

Chapter 4: Project Integration Management



Ir. Munawar, MMSI,. M.Com
an_moenawar@yahoo.com

Learning Objectives

- Describe an overall framework for project integration management as it relates to the other project management knowledge areas and the project life cycle.
- Explain the strategic planning process and apply different project selection methods.
- Explain the importance of creating a project charter to formally initiate projects.
- Discuss the process of creating a preliminary project scope statement.

Learning Objectives

- Describe project management plan development, including content, using guidelines and templates for developing plans, and performing a stakeholder analysis to help manage relationships.
- Explain project execution, its relationship to project planning, the factors related to successful results, and tools and techniques to assist in project execution.
- Describe the process of monitoring and controlling project work.

Learning Objectives

- Understand the integrated change control process, planning for and managing changes on information technology projects, and developing and using a change control system.
- Explain the importance of developing and following good procedures for closing projects.
- Describe how software can assist in project integration management.

What is Project Integration Management?

- Project integration management involves coordinating all the other project management knowledge areas throughout a project's life cycle.
- Integration ensures that all the elements of a project come together at the right times to complete a project successfully.

Project Integration Management Processes

- **Develop the project charter:** Work with stakeholders to create the document that formally authorizes a project—the charter.
- **Develop the preliminary project scope statement:** Work with stakeholders, especially users of the project's products, services, or results, to develop the high-level scope requirements and create a preliminary project scope statement.
- **Develop the project management plan:** Coordinate all planning efforts to create a consistent, coherent document—the project management plan.

Project Integration Management Processes (cont'd)

- **Direct and manage project execution:** Carry out the project management plan by performing the activities included in it.
- **Monitor and control the project work:** Oversee project work to meet the performance objectives of the project.
- **Perform integrated change control:** Coordinate changes that affect the project's deliverables and organizational process assets.
- **Close the project:** Finalize all project activities to formally close the project.

The Key to Overall Project Success: Good Project Integration Management

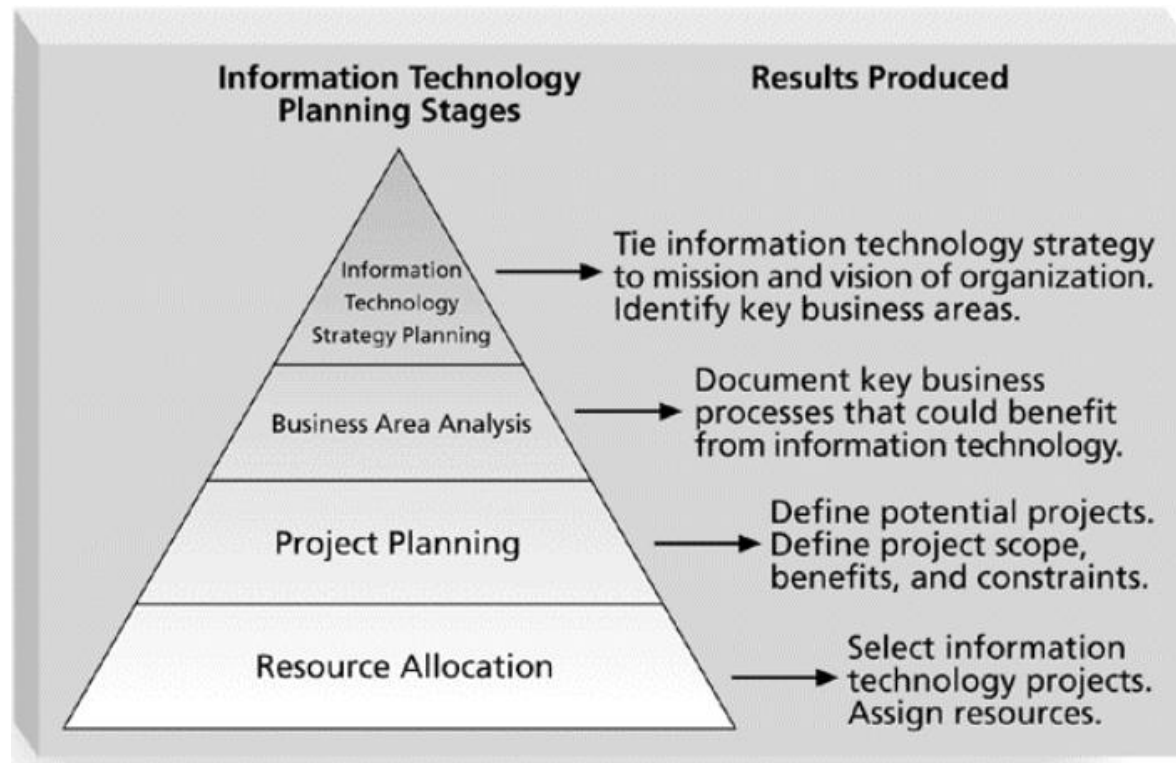
- Coordinating all of the people, plans, and work required to complete a project
- Focus on the big picture of the project and steer the project team toward successful completion
- Make final decision when there are conflicts among project goals or people involved
- Communicate key project information to top management

Interface Management

- Interface management involves identifying and managing the points of interaction b/w various elements of the project.
- The number of interfaces can increase exponentially as the number of people involved in the project increase.
- The most important jobs of a project manager is to establish and maintain good communication and relationships across organizational interfaces

Strategic Planning and Project Selection

- Identifying Potential Projects
 - Deciding what projects to do in the first place



Strategic Planning and Project Selection

- **Strategic planning** involves determining long-term objectives, predicting future trends, and projecting the need for new products and services.
- Organizations often perform a **SWOT analysis**:
 - **Strengths, Weaknesses, Opportunities, and Threats**

Methods for Selecting Projects

- There is usually not enough time or resources to implement all projects.
- Methods for selecting projects include:
 - Focusing on broad organizational needs.
 - Categorizing information technology projects.
 - Performing net present value or other financial analyses.
 - Using a weighted scoring model.
 - Implementing a balanced scorecard.

Focusing on Broad Organizational Needs

- It is often difficult to provide strong justification for many IT projects, but everyone agrees they have a high value.
- “It is better to measure gold roughly than to count pennies precisely.”
- Three important criteria for projects:
 - There is a **need** for the project.
 - There are **funds** available for the project.
 - There is a strong **will** to make the project succeed.

Categorizing IT Projects

- One categorization assesses whether the project provides a response to:
 - A problem
 - An opportunity
 - A directive
- Another categorization is based on the time it will take to complete a project or the date by which it must be done.
- Another categorization is the overall priority of the project.

Financial Analysis of Projects

- Financial considerations are often an important aspect of the project selection process.
- Three primary methods for determining the projected financial value of projects:
 - Net present value (NPV) analysis
 - Return on investment (ROI)
 - Payback analysis

Net Present Value Analysis

- **Net present value (NPV)** analysis is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time.
- Projects with a positive NPV should be considered if financial value is a key criterion.
- The higher the NPV, the better.

Figure 4-2. Net Present Value Example

	A	B	C	D	E	F	G
1	Discount rate	10%					
2							
3	PROJECT 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
4	Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000
5	Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000
6	Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
7	NPV →	\$2,316					
8		Formula =npv(b1,b6:f6)					
9							
10	PROJECT 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
11	Benefits	\$1,000	\$2,000	\$4,000	\$4,000	\$4,000	\$15,000
12	Costs	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
13	Cash flow	(\$1,000)	\$0	\$2,000	\$2,000	\$2,000	\$5,000
14	NPV →	\$3,201					
15		Formula =npv(b1,b13:f13)					
16							

Note that totals are equal, but NPVs are not because of the time value of money.

Figure 4-3. JWD Consulting NPV Example

Multiply by the discount factor each year, then subtract costs from cumulative benefits to get NPV.

Discount rate	8%								
Assume the project is completed in Year 0		Year							
	0	1	2	3	Total				
Costs	140,000	40,000	40,000	40,000					
Discount factor	1	0.93	0.86	0.79					
Discounted costs	140,000	37,200	34,400	31,600	243,200				
Benefits	0	200,000	200,000	200,000					
Discount factor	1	0.93	0.86	0.79					
Discounted benefits	0	186,000	172,000	158,000	516,000				
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	272,800	← NPV			
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800					
ROI	→ 112%								
	Payback In Year 1								

Note: See the template called business_case_financials.xls.

NPV Calculations

- Determine estimated costs and benefits for the life of the project and the products it produces.
- Determine the discount rate (check with your organization on what to use).
- Calculate the NPV (see text for details).
- Some organizations consider the investment year as year 0, while others consider it year 1. Some people enter costs as negative numbers, while others do not. Make sure to identify your organization's preferences.

Return on Investment

- **Return on investment (ROI)** is calculated by subtracting the project costs from the benefits and then dividing by the costs.

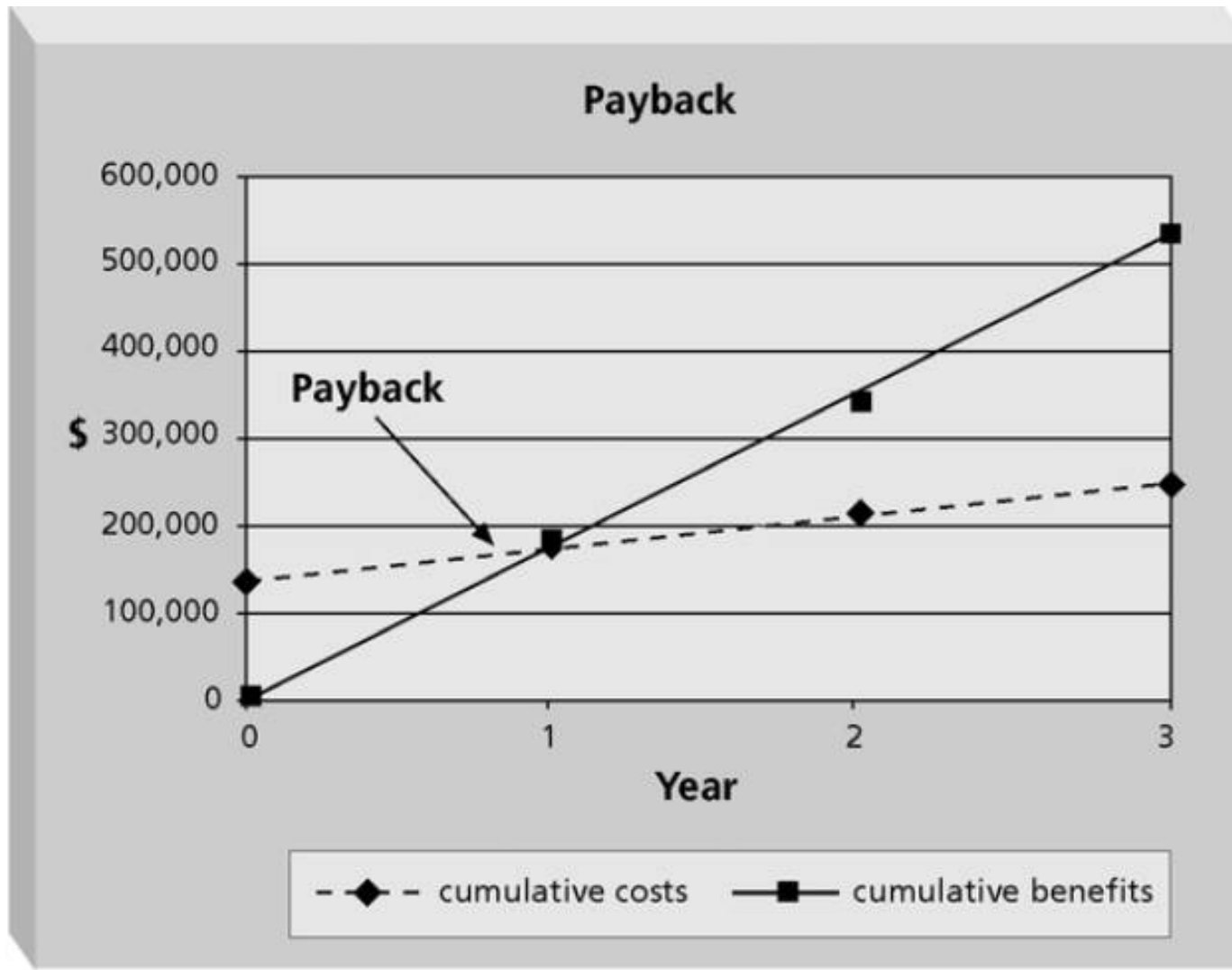
$$\text{ROI} = (\text{total discounted benefits} - \text{total discounted costs}) / \text{discounted costs}$$

- The higher the ROI, the better.
- Many organizations have a required rate of return or minimum acceptable rate of return on investment for projects.
- Internal rate of return (IRR) can be calculated by setting the NPV to zero.

Payback Analysis

- Another important financial consideration is payback analysis.
- The **payback period** is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project.
- Payback occurs when the cumulative discounted benefits and costs are greater than zero.
- Many organizations want IT projects to have a fairly short payback period.

Figure 4-4. Charting the Payback Period

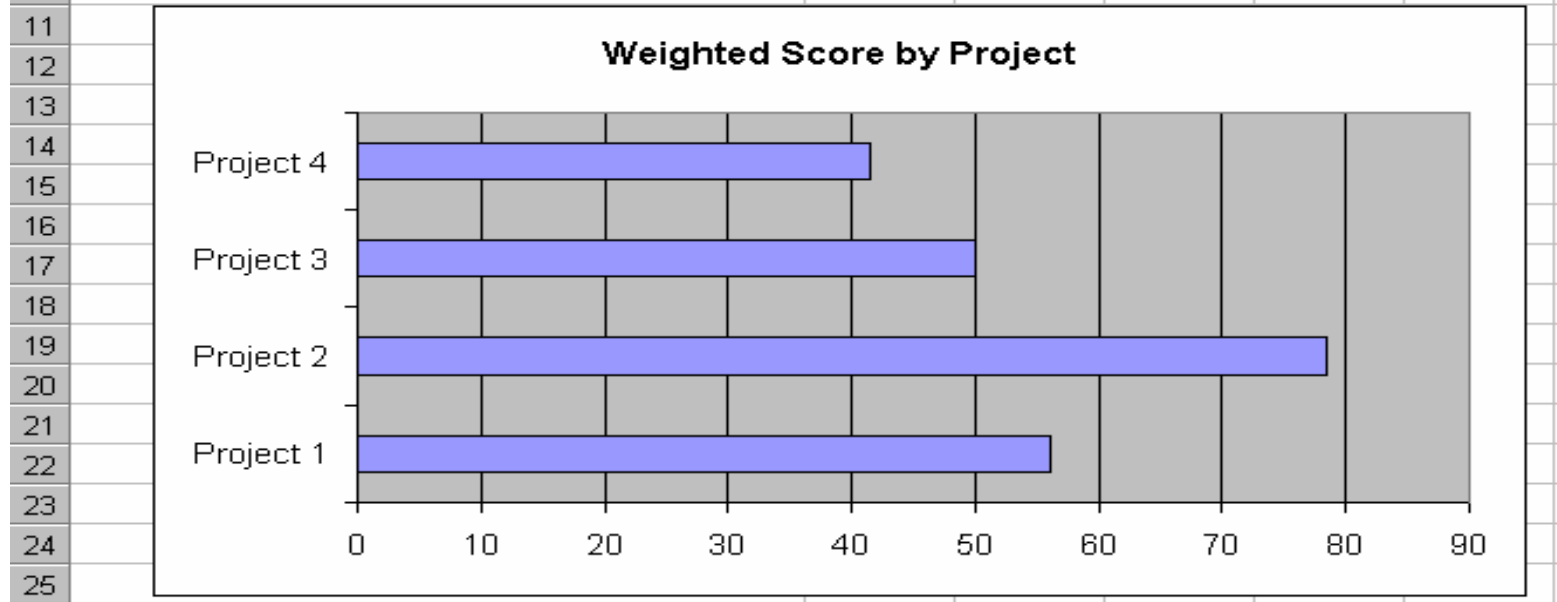


Weighted Scoring Model

- A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria.
- Steps in identifying a weighted scoring model:
 1. Identify criteria important to the project selection process.
 2. Assign weights (percentages) to each criterion so they add up to 100 percent.
 3. Assign scores to each criterion for each project.
 4. Multiply the scores by the weights to get the total weighted scores.
- The higher the weighted score, the better.

Figure 4-5. Sample Weighted Scoring Model for Project Selection

	A	B	C	D	E	F
1	Criteria	Weight	Project 1	Project 2	Project 3	Project 4
2	Supports key business objectives	25%	90	90	50	20
3	Has strong internal sponsor	15%	70	90	50	20
4	Has strong customer support	15%	50	90	50	20
5	Realistic level of technology	10%	25	90	50	70
6	Can be implemented in one year or less	5%	20	20	50	90
7	Provides positive NPV	20%	50	70	50	50
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90
9	Weighted Project Scores	100%	56	78.5	50	41.5
10						



Implementing a Balanced Scorecard

- Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy.
- A **balanced scorecard** is a methodology that converts an organization's value drivers, such as customer service, innovation, operational efficiency, and financial performance, to a series of defined metrics.
- See www.balancedscorecard.org for more information.

Project Charters

- After deciding what project to work on, it is important to let the rest of the organization know.
- A **project charter** is a document that formally recognizes the existence of a project and provides direction on the project's objectives and management.
- Key project stakeholders should sign a project charter to acknowledge agreement on the need and intent of the project; a signed charter is a key output of project integration management.

Input for Developing a Project Charter

- A contract: includes much of the information needed for creating a good project charter
- Statement of work: describe business need for the project, summary of the requirements and characteristics of the products or services, and organizational information
- Enterprise environmental factors: organization's structure, culture, infrastructure, human resources, personnel policies, marketplace conditions, stakeholder risk tolerances, industry risk information

Input for Developing a Project Charter

- Organizational process assets information: formal and informal plan, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information

Project Charters

- The project's title and date of authorization
- The project manager's name and contact information
- A summary schedule, including the planned start and finish dates
- A summary of the project's budget or reference to budgetary documents
- A brief description of the project objectives, including the business need or other justification for authorizing the project
- A roles and responsibilities matrix
- A sign-off section for signatures of key project stakeholders
- A comments section in which stakeholders can provide important comments related to the project

Project Charters

Project Title: Project Management Intranet Site Project

Project Start Date: May 2, 2005

Projected Finish Date: November 4, 2005

Budget Information: The firm has allocated \$140,000 for this project. The majority of costs for this project will be internal labor. An initial estimate provides a total of 80 hours per week.

Project Manager: Erica Bell, (310) 555-5896, erica_bell@jwdconsulting.com

Project Objectives: Develop a new capability accessible on JWD Consulting's intranet site to help internal consultants and external customers manage projects more effectively. The intranet site will include several templates and tools that users can download, examples of completed templates and related project management documents used on real projects, important articles related to recent project management topics, an article retrieval service, links to other sites with useful information, and an "Ask the Expert" feature, where users can post questions they have about their projects and receive advice from experts in the field. Some parts of the intranet site will be accessible free to the public, other parts will only be accessible to current customers and/or internal consultants, and other parts of the intranet site will be accessible for a fee.

Project Charters

Approach:

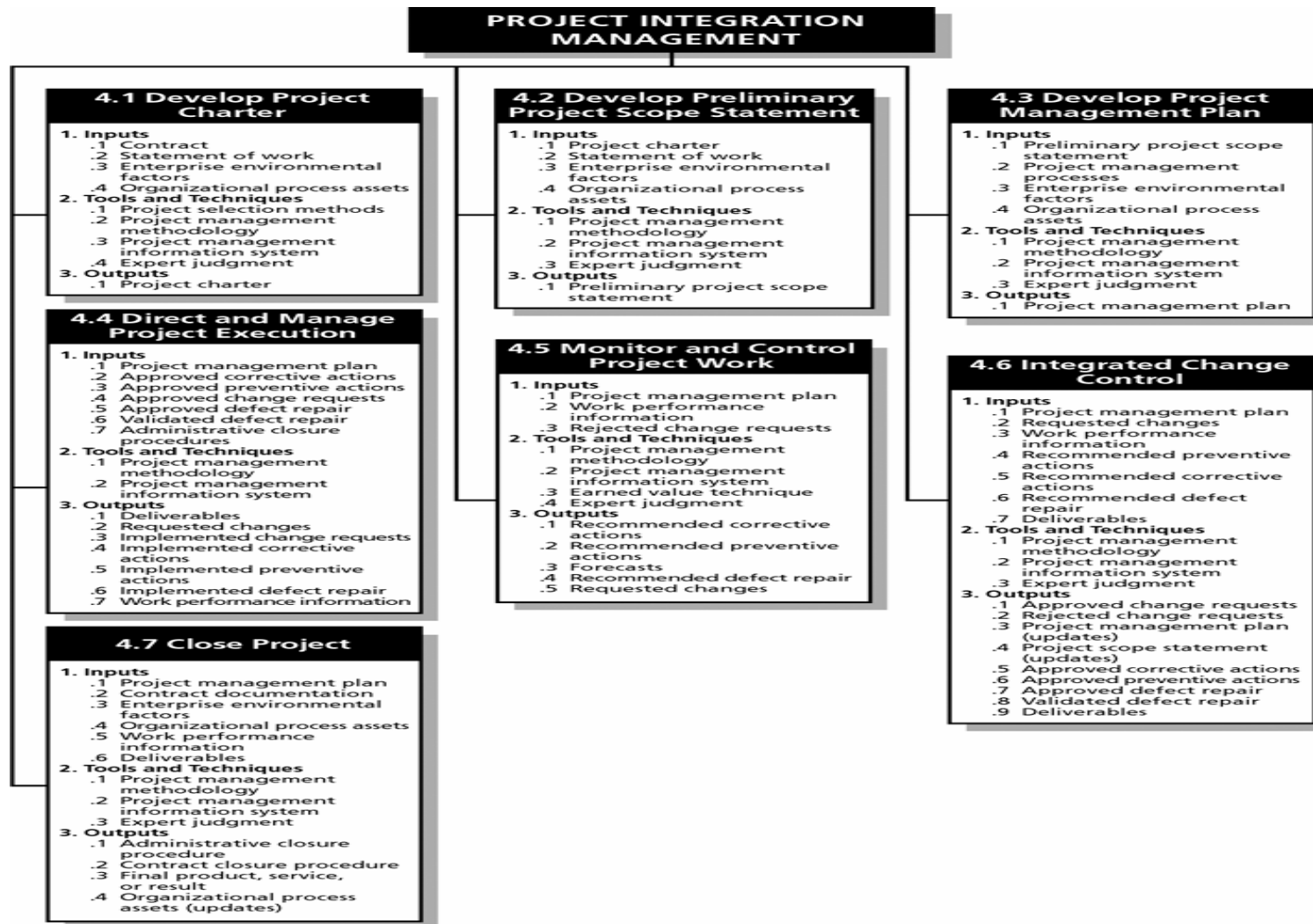
- Develop a survey to determine critical features of the new intranet site and solicit input from consultants and customers.
- Review internal and external templates and examples of project management documents.
- Research software to provide security, manage user inputs, and facilitate the article retrieval and “Ask the Expert” features.
- Develop the intranet site using an iterative approach, soliciting a great deal of user feedback.
- Determine a way to measure the value of the intranet site in terms of reduced costs and new revenues, both during the project and one year after project completion.

Project Charters

ROLES AND RESPONSIBILITIES:

NAME	ROLE	POSITION	CONTACT INFORMATION
Joe Fleming	Sponsor	JWD Consulting, CEO	joe_fleming@jwdconsulting.com
Erica Bell	Project Manager	JWD Consulting, manager	erica_bell@jwdconsulting.com
Michael Chen	Team Member	JWD Consulting, senior consultant	michael_chen@jwdconsulting.com
Jessie Faue	Team Member	JWD Consulting, consultant	jessie_faue@jwdconsulting.com
Kevin Dodge	Team Member	JWD Consulting, IT department	kevin_dodge@jwdconsulting.com
Cindy Dawson	Team Member	JWD Consulting, IT department	cindy_dawson@jwdconsulting.com
Kim Phuong	Advisor	Client representative	kim_phuong@client1.com
Page Miller	Advisor	Client representative	page_miller@client2.com

Figure 4-6. Project Integration Management Overview



Preliminary Scope Statements

- A **scope statement** is a document used to develop and confirm a common understanding of the project scope.
- It is an important tool for preventing **scope creep**:
 - The tendency for project scope to keep getting bigger.
- A good practice is to develop a preliminary or initial scope statement during project initiation and a more detailed scope statement as the project progresses.

Scope Statement (Draft Version)

Product Characteristics and Requirements:

1. **Templates and tools:** The intranet site will allow authorized users to download files they can use to create project management documents and to help them use project management tools. These files will be in Microsoft Word, Excel, Access, Project, or in HTML or PDF format, as appropriate.
2. **User submissions:** Users will be encouraged to e-mail files with sample templates and tools to the Webmaster. The Webmaster will forward the files to the appropriate person for review and then post the files to the intranet site, if desired.
3. **Articles:** Articles posted on the intranet site will have appropriate copyright permission. The preferred format for articles will be PDF. The project manager may approve other formats.
4. **Requests for articles:** The intranet site will include a section for users to request someone from the Project Management Office (PMO) at JWD Consulting to research appropriate articles for them. The PMO manager must first approve the request and negotiate payments, if appropriate.
5. **Links:** All links to external sites will be tested on a weekly basis. Broken links will be fixed or removed within five working days of discovery.

Scope Statement (Draft Version)

(continued)

6. The “Ask the Expert” feature must be user-friendly and capable of soliciting questions and immediately acknowledging that the question has been received in the proper format. The feature must also be capable of forwarding the question to the appropriate expert (as maintained in the system’s expert database) and capable of providing the status of questions that are answered. The system must also allow for payment for advice, if appropriate.
 7. Security: The intranet site must provide several levels of security. All internal employees will have access to the entire intranet site when they enter their security information to access the main, corporate intranet. Part of the intranet will be available to the public from the corporate Web site. Other portions of the intranet will be available to current clients based on verification with the current client database. Other portions of the intranet will be available after negotiating a fee or entering a fixed payment using pre-authorized payment methods.
 8. Search feature: The intranet site must include a search feature for users to search by topic, key words, etc.
 9. The intranet site must be accessible using a standard Internet browser. Users must have appropriate application software to open several of the templates and tools.
 10. The intranet site must be available 24 hours a day, 7 days a week, with one hour per week for system maintenance and other periodic maintenance, as appropriate.
-

Project Management Plans

- A **project management plan** is a document used to coordinate all project planning documents and help guide a project's execution and control.
- Plans created in the other knowledge areas are subsidiary parts of the overall project management plan.

Attributes of Project Plans

- Just as projects are unique, so are project plans.
- Plans should be:
 - Dynamic
 - Flexible
 - Updated as changes occur
- Plans should first and foremost guide project execution by helping the project manager lead the project team and assess project status.

Common Elements of a Project Management Plan

- Introduction or overview of the project.
- Description of how the project is organized.
- Management and technical processes used on the project.
- Work to be done, schedule, and budget information.

Introduction of the Project

- The project name
- A brief description of the project and the need it addresses
- The sponsor's name
- The names of the project manager and key team members
- Deliverables of the project
- A list of important reference materials
- A list of definition and acronyms

Description of How the Project is Organized

- Organizational charts
- Project responsibilities
- Other organizational or process-related information

Management and Technical Processes Used on the Project

- Management objectives
- Project controls
- Risk management
- Project staffing
- Technical process

Work to be Done

- Major work packages
- Key deliverables
- Other work-related information

Project Schedule

- Summary schedule
- Detailed schedule
- Other schedule-related information

Budget

- Summary budget
- Detailed budget
- Other budget-related information

Table 4-1. Sample Contents for a Software Project Management Plan (SPMP)

MAJOR PROJECT MANAGEMENT PLAN SECTIONS					
	OVERVIEW	PROJECT ORGANIZATION	MANAGERIAL PROCESS PLANS	TECHNICAL PROCESS PLANS	SUPPORTING PROCESS PLANS
Section Topics	Purpose, scope, and objectives; assumptions and constraints; project deliverables; schedule and budget summary; evolution of the plan	External interfaces; internal structure; roles and responsibilities	Start-up plans (estimation, staffing, resource acquisition, and project staff training plans); work plan (work activities, schedule, resource, and budget allocation); control plan; risk management plan; closeout plan	Process model; methods, tools, and techniques; infrastructure plan; product acceptance plan	Configuration management plan; verification and validation plan; documentation plan; quality assurance plan; reviews and audits; problem resolution plan; subcontractor management plan; process improvement plan

IEEE Standard 1058-1998.

What the Winners Do

“The winners clearly spell out what needs to be done in a project, by whom, when, and how. For this they use an integrated toolbox, including PM tools, methods, and techniques...If a scheduling template is developed and used over and over, it becomes a repeatable action that leads to higher productivity and lower uncertainty. Sure, using scheduling templates is neither a breakthrough nor a feat. But laggards exhibited almost no use of the templates. Rather, in constructing schedules their project managers started with a clean sheet, a clear waste of time.”*

*Milosevic, Dragan and And Ozbay, “Delivering Projects: What the Winners Do,” Proceedings of the Project Management Institute Annual Seminars & Symposium (November 2001).

Stakeholder Analysis

- A **stakeholder analysis** documents important (often sensitive) information about stakeholders such as:
 - Stakeholders' names and organizations.
 - Their roles on the project.
 - Unique facts about each stakeholder.
 - Their level of influence on and interest in the project.
 - Suggestions for managing relationships with each stakeholder.

Table 4-2. Sample Stakeholder Analysis

	KEY STAKEHOLDERS				
	AHMED	SUSAN	ERIK	MARK	DAVID
<i>Organization</i>	Internal senior management	Project team	Project team	Hardware vendor	Project manager for other internal projects
<i>Role on project</i>	Project sponsor and one of the company's founders	DNA sequencing expert	Lead programmer	Supplier of some instrument hardware	Competitor for company resources
<i>Unique facts</i>	Quiet, demanding, likes details, business-focused, Stanford MBA	Ph.D. in biology, easy to work with, has toddler	Very smart, best programmer I know, weird sense of humor	Head of a start-up company, he knows we can make him rich if this works	Nice guy, one of the oldest people at company, has three kids in college
<i>Level of interest</i>	Very high	Very high	High	Very high	Low to medium
<i>Level of influence</i>	Very high; can call the shots	Subject matter expert; critical to success	High; hard to replace	Low; other vendors available	Low to medium
<i>Suggestions on managing relationship</i>	Keep informed, let him lead conversations, do as he says and quickly	Make sure she reviews specifications and leads testing; can do some work from home	Keep him happy so he stays; emphasize stock options; likes Mexican food	Give him enough lead time to deliver hardware	He knows his project takes a back seat to this one, but I can learn from him

Project Execution

- Project execution involves managing and performing the work described in the project management plan.
- The majority of time and money is usually spent on execution.
- The application area of the project directly affects project execution because the products of the project are produced during project execution.

Project Execution

- The project manager need to focus on leading the project team and managing stakeholder relationships to execute the project management plan successfully.
- Project human resource management and project communications management are crucial.

Coordinating Planning and Execution

- Project planning and execution are intertwined and inseparable activities.
- Those who will do the work should help to plan the work.
- Project managers must solicit input from the team to develop realistic plans.

Leadership and a Supportive Culture

- Project managers must lead by example to demonstrate the importance of creating and then following good project plans.
- Organizational culture can help project execution by:
 - Providing guidelines and templates.
 - Tracking performance based on plans.
- Project managers may still need to break the rules to meet project goals, and senior managers must support those actions.

Important Skills for Project Execution

- General management skills such as leadership, communication, and political skills.
- Product, business, and application area skills and knowledge.
- Use of specialized tools and techniques.

Project Execution Tools and Techniques

- **Project management methodology:** Many experienced project managers believe the most effective way to improve project management is to follow a methodology that describes not only what to do in managing a project, but how to do it.
- **Project management information systems:** Hundreds of project management software products are available on the market today, and many organizations are moving toward powerful enterprise project management systems that are accessible via the Internet.
- See the “What Went Right?” example of Kuala Lumpur’s Integrated Transport Information System.

Monitoring and Controlling Project Work

- Changes are inevitable on most projects, so it's important to develop and follow a process to monitor and control changes.
- Monitoring project work includes collecting, measuring, and disseminating performance information.
- Two important outputs of monitoring and controlling project work include recommended corrective and preventive actions.

Integrated Change Control

- Three main objectives are:
 - Influence the factors that create changes to ensure that changes are beneficial.
 - Determine that a change has occurred.
 - Manage actual changes as they occur.
- A **baseline** is the approved project management plan plus approved changes.

Change Control System

- A formal, documented process that describes when and how official project documents and work may be changed.
- Describes who is authorized to make changes and how to make them.

Change Control Boards (CCBs)

- A formal group of people responsible for approving or rejecting changes on a project.
- CCBs provide guidelines for preparing change requests, evaluate change requests, and manage the implementation of approved changes.
- CCBs include stakeholders from the entire organization.

Making Timely Changes

- Some CCBs only meet occasionally, so it may take too long for changes to occur.
- Some organizations have policies in place for time-sensitive changes.
 - A “48-hour policy” allows project team members to make a decision and have 48 hours to seek approval from top management. If the team decision cannot be implemented, management has 48 hours to reverse a decision; otherwise, the team’s decision is approved.
 - Another policy is to delegate changes to the lowest level possible, but keep everyone informed of changes.

Configuration Management

- Ensures that the descriptions of the project's products are correct and complete.
- Involves identifying and controlling the functional and physical design characteristics of products and their support documentation.
- Configuration management specialists identify and document configuration requirements, control changes, record and report changes, and audit the products to verify conformance to requirements.

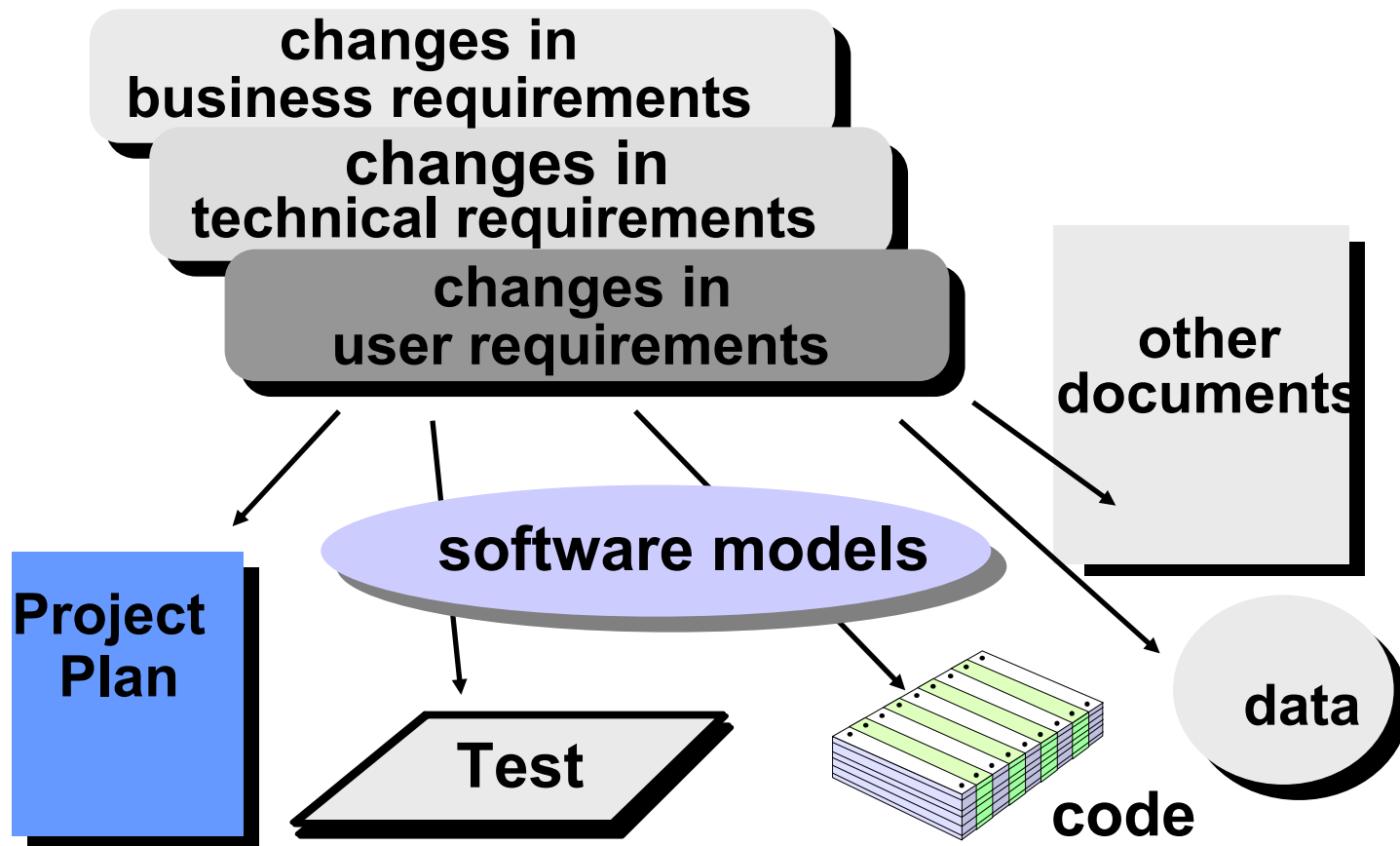
Software Configuration Management (SCM)

The “First Law”

No matter where you are in the system life cycle, the system will change, and the desire to change it will persist throughout the life cycle.

Bersoff, et al, 1980

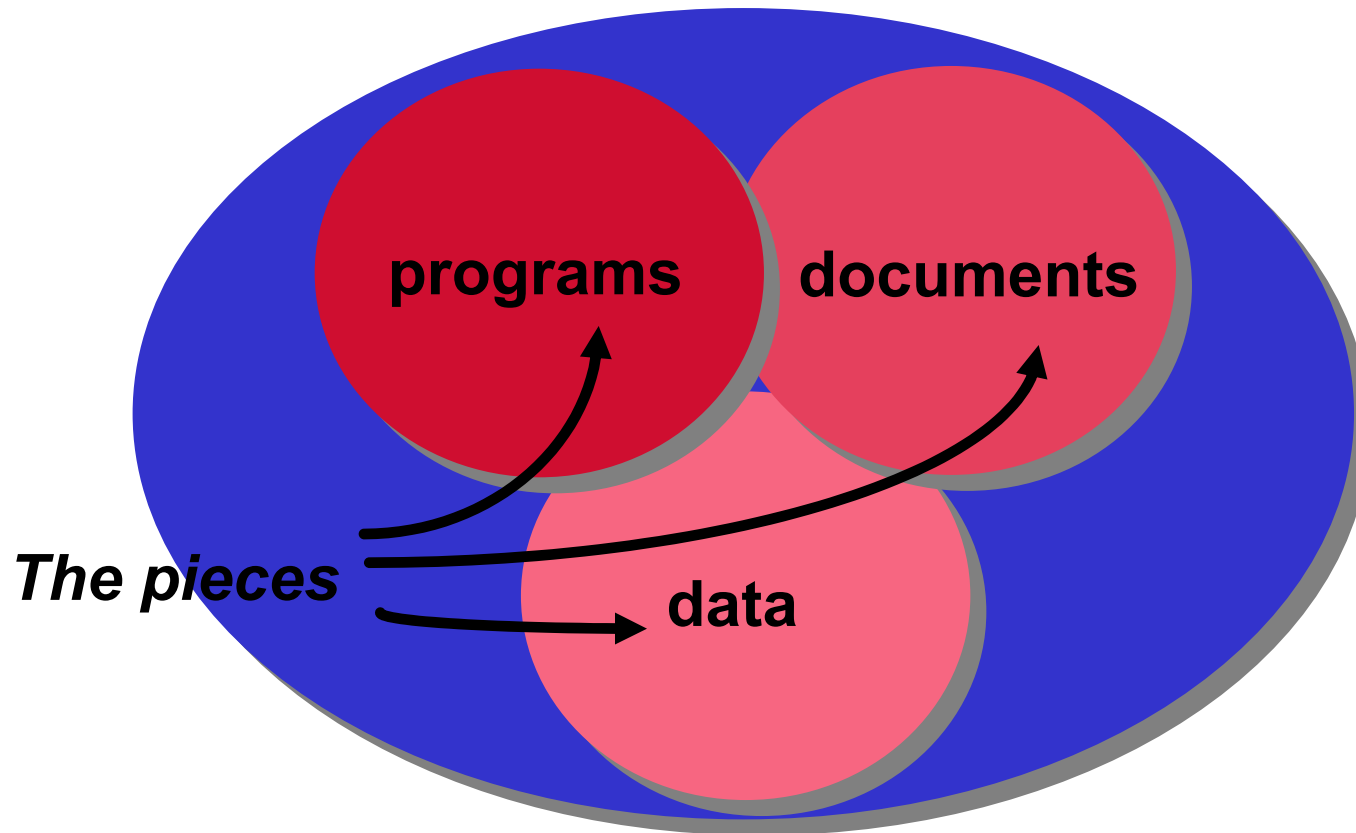
What Are These Changes?



What is SCM

- SCM is a set of tracking and control activities that begin with a software project begins and terminate only when the software is taken out of operation
- The purpose of SCM is to maintain the integrity of products as the evolve from specifications through design, development, and production

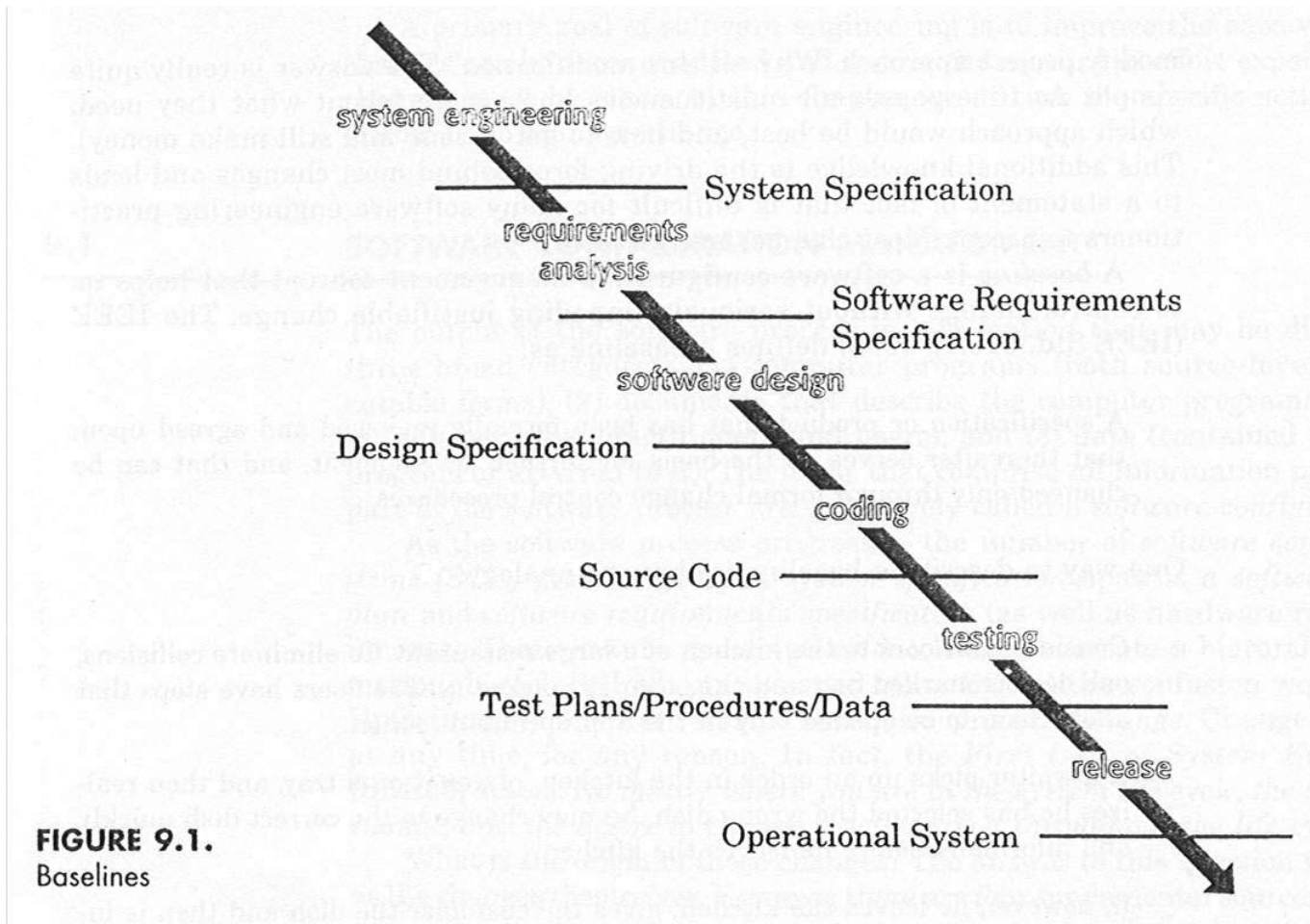
The Software Configuration



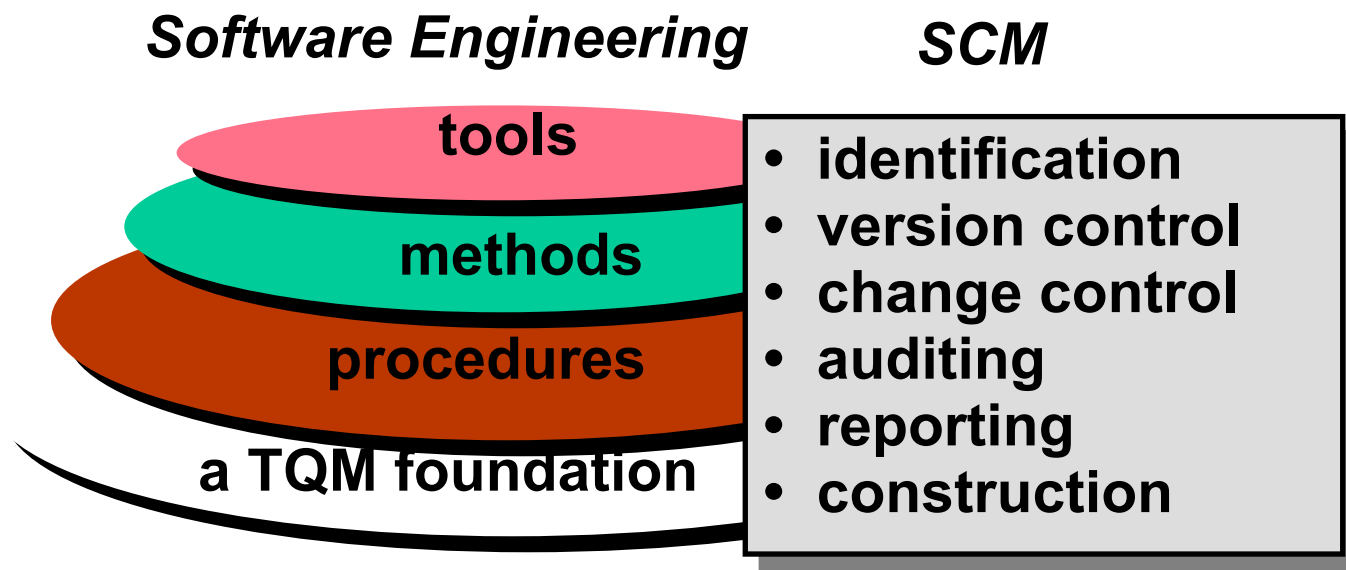
Software Configuration Item (SCI)

- System Specification
- Software Project Plan
- Software Requirements Specification
- Preliminary User Manual
- Design Specification
- Source Code Listing
- Test Specification
- Operation and Installation Manuals
- Executable Program
- Database Description

Software Configuration Item



Change & SCM



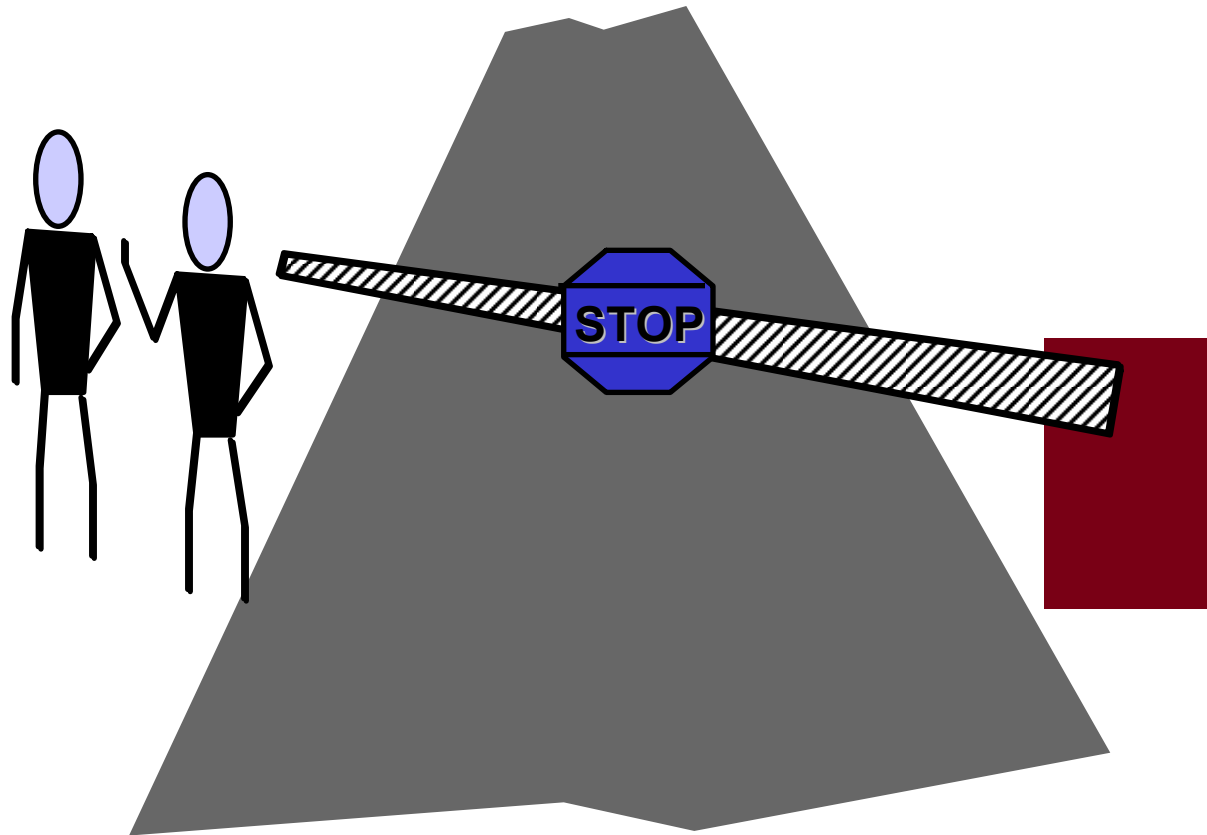
Component Identification

- 714F-RTC-SRS-B
- 714-MTEP-A
 - where
 - 714 -- project
 - RTC -- Real Time Control
 - SRS -- Software Requirement Specification
 - MTEP -- Master Test and Evaluation Plan
 - A -- revision

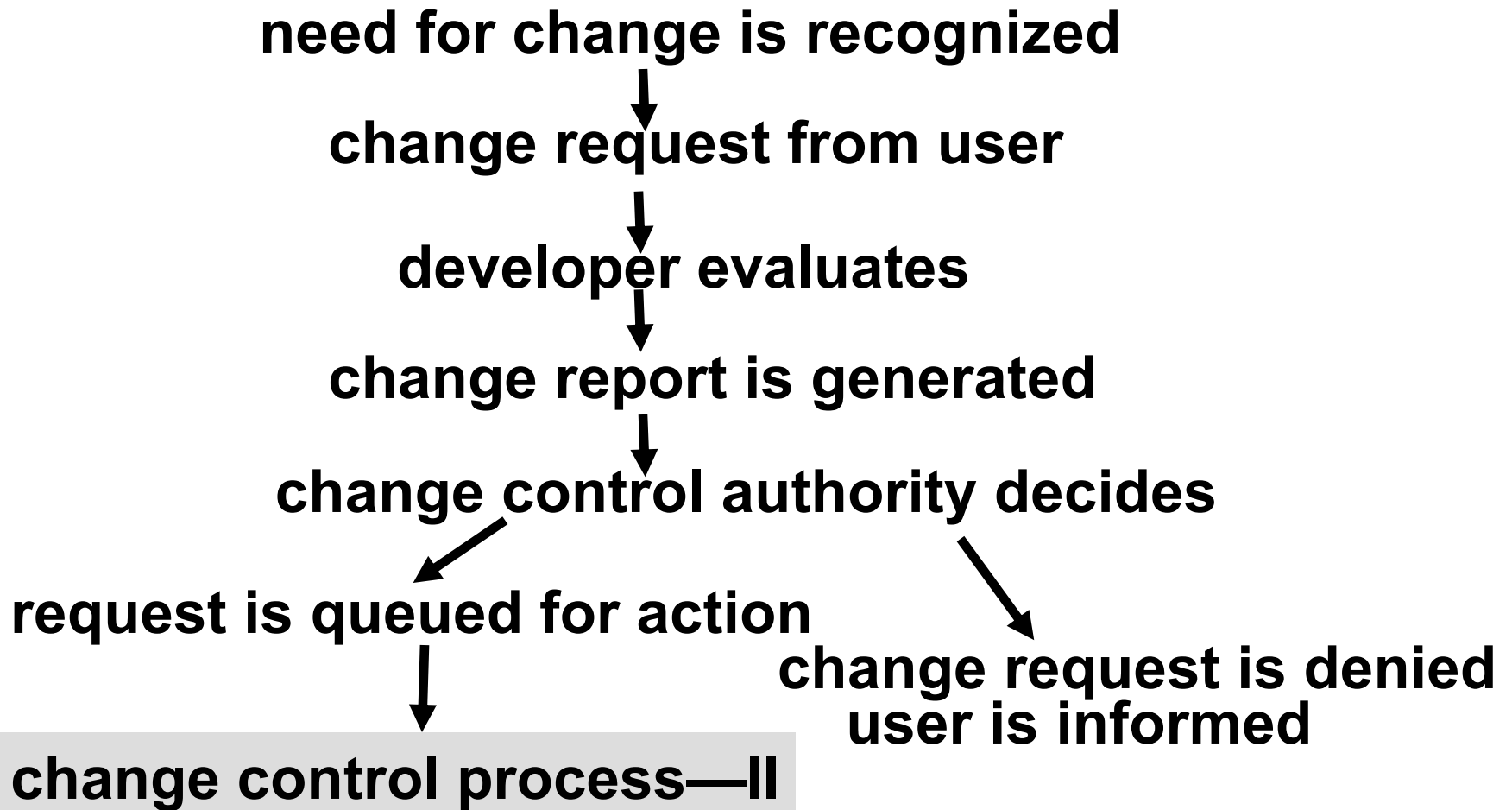
Version Control

- RTC_101.FOR.5
 - where
 - 101 = input / output
 - FOR = Fortran language
 - 5 = version

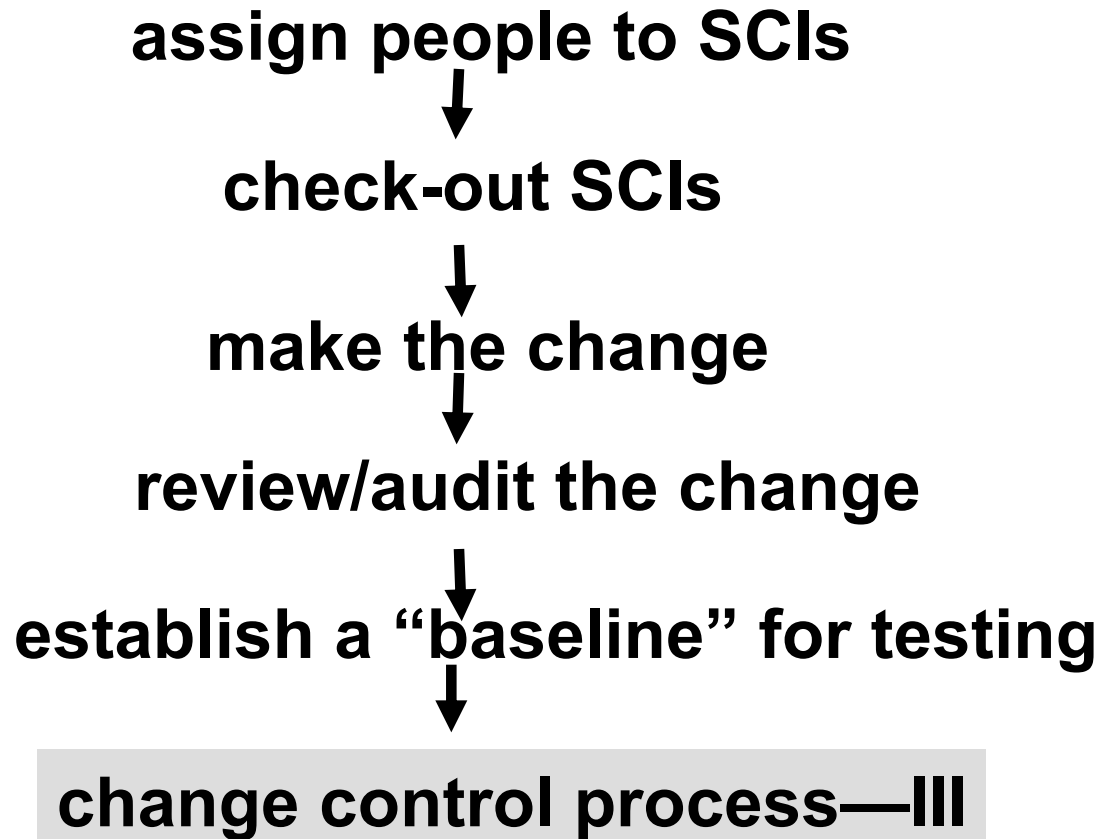
Change Control



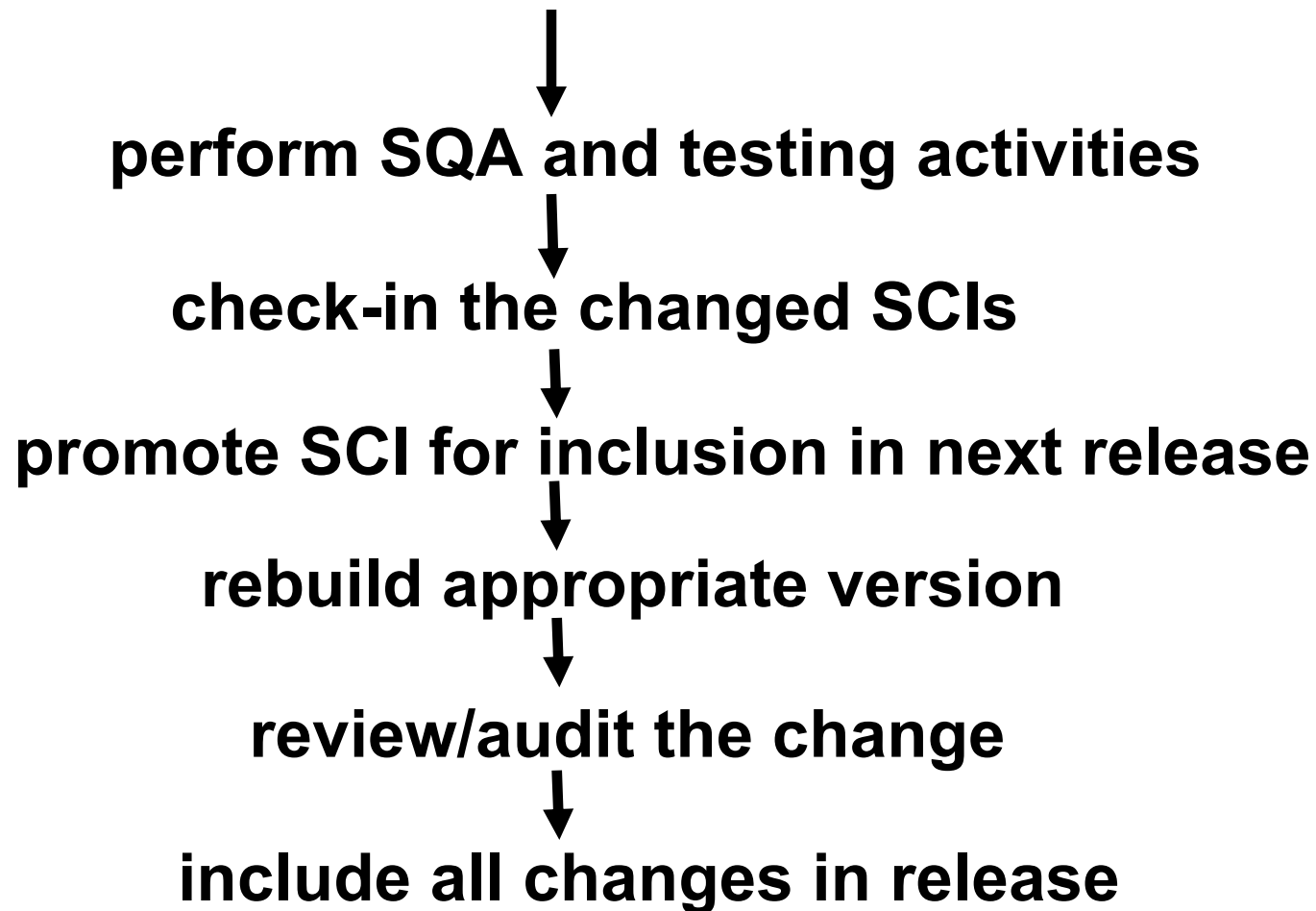
Change Control Process—I



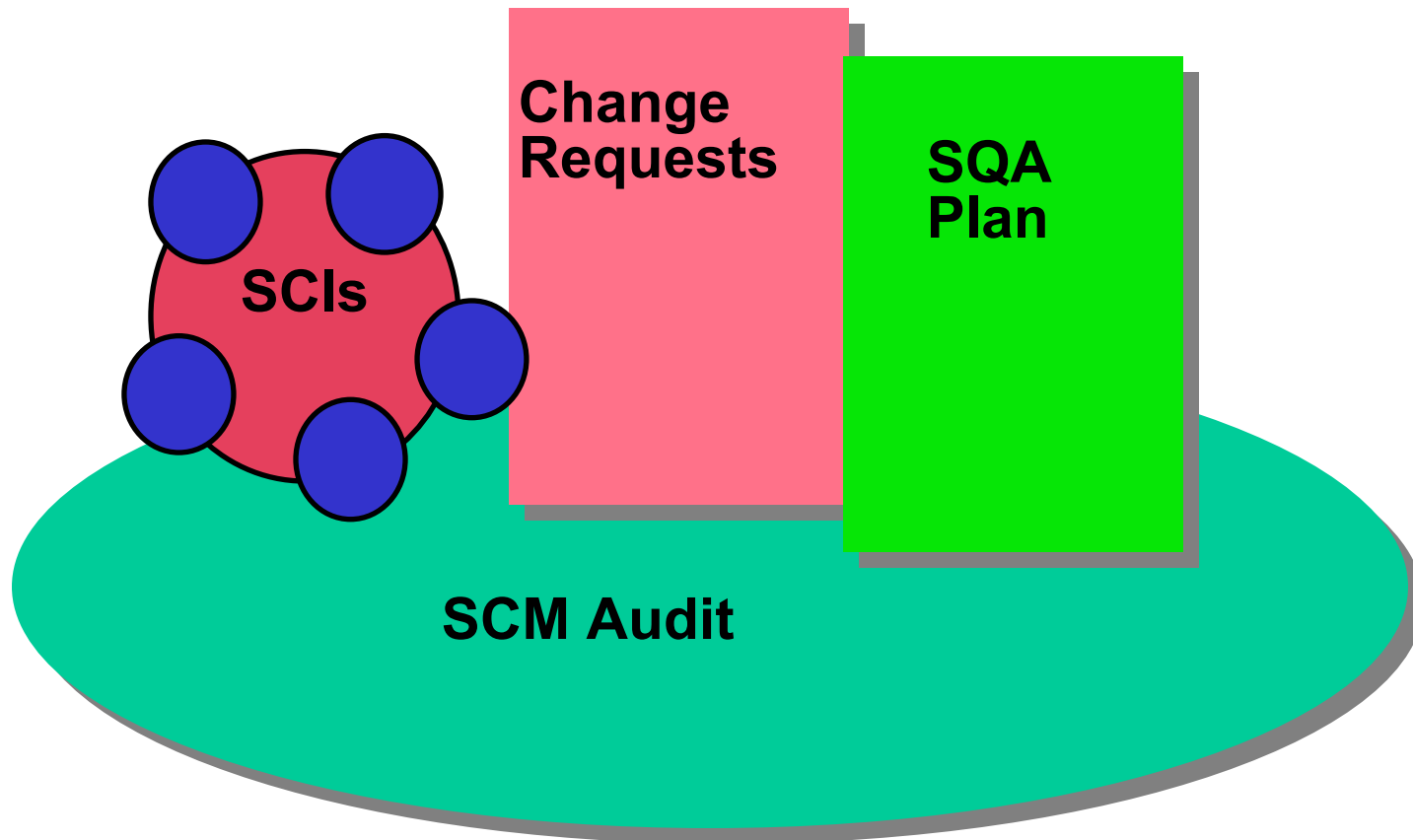
Change Control Process-II



Change Control Process-III



Auditing



Access Control

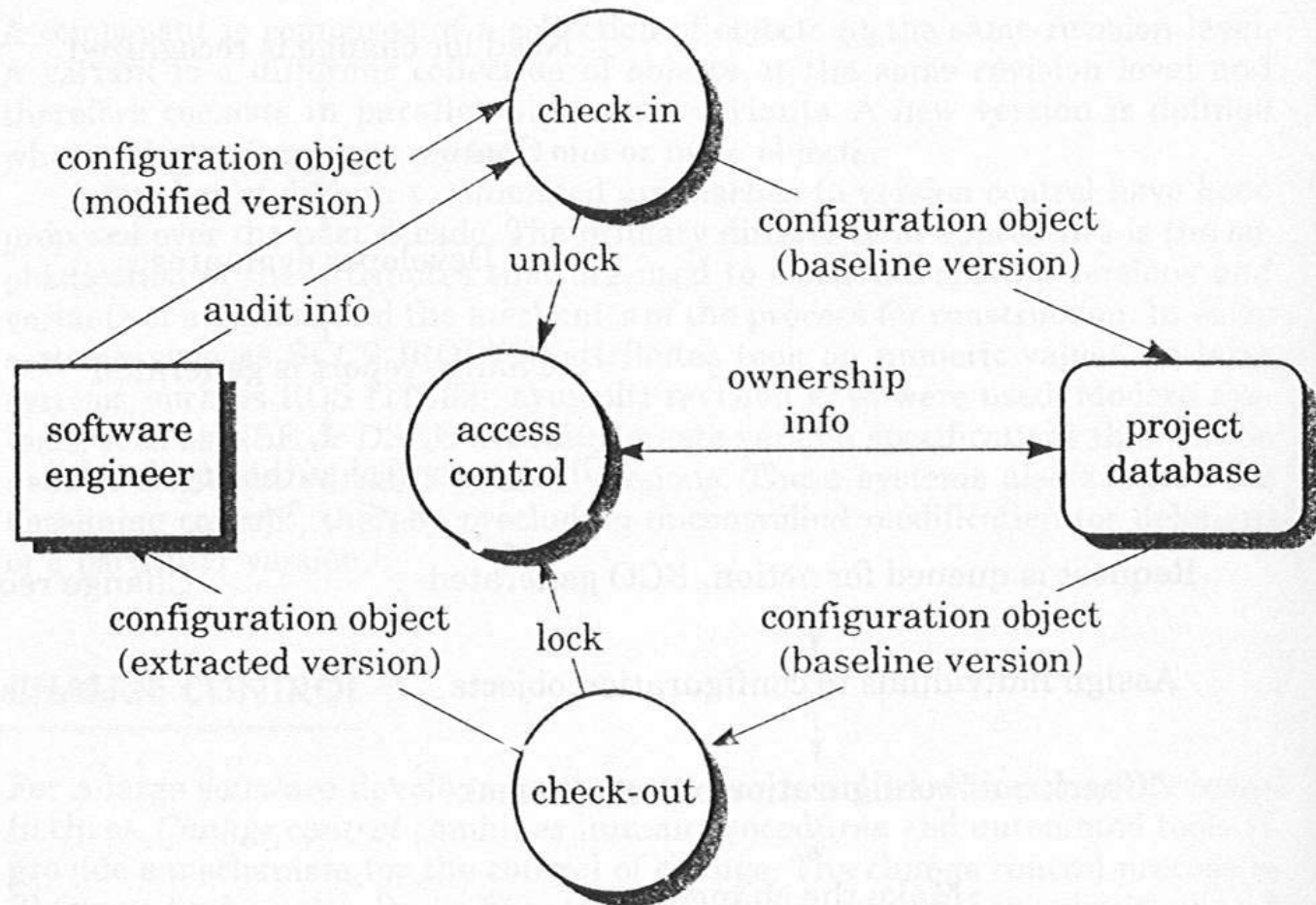


FIGURE 9.8.
Access and synchronization control

Status Accounting

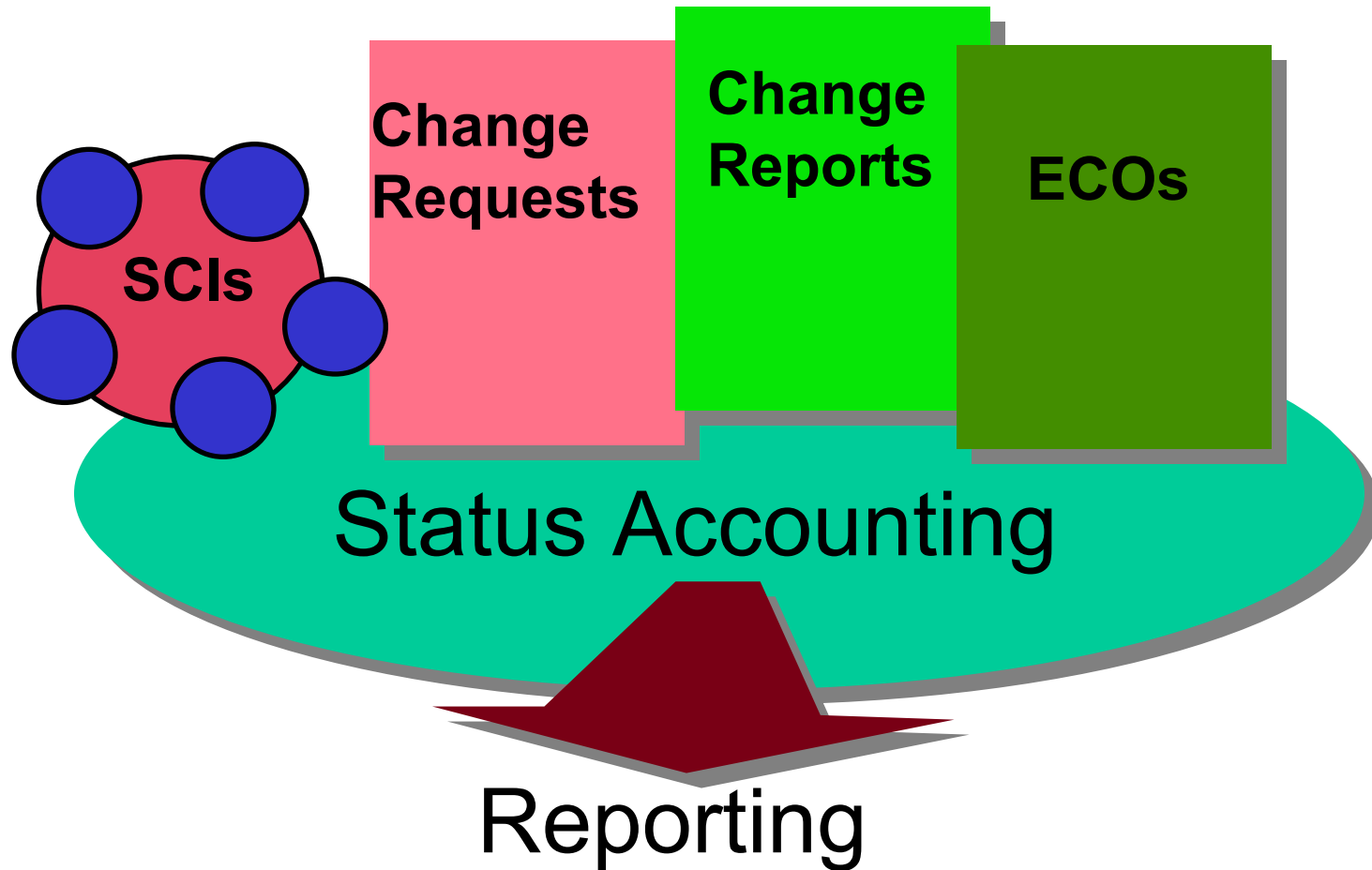


Table 4-3. Suggestions for Managing Integrated Change Control

- View project management as a process of constant communication and negotiation.
- Plan for change.
- Establish a formal change control system, including a change control board (CCB).
- Use good configuration management.
- Define procedures for making timely decisions on smaller changes.
- Use written and oral performance reports to help identify and manage change.
- Use project management and other software to help manage and communicate changes.

Closing Projects

- To close a project, you must finalize all activities and transfer the completed or cancelled work to the appropriate people.
- Main outputs include:
 - Administrative closure procedures.
 - Contract closure procedures.
 - Final products, services, or results.
 - Organizational process asset updates.

Using Software to Assist in Project Integration Management

- Several types of software can be used to assist in project integration management:
 - Word processing software creates documents.
 - Presentation software creates presentations.
 - Spreadsheets or databases perform tracking.
 - Communication software such as e-mail and Web authoring tools facilitate communications.
 - Project management software can pull everything together and show detailed and summarized information.

Chapter Summary

- Project integration management includes:
 - Developing a project charter.
 - Developing a preliminary project scope statement.
 - Developing a project management plan.
 - Directing and managing project execution.
 - Monitoring and controlling project work.
 - Performing integrated change control.
 - Closing the project.