CALIFORNIA STATE UNIVERSITY
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COLLEGE OF ENGINEERING
AND COMPUTER SCIENCE

Advanced Software Process

Part II: The Repeatable Process

5. Managing Software Organizations

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Course Roadmap

Part I: Software Process Maturity
- 1. A Software Maturity Framework
- 2. The Principles of Software Process Change
- 3. Software Process Assessment
- 4. The Initial Process

Part II: The Repeatable Process
- 5. Managing Software Organizations
- 6. The Project Plan
- 7. Software Configuration Management (Part I)
- 8. Software Quality Assurance

Part III: Defined Process
- 9. Software Standards
- 10. Software Inspections
- 11. Software Testing
- 12. Software Configuration Management (continued)
- 13. Defining the Software Process
- 14. The Software Engineering Process Group

Part IV: The Managed Process
- 15. Data Gathering and Analysis
- 16. Managing Software Quality

Part V: The Optimizing Process
- 17. Defect Prevention
- 18. Automating the Software Process
- *19. Contracting for Software*
- *20. Conclusion*

Part II Summary
The Repeatable Process

Ch.05 – Managing SW Organizations
- Deals with the way SW commitments are made and managed

Ch.06 – The Project Plan
- Reviews SW planning principles and goals, the Work Breakdown Structure, size estimating, resource estimating, and project tracking

Ch.07 – Software Configuration Management (Part I)
- Explains why configuration management is important and describes the capabilities with highest initial priority.

Ch.08 – Software Quality Assurance
- Describes the benefits and goals of SQA, how it is organized, and some of the key considerations in establishing and managing an SQA organization.

Part II Summary
The Repeatable Process

The reason the four topics of Part II are addressed at this point is not that they cover all important issues but that they likely represent the highest-priority areas for organizational improvement at this point.

Part II Summary
The Repeatable Process

The reason these four topics are selected for attention at this point is that they establish a sound basis for project planning and process management.

- Until the organization effectively handles commitments, planning, configuration management, and Quality Assurance, the process will be too erratic to permit orderly improvement.

Managing Software Organizations

- Commitment Discipline
- The Management System
- Establishing a Project Management System

Managing Software Organizations

- The role of the management system is to ensure that projects are successfully completed.
- This implies some organization-wide agreement on the meaning of the terms "success" and "completion".
- It also requires a continuing management focus on the progress of each project.
- Project management starts with a definition of the job to be done and the plan to do it.

Managing Software Organizations

Basic principles of project management:

- Each project has a plan that is based on a hierarchy of commitments.
- A commitment is an agreement by one person to do something for another.
- A management system resolves the natural conflicts between the projects and between the line and staff organizations.
- An oversight and review system audits and tracks progress against the plans.

Commitment Discipline

The foundation for software project management is the commitment discipline.

This is supported by plans, estimates, reviews, and tracking systems, which focus on ensuring that the organization meets its commitments.

Commitments are not met by reviews, procedures, or tools, however; they are met by committed people.

Making a Commitment

A commitment involves a planned completion date and some consideration or payment.

When the coordinated efforts of many professionals are involved, mutual commitments are essential.

Making a Commitment

The elements of an effective commitment

- The person making the commitment does so willingly.
- The commitment is not made lightly.
  - The work involved, the resources, and the schedule are carefully considered.
- There is agreement between the parties on what is to be done, by whom, and when.
- The commitment is openly and publicly stated.
- The person responsible tries to meet the commitment, even if help is needed.
- Prior to the committed date, if it is clear that it cannot be met, advance notice is given and a new commitment is negotiated.

The Commitment Hierarchy

While commitments are met by committed individuals, the work is not done in a vacuum.

As long as the professionals feel they are part of an organization that treats its commitments seriously, they will strive to do their part.

This calls for a management team that takes care in making commitments and then insists on extraordinary efforts to meet them.

The Software Commitment Process

To be effective, the software commitment process must reach to the top of the organization.

This requires that:

- All commitments for future SW delivery are personally made by the organization's senior executive.
- These commitments are made only after successful completion of a formal review and concurrence process.
- An enforcement mechanism ensures that these reviews and concurrences are properly conducted.

Establishing a Commitment Process

A commitment process can be established very quickly.

The basic requirement is a senior executive who is willing to insist that the required planning be done before any commitment is made.

In addition, since the people must know how to make schedules and estimates, training courses are required, as are specific estimating, review, and approval procedures.

The Management System

While every organization will have unique objectives, there are generally four components:

- To have a technical and business strategy that aims at such long-term goals as growth rate or market position
- To provide quality products that meet customer's needs in a timely and effective way
- To perform the assigned mission competitively and economically
- To improve continually the organization's ability to handle more challenging work

Product and Period Plans

To resolve the inherent conflict and to establish a framework for operations, most organizations produce annual operating plans.

These specify the tasks to be performed and assign the responsibilities and resources to accomplish them.

Since skilled resources are the single most important need of every project and staff, their allocation is the essential first step in producing these plans.

Management Oversight

An effective management system typically uses reviews and a contention system to resolve product and period conflicts and establish the balance between line and staff.

Each line and staff organization prepares its annual plan and reviews it with all involved parties.

Management Oversight

The issues are then resolved, the separate plans are consolidated into a total organization plan, and this total plan is incorporated in the plan for the next higher organizational level.

Similarly, each project area establishes its own plan prior to project initiation and periodically reviews and updates it.

The Contention Process

An effective review system requires a parallel contention system to encourage the open expression of differences and their rational resolution.

The principle behind the contention system is that the best decisions are based on a full understanding of the relevant issues.

There are many ways to solve most problems and there is rarely agreement on the best approach.

The Contention Process

Most of successful organizations have found that the contention system helps them arrive at better decisions.

Alfred P. Sloan, the founder of GM

> *"No important decision should be made unless there is some contention."*

The Principles of the Contention System

- All major decisions are reviewed with the involved parties in advance, and the parties are requested to agree.
  - When possible, any issues are resolved before proceeding.
- When the time comes for the decision, all dissenting parties are present and asked to state their views.
- When there is no disagreement, the senior manager determines if there is knowledgeable agreement, if any disagreeing parties are absent, or if more preparation is needed.
  - In the latter two cases, the decision is deferred until the necessary homework has been done.

The Quarterly Review

The quarterly review provides a forum for resolving conflicts and monitoring progress against period and product objectives.

The topics should typically include an assessment of project performance against plan and the organization's performance against its goals.

The Quarterly Review

TABLE 5.1
EXAMPLE OF A QUARTERLY REVIEW AGENDA

Opening Comments	**Site Manager**
Project A Review	
Milestone Status	Project A Manager
Financial Status	Finance Manager
Issues	Project A Manager
Staff Comments	Finance and SQA
Project B Review	
Milestone Status	Project B Manager
Financial Status	Finance Manager
Issues	Project B Manager
Staff Comments	Finance and SQA
Project C Review	
Milestone Status	Project C Manager
Financial Status	Finance Manager
Issues	Project C Manager
Staff Comments	Finance and SQA
Remaining Project Overviews	
Milestone Status	Development Manager
Financial Status	Finance Manager
Issues	Development Manager
Staff Comments	Finance and SQA
Computing Support	
Performance Measures	Computing Manager
Issues	Computing Manager
Project Comments	Development Manager
Process Status	
Assessment Update	SEPG Manager
Action Plan Status	SEPG Manager
Technology Plan Status	SEPG Manager
Organization Performance	
Productivity	Finance/SEPG
Quality	SQA/SEPG
Action Item Summary	Site Manager

Example of a Quarterly Review Agenda (Table 5.1)

The Quarterly Review

Typical Software Lab Organization (Figure 5.1)

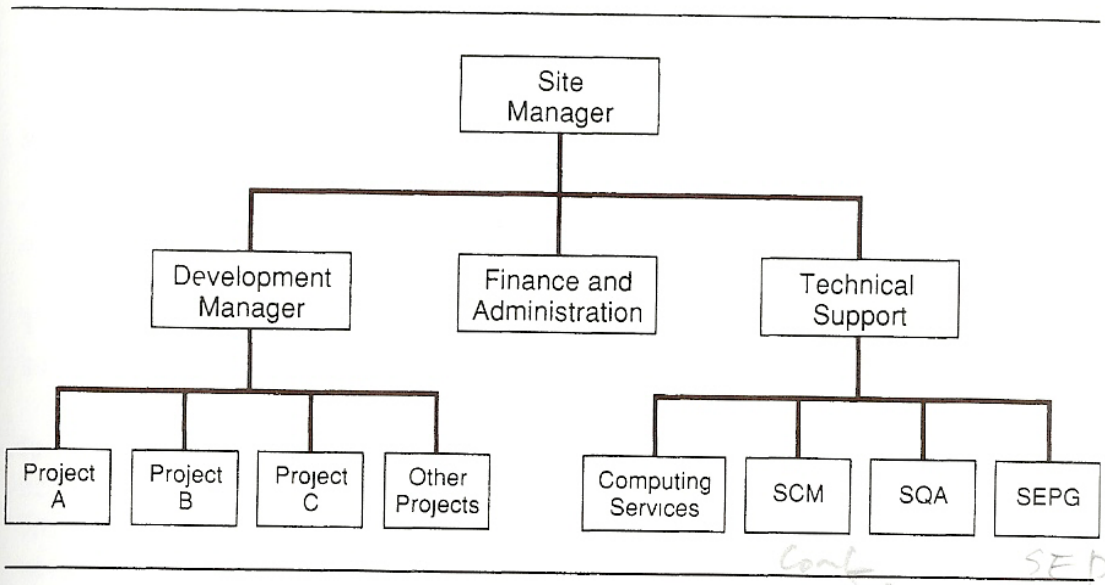

FIGURE 5.1
Typical Software Laboratory Organization

The Quarterly Review

Simple Project Schedule Checkpoints (Table 5.2)

TABLE 5.2
SIMPLE PROJECT SCHEDULE CHECKPOINTS

Project: _____ Manager: _____ Date: _____

Item	Planned	Projected	Actual	Difference
Functional Rqts. Approval				
Phase 1 Review Approval				
Design Reviews Complete				
Phase 2 Review Approval				
Code Reviews Complete				
Unit Test Complete				
Phase 3 Review Approval				
Integration Test Entry Complete				
System Test Complete				
Phase 4 Review Approval				
Customer Shipment				

Project Phase Reviews

Management must also assess project progress periodically.

This is typically accomplished through a sequence of reviews at key points in each project.

Project Phase Reviews

ISO/DoD Standards

- DoD standards MIL-STD-2167
  - Establishes a uniform software development process which is applicable throughout the system life cycle
  - http://www.stsc.hill.af.mil/
  - http://www.crosstalkonline.org
- MIL-STD-498: SW Development and Documentation
- ISO/IEC 12207: Information Technology – SW Life Cycle Processes
- ISO/IEC 15504: Information Technology – Process Assessment (SPICE)
- ISO/IEC 15288: Systems and Software Engineering – System Life Cycle Processes
- ISO 9000 Series – standards related to quality management systems

Establishing a Project Management System

The most important management review system is that conducted by the project management team itself.

If project management is not aware of and not actively involved in project issues, no other management system can be fully effective.

With effective and involved project managers, however, a management system is still needed to resolve conflicts between the projects and between the line and the staff organizations.

References

Humphrey, Watts S., *Managing the Software Process*, The SEI Series in Software Engineering, Addison-Wesley, 1989. (29th Printing, May 2003) (ISBN 0-201-18095-2)