An Introduction to Project Management,
Seventh Edition
Predictive, Agile, and Hybrid Approaches
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Chapter 8: Monitoring and Controlling Projects

Note: See the text itself for full citations. Text website is http://intropm.com.

Learning Objectives

- List several processes and outputs of project monitoring and controlling, and describe outputs common to all knowledge areas when using a predictive approach to project management
- Discuss monitoring and controlling project work and performing integrated change control as part of project integration management and how to use earned value management
- Explain the importance of validating and controlling scope
- Describe the schedule control process and schedule performance measurement tools, such as tracking Gantt charts
- Discuss tools and techniques to assist in cost control
- List the Seven Basic Tools of Quality, and provide examples of how they assist in performing quality control
- Explain the process of controlling resources
- Summarize methods for monitoring communications
- Discuss different approaches to monitoring stakeholder engagement
- Describe the process of monitoring risks
- Explain how to control procurements
- Apply the project management principles to monitoring and controlling projects
- Discuss unique aspects of monitoring and controlling agile/hybrid projects

Introduction

▸ Monitoring and controlling involves regularly measuring progress to ensure that the project is meeting its objectives and addressing current business needs

▸ The project manager and other staff monitor progress against plans and take corrective action when necessary

Figure 8-1. Summary of Monitoring and Controlling Outputs

Knowledge area	Monitoring and controlling process	Outputs
Project integration management	Monitor and control project work	Work performance reports
		Change requests
		Project management plan updates
		Project documents updates
	Perform integrated change control	Approved change requests
		Project management plan updates
		Project documents updates
Project scope management	Validate scope	Accepted deliverables
		Work performance information
		Change requests
		Project documents updates
	Control scope	Work performance information
		Change requests
		Project management plan updates
		Project documents updates
Project time management	Control schedule	Work performance information
		Schedule forecasts
		Change requests
		Project management plan updates
		Project documents updates
Project cost management	Control cost	Work performance information
		Cost forecasts
		Change requests
		Project management plan updates
		Project documents updates
Project quality management	Control quality	Quality control measurements
		Verified deliverables
		Work performance information
		Change requests
		Project management plan updates
		Project documents updates
Project resource management	Control resources	Work performance information
		Change requests
		Project management plan updates
		Project documents updates

Figure 8-1. Summary of Monitoring and Controlling Outputs (continued)

Knowledge area	Monitoring and controlling process	Outputs
Project communications management	Monitor communications	Work performance information Change requests Project management plan updates Project documents updates
Project stakeholder management	Monitor stakeholder engagement	Work performance information Change requests Project management plan updates Project documents updates
Project risk management	Monitor risks	Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
Project procurement management	Control procurements	Closed procurements Work performance information Procurement documentation updates Change requests Project management plan updates Project documents updates Organizational process assets updates

Project Integration Management

- The main monitoring and controlling processes performed as part of project integration management include monitoring and controlling project work and performing integrated change control.

- These are crucial processes that must be done well to ensure project success.

Forecasting With Earned Value Management

- **Earned value management (EVM)** is a project performance measurement technique that integrates scope, time, and cost data
- Given a baseline, project managers and their teams can determine how well the project is meeting scope, time, and cost goals by entering actual information and then comparing it to the baseline
- The baseline information includes:
  - Scope data (WBS tasks)
  - Time data (start and finish estimates for each task)
  - Cost data (cost estimates for each task)
- Note that you can use earned value management at either a detailed or a summary level

Earned Value Terms

▸ The **planned value (PV)** is the authorized budget assigned to scheduled work

▸ The **actual cost (AC)** is the realized cost incurred for the work performed on an activity during a specific time period

▸ The **earned value (EV)** is the measure of work performed expressed in terms of the budget authorized for that work. It cannot be greater than the authorized PV budget for a component as it is calculated as the sum of the PV of the completed work

Figure 8-2a. Earned Value Formulas

Term	Formula
Planned Value (PV)	PV = authorized budget assigned to scheduled work
Earned Value (EV)	EV = PV of all completed work (can also include partially completed work)
Cost Variance (CV)	CV = EV – AC
Schedule Variance (SV)	SV = EV – PV
Cost Performance Index (CPI)	CPI = EV/AC
Schedule Performance Index (SPI)	SPI = EV/PV
Estimate at Completion (EAC)	EAC = Budget at Completion (BAC)/CPI (one method)
Estimate To Complete (ETC)	EAC-AC

Figure 8-2.b. Earned Value, Planned Value, and Actual Cost

Source: Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition* (2017).

Figure 8-3. Earned Value Calculations For One Activity After One Week

Term or Calculation	Amount
Earned Value (EV)	$5,000
Planned Value (PV)	$5,000
Actual Cost (AC)	$6,000
Cost Variance (CV)	−$1,000
Schedule Variance (SV)	0
Cost Performance Index (CPI)	83.33%
Schedule Performance Index (SPI)	100%

Interpreting Earned Value Numbers

▸ In general, *negative numbers for cost and schedule variance indicate problems in those areas*

▸ Negative numbers mean the project is costing more than planned or taking longer than planned

▸ Likewise, *CPI and SPI less than one or less than 100 percent indicate problems*

Study on EVM Practice

▸ PMI conducted a study in 2011 to help understand and gauge the current level of EVM practice.

▸ The researchers surveyed more than 600 project management practitioners in 61 countries

▸ Key findings:
  ◦ EVM is used worldwide, and it is popular in the Middle East, South Asia, Canada, and Europe
  ◦ Most countries require EVM for large defense or government projects
  ◦ Project budget size appears to be the most important factor in deciding whether or not to use EVM

Figure 8-4. Percentage of Organizations Using Earned Value
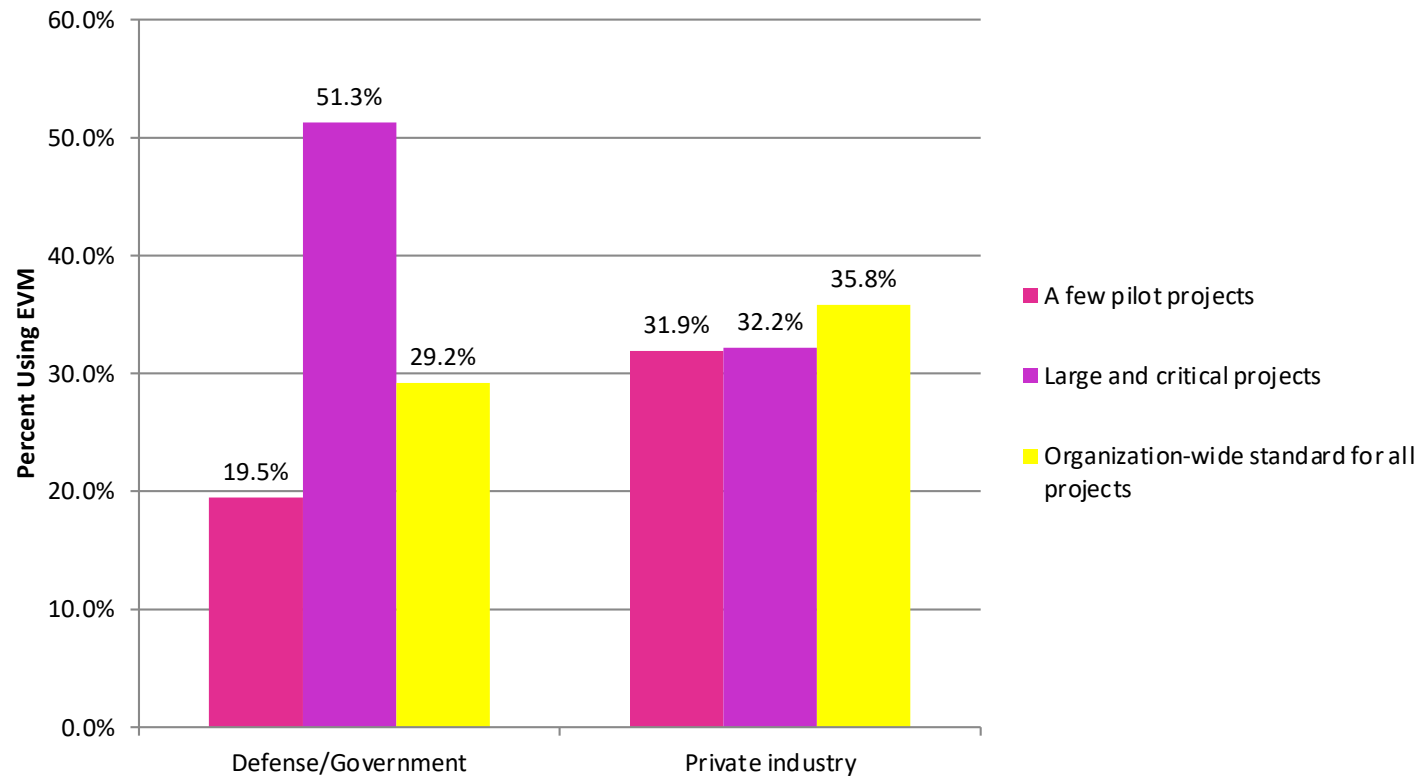
Source: Lingguang Song, "Earned Value Management: A Global and Cross-Industry Perspective on Current EVM Practice," PMI (2011).

Budget at Completion (BAC)

▸ The **budget at completion (BAC)**, or the approved total budget for the project, can be divided by the cost performance index to calculate the **estimate at completion (EAC)**, which is a forecast of how much the project will cost upon completion. This calculation assumes you will be spending at the same rate as your current level of spending.

▸ Likewise, the approved time estimate for the project can be divided by the schedule performance index to calculate when the project will be completed.

▸ Earned value, therefore, provides an excellent way to monitor project performance and provide forecasts based on performance to date.

Sample Forecast Using an Earned Value Chart

▸ You can graph earned value information to track project performance and to forecast when a project will be completed and for how much

- CPI = EV/AC = $900,000/$1,200,000 = .75
- SPI = EV/PV = $900,000/$600,000 = 1.5
- EAC = BAC/CPI = $1,200,000/.75 = $1,600,000
- New time estimate = Original time estimate / SPI = 12 months/1.5 = 8 months

Figure 8-5. Sample Earned Value Chart
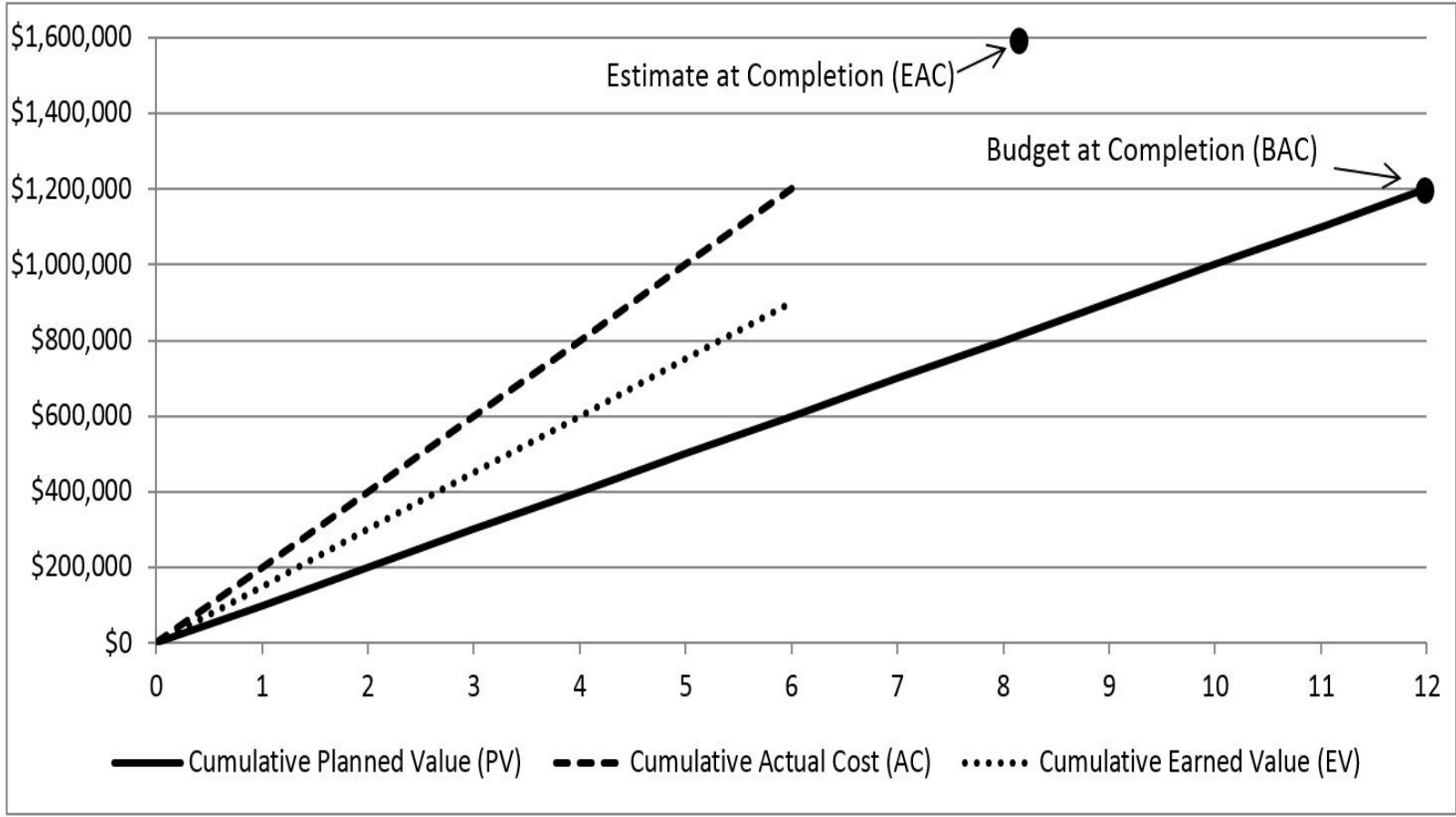
Performance Reports

- **Status reports** describe where the project stands at a specific point in time

- **Progress reports** describe what the project team has accomplished during a certain period

- **Forecasts** predict future project status and progress based on past information and trends

Figure 8-6. Sample Performance Report

Progress Report
Project Name: Just-In-Time Training Project **Project Manager Name:** Kristin Maur **Date: February 3** **Reporting Period:** January 1 – February 1
Work completed this reporting period: • Held first negotiating skills course (instructor-led) with 20 participants • Held first supplier management executive course (instructor-led) with 17 participants • Held second supplier management introductory course (instructor-led) with 20 participants • Had 32 people begin the Web-based introductory supplier management course • Continued developing other Web-based courses • Prepared evaluations of all courses held to date
Work to complete next reporting period: • Hold first advanced supplier management course • Hold first project management course • Hold first software applications course

Figure 8-6. Sample Performance Report (continued)

What's going well and why:
• Participation in all courses is good. Every instructor-led course was full, except the supplier management executive course. All of the courses were advertised well, and we had more than enough people sign-up for the classes. We put several people on the list for later courses after courses were filled in the registration system.
• The average course ratings were above 3.8 on a 5.0 scale. Comments were generally very positive.
• More people than expected started the first Web-based course. Development of new Web-based courses is going well.
What's not going well and why:
• We did not fill the supplier management executive course as planned. Three people could not attend at the last minute, and it was too late to get replacements. We will work on a policy to help prevent this problem in the future for all instructor-led classes.
• We were surprised that so many people started the Web-based introductory supplier management course. We can handle the numbers, but we could have done a better job at forecasting demand.
Suggestions/Issues:
• Develop a policy to handle people not being able to attend instructor-led courses at the last minute.
• Try to do a better job at forecasting demand for Web-based courses.
Project changes:
No major changes to report. The earned value chart in Attachment 1 shows planned value, actual cost, and earned value information to date. We are very close to our plans, running slightly ahead of schedule and a bit over budget.

Integrated Change Control

- Integrated change control involves identifying, evaluating, and managing changes throughout the project's life cycle
- Objectives are as follows:
  - Influence the factors that cause changes to ensure that changes are beneficial
  - Determine that a change has occurred
  - Manage actual changes as they occur
- The project management plan provides the baseline for identifying and controlling project changes

What Went Right?

- Chicago's Museum of Contemporary Art (MCA) provides a great example of tracking key project performance information to ensure project success.

- In September 2014 MCA became the first U.S. venue to stage the "David Bowie Is" exhibit. The $2 million project took thirteen months to complete.

- The MCA team knew they had to sell a lot of tickets for the four-month run of the exhibit—about 150,000, which was more than half if its annual average. They put metrics in place to track several key items, including ticket sales. Their online ticket sales dashboard allowed the team to compare sales each day with projections so they could adjust the marketing strategy as needed.

Project Scope Management

- The main monitoring and controlling processes performed as part of project scope management are validating scope and controlling scope
- Key outputs are accepted deliverables and work performance information
- It is difficult to create a good project scope statement and WBS; it is often even more difficult to validate the project scope and minimize scope changes

Scope Creep

- Even when the project scope is fairly well defined, many projects suffer from scope creep—the tendency for project scope to grow bigger and bigger
- There are many horror stories about projects failing due to scope creep
- Even for fairly simple projects, people have a tendency to want more
- How many people do you know, for example, who said they wanted a simple wedding or a basic new house constructed, only to end up with many more extras than they initially planned?

Validating Scope

- **Scope validation** involves formal acceptance of the completed project deliverables by the project customer or designated stakeholders
- Acceptance is often achieved through customer *inspection* and then *sign-off* on key deliverables
- Recall from Chapter 4 that a verified deliverable has been completed and checked for correctness as part of quality control
- The customer is often more than one person, so group decision-making is often required for the inspection and acceptance

Figure 8-7. Sample Deliverable Acceptance Form (partial)

1. Was this deliverable completed to your satisfaction?   Yes_____No X

2. Please provide the main reasons for your satisfaction or dissatisfaction with this deliverable.

As stated in the contract statement of work, the course materials are not completed until all constructive feedback from the prototype course has been incorporated or the supplier has provided strong rationale as to why the feedback should not be incorporated. We requested that a new section be added to the course to cover issues related to working with suppliers in virtual settings. The final materials delivered did not include this new section or discuss why it was not added. We believe it was an oversight that can be corrected with a minimal amount of additional work.

3. If the deliverable is not acceptable, describe in detail what additional work must be done to complete it.

The supplier will add a new section to the course on working with suppliers in a virtual setting. This section should take about thirty minutes of class time in a face-to-face or e-learning setting. This new section will follow the format and review process used for other topics in the course. We request delivery of the draft of this new section within one week and the final delivery within two weeks.

Controlling Scope

▸ You cannot control the scope of a project unless you have first clearly defined the scope and set a scope validation process in place

▸ You also need to develop a process for soliciting and monitoring changes to project scope; stakeholders should be encouraged to suggest beneficial changes and discouraged from suggesting unnecessary changes

Best Practice

- Northwest Airlines developed a new reservation system in the late 1990s that took several years and millions of dollars to develop

- They knew that users would request changes and enhancements to the system, so they built in a special function key for submitting change requests and assigned three full-time programmers to work exclusively on them

- Users made over 11,000 enhancement requests the first year the system was in use, which was much more than the three programmers could handle

- Although they only implemented 38% of the requested enhancements, these were the most important, and users were very satisfied with the system and process

Project Schedule Management

- The main monitoring and controlling process performed as part of project schedule management is controlling the schedule or schedule control
- Project managers often cite delivering projects on time (schedule control) as one of their biggest challenges, because schedule problems often cause more conflict than other issues
- During project initiation, priorities and procedures are often most important, but as the project proceeds, especially during the middle and latter stages of the project, schedule issues become the predominant source of conflict

Why Schedules Cause Conflicts

- Time is the variable with the least amount of flexibility; time passes no matter what happens on a project
- Individual work styles and cultural differences may also cause schedule conflicts.
  - People who prefer the "P" vs. "J" in the MBTI profile may not like having schedules and deadlines
  - Different cultural views of time affect meeting schedules and attitudes toward work

Media Snapshot

▸ In contrast to the 2002 Olympic Winter Games in Salt Lake City (see the Media Snapshot of Chapter 4), planning and scheduling for the 2004 Olympic Summer Games in Athens, Greece and the 2014 Sochi Winter Olympic Games did not go so well.

▸ The Greeks made fun of critics by having construction workers pretend to still be working on the stage as the ceremonies began. Unfortunately, the Greek government suffered a huge financial deficit because the games cost more than twice the planned budget.

▸ The 2014 Winter Olympic Games in Sochi, Russia suffered even more financial losses. Originally budgeted at US$12 billion, final costs reached over US$51 billion, making it the most expensive games in history.
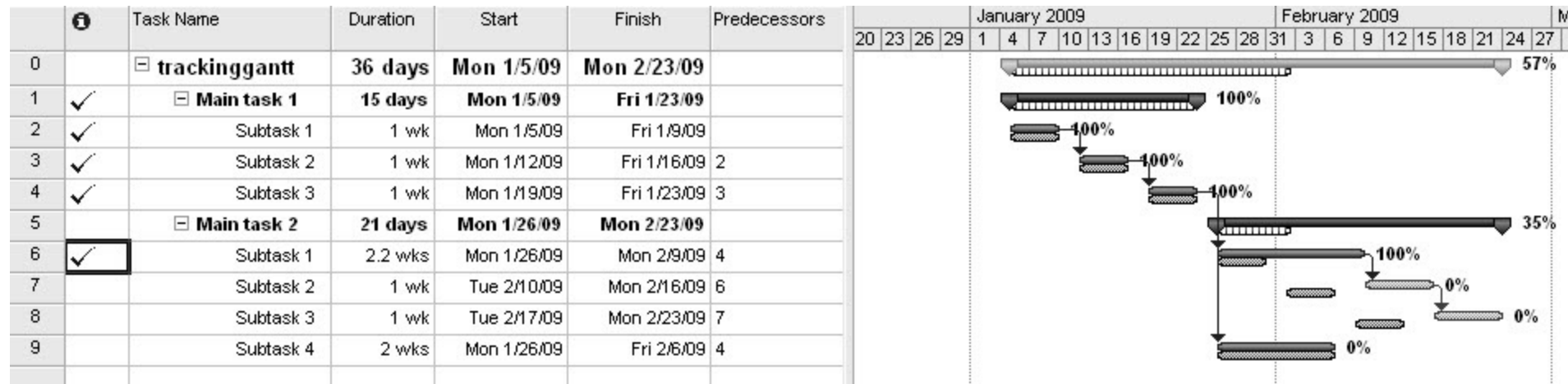
Sample Work Performance Information

- The goal of schedule control is to know the status of the schedule, influence the factors that cause schedule changes, determine whether the schedule has changed, and manage changes when they occur

- Key outputs of schedule control are forecasts and work performance information

Figure 8-8. Sample Schedule Performance Measurement Using a Tracking Gantt Chart in Microsoft Project

	❶	Task Name	Duration	Start	Finish	Predecessors
0		⊟ trackinggantt	36 days	Mon 1/5/09	Mon 2/23/09	
1	✓	⊟ **Main task 1**	**15 days**	**Mon 1/5/09**	**Fri 1/23/09**	
2	✓	Subtask 1	1 wk	Mon 1/5/09	Fri 1/9/09	
3	✓	Subtask 2	1 wk	Mon 1/12/09	Fri 1/16/09	2
4	✓	Subtask 3	1 wk	Mon 1/19/09	Fri 1/23/09	3
5		⊟ **Main task 2**	**21 days**	**Mon 1/26/09**	**Mon 2/23/09**	
6	✓	Subtask 1	2.2 wks	Mon 1/26/09	Mon 2/9/09	4
7		Subtask 2	1 wk	Tue 2/10/09	Mon 2/16/09	6
8		Subtask 3	1 wk	Tue 2/17/09	Mon 2/23/09	7
9		Subtask 4	2 wks	Mon 1/26/09	Fri 2/6/09	4

- A **tracking Gantt chart** compares planned and actual project schedule information
- A **slipped milestone** refers to a milestone activity that was actually completed later than originally planned

No Surprises

- Top management hates surprises, so the project manager must be clear and honest in communicating project status
- By no means should project managers create the illusion that the project is going fine when, in fact, serious problems have emerged

Project Cost Management

- Cost control includes monitoring cost performance, ensuring that only appropriate project changes are included in a revised cost baseline, and informing project stakeholders of authorized changes to the project that will affect costs

- Outputs include work performance information, cost forecasts, change requests, project management plan updates, and project documents updates

Tools and Techniques for Controlling Costs

- Expert judgment
- Data analysis
- Project management information systems
- **To-complete performance index (TCPI)**, which is a measure of the cost performance that must be achieved on the remaining work in order to meet a specified goal, such as the BAC or EAC

What Went Wrong?

- Cost overruns tend to be the norm for construction projects. Below are a few recent statistics:
    - 85% of construction projects completed in 20 countries over the course of a 70-year period experienced cost overrun. The overall average overrun was 28%.
    - Large construction projects take 20% longer to finish than expected, and are up to 80% over budget.
    - 45% of construction professionals reported spending more time than expected on non-optimal activities, such as fixing mistakes, looking for project data, and managing conflict resolution.
    - Common causes of cost overrun include inaccurate project estimates/unclear project scope, project design errors, unforeseen project changes, administration errors, and poor communication.
- Technology projects also have a terrible track record.
- What can be done? Dr. Steve Andiole, author of several books, including IT's All About the People, says you have to focus on the people! Vet project managers based on their experience, find and reward real leaders, build the right teams, and fix training by making it more hands-on, like a medical residency.

Project Quality Management

- Key outputs of quality control include quality-control measurements, verified deliverables, work performance information, change requests, project management plan updates, and project documents updates

- Outcomes are acceptance decisions, rework, and process adjustments

Sample Quality-Control Tools

▸ Data gathering: Checklists, check sheets, statistical sampling, questionnaires, and surveys

▸ Data analysis: Performance reviews and root cause analysis

▸ Inspection

▸ Testing/product evaluations

▸ Data representation: cause-and-effect diagrams, control charts, histograms, and scatter diagrams

▸ Meetings

Seven Basic Tools of Quality (ASQ)

- **Cause-and-effect diagrams**: Help you find the root cause of quality problems
- **Check sheets**: Also called a tally sheets, are structured forms for collecting and analyzing data
- **Control charts**: Illustrate the results of a process over time and show if a process is in control
- **Histograms**: Show a bar graph of a distribution of variables
- **Pareto charts**: Help you identify and prioritize problem areas
- **Scatter diagrams**: Show if there is a relationship between two variables
- **Stratification**: A technique used to separate data to see patterns in data.
  - A **run chart** displays the history and pattern of variation of a process over time.
  - A **flow chart** is a graphical display of the logic and flow of processes that help you analyze how problems occur and how processes can be improved
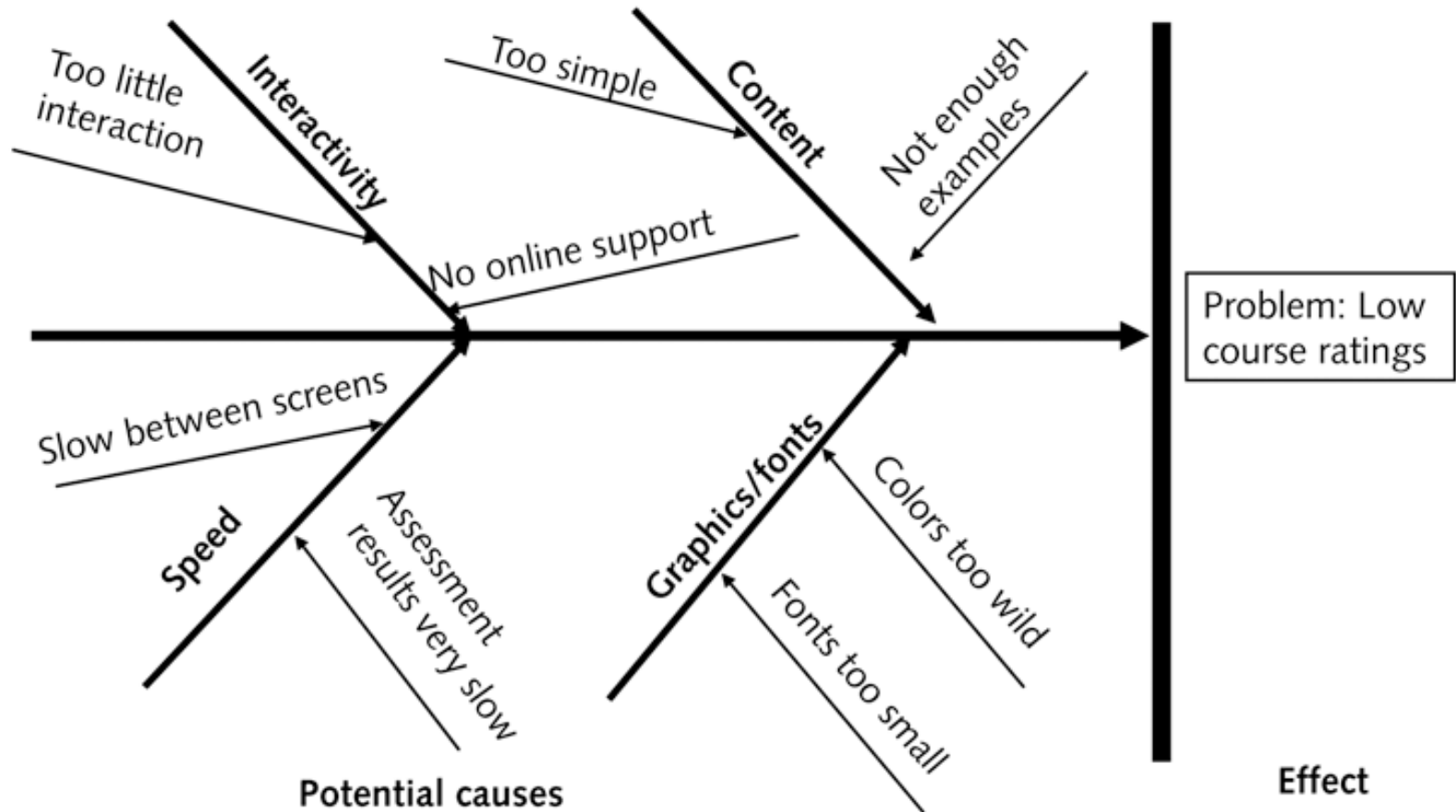
Figure 8-9. Sample Cause-and Effect Diagram

Too little interaction

Interactivity

Too simple

Content

Not enough examples

No online support

Slow between screens

Speed

Assessment results very slow

Graphics/fonts

Colors too wild

Fonts too small

Problem: Low course ratings

Potential causes

Effect

Figure 8-10. Sample check sheet

Defect	Day 1	Day 2	Day 3	Day 4	Total
Broken link	5	3	2	4	14
Spelling error	2	1	2	2	7
Wrong format	3	2	4	1	10

Figure 8-11. Sample Control Chart
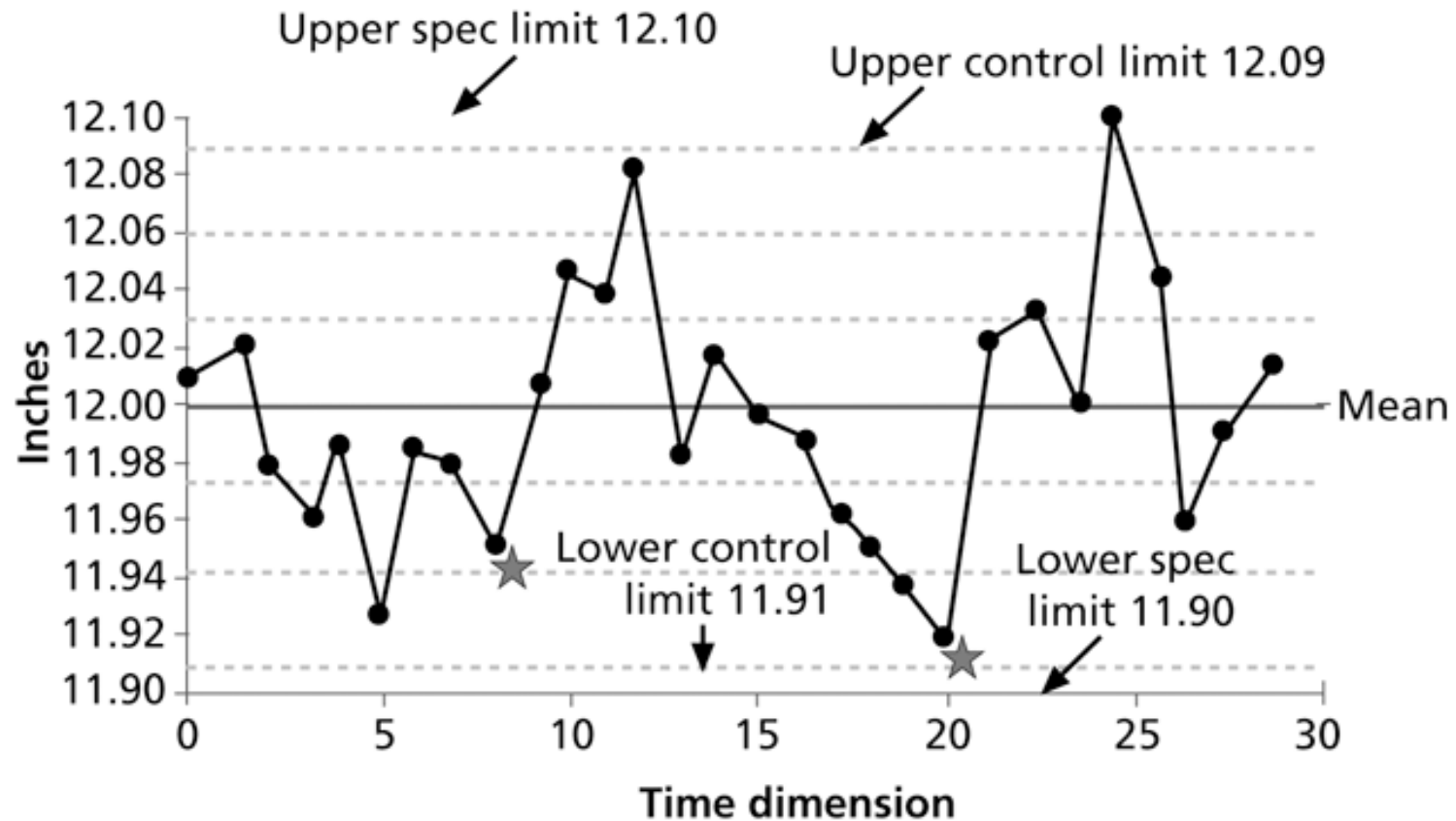
Schwalbe, Information Technology Project Management, Sixth Edition, 2010

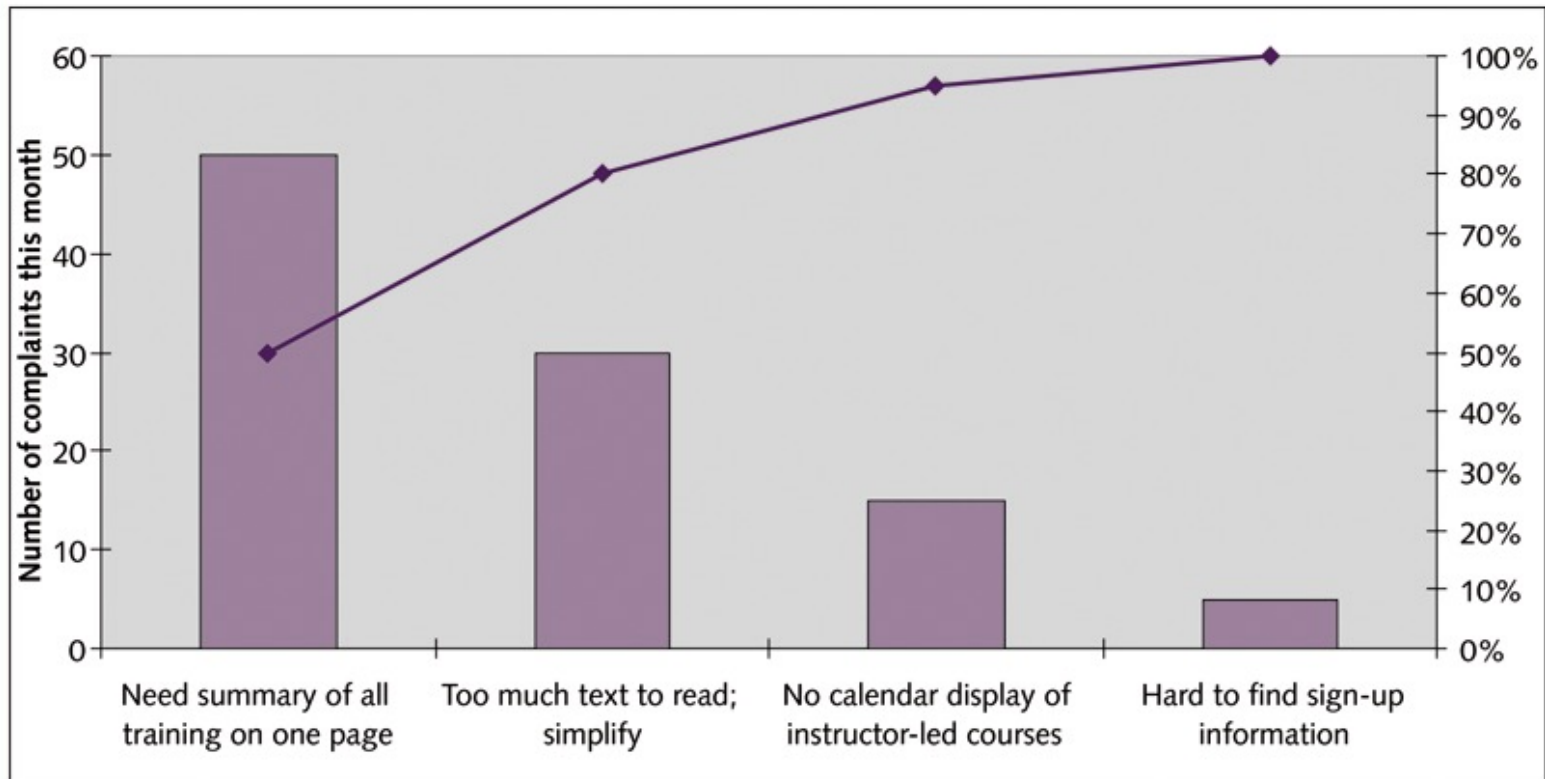# Figure 8-12. Sample Histogram
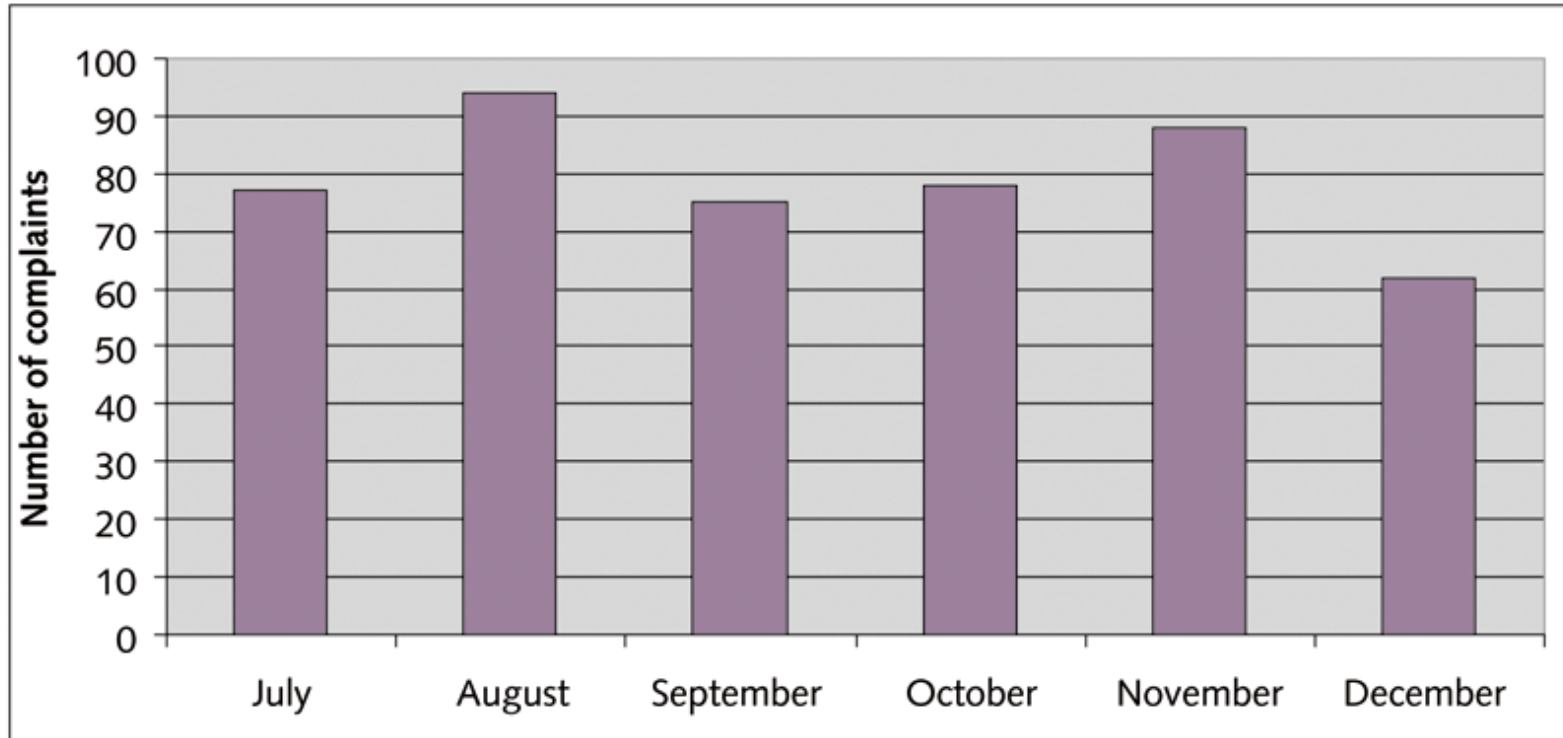
Figure 8-13. Sample Pareto Chart
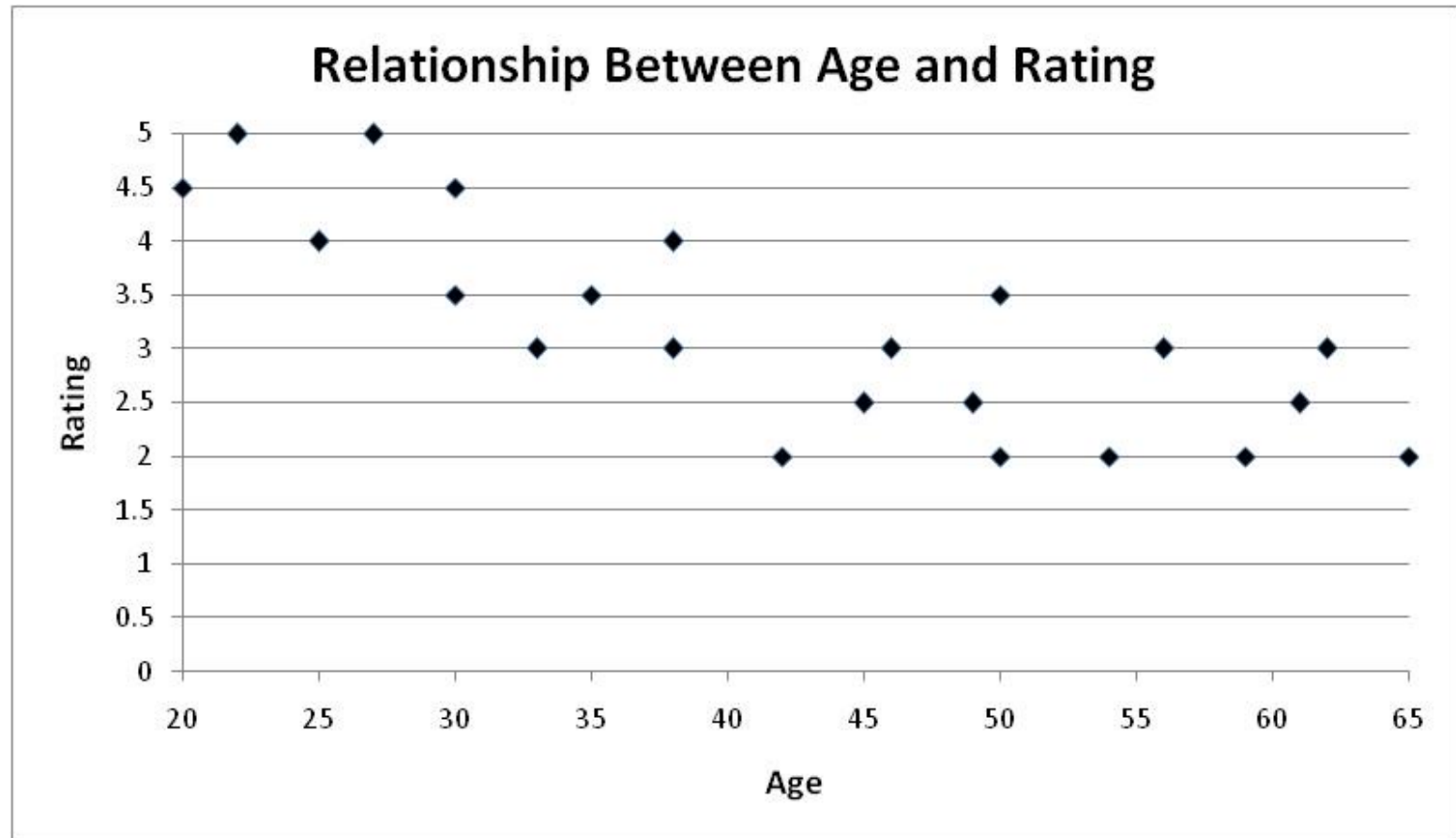
Figure 8-14. Sample Scatter Diagram

Relationship Between Age and Rating

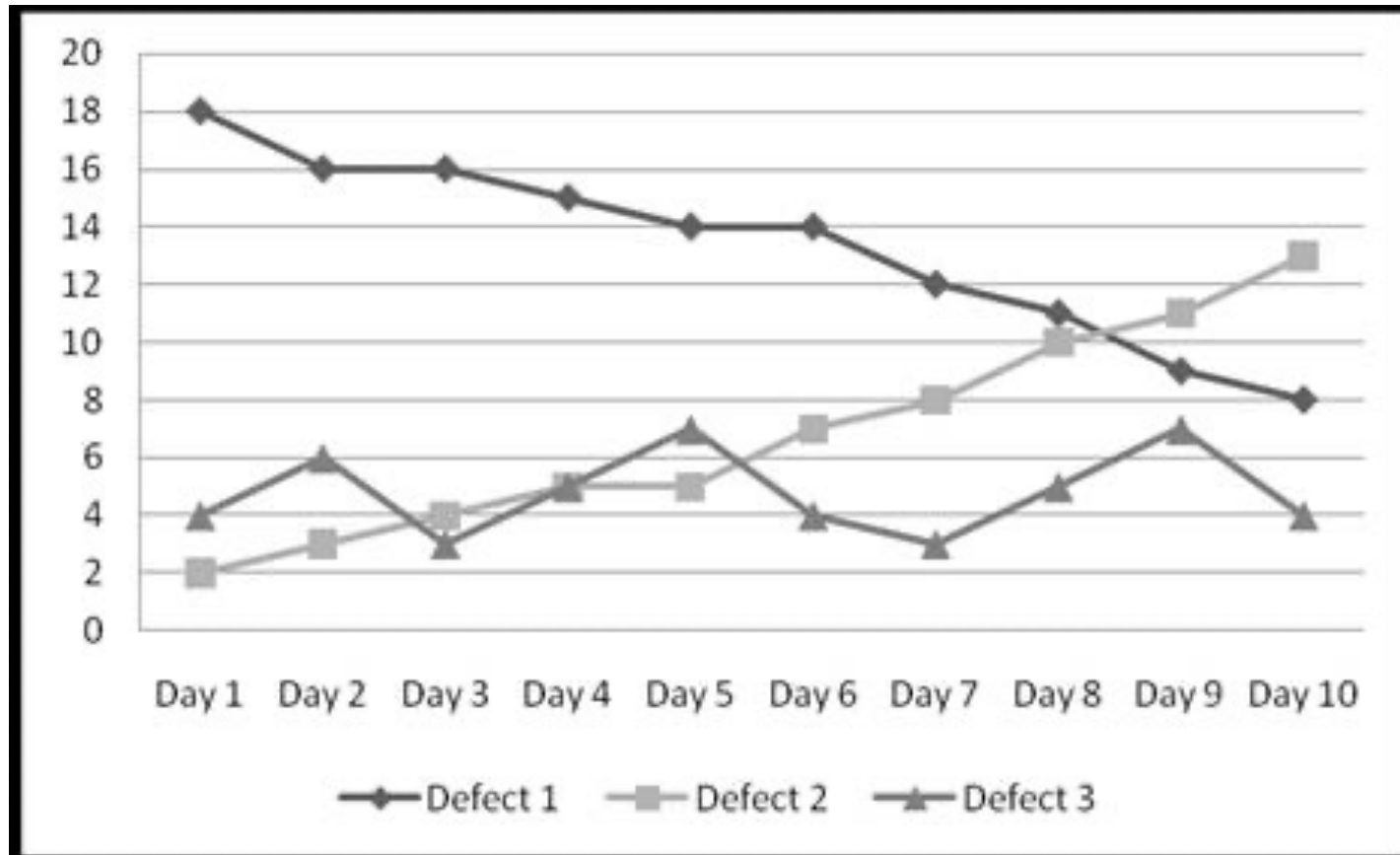# Figure 8-15. Sample Run Chart

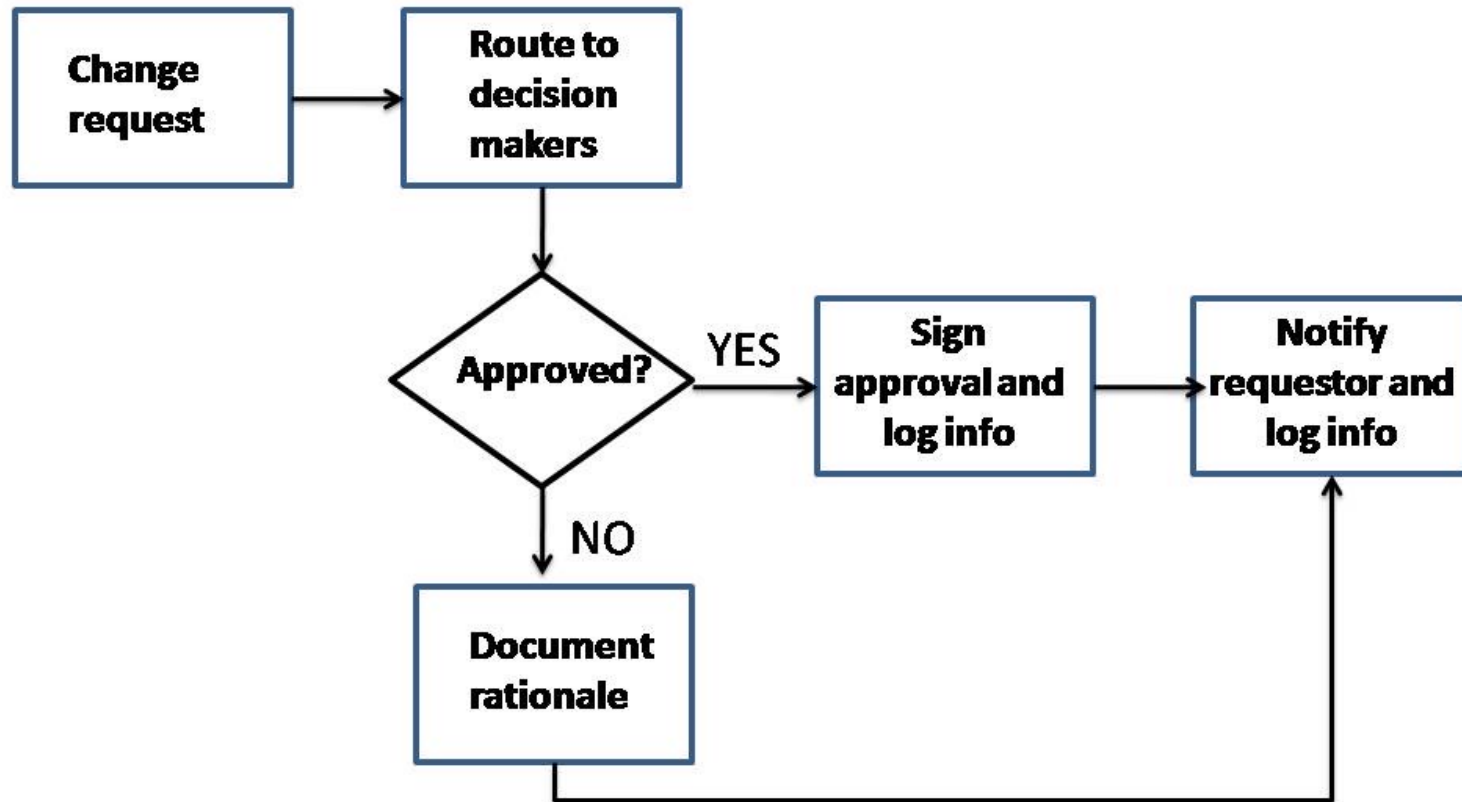# Figure 8-16. Sample Flowchart

Figure 8-17. Lunch order (www.xkcd.com)

Project Resource Management

▸ Controlling resources involves ensuring that the *physical* resources assigned to the project are available as planned and monitoring the planned versus actual resources utilization, taking corrective actions as needed

▸ Making effective use of team members is addressed under the Manage Team process

▸ Tools and techniques include data analysis, problem solving, interpersonal and team skills, and project management information systems

▸ Key outputs include work performance information, change requests, project management plan updates, and project documents updates.

Project Communications Management

▸ Controlling communications involves monitoring and controlling communications throughout the project life cycle to ensure that stakeholder information needs are met

▸ Key outputs include work performance information, change requests, project management plan updates, and project documents updates

Project Stakeholder Management

- You cannot control stakeholders, but you can control their level of engagement
- Controlling stakeholder engagement involves monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders as needed
- Outputs include work performance information, change requests, project management plan updates, and project documents updates
- On some projects key stakeholders are members of the project team

Video Highlights

▸ The German firm PERI not only printed Germany's first home (meeting all permit requirements) but also Europe's largest 3-D-printed apartment building. Errors on site have been almost completely eradicated with 3-D printing, saving time, money, and waste material.

▸ Customers seem to be flocking toward the new technology in some areas. Rancho Mirage, California, near Palm Springs, is the site of the first 3-D-printed community in the U.S., set for completion in spring 2022. Pari development group and Mighty Buildings are working together to build 15 eco-friendly homes, each with three-bedrooms, two-bathrooms, and 1,450 square feet on a 10,000 square-foot lot with a swimming pool and deck for $595,000. "The presale campaign started in late February and sold out within days, with buyers paying $1,000 to reserve a spot, said Palari Chief Executive Basil Starr. 'It was reassuring to see such demand for these homes.'

Project Risk Management

▶ Monitoring and controlling risks involves implementing the risk response plans, while continuing to identify and analyze new risks and evaluate risk process effectiveness

▶ Carrying out individual risk management plans involves monitoring risks based on defined milestones and making decisions regarding risks and their response strategies

▶ Project teams sometimes use **workarounds**—unplanned responses to risk events—when they do not have contingency plans in place

▶ Outputs of risk control include work performance information, change requests, project management plan updates, project documents updates (especially updating the risk register), and organizational process assets updates

Sample Risk Register Updates

- Recall that the number one risk event in the risk register for the Just-In-Time Training project was a poor survey response. Because the project was now halfway completed, the risk register would have to change significantly

- For example, senior management informed Kristin that Global Construction, Inc. was growing faster than expected, and they thought the number of people needing training would be higher than expected. This information resulted in the identification of several new risks related to accommodating this growth in trainees

Project Procurement Management

- Controlling procurements involves managing procurement relationships, monitoring contract performance, making changes and taking corrective actions as needed, and closing out contracts
- The contractual relationship is a legal relationship and, as such, is subject to state and federal contract laws
- Someone from the procurement or legal department in organizations usually closes out contracts
- In addition to work performance information, change requests, project management plan updates, project documents updates, and organizational process asset updates, key outputs of controlling procurements include closed procurements and procurement documentation updates

Watch for Constructive Change Orders

- **Constructive change orders** are oral or written acts or omissions by someone with actual or apparent authority that can be construed to have the same effect as a written change order
- For example, if a project team member has met with a supplier or contractor on a weekly basis for three months to provide guidelines for performing work, he or she can be viewed as an apparent authority
- If he or she tells the contractor to redo part of a report that has already been delivered and accepted by the project manager, that action can be viewed as a constructive change order, and the contractor can legally bill the buyer for the additional work

Figure 8-18. Sample Contract Closure Notice

Global Construction, Inc. Contract Closure Notice
September 16

As described in our service agreement, this letter provides formal notice that the work you were contracted to perform for Global Construction has been completed. ABC Training developed a qualified sellers list containing thirty potential sellers and a report with one-page of key information on each seller. Payment is being processed based on the invoice provided by ABC Training.

Kristin Maur, the project manager, has provided the following performance assessment for the work provided:

"We were very pleased with the work of ABC Training. Members of the firm were professional, knowledgeable, and easy to work with. Global Construction depended on ABC Training to develop a qualified sellers list for this important project, and we were extremely happy with the results. On a scale of 1 to 10, you earned a 10!"

Lawrence Scheller

By: Lawrence Scheller, Contract Specialist
Date   September 16

APPLYING PROJECT MANAGEMENT PRINCIPLES TO MONITORING AND CONTROLLING PROJECTS

▸ Embracing adaptability and resiliency.

▸ According to the PMBOK® Guide – Seventh Edition, "**Adaptability** is the ability to respond to changing conditions. **Resiliency** is the ability to absorb impacts and to recover quickly from a setback or failure."

▸ It's important for project teams to expect changes, plan for them, and be adaptable and resilient in responding to them.

MONITORING AND CONTROLLING AGILE/HYBRID PROJECTS

▸ The daily Scrum and sprint review meetings assist in monitoring and controlling agile projects

▸ **Burn charts** show project team velocity. **Velocity** measures the productivity rate at which the deliverables are produced, validated, and accepted within a predefined interval.

▸ You can create the following types of burn charts:
  ◦ **Burndown charts** show the amount of work (number of tasks) remaining compared to the plan. They are often used for each sprint and discussed during sprint retrospectives.
  ◦ **Burnup charts** show the amount of work (tasks) completed compared to the plan. They can be used during each sprint, and they can also show progress for several sprints.
  ◦ **Combined burn charts** show how much work has been completed and how much remains.

Figure 8-19. Sprint Burndown Chart

Days	Planned	Actual
D0	20	20
D1	19	19
D2	18	18
D3	17	16
D4	16	14
D5	15	12
D6	14	10
D7	13	10
D8	12	10
D9	11	10
D10	10	10
D11	9	10
D12	8	10
D13	7	10
D14	6	9
D15	5	8
D16	4	7
D17	3	5
D18	2	5
D19	1	4
D20	0	3

Burndown Chart

Work is behind schedule. There is more work left than originally planned.

Work is ahead of schedule. There is less work left than originally planned.
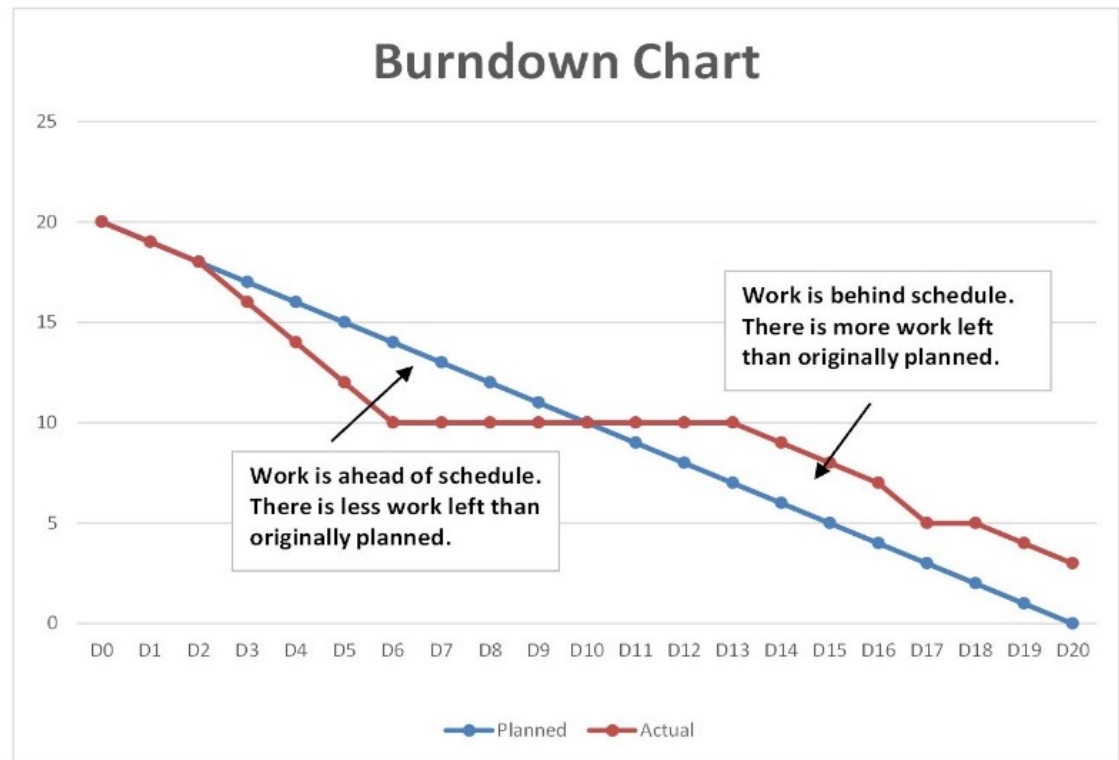
Figure 8-20. Sample Burnup Chart

Sprints	Planned	Actual
S1	100	20
S2	100	40
S3	100	65
S4	120	80
S5	120	
S6	120	

Burnup Chart

Figure 8-21. Sample Velocity Chart

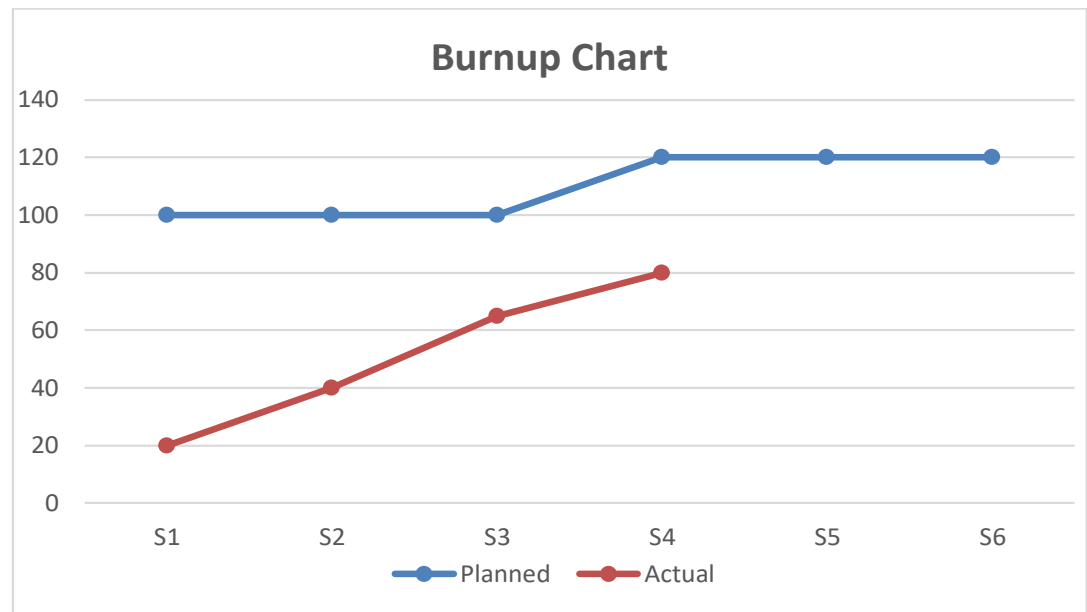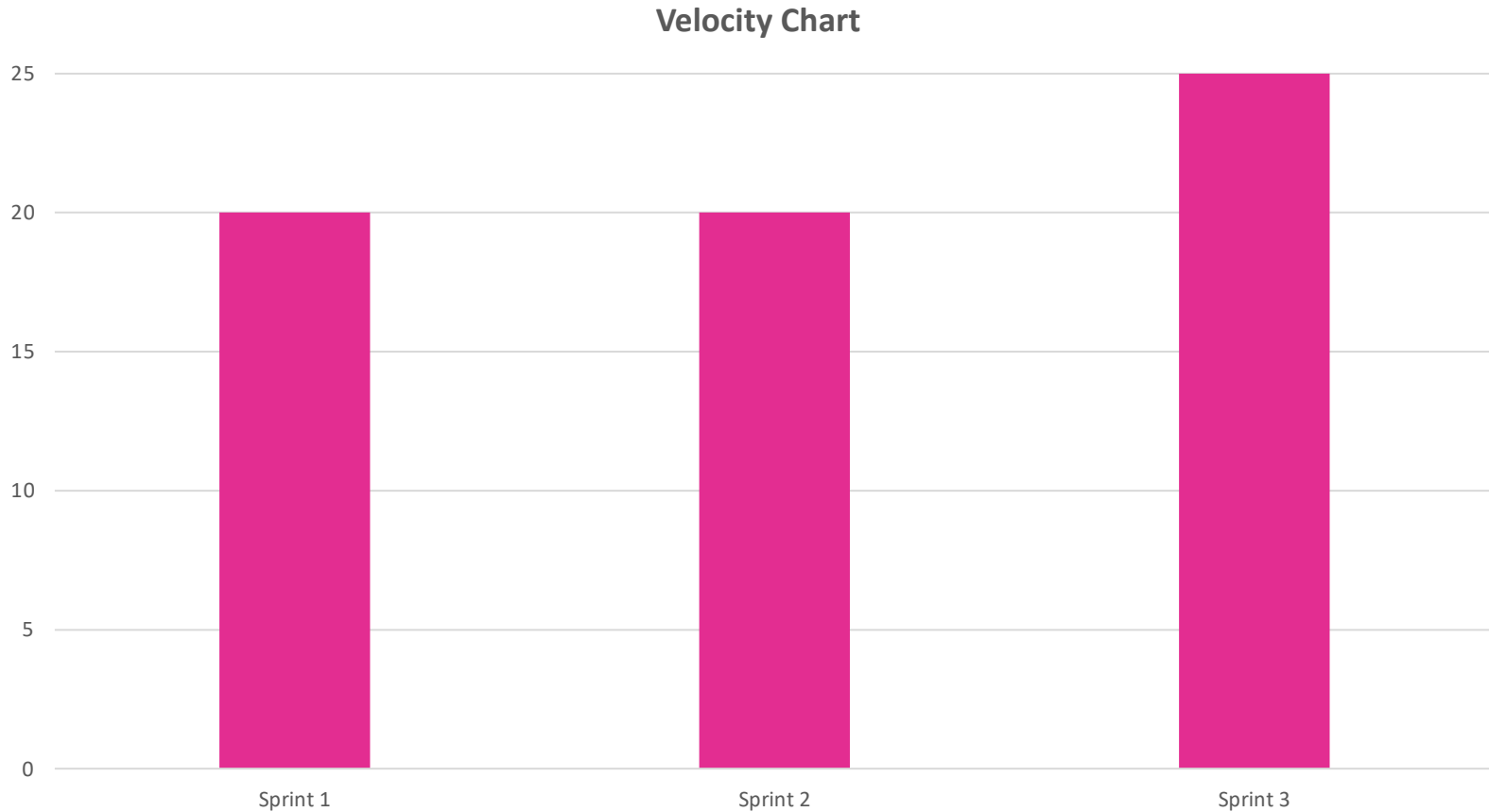**Velocity Chart**

Chapter Summary

- Monitoring and controlling involves regularly measuring progress to ensure that the project is meeting its objectives and addressing current business needs. The project manager and other staff monitor progress against plans and take corrective action when necessary.

- Every knowledge area includes processes and outputs to help monitor and control projects. Outputs common to several knowledge areas include change requests, work performance information, organizational process assets updates, project management plan updates, and project document updates.

- Project managers should apply the project management principle of embracing adaptability and resiliency when monitoring and controlling projects.

- Agile teams also monitor and control their projects. Daily Scrums and sprint reviews are events that assist in monitoring and controlling on a regular basis. Burn charts, task boards, and velocity charts are artifacts that assist in showing progress to all interested stakeholders.