Plan-Driven Methodologies

- The “traditional” way to develop software
- Based on system engineering and quality disciplines (process improvement)
- Standards developed from DoD & industry to make process fit a systems approach
- Values well defined work products

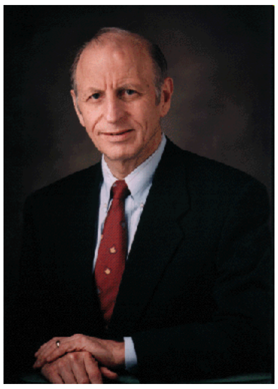
Plan Driven Characteristics

- Focus on repeatability and predictability
- Defined, standardized, and incrementally improving processes
- Thorough documentation
- A software system architecture defined up-front
- Detailed plans, workflow, roles, responsibilities, and work product descriptions
- Process group containing resources for specialists: process monitoring, controlling, and educating
- On-going risk management
- Focus on ***verification and validation***

Plan-Driven Methodologies

- Personal Software Process (PSP)
- Team Software Process (TSP, TSPi)
- Rational Unified Process (RUP)

PSP / TSP



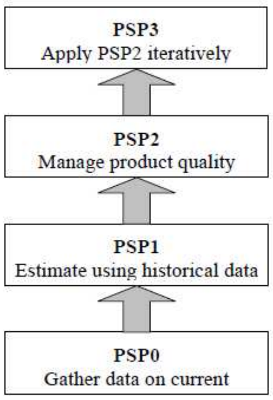
http://www.sei.cmu.edu/staff/watts/

- Watts Humphrey
- SEI – Software Engineering Institute, Carnegie Mellon University
- Also instrumental in the development of the CMM (Capability Maturity Model)
- Overview of PSP/TSP
  http://www.sei.cmu.edu/tsp/
- Video: "Competing in the Software Age"
  http://www.sei.cmu.edu/videos/watts/DPWatts.mov

PSP

- PSP is an ***individual*** process methodology
- PSP is a structured framework of forms, guidelines, and procedures intended to guide an engineer in using a defined, measured, planned, and quality controlled process.
- Goal is to quantitatively access individual development skills in order to improve personal performance.

PSP



- ***Early defect detection is much less expensive than later defect removal***
- PSP training follows an evolutionary improvement approach. An engineer learning to integrate the PSP into his or her process begins at Level 0 and progresses in process maturity to Level 3
- Each level incorporates skills and techniques that have been proven to improve the quality of the software process.
- Each level has detailed scripts, checklists, and templates to guide the engineer through required steps

PSP Artifacts

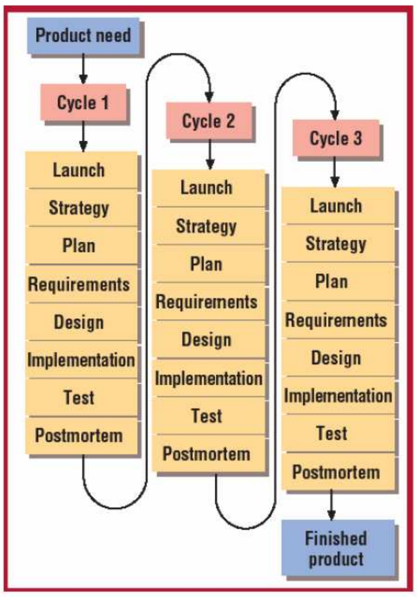
- PSP is an artifact centric methodology
- ***Scripts*** – orderly structure of steps for each phase of development and review
- ***Forms*** – used in data collection for defect recording, time recording and project planning.
- ***Checklists*** – design, coding, etc.

PSP

- Advantages
  - Improved size & time estimation
  - Improved productivity
  - Reduced testing time
  - Improved Quality
- Disadvantages
  - Pushback on forms & detailed data recording
  - Longevity of PSP requires discipline and opportunity to work on TSP teams.

Team Software Process (TSP)

- The TSP supports the development of industrial strength software through the use of team building, planning, and control.
- Relies on PSP team members, but not a necessity.
- Project divided into overlapping, iterative development cycles
- Each of the cycles is a “mini waterfall” consisting of a cycle launch, strategy, planning, requirements, design, implementation, test, and postmortem.



TSP Structure

- Seven iterative steps in each cycle.
- Cycles can and should overlap.
- Each cycle produces a ***testable*** version that is a subset of the final project.

TSP Roles

- Team Leader
- Development Manager
- Planning Manager
- Quality/Process Manager
- Support Manager
- An SEI trained and qualified ***team coach*** oversees the project from a management perspective.

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TSP Artifacts

Lots….

- 21 Process scripts
- 10 Role scripts
- 21 Forms
- 3 Standards
- Like PSP, goal is to use above artifacts to guide organization and use measurements to continually improve the team as a whole.

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TSP

- **Advantages**
  - Scripted (consistent) process activities.
  - Teams take ***ownership*** of their process and plans (i.e. make realistic commitments)
  - Process improvement focus
  - Visible tracking
- **Disadvantages**
  - Similar to PSP (artifact centric, high ceremony)
  - Doesn’t scale well for small teams / short projects

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Rational Unified Process (RUP)

- Generic process framework intended to to be adjusted to a variety of organizations and projects
- Specifically designed for O-O techniques using UML diagrams
- A tool centric methodology

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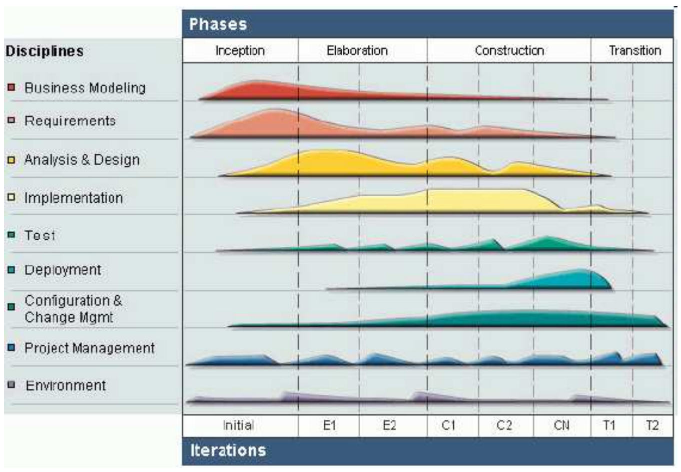

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Time Dimensions (Phases)

- **Inception phase** – Decide what to do, the business case, and the scope of the project. Make an initial project plan with rough estimations of time and resources required. Define risks that need to be handled in the elaboration phase.
- **Elaboration phase** – Analyze the problem domain and define a technically feasible architecture. Mitigate the highest risks to the projects. Make a detailed project plan with prioritized activities.
- **Construction phase** – Develop, integrate and test the product defined in the elaboration phase. Optimize the resources so that they can work in parallel and reuse each other's work. Produce user documentation.
- **Transition phase** – Distribute the product to the customers and maintain it.

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Core Process Disciplines (Engineering Workflows)

- **Business modeling** - Common understanding for the business process to be supported is assured.
- **Requirements**– Translation of the business model to functional and non-functional requirements
- **Analysis & Design**– Description of how the system is to be realized to fulfill all requirements.
- **Implementation**– Implementation of the design, unit tests and integration of components into executable systems.
- **Test** - Find defects as early as possible as the cost to correct them increases the later in a software cycle they are found. Tests are focused on three areas, reliability, functionality and performance.
- **Deployment** – Production of product releases, and delivery of them to end-users. Provision of support and migration help.

Supporting Workflows

- **Project Management** – Management of competing objectives, risks to the project and successful delivery of a product.
- **Configuration and Change Management -** Management of parallel development, development done at multiple sites, multiple variants of systems and change requests.
- **Environment** – Provision of tools to a software project and adaptation of RUP to the specific project.

RUP Artifacts

- ~30 top level documents, each discipline has its own set
- Supported by Rational Tools
- Example: Requirements Workflow, RequisitePro Tool
  - Vision Statement
  - SRS (Software Requirements Specification)
  - Supplementary Spec (non-functional req)
  - Use Cases
  - Glossary
  - Use Case Model

RUP Best Practices

- Develop software iteratively
- Manage Requirements
- Use component-based archtiectures
- Visually model software
- Continually verify software
- Control changes to software

RUP Roles

Expand or contract based on project size:

- Analyst
- Designer
- Implementer
- Reviewer
- Test Designer
- Tester
- Integrator
- Project Manager
- Technical Writer
- Architect
- User Interface Designer

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RUP

- **Advantages**
  - Tool and O-O practices support
  - Can be tailored to for project size
- **Disadvantages**
  - Dependent on Rational Tools and practices
  - Not always easy to scope down for smaller projects.

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