback

Discipline

Supportive environment

Passion

### Absent

No method for improvement

Don't know what to improve

Don't know if improving or  
not

No consistency

Discipline fails

No desire to improve



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## **Why Should PSP/TSP Users Care About Deliberate Practice?**

Deliberate practice

- enables automaticity: excellent performance can be achieved under stress, when outcome is critically important
- facilitates creativity
- provides a framework for identifying performance problems
- enables continuing growth / improvement



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## **Conclusions**

There is no “royal road” to expert performance.

The elements required to achieve expert performance are described by deliberate practice.

TSP provides the essential elements needed to realize and sustain superior performance.



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## **For More Information**

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