INFO3333
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Module 2 Lecture:
Overview of Project Management

based on slides by Dr Rabiul Hasan and Prof Alan Fekete

Learning objectives

- Terminology
- Project compared to other activities
- Project Manager role
- IT Projects compared to other kinds

- Project Process Groups
  - especially inputs and outputs
- Project Management Knowledge Areas
  - several will be explored in more depth in coming weeks
- Different approaches to software development projects

PMBOK

- "Project Management Body of Knowledge"
- as captured in "Guide to the PMBOK"
  - 6th edition published in 2017 by Project Management Institute (PMI)
  - first edition was in 1996
- what are considered good practices, tested in certification
  - general agreement that these can help project success in many situations

Note: you are not expected to own or read the Guide, but do know what we cover in class!

What is a Project?

- “A temporary endeavor undertaken to create a unique product, service, or result” [Guide to PMBOK]

Project characteristics

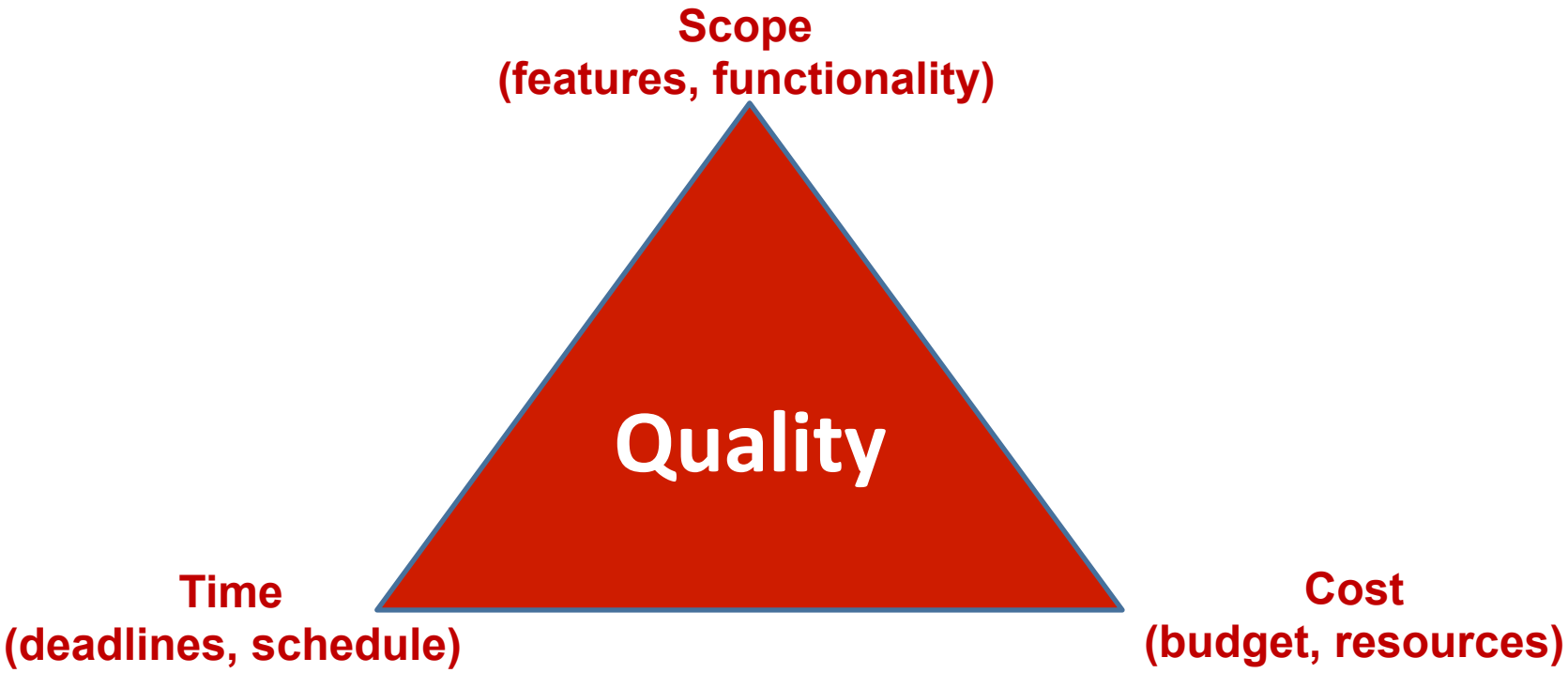
- Temporary
  - start, finish
- Purposeful
  - aim to create specific value
- Each project is different
  - though some features may recur
- Resources are needed
  - workers and their effort, tools
- May be individual, or small team, or large team
- Workers may be employees of client organization, or external (pay-for-work), or volunteers

Is it a project?

- Do your maths/commerce/AI assignment
- Gardening
- Pay rent
- Arrange a holiday
- Enjoy life
- Produce Faculty Revue (drama show)

What makes projects hard?

- “Triple constraint”



Project Manager

- Person with “the responsibility of the planning, procurement and execution of a project”
  - “this individual seldom participates directly in the activities that produce the end result, but rather strives to maintain the progress, mutual interaction and tasks of various parties in such a way that reduces the risk of overall failure, maximizes benefits, and minimizes costs.”
- From https://en.wikipedia.org/wiki/Project_manager]
- Usually, trained (even certified) in project management
  - general techniques that apply to many different types of projects
  - eg USyd offers “Project Management” major or degree

Skills of Project Manager

- “Project managers are **change agents**: they make project goals their own and use their skills and expertise to inspire a sense of shared purpose within the project team. They enjoy the organized adrenaline of new challenges and the responsibility of driving business results.
- They work well under pressure and are **comfortable with change and complexity in dynamic environments**. They can shift readily between the "big picture" and the small-but-crucial details, knowing when to concentrate on each.
- Project managers cultivate the **people skills** needed to develop trust and communication among all of a project's stakeholders: its sponsors, those who will make use of the project's results, those who command the resources needed, and the project team members.
- They have a **broad and flexible toolkit of techniques**, resolving complex, interdependent activities into tasks and sub-tasks that are documented, monitored and controlled. They adapt their approach to the context and constraints of each project, knowing that no "one size" can fit all the variety of projects. And they are always improving their own and their teams' skills through lessons-learned reviews at project completion.”
- [From https://www.pmi.org/about/learn-about-pmi/who-are-project-managers]

Impact of Project Manager

- Monitoring progress
- Early warning of problems
- Keep focus on priorities
- Advocate for assistance
- Specialist techniques eg estimation

- Success rate is higher for projects with a professional project manager

Project lifecycle

- “Projects go through definite and describable phases. Each phase can be brought to some sense of closure as the next phase begins. Phases can be made to result in deliverables or accomplishments to provide the starting point for the next phase. Phase transitions are ideal times to update planning baselines, to conduct high level management reviews, and to evaluate project costs and prospects.”
  - [from https://en.wikipedia.org/wiki/Project_cycle_management]
- Eg starting, organizing/preparing, carrying out work, finishing
- Important note: a deliverable is often a document, not necessarily a part of the product

PMBOK Process Groups

- **Initiating**: processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning**: Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing**: Those processes performed to complete the work defined in the project management plan to satisfy the project specifications
- **Monitoring and Controlling**: Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
- **Closing**: Those processes performed to finalize all activities to formally close the project or phase.
- [from https://en.wikipedia.org/wiki/Project_Management_Body_of_Knowledge]
- These apply to whole project, and *also to each phase within a project*

Initiating processes

- Inputs: statement of work, business case, knowledge of context
- Output: project charter

planning processes

- Input: project charter, knowledge of context
- Output: project management plan

executing processes

- Inputs: project management plan, knowledge of context, [ongoing] approved change requests
- Output: product (or parts), work performance data, change requests, document updates

monitoring and control processes

- Note: this occurs throughout, and observes/ influences all activities
- Inputs: project management plan, lots of data
- Output: reports, document updates, change requests

Process closing

- Inputs: project management plan, deliverables
- Output: transition, reports

PMBOK Knowledge Areas (I)

- Project Integration Management : the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups.
- Project Scope Management : the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- Project Schedule Management : the processes required to manage the timely completion of the project. Until the 6th edition of the PMBOK Guide this was called "Project Time Management"
- Project Cost Management : the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.
- Project Quality Management : the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.
- [from https://en.wikipedia.org/wiki/Project_Management_Body_of_Knowledge]

PMBOK Knowledge Areas (II)

- Project Resource Management : the processes that organize, manage, and lead the project team. Until the 6th edition of the PMBOK Guide this was called "Project Human Resource Management"
- Project Communications Management : the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.
- Project Risk Management : the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.
- Project Procurement Management : the processes necessary to purchase or acquire products, services, or results needed from outside the project team. Processes in this area include Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration, and Contract Closeout.
- Project Stakeholder Management : the processes required to identify all people or organizations impacted by the project, analyzing stakeholder expectations and impact on the project, and developing appropriate management strategies for effectively engaging stakeholders in project decisions and execution.
- [from https://en.wikipedia.org/wiki/Project_Management_Body_of_Knowledge]

Are IT projects special?

- IT projects seem to have much higher failure rates than other projects; classic analysis in Standish Group's CHAOS reports (1994, and more recent too)
- Possible reasons might be:
  - lack of continuous properties (that allow "fudge factor" protection technques)
  - lack of strong evidence base for practices
  - lack of managers experience/understanding of the domain

IT Project outcomes

- Over 2011-2015, 44% of software projects surveyed were considered “Not satisfactory” by customer
  - 56% were not OnBudget, 60% were not OnTime
- Size really matters: 61% of small projects were “successful” vs 11% of large projects
- From https://www.standishgroup.com/sample_research_files/CHAOSReport2015-Final.pdf

Methodologies for PM

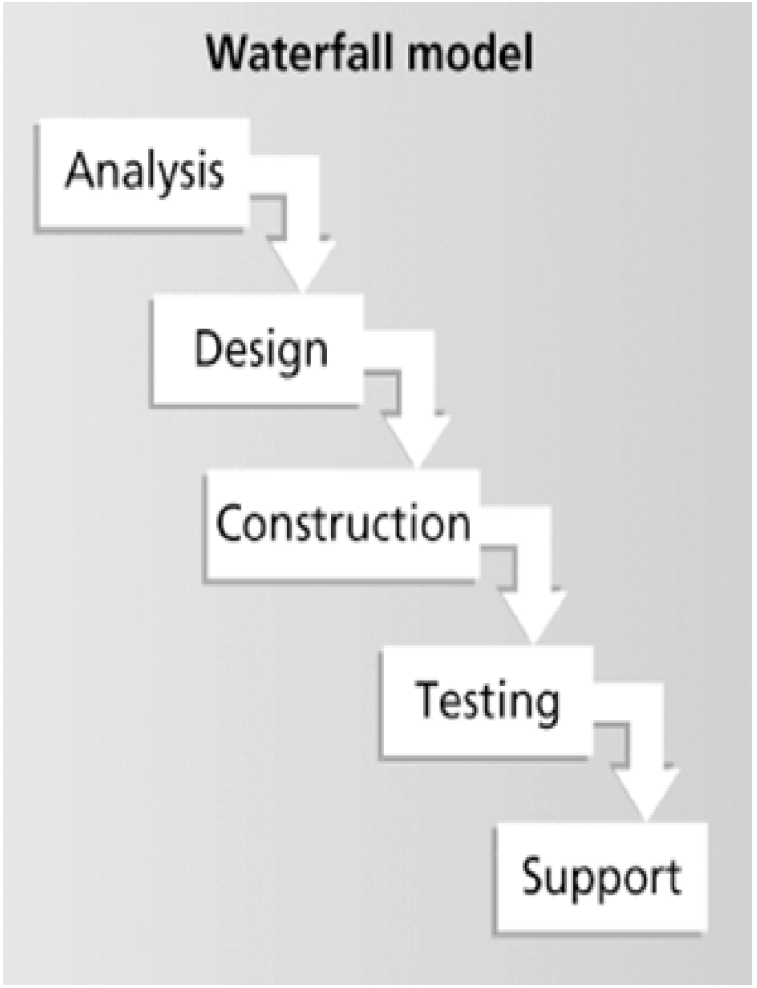
- A PM methodology is a set of practices, or ways to do things
  - what is done, and when it is done
- Different project managers follow different approaches in managing a project
  - often, an organization will require a particular methodology to be used

Methodologies for software development

- In a software development project, there are general practices about the project, and also specific practices around the coding
- Eg Test-Driven Development, Pair Programming, Refactoring
- These are not the focus in this unit; instead study these in SOFT2412

Waterfall

- Aim to complete each kind of activity before starting the next activity
  - Detailed understanding of what will be done, then think how to do it, then do it, then check it.
- Often, different teams are used to perform each activity
  - little capacity to even consult the people about the earlier decisions, let alone adjust them
- Explicit signoff of each transition



Iterative waterfall

- Project is constructed of stages, each of which adds some functionality
- Within a single stage, waterfall is adopted: get a very detailed statement of what is to be produced in this stage, design it, then code it, then test it,

PRINCE2

- PM approach developed by UK government
  - from 1996
- Divides project into many stages
- Comes with document templates
  - eg Business Case, Project Brief, Daily Log, Issues Register, Risk Register
- Taught and certified

Kanban

- Origins in Toyota manufacturing
- Balance work and avoid bottlenecks
- *Visualize* work items (to-be-done, in-progress, completed), “pull” one to do work on it when capacity is available
  - limit the amount of work in-progress at any time
  - allow workers to improve the process

Six Sigma

- Origins in Motorola, widespread adoption in GE
- Focus on removing defects and reducing variability
- Data-driven decisions
- Special training and certification

Scrum

- Origins in software development, but now generalized to other projects esp knowledge work
  - focus on settings where requirements change frequently
- "It is designed for teams of three to nine members, who break their work into actions that can be completed within timeboxed iterations, called *sprints*, no longer than one month and most commonly two weeks, then track progress and re-plan in 15-minute time-boxed stand-up meetings, called *daily scrums*"
  - [from https://en.wikipedia.org/wiki/Scrum_(software_development)]
- Extensions for larger projects, as scrum-of-scrums etc
- Training and certification

XP

- invented by Kent Beck from 1996 at Chrysler in a software project
- a suite of practices of software development, including pairs programming, unit tests written first, very frequent integration tests, refactoring
- close listening to customers, no overtime, minimal documents (use tests instead)
- [from https://en.wikipedia.org/wiki/Extreme_programming]

RUP

- Rational Unified Process
- an iterative development approach, created by Philippe Krutchen IBM and supported by tools, training and certification
- Phases: inception, elaboration, construction, transition
- not one single methodology but a framework for a variety of processes
- [see https://en.wikipedia.org/wiki/Rational_Unified_Process]

Agile movement

- A group of practitioners and some academics, who wanted to focus on software development practices that were more enjoyable for developers and gave better outcomes
  - compared to waterfall and heavy-weight PM approaches common in industry
- In 2001, they produced “Agile Manifesto” describing their values
- see https://agilemanifesto.org/ and next slide
- Standish reports showed better success rates, so many organizations tried to adopt “agile”, often formalizing it

Agile Manifesto

"We have come to value

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more."

Lean thinking

- Derived from study of Toyoto practices
  - including Kanban
- Focus on delivering value by minimizing waste
- [see https://en.wikipedia.org/wiki/Lean_thinking]

Choosing a methodology

- Choice for a given project depends both on project characteristics and on context
  - Scale of project?
  - Potential for change during project?
    - genuine change driven externally
    - change due to lack of initial understanding
  - Skills of participants?
  - Organizational demands?

Developers' counter-view?

- Some developers and thought leaders see "agile methods" being used by managers, in ways against the values of the original Agile Manifesto
- See material at https://ronjeffries.com/categories/all-articles/index.html especially https://ronjeffries.com/articles/018-01ff/abandon-1/ and https://ronjeffries.com/articles/018-01ff/ds-case-sprint-mitigate/

Key knowledge (quiz, exam!)

- Guide to PMBOK
- Project definition
- Project manager role
- Triple constraints
- Processes
- PMBOK Knowledge areas
- Methodologies (esp Waterfall, Iterative waterfall, Scrum, Kanban, XP)