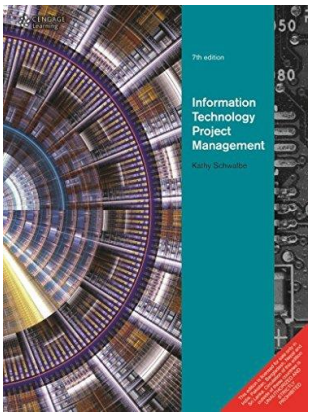
COMP313
Project Management

- Instructor: Andrew Siu
- Contact Info: kmsiu@ipm.edu.mo
- Office: A319
- Office hour:
  - Monday 9:30-13:00
  - Tuesday 14:30-17:00



- Textbook

  Schwalbe, Kathy (2014). Information Technology Project Management (7th edition).
- Canvas – all lecture notes, and quizzes/exercises

- Marks breakdown

1. *25% term project using MS project*
2. *5% class exercises*
3. *30% tests*
4. *40% exam*

What I have learned so far?

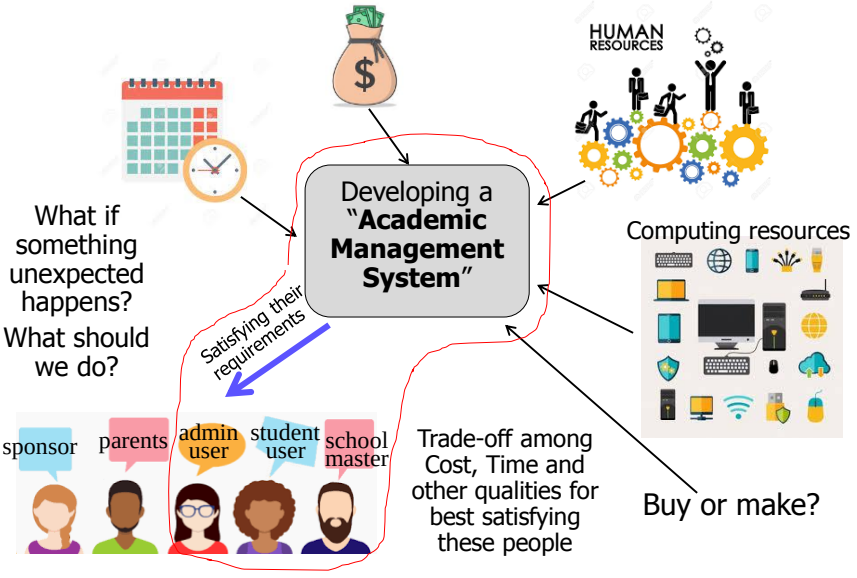
- Programming Language 1 & 2
- Internet Programming 1 & 2
- Data structure
- Database
- Computer Network
- Operating Systems
- Software Engineering
- **Project Management**

Why we need study them?

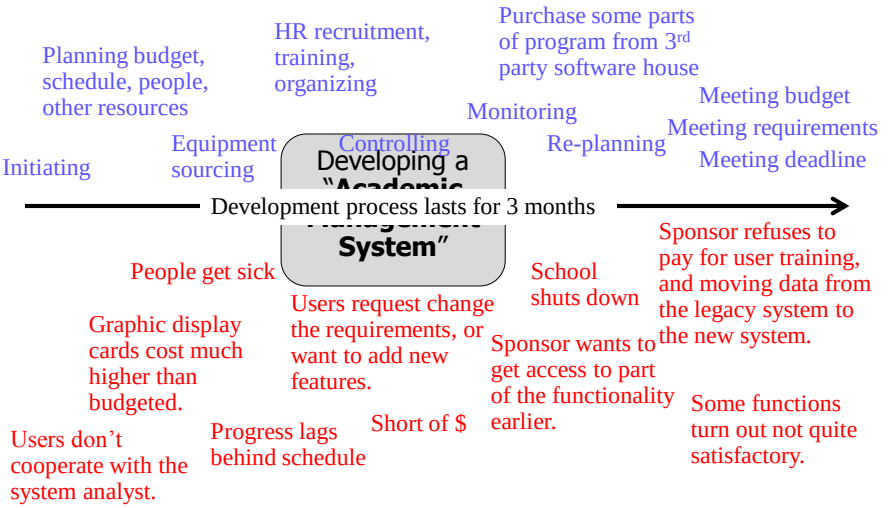
- SUCCESS – benefiting the people involved, not just the users.
- Sometimes, the bigger success is NOT to develop the software in the first place.

Project Management	Methods for managing the development of a "big" software for achieving better **success**
Software Engineering	Methods for developing a "big" software
Database design	Data scheme and storage for enormous size of data for better access based on specific application contexts
Internet Programming 1 & 2	Practical programming skills in Internet context
Data structure	Fundamental skills in organizing data for optimal access & better problem solving
Programming Language 1 & 2	Fundamental programming logics and skills

There are more things we should be concerned about?



In Reality, we need to face…



Despite these difficulties, we aims to maximize the chance of success.

Chapter 1

Introduction to Project Management

What, Why, How, Who?

- What is Project and Project Management?
- Why we need PM?
- How to carry out a Project?
- Who carries out Projects?

What Is a Project?

- A **project** is "a temporary endeavor undertaken to create a unique product, service, or result."*
- **Operation** is a work done to sustain the on-going business and/or to produce repetitive products and services.
- A project ends when its objectives have been reached, or the project has been terminated.
- *There is no such thing as an Ongoing Project.*

*PMI, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (2004), p. 5.

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Project vs Operation

- Specific time frame (it ends when the objective reached or it's terminated.)
- Clear objective

- Ongoing
- No specific time frame
- Clear direction
- Stage objectives

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Is it a project?

1. Developing a smartphone app
2. Design a driverless car
3. Assembling cars in an assembly line
4. Undertaking a car manufacturing business
5. Adding a new feature to an internal software application for the finance department.
6. Maintaining an academic software system
7. Working on a survey research
8. Upgrading a college's technology infrastructure to provide wireless Internet access across the campus
9. Repairing a car

Project Attributes

- A **project**:
  - Has a unique purpose -- creating a unique **product**, **service** or **result**.
  - Is temporary and has a time frame.
  - Should have a primary **customer** or **sponsor**.
  - Is developed using ***progressive elaboration**.
  - Requires **resources**, often from various areas.
  - Involves uncertainty. *(so we need risk assessment)*

** **Progressive elaboration**: Start with more general ideas and substantiated in later stages. Keeping on improving, modifying and detailing the plan as time passes.*

Is it a project? (*cont.*)

10. Organizing a trip to Hong Kong
11. Operating a railway transportation business
12. Making a financial statement by the end of each month
13. A bank teller services customers in line.
14. Launching a landing programme on Mars
15. Exploring the outer space
16. A government department develops a system to track child immunizations.
17. Peter writes a simple program for practicing programming skill.

Is it a project? (*cont.*)

18. Health government department ensures the public health of the citizens.
19. Conducting a R&D for the UI of their new smartphone model
20. Handling daily customer complaints in sales department
21. Arranging a wedding ceremony
22. Investigating an accident
23. Constructing the Macao lite-railway facility
24. Operating the Macao lite-railway transportation business
25. Launching a rescue operation
26. Filming a movie

Answers

1 – Y; 2 – Y; 3 – N; 4 – N; 5 – Y; 6 – N; 7 – Y; 8 – Y;

9 –Y; 10– Y; 11 – N; 12 – N; 13 – N; 14 – Y; 15 – N ;

16 – Y; 17 – N; 18 – N; 19 – Y; 20 – N; 21 – Y; 22 – Y;

23 – Y; 24 – N; 25 – Y; 26 – Y

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Why Starts a Project?

When to End a Project?

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Why Starts a Project? (1)

- **Market Demand**
  - Building a more efficient car in response to fuel shortage
- **Strategic Opportunity / Business Need**
  - Creating a new App to increase revenue
  - Creating an inventory system to expedite the stocktaking process
- **Customer Request**
  - A corporate client requests to build a financial analytical software program
- **Technological Advance**
  - Developing a faster and more compact mobile phone by taking advantage of the newly developed technology (*similar to Business Need, but this one is triggered by a new technology, whereas the previous one is triggered by a business objective*)

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Why Starts a Project? (2)

- **Legal Requirement**
  - Creating a new security software program for fulfilling government regulations
  - Government regulations require new reporting of business data for gaming industry.
- **Social Needs**
  - A developing country is experiencing a fast-spreading disease that's infecting large portions of the population. Medical supplies and facilities are needed to vaccinate and treat those infected with the disease.
  - Gambling business is urged to go for Responsible Gambling practices.
- **Environmental Considerations**
  - Manufacturing or processing plants that voluntarily remove their waste products from water prior to putting the water back into a local river or stream to prevent contamination.

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When to End a Project?

- The project's objectives have been achieved.
- Its objectives will not or cannot be met anymore.
- The need for the project no longer exists.
- The client (customer, sponsor or champion*) wishes to terminate the project.

** Champion – a project advocate, strong supporter.*

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Examples

- You are filming a movie. However, the main character suddenly quits and you don't think you could find anyone suitable for replacement.
- You are developing a Wei-Chi program with traditional algorithmic approach. However, a new approach has been adopted with AI technique, making the traditional approach obsolete.
- You develop a financial software system, but your company has been closed down.
- The project "Macao Int'l Firework Display Contest" has been cancelled because the gov't doesn't feel it a good time to do so due to the typhoon's aftermath.
- You plan to sell souvenirs during Olympic Games a month later, but you find out you cannot catch the schedule.

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Why Project Management is needed?

- How to recruit and dismiss a team?
- Does it guarantee the bridge can be built as expected?
- To be built in an acceptable time period?
- With suitable amount of money?
- Acceptably satisfying the "people"? Who are those people?
- Does it consider the maintenance problems?
- What if some unexpected incidents occur, what should you do?

Just want to ensure the uncertainties turning to be certain as much as possible.

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Cases of Project Failure (1)

- Care Records Service of National Health Service (UK) – 2008
  - Centralizing health records of the UK
  - Cost: $24B project (World's largest civil IT project)
  - Causes of failure:
    - Original scope and cost of project was radically underestimated since underestimating its complexity. Original budget was $4.6B, it has subsequently grown to $24B, could grow to as much as $40B.

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Cases of Project Failure (2)

- Transit Ticketing Authority (Australia) – 2008

  Constructing Smart card system to allow bus, rail and tram travel on a single ticket
  - Cost: up to $350M AUD
  - It had been delayed by as much as 5 years and over budget by between $200M and $350M.
  - Causes of failure:
    - Underestimation of complexity, schedule underestimation, “technical flaws” etc.

Cases of Project Failure (3)

- Virtual Case File – FBI (US) – 2005
  - Ambitious program to replace paper based reporting of crimes and investigations with an online system is scrapped. System was intended to aid efficiencies and allow pieces of information gathered through different channels at different times to be connected up thereby allowing for more effective investigations through better flows of information.
  - Cost : $170M USD
  - The project was in serious trouble and was eventually deemed unfit for use. The project was ultimately scrapped in 2005.
  - Causes of failure :
    - Poor requirements, continual changes in specifications, poor communications, lack of planning, lack of central architecture, lack of oversight.

Cases of Project Failure (4)

- "Jetsmart" engineering parts management system - **Qantas – Australian airline**
  - Cost: $40M
  - Failure to engage the engineers who would be the eventual users of the system into the requirements and design processes resulted in a system that the engineers deemed to be unusable once it was launched. After just a few years in operation (during which time some staff refused to use it and unions threatened industrial action), the system is dumped and a new system introduced.
  - Causes of failure :
    - Lack of stakeholder engagement; Requirements solicitation management failure; Change management failure.

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Cases of Project Failure (5)

- Payroll and benefits system - University of Wisconsin – (2006)
  - **Cost :**$28M USD
  - Payroll and benefits system project is abandoned after 5 years of effort. Board of governors had not received a single report on the project in its 5 years and was unaware that the University was facing a large scale project failure.
  - Causes of failure :
    - Poor leadership; Lack of progressive elaboration; Lack of planning; Bureaucratic infighting.

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Macao Lite-Rail Construction

- Constructing a Lite-Rail system of 21 km
  - Original budget (2007): MOP4.2b ;
    Original schedule: End of 2011
  - As of 2019, only 9.3km had been built (Taipa branch);
    Estimated total cost: MOP40b
    Estimated schedule to completion: 2026

(From Macao daily post, 2017)

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Causes of the Failure

- Original scope and cost of project was radically underestimated
- Underestimation of complexity
- Schedule underestimation
- Poor requirements
- Continual changes in specifications
- Poor communications
- Lack of planning
- Lack of central architecture
- Lack of oversight
- "technical flaws"
- Programming errors
- Failure to test the system with realistic load
- Failure to establish and stabilize requirements
- Lack of risk management
- Lack of stakeholder engagement
- Requirements solicitation management failure
- Change management failure
- Poor leadership
- Lack of progressive elaboration
- Lack of planning
- Bureaucratic infighting
- Poorly planned and managed
- Lack of staff training
- Poor staff morale

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Statistics of Failure

- IT projects have a terrible track record.
  - A 1995 Standish Group study (CHAOS) found that only 16.2% of IT projects were successful in meeting scope, time, and cost goals.
  - Over 31% of IT projects were canceled before completion, costing over $81 billion in the U.S. alone.*

**The Standish Group, "The CHAOS Report" (www.standishgroup.com) (1995). Another reference is Johnson, Jim, "CHAOS: The Dollar Drain of IT Project Failures," Application Development Trends (January 1995).*

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Improved Project Performance

- The Standish Group's CHAOS studies show improvements in IT projects in the past decade.*

Measure	1994 Data	2002 Data	Result
Successful projects	16%	34%	Doubled
Failed projects	31%	15%	Halved
Money wasted on challenged and failed projects	$140 B out of $250 B	$55 B out of $255 B	More than halved

**The Standish Group, "Latest Standish Group CHAOS Report Shows Project Success Rates Have Improved by 50%" (March 25, 2003).*

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Why the Improvements?

Better tools have been created to monitor and control progress

Better skilled project managers with **better management processes** are being used*

**The Standish Group, "CHAOS 2001: A Recipe for Success" (2001).*

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What is Project Management?

- **Project Management** is "the application of knowledge, skills, tools and techniques to project activities to meet project requirements."*

**PMI, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (2004), p. 8.*

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Advantages of Using Project Management

- Helping meet strategic goals
- Better control of financial, physical, and human resources
- Meeting predetermined development times
- On-budget
- Higher quality and increased reliability
- Improved productivity
- Better internal coordination
- Improved customer relations
- Higher worker morale

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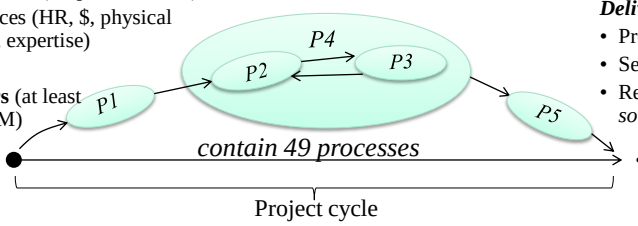
Project Management - Overview

- **Project Statement of Work (SoW)**
  - Project idea & problems
  - Requirements (*usually from customer*)
- **Business case**
  - Constraints (scope, time, cost)
  - Resources (HR, $, physical capital, expertise)
- **Agreements**
- **Stakeholders** (at least sponsor & PM)
- …



Deliverables
- Product
- Service
- Result (*required some endeavor*)
- *Lessen learned*

Project cycle

PM processes (*require 10 knowledge areas*)

Process Groups
- P1- **Initiating**
- P2 - **Planning**
- P3 - **Executing**
- P4 - **Controlling & Monitoring**
- P5 - **Closing**

Knowledge Areas
- **Integration**
- **Scope**
- **Schedule**
- **Cost**
- **Quality**
- **Resources**
- **Communications**
- **Risk**
- **Procurement**
- **Stakeholder**

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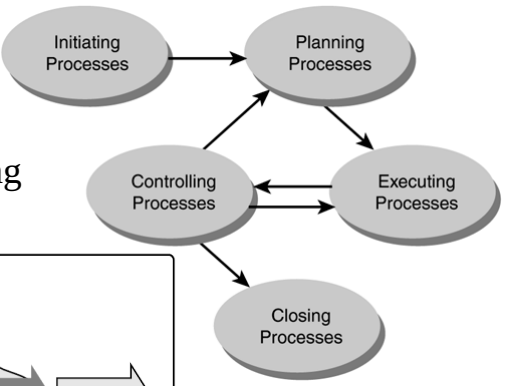
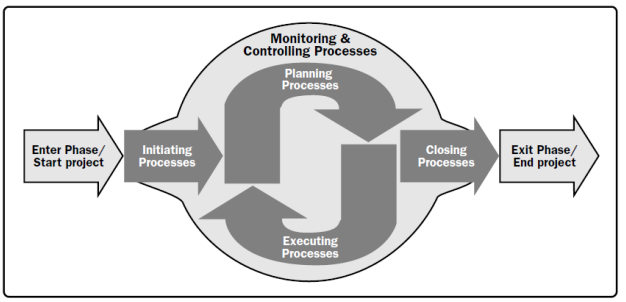
5 Process Groups

- Initiating
- Planning
- Executing
- Controlling & Monitoring
- Closing





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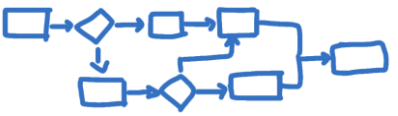
Process Group

A **Process** is a series of actions directed toward a particular result.



A **Process Group** is a group of related processes at a certain stage of project.

Process Groups

- **Initiating**
  - Defining and authorizing a project
  - Identifying important stakeholders
- **Planning**
  - Devising and maintaining a workable plan to ensure that the project addresses the organization's needs
- **Executing**
  - Coordinating people and other resources to carry out the various plans and create the products, service or results of the project
- **Monitoring and controlling**
  - Regularly measuring and monitoring progress to ensure that the project team meets the project objectives
- **Closing**
  - Formalizing acceptance of the project and ending it
    - Ex: closing out contracts, informing the relevant stakeholders of the closure, documenting lessons learned, and receiving formal acceptance of the delivered work, restoring everything for the next project, returning the resources to the original owners etc.

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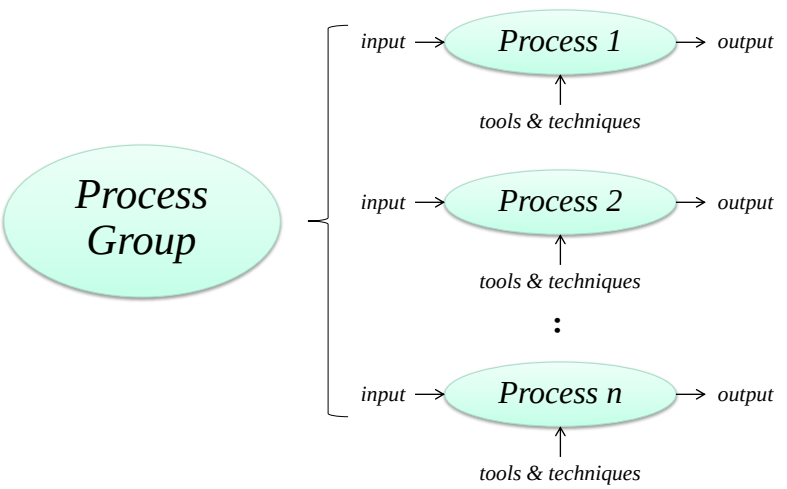
Process Group & Processes



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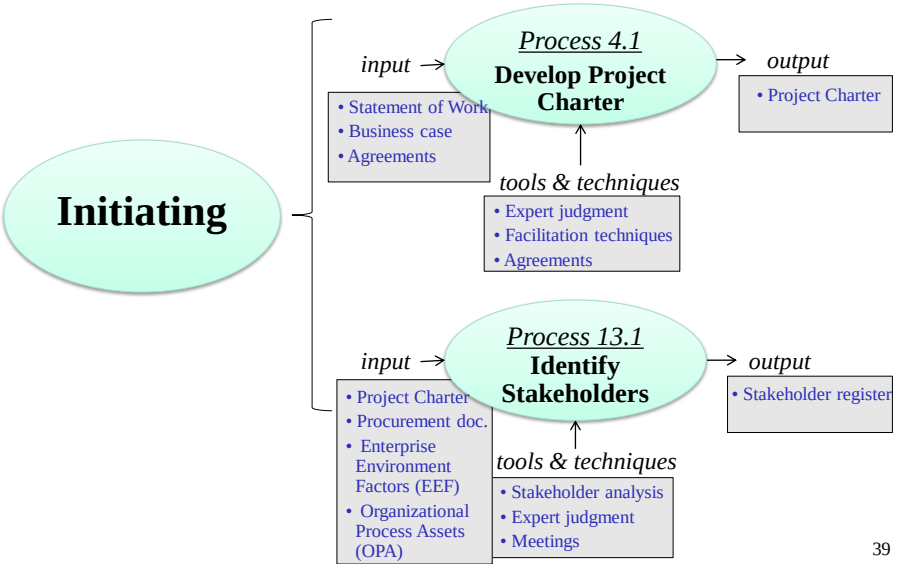
Process Group & Processes
(Example: Process Group: "*Initiating*")



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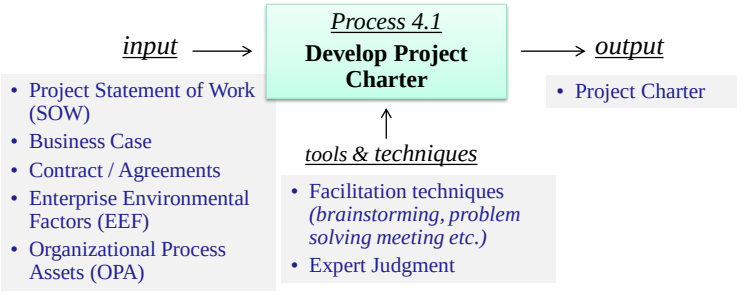
Process (*example: Process 4.1*)

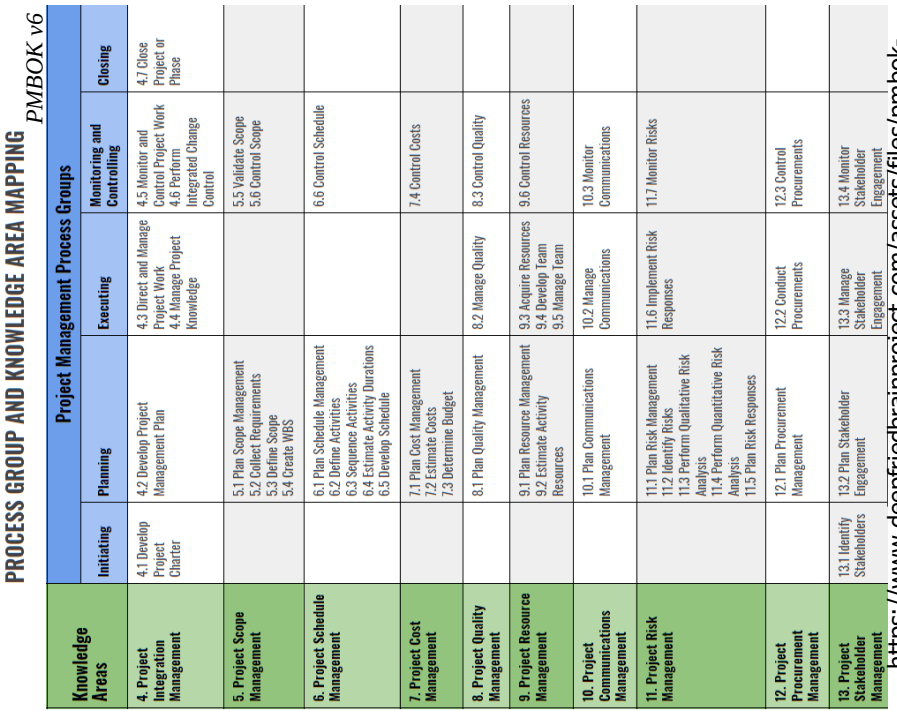
- For developing the Project Charter:
  - formally authorizes a project or phase
  - documenting initial requirements that satisfy the stakeholders' needs and expectations
  - establishes partnership between performing group and requesting group and **formally initiates the project**.



Process Group / Knowledge Area	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.4 Monitor and Control Project Work 4.5 Perform Integrate Change Control	4.6 Close Project or Phase
Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
~~Time~~ Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Duration 6.6 Develop Schedule		6.7 Control Schedule	
Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
Quality Management		8.1 Plan Quality Management	8.2 Perform Quality ~~Assurance~~	8.3 Control Quality	
~~Human~~ Resource Management		9.1 Plan Human Resource Management	9.2 Acquire ~~Project Team~~ Resources 9.3 Develop Project Team 9.4 Manage Project Team	Control Resources	
Communications Management		10.1 Plan Communication Management	10.2 Manage Communications	10.3 Control Communications	
Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	Implement Risk Responses	11.6 ~~Control~~ Risks Monitor	
Procurement Mgmt		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurement	~~12.4 Close Procurements~~
Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder ~~Management~~ Engagement	13.3 Manage Stakeholder Engagement	13.4 ~~Control~~ Stakeholder Engagement Monitor	

PMBOK v5

PMBOK 5 – PMP (5 Process Groups, 10 Knowledge Areas, and 47 Processes) 41



https://www.deepfriedbrainproject.com/assets/files/pmbok-guide-6th-edition-process-group-knowledge-area.pdf

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Exercise: Manage the project

"Going for a field trip to Hong Kong"

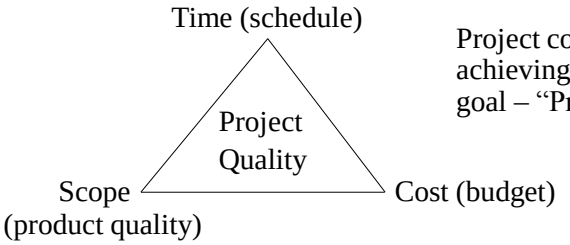
0. **Before Initiating**
   - SOW
   - Biz case
   - Important stakeholders
1. **Initiating**
2. **Planning** (Scope, Time, Cost, Quality, Communication, Procurement and Risk)
3. **Executing**
4. **Monitoring & Controlling**
5. **Closing**

The Triple Constraints

- Every project is constrained in different ways by its:
  - **Scope** goals: What work will be done?
  - **Time** goals: How long should it take to complete?
  - **Cost** goals: What should it cost?
- It is the project manager's duty to balance these three often-competing goals while satisfying the sponsors and end users.

Balancing the competing constraints

Project management involves in balancing the 3 competing constraints:



Project constraints in achieving the project goal – "Project Quality"

Ideal combination: Cheap, Fast, Good

= Good project management

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Some questions

1. If the sponsor wants a program to be delivered on time with a lower Cost, how does it affect the Scope?

2. If the sponsor wants to add a few more functions in the program (bigger Scope), how does it affect the Time and Cost?

3. If the sponsor wants a program to be delivered much earlier, how does it affect the Scope and Cost?

   What if he/she doesn't want to cut the Scope?

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Some questions

4. If you had planned for a project with a budget of $1 mil and you ended up spending $200,000 only (assuming that the Scope and Time didn't change), is it good?

Project Stakeholders

- **Stakeholders** are the people involved in or affected by project activities.
- Stakeholders include:
  - Project sponsor
  - Project manager
  - Project team
  - Support staff
  - Customers/Users
  - Suppliers
  - Opponents to the project

Example – Home renovation

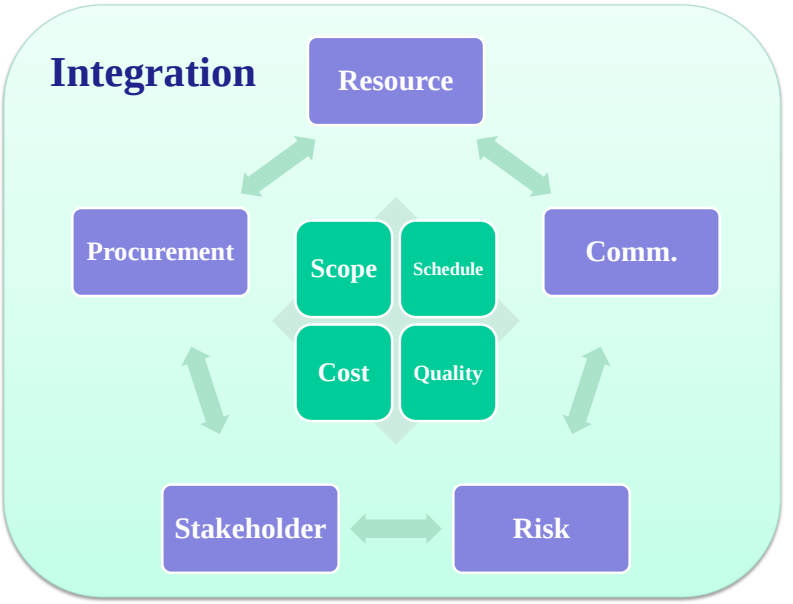
- Sponsor
  - You, your father (maybe)
- Customer/User
  - You & your family
- Project manager
  - General contactor
- Project team
  - construction staff, designers, electricians, carpenters, …
- Support staff
  - Admin office assistants of general contractor who are responsible for coordinating the meeting, making doc., filing government applications

Example – Home renovation *(cont.)*

- Suppliers
  - who provide the materials (wood, windows, doors, floor, paint,…) for the renovation, and maybe deliver the materials to the construction site.
- Opponents
  - Your neighbors, property management office, home owners' committee, your landlord (if you rent the flat)
  - Government - construction works bureau, fire department, …

10 Project Management Knowledge Areas

- Knowledge areas describe the key competencies that project managers must develop.
  - 4 core knowledge areas lead to specific project objectives (**scope, schedule (time), cost,** and **quality**).
  - 5 facilitating knowledge areas are the means through which the project objectives are achieved (**resources, communication, risk, procurement,** and **stakeholder management**).
  - 1 connecting knowledge area (**project integration management**) affects and is affected by all of the other knowledge areas.



10 Knowledge Areas

- **Project Scope Management**
  - Clear scope statement
  - Prevent scope creep
- **Project Schedule Management**
  - Planning time and schedule
  - Controlling schedule
- **Project Cost Management**
  - Budget estimating and planning
  - Budget control
- **Project Quality Management**
  - Planning quality
  - Enforcing quality
  - Checking quality control

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10 Knowledge Areas

- **Project Resource Management**
  - Planning the use of resources (people, equipment, machines …)
  - Organizational planning
  - Making a team; motivating a team
- **Project Communications Management**
  - Communication plan
- **Project Risk Management**
  - Identifying and analyzing risks;
  - Planning risk responses
- **Project Procurement Management**
  - Acquisition of services and products
  - Contract management

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10 Knowledge Areas

- **Project Integration Management**
  - Fitting everything together
  - Making a master plan
- **Project Stakeholder Management** *(in new version)*
  - Identifying and Analyzing stakeholders
  - Managing and controlling their engagement throughout the life of the project

Project Management Tools and Techniques

- Project management tools and techniques assist project managers and their teams to carry out processes.
- Specific tools and techniques include:
  - Project charters, scope statements, and WBS (scope).
  - Gantt charts, network diagrams, critical path analyses, critical chain scheduling (time).
  - Cost estimates and Earned Value Management (cost).
  - *See Table 1-1 (P.13) for more examples.*

Project Success

- There are several ways to define project success:
  - Meeting scope, time, and cost goals
  - Satisfying the customer/sponsor
  - Meeting the project's sponsors' objectives, *such as*:
    - Making or saving a certain amount of money
    - Providing a good return on investment
    - Simply making the sponsors happy

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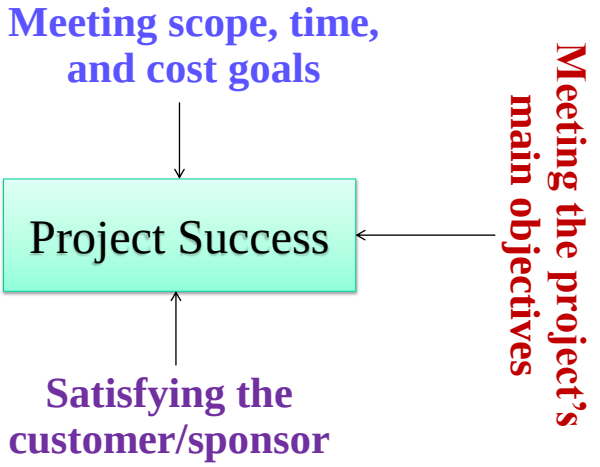

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Examples of Meeting Sponsor's Objectives

- The Objectives of the project – "Repairing the car":
  1. For good quality to run as long as it can (*a valuable antique car*)
  2. For passing the annual car quality check (*just use it for another year*)
  3. For increasing its bargaining power to sell out (*just make it looks nice*)

How does each of these affect the Scope, Time and Cost?

Project Success Factors*

1. User involvement
2. Executive support
3. Clear business objectives
4. Emotional maturity
5. Optimizing scope
6. Agile process
7. Project management expertise
8. Skilled resources
9. Execution
10. Tools and infrastructure

*The Standish Group, "CHAOS Activity News" (2011).

Table 1-3. Fifteen Project Management Job Functions*

- Define scope of project.
- Identify stakeholders, decision-makers.
- Develop detailed task list (work breakdown structures).
- Estimate time requirements.
- Identify required resources and budget.
- Report project status.
- Evaluate project requirements.
- Identify and evaluate risks.
- Prepare contingency plan.
- Identify interdependencies.
- Identify and track critical milestones.
- Participate in project phase review.
- Secure needed resources.
- Manage the change control process.

*Northwest Center for Emerging Technologies, "Building a Foundation for Tomorrow: Skills Standards for Information Technology," Belleview, WA, 1999.

Suggested Skills for Project Managers

- **Communication skills**: Listens, persuades.
- **Team-building skills**: Shows empathy, motivates, promotes *esprit de corps*.
- **Leadership skills**: Sets examples, provides vision (big picture), delegates, positive, energetic.
- **Coping skills**: Flexible, creative, patient, persistent.
- **Organizational skills**: Plans, sets goals, analyzes.
- **Technical skills**: Experience, project knowledge.

Soft skills

Hard skills

Portfolio, Program and Project

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Program and Portfolio

- **Program**: "A group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually."*
  - Examples of common programs in the IT field include infrastructure, applications development, and user support
- **Portfolio**: "A group of related programs and projects managed as a portfolio of investments that contribute to the entire enterprise's success – or meeting the enterprise's strategic goals."

*PMI, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (2004), p. 16.

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Program and Portfolio Managers

- **Program managers** provide leadership and direction for the project managers heading the projects within the program
- **Portfolio managers** help their organizations make wise investment decisions by helping to select and analyze projects from a strategic perspective

Top 10 IT Skills in Demand for 2017

- **Software / Application Developers (with Python, Java, C#, PHP)**
- **Help Desk / Technical Support**
- **Security Analyst with a focus on Governance, Risk & Compliance (GRC)**
- **Cloud Skills with a focus on SaaS**
- **Business Intelligence (BI) / Data Analytics / Visualization**
- **Web Development**
- **Database Administration (DBA)**
- **Project Management (PM)**
- **Big Data**
- **Mobile Application Development**

http://www.itcareerfinder.com/brain-food/blog/entry/top-10-it-skills-in-demand-for-2017.html 67

10 hottest tech skills for 2016

1. IT architecture (42%)
2. Programming/application development (40%)
3. **Project management (39%)**
4. Big data (36%)
5. Business intelligence/analytics (34%)
6. Help desk/technical support (30%)
7. Database administration (25%)
8. Security/compliance/governance (25%)
9. Cloud/SaaS (25%)
10. Web development (24%)

The % of respondents with hiring plans said they will be seeking people with this skill in the next 12 months

* From Computerworld | Dec 7,2015.

Project Management Office (PMO)

- A PMO is an organizational group responsible for coordinating the project management function throughout an organization.
- Possible goals include:
  - Manage shared resources across all projects administered by the PMO.
  - Coordinate communication across projects
  - Collect, organize, and integrate project data for the entire organization.
  - Develop and maintain policies, templates and standards for project documents.
  - Develop or coordinate training in various project management topics.
  - Develop and provide a formal career path for project managers.
  - Provide project management consulting and training services.
  - Provide a structure to house project managers while they are acting in those roles or are between projects.

Project Management Certification

- PMI provides certification as a Project Management Professional (PMP).
- A PMP has documented sufficient project experience, agreed to follow a code of ethics, and passed the PMP exam.
- The number of people earning PMP certification is increasing quickly.

Ethics in Project Management

- Ethics is an important part of all professions.
- Project managers often face ethical dilemmas regarding honesty, responsibility, attitude, fairness …
- In order to earn PMP certification, applicants must agree to the PMP code of professional conduct.
- Several questions on the PMP exam are related to professional responsibility, including ethics.

(Refer to page 32-33 for some examples)

VALUE: Honesty, Responsibility, Respect and Fairness

Chapter Summary

- As the number and complexity of projects continue to grow, it is becoming even more important to practice good project management.
- A project has several attributes, such as being unique, temporary and developed incrementally.
- A framework for project management includes project stakeholders, the nine knowledge areas, tools and techniques, and creating project portfolios to ensure enterprise success.
- Successful project managers must possess and development many skills and lead their teams by example.
- The project management profession continues to mature as more people become certified and more tools are created.