Georgia Technology Authority

Project Fundamentals – Student Guide

Table of Contents

Preface for Students **4**
Lesson 1: Introduction to Project Fundamentals **5**
Topic 1: Definition of a Project 6
Topic 2: What is Project Management? 17
Topic 3: Project Management in Practice 19
Topic 4: Project Stakeholders 25
Topic 5: Project Management Standards 31
Topic 6: Project Management Skills 36
Topic 7: Project Management Areas of Knowledge 43
Lesson review 48
Lesson 2: Structuring a Project **49**
Topic 1: Management by Objectives 50
Topic 2: Project Phases and Life Cycle 54
Topic 3: Project Life Cycles in Practice 67
Lesson review 75
Lesson 3: Project Processes **77**
Topic 1: Definition of Project Processes 78
Topic 2: Project Interactions 82
Topic 3: Using the Project Processes 92
Topic 4: Exercise – Identifying Process Groups 94
Lesson review 97
Lesson 4: Project Management Knowledge Areas **99**
Topic 1: Project Scope Management 100
Topic 2: Project Time Management 104
Topic 3: Project Cost Management 107
Topic 4: Project Risk Management 109
Topic 5: Project Integration Management 113
Topic 6: Project Communications Management 119
Topic 7: Project Quality Management 122
Topic 8: Project Procurement Management 126
Topic 9: Human Resource Management 129
Topic 9: Exercise – Identifying Knowledge Area Processes 134
Lesson review 140

Table of Contents (cont'd)

Lesson 5: Project Teams **141**
Topic 1: Organizational Influences 142
Topic 2: Project Management Office 151
Topic 3: Effective Project Teams 154
Topic 4: Project Leadership 165
Topic 5: Project Management Skills 168
Lesson review 175
Sample Answers **177**
Lesson 1, Topic 1, Exercise: Identifying Operations and Projects 178
Lesson 1, Topic 3, Exercise: Dealing with Uncertainty and Change 179
Lesson 1, Topic 4, Exercise: Identifying Stakeholders 180
Lesson 1, Topic 7, Exercise: Knowledge Areas used by NASA 181
Lesson 2, Topic 3, Exercise: Project Management Tasks 184
Lesson 3, Topic 2, Exercise: Identifying Project Activities 186
Lesson 3, Topic 4, Exercise: Identifying Process Groups 187
Lesson 4, Topic 9, Exercise: Identifying Knowledge Area Processes 188

Preface for Students

About the Student Guide

This Student Guide is designed to supplement the presentation on Project Fundamentals. It includes:

- PowerPoint slides: The PowerPoint presentation highlights the key points, concepts, illustrations and diagrams associated with the course. This guide contains a grab of each slide in that presentation.

- Student learning objectives: The presentation is divided into a number of lessons. Each lesson is then further subdivided into a number of topics. A topic is stand-alone piece of instruction that has a specific, demonstrable learning objective. You should begin each lesson by taking a moment to review the objectives.

- Supplementary notes: Supplementary notes appear with each slide, adding detail to what has been covered in the presentation. It is recommended that you review these notes following each presentation.

Lesson 1: Introduction to Project Fundamentals

Topic 1: Definition of a Project

Topic 2: What is Project Management?

Topic 3: Project Management in Practice

Topic 4: Project Stakeholders

Topic 5: Project Management Standards

Topic 6: Project Management Skills

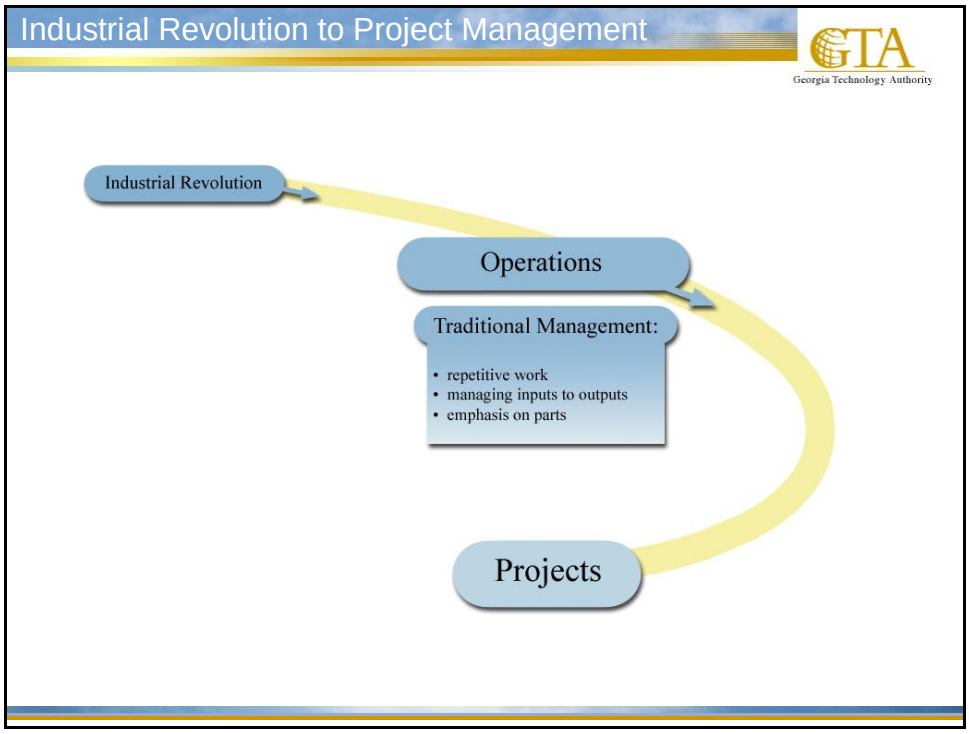
Topic 7: Project Management Areas of Knowledge

Student learning objectives

After completing this lesson, you should be able to

- define a project and explain how it differs from an operation
- describe the role of project management
- explain how project management operates in practice
- identify key project stakeholders
- describe the key general management skills that also apply to project management
- identify the main domestic and international sets of project management standards
- identify the different knowledge components for a project manager

Topic 1: Definition of a Project



The concept of mechanics that emerged during the Industrial Revolution emphasized the view that if you want to understand something, you need to take it apart and understand its components. This led to the adoption of traditional management, where work issues are broken into isolated parts as a way of obtaining better control.

Traditional management has the following characteristics:

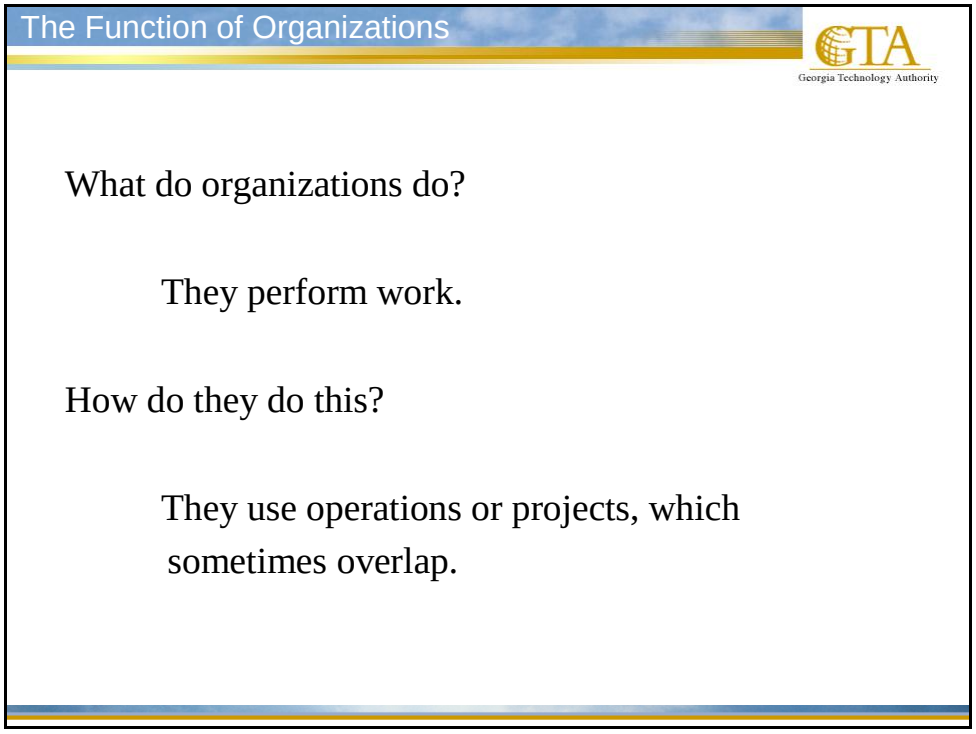
- each work task is repetitive and self-contained
- management oversees the conversion of inputs, taken from the environment, into useable outputs, which are put back into the environment

The management of the conversion of inputs into outputs is achieved through

- planning
- organizing the resources to implement the plan
- directing along the lines of the plan
- controlling actions

Traditional management does not necessarily consider the interrelationship or the integration of activities. It was subsequently adapted to handle operations.

Topic 1: Defining a Project (cont'd)



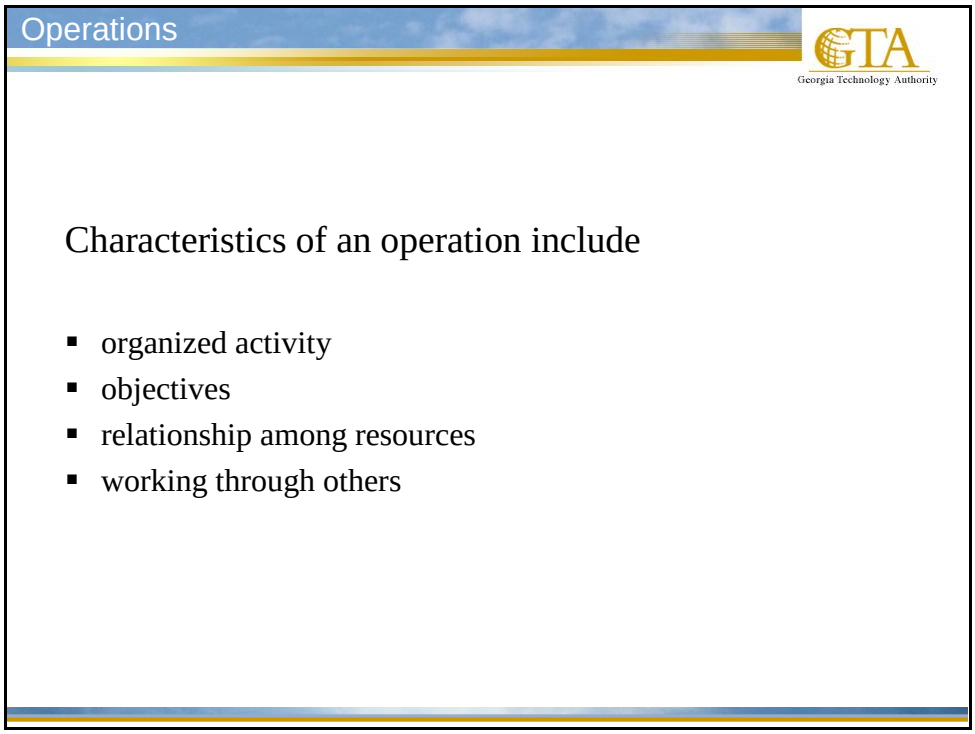
Organizations perform work, which can be divided into two categories: operations and projects. These categories sometimes overlap.

Organizations have traditionally performed work through operations and traditional management.

With the rise of uncertainty and increased pressures from the market, organizations have found that the operation mode is redundant. Projects have replaced operations in organizations where uncertainty, market unpredictability, and increased product turnaround times are the norm.

Projects and operations have overlapped through this transition, as well as through occurrences of uncertainty. Projects manage uncertainty, whereas operations manage predictability.

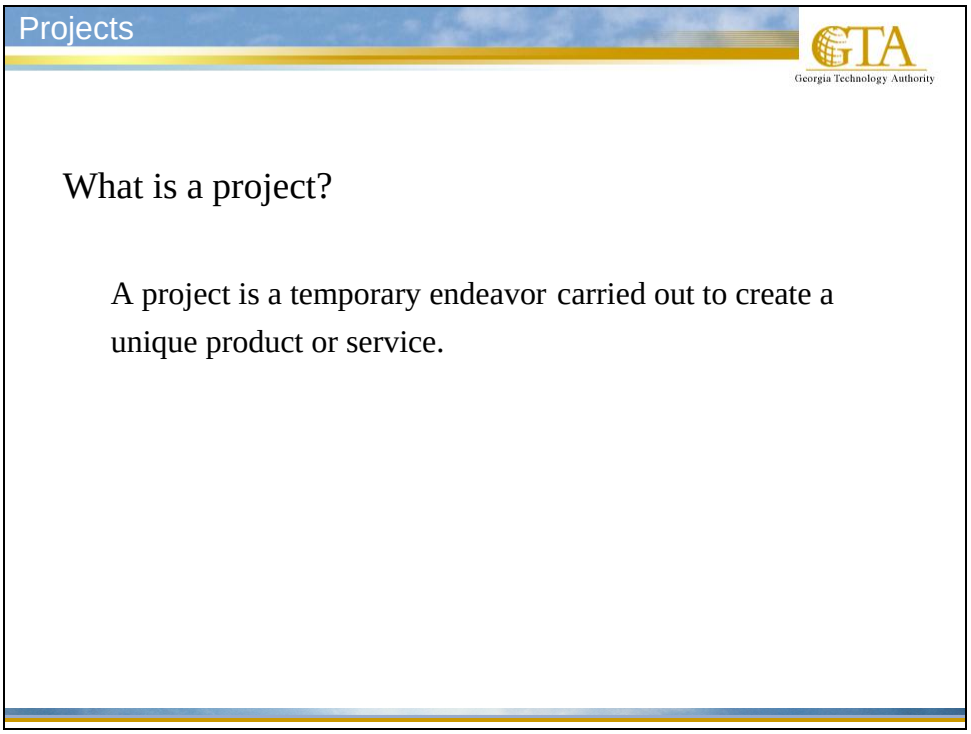
Topic 1: Defining a Project (cont'd)



An operation is an ongoing business process with the following characteristics:

- in an operation, people work toward a common goal in the form of a deliverable or objective
- actions are required to support the goals toward which organized activity is directed
- there is a relationship – generally physical in nature – between material, supplies, equipment, and people in order to get the job done
- responsibility or authority is delegated from one person to another to accomplish goals. Activity is organized in this way so that certain relationships must be created among resources.

Topic 1: Defining a Project (cont'd)

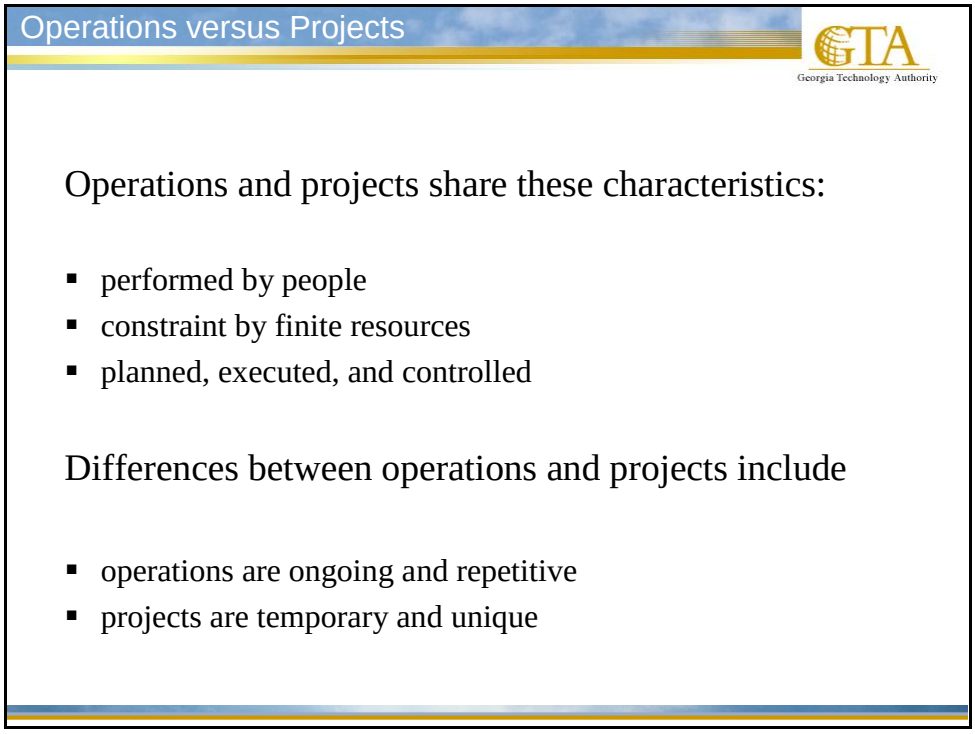


Projects enable organizations to respond to requirements or opportunities that cannot be addressed within normal operational limits.

Projects are undertaken at all levels of an organization. They may involve a single staff member or thousands of employees across different departments. Projects may also cross organizational boundaries – for example, joint ventures and partnering projects.

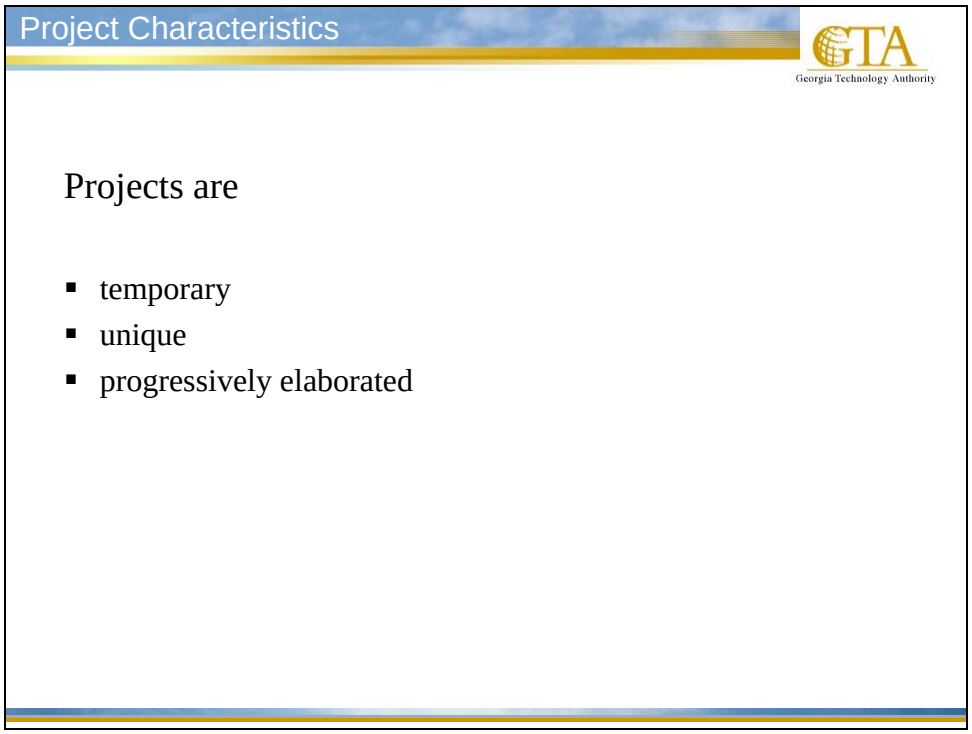
Projects are critical to the realization of an organization's business strategy because projects are a means by which strategy is implemented. Projects are defined using various measures. One such measure used by Georgia Technology Authority is hours.

Topic 1: Defining a Project (cont'd)



The objectives of operations and projects also differ. The objective of an ongoing operation is generally to sustain the business, whereas the objective of a project is to attain the objective and close the project. An operation continually adopts a new set of objectives to suit conditions, whereas a project ends when its declared objectives have been met.

Topic 1: Defining a Project (cont'd)



Characteristics of Projects

- Projects are **temporary** because they have a definite beginning and end.

  Projects are generally initiated in response to a temporary market opportunity, and they have a limited time frame in which to produce their product or service. Most project teams created to perform a project are disbanded when the project is complete – although members of the team may be brought together again for a new project in the future.

  A project ends when its objectives have been met, when it becomes clear that the project objectives will not or cannot be met, or when the need for the project no longer exists.

  Temporary does not necessarily mean projects are short in duration – projects range in length from a few weeks to several years – but their duration is finite.

  In addition, temporary does not generally apply to the product or service created by the project because most projects are undertaken to create a lasting result, such as erecting a national monument.

- Projects are **unique** because their outcome is a unique product, service, or result.

  A product or service is unique even if the category to which it belongs is large or elements of the project are repetitive. For example, real estate developments can include several different types of house designs, each of which constitutes a unique design project.

Topic 1: Defining a Project (cont'd)

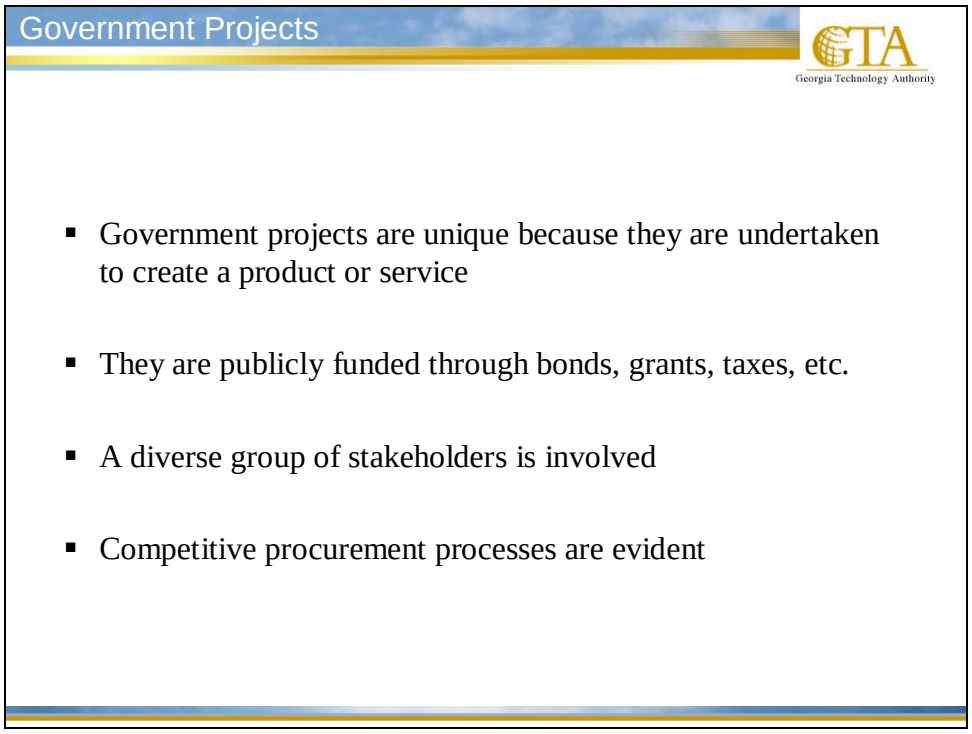
- The characteristics distinguishing the project's product or service are **progressively elaborated** as the project proceeds.

  In other words, distinguishing characteristics are broadly defined early in the project but made more explicit and detailed as the project team develops a better and more comprehensive understanding of the product.

  For example, the initial definition of the product (result) of an organizational change management project might be "to improve communication systems within the organization." As the project proceeds, the product is described more specifically as "providing all employees with access to e-mail and an organization intranet."

  Progressive elaboration of product characteristics should be carefully coordinated with appropriate project scope definition, particularly if the project is performed under contract. When properly defined, the scope of the project – the work to be carried out – should remain constant even as the product characteristics are progressively elaborated.

Topic 1: Defining a Project (cont'd)



Governments spend huge amounts of money on projects, so it is crucial that we understand the factors that make government projects unique (Government Extension to A Guide to the Project Management Body of Knowledge, © 2000 Edition; Chapter 1). Government projects differ from other projects for two principal reasons.

1. **Government projects are often driven by various stakeholders to include elected officials and government bodies.**

   Electing multiple representatives serves as a protection against fraud and encourages debate and, ultimately, better decisions.

   Because it is not practical for a representative body to provide day-to-day direction to project managers, an executive is generally appointed or elected to carry out the policies and rules set by the representative body. The representative body's key functions include setting the budget for the executive and scrutinizing the work of the executive.

   Project managers are generally part of, and report to members of, the executive staff. On large projects, such as projects involving state security, they may report directly to the chief executive (e.g. the state governor of Georgia).

2. **Government projects are funded from mandatory taxes and fees.**

   Whether or not they use government services, taxpayers contribute to the funding of these services and the projects that create the services. Taxpayers hold governments – and how they spend tax money on projects – accountable through their elected representatives. In addition, project managers have a responsibility to use taxpayers' funds to meet goals set by elected representatives.

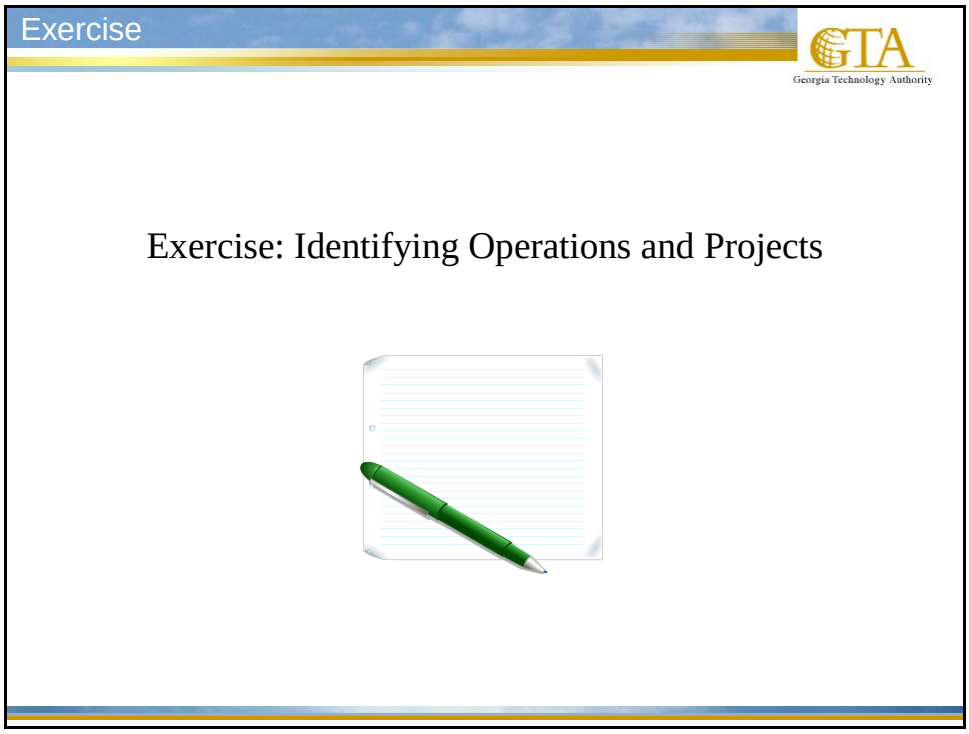
   Understanding project management theory and practice is important and applicable to the development of management practices in the state of Georgia.

Topic 1: Defining a Project (cont'd)

Examples of such projects include

- implementation of e-voting systems in the state of Georgia
- upgrading of the state employees retirement system
- implementation of a unified state employee email system
- hR facilities application upgrade
- data Center upgrade
- introduction of web-based systems for payroll systems

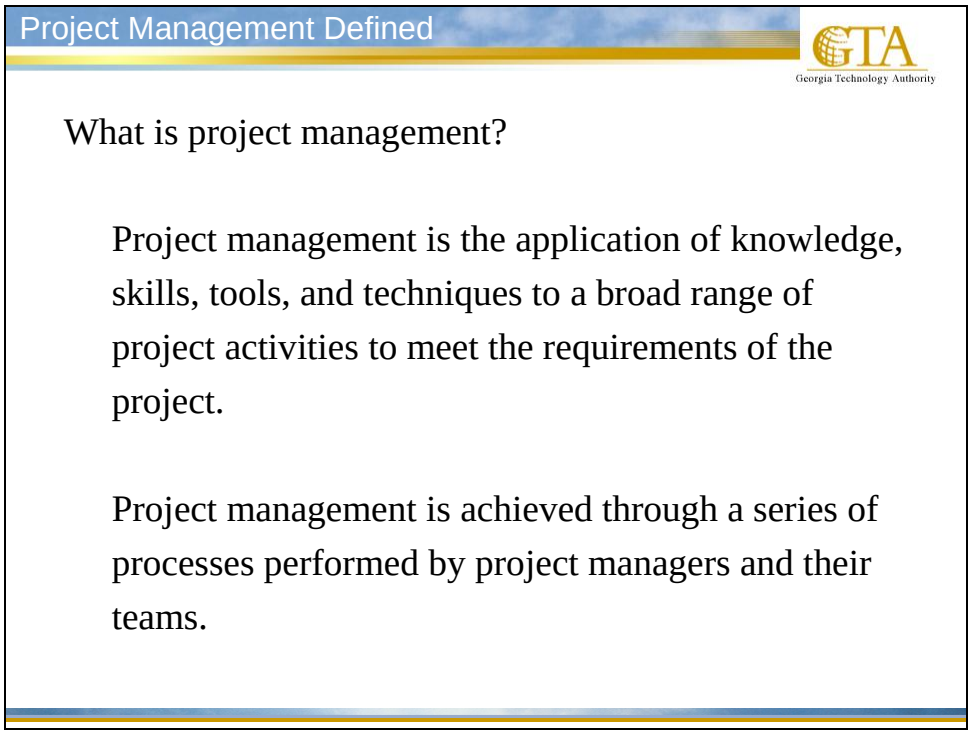
Topic 1: Exercise – Identifying Operations and Projects



Identify an operation you have been involved in (e.g. the operation of a payroll system) and list the characteristics (list 1). Next identify a project in which you have been part of (e.g. the rollout of a new payroll system) and list the characteristics (list 2). Compare list 1 with list 2. Do the project and operation characteristics overlap?

Topic 1: Exercise Worksheet

Topic 2: What is Project Management?



What is Project Management?

Project management is the application of the following factors to a broad range of project activities to meet the requirements of a project:

- **knowledge** – for example, past experience
- **skills** – for example, people skills
- **tools and techniques** – for example, scheduling tools

The requirements of a project relate to, among other things, stakeholder expectations.

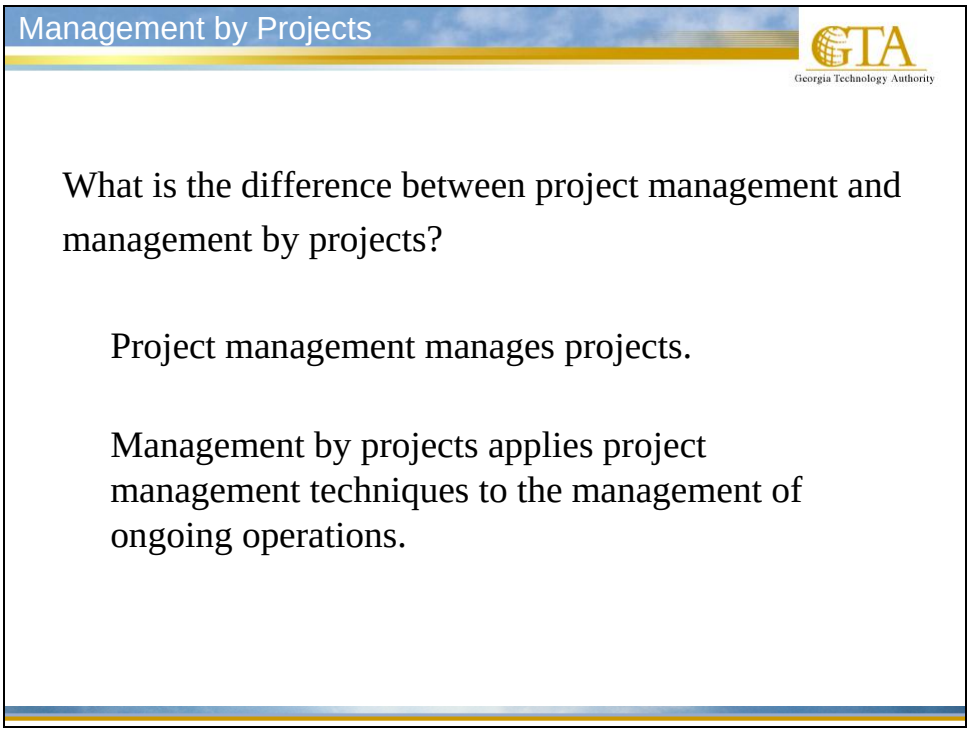
Project management is a holistic approach to management dominated by a set of processes and behaviors.

Project management is achieved through the use of such processes as initiating, planning, executing, controlling, and closing projects. Many processes within project management are iterative – they are characterized by incremental evolution and delivery of objectives.

Project teams manage the work of the projects, including

- competing demands regarding scope, time, cost, risk, and quality
- stakeholders with differing needs and expectations
- project requirements

Topic 2: What is project management? (cont'd)

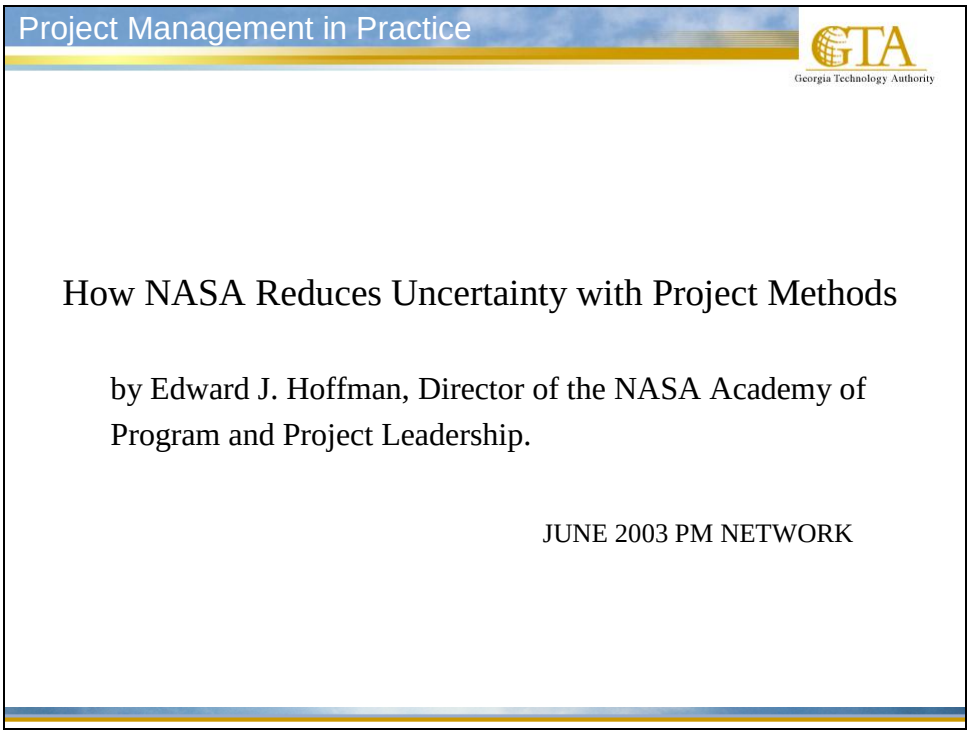


The term **project management** is sometimes used to describe an organizational approach to the management of ongoing operations, in which many aspects of operations are treated as projects to which project management techniques can be applied.

However, this approach is more properly called **management by projects** – it requires an understanding of, but is distinct from, project management.

You'll recall that operations are ongoing and repetitive, whereas projects are temporary and unique. Project management techniques can be applied to the management of operations, but this does not constitute project management.

Topic 3: Project Management in Practice



Project managers face a **triple constraint** – project scope, time, and cost – when managing competing project requirements. Project quality depends on the balance among these three constraints, with high quality projects delivering required results within scope, on time, and within budget.

Constraints associated with **value** (e.g. stakeholder perceptions or customer satisfaction) must also be considered when managing project requirements. Without the inclusion of perception and value of product, the project is likely to miss a key element during planning and execution.

Project managers also need to manage projects in response to change and uncertainty. Project risks – uncertain events or conditions – can have a positive or negative effect on at least one project objective.

Let's take a look at a real-world example of how project management's role in balancing constraints and reducing uncertainty contributes to the success of large-scale projects.

Read the article that follows and identify what you think are the key points that illustrate why project management is a critical and popular management technique.

Topic 3: Project Management in Practice (cont'd)

NASA Reduces Uncertainty with Project Methods
by Edward J. Hoffman, PhD
JUNE 2003 PM NETWORK

At NASA, project management is our lifeblood. Without it, there'd be no man on the moon, no mission to Mars, no Earth-observing satellites. Everything we do is dictated by the challenges of managing complex projects in an unforgiving and uncertain environment.

NASA's project management standards flow down through an overarching policy document that establishes high-level guidelines to ensure consistency. A project manager at the beginning of a mission must sign agreements indicating compliance with sound project management principles. But NASA's project management is not a "follow-the-numbers" exercise. In reality, project practitioners must make daily decisions requiring intuition, creativity, and experience.

An organization committed to project excellence strives to create environmental conditions that foster project success. The NASA structure integrates functions aimed directly at project management excellence. NASA's Independent Program Assessment Office (IPAO) reviews selected projects to ensure rigorous project methodology is in practice. Each NASA field center also has a Systems Management Office (SMO) for support and advice and to observe the health and capability of projects. These functions are intended to provide resources at a corporate and local level for project management.

While NASA prioritizes our project approach, each day brings a new set of challenges. Here, the capability, adaptability, and passion of a team will determine success. The Academy of Program and Project Leadership (APPL) is charged with developing the NASA project community to meet challenges, in advance of need. Driven by what practitioners and project teams need and when they need it, APPL uses a blended learning approach. This reflects NASA's value to provide a mature curriculum for professional development, coupled with just-in-time development support to meet any project team challenge.

We take special care to expound a systems view of project management, so each team member can approach a project at any point in its life cycle and understand how his or her responsibilities link together. Project success depends on the knowledge and capabilities of many disciplines, so it is important to prepare and support the entire team. Competence in project planning, scheduling, managing resources, systems engineering, software and leadership are just some of the ingredients demanded of a prepared project staff.

Because of the level of uncertainty associated with aerospace, there is a high degree of redundancy built into NASA's project management. Whether sending astronauts into space or exploring the stars, there's not much leeway for error, so the early stages of a project revolve around a heavy amount of testing and prototyping. When it gets down to the "real deal," you've only got one shot to get it right, with a thousand things that can go wrong.

The success or failure of a project also depends on how rigorously we apply our risk management techniques. In such a critical area, the concept of blended learning makes sense. APPL works with the project system to ensure training and development opportunities are available to all practitioners, tailored to level and need. We also have subject matter experts available to work directly with projects when the need arises, so learning takes place just-in-time to enhance project performance.

In addition to career development and performance enhancement, NASA strives to promote communication and wisdom transfer through knowledge management. Typical of most project managers, our staff does not want to hang around at a project's completion to write memoirs; team members want to move on to the next big, exciting project. However, we must stress the importance of taking time for lessons learned. We must continue to ascertain how NASA can become better by reflection and application of our experiences. Such a strategy incorporates lessons-learned database systems, case studies, development assignments and the like.

Topic 3: Project Management in Practice (cont'd)

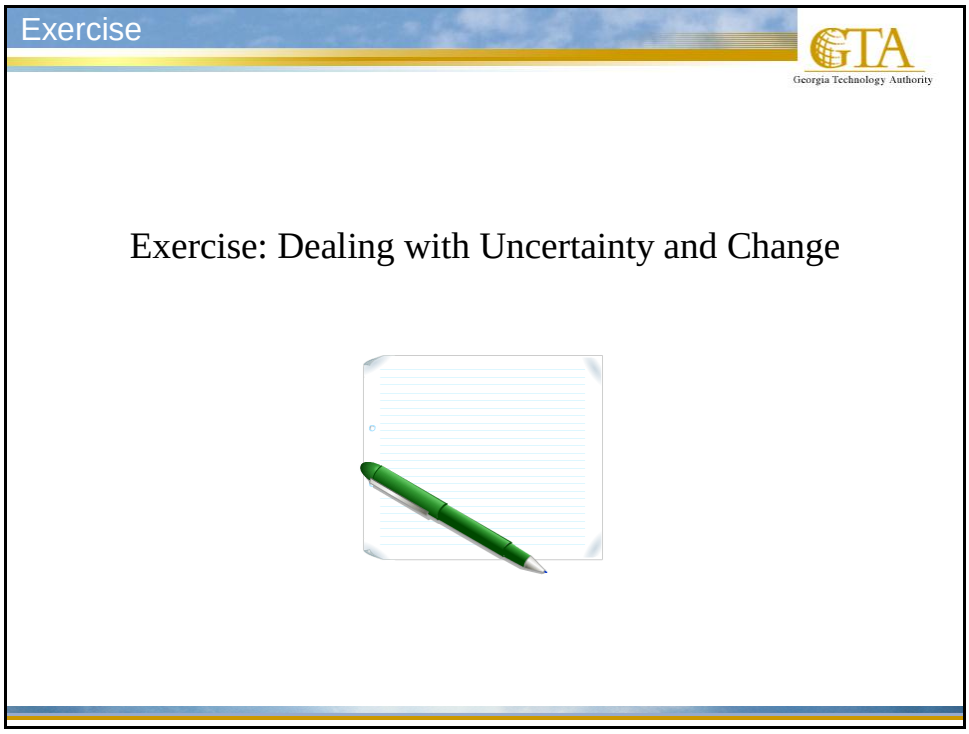
For this purpose, NASA has established an in-depth knowledge sharing program. APPL sponsors short forums allowing project managers to share their lessons through stories, as in our internal magazine ASK (http://appI.nasa.gov). ASK and the knowledge-sharing forums have helped to create a more cohesive knowledge-sharing community.

As in any field, we cannot learn just one method and expect it to remain effective from there on out. The aerospace and exploratory communities are rife with change and our project managers must be able to adapt quickly to thrive. NASA's Pathfinder mission to Mars received so many accolades because our project managers and team members worked through a continual process of adaptation, always asking what could go wrong and what could be better. Such is the standard for all of NASA's projects.

Topic 3: Project Management in Practice (cont'd)

(Graphic Source: Image developed by Manny Rodriguez and created by Lawana Lewis)

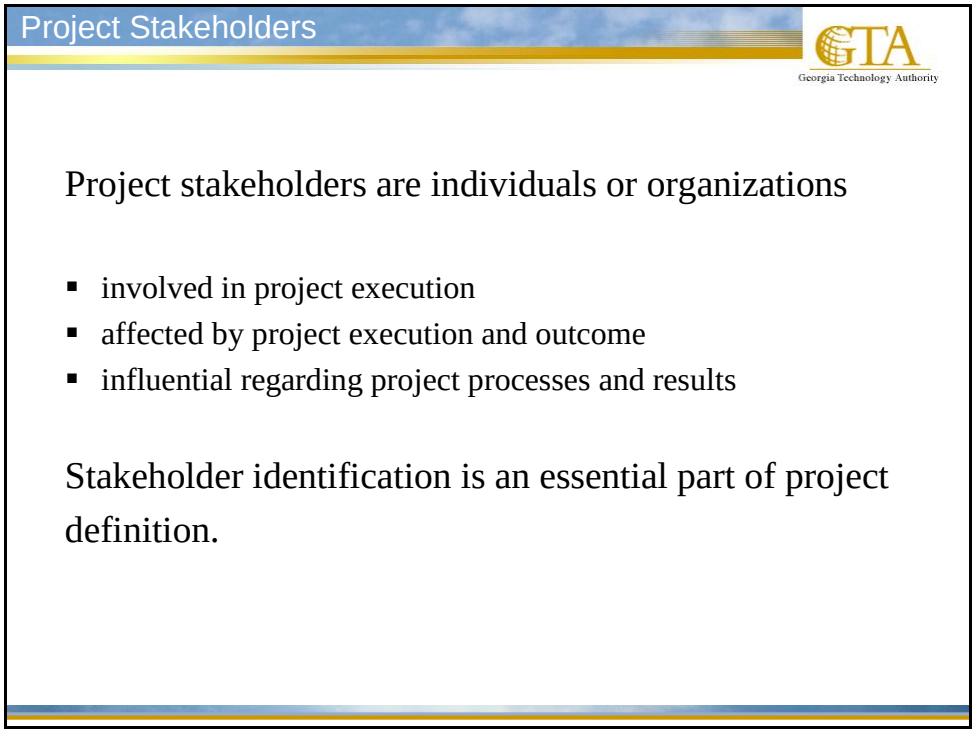
Topic 3: Exercise – Dealing with Uncertainty and Change



Using the article "How NASA Reduces Uncertainty with Project Methods," discuss how project management plays a central role in enabling NASA to deal with uncertainty and change.

Topic 3: Exercise Worksheet

Topic 4: Project Stakeholders



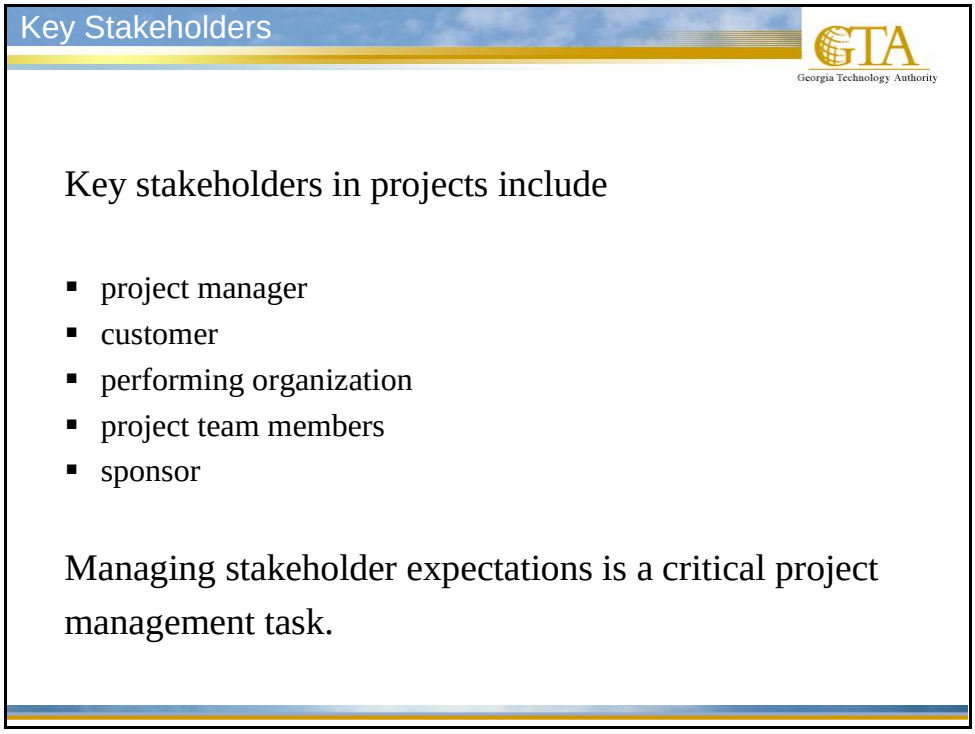
Project stakeholders are individuals or organizations actively involved in a project, positively or negatively affected by project execution or outcome, or influential regarding a project and its results.

During project initiation and subsequent planning, the project management team must identify the stakeholders, determine their requirements, and then manage and influence those requirements to ensure a successful project.

This is an essential part of the project definition process. It helps the project management team put the project in proper perspective so that the team can plan accordingly, set priorities, and establish effective management procedures.

Stakeholder identification can be difficult. For example, let's say a manufacturing company is developing a new production process to increase efficiency and reduce labor costs. Is a worker whose future employment depends on the outcome of this new project a stakeholder? Is a worker in a competitor company a stakeholder?

Topic 4: Project Stakeholders (cont'd)



Key Stakeholders in a Project

The **project manager** is the individual who is directly responsible for managing the project.

The **customer** is the individual or organization that uses the product, service, or result of the project. A project may have several layers of customers. For example, the customers for a project to develop a new parking meter may include the city authorities who buy the parking meters, the drivers who use them, and the city residents who benefit from the money collected.

The **performing organization** is the enterprise whose employees are most directly involved in performing the project tasks.

Project team members are the individuals who together make up the group that is performing the project tasks.

The **sponsor** is the individual or group that provides the resources for the project, in cash or in kind. The sponsor may be an internal stakeholder or, in many cases, external to the performing organization.

Topic 4: Project Stakeholders (cont'd)

Other categories used to identify which individuals and organizations consider themselves to be stakeholders include

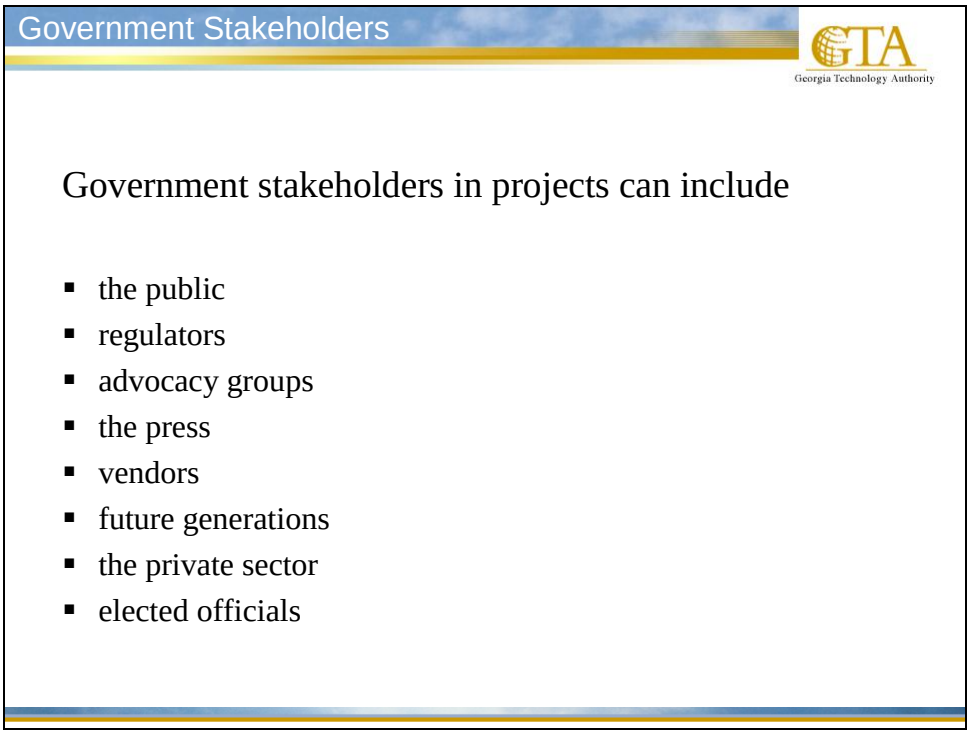
- internal and external
- owners and funders
- vendors
- team members and their families
- government agencies
- media outlets
- individual citizens
- temporary or permanent lobbying organizations
- society at large

Stakeholders frequently have very different objectives, so managing stakeholder expectations is a major challenge of project management. Although differences between or among stakeholders should generally be resolved in favor of the customer, the expectations of other stakeholders should not be disregarded.

For example, the manager of a department that needs a new management information system wants a low-cost solution. The system architect emphasizes technical excellence, while the programming contractor wants to maximize its profits.

The challenge is to find a solution that, as far as possible, meets the expectations of all stakeholders – this may prove to be an impossible task.

Topic 4: Project Stakeholders (cont'd)



Key Stakeholders in a Government Project

As well as the key project stakeholders outlined previously, government projects have additional stakeholders who must be considered.

The **public**, including voters and taxpayers, participate in projects either indirectly through electing public representatives or directly through lobbying or attending public hearings.

Regulators approve various aspects of a project and enforce rules and regulations on behalf of the government or a higher governing institution, such as an international regulatory organization.

Advocacy groups are stakeholders who have an interest in the failure of a project – for example, residents who live beside the site of a proposed highway that will replace parkland and substantially increase traffic in the area.

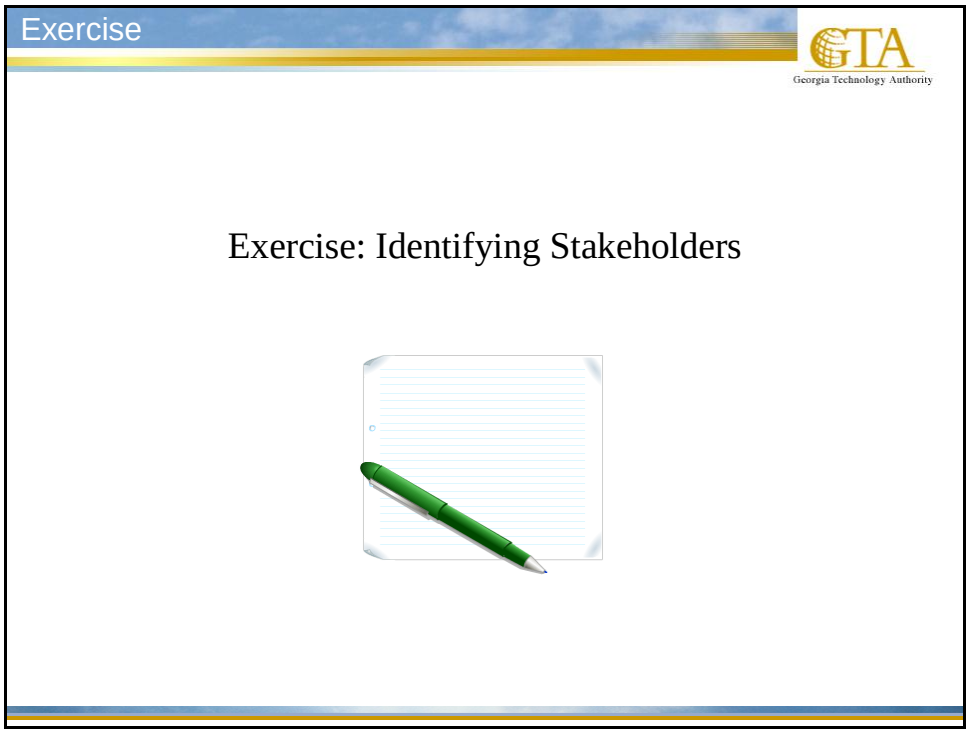
The press has an important role to play in holding governments accountable through reporting on projects that involve large amounts of taxpayers' money.

Vendors are central to government projects that require a substantial amount of procurement or goods and services from external parties.

Future generations are important stakeholders in government projects that will have a long-term impact on such factors as government debt, public infrastructure, and the environment.

Elected officials are central stakeholders and will have an impact on such factors as financial and project objective support.

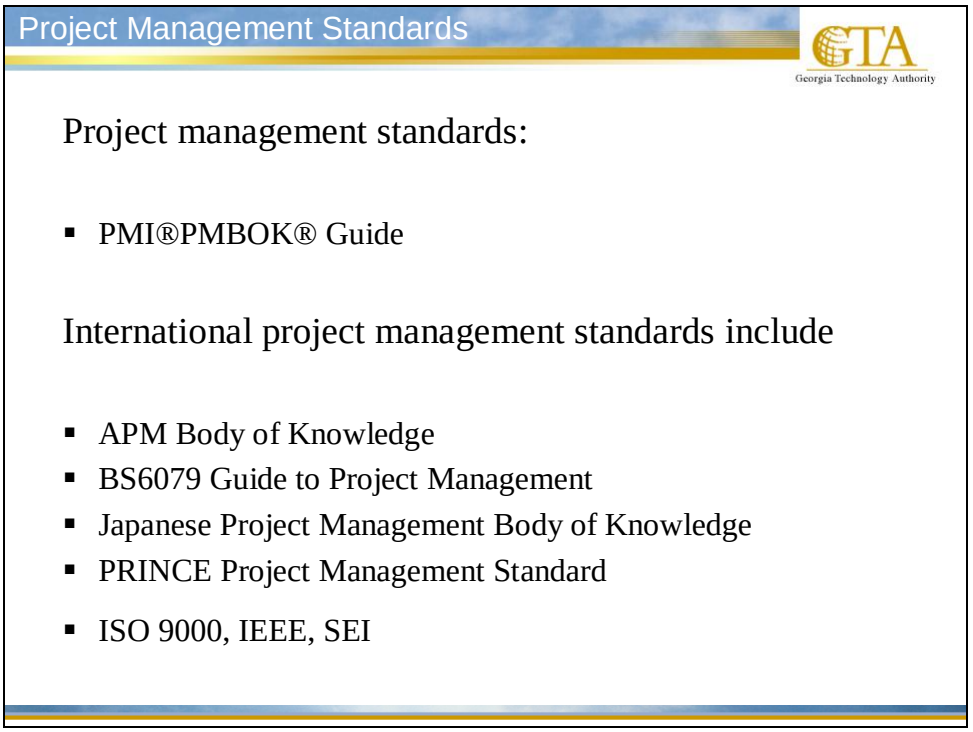
Topic 4: Exercise – Identifying Stakeholders



Drawing on the article "How NASA Reduces Uncertainty with Project Methods," identify stakeholders that may be involved in a NASA project. Categorize the stakeholders as important to the project, somewhat important, and least important.

Topic 4: Exercise Worksheet

Topic 5: Project Management Standards



A project management standard is a comprehensive approach to evaluating and developing project management methodologies for the conduct, certification, and understanding of the project management discipline.

The mission of a standard is to assist in improving the understanding and competency of experienced and new project management practitioners and customers.

The most widely used set of standards in the United States is the **PMI®PMBOK® Guide**.

The Project Management Institute publishes A Guide to the Project Management Body of Knowledge (PMBOK® Guide) that identifies and describes the generally accepted project management body of knowledge.

Topic 5: Project Management Standards (cont'd)

PMBOK® Guide is the basic reference for project management professionals, providing a common lexicon within the profession for discussing project management. According to the guide, the generally accepted project management body of knowledge includes, but is not limited to, various project management knowledge areas:

- scope
- integration
- time
- cost
- quality
- procurement
- communication
- risk
- human resources

PMBOK® Guide is used by the Institute to provide a consistent structure for its professional development programs.

It is also the principal source material for this course.

Other project management standards used overseas include

- **APM Body of Knowledge –** published by the UK-based Association for Project Management

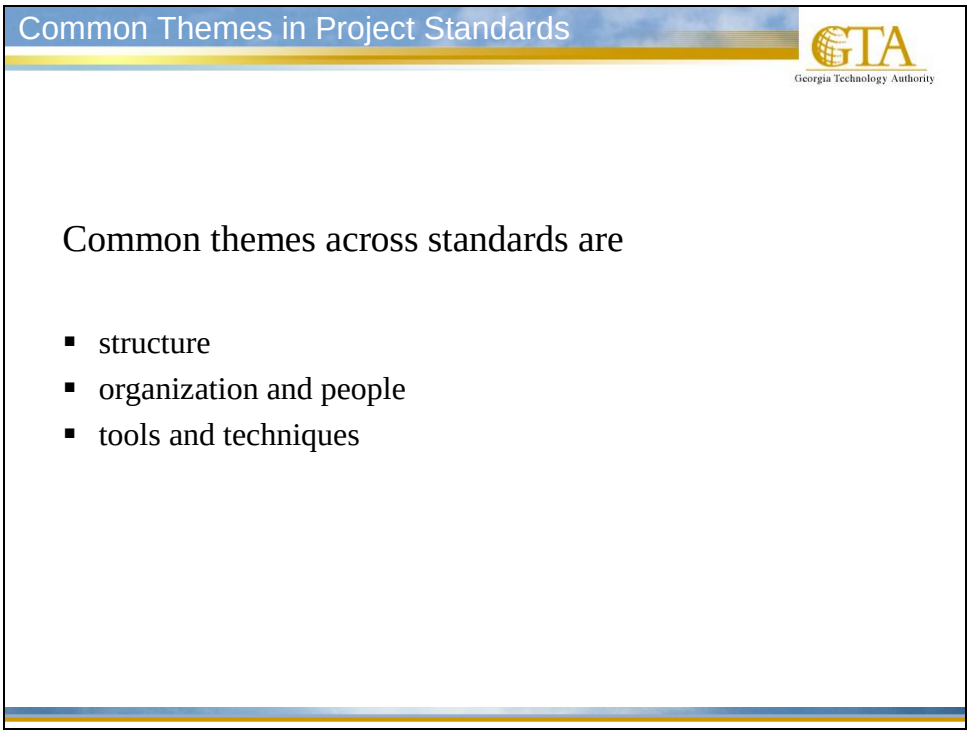
- **BS6079 Guide to Project Management –** issued by the British Standards Institute

- **Japanese Project Management Body of Knowledge –** published by the Engineering Advancement Association (ENAA) of Japan

- **PRINCE Project Management Standard –** developed as a UK government standard for IT project management

- **ISO 9000, IEEE, SEI –** worldwide quality and engineering standards

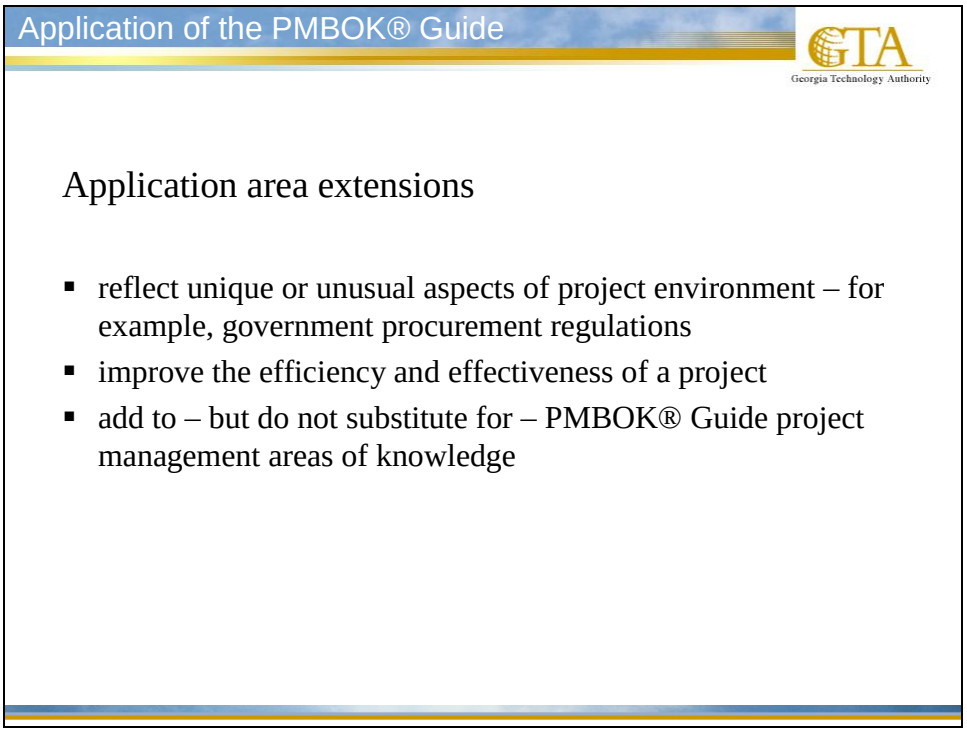
Topic 5: Project Management Standards (cont'd)



There are some common themes that run through all project management standards.

- Project structure is a key component made up of life cycles and phases (see lesson 2).
- Organizations and people are the key soft skills required for successful project management (see lesson 5).
- Projects require tools and techniques that can consistently achieve objectives (see lessons 3 and 4).

Topic 5: Project Management Standards (cont'd)



The PMBOK® Guide identifies and describes the generally accepted project management body of knowledge and is the basic reference for project management professionals.

However, the PMBOK® Guide and the project management areas of knowledge it describes may not be applicable in all cases. Therefore, there is a need to customize the application of the PMBOK® standard through application area extensions.

Generally accepted knowledge and practices for projects in one application area might not be generally accepted across the full range of projects types in most application areas.

Application area extensions

- reflect unique or unusual aspects of the project environment
- provide common knowledge and practices that improve the efficiency and effectiveness of a project
- add to the Guide to Project Management Body of Knowledge areas of knowledge

Application area-specific knowledge and practices develop due to such factors as differences in cultural norms, project life cycles, societal impact, or technical terminology. For example, in government contracting, common knowledge and practices are driven by unique government procurement regulations that require full transparency. Such regulations do not necessarily apply to other categories of projects.

Other examples of sectors where common knowledge and practices do not apply to all categories of projects include the construction industry, where virtually all work is accomplished under contract, and bioscience, which has a unique regulatory environment that influences project management practices.

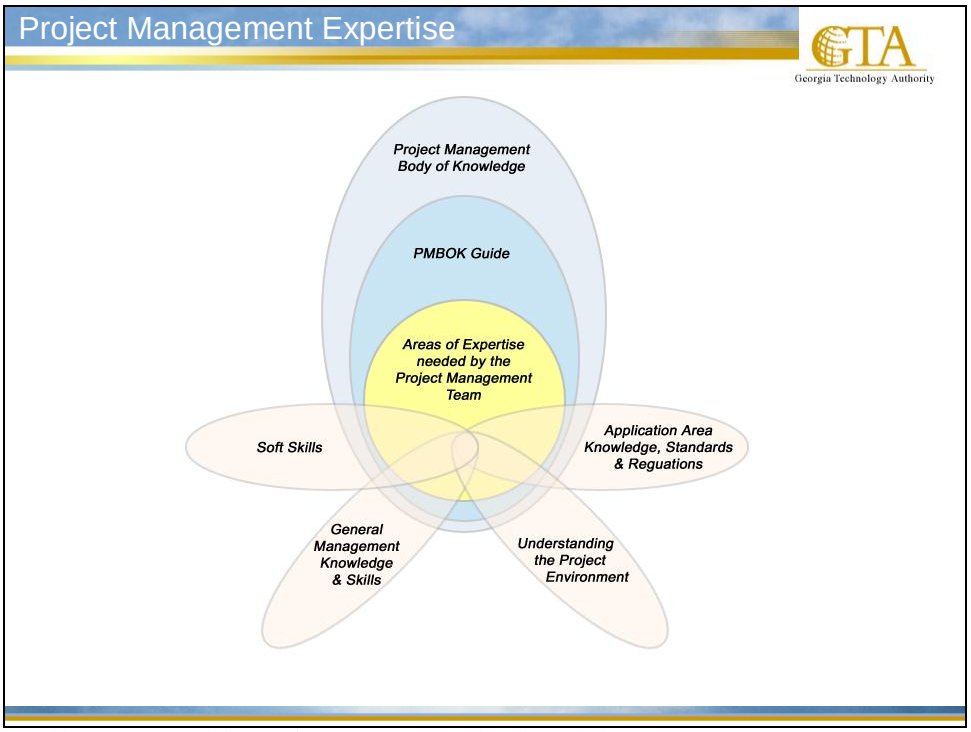
Topic 5: Project Management Standards (cont'd)

Application area extensions are additions to, not substitutes for, the PMBOK® Guide project management areas of knowledge. Unique additions to the areas of knowledge include

- identifying new or customized processes
- subdividing processes
- describing different sequenced processes
- modifying common process definitions
- defining special inputs, tools, and techniques for existing processes

The standard knowledge areas, proposed by the PMBOK® guide, are presented in topic 7.

Topic 6: Project Management Skills

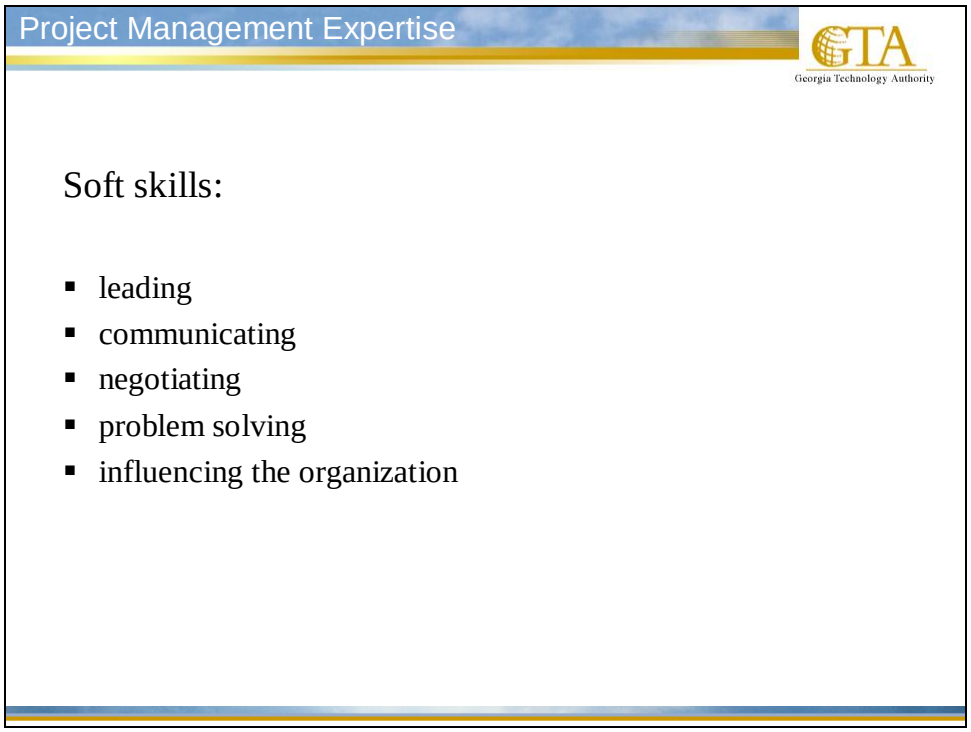


(Graphic Source: - A Guide to Project Management Body Of Knowledge – © PMBOK ® 2004)

Effective project managers require a thorough understanding of project management standards and areas of knowledge – the "hard" project management skills discussed in topics 6 and 7.

In addition, project managers need to understand the "soft" project management skills, many of which overlap with other management disciplines, particularly general management and application areas.

Topic 6: Project Management Skills (cont'd)



There are five major soft project management skills that affect most projects; leading, communicating, negotiating, problem-solving, and influencing the organization.

- **Leading** involves
  - establishing direction – developing a vision of the future and strategies to produce the changes required to achieve the vision
  - aligning people – communicating the vision by words and actions to individuals and groups whose cooperation may be required to achieve the vision
  - motivating and inspiring – encouraging and helping people to energize themselves so they can overcome political, bureaucratic, and resource barriers to change

  Although the project manager is generally a project's principal leader, leadership can and should be demonstrated by many different individuals at many different times during the project.

- **Communicating** involves exchanging information. The sender must ensure that the information is clear, unambiguous, and complete so that the receiver can understand it correctly. The receiver must ensure that the entire information is received and understood correctly.

Topic 6: Project Management Skills (cont'd)

People communicate in different ways:

- written and oral
- internal (within a project) and external (to the customer, for example)
- formal (reports, briefings) and informal (memos, ad hoc conversations)
- vertical (up and down the organization) and horizontal (with peers and partner organization)

In addition, there are many general communication concepts and techniques that project communications management applies to the specific needs of a project. These include

- sender-receiver communication models – characterized by feedback loops and barriers to communications
- choice of media – for example, when to communicate in writing or orally and when to write an informal memo or a formal report
- writing style – for example, active versus passive voice
- presentation techniques – the use of body language or visual aids
- meeting management techniques – how to prepare an agenda or deal with conflict

- **Negotiating** involves conferring with others to reach an agreement or arrangement. Agreements may be negotiated directly or with assistance, such as through mediation or arbitration.

  A project team is likely to negotiate some or all of the following in the course of a typical project:

  - scope, cost, and schedule objectives
  - changes to scope, cost, or schedule
  - contract terms and conditions
  - assignments
  - resources

- **Problem solving** combines problem definition and decision making. Problem definition involves distinguishing between causes and symptoms.

  Problems may be

  - internal – insufficient resources are allocated to the project
  - external – a customer requests a different project end product
  - technical – the wrong project machinery is provided
  - managerial – a functional group is not meeting project targets
  - interpersonal – some project team members do not get along

  Decision making involves analyzing a problem to identify viable solutions and choosing the most appropriate solution.

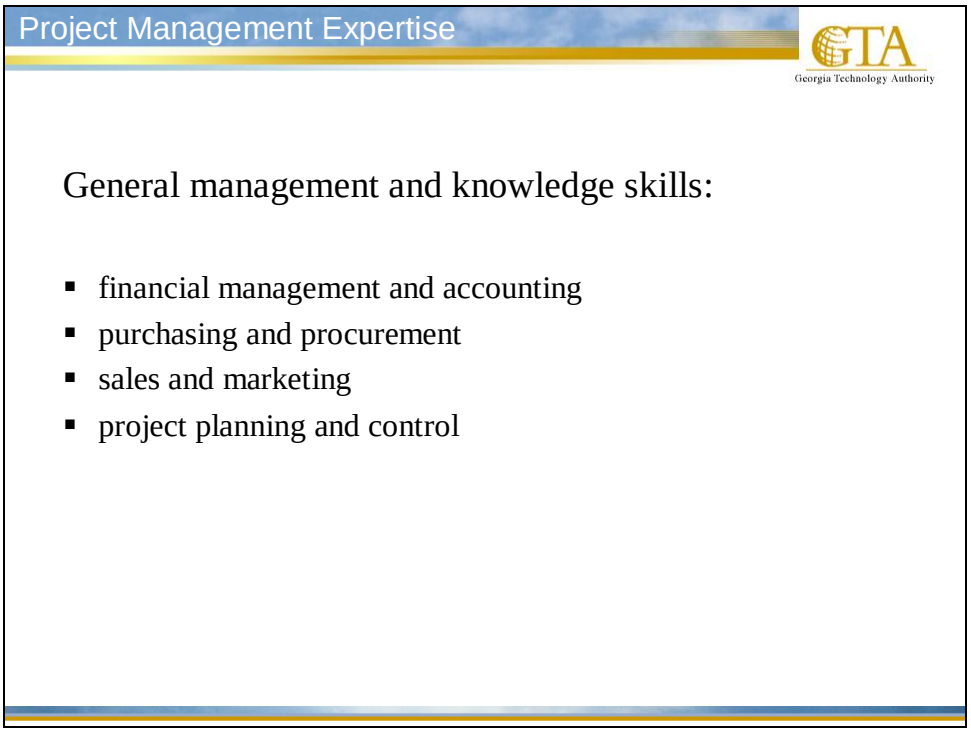
  Decisions can be made or obtained from a stakeholder – for example, the customer, the team, or a functional manager. Once made, decisions need to be implemented. In addition, decisions have a time element because the "right" decision may not be the "best" decision if it is made too early or too late.

Topic 6: Project Management Skills (cont'd)

- **Influencing the organization** means "getting things done" through persuasion. It requires an understanding of both the formal and informal structures within all stakeholder groups and organizations.

  Influencing the organization also requires an understanding of the mechanics of power and politics in order to, among other things, effect change, overcome resistance to change, and get a group of people with different interests to act collectively.

Topic 6: Project Management Skills (cont'd)



General management covers a wide range of tasks and responsibilities, including planning, organizing, staffing, executing, and controlling the operations of an ongoing business enterprise. General management also includes such supporting disciplines as human resources management, law, logistics, and strategic planning. The specific areas highlighted are:

- **financial management and accounting** – identifying and understanding the flow of funds through an organization. A project will always require financial management in putting aside and managing appropriate funds while ensuring the correct presentation of all financial events as per standard accounting principles.

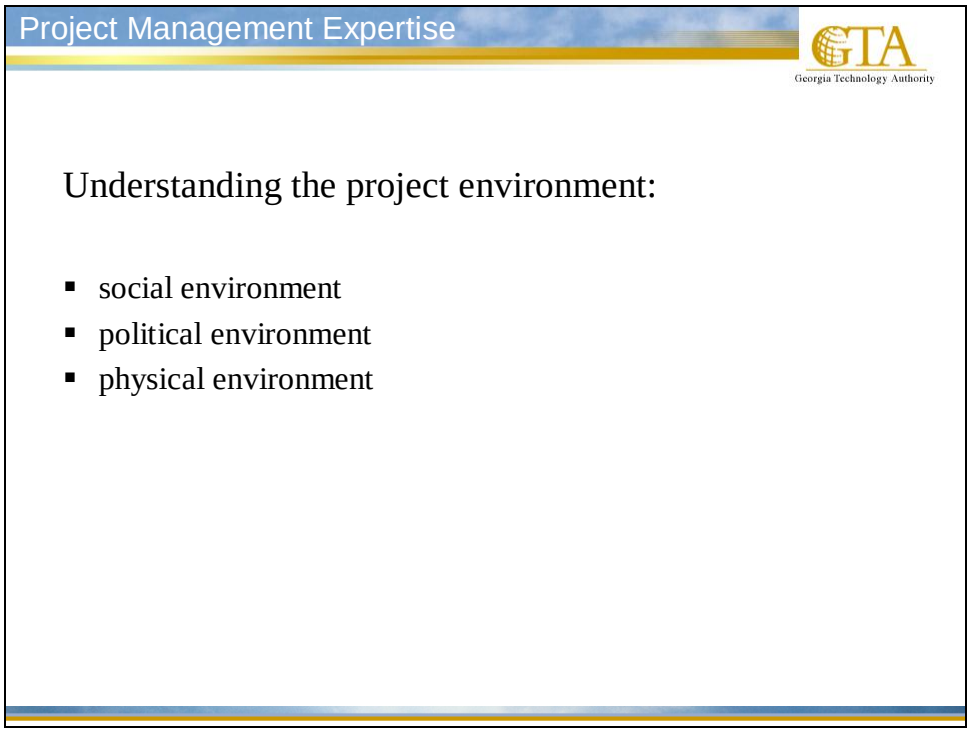
- **purchasing and procurement** – purchasing, contracting, outsourcing and vendor management are necessary prerequisites of any project manager skills portfolio. As project resources are assigned, there should be a constant evaluation of what skills and materials are available from the external environment.

- **sales and marketing** – the product of the project is sold on many occasions. Initially it is sold to the project sponsor, whereas in the latter stages it is sold to the external environment. Sales and marketing go hand-in-hand to promote and sell the well-being of the project.

- **project planning and control** – the core skills of a project manager are communication and control and to do these well the project must be well planned.

Project management overlaps or modifies general management in many areas – for example, organizational behavior, financial forecasting, or planning techniques.

Topic 6: Project Management Skills (cont'd)



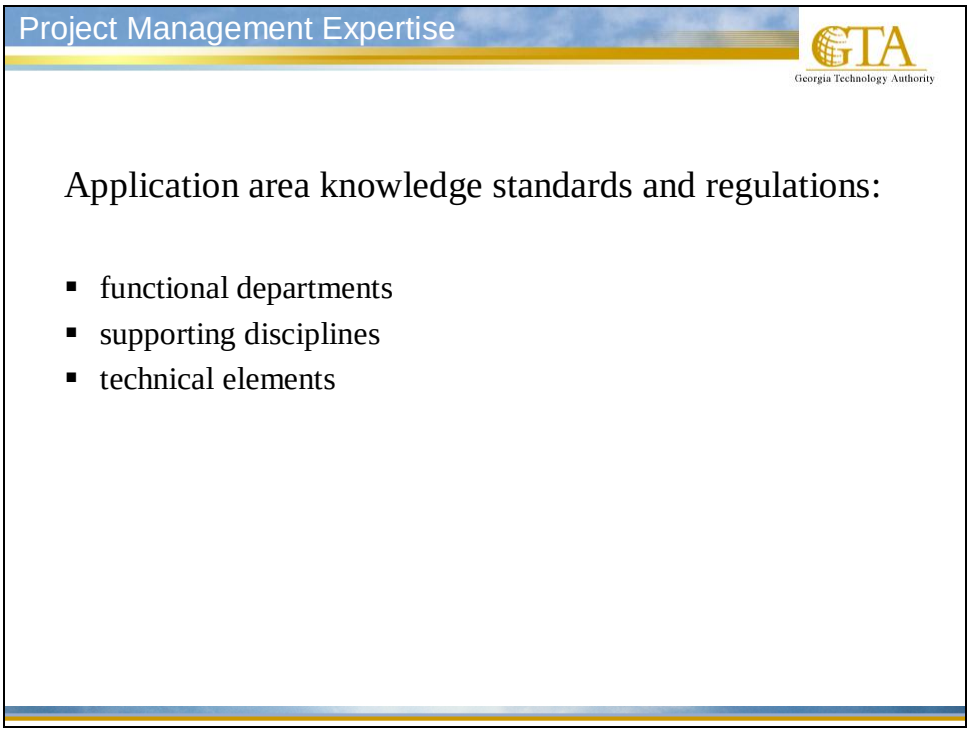
Understanding the Project Environment
The project management team should consider the project in the context of its social, political, and physical environment.

- **Social environment**: The team should have an understanding of how the project affects people and how people affect the project. Economic, demographic, ethical, educational and religious issues should be considered.

- **Political environment**: Some team members may need to be familiar with applicable international, national, regional and local laws, and the political climate that could affect the project.

- **Physical environment**: If the project will impact on the physical environment, some team members should be aware of the local ecology and physical geography that could be affected.

Topic 6: Project Management Skills (cont'd)



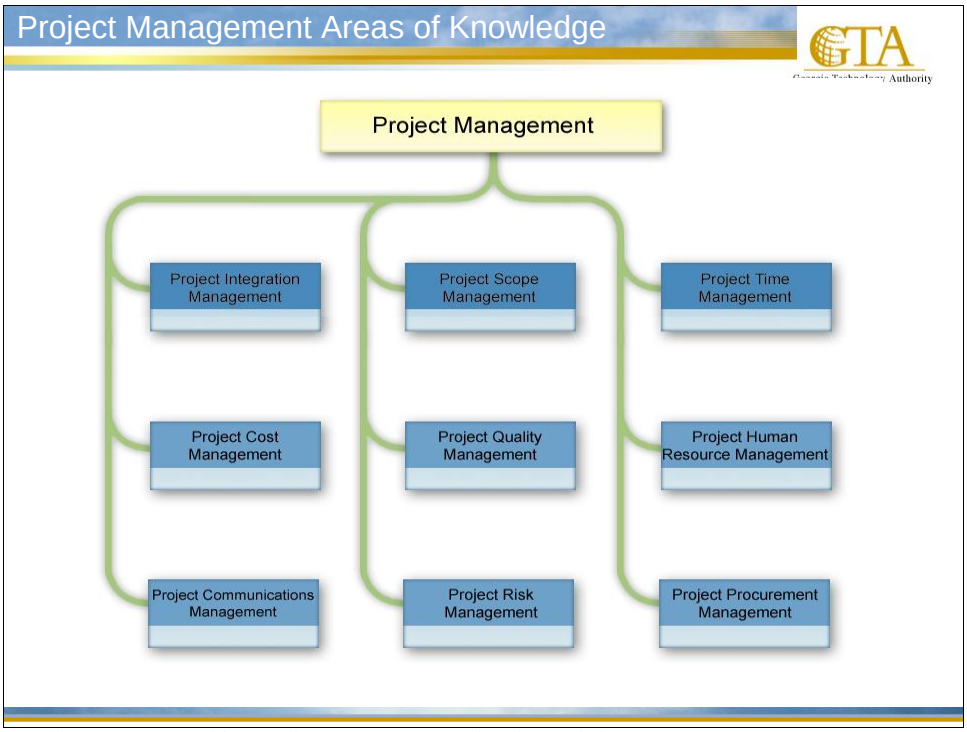
Application Area Knowledge Standards and Regulations

Application areas are categories of projects that have common elements, some of which are important for specific projects but not required or present in all projects.

Examples of application areas include the following:

- functional departments and supporting disciplines, such as legal, production and inventory management, and human resource management
- technical elements, such as software development, pharmaceuticals, and construction engineering

Topic 7: Project Management Areas of Knowledge

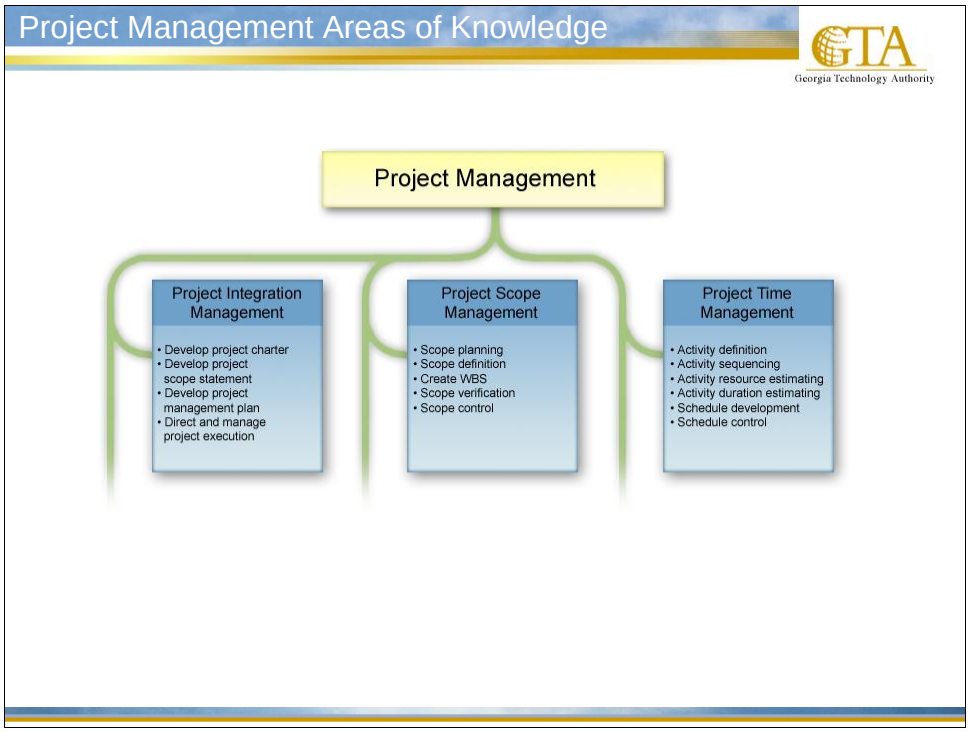


(Graphic Source: - A Guide to Project Management Body Of Knowledge – © PMBOK ® 2004)

Project management can be organized into nine key knowledge areas:

- project integration management
- project scope management
- project time management
- project cost management
- project quality management
- project human resource management
- project communications management
- project risk management
- project procurement management

Topic 7: Project Management Areas of Knowledge (cont'd)



Project integration management covers the processes that together ensure that the various elements of the project are properly coordinated. These include

- develop project charter
- develop project scope statement
- develop project management plan
- direct and manage project execution
- monitor and control project work
- integrate change control

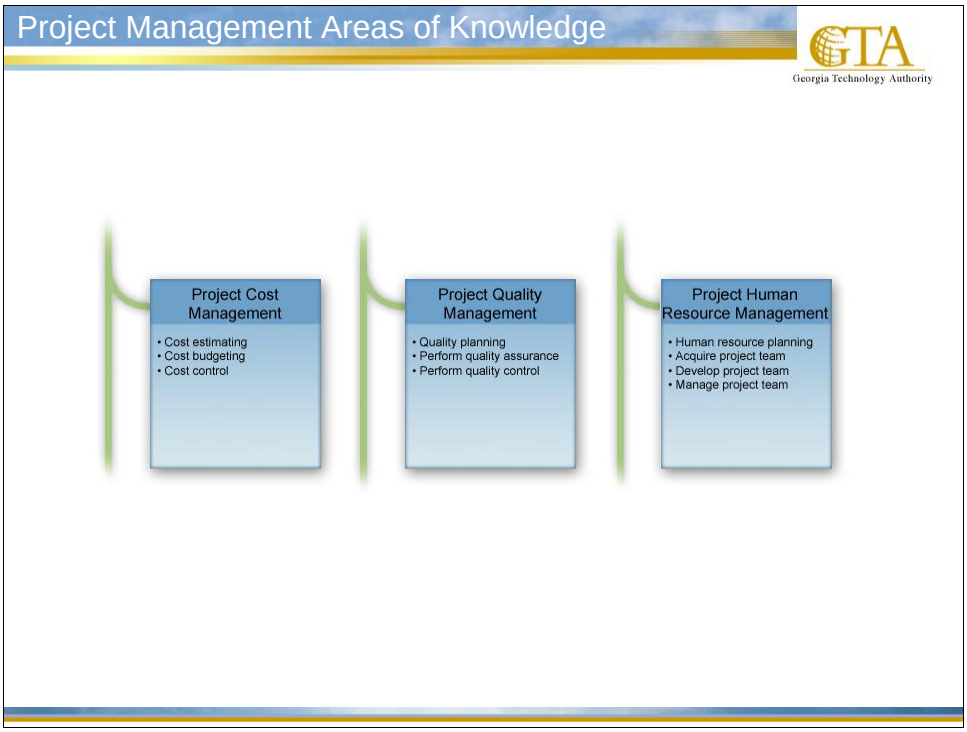
Project scope management covers the processes that ensure that the project includes all the work required, and only the work required, to complete the project successfully. These include

- scope planning
- scope definition
- create WBS
- scope verification
- scope change control

Project time management entails using processes that ensure the project is completed on time. These include

- activity definition
- activity sequencing
- activity resource estimating
- activity duration estimating
- schedule development
- schedule control

Topic 7: Project Management Areas of Knowledge (cont'd)



Project cost management covers the processes that ensure the project is completed within the approved budget. These include

- cost estimating
- cost budgeting
- cost control

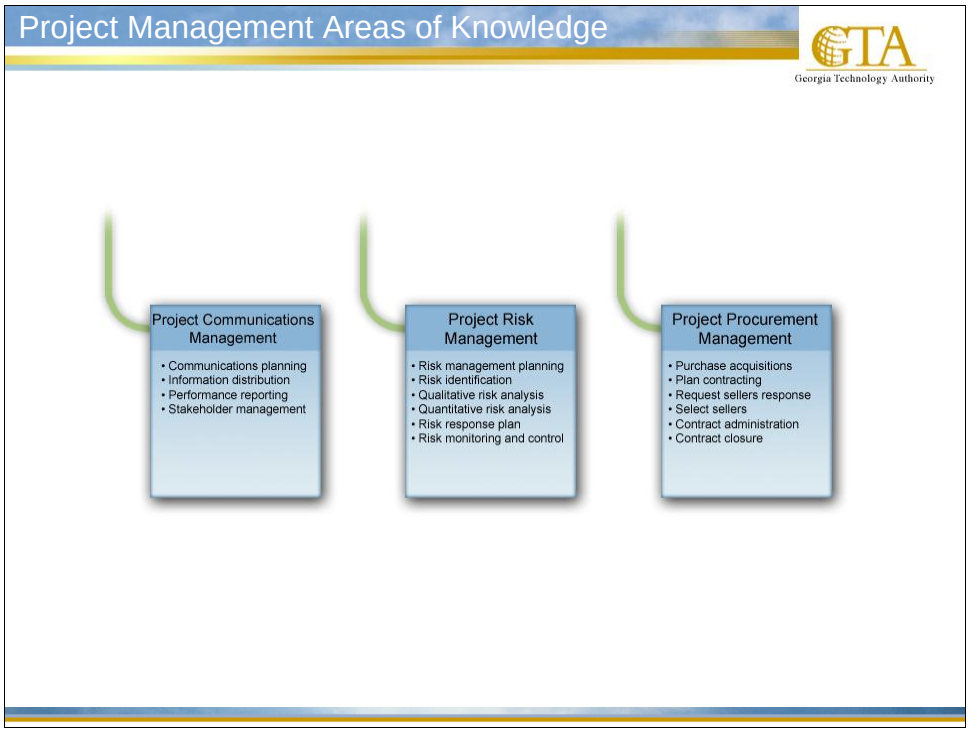
Project quality management entails using processes that ensure the project will satisfy the needs for which it was undertaken. These include

- quality planning
- quality assurance
- quality control

Project human resource management covers the processes that make the most effective use of the people involved with the project. These include

- human resource planning
- acquire project team
- develop project team
- manage project team

Topic 7: Project Management Areas of Knowledge (cont'd)



Project communications management entails using processes that ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. These include

- communications planning
- information distribution
- performance reporting
- manage stakeholders

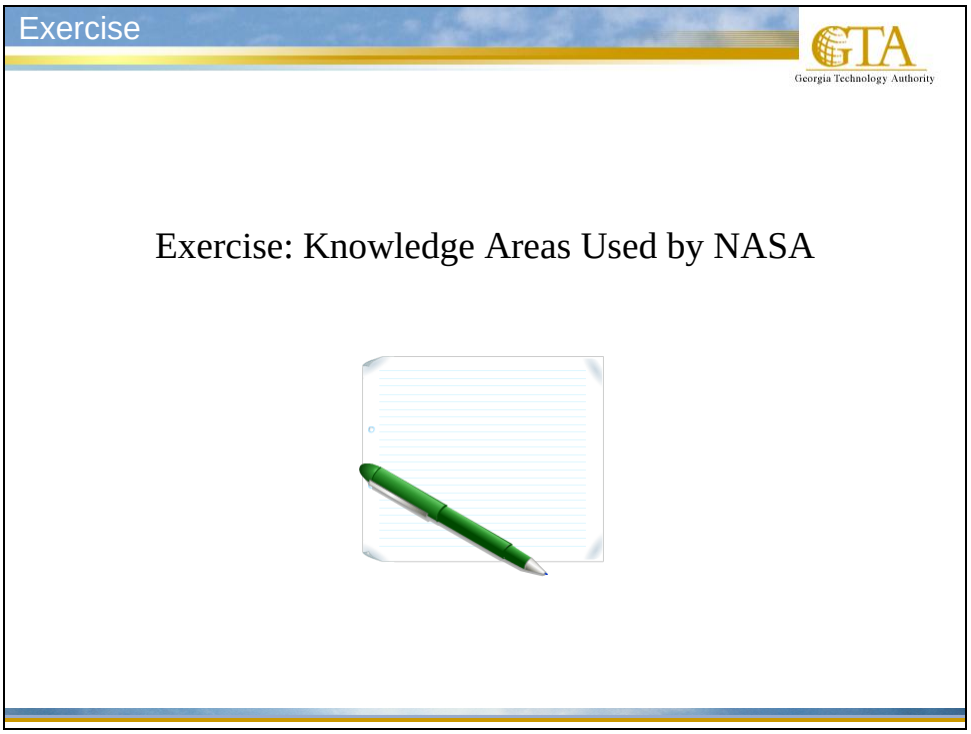
Project risk management covers the processes for identifying, analyzing, and responding to project risk. These include

- risk management planning
- risk identification
- qualitative risk analysis
- quantitative risk analysis
- risk response planning
- risk monitoring and control

Project procurement management covers the processes for acquiring goods and services from outside the performing organization. These include

- purchase and acquisition
- plan contracting
- request seller (vendor) response
- select sellers (vendors)
- contract administration
- contract closure

Topic 7: Exercise – Knowledge Areas Used by NASA



Which of the project management knowledge areas do you think NASA uses? Are these knowledge areas applicable to all projects?

Sample answer:

NASA uses most of these knowledge areas, to a greater or lesser degree. As stated in the article, NASA has one attempt at each project, and this indicates that all avenues of proactive project planning and management are undertaken.

For other projects, some of these knowledge areas may apply and others not. It depends on the type of project, size of the project, the environment, the practices, and many other factors.

Lesson review

Topic 1: Definition of a Project

Topic 2: What is Project Management?

Topic 3: Project Management in Practice

Topic 4: Project Stakeholders

Topic 5: Project Management Skills

Topic 6: Project Management Standards

Topic 7: Project Management Areas of Knowledge

Student learning objectives

After completing this lesson, you should be able to

- define a project and explain how it differs from an operation
- describe the role of project management
- explain how project management operates in practice
- identify key project stakeholders
- describe the key general management skills that also apply to project management
- identify the main domestic and international sets of project management standards
- identify the different knowledge components for a project manager

Lesson 2: Structuring a Project

Topic 1: Management by Objectives

Topic 2: Project Phases and Life Cycle

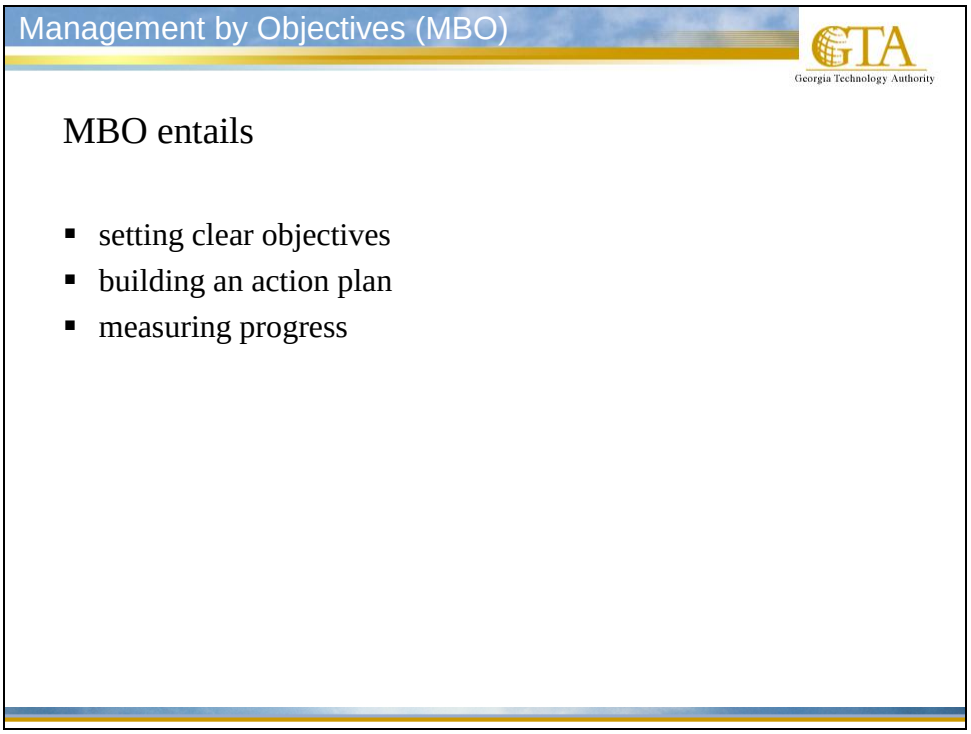
Topic 3: Project Life Cycles in Practice

Student learning objectives

After completing this lesson, you should be able to

- explain how the concept of objectives has evolved in project management
- identify and explain the role of project phases and project life cycle
- describe how a project life cycle contributes to project success

Topic 1: Management by Objectives



As we'll learn later in this course, the planning process in current project management theory involves defining and refining goals and objectives and selecting the best of alternative courses of action to attain the objectives of the project.

The importance of goals and objectives in business management has its origins in the 1960s and 1970s with the emergence of the concept of management by objectives (MBO).

People appear to need goals and objectives to achieve extraordinary outcomes. In the last 50 years, there have been more than 300 studies repeatedly demonstrating basic truths about humans and goals. These truths include that people

- accomplish beyond their norm when they use goals
- respond positively to stretched goals that they consider to be achievable
- stay attached to goals when leaders support a goal process by both modeling the goal-related behavior and providing feedback relative to goal progress

Topic 1: Management by Objectives (cont'd)

In the 1960s and 1970s, the idea of managing work efforts by goals and objectives became popular – hence the term MBO. The idea was to improve management and work productivity in general by defining intended outcomes.

MBO principles contain many precursors to the basic building blocks used by current project management theory. The basic MBO principles are setting clear objectives, building an action plan, and measuring progress.

A more detailed set of MBO tenets includes

- establishing a set of **top-level strategic objectives**
- creating a cascade of **organizational objectives** that is supported by lower-level definitive objectives and action plans
- developing an organizational role and **mission statement**, as well as specific objectives and action plans for each member, often in a manner that involves participative decision making
- establishing **key results** or performance standards for each objective
- periodically **measuring/assessing the status** or outcome of the objectives

The strength of the MBO model lies in the idea that if a desired outcome is defined as an objective and progress is measured toward reaching that objective, then the chances of reaching that outcome are enhanced.

Topic 1: Management by Objectives (cont'd)

Management by objectives focuses on the importance of the goal definition process, in particular defining critical success factors (CSFs). The CSF goal era of the 1990s provides helpful criteria about what makes objectives effective in shaping behavior. SMART (Specific, Measurable, Actionable, Reasonable, Time-framed) is another method of shaping effective objectives: Each word in the acronym describes a particular aspect of thegoal to be achieved:

- **specific –** a goal needs to be exact, distinct and clearly stated
- **measurable –** how do you know when the goal is completed? When specifying the goal you should state how you are going to measure its completion.
- **actionable** – goals should be set in such a way that ownership is transferable
- **reasonable –** setting a reasonable goal is fundamental
- **time-framed –** you should also allow yourself enough time to succeed

CSF parameters are good predictors of influential or effective goals. Definition of CSFs are

- mirror the objectives of the project
- provide objectives that can be divided into measurable, reasonable, and attainable goals
- are approved by project stakeholders
- are used to measure the success of the project through attaining the goals

Drawing on the influence of MBO and CSF theories, the project management movement emerged, emphasizing project objectives and how to fulfill them:

- **set clear objectives**, get key stakeholder buy-in, and define objectives for the participant through explicit requirement setting
- put together a **series of best practice action steps** in the form of a work breakdown structure

Topic 1: Management by Objectives (cont'd)

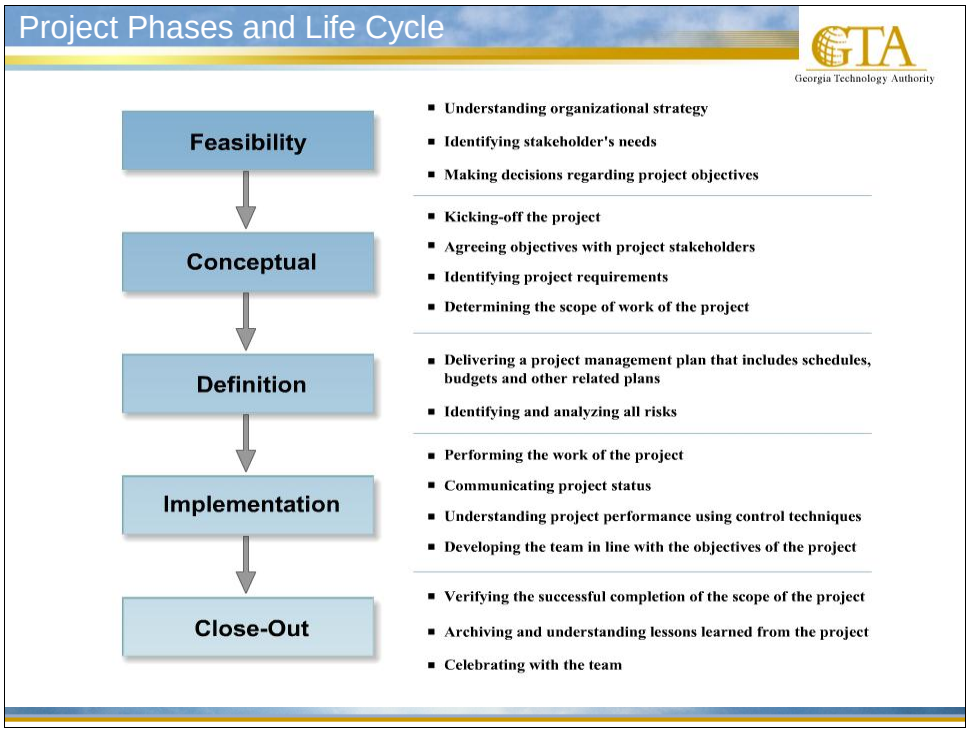
- most important, **help people achieve their objectives** – plan, secure, and schedule deployment of resources and completion of tasks

You can look at the example of baking a cake to understand the evolution from MBO to project management. The MBO and CSF models emphasize setting a goal – baking a cake – with as much specificity as possible regarding the nature of the cake and your action plan for reaching the kitchen and conducting cake baking activities.

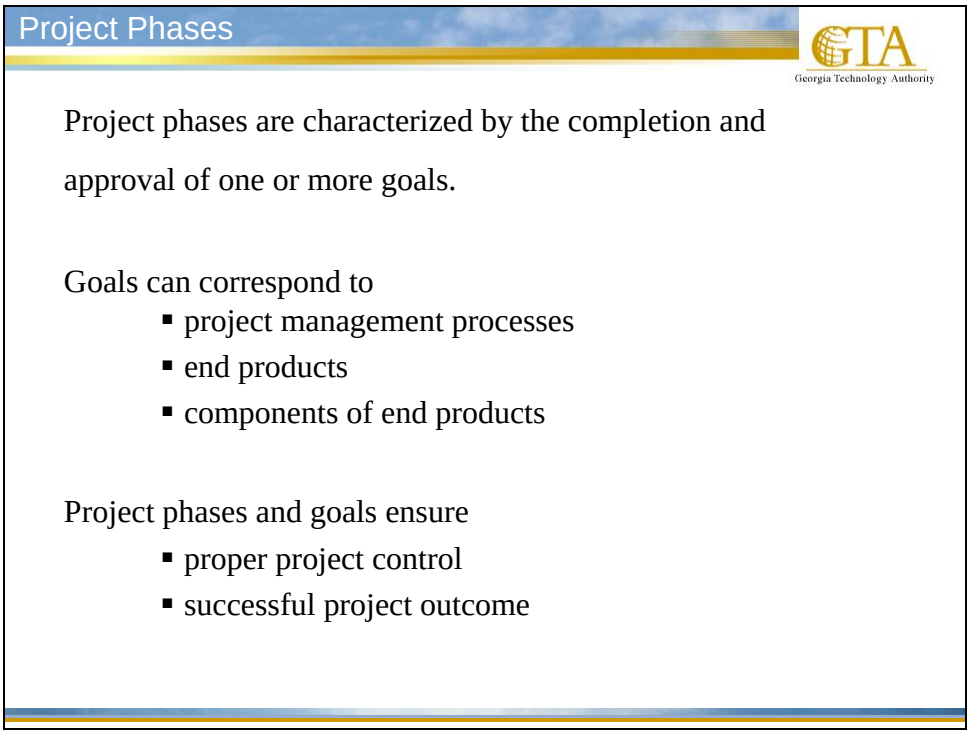
The project management model incorporates elements of the MBO model but adds that the best predictor of baking a cake is your ability to obtain the right ingredients and effectively complete the tasks of measuring, combining, and heating the ingredients as per the recipe.

Take a project example of introducing a new payroll system; where the objective is to introduce a new system for collecting payroll and producing payroll information. The critical success factors in this case might be that the system needs to be available in a certain time frame and the deliverable must meet certain compliance conditions.

Topic 2: Project Phases and Life Cycle



Topic 2: Project Phases and Life Cycle (cont'd)



Project Phases

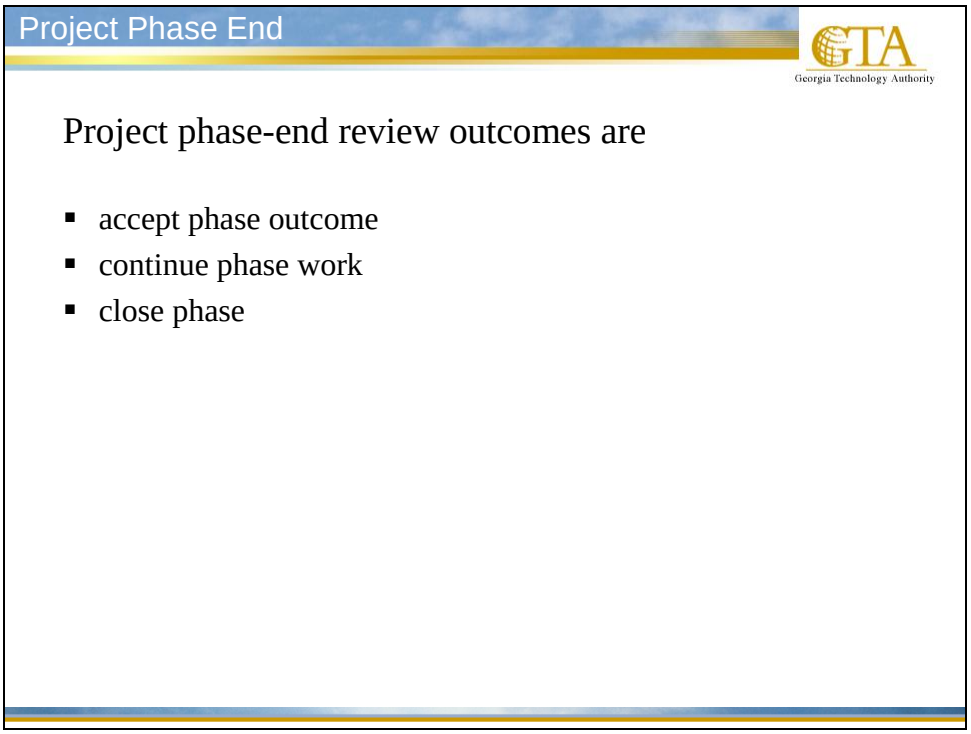
Organizations generally divide projects into project phases to improve management control and to link the project to ongoing organization operations.

Project phases are characterized by the completion and approval of one or more goals. A goal is a tangible, measurable, and verifiable work product that maps directly to a project objective. For a phase to be successful, it must achieve the goal/objective.

Some goals correspond to the project management process, whereas other goals are the end products or components of the end products of a project. Examples of goals include feasibility study reports, detailed design documents, working prototypes, and finished products.

Project phases, and their goals, are part of a sequential process designed to ensure that there is proper control of the project and that the project outcome is achieved. Project phases can be further subdivided into subphases, each of which is aligned to one or more specific goals for monitoring and control.

Topic 2: Project Phases and Life Cycle (cont'd)



Project Phase-End Outcomes

At the end of a project phase, a technical or design review of key goals and project performance to date generally takes place. These phase-end reviews – also known as phase exits, kill points, or stage gates – determine whether the project phase outcome is accepted, whether extra work is still required, or whether the phase should be considered accepted.

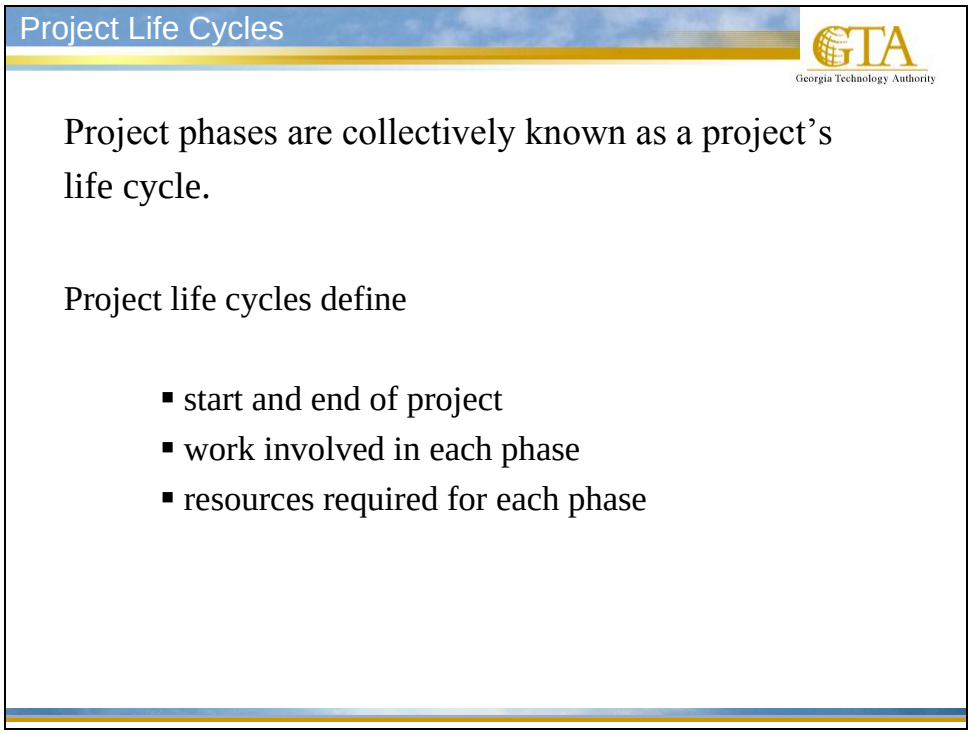
Other phase-end review outcomes include

- a decision to start the activities of the next phase without closing the current phase – for example, when the project manager chooses to accelerate the course of action

- a decision to close a phase without initiating any other phases – for example, when the project ends or when the risk is considered too great for the project to be allowed to continue

Formal phase completion does not include authorizing the subsequent phase because each phase is initiated to produce a phase-dependent output, specifying what is allowed and expected for that phase. However, a phase-end review can be held with the explicit goal of obtaining authorization to close the current phase and to initiate the subsequent one.

Topic 2: Project Phases and Life Cycle (cont'd)



A project's phases are collectively known as the project's life cycle.

The project life cycle defines the start and end of a project. For example, when an organization identifies a business opportunity, it generally undertakes a needs assessment or a feasibility study to decide whether it should proceed with a project to realize the opportunity. The project life cycle definition determines whether the feasibility study constitutes the first project phase or is a separate, standalone project.

The project life cycle definition also determines which transitional actions at the beginning and the end of the project are included in the project and which are not. In this way, the project life cycle definition is used to link the project to the organization's ongoing operations.

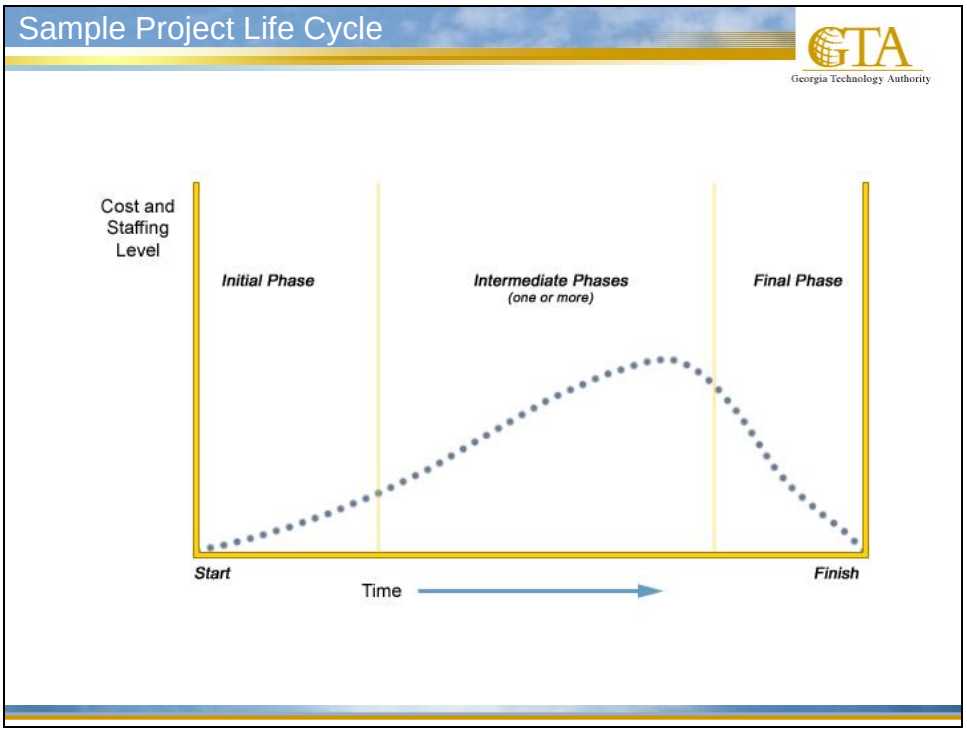
Within a project life cycle, deliverables from the preceding project phase are usually approved before work starts on the next phase. However, a new project phase sometimes starts before the previous phase deliverables are approved when the risks involved are deemed acceptable – this practice of overlapping phases is called fast tracking.

Project life cycles generally define

- what technical work is required in each phase
- who should be involved in each phase

Project life cycle descriptions can be very general or highly detailed. Highly detailed project life cycle descriptions have numerous forms, charts, and checklists to provide structure and consistency – such detailed approaches are called project management methodologies.

Topic 2: Project Phases and Life Cycle (cont'd)

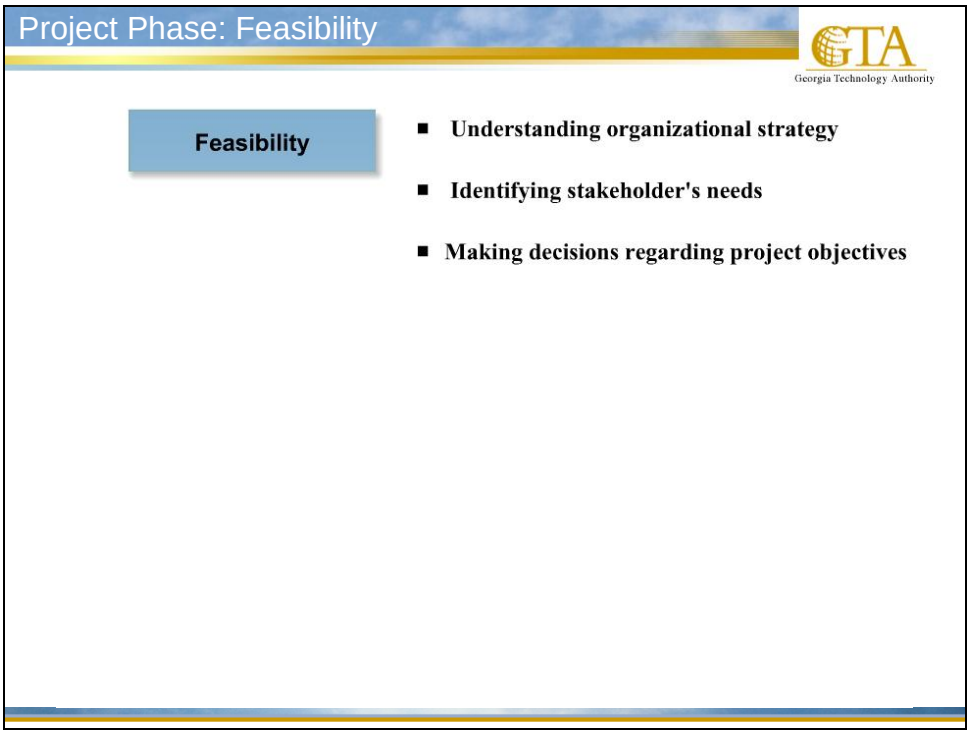


Project life cycle descriptions generally share a number of common characteristics.

- **Cost and staffing levels** are initially low, higher toward the end, and fall rapidly as the project draws to a conclusion (illustrated on slide).
- The **probability of successfully completing the project** is progressively higher as the project continues – risk and uncertainty are highest at the start of the project.
- **Stakeholders' ability to influence** a project's outcome and final cost is highest at the start and gets progressively lower as the project continues – the cost of changes and error correction increases as the project continues.

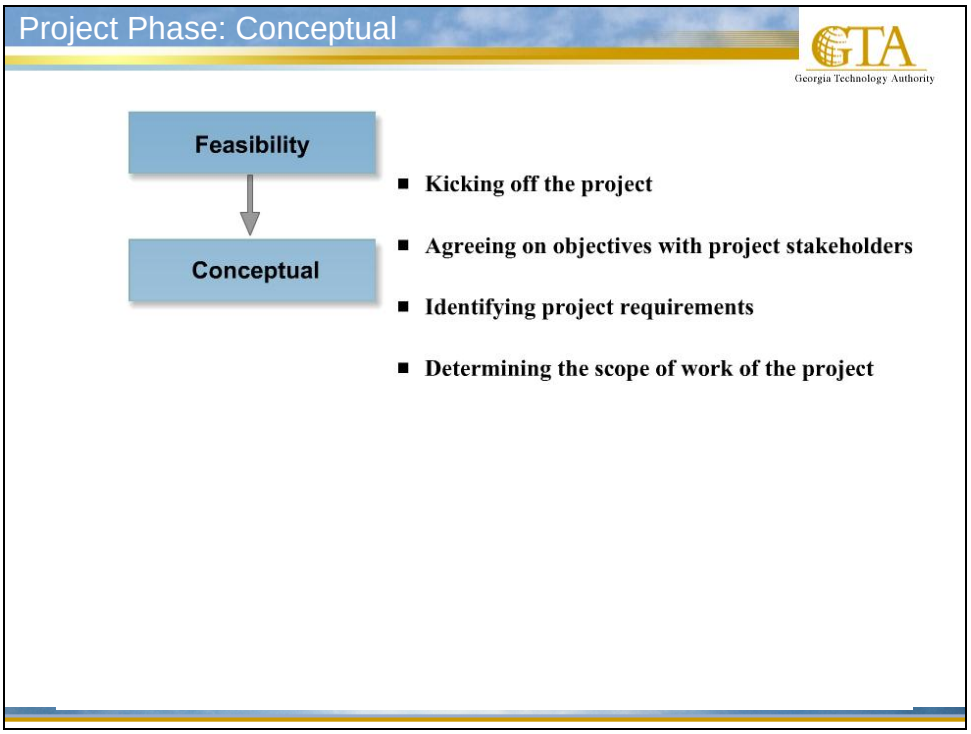
The project life cycle must be differentiated from the product life cycle. For example, a project undertaken to bring a new prescription drug to market is just one phase or stage of the product life cycle.

Topic 2: Project Phases and Life Cycle (cont'd)



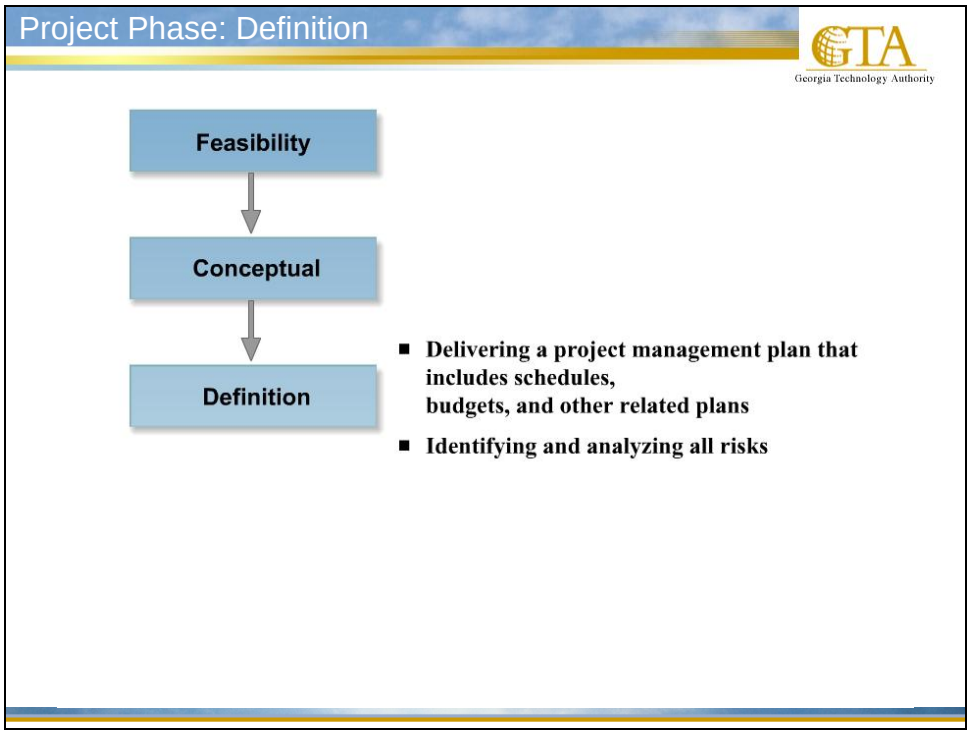
Feasibility is the first phase in the project life cycle. During the feasibility phase, a study is conducted to identify and analyze a problem and its potential solutions in order to determine their viability.

Topic 2: Project Phases and Life Cycle (cont'd)



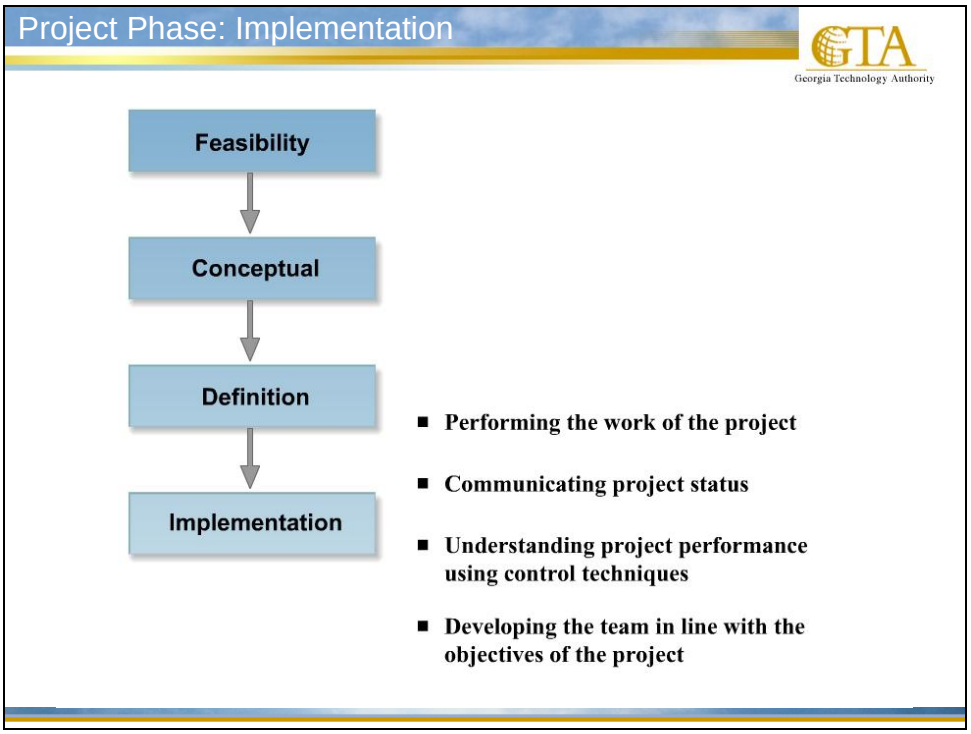
The **conceptual** phase is the second phase of the project life cycle. During this phase, objectives are agreed and the scope of work is defined, including projected time, cost and performance requirements, together with the potential impact on company resources.

Topic 2: Project Phases and Life Cycle (cont'd)



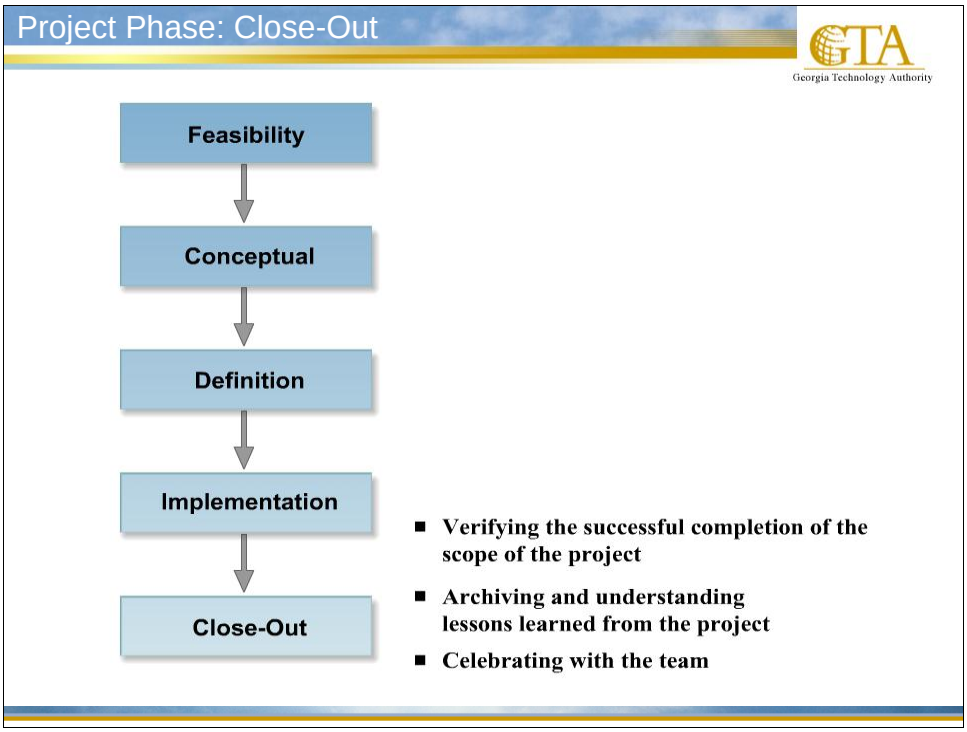
During the **definition** phase, the preparation of all documentation necessary to support the project takes place, the resources for the project are firmly identified and specific time, cost, and performance parameters are set.

Topic 2: Project Phases and Life Cycle (cont'd)



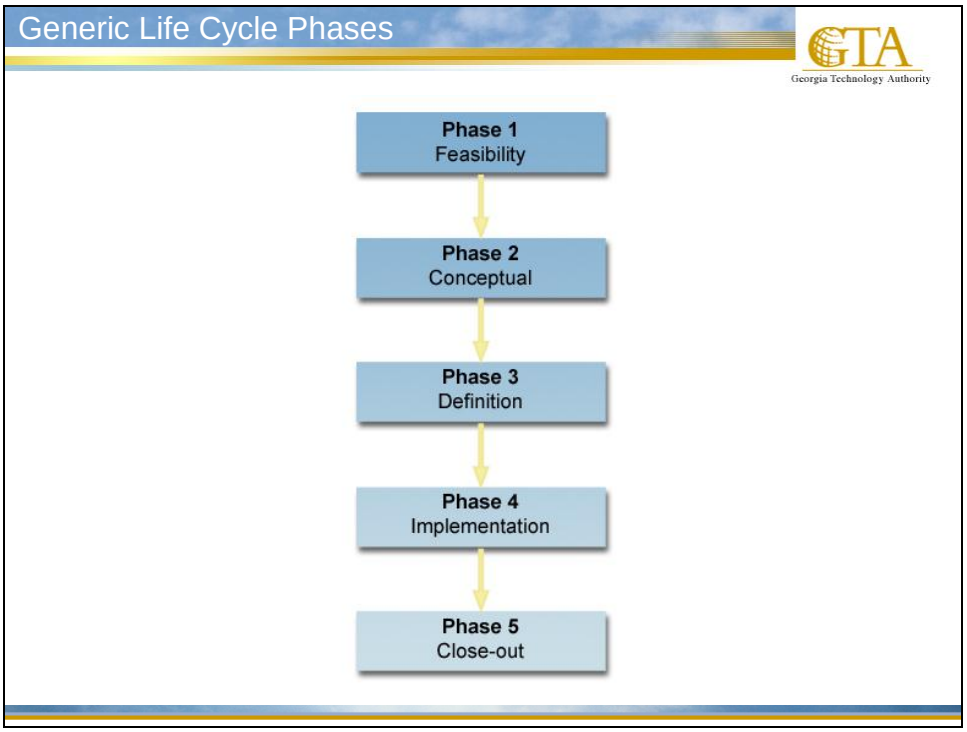
The fourth phase is the **implementation** phase, during which the work of the project takes place. The project is tasked with the controlling of product deliverables as well as the communication of project performance and status.

Topic 2: Project Phases and Life Cycle (cont'd)



During the **close-out** phase the efforts and results of the project are evaluated and analyzed. They are also recorded as lessons learned, to serve as input to the feasibility and conceptual phases of new projects.

Topic 2: Project Phases and Life Cycle (cont'd)



Using the evaluation of project phases, project management theory provides a generic life cycle, which consists of five distinct phases:

- **feasibility phase –** the initial phase concerned with understanding the viability of a project

  The decision whether to proceed with a project is often based on the following criteria:

  - alignment with strategic objectives – Does the project align with the strategic direction of the business?
  - product analysis – Can the product contribute to the business? What is the demand for the product likely to be?
  - stakeholder commitment – Are the stakeholders (including the organization) willing to support and commit to the project?

  These factors combine to provide the project's management team with an understanding of the feasibility of the project. This phase provides a series of product guidelines and, more important, an objective to kick off the project.

  The **output** from the feasibility phase is a project charter that includes objectives, justification, and intent. This charter is committed to by all stakeholders.

Topic 2: Project Phases and Life Cycle (cont'd)

- **conceptual phase** – the initial evaluation of the project objective and the associated requirements

  This phase includes a preliminary analysis of risk and the resulting impact on time, cost, and performance requirements.

  Activities in the conceptual phase include

  - determining the requirements needs and wants
  - conducting technical and economic studies
  - carrying out cost-benefit analysis
  - conducting environmental studies
  - obtaining approval to move to the definition stage of the project

  The activities concentrate on deciding, from a range of options, what is likely to be the best solution to satisfy requirements. This conceptual phase must be completed before the project is definitively identified. Prior to this, the project is a series of schemes or alternatives under consideration.

  The **output** from the conceptual phase is a definition of the project, generated using a scope statement that contains project requirements, critical success factors, constraints, and assumptions. An initial definition of the project should be present using a work breakdown structure.

- **definition phase –** a refinement of the requirements that are described at the conceptual phase

  Activities in this phase include

  - establishing the project goals and objectives in terms of time, cost, and performance
  - defining the work that is required in order to complete the project with respect to the proposed objectives and constraints
  - scheduling and budgeting the project work
  - developing and scheduling the project resources, including the project team
  - obtaining approval for the transition to the implementation phase with the proposed master project plan
  - producing all documentation required to support the project (e.g. project management plan, including scope definition)

  The definition phase begins with a partially defined project that depends on the outcome and success of the conceptual phase. Two distinct elements of this phase are

  - design – the what and how of the project
  - procurement – who, how long, and how much

  The deliverable at the end of this phase becomes the starting position for the implementation phase.

Topic 2: Project Phases and Life Cycle (cont'd)

The **output** from the definition phase is a project management plan that includes all schedules, budgets, quality plans, contracting plans, risk management plans, and any plan that relates to the project activities.

- **implementation phase –** when the project's product or service is integrated into the organization

  Actions, plans, and documentation produced in previous phases are adhered to in order to implement the project product. At the same time, the project is controlled and managed with respect to risks and constraints.

  Activities in the implementation phase include

  - tracking project accomplishment
  - analyzing project quality
  - detecting project changes
  - initiating corrective action and re-planning of project objectives and constraints as required
  - approving staged payments to participating entities in projects that require services to be procured from outside the organization
  - performing the work as detailed by the master project plan
  - obtaining approval for the transition to the close-out phase

  The **output** from the implementation phase is the delivery of a product that meets the customer specifications

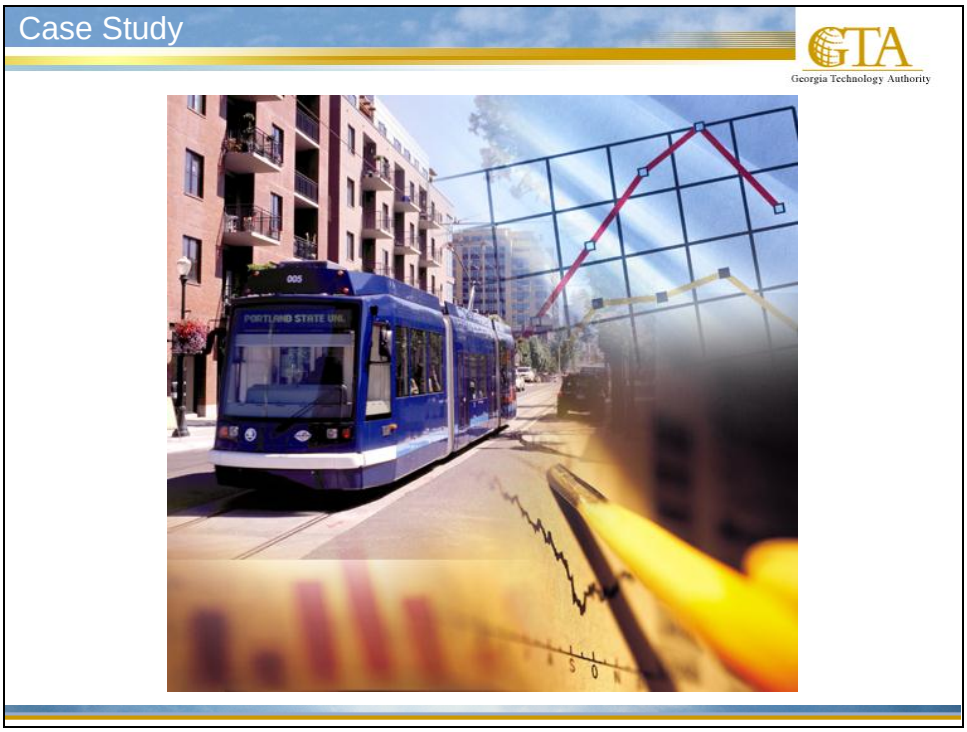
- **close-out phase –** evaluation of the efforts and results of the project, which serves as input for the conceptual phase of future projects

  Activities in this phase include

  - delivering the product or service to the customer
  - acceptance from the customer
  - releasing personnel and equipment to other projects
  - closing and archiving project records, which act as historical material for future projects
  - writing "lessons-learned" reports

  The **output** of this phase is the formal closing of the project with confirmation by the project manager and project stakeholders that the scope of the project has been satisfied.

Topic 3: Project Life Cycles in Practice



The following case study illustrates how in major infrastructure projects distinct project phases and life cycles must be completed before a project proceeds.

Read the case study and then complete the exercise that follows it.

The Georgia Rail Project

Introduction

Traffic flow, congestion, and pollution are major issues for the state of Georgia. According to statistics gathered over the past ten years,

- the number of licensed drivers has increased by 44%
- on average, 21% extra people travel into the major cities between 8:00 am and 1:00 am each working day
- there has been a 47% increase in the use of automobiles during a working week
- automobile ownership was increased by 7% per year
- over 77% of Georgia drivers now travel alone to work, whereas just over 14% avail of the carpool facility, and 4% avail of public transport
- incidents of crashes are up 4%

Project History

Georgia's transport needs have been under consideration for some time. In 1994, the state initiated an investigation, which led to the publication of a transport strategy report in 1997.

The report found that the public did not consider the current public transportation system to be an adequate alternative to auto transport, resulting in a high reliance on the car. Based on this, the report suggested that the state incorporate a series of measures into its transportation policy:

- review the current public transportation system and invest in new and alternative modes of public transportation in urban commuter areas
- encourage and educate auto users so they see the benefits of alternative transportation with an emphasis on reducing "auto-reliance"

After a period of discussion among various government bodies and other stakeholders, a committee – Transport © 2000 – was formed in 1999 to investigate the different alternatives. The committee evaluated alternatives based on expert opinion and historical information, as well as public opinion. The committee also identified the public as a key stakeholder in any transportation project and sought their opinion.

For historical data and expert opinion, the committee looked to developments in Arizona, where a state-of-the-art, $1.13 billion project proposes to link three cities (Phoenix, Tempe, and Mesa) by rail. Funded by the Arizona state government and the three cities, the Central Phoenix/East Valley Light Rail Transit system is scheduled for completion in August 2007. However, due to the success of the project, parts of the rail line will open to the commuter population in December 2006 and April 2007[1].

The Central Phoenix/East Valley Light Rail Transit system has the capacity to transport around 5000 passengers in each direction every hour. A private company will operate the system under a five-year franchise.

Project Proposal

In late 2000, the Transport 2000 committee proposed the establishment of a rail-based public transportation system between the major urban cities of the state. The objective was to provide a speedy, efficient, and cost-effective commuter system, allowing the state population to travel within and between urban districts.

The committee detailed their plans to the state by breaking down the project specification into three sections:

- urban rail system: link each urban "business" area with a reliable light-rail system
- inter-city connection: provide rail segments that will join each urban rail system
- vendor management: identified as a key aspect for the success of the project

The government accepted much of the committee's evidence and the findings, but the major stumbling block was the budget. The state did not accept that the committee could justify the level of investment required for the project with sufficient tangible benefits. It did not help that Phoenix's system was not up and running at the point of the committee reporting.

After lengthy discussion and analysis, the committee was disbanded in mid-2001 with its findings and proposals sitting in the governor's office.

Project Implementation Alternative

During 2002, the statistics continued to show an increase in auto use coupled with a slight increase in road fatalities. The state authorities accepted that the Transport 2000 proposal should be reexamined, although a thorough feasibility study would first be required. In late 2002, a feasibility team was established to present project implementation alternatives. The objective for the team was to highlight implementation objectives, alternatives, and critical success factors.

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[1] Information on Phoenix Rail System sourced from article in PM Network 2004 (Admed H. Chilmeran, PMP; Keep Costs under Control; PM NETWORK, FEB 2004)

Topic 3: Project Life Cycles in Practice (cont'd)

Matching Business and Project Objectives

The feasibility team, in collaboration with government bodies, identified the business and strategic objectives:

No.	Business Objective	Strategic Objective
1	Reduce the amount of people using auto transport	1. Minimize traffic congestion 2. Minimize road fatalities 3. Increase public transportation options
2	Upgrade and "re-invent" the current public transportation system	1. Minimize traffic congestion 2. Increase appeal of state for new business location
3	Provide a reliable and efficient service to all individuals to accommodate both professional and private use	1. Increase commuter confidence in public transportation 2. Increase appeal of state for new business allocation
4	Establish a system that will generate revenue for the government	1. Profit orientated 2. Maximize sales potential

The feasibility team, like the previous committee, identified the public as a key factor in the success of any public-service project.

The public was broken into three categories:

- public users: potential customers with direct access to the rail system
- impacted users: people directly impacted by the construction of the railway system (i.e. land or property owners along the rail routes)
- operating users: rail operators that will work and maintain the system and provide a support function to the public users

Topic 3: Project Life Cycles in Practice (cont'd)

The project objectives can be summarized as follows:

Project Objective No.	Business Objective No.	Project Objective Description
1	1,2,3	Provide light-rail system within major urban areas that will facilitate professional and private commuters
2	4	Provide a rail system between major urban areas that will facilitate professional and private commuters
3	1,2,3	Provide a transportation system that will reduce the number of auto users
4	1,2,3,4	Implement – in a seamless fashion – a new system that has minimal impact on current operations
5	3,4	Educate public on transportation alternatives to ensure each individual understands new system
6	1	Provide transportation system that is cost effective and geared toward profits

The feasibility team evaluated specialized contractors to recruit a team to establish detailed specification around the structural aspects of the project. The government also allocated a budget to invest in highly capable individuals who could provide a complete structural solution.

Project Implementation

Specialists recruited by the feasibility team subsequently presented a work breakdown structure (WBS) for the project, which subdivides the project work into the major elements and then their sub-elements. For example, a major element of work is the civil/track work, which is subdivided into five line sections. The system's work is split into light rail vehicles, the traction power/overhead contact system, fare collection machines, and light rail transit signals and communications. Other work elements, such as the station finishes, are treated as whole contract units.

The specialists developed the lower tiers of the WBS hierarchy in isolation. This practice provides flexibility and full control over respective responsibilities:

- WBS level 1 – Program: local and federal programs identified
- WBS level 2 – Project: the project's major work elements
- WBS level 3 – Project units: the main units/packages associated with each project
- WBS level 4 – Sections: the main sections of each unit
- WBS level 5 – Contract: the main contracts that can be offered
- WBS level 6 – Contract unit: level of work effort required, such as engineering and project management

Topic 3: Project Life Cycles in Practice (cont'd)

The specialist team proposed that once the contracts and contract units were identified, the project could then be outsourced to different contractors, including, most likely, a consortium.

Project Management

The feasibility team has proposed that a dedicated project management team be established within the government. The team would have total control over budgets and schedules and would report directly to the state legislature.

The control, planning, and management of the project present complex logistical issues. The scheme may entail numerous individual contract packages, which will require coordination.

At a very early stage, the feasibility team settled the key project management objectives as

- effective and efficient communication of information
- utilization of thorough project control techniques
- efficient and widely understood procurement and contractor processes

This standardization is necessary to ensure that all contractors are working in unison. To furnish timely and accurate cost reports, the project control team needs a comprehensive system that integrates cost and schedule, provides reporting capabilities consistent with the project requirements, and improves operating efficiency.

The system has to be capable of processing and analyzing a vast amount of incoming monthly cost data quickly and accurately. Also, the team could use integrated systems to perform risk and schedule simulation analysis where the relationship between the schedule and cost is not always clear.

Although technology has simplified data collection and scheduling, the feasibility team has identified that professionals must carefully study and analyze the system output to provide a logical, meaningful explanation of the causes of any cost and schedule variances. In this way, sound project control methodologies reduce cost overruns, control cost growth, help meet project schedule objectives, and ultimately satisfy the client's expectations.

Feasibility Report

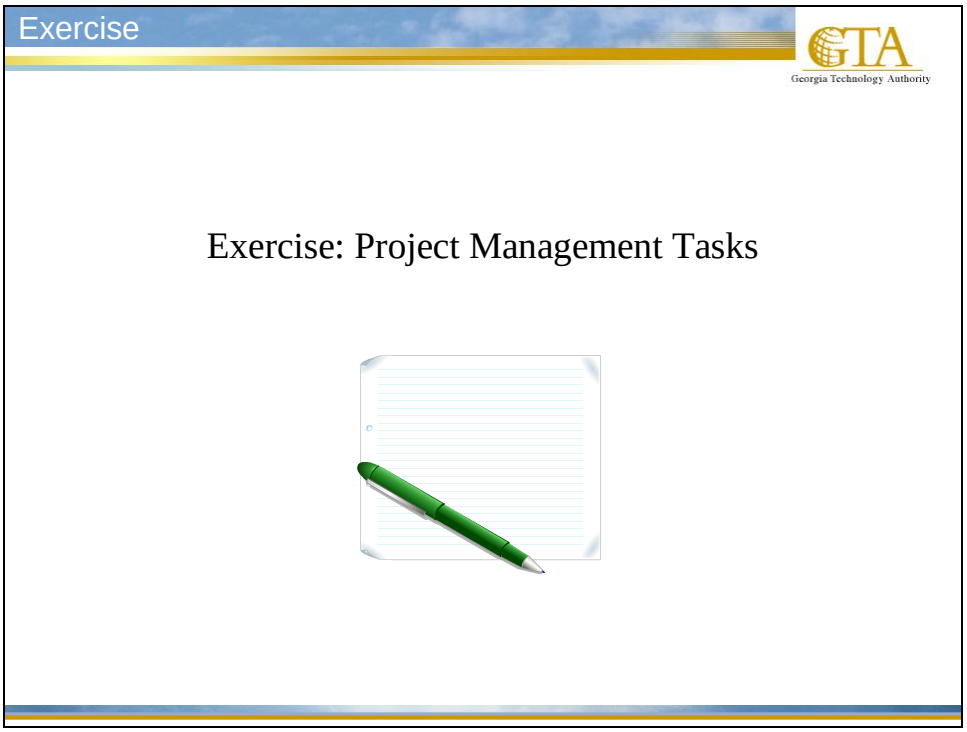
The feasibility team completed their study on schedule with an outline of strategy, detailed recommendations, and a list of preferred suppliers.

The main outcomes from the team are the following:

- The light-rail system should be piloted in one city. Based on the relative success of the pilot and after a period of "customization", the transportation initiative can be deployed in other areas.
- Contractor participation is a key aspect to the success of the project, and the government should establish and work with a set of preferred suppliers.
- The government should establish a detailed project management office that has the authority to manage and control the project and report to senior government officials.

The feasibility team gave the green light for the project, based on these recommendations.

Topic 3: Exercise – Project Management Tasks



Assume that the Georgia State Authority has sanctioned the rail project. You are part of the assembled dedicated project management team. You need to perform the following initial tasks:

1. re-establish the project objectives
2. identify a set of critical success factors that will guide the project
3. evaluate a project structure

Topic 3: Exercise Worksheet

Topic 3: Exercise Worksheet

Lesson review

Topic 1: Management by Objectives

Topic 2: Project Phases and Life Cycle

Topic 3: Project Life Cycles in Practice

Student learning objectives

After completing this lesson, you should be able to

- explain how the concept of objectives has evolved in project management
- identify and explain the role of project phases and project life cycle
- describe how a project life cycle contributes to project success

Lesson 3: Project Processes

Topic 1: Definition of Project Management Processes

Topic 2: Project Interactions

Topic 3: Using Project Processes

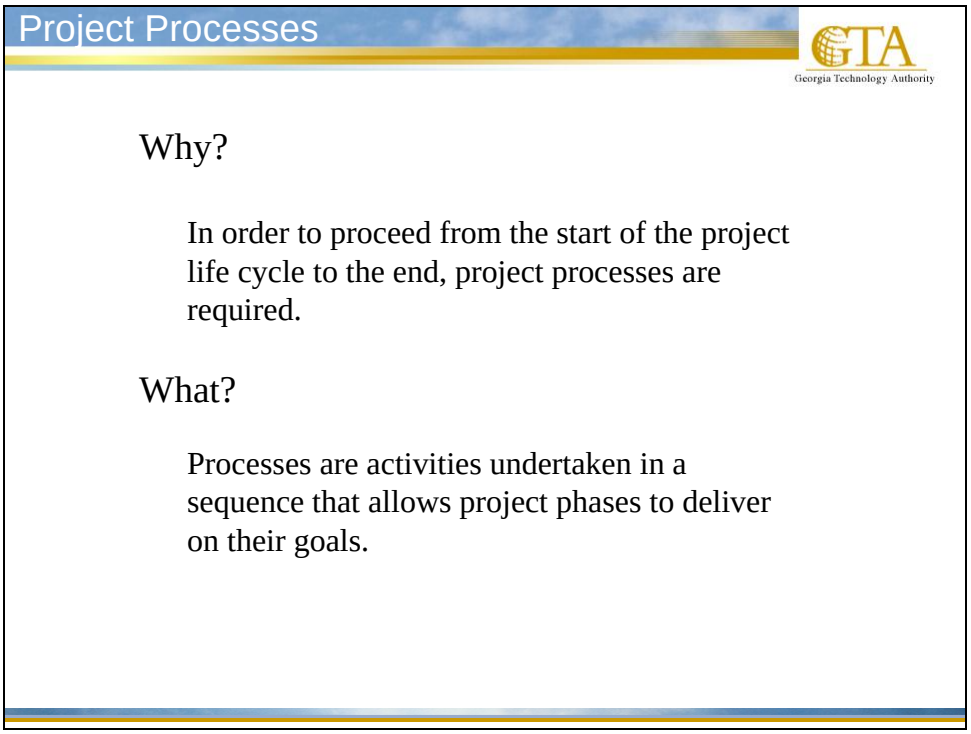
Topic 4: Exercise: Identifying Process Groups

Student learning objectives

After completing this lesson, you should be able to

- identify what project processes are and explain why they are used
- describe, at micro level, what is required to manage a project
- identify what is required for a project and how project processes can be used in a project

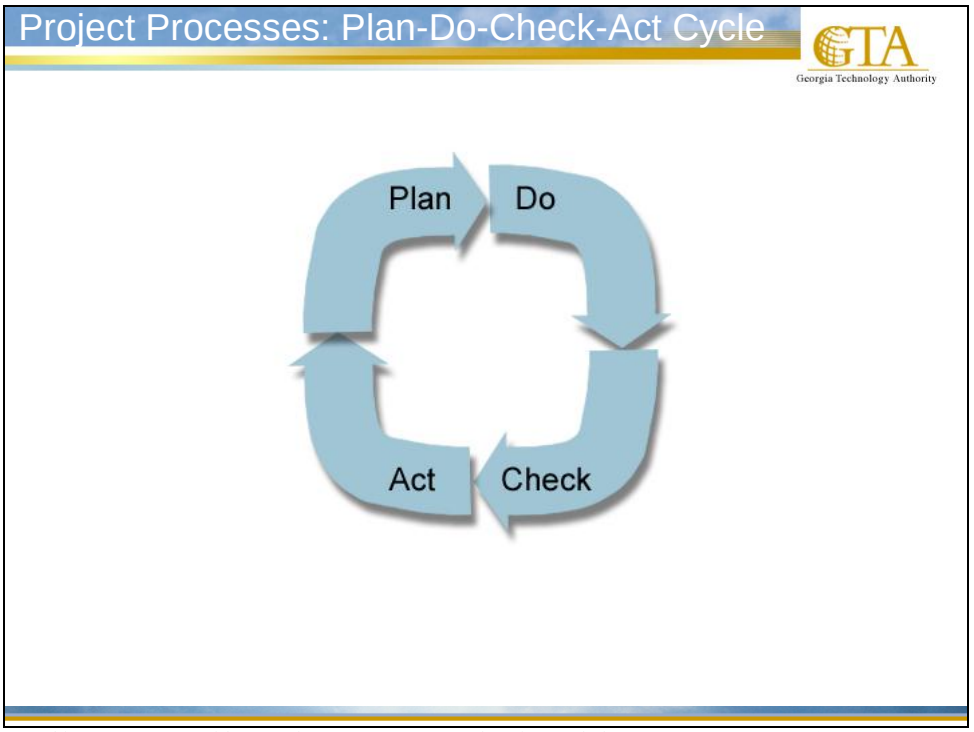
Topic 1: Definition of Project Processes



This topic introduces the concept of project management processes. In an ideal situation, these are discrete elements with well-defined interfaces. In reality, however, they overlap and interact in several ways.

In order to proceed from the start of a project life cycle to the end, project processes are required. They allow activities to be undertaken in a sequence that enables project phases to deliver on their goals.

Topic 1: Definition of Project Processes (cont'd)

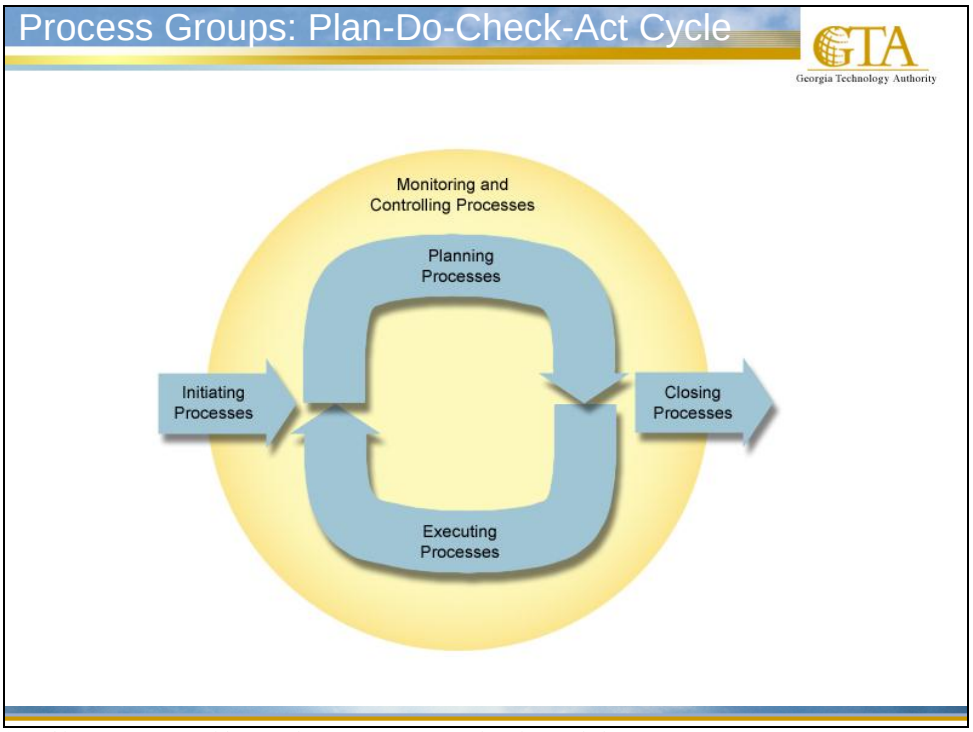


(Graphic Source: - A Guide to Project Management Body Of Knowledge – © PMBOK ® 2004)

The plan-do-check-act cycle is the underlying concept for the interaction among project management processes. Each element in the cycle is linked to the next by the result it produces. The result of one part of the cycle serves as the input to another.

Dr. Edward Deming has advocated the plan-do-check-act cycle, which is now a universal improvement methodology. The original idea was to improve by constantly mapping the requirements to the performance of any project. The application in project management is similar because the project life-cycle process is used to plan the requirements, execute (do) on the requirements, control (check) conformity, and then act on any apparent gaps.

Topic 1: Definition of Project Processes (cont'd)



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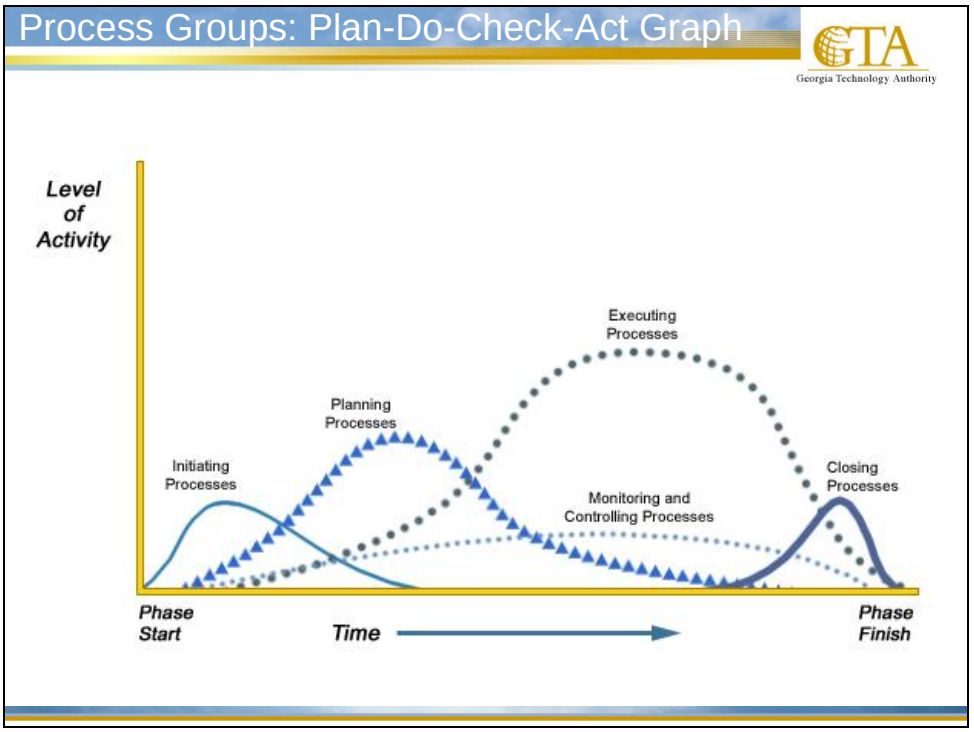
The plan-do-check-act cycle can be applied to the interrelationships within and among project process groups:

- the planning process group maps to the "plan" component
- the execute process group maps to the "do" component
- the monitoring and control process groups map to the "check/act" components

Additionally,

- the initiating process group starts these cycles
- the closing process group ends them

Topic 1: Definition of Project Processes (cont'd)



Project management can be aggregated into five project process groups. The project groups have clear dependencies and are carried out in the same sequence on each project.

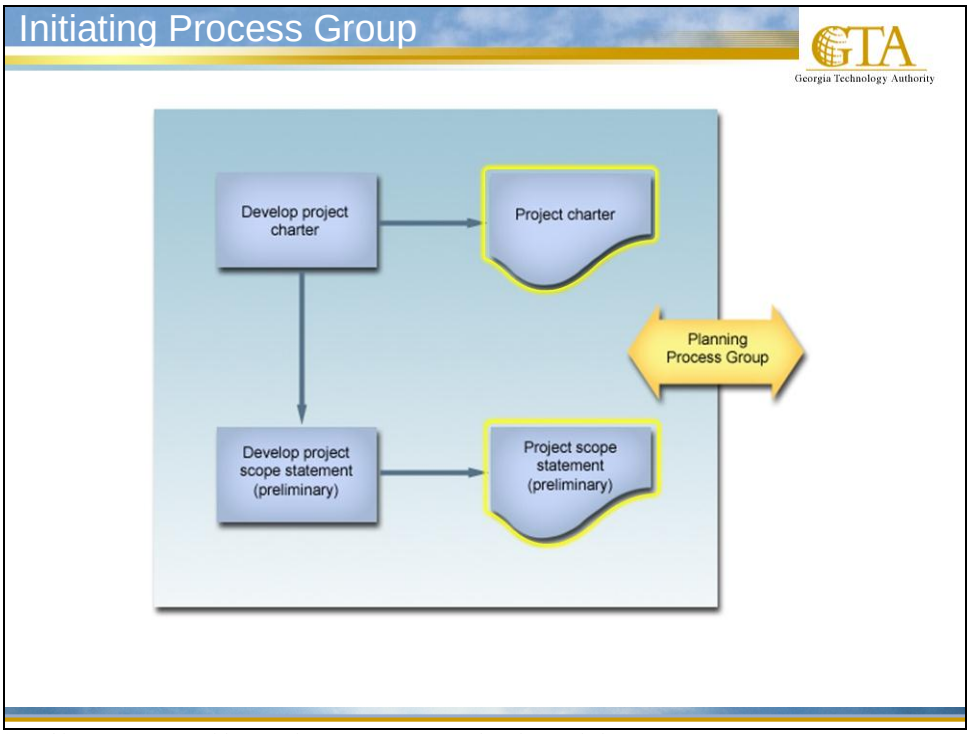
They act independently of application area or industry focus. There are also interactions both within a group and from group to group.

The five project process groups are

- **initiating** – the project or phase is authorized
- **planning** – objectives are defined and refined and the best of the alternative courses of action are planned
- **executing** – people and other resources required to carry out the plan are coordinated
- **monitoring and controlling** – the project objectives are met by monitoring and measuring the progress regularly to identify variances from plan and take corrective action if necessary
- **closing** – the project or phase is formally accepted and brought to an orderly end

For a blank Project Phases and Processes template, see template 3 of *Appendix: Tools & Templates*.

Topic 2: Project Interactions



(Graphic Source: - A Guide to Project Management Body Of Knowledge – © PMBOK ® 2004)

The **initiating process** comprises the processes required to authorize the start of a new project.

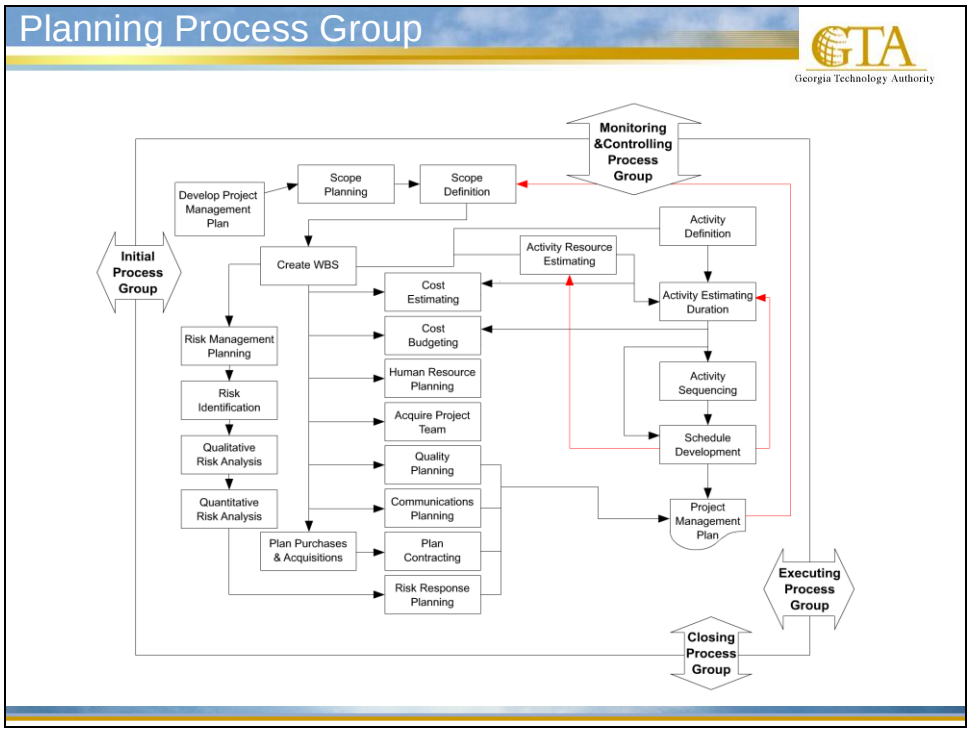
It entails formally authorizing a new project or authorizing that an existing project should continue into its next phase.

The output from this group is the definition of the project's purpose, the identification of its objectives, and the authorization for the project manager to begin.

Developing a **project charter** is needed for documenting the business needs and the new product or service intended to satisfy these needs.

Developing a **project scope statement** (preliminary) produces a high-level definition of the project using the charter with other inputs to the initiating processes.

Topic 2: Project Interactions (cont'd)



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Planning is of major importance because a project typically involves doing something that has not been done before. For this reason, there are more processes in this group than in the other process groups.

The number of processes does not necessarily mean that project management is primarily planning. The amount of planning performed should be in keeping with the scope of the project and the usefulness of the information developed.

The planning process group comprises the processes that define and develop the scope of the project, develop the project management plan, and identify and schedule the project activities that occur within the project.

It paves the way for the project team's documentation of the processes and interactions that the project management team decides are needed to plan and manage a successful project for the organization.

Topic 2: Project Interactions (cont'd)

The sub-processes for the key areas of scope, time, cost, risk, and quality are as follows:

- **scope**
  - scope planning
  - scope definition
  - creating work breakdown structure (WBS)

- **time**
  - schedule development

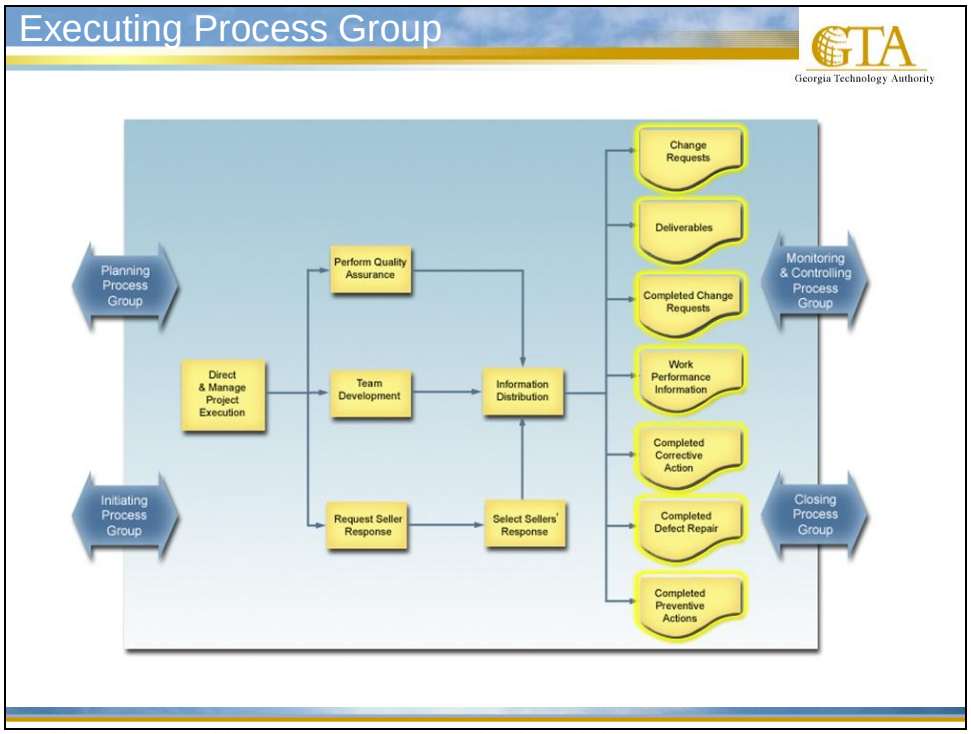
- **cost**
  - cost estimating
  - cost budgeting

- **risk**
  - risk management planning
  - risk identification
  - risk analysis
  - risk response planning

- **quality**
  - quality planning

The end result of the planning process group is the project management plan.

Topic 2: Project Interactions (cont'd)



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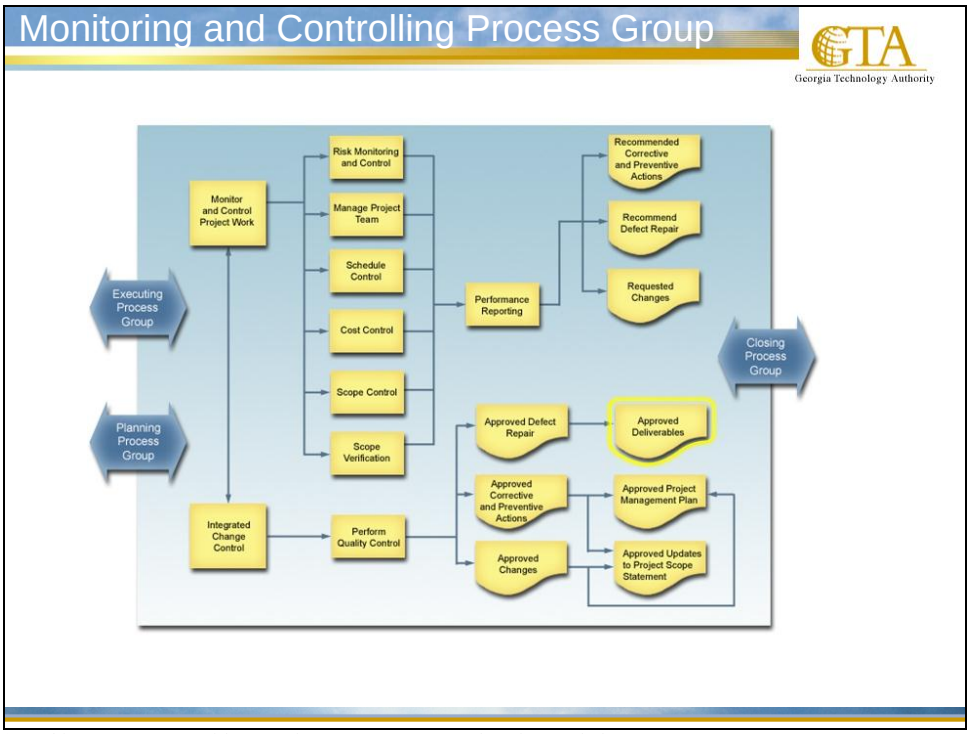
The executing process group comprises the processes required to complete the work defined in the project management plan. This group coordinates people and resources, as well as the integration and performance of the project or phase, in line with the project management plan. In addition, the group addresses the scope defined in the project scope statement and implements approved changes. Usually, there will be some variance from the plan at the executing phase in the project and some replanning will be required.

The executing process group includes the following processes:

- **directing and managing** the various technical and organizational interfaces in the project
- **performing quality assurance** – planned, systematic quality activities that must be applied to ensure that the project will satisfy the relevant quality standards
- **developing project team** – development of individual and group competencies to enhance project performance
- **distributing information** – provision of required information to project stakeholders
- **requesting seller (vendor) responses** – sourcing information, quotations, bids, offers, or proposals as appropriate
- **selecting sellers (vendors)** – selection of a seller (vendor) from the candidate list and negotiating a written contract with the seller (vendor)

Topic 2: Project Interactions (cont'd)



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Monitoring and controlling is concerned with communication and control of project progress. Project performance must be monitored and measured to identify variances from the plan. Any identified variances are fed into the control processes in the various knowledge areas. Any variances that endanger the project objectives must be taken into account by adjusting the plan through repeating the appropriate project planning processes.

Controlling also includes preventive action taken in anticipation of possible problems. The main benefit of the monitoring and controlling group is that project performance is monitored and measured regularly to identify variances from the project management plan.

Topic 2: Project Interactions (cont'd)

The monitoring and controlling process group includes the following processes:

- **monitor and control project work** – collecting, measuring, and disseminating performance information, as well as assessing measurements and trends that impact process improvements

- **integrated change control** – controlling factors that create changes in order to make sure that the changes are beneficial, determining if a change has occurred, and managing the approved changes (this is formally discussed as part of project integration management)

- **scope verification** – confirmation that the project scope has been accepted (this is formally discussed as part of project scope management)

- **process control**

    - scope control – control of changes to the project scope

    - schedule control – control of changes to the project schedule

    - cost control – control of changes to the project budget

    - perform quality control – control of specific project results to ensure compliance with relevant quality standards and identification of methods of eliminating causes of unsatisfactory performance

    - manage project team – tracking individual and team performance, providing feedback, resolving issues, and coordinating changes

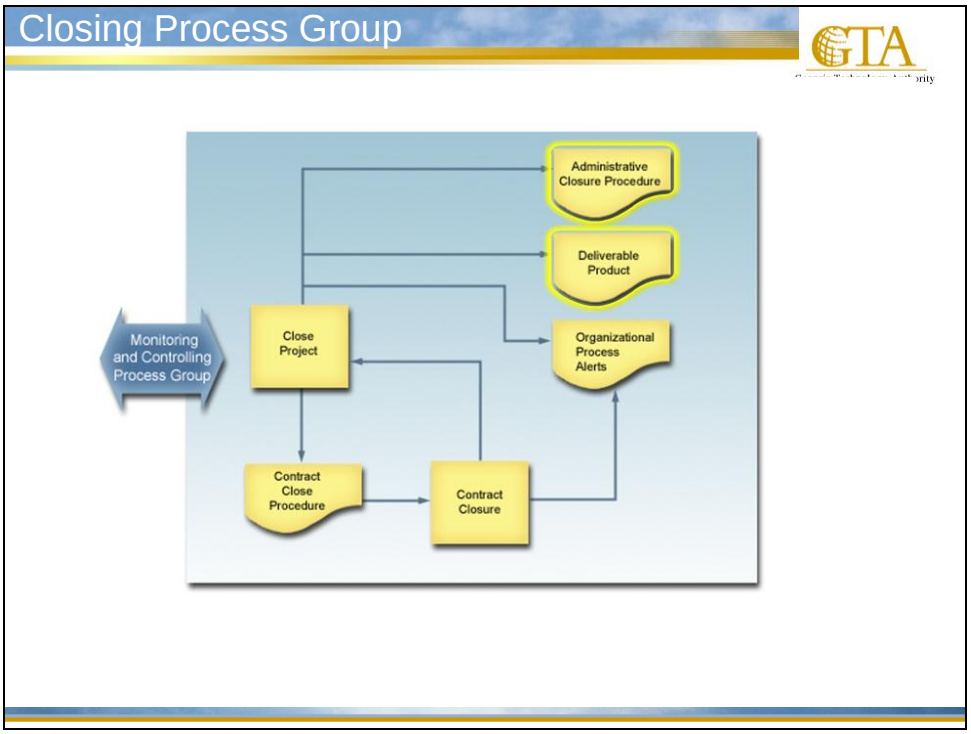
- **performance reporting** – collection and dissemination of performance information, including status reporting, progress measurement, and forecasting (this is formally discussed as part of project communication management)

- **manage stakeholders** – managing communications with stakeholders

- **risk monitoring and control** – tracking identified risks, monitoring residual risks and identifying new risks, ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk (this is formally discussed as part of project risk management)

- **contract administration** – managing the contract and the buyer/seller (vendor) relationship, reviewing and documenting seller (vendor) performance, managing changes to the contract, and managing the relationship with the outside buyer, when appropriate (this is formally discussed as part of project procurement management)

Topic 2: Project Interactions (cont'd)



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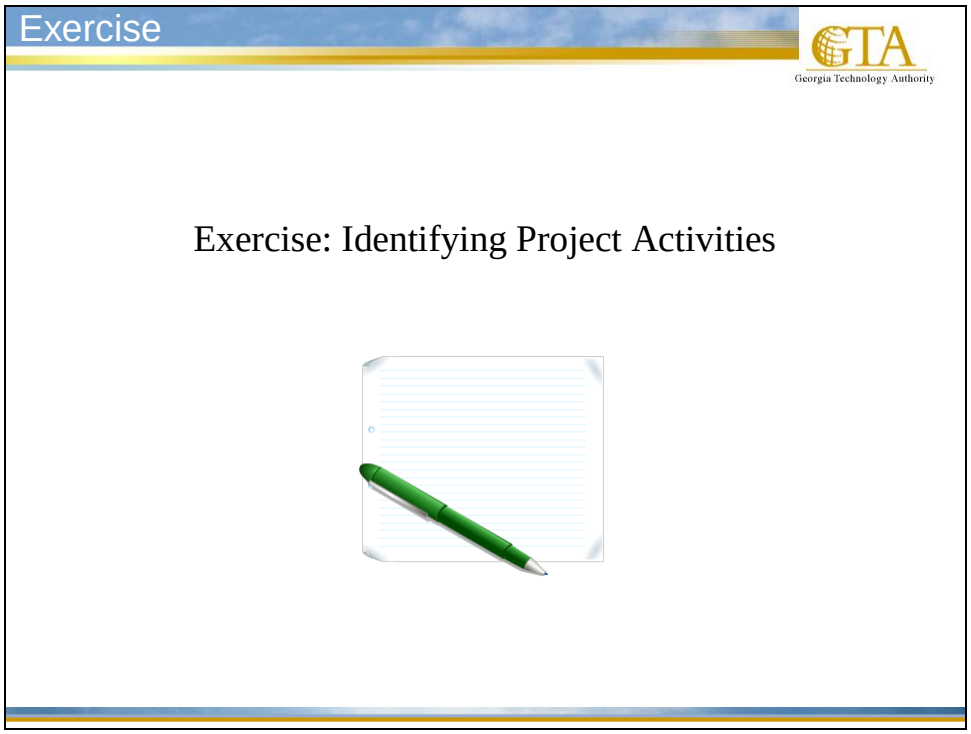
Closing processes include the core processes of contract closeout and administrative closure. These processes interact as shown in the figure above.

The closing process group includes the following components:

- **close project** – documenting the procedures for executing the administrative closure of the project or phase
- **contract closure** – completing and settling each contract, including resolving any outstanding issues
- **lessons learned** – identifying project successes and project failures, including recommendations on how performance can be improved in future projects
- **team celebration** – marking the end of the project and the achievement of the project objectives

Topic 2: Exercise – Identifying Project Activities



Given the five project management processes of initiation, planning, executing, controlling and monitoring, and closeout, identify the project activities that would be required for the nine knowledge areas as presented in the template.

Use the table on the following page to complete the exercise.

Topic 2: Exercise Worksheet

Topic 2: Exercise Worksheet

Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Integration Management					
Project Scope Management					
Project Time Management					
Project Cost Management					
Project Quality Management					
Project Human Resource Management					
Project Communications Management					
Project Risk Management					
Project Procurement Management					

Topic 3: Using the Project Processes

Mapping the Project Processes (part 1)

Georgia Technology Authority

Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Integration Management	Develop Project Charter	Develop Project Management Plan	Direct and Manage Project Execution	Monitor and Control Project Work	Close Project
Project Scope Management		Scope Planning Scope Definition		Scope Verification Scope Control	
Project Time Management		Activity Definition Activity Sequencing Activity Duration Estimating Schedule Development		Schedule Control	
Project Cost Management		Cost Estimating Cost Budgeting		Cost Control	

The processes and interactions discussed so far meet the test of general acceptance – this means that they apply to most projects most of the time.

This is not always the case – not all of the processes will be needed on all projects, and not all of the interactions will apply to all projects. The processes and interactions can be customized to the specific requirements of the project.

For example, a larger project may require more detail. It may be necessary to subdivide risk identification in order to focus separately on identifying cost risks, schedule risks, technical risks, and quality risks.

Topic 3: Using the Project Processes (cont'd)

Mapping the Project Processes (part 2)

Georgia Technology Authority

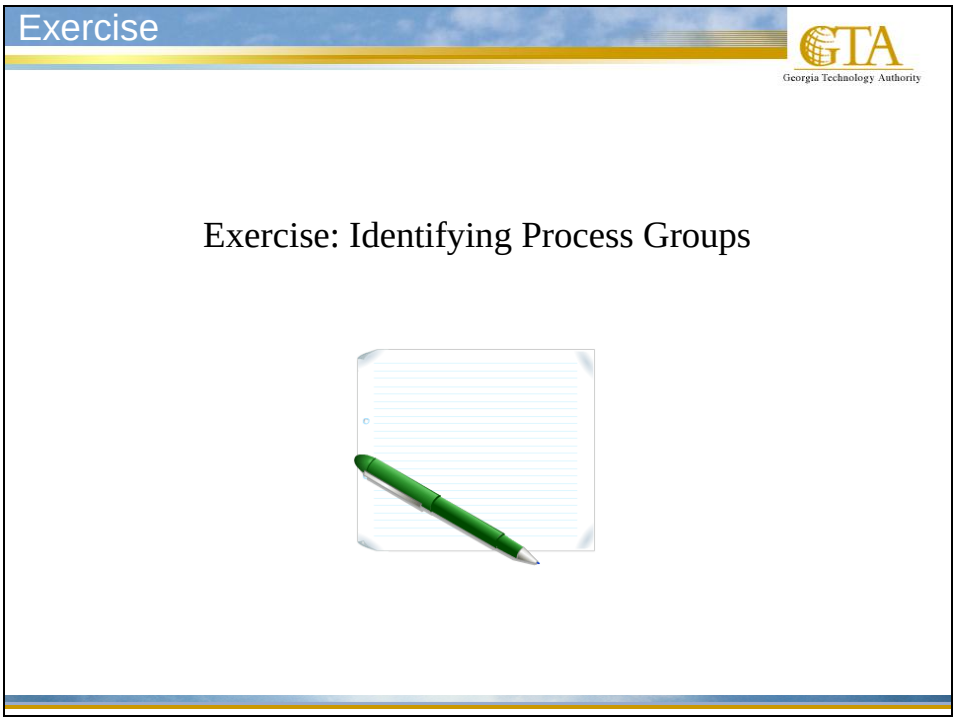
Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Cost Management		Cost Estimating Cost Budgeting		Cost Control	
Project Quality Management		Quality Planning	Perform Quality Assurance	Perform Quality Control	
Project Human Resource Management		HR Planning Acquire Project Team	Develop Project Team	Manage Project Team	
Project Communications Management		Communications Planning	Information Distribution	Performance Reporting	
Project Risk Management		Risk Management Planning Risk Identification Qualitative Risk Analysis Quantitative Risk Analysis Risk Response Planning		Risk Monitoring and Control	
Project Procurement Management		Planning Purchases and Acquisitions Plan Contracting	Request Seller Responses Select Sellers	Contract Administration	Contract Closeout

In the table, 44 project management processes are mapped across the five project management process groups and the nine project management knowledge areas are outlined:

- project integration management
- project scope management
- project time management
- project cost management
- project quality management
- project human resource management
- project communications management
- project risk management
- project procurement management

The diagram illustrates where the project management processes fit into both the project management process groups and the project management knowledge areas.

Topic 4: Exercise – Identifying Process Groups



Having read the Georgia Rail Project case study and established a project structure, you now need to identify the process groups required to meet the project objectives.

Analyze each phase to determine what processes are needed. It is assumed that each phase should be initiated and closed. To reduce repetition, these are not mentioned unless the processes are vital.

Topic 4: Exercise Worksheet

Topic 4: Exercise Worksheet

Lesson review

Topic 1: Definition of Project Management Processes

Topic 2: Project Interactions

Topic 3: Using Project Processes

Topic 4: Exercise: Identifying Process Groups

Student learning objectives

After completing this lesson, you should be able to

- identify what project processes are and explain why they are used
- describe, at micro level, what is required to manage a project
- identify what is required for a project and how project processes can be used in a project

Lesson 4: Project Management Knowledge Areas

Topic 1: Project Scope Management

Topic 2: Project Time Management

Topic 3: Project Cost Management

Topic 4: Project Risk Management

Topic 5: Project Integration Management

Topic 6: Project Communications Management

Topic 7: Project Quality Management

Topic 8: Project Procurement Management

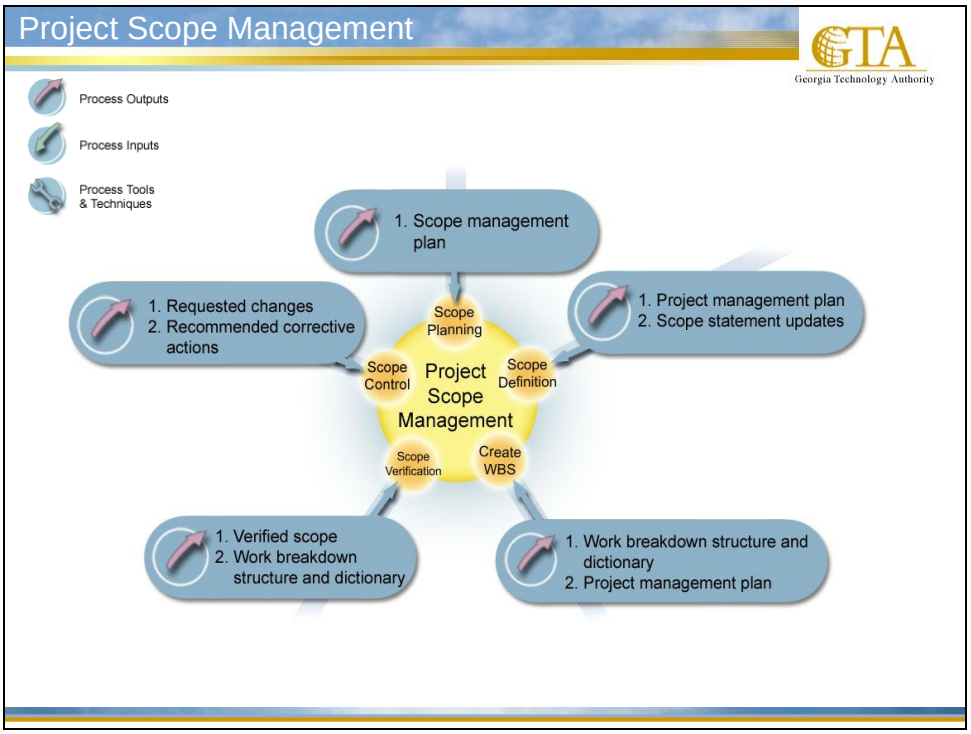
Topic 9: Human Resource Management

Student learning objectives

After completing this lesson, you should be able to

- define what scope management is and identify how to use a work breakdown structure (WBS)
- demonstrate what is required to develop a schedule and outline the components of a project plan
- define what cost management is and identify the primary tools and techniques of costing a project
- identify what risk management is and state the value of a risk management process
- outline the importance of project control tools and techniques
- outline the importance of project communication and identify the various facets of the discipline
- point to what quality management is and demonstrate how it is influenced by organization practices
- outline the procurement management cycle
- define human resource management and demonstrate the importance of project teams

Topic 1: Project Scope Management



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Sequence of Activities:
Scope Planning →Scope Definition →Create WBS → Scope Verification →Scope Change Control

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Work breakdown structures (WBS) are one of the most important tools in project management and are issued in the project planning phase.

Project scope management is made up of a number of processes that define and control what work is included in the project. These processes include the following:

- **scope planning** is the process of progressively elaborating and documenting the project work (project scope) that produces the project's "product." It develops a written scope statement that is used as the basis for future project decisions.

- **scope definition** subdivides the major project deliverables into smaller, more manageable components

Topic 1: Project Scope Management (cont'd)

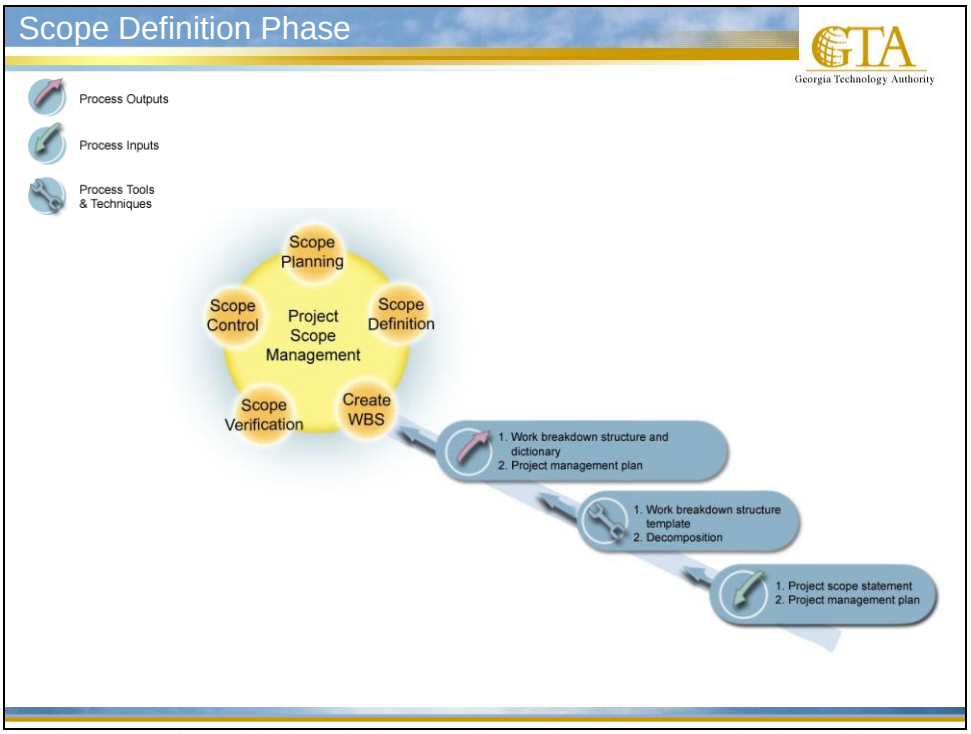
- **create WBS** creates the WBS, which is a hierarchy of decomposed project components that organizes and defines the total scope of the project. The WBS is a representation of the detailed scope statement that specifies the work to be accomplished by the project.

- **scope verification** is the process of obtaining formal acceptance of the project scope by the stakeholders. It involves reviewing deliverables and work results to ensure that they were completed correctly and satisfactorily.

- **scope change control** controls the changes to project scope. It must be thoroughly integrated with the other control processes – for example, schedule control, cost control, and quality control.

Project scope may refer to a product or a service. A project generally results in a single product, which may include subsidiary components, each with its own separate but interdependent product scopes.

Topic 1: Project Scope Management (cont'd)



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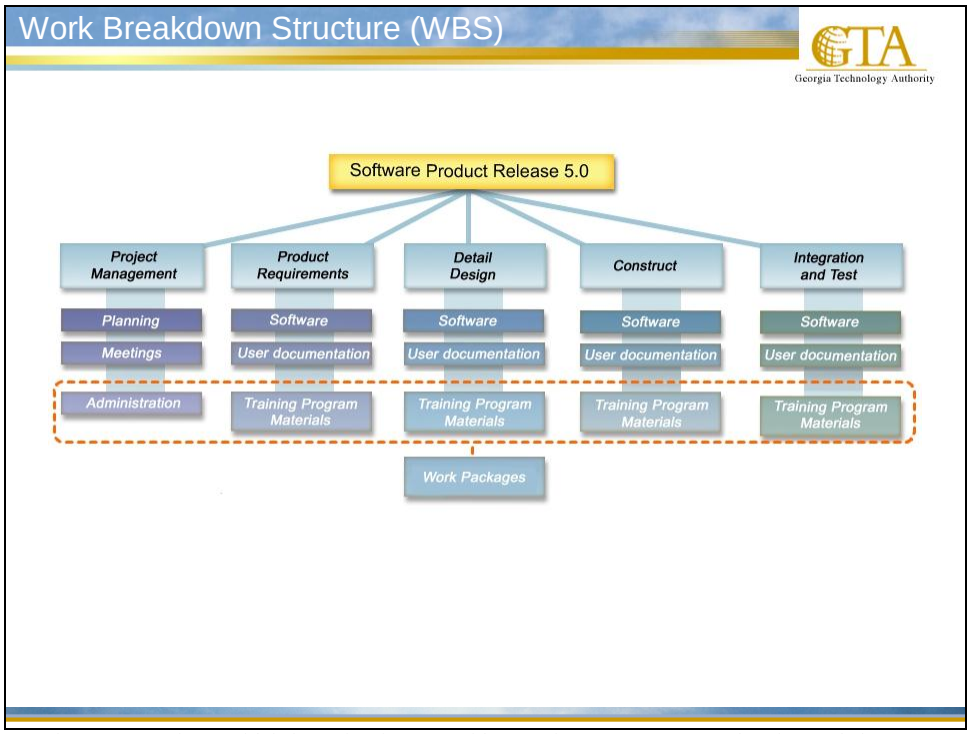
A WBS is the key output of the scope definition phase of project scope management. In this phase, the major project deliverables are subdivided into smaller, more manageable components.

The **benefits** of doing this include

- improving the accuracy of cost, duration, and resource estimates
- defining a baseline for performance measurement and control
- facilitating clear responsibility assignments

Topic 1: Project Scope Management (cont'd)



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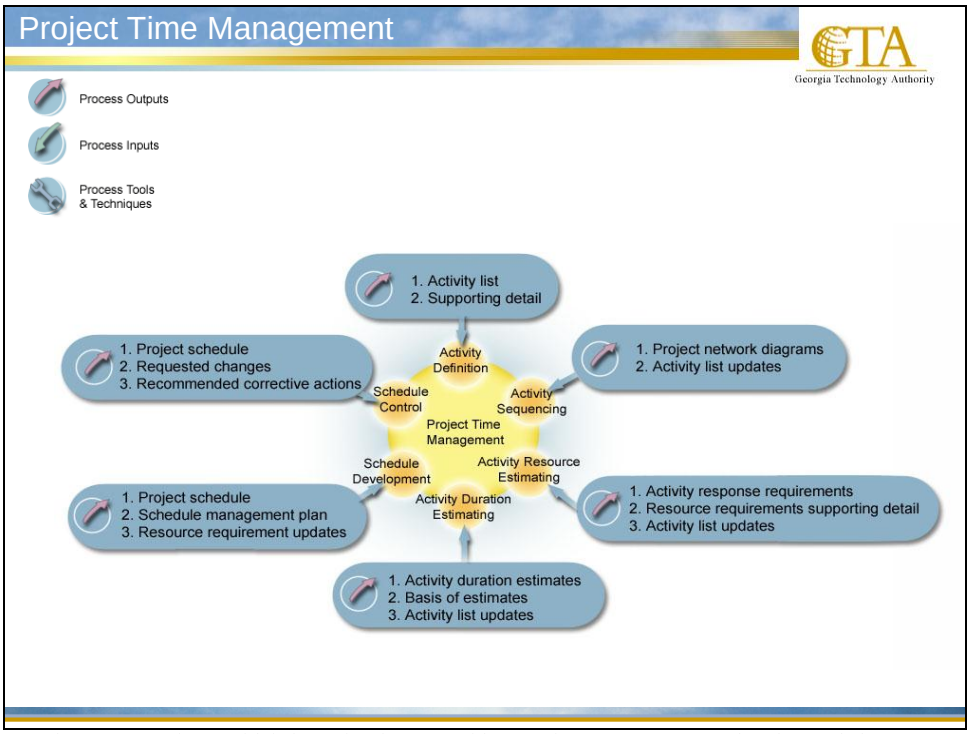
A WBS is a deliverable-oriented grouping of project components that organizes and defines the total scope of the project. Any work not in the WBS is considered to be outside the scope of the project. It is the role of the project manager to get the project team to deliver the content of the WBS. As with the scope statement, the WBS is often used to develop or confirm that everyone has a common understanding of project scope. Each descending level represents an increasingly detailed description of the project deliverables.

A WBS is normally presented in chart form, and each item in the WBS is generally assigned a unique identifier, which provides a structure for a hierarchical summation of costs and resources. The project manager normally uses this type of approach when assigning a scope of work to another organization and where this organization must plan and manage the scope of work at a more detailed level than the project manager.

A WBS from a previous project can be used as a template for a new project. This is possible because projects resemble other projects to some extent. For example, projects within an organization will have the same or similar project life cycles, so each phase will have the same or similar deliverables.

A work package is a deliverable at the lowest level of the WBS, when that deliverable may be assigned to the project to plan and execute. To identify a work package, the 80-hour rule can be used. The duration of a work package should be between 8 and 80 hours. Anything that exceeds this is not classed as a single work package. For a blank WBS, see template 2 in *Appendix: Tools & Templates*.

Topic 2: Project Time Management



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Sequence of Activities:
Activity Definition →Activity Sequencing → Activity Resource Estimation → Activity Duration Estimation →Schedule Development →Schedule Control

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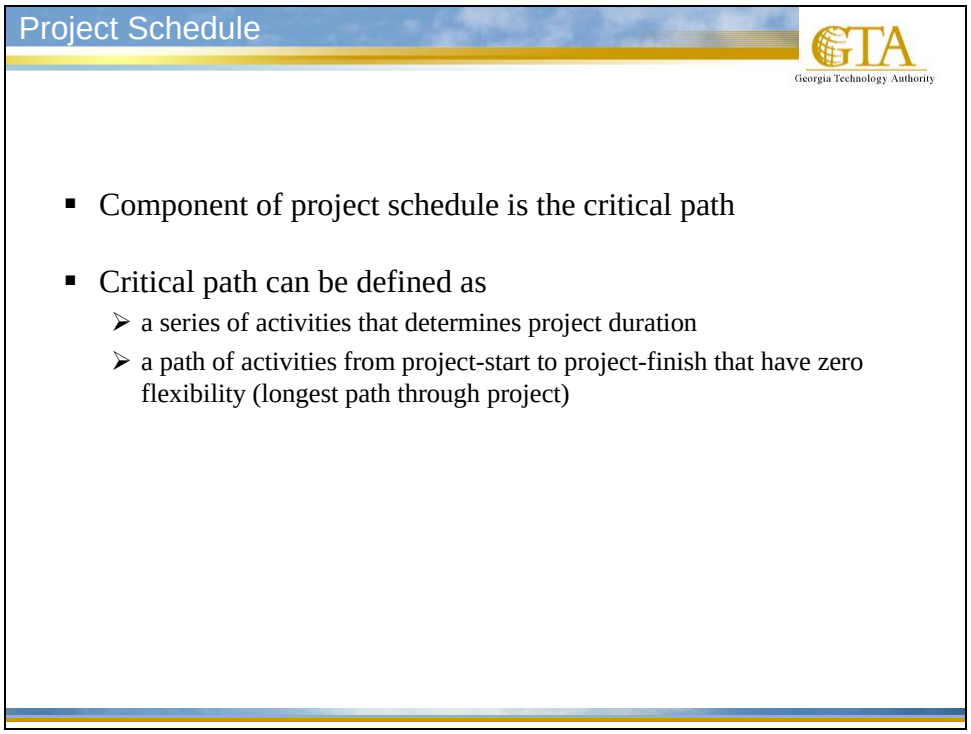
Schedule development is one of the processes used in project time management, which ensures the timely completion of a project. The function of schedule development is to analyze activity sequences, activity durations, and resource requirements in order to create the project schedule.

The project schedule provides the basis for measuring and reporting schedule performance. It includes at least planned start and expected finish dates for each activity. It may be presented in summary form (the *master schedule*) or in detail. Normally, it is presented graphically using project network diagrams (with date information added), bar charts (Gantt charts), or milestone charts.

On small projects, schedule development and the other processes in project time management are so closely linked that they are viewed as a single process – they may be performed by a single individual over a relatively short period of time.

Topic 2: Project Time Management (cont'd)



A WBS provides a series of work deliverables that can be converted into work packages. A work package is a deliverable at the lowest level of the WBS, when that deliverable may be assigned to the project to plan and execute. A work package is identifiable as a piece of work that can be planned within a schedule (i.e. time), allocated a cost, and reported on.

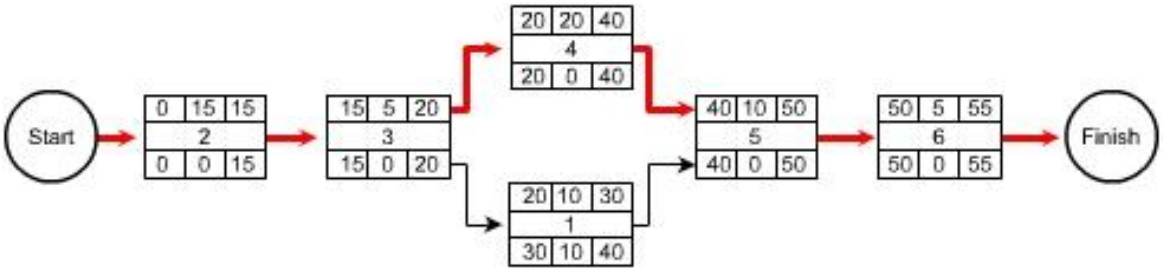
Identified work packages yield a set of project activities. These can be linked together to give a sequence of activities. The sequence, with time applied, produces a project network or schedule.

Topic 2: Project Time Management (cont'd)

The following example presents a list of government procurement activities:

No.	Activity	Duration (Days)
1	Identify Sellers	10
2	Identify Contract Requirements	15
3	Advertise Proposal	20
4	Interview Sellers	5
5	Select Sellers	10
6	Sign Contracts	5

Scheduling the activities, with time, yields the following project network or schedule: -

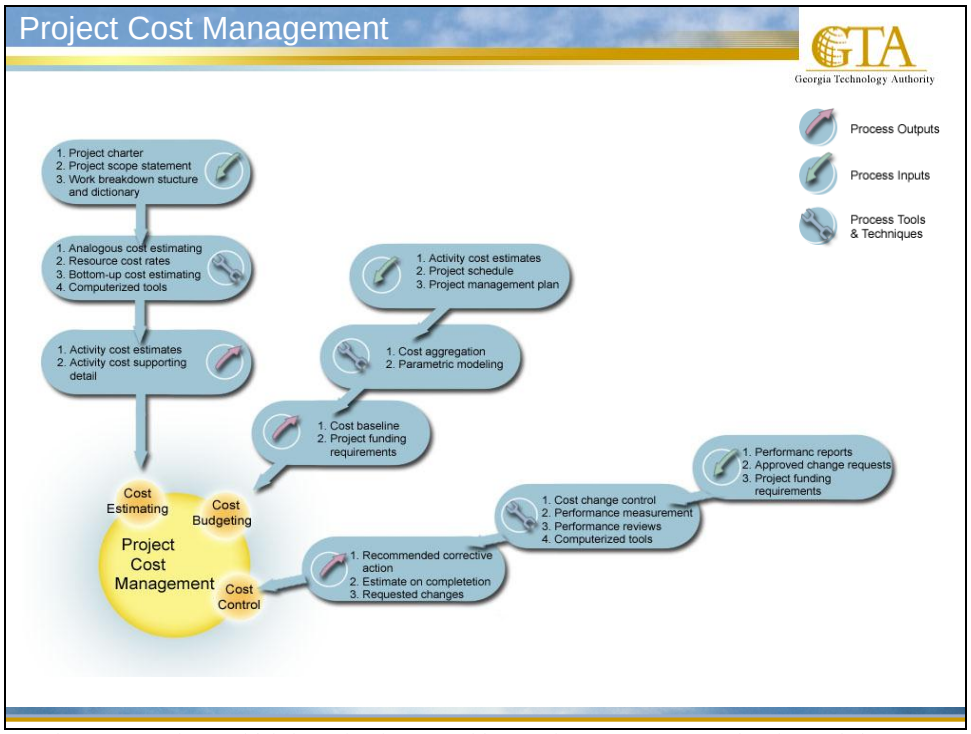


Note that the project duration is taken from the critical path of activities. The duration is 55 days.

A **critical path is defined as a series of activities that determines the duration of the project** and is a path of activities from project-start to project-finish that have zero float (or flexibility). It is the longest path through the project.

The critical path of activities is to **identify the contract requirements**, **advertise the proposal**, and then **interview the vendors**, **select the vendors,** and finally **sign the contracts**. If any of these activities is delayed, the overall project duration is delayed.

Topic 3: Project Cost Management



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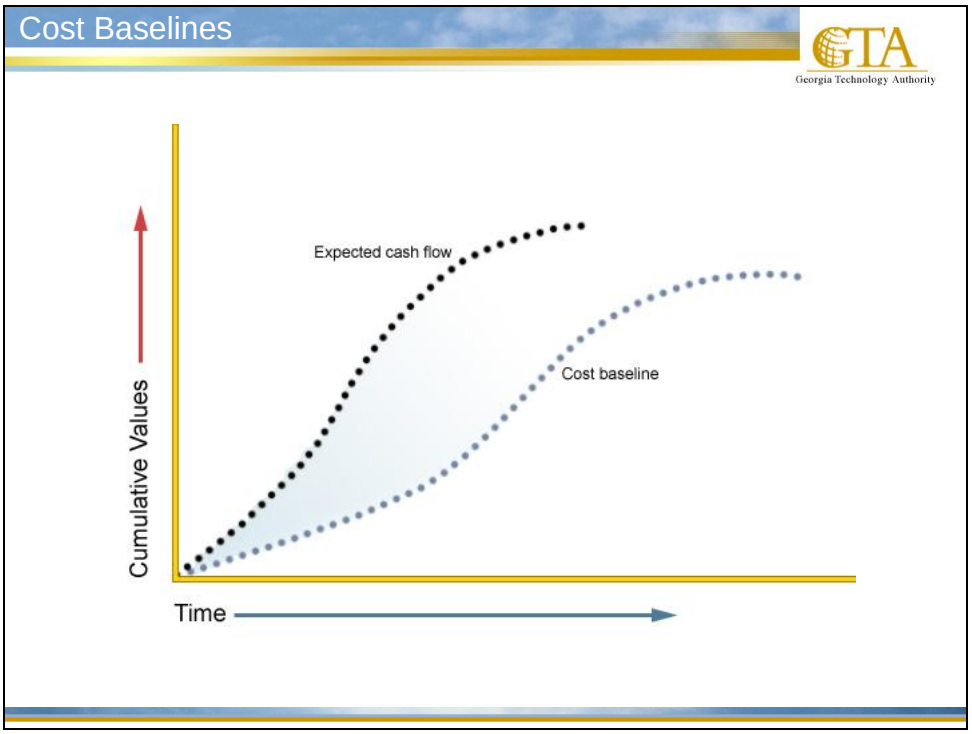
Sequence of Activities:
Cost Estimating → Cost Budgeting → Cost Control

Project cost management ensures that a project is completed within the approved budget.
It consists of

- **cost estimating** – developing an estimate of the costs of the resources needed to complete project tasks
- **cost budgeting** – allocating the overall cost estimate to individual work tasks
- **cost control** – controlling changes to the project budget

The primary concern of project cost management is to determine the cost of the resources. It should consider the effect that project decisions will have on the cost of using the project's product. For example, cutting back on the number of design reviews may reduce the cost of the project and help reduce the customer's operating costs. This broader view of project cost management is called life-cycle costing.

Topic 3: Project Cost Management (cont'd)



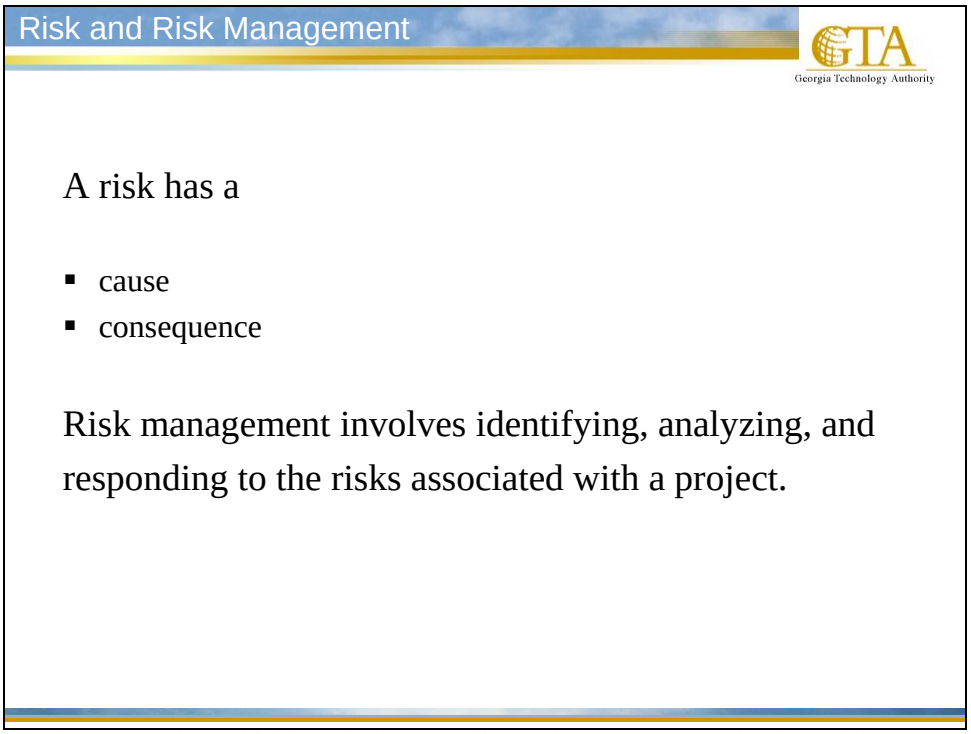
Cost budgeting entails allocating the overall **cost estimates** to individual activities or work packages to establish a cost baseline for measuring project performance.

A baseline is the original approved plan – for example, a project, work package, or activity, plus or minus any approved scope changes.

A **cost baseline** is a measurement tool that is used in project control. It is an **agreement with all stakeholders about the project budget**, and it is generally used to gauge or measure a project's progress. It can be thought of as a time-phased project budget that is usually displayed as an S-curve and is created by adding estimated costs for each period.

Small projects may have one or two cost baselines, whereas large projects may have multiple cost baselines that measure different aspects of cost performance. For example, disbursements can be measured by using a cash-flow forecast or spending plan as a cost baseline.

Topic 4: Project Risk Management



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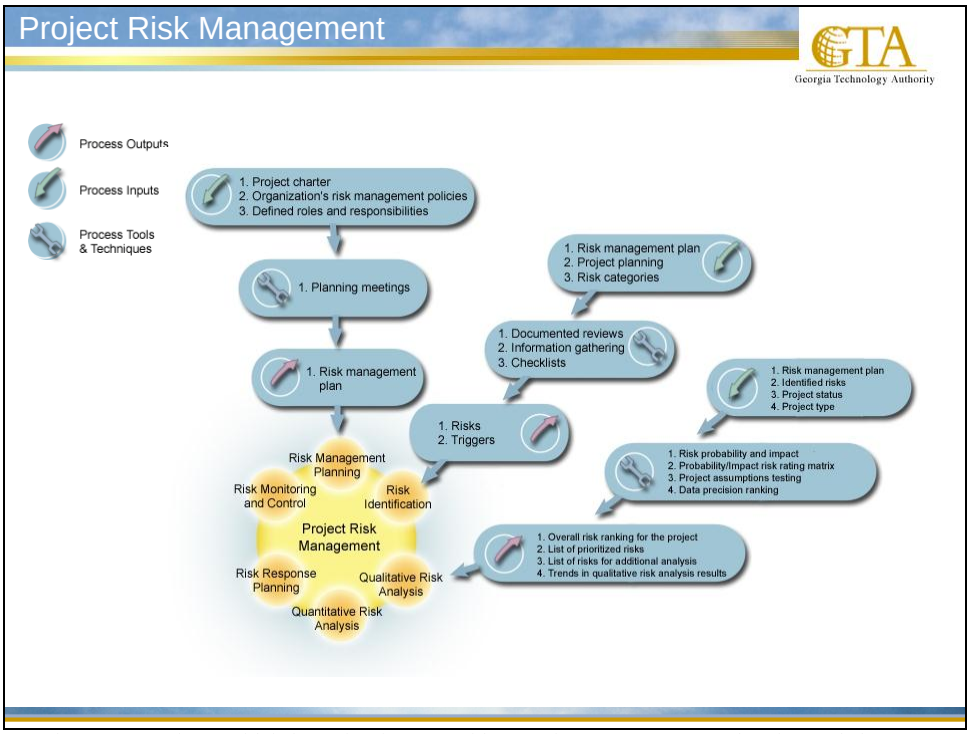
A risk has a cause and a consequence (if it occurs):

- **cause** – for example, new employees may need a work permit or there may be a limited number of people assigned to a project

- **consequence** – for example, if the project cannot start on time because the work permits take longer than planned, or the quality of work is below standard because the personnel are unsuitable for the task, the project cost, schedule, and quality are affected

Risk management attempts to increase the chances and consequences of positive events occurring, while reducing the chances and consequences of adverse events affecting the project. These uncertain events or conditions can have a positive or a negative effect on a project objective.

Topic 4: Project Risk Management (cont'd)



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Sequence of Activities:
Risk Management Planning →Risk Identification → Qualitative Risk Analysis → Quantitative Risk Analysis → Risk Response Planning → Risk Monitoring and Control

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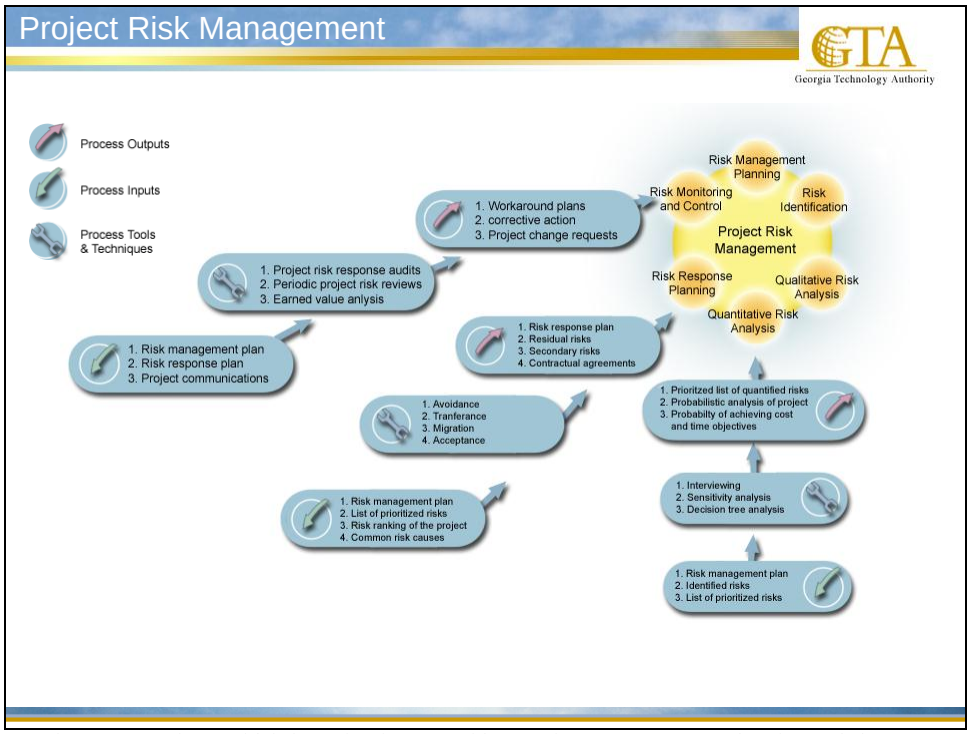
Risk management is made up of two processes.

- **risk management planning** defines the approach and plan to use for the project's risk management activities. The risk management plan is the means of defining this process.
- **risk identification** determines the risks that may occur and details their characteristics

Topic 4: Project Risk Management (cont'd)



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The remaining processes involved in risk management are

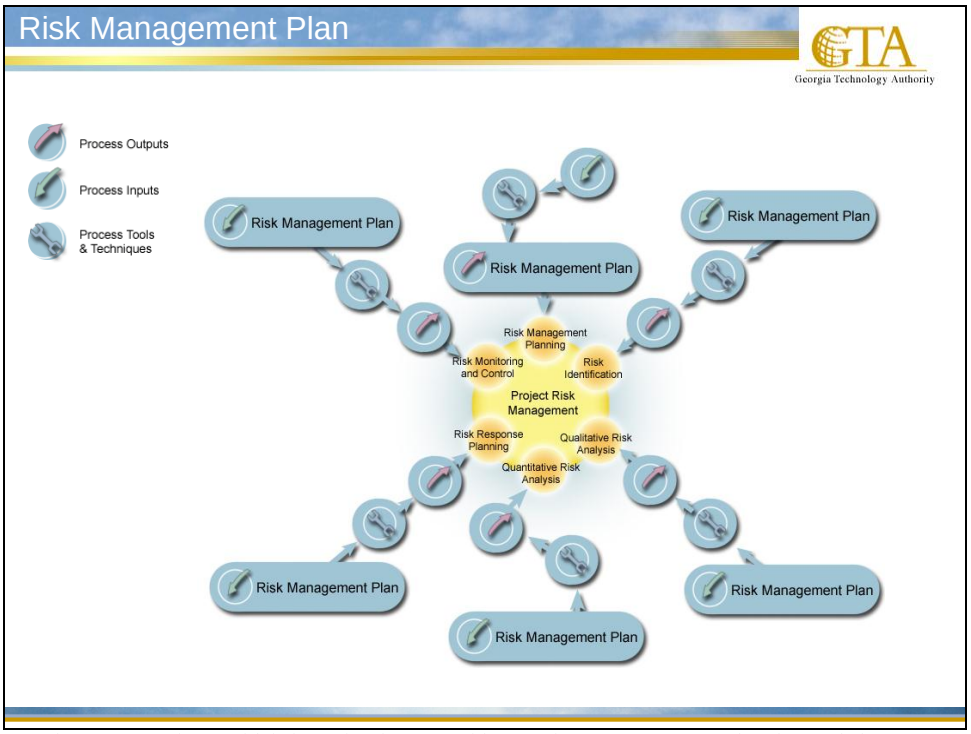
- **risk analysis –** performing a qualitative analysis of risks and conditions helps prioritize their effects on project objectives. It involves assessing the probability and impact of project risk(s) and classifies risks into categories (high, moderate, and low) for prioritized risk response planning. This process uses methods such as probability and impact matrix.

  Quantitative analysis entails measuring the probability and consequences of risks and estimating their implications for project objectives. Risks are characterized by probability distributions of possible outcomes. This process uses such techniques as simulation and decision tree analysis.

- **risk response planning –** risk response is the process of deciding what to do with analyzed risk. It includes understanding the quantified risks and defining enhancement steps for opportunities and mitigation steps for threats to reducing, if not eliminating, its occurrence.

- **risk monitoring and control –** this process entails monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle

Topic 4: Project Risk Management (cont'd)



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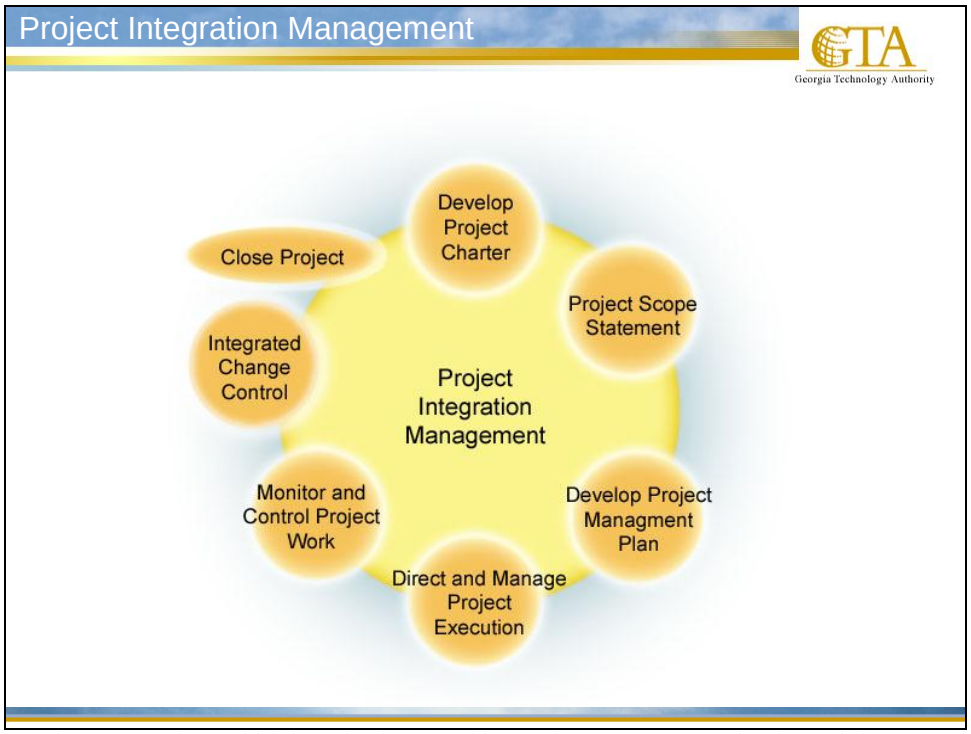
The risk management plan defines the processes for risk management – it details how the different processes will be structured and performed during the project life cycle. A risk management plan can include the following (see template 4 in *Appendix: Tools & Templates* for an example of a risk management plan*)*:

- **methodology** – the approaches, tools, and data sources used to perform risk management on the project
- **roles and responsibilities** – risk management team members' roles and responsibilities for each type of action in the risk management plan
- **budgeting** – a risk management budget for the project
- **timing** – how often the risk management process will be performed throughout the project life cycle
- **scoring and interpretation** – the methods appropriate for the type and timing of the qualitative and quantitative risk analysis being performed
- **thresholds** – the threshold criteria for risks that will be acted upon
- **reporting formats** – the content and format of the risk response plan, defining how the results of the risk management processes will be documented, analyzed, and communicated to the people concerned
- **tracking** – how all aspects of risk activities will be recorded

Topic 5: Project Integration Management



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Sequence of Activities:
Develop Project Charter → Project Scope Statement → Develop Project Management Plan → Direct and Manage Project Execution → Monitor and Control Project Work → Integrated Change Control →Close Project

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Integration is primarily concerned with integrating the processes that are required to accomplish project objectives. These processes are as follows:

- **develop project charter** – developing the project charter that formally authorizes a project (see template 1 in *Appendix: Tools & Templates* for an example of a project charter*)*

- **develop project scope statement –** developing the preliminary project scope statement that provides a high-level scope narrative

Topic 5: Project Integration Management (cont'd)

- **develop project management plan** – defines the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans into a project management plan

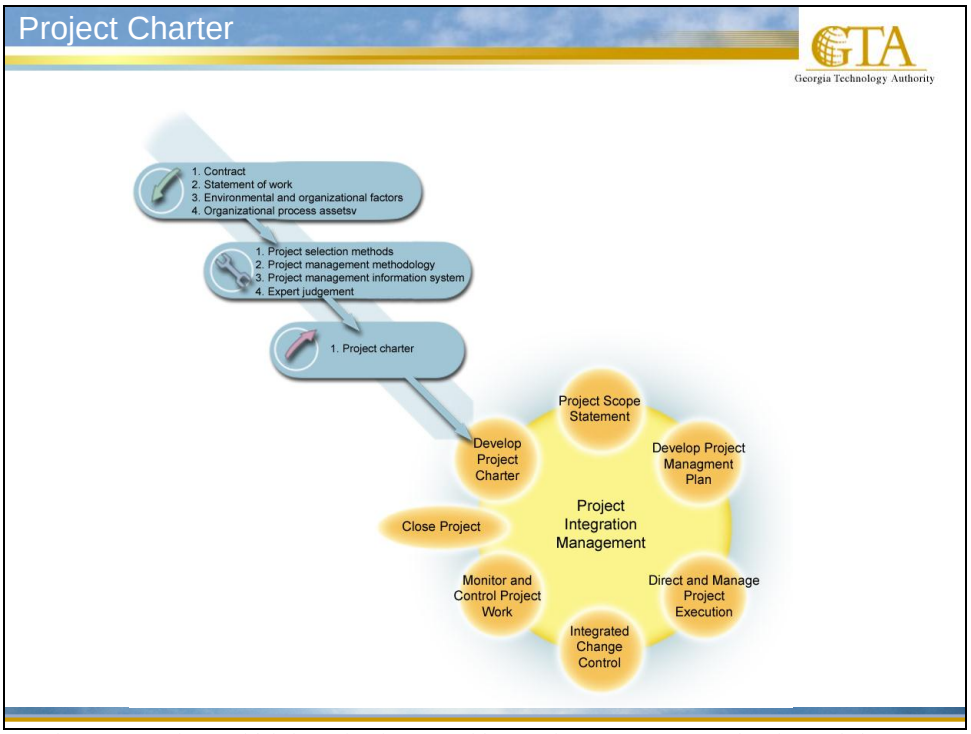
- **direct and manage project execution** – executing the work defined in the project management plan to achieve the project's objectives

- **monitor and control project work** – monitoring and controlling the processes required to initiate, plan, execute, and close a project in order to meet the performance objectives defined in the project management plan

- **integrated change control** – reviewing all change requests, approving changes, and controlling changes to the deliverable and organizational process assets

- **close project** – finalizing all activities across all of the project process groups to formally close the project or phase

Topic 5: Project Integration Management (cont'd)



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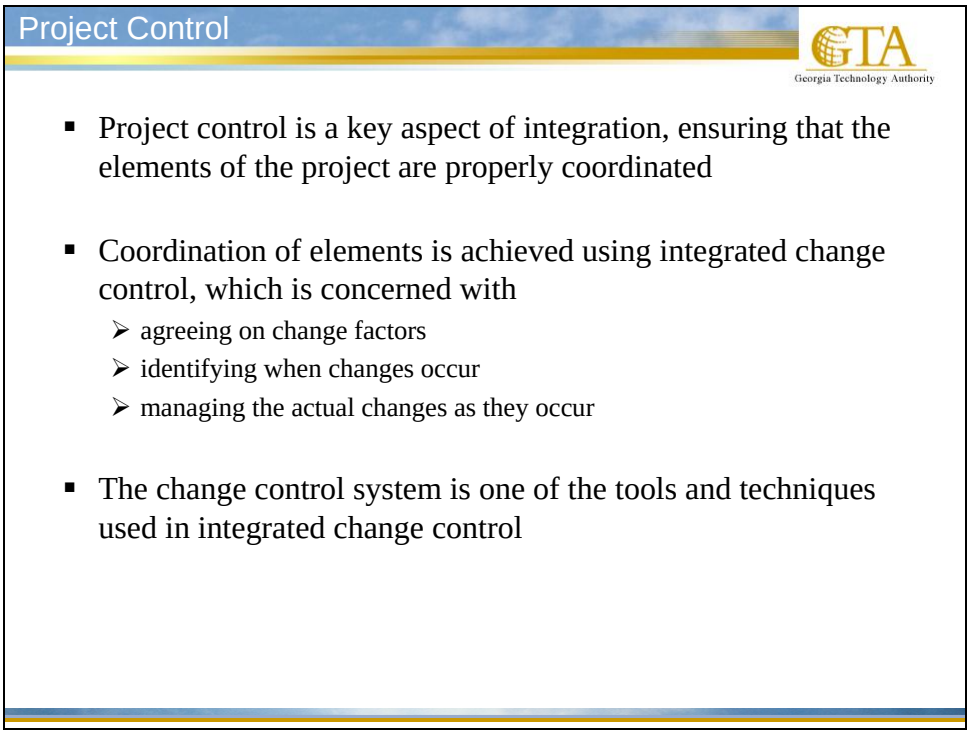
The project charter is the document that formally authorizes a project. It is issued by a project initiator or sponsor external to the project organization. It must be carried out at a level, within the organization authorizing the project, which is appropriate to funding project needs.

The project charter provides the project manager with the authority to assign organizational resources to project activities. As part of the process, a project manager is identified and assigned as early in the project as is feasible. Project managers should be assigned prior to the start of the planning – preferably while the project charter is being developed.

Chartering a project links the project to the ongoing work of the performing organization. In some organizations, the project is not formally chartered and initiated until some form of analysis is carried out – for example, a needs assessment, feasibility study, or preliminary plan.

Projects are usually chartered and authorized outside of the project organization by the enterprise, a government agency, a company, a program organization, or a portfolio organization.

Topic 5: Project Integration Management (cont'd)



A key aspect of integration is project control, which ensures that the various elements of a project are properly coordinated. It generally comes into play when plans are established – that is, when scope requirements, definitions, schedules, and budgets are in place.

One of the major processes used to achieve project coordination is integrated change control, which coordinates changes across the entire project.

It is concerned with

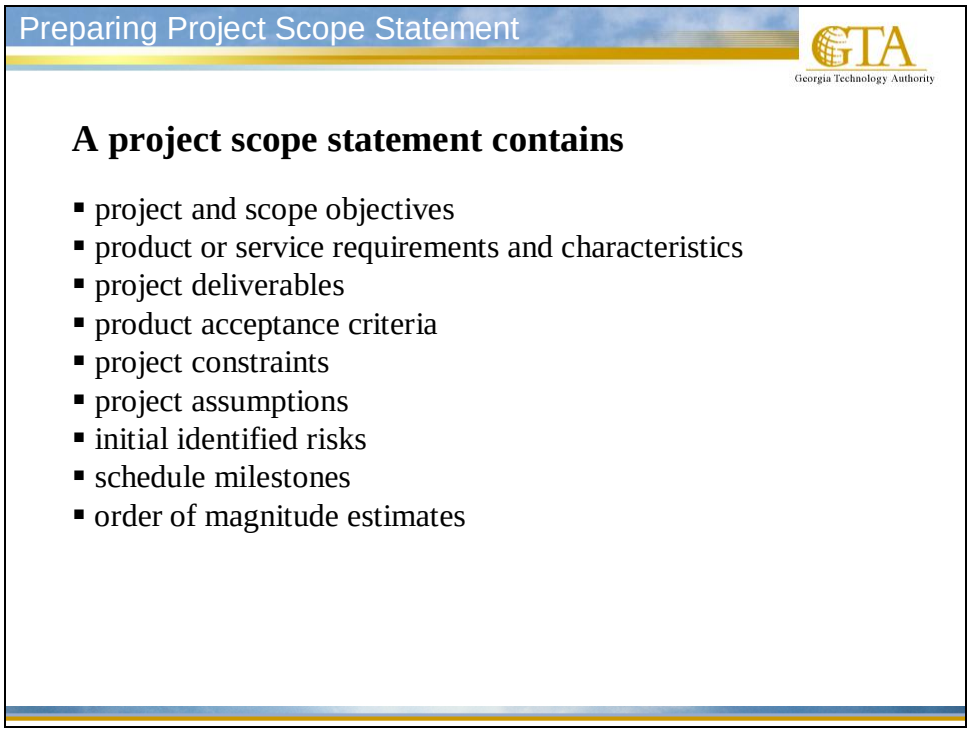
- agreeing on change factors
- identifying when changes occur
- managing the actual changes as they occur

When changes occur, the project scope definition and the integrated performance baseline must be updated. Integrated change control requires

- maintaining the integrity of the performance measurement baselines
- amending the project scope's definition to ensure that changes to the product scope are accounted for
- coordinating changes across knowledge areas – for example, a change in a schedule can affect cost, risk, quality, and staffing

One of the tools and techniques used in integrated change control is the change control system.

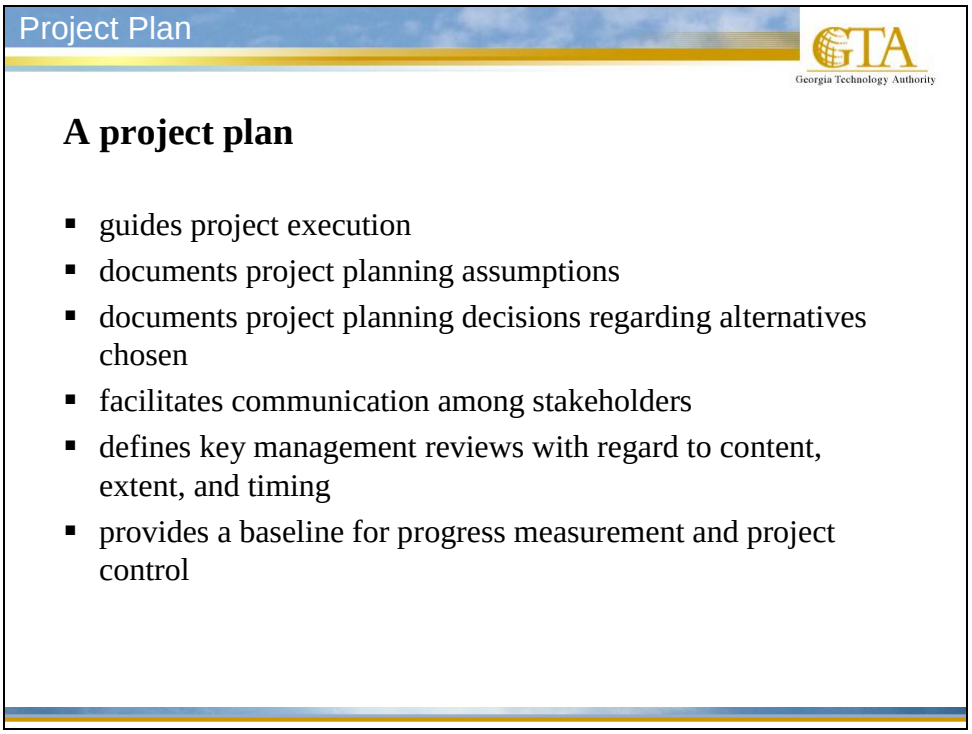
Topic 5: Project Integration Management (cont'd)



A project scope statement contains

- **project and scope objectives** – this section lists the objectives for producing the product within the scope identified
- **product or service requirements and characteristics** – this section details the specifics of the project's product or service, and the components required to produce that product or service
- **project deliverables** – these include project management reports, additional documentation, plus the ultimate output: the product of the project
- **product acceptance criteria** – this defines the process for accepting the project deliverables
- **project constraints** – this section lists the specific constraints that are linked to the scope of the project and limit the project team's options, e.g. budgetary limitations, deadlines or contractual provisions. The constraints listed in the project scope statement are typically more numerous and detailed than those listed in the project charter.
- **project assumptions** – this section details the specific assumptions associated with the project scope and the potential impact if those assumptions turn out to be incorrect. As with project constraints, the project assumptions are listed in more detail in the project scope statement than in the project charter.
- **initial defined risks** – this section lists all the known risks associated with the project
- **schedule milestones** – key dates imposed by the customer or the organization are listed here.
- **order of magnitude estimates** – this section includes project costs, resources, and durations. Accuracy is indicated by the order-of-magnitude modifier.

Topic 5: Project Integration Management (cont'd)



A project plan is one of the outputs of the project plan development process used in project integration management (see template 3 in *Appendix: Tools & Templates* for an example of a project management plan).

There are many different ways to organize and present the project plan, but it commonly includes

- a project charter
- a description of the project management approach or strategy
- a scope statement – project objectives and deliverables
- WBS
- cost estimates, scheduled start and finish dates (schedule), and responsibility assignments for each deliverable within the WBS
- performance measurement baselines for technical scope, schedule, and cost – that is, the schedule baseline (project schedule) and the cost baseline (time phased project budget)
- major milestones and target dates for each baseline
- key/required staff and their expected cost or effort
- risk management plan, including key risks (constraints and assumptions) and planned responses and contingencies (where appropriate) for each
- subsidiary management plans, including scope management, schedule management, cost management, quality management, staffing management, communications management, risk response, and procurement management
- open issues and pending decisions

Topic 6: Project Communications Management

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Sequence of Activities:
Communications Planning →Information Distribution → Performance Reporting → Manage Stakeholders

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Project communications management refers to the processes used to generate, collect, disseminate, store, and use project information. It provides the critical links among people, ideas, and information that are necessary for the project's success. It helps the people involved in sending and receiving project communications to understand that their individual communications can affect the project as a whole.

Topic 6: Project Communications Management (cont'd)

The major processes involved in project communications management are

- **communications planning**, which determines the information and communications needs of the stakeholders and determines who needs the information and what information they need, when they will need it, and how they will receive it

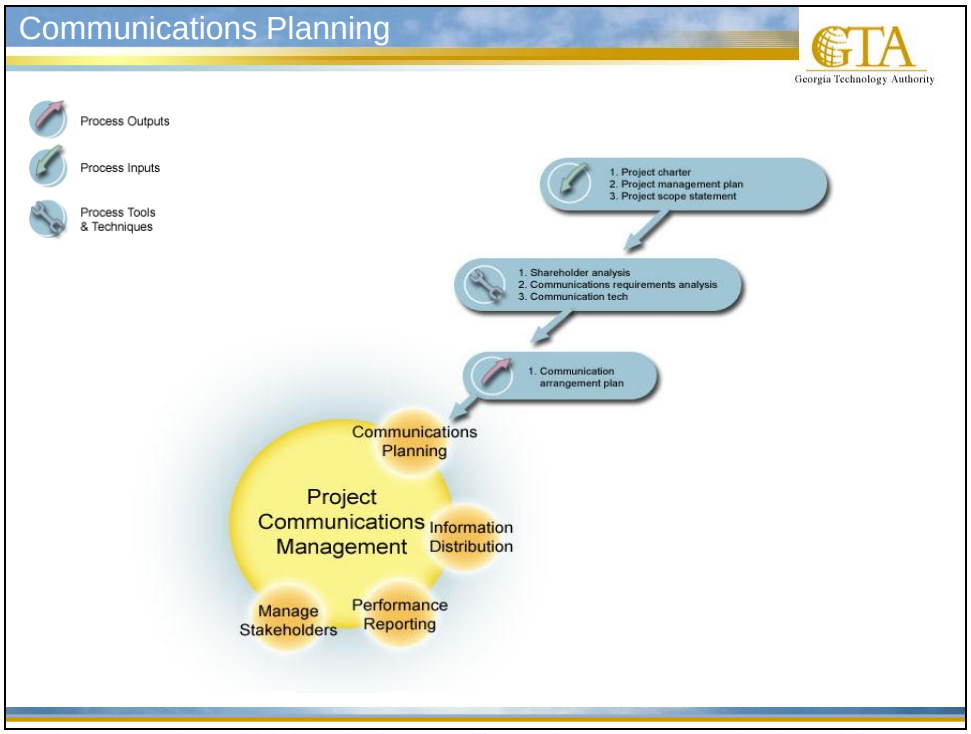
- **information distribution**, which ensures the timely delivery of information to project stakeholders

- **performance reporting**, which collects and disseminates performance information – for example, status reporting, progress measurement, and forecasting

- **manage stakeholders**, which entails managing communications to satisfy the needs of and resolve issues with project stakeholders

An essential part of project communications management is the art of communicating. This management skill is a broader subject and not one that is used only in a project context. For example, it can relate to the choice of media (written, oral), writing style, and the techniques used for presentation and managing meetings.

Topic 6: Project Communications Management (cont'd)



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Communications planning identifies the stakeholders' informational needs and determines a suitable way of meeting those needs. This process can be difficult because the informational needs and the methods of distribution can vary widely.

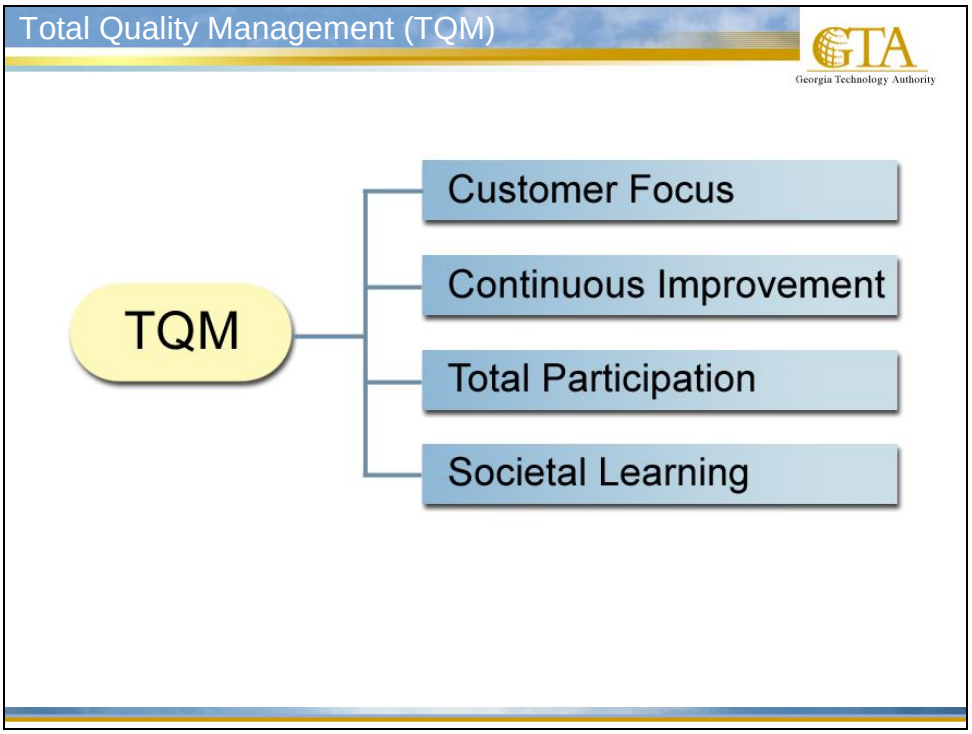
The various stakeholders have different information needs. These needs should be analyzed in order to obtain a methodical and logical view of the information required and identify the most appropriate distribution methods.

The analysis should look at the different methods and technologies that can be used to provide project-specific information. It is important that resources are not wasted on gathering unnecessary information or developing or using inappropriate technology.

Communications planning is generally done at the start of a project (at the earlier project phases). However, the results of this process should be reviewed regularly and revised as needed to ensure that the results can be continually applied.

Communications and organizational planning are often tightly linked because the project's organizational structure has a major effect on the project's communications requirements.

Topic 7: Project Quality Management



Total quality management (TQM) is an evolving system of practices, tools, and training methods that are used to manage organizations to enable them to provide ongoing customer satisfaction in a rapidly changing environment.

In TQM, there is a strong emphasis on involving all employees on a day-to-day basis so that they can improve and sustain the necessary quality of the organization as a whole.

The four principles that ensure the successful implementation of TQM include

1. **customer focus** – TQM companies focus on customers and on satisfying their needs. Therefore, they must be able to react fast to ever-changing customer needs and to focus their activities so they lead to sustained customer satisfaction.

2. **continuous improvement** – TQM companies seek continuous improvement of the processes that lead to higher quality products and services.

Topic 7: Quality Management (cont'd)

Continuous improvement involves

- using a scientific approach to make improvements
  (analyze facts, base actions on facts, test results, etc.)
- undertaking step-by-step improvements to get to markets fast
- building on experience to reach even higher levels of quality

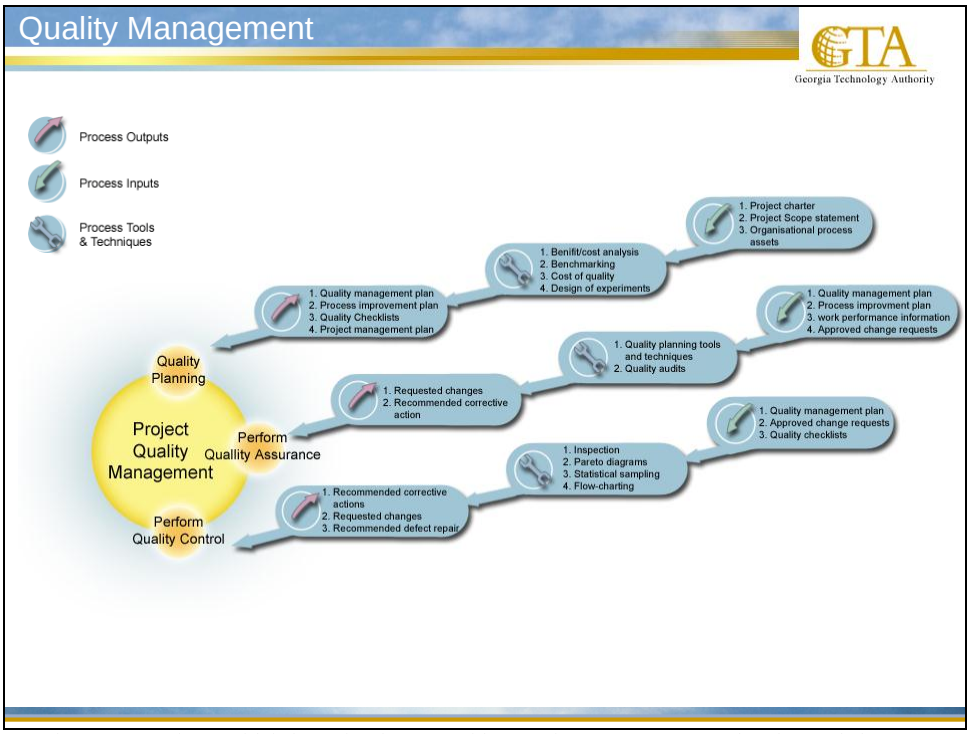
3. **total participation** – TQM organizations seek the total participation of their staff. All the capabilities of all company members must be used if companies are to make continuous improvement and to satisfy their customers.

4. **societal learning** – TQM organizations must participate in sharing learning with other companies. This helps to

   - avoid the re-invention of methods
   - implement quality practices more quickly
   - create a quality culture in which to do business

Project quality management can be thought of as a subset of TQM.

Topic 7: Project Quality Management (cont'd)



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Sequence of Activities:
Quality Planning → Perform Quality Assurance → Perform Quality Control

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Project quality management includes the processes required to ensure that the project will achieve its objectives. The major processes involved are

- **quality planning**, which identifies the quality standards that are relevant to the project and determines how these standards can be met
- **quality assurance**, which involves applying planned, systematic quality activities – for example, audits and peer reviews – to ensure that the project will employ all processes needed to meet all stakeholders expectations
- **quality control**, which monitors specific project results to determine whether they adhere to relevant quality standards and takes corrective action if the results are substandard

Topic 7: Project Quality Management (cont'd)

Project quality management must address both the management of the project and the outcome of the project – the quality of the goods or services produced. If the quality requirements of either of these are not met, it can have serious negative consequences for the project stakeholders. It is also important that the right approach is taken when meeting the requirements. For example, the project team may have been overworked to meet the customer requirements, which can result in increased employee attrition. Another example is when planned quality inspections have been rushed or skipped in order to stick to the project schedule, resulting in errors going undetected.

Quality has different meanings. Generally, quality can be defined as meeting customer needs (both stated and implied) and providing value to them as well. It is these stated and implied needs that are used to develop the project requirements, which are achieved by project scope management.

It is important that the project management team does not confuse quality with grade. Grade is a characteristic of the product or service, in that the product or service can have the same functional use but different technical characteristics.

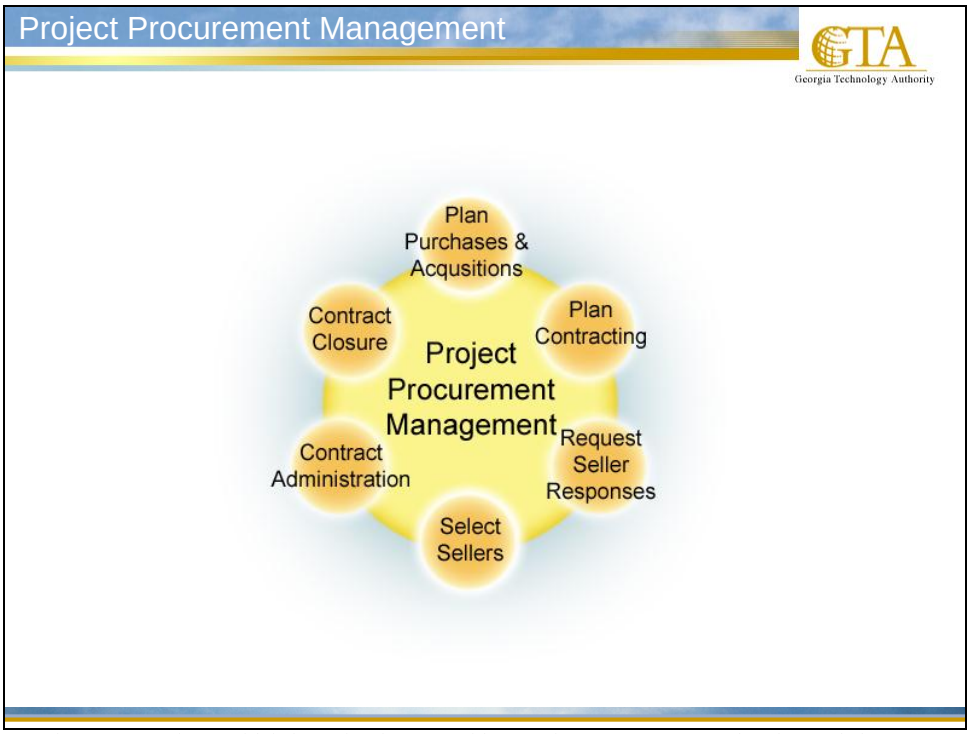
Low grade is not necessarily a problem, but low quality is. For example, a low quality software product – one that has many bugs and an unreadable user manual – will be of little use to anyone, even if it is of high grade (loads of features).

It is the project manager's (and project team's) responsibility to determine and deliver the appropriate level of quality and grade.

Modern quality management complements project management. For example, both disciplines recognize the importance of customer satisfaction, of preventing mistakes over the cost of correcting them, and of management responsibility in providing the resources needed to succeed. In addition, both recognize that each phase in the cycle is made up of different processes.

Any initiatives undertaken by the organization to improve the quality of the project's product will also improve the quality of the project's management. However, any investments in product quality improvement must be borne by the organization because the project may not last long enough to reap the rewards.

Topic 8: Project Procurement Management



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Sequence of Activities:
Plan Purchases and Acquisitions → Plan Contracting → Request Seller (Vendor) Responses →Select Sellers (Vendors) →Contract Administration → Contract Closure

---

Project procurement management includes the processes required to acquire goods and services from outside the organization.

It consists of the following major processes:

- **plan purchases and acquisitions** – determining what to procure and when
- **plan contracting** – documenting material, product, goods and services requirements and identifying potential sources
- **request seller (vendor) responses** – obtaining quotations, bids, offers, or proposals

Topic 8: Project Procurement Management (cont'd)

- **select sellers (vendors)** – reviewing offers, choosing the potential seller (vendor), and negotiating a written contract with seller (vendor)
- **contract administration** – managing the relationship with the seller (vendor)
- **contract closure** – contract completion and settlement

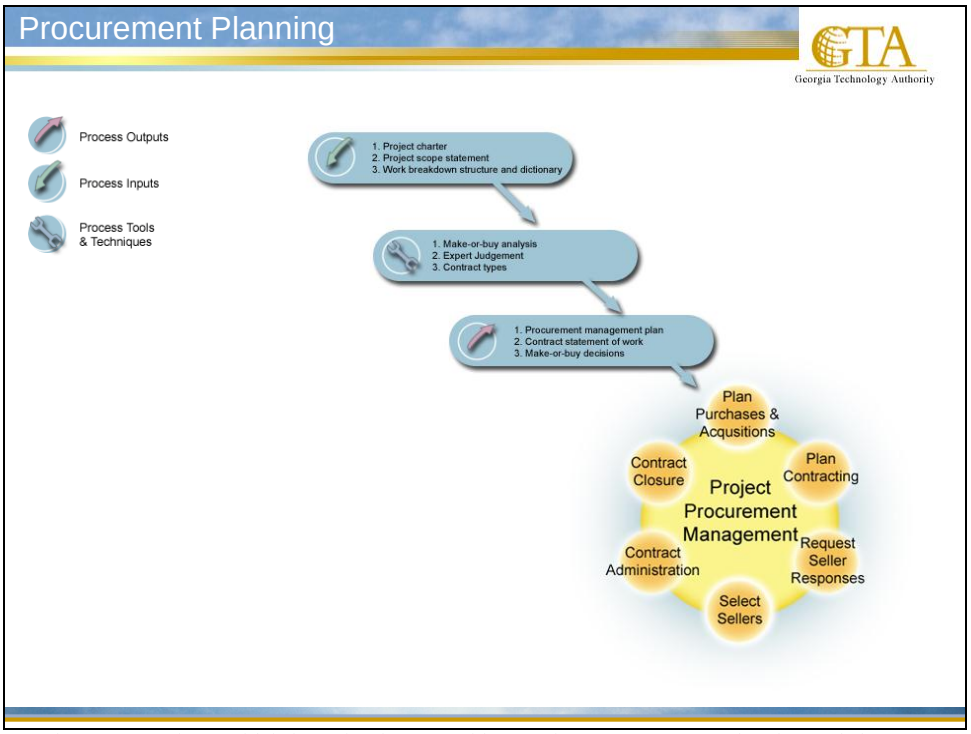
The buyer-vendor relationship is a central part of project procurement management and can exist at many levels in a project. In this topic, project procurement management is discussed from the perspective of the buyer.

The vendor is referred to by different terms, depending on the application area – for example, the vendor may be a called a subcontractor, a seller (vendor), or a supplier.

The vendor will generally manage its work as a project. In these cases, the buyer becomes the customer and is thus a key stakeholder for the vendor. The vendor needs to pay attention to all the processes involved in project management and not just focus on the processes in their knowledge area. Key inputs to many of the vendor's processes are the terms and conditions of the contract. This may contain the actual inputs – for example, the major deliverables, key milestones, and cost objectives – or it may reduce the options that the project team makes – for example, staffing decisions generally require the buyer's approval on design projects.

This topic assumes that the vendor is external to the performing organization, but the vendor can be applied to other units of the performing organization where formal agreements exist between them. In such cases, the processes used in project human resource management and project communications management are more likely to be applied.

Topic 8: Project Procurement Management (cont'd)



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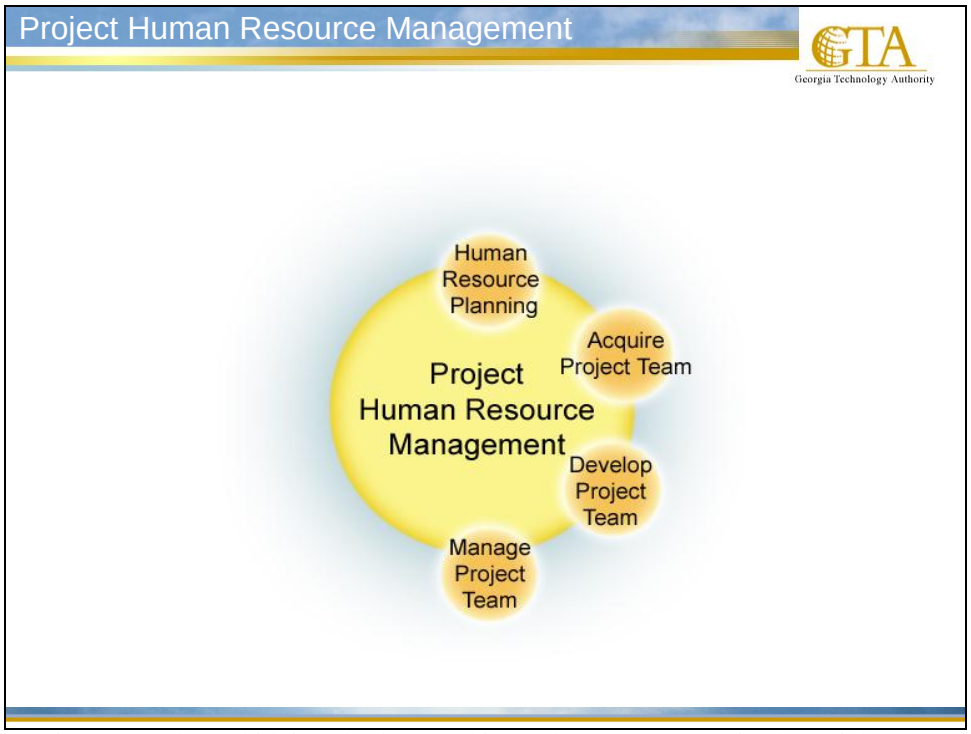
Procurement planning is the process of identifying the project needs that can be best met by procuring products or services from outside the organization. It involves considering the various aspects of procurement – whether to procure, how to procure, what to procure, how much to procure, and when to procure. This process should be accomplished when defining the scope definition.

The number of processes performed in quality procurement management depends on whether the products and services are obtained from outside. If they're not, only the procurement planning process is performed. Otherwise, all the processes are performed for each product or service item.

The project management team may, when needed, avail of the help of specialists in the areas of contracting and procurement. The specialists should be considered members of the project team and be involved early in the process.

Topic 9: Human Resource Management



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Sequence of Activities:
Human Resource Planning → Acquire Project Team → Develop Project Team → Manage Project Team

---

Project human resource management includes the processes required to make the most effective use of the people involved with the project. It typically involves all stakeholders from customers and partners to sponsors and individual contributors. It consists of the following processes:

- **human resource planning** – identifying, documenting, and assigning project roles, responsibilities, and reporting relationships
- **acquire project team** – getting the personnel needed for the project
- **develop project team** – developing individual and group skills to enhance project performance
- **manage project team** – monitoring individual and group performance, providing feedback, resolving issues, and coordinating changes to enhance project performance

Topic 9: Human Resource Management (cont'd)

Responsibility Assignment Matrix (RAM) Template:

Project Name:	Control Number:	Date:

Task	Resource:	Resource:	Resource:	Resource:	Resource:

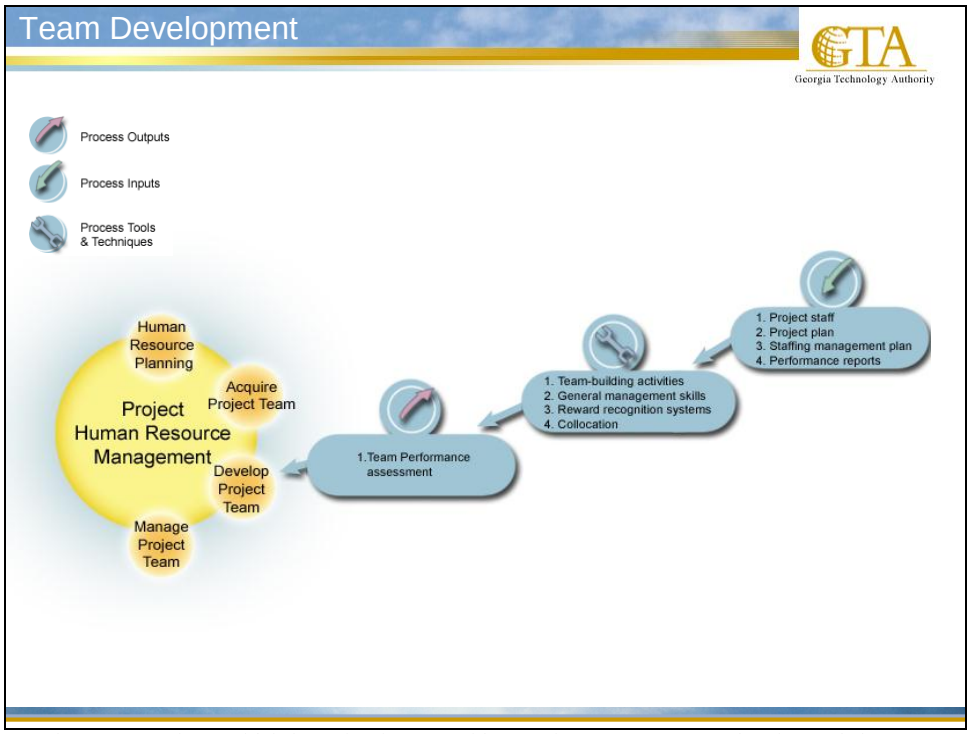
* **Legend: R= responsible A= approve P= participant**

There is a substantial body of literature available to the project manager and management team to enable them to effectively lead and manage people on projects and deal with stakeholders and situations that arise within and between these two groups. This literature includes

- general management skills – for example, leading, communicating, and negotiating
- skills related to dealing with individuals – for example, delegating, motivating, coaching, and mentoring
- group skills – for example, team building and dealing with conflict
- administration skills – for example, recruiting and retaining staff, giving performance appraisals, engaging in labor relations, and detailing health and safety regulations

The project manager and management team need to aware that the selection and application of appropriate skills for the management of human resources on projects are slightly different when compared to normal day-to-day operations. For example, the temporary nature of projects means that the personal and organizational relationships will be transient, whereas in day-to-day operations, the relationships are more established. In addition, the nature and number of project stakeholders differ at each stage, so techniques need to be appropriate to the current needs of the project. General management and project team skills are dealt with in Lesson 5.

Topic 9: Human Resource Management (cont'd)



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The development of the project team is considered a critical success factor for the project. Team development, which includes both enhancing the ability of stakeholders and team members, should occur throughout the project.

In some projects, the individual team members are accountable to both a functional manager and the project manager. This dual reporting relationship can complicate team development. The project manager is generally responsible for the management of this relationship, so it is important that they manage it effectively.

Topic 9: Human Resource Management (cont'd)

Mapping the Project Processes (part 1)

Georgia Technology Authority

Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Integration Management	Develop Project Charter	Develop Project Management Plan	Direct and Manage Project Execution	Monitor and Control Project Work	Close Project
Project Scope Management		Scope Planning Scope Definition		Scope Verification Scope Control	
Project Time Management		Activity Definition Activity Sequencing Activity Duration Estimating Schedule Development		Schedule Control	
Project Cost Management		Cost Estimating Cost Budgeting		Cost Control	

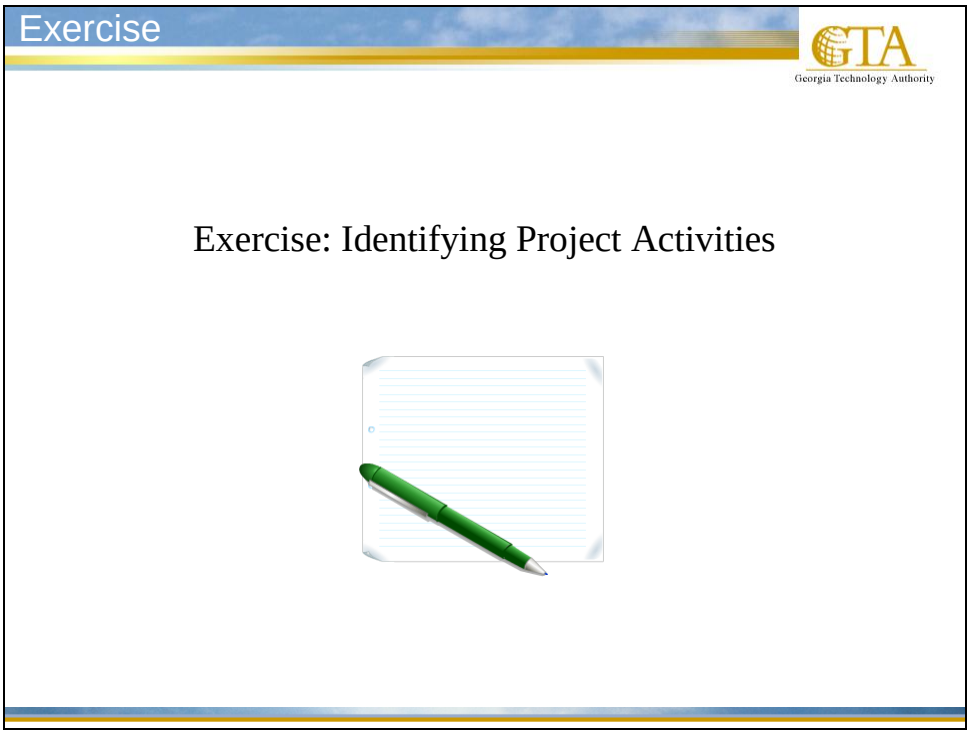
Topic 9: Human Resource Management (cont'd)

Mapping the Project Processes (part 2)

Georgia Technology Authority

Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Cost Management		Cost Estimating Cost Budgeting		Cost Control	
Project Quality Management		Quality Planning	Perform Quality Assurance	Perform Quality Control	
Project Human Resource Management		HR Planning Acquire Project Team	Develop Project Team	Manage Project Team	
Project Communications Management		Communications Planning	Information Distribution	Performance Reporting	
Project Risk Management		Risk Management Planning Risk Identification Qualitative Risk Analysis Quantitative Risk Analysis Risk Response Planning		Risk Monitoring and Control	
Project Procurement Management		Planning Purchases and Acquisitions Plan Contracting	Request Seller Responses Select Sellers	Contract Administration	Contract Closeout

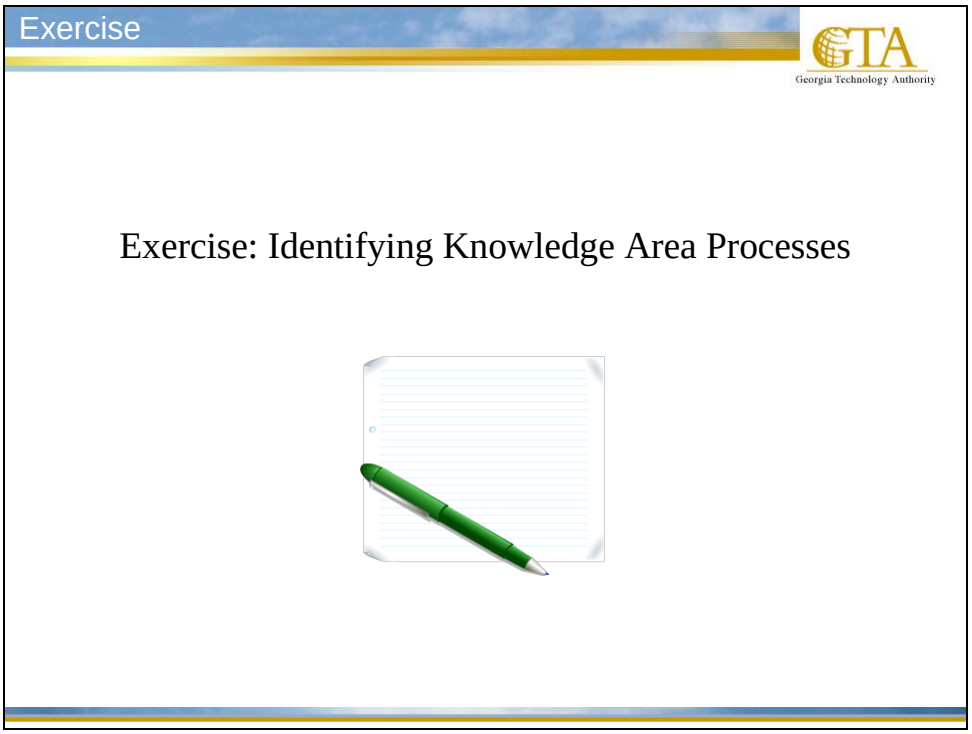
Topic 10: Exercise – Identifying Knowledge Area Processes



Given the five project management processes of initiation, planning, executing, controlling and monitoring, and closeout, identify the project activities that would be required for the nine knowledge areas as presented in the template.

Topic 10: Exercise Worksheet

Topic 10: Exercise – Identifying Knowledge Area Processes



Having read the case study about the Georgia Light Rail system and established a project structure with process groups, you now must break the process groups into what you consider to be applicable processes.

Why do you consider the processes to be applicable?

Sample answer:

Phase 1: Conceptual phase (goal: requirement identification)
Applicable processes: Initiation and planning with control of scope

Input: Feasibility study

- Initiation processes: Scope initiation
- Planning processes: Scope planning and scope definition
- Control processes: Scope management

Goal: Documented project requirement and first draft of WBS

Topic 10: Exercise – Identifying Knowledge Area Processes (cont'd)

Phase 2: Supplier identification (goal: list of preferred suppliers)
Applicable processes: Procurement planning

Inputs: Procurement requirements

- Solicitation planning to identify potential sources
- Solicitation to obtain quotations, bids, offers, or proposals
- Source selection

Goals: Preferred list of suppliers

Phase 3: Detailed planning (Goal: Presentation of project planning)
Applicable processes: Planning with control of management plans
(i.e. scope, cost, time, etc)

Inputs: Project requirements, list of suppliers and WBS

- Planning: Time, cost, quality, communication and risk
- Control: Control of all the above plans with identification of performance measurement tools

Risk identification should ideally be at the commencement of the project. The planning aspect is referred to here.

Goals: Detailed project plan with set of performance tools

Phase 4: Construction phase 1: Foundation
(Goal: Foundation laid for light rail systems)
Applicable processes: Implementation and project control

Phase 5: Construction Phase 1: Rail system (Goal: Laying rail tracks and all cabling)
Applicable processes: Implementation and project control

Phase 6: Test phase 1: Rail carriages (Goals: Carriages pass indoor testing)
Applicable processes: Implementation and project control

Phase 7: Test phase 2: Rail carriage pass outdoor testing
(Goals: Carriages pass outdoor testing)
Applicable processes: Implementation and project control

Phase 8: Integration test (Goals: Carriages tested on rail system)
Applicable processes: Implementation and project control and scope verification

Inputs: The phases are grouped together as the driver for each of these phases is the detailed project plans

- Implementation: Team execution and management with communication of information
- Control: Performance measurement and progress reporting

Goals: The delivery of a product that meets the initial requirements. This is verified through scope verification.

Topic 10: Exercise – Identifying Knowledge Area Processes (cont'd)

Phase 9: Launch (Goals: Public launch light rail system in city area)
Applicable processes: Implementation and project control with contract closeouts

Inputs: The verified product

- Implementation: Team execution and management with communication of information
- Control: Performance measurement and progress reporting

Goals: The piloting and customer sign-off of the product

Phase 10: Closeout (Goals: Scope verification and lessons learned archived for next project)
Applicable processes: Contract and project closeout

Inputs: Customer sign-off

- Closeout: Administrative and contract closeout

Goals: Archival of lesson learned and formal project closure

Topic 10: Exercise Worksheet

Lesson review

Topic 1: Project Scope Management

Topic 2: Project Time Management

Topic 3: Project Cost Management

Topic 4: Project Risk Management

Topic 5: Project Integration Management

Topic 6: Project Communications Management

Topic 7: Project Quality Management

Topic 8: Project Procurement Management

Topic 9: Human Resource Management

Student learning objectives

After completing this lesson, you should be able to

- define what scope management is and identify how to use a work breakdown structure (WBS)
- demonstrate what is required to develop a schedule and outline the components of a project plan
- define what cost management is and identify the primary tools and techniques of costing a project
- identify what risk management is and state the value of a risk management process
- outline the importance of project control tools and techniques
- outline the importance of project communication and identify the various facets of the discipline
- point to what quality management is and demonstrate how it is influenced by organization practices
- outline the procurement management cycle
- define human resource management and demonstrate the importance of project teams

Lesson 5: Project Teams

Topic 1: Organizational Influences

Topic 2: Project Management Offices

Topic 3: Effective Project Teams

Topic 4: Project Leadership

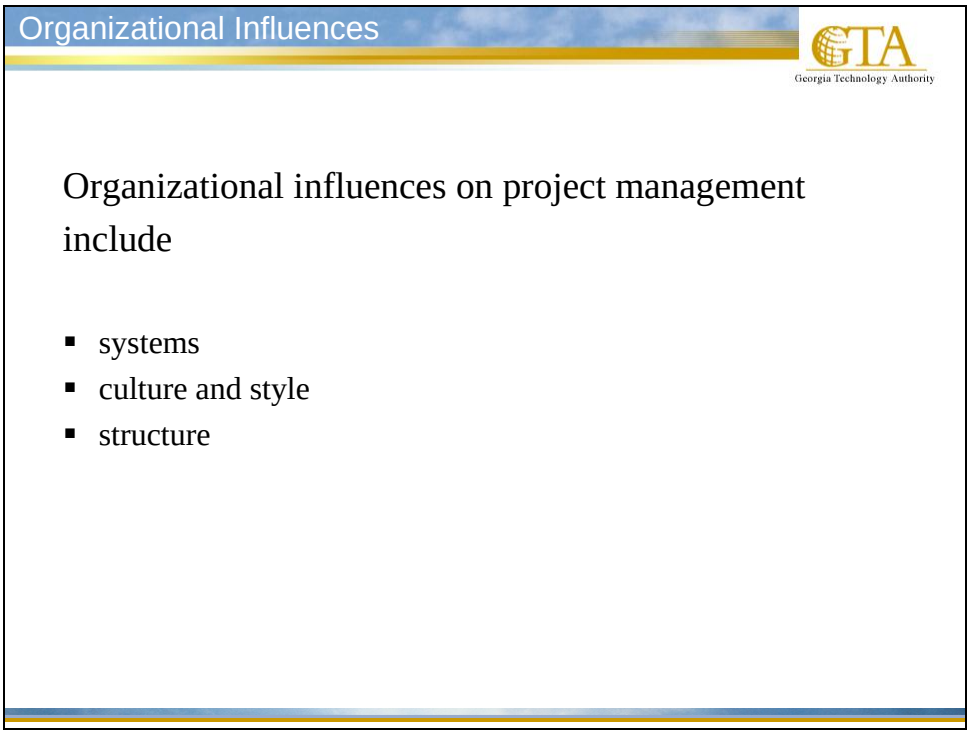
Topic 5: Project Management Skills

Student learning objectives

After completing this lesson, you should be able to

- delineate the organizational influences that impact projects
- describe project management-related activities that apply the same basic skills as managing a project but are performed on different levels
- identify the characteristics of effective project teams and barriers to building effective project teams
- describe the leadership qualities necessary for project success
- outline the skills that a project manager requires in a team environment

Topic 1: Organizational Influences



A project does not take place in isolation but rather is generally part of an organization larger than the project – for example, business corporations, government agencies, or professional associations.

Even when the project is the organization – for example, a project to set up a joint venture – the parent organization or organizations, as well as other external factors, influence how the project proceeds.

Factors that can influence a project include the nature and level of development of an organization's

- **systems**
- **culture and style**
- **structure**

Let's take a look at key aspects of these organizational influences on a project.

Topic 1: Organizational Influences (cont'd)

Organizational Systems

Project-based organizations' operations consist mainly of projects, and such organizations fall into two categories:

- organizations that carry out projects for others – for example, management consultants, construction companies, or engineering firms

- organizations that employ the management by projects approach to operations

Such organizations generally have management systems that facilitate project management – for example, their financial systems are designed for accounting, tracking, and reporting on multiple simultaneous projects.

A project management team needs to know how the organization's systems affect the project. If, for example, an organization rewards managers for charging staff time to projects, the project management team may need to implement controls to ensure that assigned staff members are being used effectively on the project.

Organizational Culture and Style

An organization develops its own unique culture and style, which is reflected in, among other things, shared values, norms, beliefs, and expectations; policies and procedures; and authority relationships.

Organizational culture and style can have a direct impact on a project. For example,

- a team proposing an unusual or high-risk project is less likely to secure approval in an organization with a conservative or cautious culture

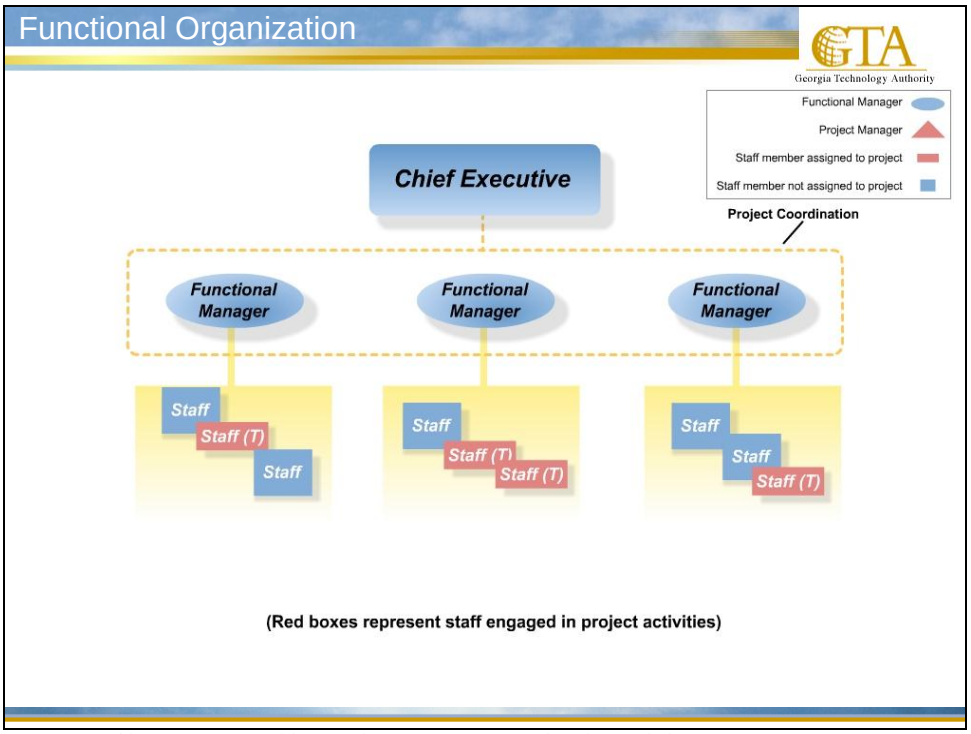
- a project manager with a highly participative style is likely to face problems in a rigidly hierarchical organization

Organizational Structure

An organization's structure has a critical influence on the use and availability of project resources and on how a project is carried out.

Organizational structures span a spectrum from functional to projectized, with several matrix structures in between.

Topic 1: Organizational Influences (cont'd)



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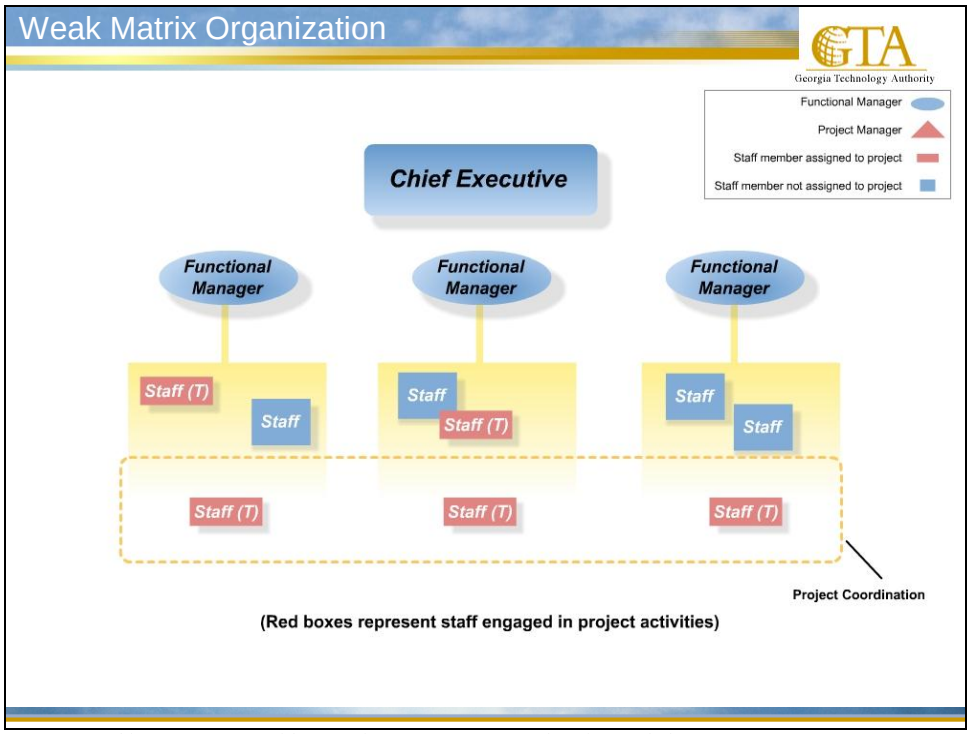
The classic functional organization is a hierarchy in which each staff member has one direct superior. Staff members are grouped by function, such as production, marketing, engineering, and accounting.

Functional organizations conduct projects, but the perceived scope of the project is limited to the boundaries of the function. For example, the engineering department in a functional organization conducts projects independent of the manufacturing department. If questions about manufacturing arise, they are passed up the hierarchy to the head of engineering, who consults with the head of manufacturing. The head of engineering then passes the answer back down the hierarchy to the relevant engineering project manager.

Topic 1: Organizational Influences (cont'd)



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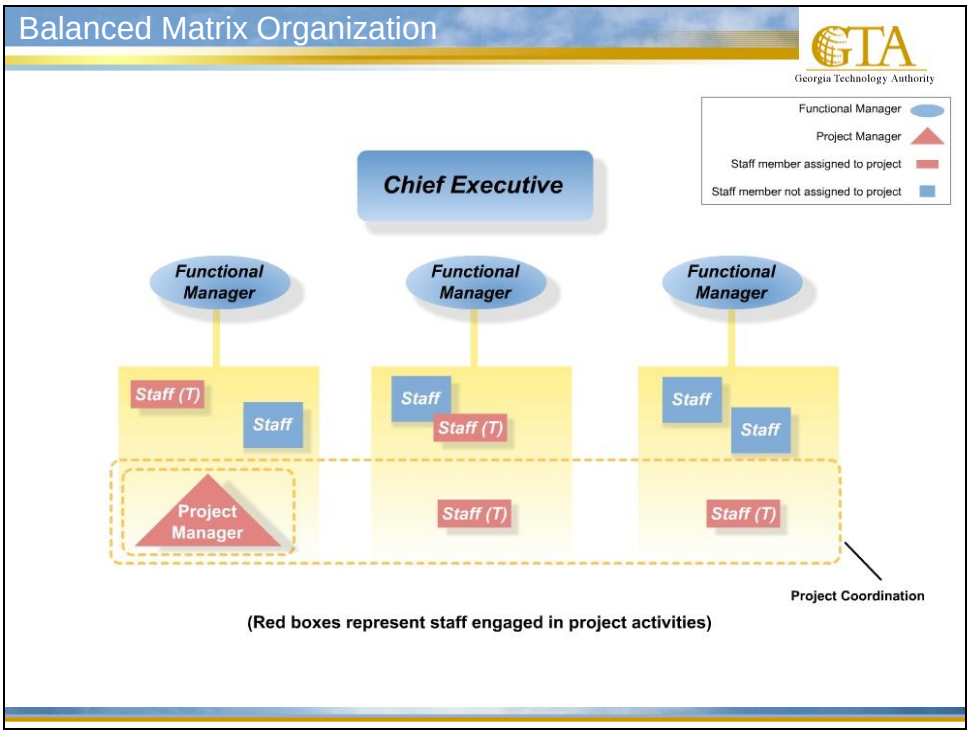
Matrix organizations combine the characteristics of functional and projectized organizations.

The weak matrix organization maintains and emphasizes characteristics of a functional organization but with a limited role for a project manager – often known as a project coordinator or leader in a weak matrix organization.

In weak matrix organizations,

- the project staff members have limited authority and the role of project manager is part-time. A staff member is a project coordinator in that the correct project management skills may not be present and there is limited authority on the project
- less than 25% of personnel are assigned full-time to project work
- project management administrative staff are part-time

Topic 1: Organizational Influences (cont'd)



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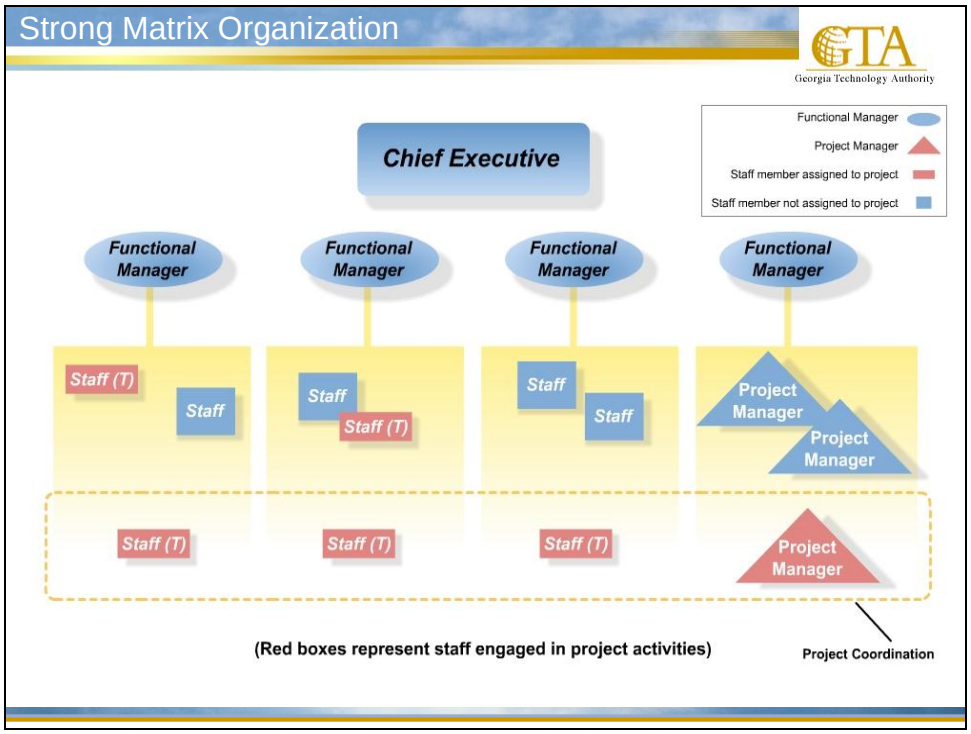
The balanced matrix organization maintains characteristics of a functional organization, but the project manager (also known as project officer) has a coordinating role across functions – there is a balance between functional and project management priorities.

In balanced matrix organizations,

- the project manager has low to moderate authority and the role is full-time
- 15% to 60% of personnel are assigned full-time to project work
- project management administrative staff are part-time

Topic 1: Organizational Influences (cont'd)



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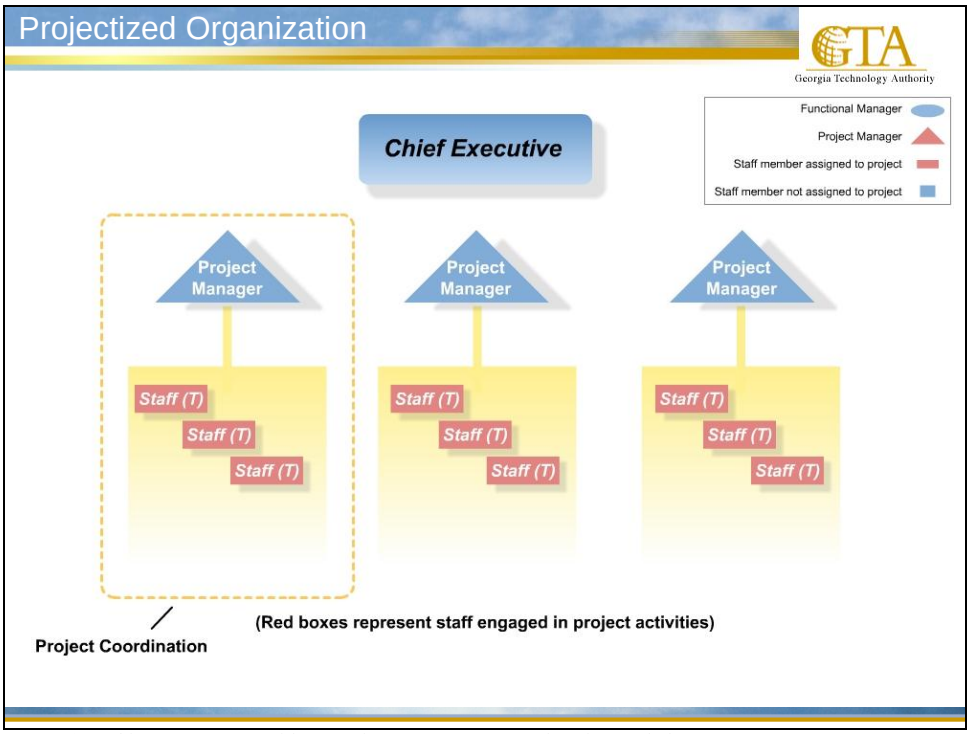
The strong matrix organization prioritizes project management by maintaining the characteristics of the projectized organization – full-time project or program managers with a great deal of authority and full-time project administrative staff.

In strong matrix organizations,

- the project manager has moderate to high authority and the role is full-time
- 50% to 95% of personnel are assigned full-time to project work
- project management administrative staff are full-time

Topic 1: Organizational Influences (cont'd)



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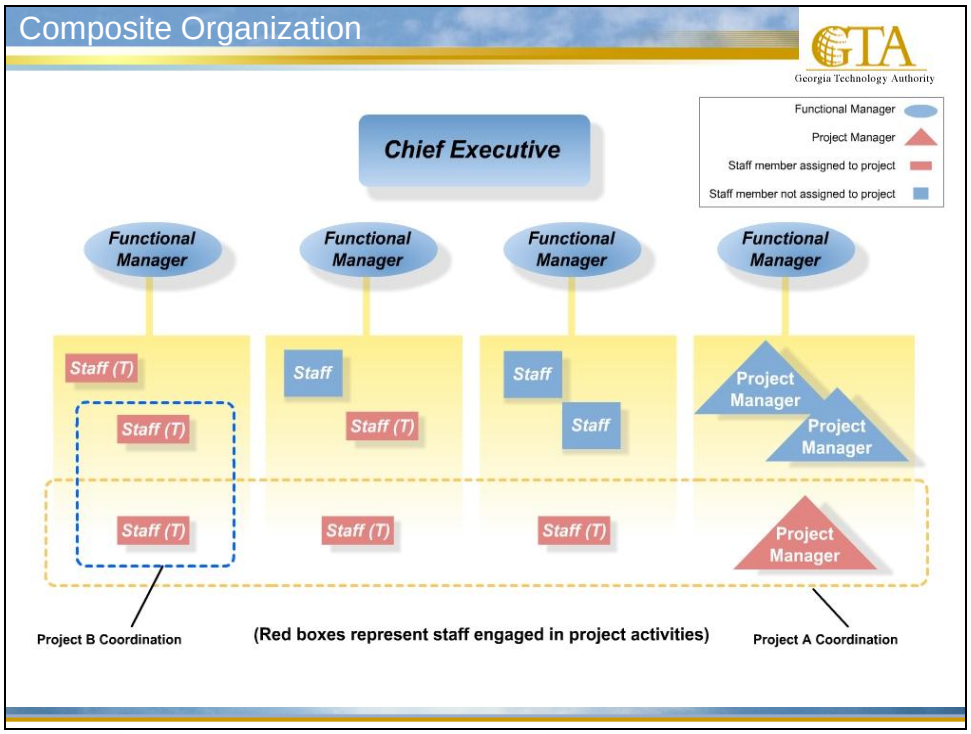
In a projectized organization, project managers have a lot of independence and authority. In addition, most of the organization's resources are involved in project work.

Projectized organizations often have organizational units called departments, which report directly to the project manager or provide support services to the various projects.

Topic 1: Organizational Influences (cont'd)



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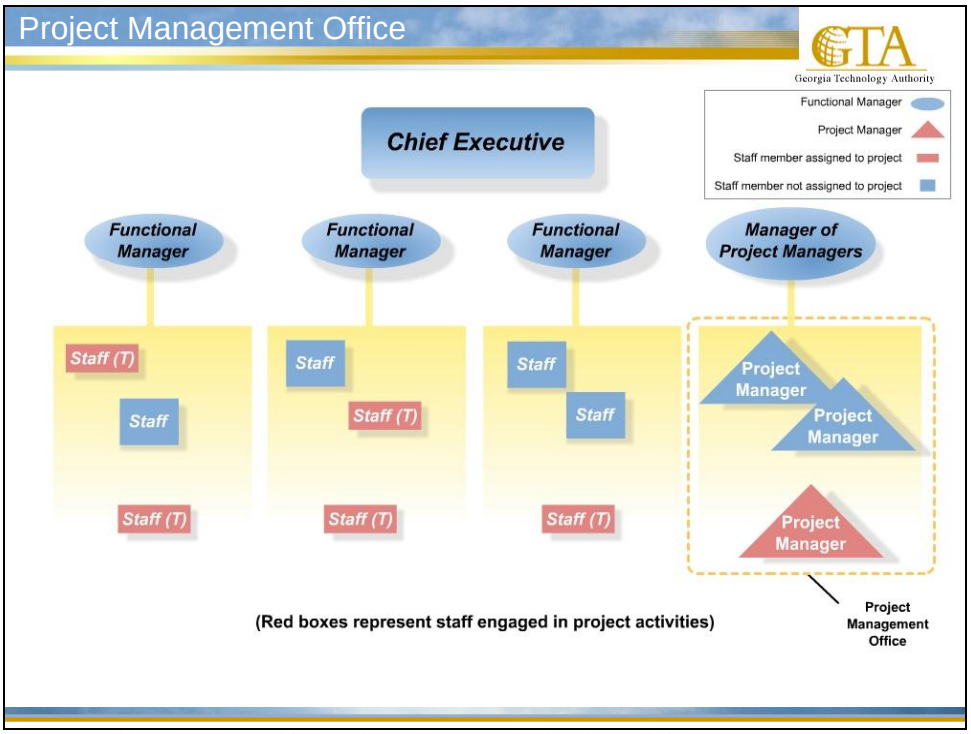
Most modern organizations combine elements of the different structures at various levels in the organization. In fact, the composite organization is the most prominent structure in organizations because it is an acceptable balance between function and project.

For example, a functional organization embarking on a critical project may create a special project team that has many of the characteristics of a project in a projectized organization. The team may include full-time staff from different functional departments, it may develop new operating procedures, and it may operate outside the existing reporting structure.

Topic 1: Organizational Influences (cont'd)



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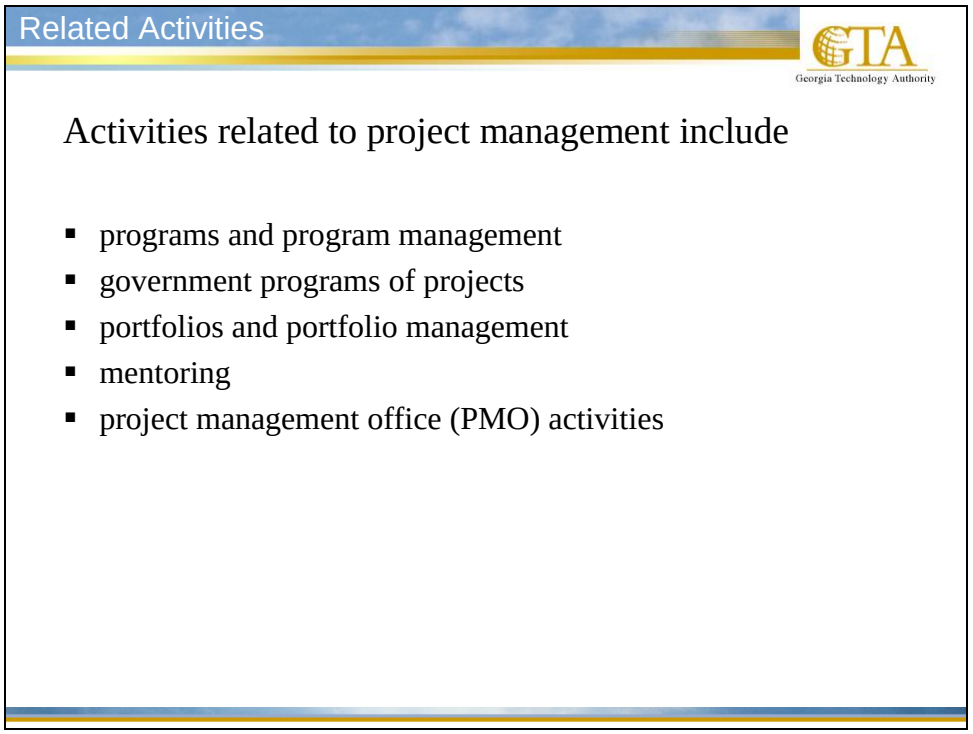
The project management office consists of individual project managers engaged in specific project activity, as well as an overall manager of the project managers.

Topic 2: Project Management Office



Project management involves related activities that apply the same basic skills as managing a project but are performed on different levels. Examples of these related activities include programs and program management, portfolios and portfolio management, and the activities of a project management office.

Programs and Program Management

A program is a group of related projects managed collectively in order to obtain greater benefits and control than would be obtained by managing the projects individually.

Programs may include work activities – for example, ongoing operations – that do not fall within the scope of specific projects within the program. Programs may also involve a series of repetitive or cyclical activities.

Examples of programs are

- **a new car model program** – made up of projects for the design of each major component, as well as ongoing manufacturing on the assembly line

- **a fundraising program** – an ongoing effort by a nonprofit organization to win financial support through a series of discrete projects, such as a membership drive

Topic 2: Project Management Office (cont'd)

Program management involves the centralized coordinated management of a program to achieve strategic objectives and benefits.

Government Programs or Projects

Programs are more common in the public than in the private sector (see Government Extension to A Guide to the Project Management Body of Knowledge © 2000, section 1.5). Representative bodies, such as state legislatures, generally assign funding to programs rather than projects because they do not have time or resources to consider individual projects. However, representative bodies should have procedures in place to delegate funding decisions for individual projects to such bodies as commissions, lower government authorities (for example, city councils), or the executive.

Government programs of projects require similar program management skills and activities to those that apply to programs in the private sector, with a particular emphasis on accountability to principal stakeholders, such as representative bodies and, ultimately, the public.

Portfolios and Portfolio Management

A portfolio is a collection of projects or programs and other work that are grouped together to enable effective management of that work in order to fulfill strategic business objectives. These projects or programs are not necessarily interdependent or directly related.

Organizations manage portfolios based on specific goals, such as

- maximizing the value of the portfolio – by careful examination of candidate projects and programs for inclusion into the portfolio
- balancing the portfolio among incremental and radical investments
- ensuring efficient use of resources

Portfolio management activities are generally the responsibility of senior managers or senior management teams.

Project Management Office Activities

A project management office (PMO) is an organizational unit that centralizes and coordinates the management of projects. The PMO coordinates the planning, prioritization, and execution of projects linked to overall business objectives.

The structure, function, and use of an organization's PMO vary depending on the application areas involved and the organization's portfolios, programs, or projects. As a result, there is no generally accepted single construct of a PMO within project management theory.

The activities of a PMO can range from providing project management support functions to direct management of projects and their results. A PMO may act as an integral stakeholder and a key decision maker with the authority to make recommendations. A PMO can also be involved in the selection, management, and redeployment of project personnel.

Topic 2: Project Management Office (cont'd)

Some of the key features of a PMO are

- **shared and coordinated resources** across all PMO projects
- **identification and development of project management methodology,** best practices, and standards
- **central office for operation and management of project tools**, such as enterprise-wide project software
- central coordination of **communication management** across projects
- central **monitoring** of PMO project timelines and budgets
- coordination of **project quality standards** between the project manager and any internal or external quality personnel or standards organization
- **education** and promotion on project management methodologies
- **mentoring** staff and project team members on project management disciplines
- to be positioned as a **knowledge center** within the organization on project management guidelines and methodologies

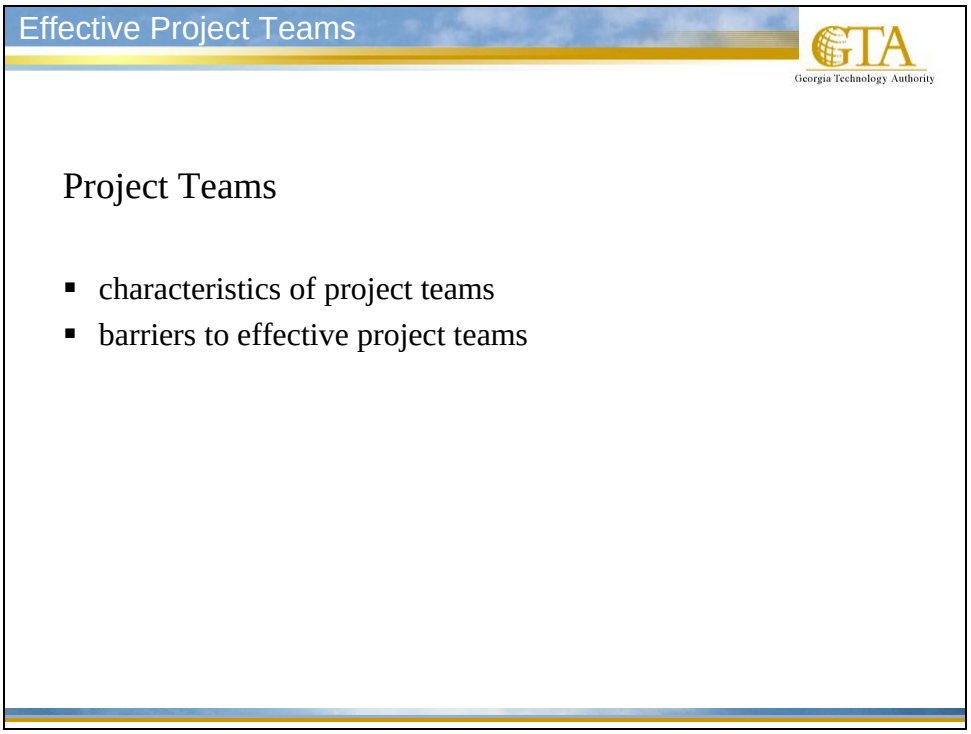
The Role of the PMO in Organizational Structure

Remember that organizational structures span a spectrum from functional to projectized, with several matrix structures in between. PMOs can exist in any of these structures, although they are most likely to be present in a projectized organizational structure, particularly when the parent organization simultaneously manages multiple and sequential projects.

Where a PMO has substantial authority from executive management to manage programs or projects, the PMO may, in turn, delegate its authority to the individual project manager. The project manager, who reports directly to the PMO, will generally receive administrative support from the PMO either through dedicated staff or through a shared staff member.

The project team members might be dedicated to the project or might also work on other projects. Project team members report directly to the project manager or, if shared with other projects, to the PMO.

Topic 3: Effective Project Teams



Characteristics of an Effective Project Team

Effective project teams have a variety of characteristics, for example:

- team members have **high levels of commitment** to the project goals
- the project team can be classified as **innovative and creative** from a behavioral viewpoint
- team members **are highly innovative** and interface effectively
- there is a capacity for **conflict resolution**. Conflict is encouraged when it can lead to beneficial results.
- **effective communication** systems are established within the project team
- high levels of trust and a **cooperative spirit** exist within the project team
- team members are willing to **make decisions** and lead on behalf of the project
- projects can **empower team members** by giving them the power to use their initiative and make their own decisions on how project goals can be attained

These characteristics take a considerable amount of time and energy to develop.

Topic 3: Effective Project Teams (cont'd)

Barriers to Effective Project Teams

The process of building an effective team is a difficult one because many barriers can arise from many different sources. An understanding of these barriers can help in preempting the problems, while also developing an environment suitable to effective project team building.

Barriers can include the following:

- **divergent outlooks –** team members may have professional objectives and interests that differ significantly from the project objectives.
- **lack of clarity on project objectives** – project teams with unclear objectives or outcomes produce a number of dysfunctional consequences, such as power struggles and destructive conflict between team members
- **team leadership structure –** leadership needs to be clearly defined and structured so that one formal leader exists. This minimizes conflict between informal and formal leaders and reinstates credibility within the team.
- **communication problems** – communication significantly influences effective team development. The following are four levels of communication that need to be maintained:
    - among team members
    - between the project manager and team members
    - between the project team and top management
    - between project manager and client
- **lack of proper support from management** – this might, for example, include lack of resources, unrealistic time constraints, and lack of responsiveness to team issues

Topic 3: Exercise – Team Work

Exercise Introduction

R. M. Belbin (1981) suggests that teams with high scores on mental ability tests do not perform well in group tasks. He found that they tended to be argumentative, difficult to manage, and destructive in debate. He also found that these teams had difficulty making decisions.

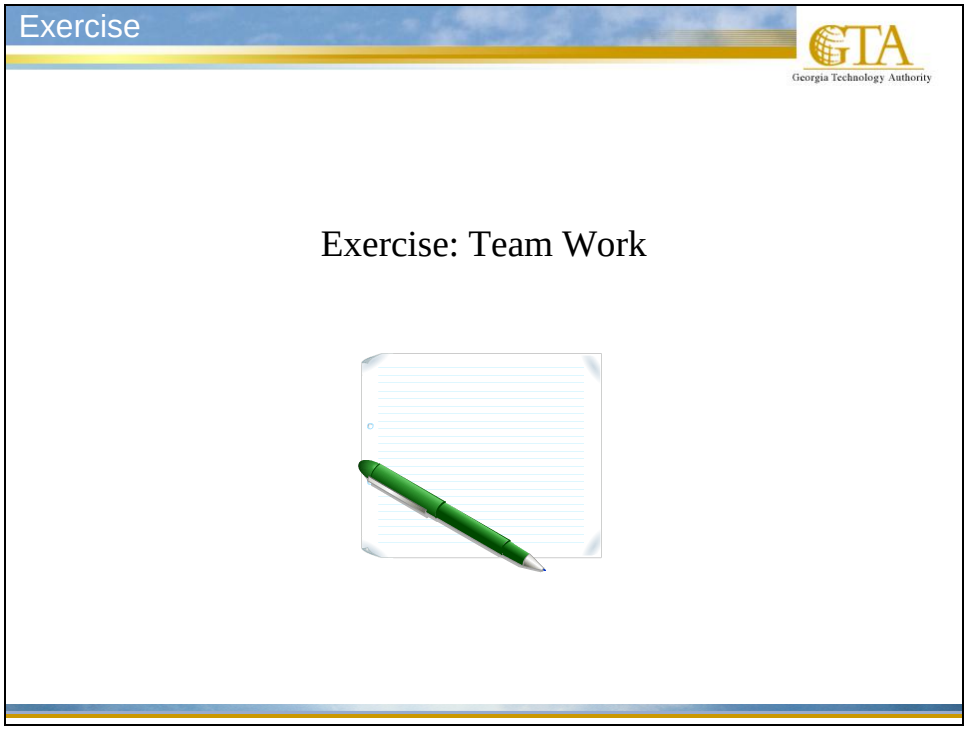
In addition, Belbin found that teams with similar personalities did not perform well. Belbin's work identified eight key roles – listed on the slide – which successful teams need to fill.

More recently, he has added a ninth role: specialist.

Belbin's Self-Perception Inventory

Belbin's inventory was developed as a means of giving group members a simple way of assessing their best team roles. The inventory is set out as an activity – devised by Sullivan, Rice, Rogerson and Saunders (1996) – to help you find out which role would suit any individual.

Topic 3: Exercise (cont'd)



Activity (to be completed individually at any time)

For each of the questions that follow, distribute a total of 10 points among the sentences that you think best describe your behavior. These points may be distributed among several sentences. You may use all the sentences, or you may give 10 points to a single sentence.

Topic 3: Exercise (cont'd)

Question 1: What can I contribute to a team?

No	Option	Points
a.	I think I can quickly see and take advantage of new opportunities.	
b.	I can work well with a very wide range of people.	
c.	Producing ideas is one of my natural assets.	
d.	My ability rests in being able to draw people out whenever I detect they have something of value to contribute to group objectives.	
e.	My capacity to follow through has much to do with my personal effectiveness.	
f.	I am ready to face temporary unpopularity if it leads to worthwhile results at the end.	
g.	I am quick to sense what is likely to work in a situation with which I am familiar.	
h.	I can offer a reasonable case for alternative courses of action without introducing bias or prejudice.	

Question 2: What are some possible shortcomings I have when working on a team?

No	Option	Points
a.	I am not at ease unless meetings are well structured and controlled and generally well conducted.	
b.	I am inclined to be too generous toward others who have a valid viewpoint that has not been given a proper airing.	
c.	I have a tendency to talk a lot once the group gets on to new ideas.	
d.	My objective outlook makes it difficult for me to join in readily and enthusiastically with colleagues.	
e.	I am sometimes seen as forceful and authoritarian if there is need to get something done.	
f.	I find it difficult to lead from the front perhaps because I am over responsive to group atmosphere.	
g.	I am apt to get too caught up in ideas that occur to me and so lose track of what is happening.	
h.	My colleagues tend to see me as worrying unnecessarily over detail and the things that may go wrong.	

Topic 3: Exercise (cont'd)

Question 3: How do I get involved in a project with other people?

No	Option	Points
a.	I have aptitude for influencing people without pressuring them.	
b.	My general vigilance prevents careless mistakes and omissions being made.	
c.	I am ready to press for action to make sure that the meeting does not waste time or lose sight of the main objective.	
d.	I can be counted on to contribute something original.	
e.	I am always ready to back a good suggestion in the common interest.	
f.	I am keen to look at the latest ideas and developments.	
g.	I believe my capacity for cool judgment is appreciated by others.	
h.	I can be relied upon to see that all essential work is organized.	

Topic 3: Exercise (cont'd)

Question 4: What is my characteristic approach to group work?

No	Option	Points
a.	I have a quiet interest in getting to know colleagues better.	
b.	I am not reluctant to challenge the views of others or to hold a minority view.	
c.	I can usually find a line of argument to refute unsound propositions.	
d.	I think I have a talent for making a plan work once it has been put into operation.	
e.	I have a tendency to avoid the obvious and to come out with the unexpected.	
f.	I bring a touch of perfectionism to any team job I undertake.	
g.	I am ready to make use of contacts outside the group itself.	
h.	While I am interested in all views, I have no hesitation in making up my mind once a decision has to be made.	

Question 5: How do I gain satisfaction in a job?

No	Option	Points
a.	I enjoy analyzing situations and weighing up all the possible choices.	
b.	I am interested in finding practical solutions to problems.	
c.	I like to feel I am fostering good working relationships.	
d.	I can have a strong influence on decisions.	
e.	I can meet people who may have something new to offer.	
f.	I can get people to agree on a necessary course of action.	
g.	I feel in my element when I can give a task my full attention.	
h.	I like to find a field that stretches my imagination.	

Topic 3: Exercise (cont'd)

Question 6: How do I respond when I am given a difficult task suddenly, have limited time, and need to work with unfamiliar people?

No	Option	Points
a.	I would feel like retiring to a corner to devise a way out of the impasse before developing a line.	
b.	I would be ready to work with the person who showed the most positive approach – however difficult they might be.	
c.	I would find some way of reducing the size of the task by establishing what different individuals might best contribute.	
d.	My natural sense of urgency would help to ensure that we did not fall behind schedule.	
e.	I believe I would keep cool and maintain my capacity to think straight.	
f.	I would retain a steadiness of purpose in spite of the pressure.	
g.	I would be prepared to take a positive lead if I felt the group was not making any progress.	
h.	I would open up discussions with a view to stimulating new thoughts and getting something moving.	

Question 7: How do I deal with problems that arise when I am working in groups?

No	Option	Points
a.	I am apt to show my impatience with those who are obstructing progress.	
b.	Others may criticize me for being too analytical and insufficiently intuitive.	
c.	My desire to ensure work is done properly can hold up proceedings.	
d.	I tend to get bored rather easily and rely on one or two stimulating members to spark me off.	
e.	I find it difficult to get started unless the goals are clear.	
f.	I am sometimes poor at explaining and clarifying complex points that occur to me.	
g.	I am conscious of demanding from others what I cannot do myself.	
h.	I hesitate to get my points across when I run up against real opposition.	

Topic 3: Exercise (cont'd)

Interpretation of Questions

To interpret the questions, you should look at the following analysis table. Enter the scores from the points table into the analysis table. Then add up the points in each column to give a total team role distribution score.

Analysis Table

Question		Impl		Chair		Shaper		Plant		Research		Monitor		Team		Finish
1	g		d		f		c		a		h		b		e	
2	a		b		e		g		c		g		f		h	
3	h		a		c		d		f		g		e		b	
4	d		h		b		e		g		c		a		f	
5	b		f		d		h		e		a		c		g	
6	F		c		g		a		h		e		b		d	
7	e		g		a		f		d		b		h		c	
Total																

Topic 3: Exercise (cont'd)

Team Characteristics

Type	Typical features
Worker/implementer	Conservative, dutiful, predictable
Chair/facilitator	Calm, self-confident, controlled
Shaper	Outgoing, dynamic
Eccentric/plant	Individualistic, serious-minded, unorthodox
Researcher/resource investigator	Extroverted, enthusiastic, curious, communicative
Monitor-evaluator	Pedantic, prudent, objective
Team worker	Socially-oriented, rather mild, sensitive
Completer-finisher	Painstaking, orderly, conscientious, anxious

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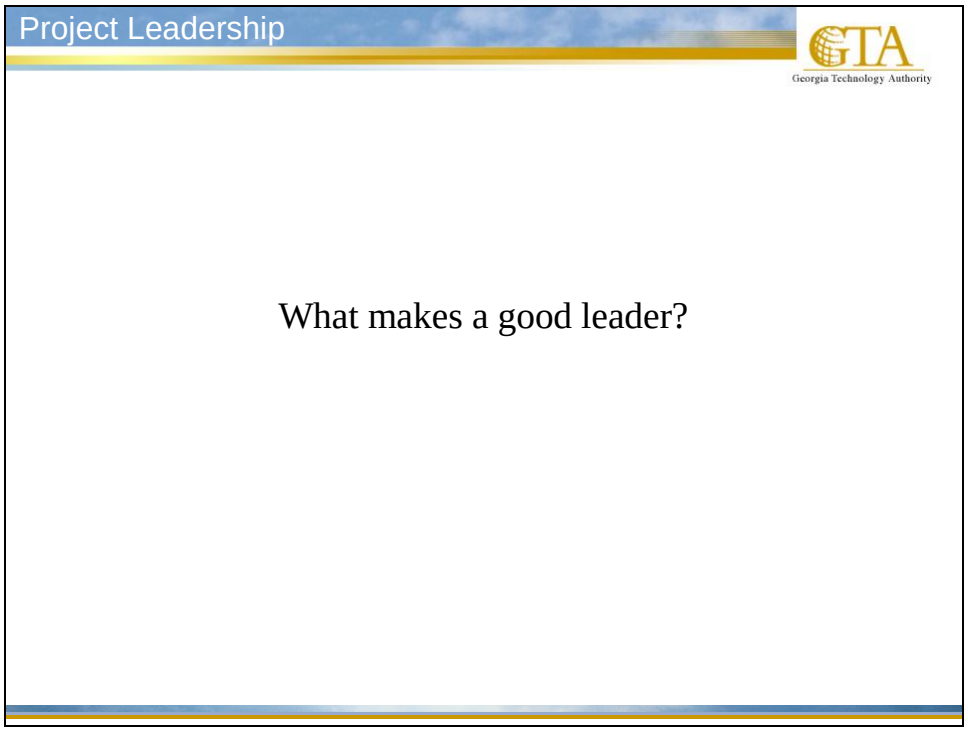
Interpretation of Total Scores

The highest score on team role indicates how best the respondent can make a mark in a project team. The next highest scores denote back-up team roles toward which the individual should shift if for some reason there is less group need for a primary team role. The two lowest scores indicate possible areas of weakness. Rather than attempting to reform in this area, the member might be better advised to seek a colleague with complementary strengths.

Topic 3: Exercise (cont'd)

Type	Symbol	Typical features	Positive qualities	Allowable weaknesses
Worker/implementer	Impl	Conservative, dutiful, predictable	Organizing ability, practical common sense, hard working, self-disciplined	Finds it hard to be flexible and is unresponsive to unproven ideas
Chair/facilitator	Chair	Calm, self-confident, controlled	A capacity for treating and welcoming all potential contributors on their merits and without prejudice	Considers self as "average"
Shaper	Shaper	Outgoing, dynamic	Drive and a readiness to challenge inertia, ineffectiveness, complacency, or self-deception	Prone to provocation, irritation, and impatience
Eccentric/plant	Plant	Individualistic, serious-minded, unorthodox	Genius, imagination, intellect, knowledge	"Up in the clouds", inclined to disregard practical details or protocol
Researcher/resource investigator	Research	Extroverted, enthusiastic, curious, communicative	A capacity for contacting people and exploring anything new. An ability to respond to challenge	Liable to lose interest once the initial fascination has passed
Monitor-evaluator	Monitor	Pedantic, prudent, objective	Judgment, discretion, hard-headedness	May find it hard to participate fully
Team worker	Team	Socially-oriented, rather mild, sensitive	An ability to respond to people in all situations, and to promote team spirit	Indecisive at moments of crisis
Completer-finisher	Finish	Painstaking, orderly, conscientious, anxious	A capacity for follow through, perfectionism	A tendency to worry about small details. A reluctance to "let go"

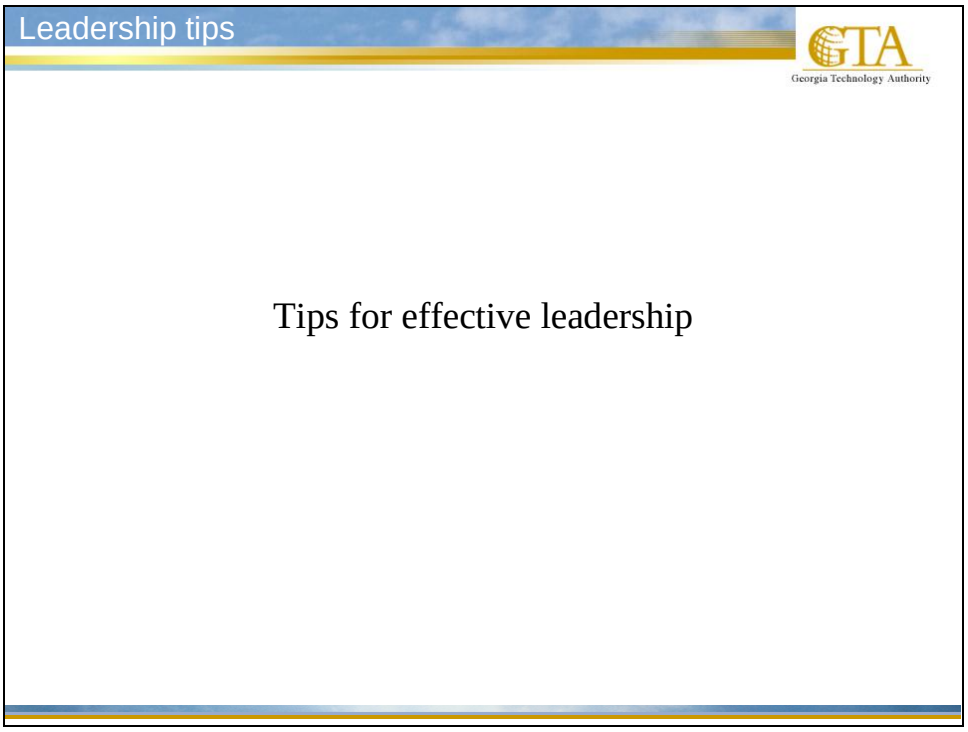
Topic 4: Project Leadership



What makes a good leader?

Write down your ideas in the space below.

Topic 4: Project Leadership (cont'd)



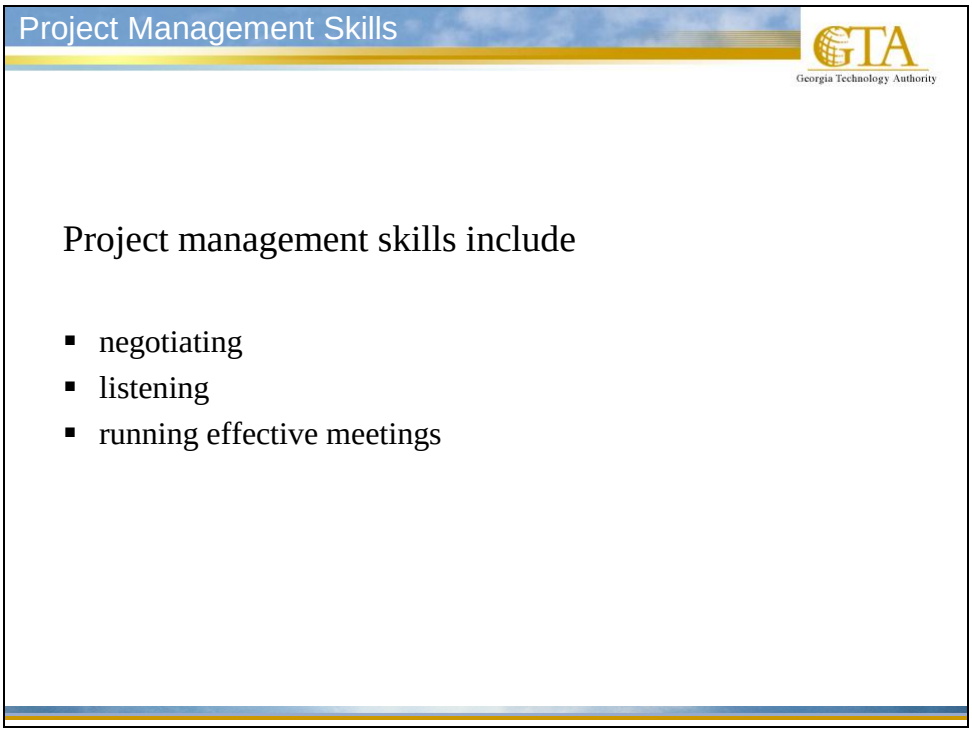
Leadership Tips for Promoting Project Success

- It's not about the ability of those around you to lead; it's about your ability to lead, in spite of what is happening around you.
- Mind your own business first. Behave as if you own the business and your business is defined by your domain of responsibility. This not only serves to strengthen your behavior and effectiveness, but, if everyone behaves similarly, your company greatly benefits as well.
- Define your roles and responsibilities and obtain agreement from your boss. You are far more likely to rise to expectations when those expectations are clearly defined. We achieve according to that which we are measured.
- Treat all project members equally. A project suffers when preferential treatment is given to any group or person – whether they are clients, vendors, contractors, or company employees.
- Boldness. You cannot be a consistently effective leader if you don't have it. The person who consistently displays bold behavior will far out-perform the person with similar knowledge and experience who does not. Bold behavior includes doing what is necessary, within legal and ethical parameters, to accomplish your job.
- Become a benevolent dictator. A benevolent dictator leads, first, by actively soliciting information and opinions from team members and others; second, by listening; and third, by demonstrating the leadership, courage, and boldness to personally make the right decision and then standing accountable for that decision.

Topic 4: Project Leadership (cont'd)

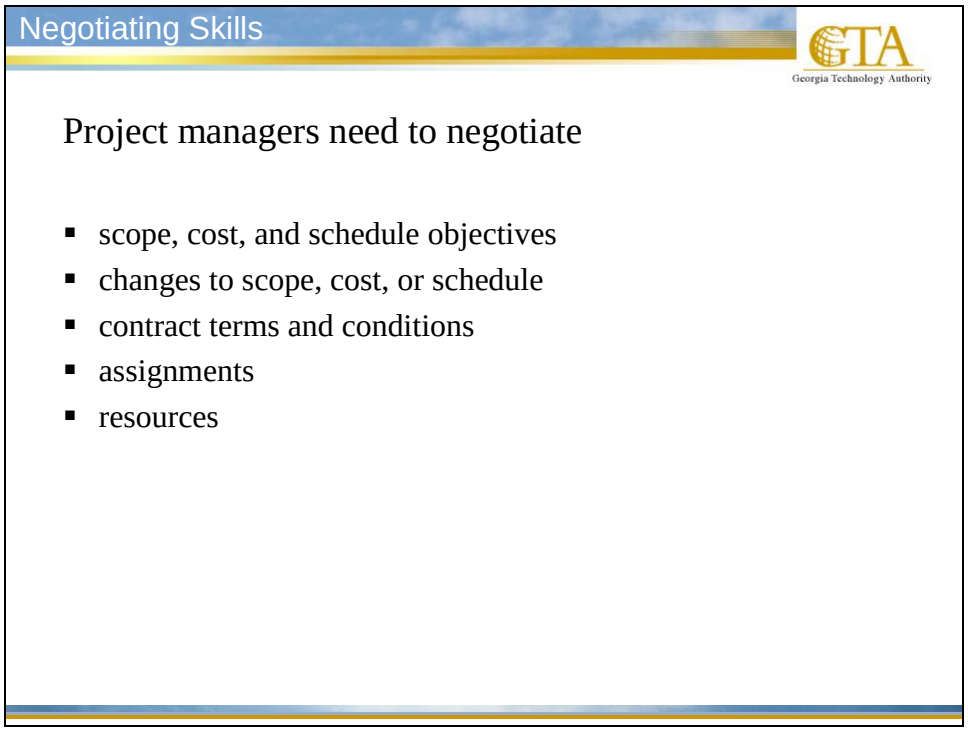
- Practice the Golden Rule. Doing unto others as you would have them do unto you is the best time-tested behavior to adopt while performing on projects.
- Perform post-project reviews and ensure that resulting lessons are applied to new projects. Lessons cannot be considered "learned" until they have been appropriately adopted.
- Seek out a mentor. There is no better way to learn than by having a mentor who has been there, done that, messed up, and learned from it. A mentor's advice can positively impact your career and help protect your projects.
- Ask for help or become part of the problem. Asking for and obtaining help is a sign of professional maturity, not weakness. It sends the signal that you take pride in your work and care about the success of the project.
- For consistent success, focus on your top three priorities each day rather than your bottom 30. The top problems of a project are the areas that can cause the most harm. They must be effectively dealt with according to the urgency they require.
- Inspect what you expect. Don't "trust" that things are progressing smoothly or will work out okay on their own. Plan, measure and, if necessary, mitigate it.
- Don't delay or avoid escalating issues that are at an apparent impasse; escalations are a healthy and essential part of business. If you and another project member are unable to see eye-to-eye, then after an earnest attempt to negotiate a resolution without success, you must call on higher levels of project leadership for help.
- The No. 1 reason why leaders fail is that they are too soft. If you are too soft, your stakeholders will not learn effective behavior. Nor will they respect you. Projects fail because their leaders fail.
- It's not about being liked but rather about doing the right thing. It's called integrity.
- You are what you perceive yourself to be. Your vision of yourself becomes your reality.

Topic 5: Project Management Skills



You'll recall from Lesson 1 that there are certain general management skills – "soft" project management skills – which project managers require, including the ability to negotiate, listen, and run effective meetings.

Topic 5: Project Management Skills (cont'd)



Negotiating

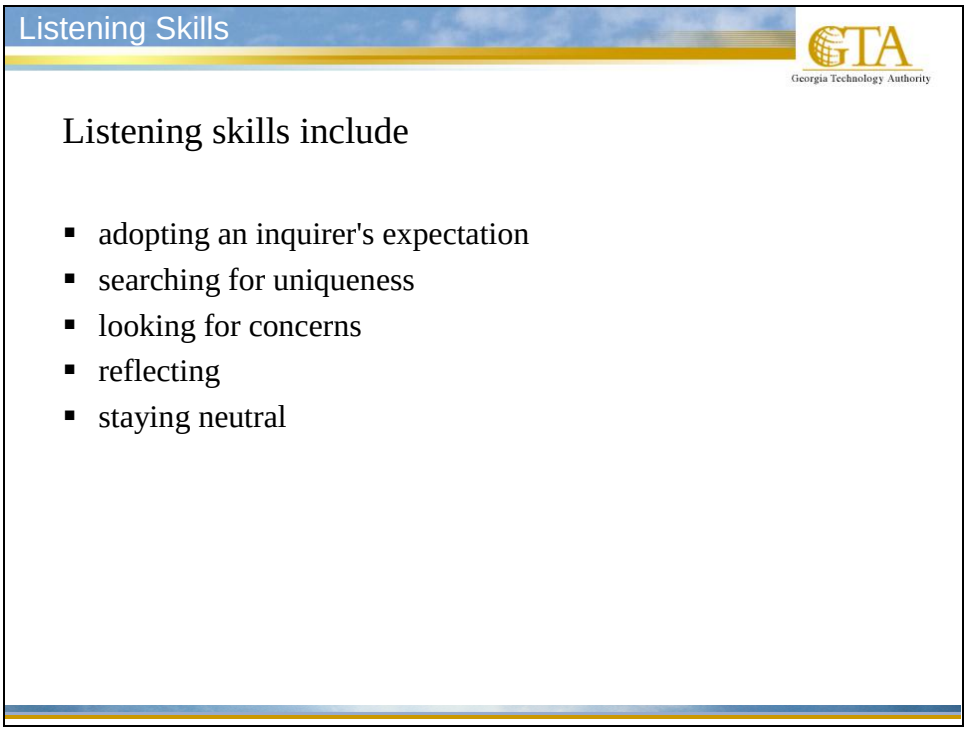
Remember that negotiating involves conferring with others to reach an agreement or arrangement. Agreements may be negotiated directly or with assistance, such as through mediation or arbitration.

A project team is likely to negotiate some or all of the following in the course of a typical project:

- scope, cost, and schedule objectives
- changes to scope, cost, or schedule
- contract terms and conditions
- assignments
- resources

Remember also that project managers face a triple constraint – project scope, time, and cost – when trying to negotiate about competing project requirements. Project quality depends on the balance between these three constraints. High quality projects deliver required results within scope, on time, and within budget.

Topic 5: Project Management Skills (cont'd)



Listening

Listening is both the most important and the most neglected part of communication. It is important because without it, communication does not happen. The most articulate speaker can run aground trying to deal with someone who does not listen, and the good listener will extract meaning from incoherence. Although communication depends on both parties, only the listener can evaluate whether it has worked.

Good listeners have acquired a set of behaviors that they can carry with them into any situation to improve the quality of their listening:

- Adopt an inquirer's expectation: You take many expectations with you when you meet someone. For example, you might expect to be bored because you have heard this problem before and understand it already. In this case, the only reason you meet might be political. Or you might expect the other person to be defensive about your proposal or attempt to impose a solution that you already know will not work.

- Search for uniqueness: We are a species of classifiers. We look for, and usually find, similarities in all situations that confront us. This is one of our strengths – we call it learning. However, there is a risk that we will decide too quickly that "we have seen this before" and begin to act without recognizing where the situation is different.

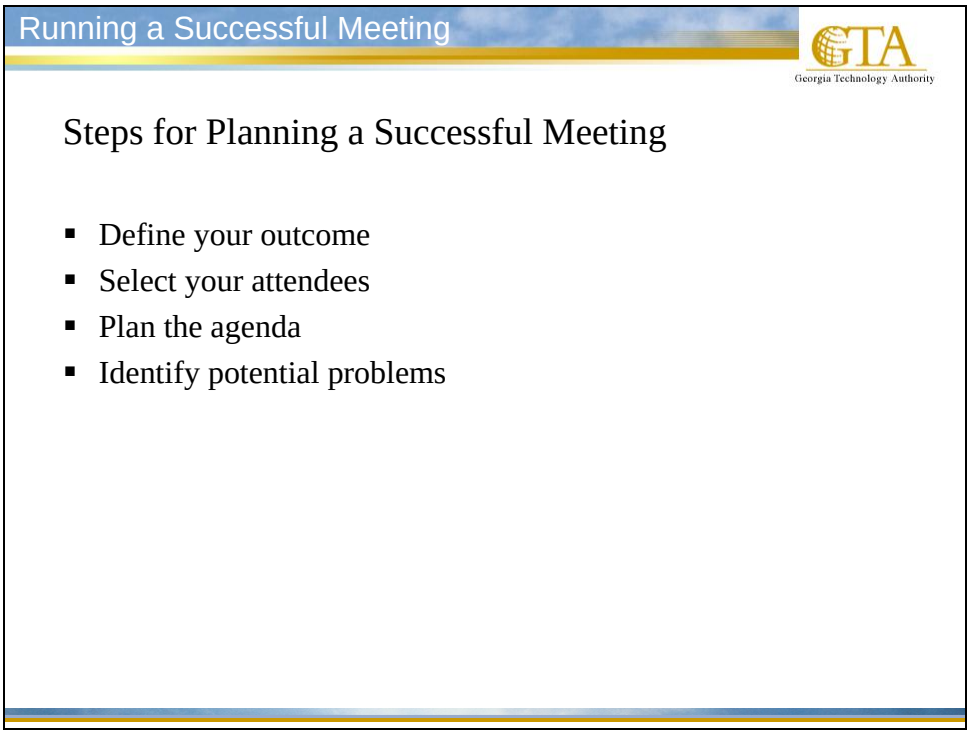
- Look for concerns: Everybody you speak to has concerns. If you do not hear them and respond to them, people will repeat them in different ways until you, and they, are exasperated.

Topic 5: Project Management Skills (cont'd)

- Reflect: Listening is an active process (hence, the redundant term "active listening") because it requires you to extract meaning from someone else. The most effective listening behavior is to "reflect back" to the speaker what you think you have heard.

- Stay neutral: We value involvement and the sense that there is another person hearing us and responding, and we tend to adapt our behavior to the feedback we get. When we see a frown or a tightened face, we back off. When we receive a smile or a bright expression, we push forward. We have learned to become sensitive to nonverbal signals and to direct our conversation accordingly.

Topic 5: Project Management Skills (cont'd)



Running Effective Meetings

One of your goals as a project manager should be to conduct meetings that your people will await with expectation, join with enthusiasm, and leave with satisfaction.

Three types of meetings are

- presentations to disseminate information
- information-gathering meetings that seek answers to specific questions
- problem-solving meetings that attempt to solve a problem or address an opportunity

Of these three types, problem-solving meetings are the most complex to run because they require attendees to present opinions and defend positions. Problem-solving meetings can be either closed or open.

In a closed meeting, the leader presents the problem or opportunity, gives alternatives and their advantages and disadvantages, and makes a recommendation. The job of the attendees is to pick one of the solutions. Sometimes, the recommendation is a so-called "straw man" that the attendees are expected to challenge and reconstruct.

In an open meeting, the leader presents the problem or opportunity and leaves it to the attendees to define the alternatives and craft a solution.

Holding open meetings – with their apparent virtues of democracy, participation, and creativity – has become the "correct" way to conduct meetings. However, the often-reviled closed approach is, in fact, more effective in solving most of the problems you will encounter on a project.

Topic 5: Project Management Skills (cont'd)

Open problem solving is suited to larger issues, such as corporate mission or strategy, or for problems that appear unique and intractable. Closed problem solving is better for operational problems where there are a few well-understood alternatives.

Before you agree to lead or participate in an open problem-solving meeting, ask yourself the following questions: Has this problem been dealt with before? Are there reasonably well-defined solutions to the problem? Could I come up with a satisfactory answer by meeting with one or two people privately?

If the answer to all three questions is yes, you don't need a meeting. Above all, you should not let team members avoid their responsibilities for solving problems by suggesting that they get together to brainstorm a creative solution.

The following are four possible steps to planning a successful meeting:

1. Define your outcome: What do you want the meeting to achieve, and what will constitute success? If you cannot state clearly why you are there, nobody else will be able to. When people do not understand the purpose of a meeting, they do not quietly await clarity – they impose their own purposes. The outcome of a meeting should be properly framed. That is, it should be specific, measurable, achievable, respective of values, and timely.

2. Select your attendees: Who needs to be there? You should make sure that you invite only those who, by virtue of their knowledge or position, can contribute to the outcome. You need to invite the 20 percent of the people who can handle 80 percent of the issues and then fill in the missing 20 percent later. If you think you may need detailed information or a quick decision from people who are not major participants, you should have them on standby, but respect their time.

3. Plan the agenda: Meetings in which the leader starts by requesting agenda items from the audience are doomed to failure. You should start the meeting with a clear agenda, which you can hand out or write on a board or flip chart. The agenda is open for discussion, and some people may request that items be added, but it is rare that attendees reject an agenda.

   Three items that must accompany each agenda are introductions, objectives, and other issues.

   Introductions are made so that the attendees will know one another, as well as to provide the rationale for each person's presence.

   The objectives of the meeting are as important for the attendees as for the leader. Everyone must know what is necessary for success and must be committed to working for it. Therefore, your second agenda item is to present the objective and to get agreement on it.

   A planned discussion period at the end lets people know that there will be time for them to present any other issues that are relevant. In practice, most of the discussion will have taken place before the end of the meeting, but the presence of "other issues" on the agenda reassures the participants that there wil1 be an opportunity for a complete discussion.

Topic 5: Project Management Skills (cont'd)

When you are planning an agenda, you should time it. If the meeting includes some presentations, you should make sure that the presenters know what their time limits are and that you will enforce them. You need to know, throughout the meeting, whether you are proceeding on time.

4. Identify potential problems: Where is the meeting likely to flounder? Are there contentious issues that wil1 spark prolonged debate? Are there personalities that wil1 clash or people who will try to dominate the meeting? If you can identify these problems in advance, you can minimize the chances that you will be blindsided in the meeting itself.

Lesson review

Topic 1: Organizational Influences

Topic 2: Project Management Offices

Topic 3: Effective Project Teams

Topic 4: Project Leadership

Topic 5: Project Management Skills

Student learning objectives

After completing this lesson, you should be able to

- delineate the organizational influences that impact projects
- describe project management-related activities that apply the same basic skills as managing a project but are performed on different levels
- identify the characteristics of effective project teams and barriers to building effective project teams
- describe the leadership qualities necessary for project success
- outline the skills that a project manager requires in a team environment

Sample Answers

Lesson 1, Topic 1: Exercise – Identifying Operations and Projects

Lesson 1, Topic 3: Exercise – Dealing with Uncertainty and Change

Lesson 1, Topic 4: Exercise – Identifying Stakeholders

Lesson 1, Topic 7: Exercise – Knowledge Areas used by NASA

Lesson 2, Topic 3: Exercise – Project Management Tasks

Lesson 3, Topic 2: Exercise – Identifying Project Activities

Lesson 3, Topic 4: Exercise – Identifying Process Groups

Lesson 4, Topic 4: Exercise – Identifying Knowledge Area Processes

Lesson 1, Topic 1, Exercise: Identifying Operations and Projects

Question:

Identify an operation you have been involved in (e.g. the operation of a payroll system) and list the characteristics (list 1). Next identify a project in which you have been part of (e.g. the rollout of a new payroll system) and list the characteristics (list 2). Compare list 1 with list 2. Do the project and operation characteristics overlap?

Sample answer

List 1: Operation characteristics	**List 2: Project characteristics**
It involves repetitive work	Unique piece of work
It is ongoing work with an infinite duration	Temporary endeavor with a finite duration
It is stable. Uncertainty occurs when the operation is changed, and this could be labeled a project	Uncertainty
It is all about efficiency (producing as many pieces as possible)	It is all about effectiveness (doing it right the first time)

Depending on the project chosen, it may be that the operation follows the project.

Take the example of working in a garden. The garden is dug and reseeded during the spring. This could be termed a project for which a landscaping expert is brought in. The reseeding will take a finite amount of time. Once complete, the garden is maintained and the grass is mowed each week until it stops growing. This is an operation involving a repetitive and stable piece of work.

Lesson 1, Topic 3, Exercise: Dealing with Uncertainty and Change

Question:

Using the article “How NASA Reduces Uncertainty with Project Methods”, discuss how project management plays a central role in enabling NASA to deal with uncertainty and change.

Sample answer:

The major points to be highlighted for discussion are listed below.

- Everything NASA does is dictated by the challenges of managing complex projects in an unforgiving and uncertain environment.
- NASA's project management standard establishes high-level guidelines to ensure consistency.
- In NASA, each day brings a new set of challenges. Here, the capability, adaptability, and passion of a team will determine success.
- Special care is taken to expound a systems view of project management, so each team member can approach a project at any point in its life cycle and understand how his or her responsibilities link together.
- Project success depends on the knowledge and capabilities of many disciplines, so it is important to prepare and support the entire team.
- Competence in project planning, scheduling, managing resources, systems engineering, software, and leadership are just some of the ingredients demanded of a prepared project staff.
- The success or failure of a project also depends on how rigorously NASA applies its risk management techniques.
- NASA strives to promote communication and wisdom transfer through knowledge management.

Lesson 1, Topic 4, Exercise: Identifying Stakeholders

Question:

Based on the article "How NASA Reduces Uncertainty with Project Methods", identify stakeholders that may be involved in a NASA project. Categorize the stakeholders as important to the project, somewhat important, and least important.

Sample answer:

Important

1. Public (sponsor/customer)
2. Project team (implementer)
3. Project manager (implementer)
4. President of USA (the sponsor/customer)
5. NASA management team (the project owner)

Somewhat important

1. Project team family members (for project team to be effective the family members must be supportive)

Least important

1. World leaders (other space programs may need to be considered)

Lesson 1, Topic 7, Exercise: Knowledge Areas used by NASA

Question:

Which of the project management knowledge areas do you think NASA uses? Are these knowledge areas applicable to all projects?

Sample answer:

NASA uses most of these knowledge areas, to a greater or lesser degree. As stated in the article, NASA has one attempt at each project and this indicates that all avenues of proactive project planning and management are undertaken.

For other projects, some of these knowledge areas may apply and others not. It depends on the type of project, size of the project, the environment, the practices, and many other factors.

An example of the way NASA uses the knowledge areas is presented in the table on the following page.

Lesson 1, Topic 7, Exercise: Knowledge Areas used by NASA (cont'd)

Knowledge Area	Example from NASA Case Study
project integration management	• Launching the project plans for the execution phase of the project • The NASA structure integrates functions aimed directly at project management excellence
project scope management	• there's not much leeway for error, so the early stages of a project revolve around a heavy amount of testing and prototyping. • When it gets down to the "real deal," you've only got one shot to get it right, with a thousand things that can go wrong.
project time management	• There is no direct reference to time or cost management but the point can be made that each project NASA take on it with the objective of completing space exploration / missions within a certain timeframe and budget
project cost management	
project quality management	• standards flow down through an overarching policy document that establishes high-level guidelines to ensure consistency
project human resource management	• A project manager at the beginning of a mission must sign agreements indicating compliance with sound project management principles • the capability, adaptability, and passion of a team will determine success • NASA's value to provide a mature curriculum for professional development, coupled with just-in-time development support to meet any project team challenge
project communications management	• In addition to career development and performance enhancement, NASA strives to promote communication and wisdom transfer through knowledge management
project risk management	• Because of the level of uncertainty associated with aerospace, there is a high degree of redundancy built into NASA's project management • The success or failure of a project also depends on how rigorously we apply our risk management techniques
project procurement management	•

Lesson 2, Topic 3, Exercise: Project Management Tasks

Question:
Assume that the Georgia State Authority has sanctioned the rail project. You are part of the assembled dedicated project management team. You need to perform the following initial tasks:

- re-establish the project objectives
- identify a set of critical success factors that will guide the project
- evaluate a project structure

Sample answer

1. The project objectives are presented in the text and updated based on the feasibility report findings. Given the findings, the project's primary objective is to pilot a light rail system in one city. While no information is presented, it can be assumed that if the pilot is successful, it will be rolled out to other cities. See sample list of project objectives below.

2. You must map each objective to a goal that is measurable, attainable, and reasonable.

3. Project structure can take the form of the generic life cycle with some alterations:

    a. The feasibility phase is completed.
    b. Emphasis needs to be placed on contractor activities.
    c. Piloting/testing is a critical aspect of the structure.

	Project Objective Description
	Provide light-rail system within one major urban area that will facilitate professional and private commuters
	Provide a transportation system that will reduce the number of auto users
	Implement – in a seamless fashion – a new system that has minimal impact on current operations
	Educate public on transportation alternatives to ensure each individual understands new system
	Provide transportation system that is cost effective and geared toward profits
	Establish and implement best-in-class procurement practices to involve the government's "preferred suppliers"
	Use best-in-class project management standards and practices

An example of an appropriate life cycle:

- Phase 1: Conceptual (goal: requirement identification)
- Phase 2: Supplier identification (goal: list of preferred suppliers)
- Phase 3: Detailed planning (goal: presentation of project planning)

Lesson 2, Topic 3, Exercise: Project Management Tasks (cont'd)

- Phase 4: Construction phase 1 – Foundation (goal: foundation laid for light rail systems)
- Phase 5: Construction phase 1 – Rail system (goal: laying rail tracks and all cabling)
- Phase 6: Test phase 1 – Rail carriages (goal: carriages pass indoor testing)
- Phase 7: Test phase 2 – Rail carriage pass outdoor testing (goal: carriages pass outdoor testing)
- Phase 8: Integration test (goal: carriages tested on rail system)
- Phase 9: Launch (goal: public launch light rail system in city area)
- Phase 10: Close-out (goal: scope verification and lessons learned archived for next project)

This maps the generic lifecycle as follows:

- Feasibility phase is not included.
- Conceptual phase is phase 1.
- Definition phase is phase 2 through phase 3.
- Implementation phase is phase 4 through phase 8.
- Close-out phase is phase 9 to phase 10.

Lesson 3, Topic 2, Exercise: Identifying Project Activities

Question:

Given the five project management processes of initiation, planning, executing, controlling & monitoring and closeout; identify the project activities that would be required for the nine knowledge areas as presented in the template.

Sample answer:

Knowledge Areas / Project Management Process Groups	Initiating Process Group	Planning Process Group	Executing Process Group	Controlling Process Group	Closing Process Group
Project Integration Management	•Develop Project Charter	•Develop Project Management Plan	•Direct and Manage Project Execution	•Monitor and Control Project Work	•Close Project
Project Scope Management		•Scope Planning •Scope Definition		•Scope Verification •Scope Control	
Project Time Management		•Activity Definition •Activity Sequencing •Activity Duration Estimating		•Schedule Control	
Project Cost Management		•Cost Estimating •Cost Budgeting		•Cost Control	
Project Quality Management		•Quality Planning	•Perform Quality Assurance	•Perform Quality Control	
Project Human Resource Management		•HR Planning •Acquire Project Team	•Develop Project Team	•Manage Project Team	
Project Communications Management		•Communications Planning	•Information Distribution	•Performance Reporting	
Project Risk Management		•Risk Management Planning •Risk Identification •Qualitative Risk Analysis •Quantitative Risk Analysis		•Risk Monitoring and Control	
Project Procurement Management		•Planning Purchases and Acquisitions •Plan Contracting	•Request Seller Responses •Select Sellers	•Contract Administration	•Contract Closeout

Lesson 3, Topic 4, Exercise: Identifying Process Groups

Question:

Having read the Georgia Rail Project case study and established a project structure, you now need to identify the process groups required to meet the project objectives.

Analyze each phase to determine what processes are needed. It is assumed that each phase should be initiated and closed. To reduce repetition, these are not mentioned unless the processes are vital.

Sample answer:

Phase	Description	Goal	Applicable Processes
1	Conceptual	Requirement identification	Initiation and planning with control of scope
2	Supplier identification	List of preferred suppliers	Procurement planning
3	Detailed planning	Presentation of project planning	Planning with control of management plans, such as scope, cost, and time
4	Construction phase 1: Foundation	Foundation laid for light rail systems	Implementation and project control
5	Construction phase 1: Rail system	Laying rail tracks and all cabling	Implementation and project control
6	Test phase 1: Rail carriages	Carriages pass indoor testing	Implementation and project control
7	Test phase 2: Rail carriages pass outdoor testing	Carriages pass outdoor testing	Implementation and project control
8	Integration test	Carriages tested on rail system	Implementation, project control, and scope verification
9	Launch	Public launch light rail system in city area	Implementation and project control with contract closeouts
10	Close-out	Scope verification and lessons learned archived for next project	Contract and project close-out

The process groups are labeled. The next step is to determine what processes or activities are required.

Lesson 4, Topic 9, Exercise: Identifying Knowledge Area Processes

Question:

Having read the case study about the Georgia Light Rail system and established a project structure with process groups, you now must break the process groups into what you consider to be applicable processes.

Why do you consider the processes to be applicable?

Sample answer:

Phase 1: Conceptual phase (goal: requirement identification)
Applicable processes: Initiation and planning with control of scope

Input: Feasibility study

- Initiation processes: Scope initiation
- Planning processes: Scope planning and scope definition
- Control processes: Scope management

Goal: Documented project requirement and first draft of WBS

Phase 2: Supplier identification (goal: list of preferred suppliers)
Applicable processes: Procurement planning

Inputs: Procurement requirements

- Solicitation planning to identify potential sources
- Solicitation to obtain quotations, bids, offers, or proposals
- Source selection

Goals: Preferred list of suppliers

Phase 3: Detailed planning (Goal: Presentation of project planning)
Applicable processes: Planning with control of management plans
(i.e. scope, cost, time, etc)

Inputs: Project requirements, list of suppliers and WBS

- Planning: Time, cost, quality, communication and risk
- Control: Control of all the above plans with identification of performance measurement tools

Risk identification should ideally be at the commencement of the project. The planning aspect is referred to here.

Goals: Detailed project plan with set of performance tools

Lesson 4, Topic 9, Exercise: Identifying Knowledge Area Processes (cont'd)

Phase 4: Construction phase 1: Foundation
(Goal: Foundation laid for light rail systems)
Applicable processes: Implementation and project control

Phase 5: Construction Phase 1: Rail system (Goal: Laying rail tracks and all cabling)
Applicable processes: Implementation and project control

Phase 6: Test phase 1: Rail carriages (Goals: Carriages pass indoor testing)
Applicable processes: Implementation and project control

Phase 7: Test phase 2: Rail carriage pass outdoor testing
(Goals: Carriages pass outdoor testing)
Applicable processes: Implementation and project control

Phase 8: Integration test (Goals: Carriages tested on rail system)
Applicable processes: Implementation and project control and scope verification

Inputs: The phases are grouped together as the driver for each of these phases is the detailed project plans

- Implementation: Team execution and management with communication of information
- Control: Performance measurement and progress reporting

Goals: The delivery of a product that meets the initial requirements. This is verified through scope verification.

Phase 9: Launch (Goals: Public launch light rail system in city area)
Applicable processes: Implementation and project control with contract closeouts

Inputs: The verified product

- Implementation: Team execution and management with communication of information
- Control: Performance measurement and progress reporting

Goals: The piloting and customer sign-off of the product

Phase 10: Closeout (Goals: Scope verification and lessons learned archived for next project)
Applicable processes: Contract and project closeout

Inputs: Customer sign-off

- Closeout: Administrative and contract closeout

Goals: Archival of lesson learned and formal project closure