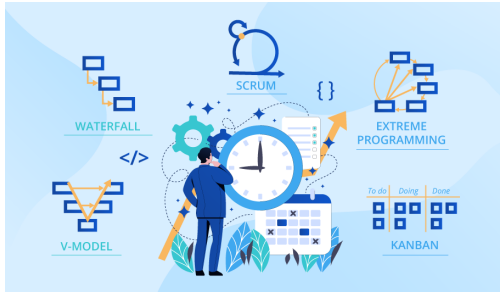


Introduction

SE423: Software Project Management

Outline

- Introduction
- Project Management History
- Project Managers
- PMBOK

Introduction

What is Project Management?

- Project management
  - The application of knowledge, skills, tools, and techniques to project activities to meet ***project*** requirements.
  - Project management refers to guiding the project work to deliver the intended outcomes. Project teams can achieve the outcomes using a broad range of approaches (e.g., predictive, hybrid, and adaptive).

Introduction

- Many people and organizations today have a new or renewed interest in project management
- The Project Management Institute reported that by 2027, employers will need 87.7 million individuals working in project management–oriented roles.
- According to PMI's 2021 Talent Gap report, 2.3 million new project management employees will be needed each year to meet global talent demands by 2030.

Introduction

- The top **skills** employers look for in new college graduates are all related to project management: team-work, problem-solving, and verbal communications.
- Organizations waste $97 million for every $1 billion spent on projects, according to PMI's Pulse of the Profession® report.
- The Saudi Smart Government Strategy is expected to set Saudi Arabia's AI market to touch $135.2 billion by 2030, which is estimated to contribute 12.4 percent to the Kingdom's gross domestic product.
- Saudi Arabia's government spending on technology has been valued at around $24.7 billion (SR 93 billion) in 2025, the highest in the world, accounting for 21.7 percent of national spending

Project Management History

The Project Management Profession

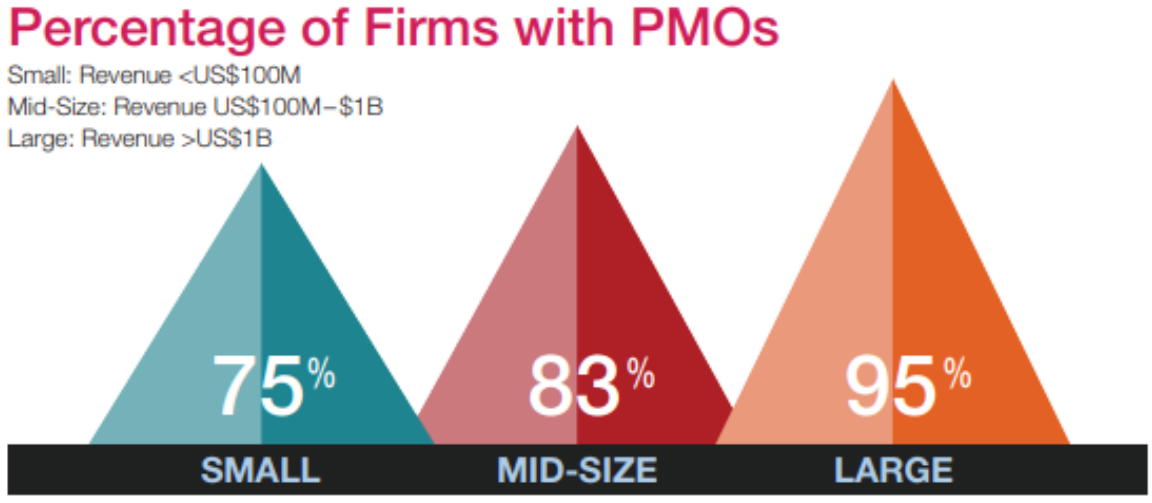
- The profession of project management is growing at a very rapid pace
- It is helpful to understand the history of the field, the role of professional societies like the Project Management Institute, and the growth in project management software

History of Project Management

- Some people argue that building the Egyptian pyramids was a project, as was building the Great Wall of China.
- Most people consider the Manhattan Project (led by Pr. Oppenheimer) to be the first project to use “modern” project management.
- This three-year, $2 billion (in 1946 dollars) project had a separate project manager and a technical manager.

History of Project Management

- In the 1990s, many companies began creating PMOs to help them handle the increasing number and complexity of projects
- A Project Management Office (PMO) is an organizational unit responsible for coordinating the project management function throughout an organization

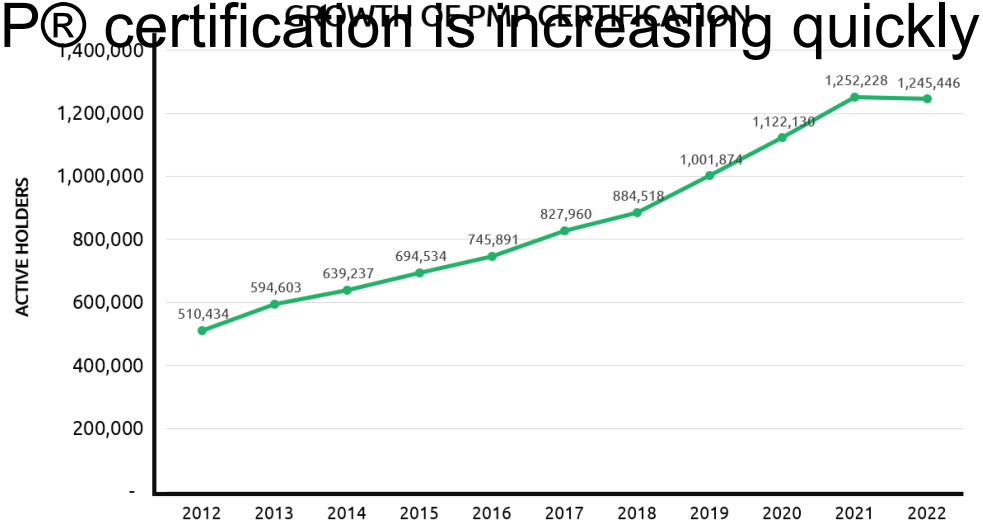


Global Issues

- Several global dynamics are forcing organizations to rethink their practices:
  - Talent development for project and program managers is a top concern
  - Basic project management techniques are core competencies
  - Organizations want to use more agile approaches to project management
  - ***Benefits realization*** of projects is a key metric

Project Management Certification

- The Project Management Institute (PMI: http://www.pmi.org/) is the leading organization in advancing the project management profession
- PMI provides certification as a Project Management Professional (PMP®)
- The number of people earning PMP® certification is increasing quickly
- Students can join PMI at a reduced fee and earn the Certified Associate in Project Management (CAPM) certification(see PMI for details)



Ethics in Project Management

- Ethics, loosely defined, is a set of principles that guide our decision making based on personal values of what is “right” and “wrong”
- Project managers often face ethical dilemmas
- In order to earn PMP® certification, applicants must agree to PMI’s Code of Ethics and Professional Conduct
- Several questions on the PMP® exam are related to professional responsibility, including ethics

Project Managers

Project Managers

- Project Managers are mainly responsible for all issues related to the software project; issues may vary depending on the project scale, some of the common issues are:
  - Schedule
  - Budget
  - Quality
  - Delivery of products
  - Locking in resources
- As a project manager you will notice that most of your time is consumed chasing and collecting the status of project tasks.

The Project Manager

The Role of the Project Manager

- Job descriptions vary, but most include responsibilities like planning, scheduling, coordinating, and working with people to achieve project goals
- Remember that 97% of successful projects were led by experienced project managers, who can often help influence success factors

Skills for Project Managers

Project managers need a wide variety of skills, They should:

- Be comfortable with change
- Understand the organizations they work in and with
- Be able to lead teams to accomplish project goals

Competencies for Project Managers

1. People skills
2. Leadership
3. Listening
4. Integrity, ethical behavior, consistent
5. Strong at building trust
6. Verbal communication
7. Strong at building teams
8. Conflict resolution, conflict management
9. Critical thinking, problem solving
10. Understands, balances priorities
11. Negotiating
12. Influencing the Organization
13. Mentoring
14. Process and technical expertise

Advantages of Using Formal Project Management

- Better control of financial, physical, and human resources
- Improved customer relations
- Shorter development times
- Lower costs and improved productivity
- Higher quality and increased reliability
- Higher profit margins
- Better internal coordination
- Positive impact on meeting strategic goals
- Higher worker morale (less stress)
  - Less overworked personnel

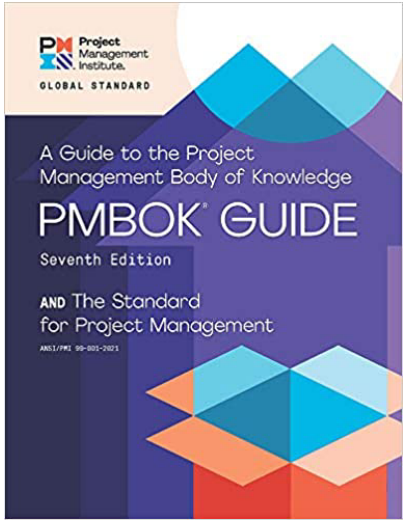
Project Management Body of Knowledge (PMBOK)

The Purpose of The Standard for Project Management

- The Standard for Project Management provides a basis for understanding project management and how it enables intended outcomes.
- This standard applies regardless of industry, location, size, or delivery approach, for example, predictive, hybrid, or adaptive. It describes the system within which projects operate, including governance, possible functions, the project environment, and considerations for the relationship between project management and product management.

Project Management 12 Principles
(PMBOK v7)

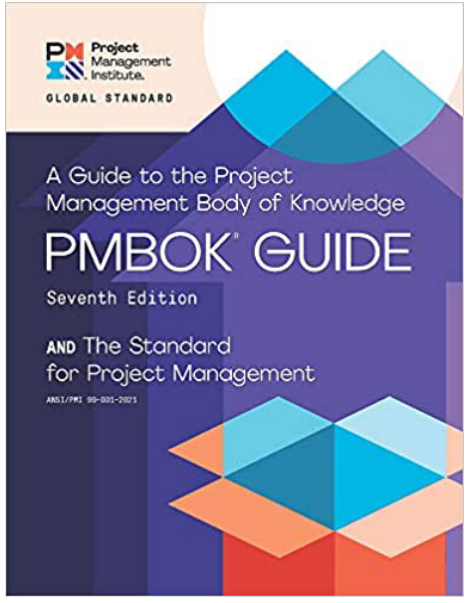
1. Stewardship : Act responsibly and ethically.
2. Team: Foster trust, respect, and open communication to empower team members.
3. Stakeholders: involve stakeholders
4. Value: Prioritize outcomes that deliver value
5. Systems Thinking: understand how project elements interact within broader organizational and external contexts.
6. Leadership: Lead with integrity, adaptability, and empathy
7. Tailoring: Adapt methods, tools, and approaches
8. Quality: Ensure quality is embedded from the start
9. Complexity: Embrace uncertainty and complexity
10. Risk: Identify, assess, and respond to risks
11. Adaptability and Resiliency: Be flexible and ready to pivot
12. Change: Support transformation and continuous improvement



Project Management
8 Project Performance Domains (PMBOK v7)

-> key areas of focus that must be managed effectively to achieve successful project outcomes

1. Stakeholders
2. Team
3. Development Approach and Life Cycle
4. Planning
5. Project Work
6. Delivery
7. Measurement
8. Uncertainty



Key Terms and Concepts

Key Terms and Concepts

- Outcome
  - An end result or consequence of a process or project.
  - Outcomes can include outputs and artifacts, but have a broader intent by focusing on the benefits and value that the project was undertaken to deliver.
- Portfolio
  - Projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives (Examples: A company's R&D programs, marketing campaigns, or infrastructure upgrades)
- Product
  - An artifact that is produced, is quantifiable, and can be either an end item in itself or a component item.

Key Terms and Concepts

- Program
  - Related projects, subsidiary programs, and program activities that are managed in a coordinated manner to obtain benefits not available from managing them individually. (Ex: digital transformation initiative of all the processes of a company)
- Project
  - A temporary endeavor undertaken to create a unique product, service, or result.
  - The temporary nature of projects indicates a beginning and an end to the project work or a phase of the project work.
  - Projects can stand alone or be part of a program or portfolio.

Key Terms and Concepts

- Project manager
  - The person assigned by the performing organization to lead the project team that is responsible for achieving the project objectives.
  - Project managers perform a variety of functions, such as facilitating the project team work to achieve the outcomes and managing the processes to deliver intended outcomes.

Key Terms and Concepts

- Project team
  - A set of individuals performing the work of the project to achieve its objectives.
- Project Management Team
  - The members of the project team who are directly involved in project management activities.
- System for value delivery
  - A collection of strategic business activities aimed at building, sustaining, and/or advancing an organization.
  - Portfolios, programs, projects, products, and operations can all be part of an organization's system for value delivery.

Key Terms and Concepts

- Value
  - The worth, importance, or usefulness of something.
  - Different stakeholders perceive value in different ways.
  - Customers can define value as the ability to use specific features or functions of a product.
  - Organizations can focus on business value as determined with financial metrics, such as the benefits less the cost of achieving those benefits.
  - Societal value can include the contribution to groups of people, communities, or the environment.

A System for Value Delivery

A System for Value Delivery

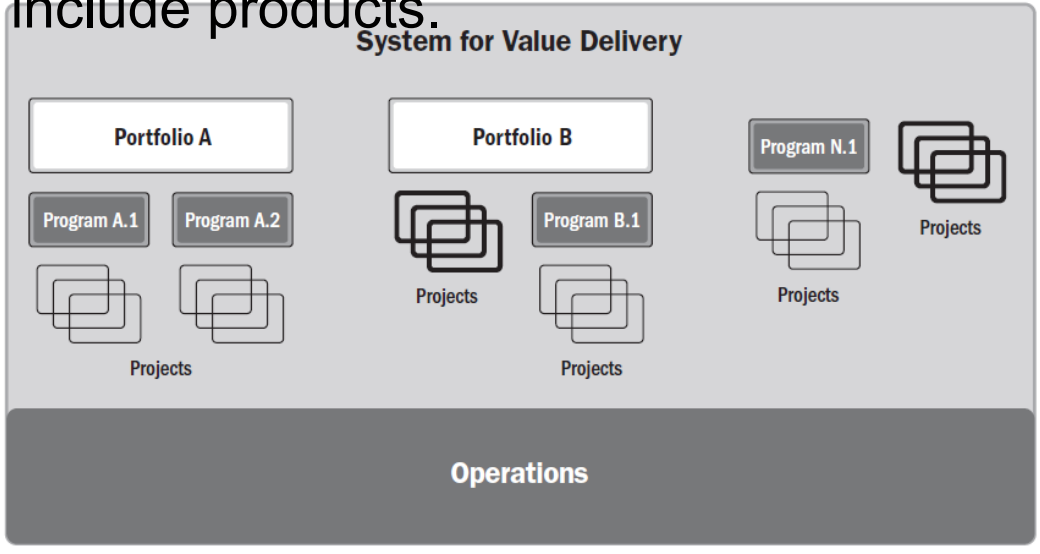
- It provides a context for value delivery, governance, project functions, the project environment, and product management.
  - How to Create Value
    - Describes how projects operate within a system to produce value (organizations and stakeholders)
  - Guided by an Organizational Governance System (policies, performance monitoring..)
    - Describes how governance supports a system for value delivery.
  - Describes Functions Associated with Projects
    - Identifies the functions that support projects.
  - Specifies The Project Environment
    - Identifies internal and external factors that influence projects and the delivery of value.
  - Specifies detailed Product Management Considerations
    - Identifies the ways portfolios, programs, projects, and products relate.

Creating Value

- Projects exist within a larger system, such as a governmental agency, organization, or contractual arrangement.
- Organizations create value for stakeholders. Examples of ways that projects produce value include, but are not limited to:
  - Creating a new product, service, or result that meets the needs of customers or end users;
  - Creating positive social or environmental contributions;
  - Improving efficiency, productivity, effectiveness, or responsiveness;
  - Enabling the changes needed to facilitate organizational transition to its desired future state; and
  - Sustaining benefits enabled by previous programs, projects, or business operations.

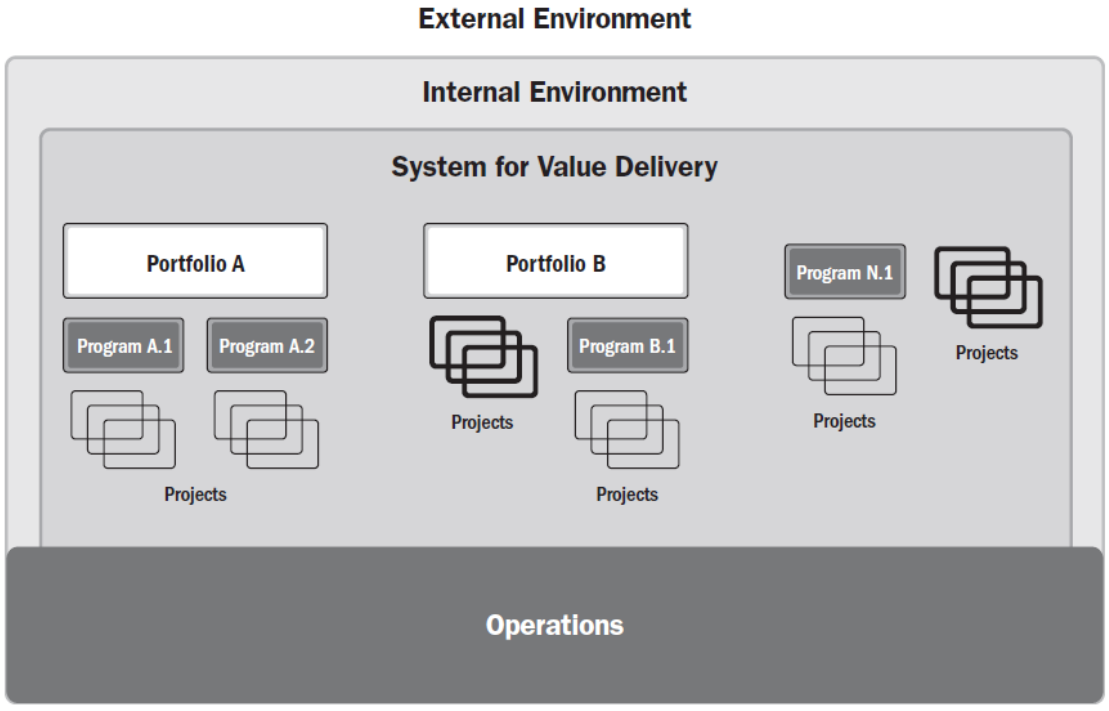
Value Delivery Components

- There are various components, such as portfolios, programs, projects, products, and operations, that can be used individually and collectively to create value.
- Working together, these components compose a system for delivering value that is aligned with the organization's strategy.
- Any of the projects or programs could include products.
- Operations can directly support and influence portfolios, programs, and projects, as well as other business functions, such as payroll, supply chain management, finance and budgeting, HR, customer service, etc.
- Portfolios, programs, and projects influence each other as well as operations.



Value Delivery Components

- A system for value delivery is part of an organization's internal environment that is subject to policies, procedures, methodologies, frameworks, governance structures, and so forth.
- That internal environment exists within the larger external environment, which includes the economy, the competitive environment, legislative constraints, etc.

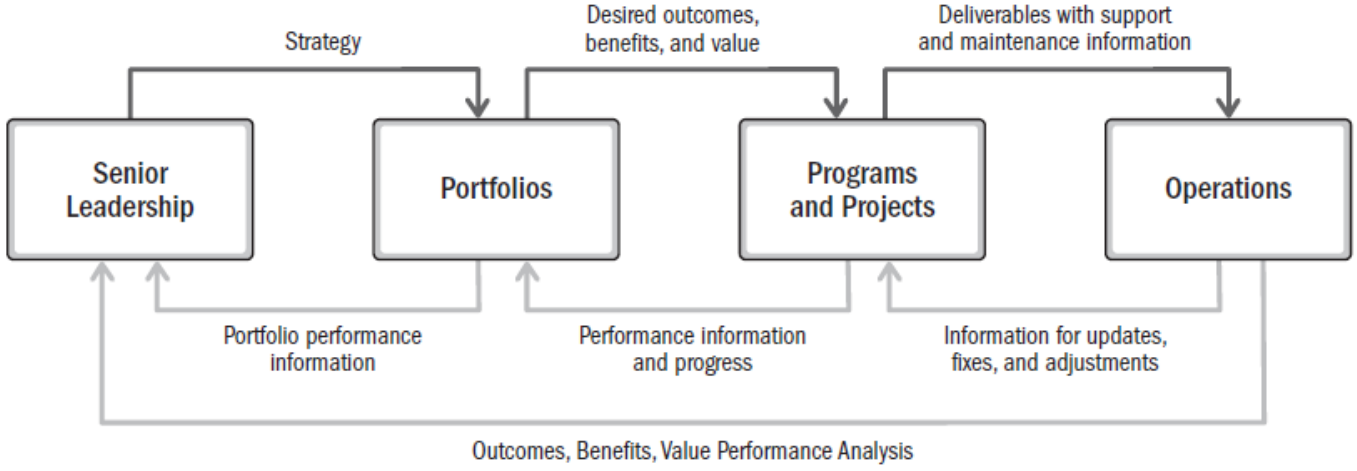


Value Delivery Components

- The components in a value delivery system create **deliverables** used to produce **outcomes**.
- An **outcome** is the end result or consequence of a process or a project.
- Focusing on outcomes, choices, and decisions emphasizes the long-range performance of the project.
- The outcomes create benefits, which are gains realized by the organization.
- Benefits, in turn, create value, which is something of worth, importance, or usefulness.

Information Flow

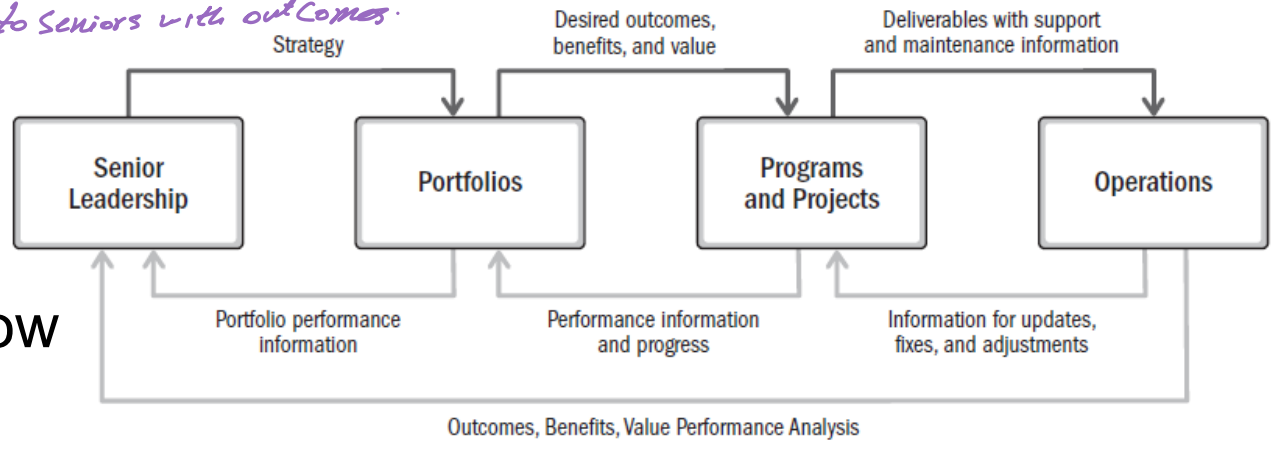
- A value delivery system works most effectively when **information** and **feedback** are shared consistently among all components, keeping the system aligned with strategy and in harmony with the environment.
- Senior leadership shares strategic information with portfolios.
- Portfolios share the desired outcomes, benefits, and value with programs and project
- Deliverables from programs and projects are passed on to operations along with information on support and maintenance for the deliverables.



Information Flow

- Information from operations to programs and projects suggests adjustments, fixes, and updates to deliverables.
- Programs and projects provide performance information and progress on achieving the desired outcomes, benefits, and value to portfolios.
- Portfolios provide evaluations on portfolio performance with senior leadership.
- Additionally, operations provide information on how well the organization's strategy is advancing.

Senior share strategy > Portfolios share desired outcomes, Programs share Deliverable and maintenance info, Operations Give feedback with Bugs and fixes + to seniors with outcomes.



Organizational Governance Systems

- The governance system works alongside the value delivery system to enable smooth workflows, manage issues, and support decision making.
- Governance systems provide a framework with functions and processes that guide activities.
- A governance framework can include elements of oversight, control, value assessment, integration among components, and decision-making capabilities.
- Governance systems provide an integrated structure for evaluating changes, issues, and risks associated with the environment and any component in the value delivery system.

Organizational Governance Systems

- This includes portfolio objectives, program benefits, and deliverables produced by projects.
- Projects can operate within a program or portfolio or as a stand-alone activity.
- In some organizations, a project management office might support programs and projects within a portfolio.
- Project governance includes defining the authority to approve changes and make other business decisions related to the project.
- Project governance is aligned with program and/or organizational governance.

Functions Associated with Projects

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- People drive project delivery.
- They do so by executing functions necessary for the project to run effectively and efficiently.
- Functions related to the project can be fulfilled by one person, by a group of people, or combined into defined roles.
- Coordinating a collective work effort is extremely important to the success of any project.
- There are different types of coordination suitable for different contexts. Some projects benefit from decentralized coordination in which project team members self-organize and self-manage.

Functions Associated with Projects

- Other projects benefit from centralized coordination with the leadership and guidance of a designated project manager or similar role.
- Some projects with centralized coordination can also benefit from including self-organized project teams for portions of the work.
- Regardless of how coordination takes place, continuous engagements between project teams and other stakeholders are necessary to successful outcomes.

Functions Associated with Projects

- Regardless of how projects are coordinated, the collective effort of the project team delivers the outcomes, benefits, and value.
- The project team may be supported by additional functions depending on the deliverables, industry, organization, and other variables.
- Other functions may be necessary to enable project deliverables that produce the desired outcomes.
- The needs of the project, organization, and environment influence which functions are used on a project and how those functions are carried out.

Functions Associated with Projects

1. Provide oversight and coordination (ex: Monitoring progress and performance.)
2. Present objectives and feedback: (ex: Defining success criteria and desired outcomes.)
3. Facilitate and support (ex: Hosting meetings, workshops, and stand-ups.)
4. Perform work and contribute insights (ex: Completing assigned deliverables.)
5. Apply expertise (ex: Advising on technical or domain-specific matters.)
6. Provide business direction and insight (ex: Identifying market trends or customer needs.)
7. Provide resources and direction (ex: Allocating budget, personnel, and infrastructure.)
8. Maintain governance (ex: Enforcing regulatory and internal standards.)

The Project Environment

- Projects exist and operate within internal and external environments that have varying degrees of influence on value delivery.
- Internal and external environments can influence planning and other project activities.
- These influences can yield a favorable, unfavorable, or neutral impact on project characteristics, stakeholders, or project teams.

The Project Environment

- Internal Environment
  - Factors internal to the organization can arise from the organization itself, a portfolio, a program, another project, or a combination of these.
  - They include artifacts, practices, or internal knowledge.
  - Knowledge includes lessons learned as well as completed artifacts from previous projects. Examples include but are not limited to:
    - Process assets
    - Governance documentation
    - Data assets
    - Knowledge assets
    - Security and safety
    - Infrastructure
    - Information technology software
    - Resource availability
    - Employee capability

The Project Environment

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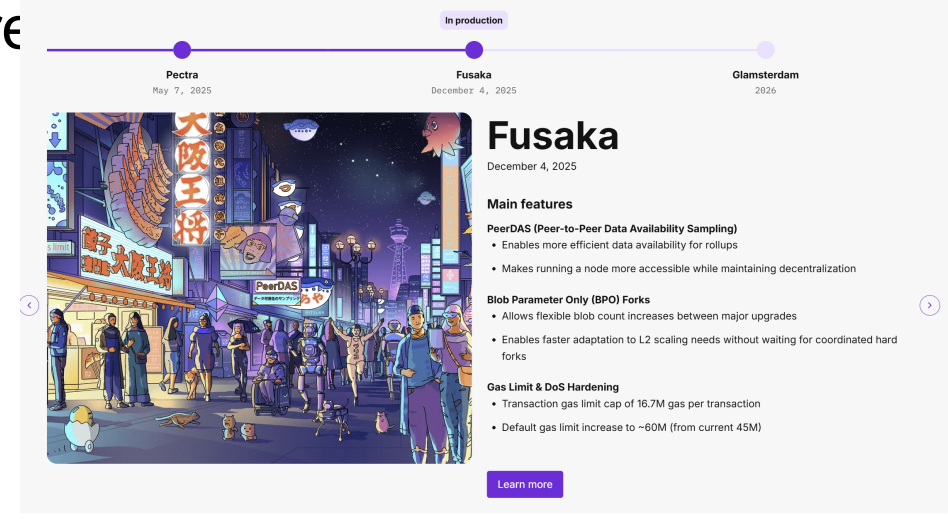
- External Environment
  - Factors external to the organization can enhance, constrain, or have a neutral influence on project outcomes. Examples include but are not limited to::
    - Marketplace conditions
    - Social and cultural influences and issues
    - Regulatory environment
    - Commercial databases
    - Academic research
    - Industry standards
    - Financial considerations
    - Physical environment

Product Management Considerations

- The disciplines of portfolio, program, project, and **product** management are becoming more interlinked.
- While portfolio, program, and **product** management are beyond the scope of the PMI standard and this course, understanding each discipline and the relationships between them provides a useful context for projects whose deliverables are products.
- Def: A product is an artifact that is produced, is quantifiable, and can be either an end item itself or a component item.

Product Management Considerations

- Product management involves the integration of people, data, processes, and business systems to create, maintain, and develop a product or service throughout its life cycle.
- The product life cycle is a series of phases that represents the evolution of a product, from introduction through growth, maturity, and to re

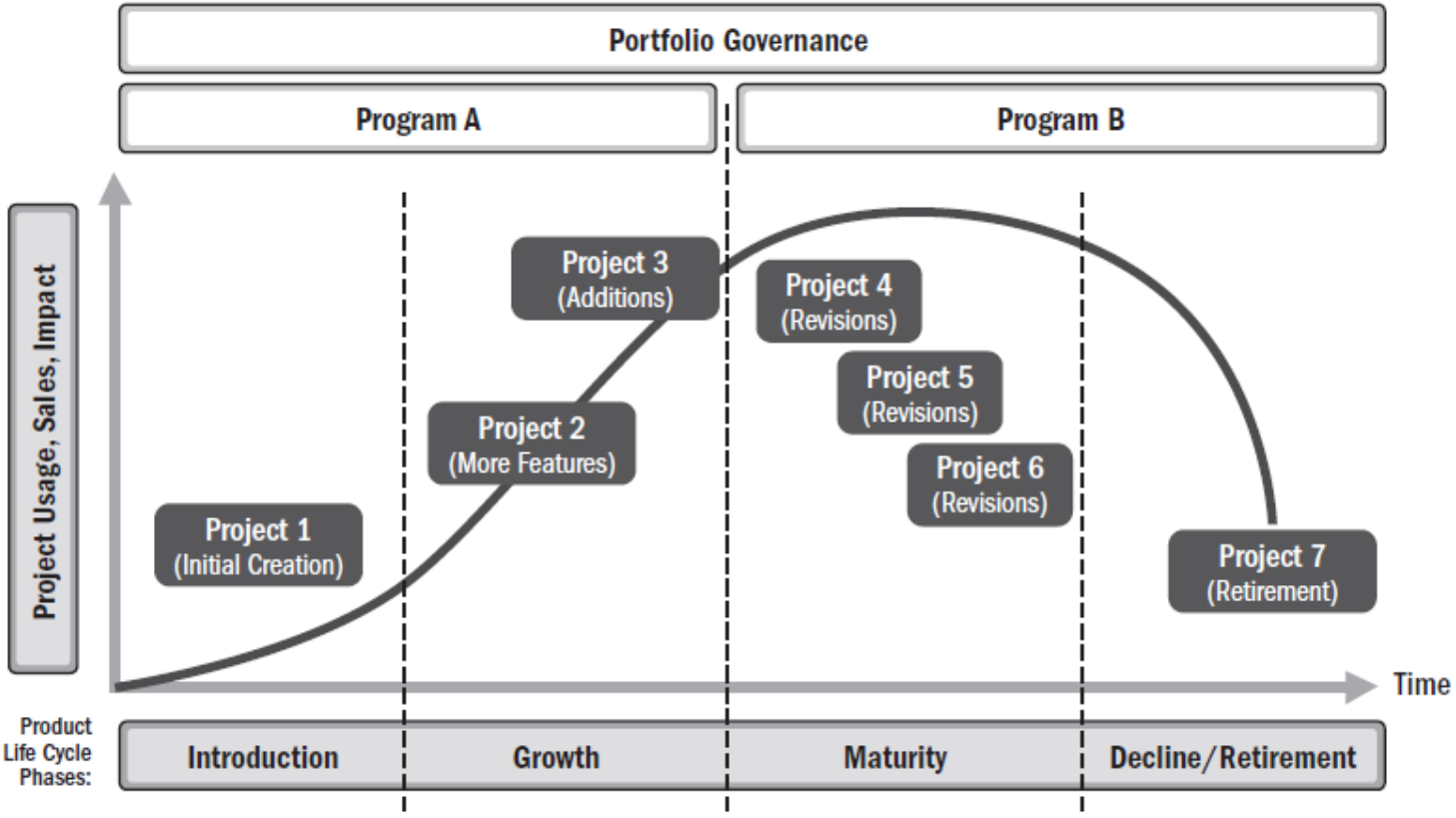


https://ethereum.org/ar/roadmap/

Product Management Considerations

- Product management may initiate programs or projects at any point in the product life cycle to create or enhance specific components, functions, or capabilities.
- The initial product may begin as a deliverable of a program or project.
- Throughout its life cycle, a new program or project may add or improve specific components, attributes, or capabilities that create additional value for customers and the sponsoring organization.
- In some instances, a program can encompass the full life cycle of a product or service to manage the benefits and create value for the organization more directly.

Product Management Considerations



Sample Product Life Cycle

Product Management Considerations

- Product management can exist in different forms, including but not limited to:
  - Program management within a product life cycle.
    - This approach incorporates related projects, subsidiary programs, and program activities.
    - For **very large or long-running products**, one or more product life cycle phases may be sufficiently complex to merit a set of programs and projects working together (ex: modernizing the product after years of product launch).

Product Management Considerations

- Product management can exist in different forms, including but not limited to:
  - Project management within a product life cycle.
    - This approach oversees development and maturing of product capabilities as an ongoing business activity.
    - Portfolio governance charters individual projects as needed to perform enhancements and improvements or to produce other unique outcomes. (ex: modernizing the UI after years of product launch).

Product Management Considerations

- Product management can exist in different forms, including but not limited to:
  - Product management within a program.
    - This approach applies the full product life cycle within the purview and boundaries of a given program. (ex: development of a POC to showcase potential directions of a given program)

Project Management Principles

Project Management Principles

- Principles for a profession serve as foundational guidelines for strategy, decision making, and problem solving. Professional standards and methodologies are often based on principles.
- In some professions, principles serve as laws or rules, and are therefore prescriptive in nature.
- The principles of project management are not prescriptive in nature.
- They are intended to guide the behavior of people involved in projects.
- They are broadly based so there are many ways individuals and organizations can maintain alignment with the principles.
- Principles can, but do not necessarily, reflect morals.

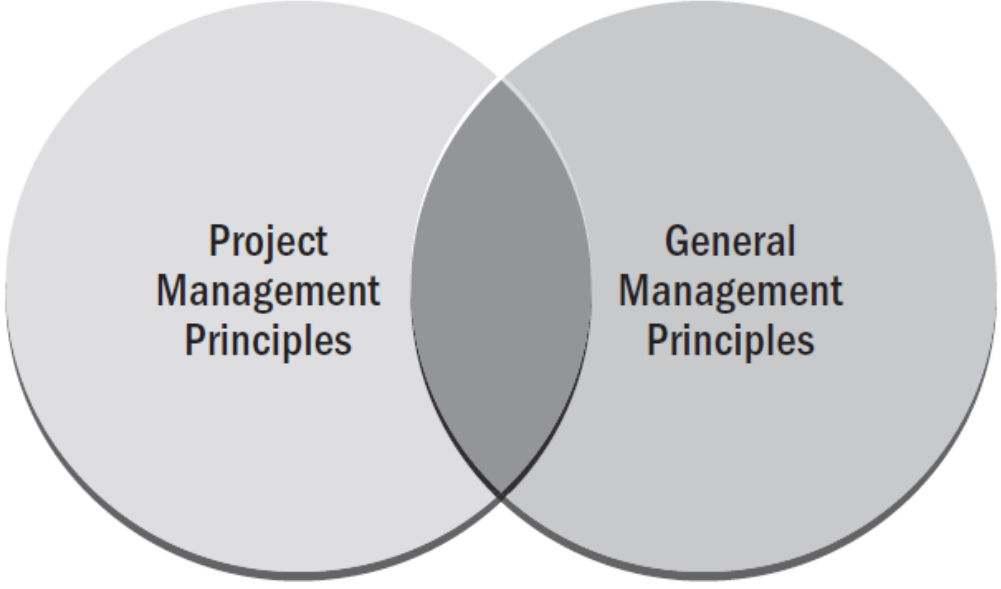
Project Management Principles

- A code of ethics is related to morals.
- A code of ethics for a profession can be adopted by an individual or profession to establish expectations for moral conduct.
- The **PMI Code of Ethics and Professional Conduct** is based on four values that were identified as most important to the project management community:
  - Responsibility,
  - Respect,
  - Fairness, and
  - Honesty.

Project Management Principles

- Because the principles of project management provide guidance, the degree of application and the way in which they are applied are influenced by the context of the organization, project, deliverables, project team, stakeholders, and other factors.
- The principles are internally consistent, meaning that no principle contradicts any other principle.
- However, practical dilemmas may arise. For instance, information disclosure intended to help understand context may provide insights that supports better system analysis. But, keeping such information confidential would conflict with that purpose.
- Principles of project management can also have areas of overlap with general management principles.
- For example, both projects and business in general focus on delivering value.

Overlap of Project Management and General Management Principles



PMI Principle Statements

- Be a diligent, respectful, and caring steward
- Create a collaborative project team environment
- Effectively engage with stakeholders
- Focus on value
- Recognize, evaluate, and respond to system interactions
- Demonstrate leadership behaviors
- Tailor based on context
- Build quality into processes and deliverables
- Navigate complexity
- Optimize risk responses
- Embrace adaptability and resiliency
- Enable change to achieve the envisioned future state

Be a Diligent, Respectful, and Caring Steward

STEWARDSHIP

Stewards act responsibly to carry out activities with integrity, care, and trustworthiness while maintaining compliance with internal and external guidelines. They demonstrate a broad commitment to financial, social, and environmental impacts of the projects they support.

- Stewardship encompasses responsibilities within and external to the organization.
- Stewardship includes:
  - Integrity,
  - Care,
  - Trustworthiness, and
  - Compliance.
- A holistic view of stewardship considers financial, social, technical, and sustainable environmental awareness.

Create a Collaborative Project Team Environment

TEAM

Project teams are made up of individuals who wield diverse skills, knowledge, and experience. Project teams that work collaboratively can accomplish a shared objective more effectively and efficiently than individuals working on their own.

- Projects are delivered by project teams.
- Project teams work within organizational and professional cultures and guidelines, often establishing their own "local" culture.
- A collaborative project team environment facilitates:
  - Alignment with other organizational cultures and guidelines,
  - Individual and team learning and development, and
  - Optimal contributions to deliver desired outcomes.

Effectively Engage with Stakeholders

STAKEHOLDERS

Engage stakeholders proactively and to the degree needed to contribute to project success and customer satisfaction.

- Stakeholders influence projects, performance, and outcomes.
- Project teams serve other stakeholders by engaging with them.
- Stakeholder engagement proactively advances value delivery.

Focus on Value

VALUE

Continually evaluate and adjust project alignment to business objectives and intended benefits and value.

- Value is the ultimate indicator of project success.
- Value can be realized throughout the project, at the end of the project, or after the project is complete.
- Value, and the benefits that contribute to value, can be defined in quantitative and/or qualitative terms.
- A focus on outcomes allows project teams to support the intended benefits that lead to value creation.
- Project teams evaluate progress and adapt to maximize the expected value.

Recognize, Evaluate, and Respond to System Interactions

SYSTEMS THINKING

Recognize, evaluate, and respond to the dynamic circumstances within and surrounding the project in a holistic way to positively affect project performance.

- A project is a system of interdependent and interacting domains of activity.
- Systems thinking entails taking a holistic view of how project parts interact with each other and with external systems.
- Systems are constantly changing, requiring consistent attention to internal and external conditions.
- Being responsive to system interactions allows project teams to leverage positive outcomes.

Demonstrate Leadership Behaviors

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LEADERSHIP

Demonstrate and adapt leadership behaviors to support individual and team needs.

- Effective leadership promotes project success and contributes to positive project outcomes.
- Any project team member can demonstrate leadership behaviors.
- Leadership is different than authority.
- Effective leaders adapt their style to the situation.
- Effective leaders recognize differences in motivation among project team members.
- Leaders demonstrate desired behavior in areas of honesty, integrity, and ethical conduct.

Tailor Based on Context

TAILORING

Design the project development approach based on the context of the project, its objectives, stakeholders, governance, and the environment using "just enough" process to achieve the desired outcome while maximizing value, managing cost, and enhancing speed.

- Each project is unique.
- Project success is based on adapting to the unique context of the project to determine the most appropriate methods of producing the desired outcomes.
- Tailoring the approach is iterative, and therefore is a continuous process throughout the project.

Build Quality into Processes and Deliverables

QUALITY

Maintain a focus on quality that produces deliverables that meet project objectives and align to the needs, uses, and acceptance requirements set forth by relevant stakeholders.

- Project quality entails satisfying stakeholders' expectations and fulfilling project and product requirements.
- Quality focuses on meeting acceptance criteria for deliverables.
- Project quality entails ensuring project processes are appropriate and as effective as possible.

Navigate Complexity

COMPLEXITY

Continually evaluate and navigate project complexity so that approaches and plans enable the project team to successfully navigate the project life cycle.

- Complexity is the result of human behavior, system interactions, uncertainty, and ambiguity.
- Complexity can emerge at any point during the project.
- Complexity can be introduced by events or conditions that affect value, scope, communications, stakeholders, risk, and technological innovation.
- Project teams can stay vigilant in identifying elements of complexity and use a variety of methods to reduce the amount or impact of complexity.

Optimize Risk Responses

RISK

Continually evaluate exposure to risk, both opportunities and threats, to maximize positive impacts and minimize negative impacts to the project and its outcomes.

- Individual and overall risks can impact projects.
- Risks can be positive (opportunities) or negative (threats).
- Risks are addressed continually throughout the project.
- An organization's risk attitude, appetite, and threshold influence how risk is addressed.
- Risk responses should be:
  - Appropriate for the significance of the risk,
  - Cost effective,
  - Realistic within the project context,
  - Agreed to by relevant stakeholders, and
  - Owned by a responsible person.

Embrace Adaptability and Resiliency

ADAPTABILITY AND RESILIENCY

Build adaptability and resiliency into the organization's and project team's approaches to help the project accommodate change, recover from setbacks, and advance the work of the project.

- Adaptability is the ability to respond to changing conditions.
- Resiliency is the ability to absorb impacts and to recover quickly from a setback or failure.
- A focus on outcomes rather than outputs facilitates adaptability.

Enable Change to Achieve the Envisioned Future State

CHANGE

Prepare those impacted for the adoption and sustainment of new and different behaviors and processes required for the transition from the current state to the intended future state created by the project outcomes.

- A structured approach to change helps individuals, groups, and the organization transition from the current state to a future desired state.
- Change can originate from internal influences or external sources.
- Enabling change can be challenging as not all stakeholders embrace change.
- Attempting too much change in a short time can lead to change fatigue and/or resistance.
- Stakeholder engagement and motivational approaches assist in change adoption.