BRIEF OVERVIEW OF PROJECT MANAGEMENT

Dr. Tony D. Barber / Prof. Sahana Kini

Fall, 2022

TODAY'S CLASS OBJECTIVES AND OUTCOME

- Define project management and the need for it
- Identify and describe main activities of project management
- Understand the Project manager role
- Apply reduced scope project management activities in your class project

RESOURCES

- **Book**
  - [Software Engineering](#), Ian Sommerville Ch 22-25

OUTLINE

- **Short lecture**
  - o Need for project management
  - o The Project manager role
  - o Project management activities and examples
    - • Using the template for the class project

PROJECT MANAGEMENT - *WHY* AND *WHAT*?

- *Why* project management?
  - Software development is a team activity, performed within an organization
  - Software development is always subject to budget and schedule constraints that are set by the organisation developing the software

- *What* is project management?
  - Activities that support development and delivery of software:
    - On time
    - On schedule
    - In accordance with the requirements and constraints of the organisations developing and procuring the software

PROJECT MANAGEMENT THROUGHOUT THE PROJECT

PROJECT
Conception & Initiation
1

PROJECT
Definition & Planning
2

PROJECT
Launch or Execution
3

PROJECT
Performance & Control
4

PROJECT
Project Close
5

Project Charter

Project Initiation

Scope & Budget

Work Breakdown Schdue

Gantt Chart

Communication Plan

Risk Management

Status & Tracking

KPIs

Quality

Forecasts

Objectives

Quality Deliverables

Effort & Cost Tracking

Performance

Post Mortem

Project Punchlist

Reporting

MARYLAND APPLIED
GRADUATE ENGINEERING
THE A. JAMES CLARK SCHOOL of ENGINEERING
UNIVERSITY OF MARYLAND

PROJECT MANAGEMENT MAIN ACTIVITIES (*WHO*?)

- The *project manager* ensures that the team:
  - Delivers to the customer software
    - That meets the customer's expectations and
    - At the agreed time
  - Keeps overall costs within budget
  - Maintains a coherent and well-functioning development team

PROJECT MANAGEMENT MAIN ACTIVITIES (*HOW*?)

- *Project planning*
  - Planning, estimating and scheduling project development
  - Assigning resources to tasks
- *Tracking project progress*
  - Check the actual work and effort against plan
- *Risk management*
  - Assess the risks that may affect a project
  - Plan for risk mitigation
  - Monitor these risks and take action when problems arise
- *People management*
  - Assign people lead to effective team performance
- *Reporting*
  - Reporting on the progress of a project to customers and to the managers of the company developing the software

PLANNING, ESTIMATING, SCHEDULING

- Identify development (and supporting) tasks
- Estimate effort to complete tasks
- Estimate schedule (start and end dates for main tasks)
- Estimate resources (people, equipment, other (e.g., software tool licenses, training, travel…)
- Allocate tasks to resources
- Define processes, methods, techniques, tools, standards

- The *project plan*
  - Is created at the start of a project
  - Is used to
    - communicate how the work will be done to the project team and customers
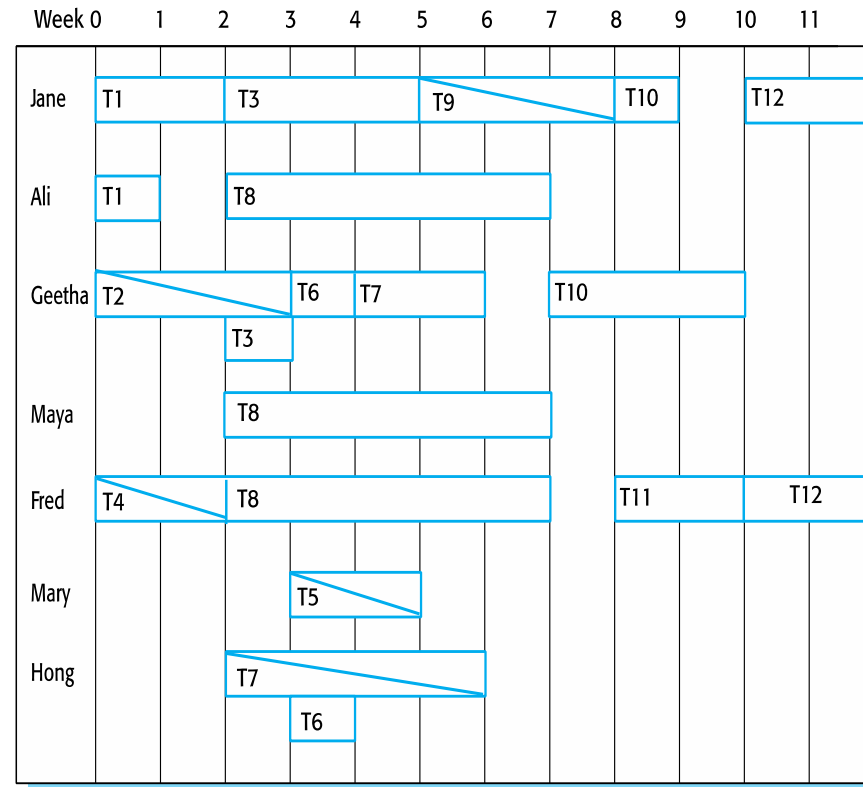   - help assess progress on the project

EXAMPLE PROJECT PLANNING CHARTS

Activity bar chart
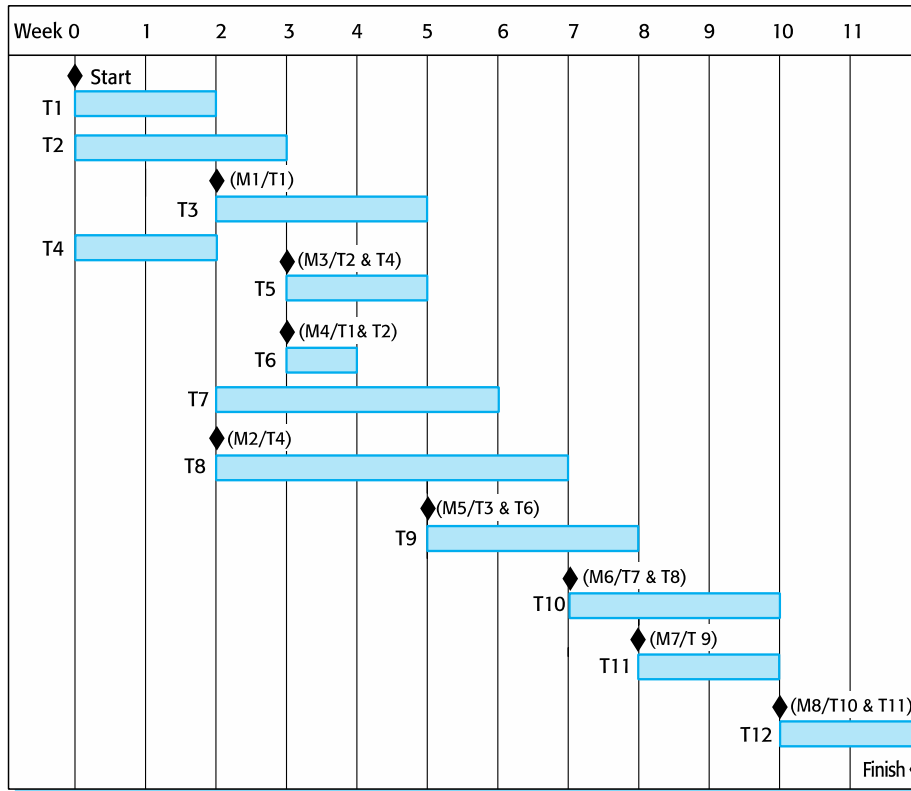
Staff allocation chart

From: *Software Engineering* by Ian Sommerville, Ch 23

ESTIMATION – EFFORT, COST, SCHEDULE

- **Need to estimate:**
  - Total effort and cost
  - Effort per task
  - Schedule
    - Start and end dates of tasks
    - Deliverables dates
    - Task dependencies
  - Type and quantity of resources per task
    - People – e.g., *Skills* and *Roles and Responsibilities* worksheets in the class template
    - Other resources – e.g., tools in *Project Environment* worksheet in the class template
- **Effort estimation techniques:**
  - By analogy, using engineering judgement
    - Break down the work in parts of software and tasks whose size can be estimated
  - Use cost models
- **Initial estimation can be adjusted for remaining tasks, as project progresses**

PROJECT MANAGEMENT FOR THE CLASS PROJECT

- The project management required for the class project is **extremely** "light weight", to provide an idea and exercise a subset of a real project management activities
- The Project Management Template provided in class is a VERY simplified template
 - In real projects, specialized tools are used (e.g., MS Project)

EFFORT ESTIMATION EXAMPLE

Effort Estimation and Tracking												
		Effort (Person hours)										
MAIN ACTIVITY	Sub-tasks	Hong		Jane		Fred		Mary		Maya		TOTAL ESTIMATED EFFORT per activity	TOTAL ACTUAL EFFORT per activity
	Sub-tasks	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actual		
Requirements													
	Analysis	5	9	5	4	5	6	5	2	5	5	25	26
Design													
	Ux design	15		10		5		2		7		39	
	Architecture design	3		0		15		10		7		35	
	Database design	0		0		5		20		7		32	
	Architecture documentation (SAD)	10		10		10		2		7		39	
	Detailed design (SADD)	5		15		10		2		7		39	
Implementation													
	See students list feature	5		4		11		12		8		40	
	Syllabus feature	20		5		11		15		5		56	
	Assignment feature	15		2		11		15		7		50	
	Gradebook feature	10		2		11		15		8		46	
	Other features	10		5		15		10		10		50	
Testing													
	Unit testing	5		10		5		3		10		33	
	Integration testing	15		15		1		3		10		44	
	System testing	3		15		1		3		10		32	
	Acceptance testing	5		10		1		3		10		29	
Documentation	User manual	2				5		3		4		14	
Overhead	Project Management	20	1	5	0.5	5	1	5	0	15	1.5	50	4
	Other random overhead	10	0.5	10	0.5	10	1	10	0	10	0	50	2
TOTAL ESTIMATED and ACTUAL EFFORT per student		158	10.5	123	5	137	8	138	2	147	6.5	603	26

WORK PROGRESS TRACKING

- Record actual (spent) effort
- Is the project on track with respect to:
  - Artifacts produced
  - Effort spent
  - Artifacts/deliverable schedule
- If not, then:
  - Determine cause
  - Take corrective action: re-estimate, get more resources, and/or negotiate cost, schedule and/or scope
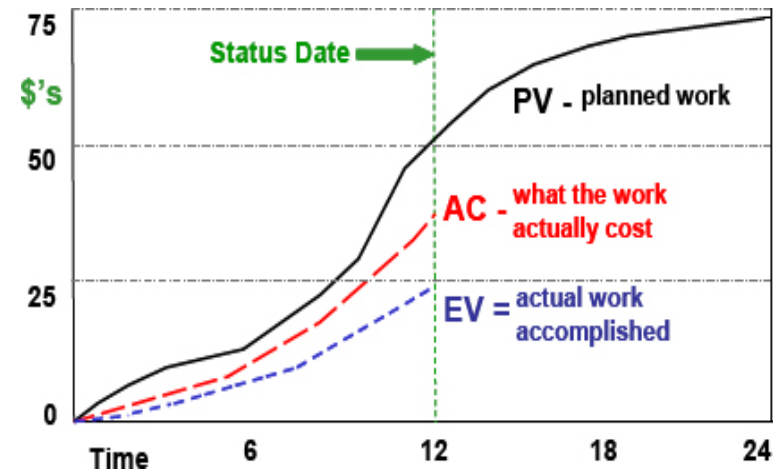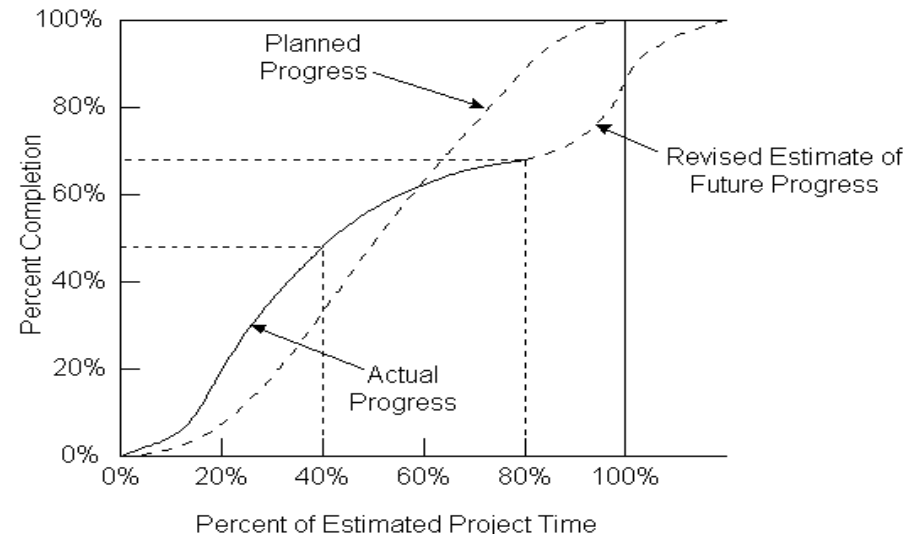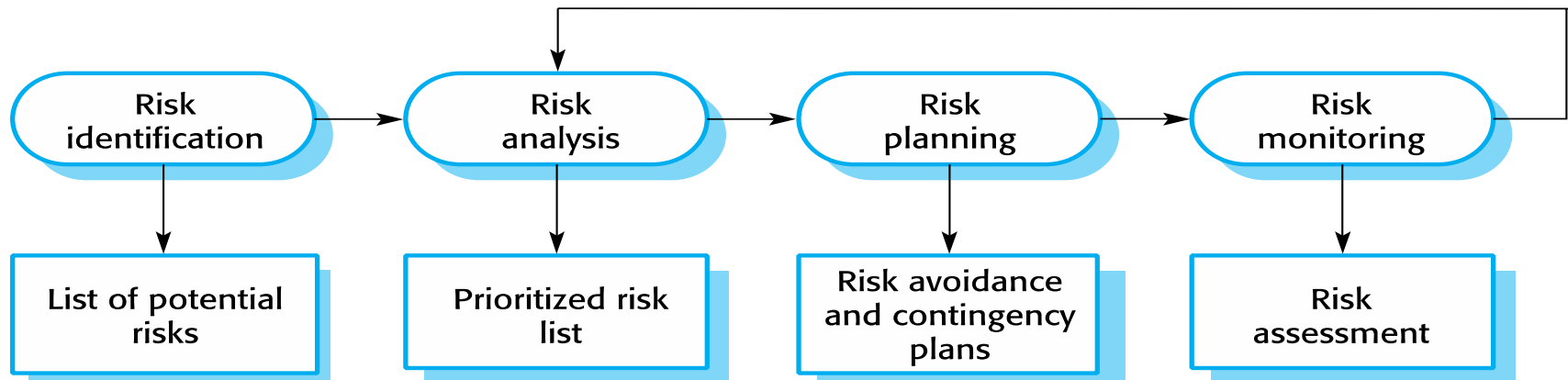
EFFORT RECORDING EXAMPLE

| Effort Estimation and Tracking													
		Effort (Person hours)											
MAIN ACTIVITY	Sub-tasks	Hong		Jane		Fred		Mary		Maya		TOTAL ESTIMATED EFFORT per activity	TOTAL ACTUAL EFFORT per activity
	Sub-tasks	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actual		
Requirements													
	Analysis	5	9	5	4	5	6	5	2	5	5	25	26
Design													
	Ux design	15		10		5		2		7		39	
	Architecture design	3		0		15		10		7		35	
	Database design	0		0		5		20		7		32	
	Architecture documentation (SAD)	10		10		10		2		7		39	
	Detailed design (SADD)	5		15		10		2		7		39	
Implementation													
	See students list feature	5		4		11		12		8		40	
	Syllabus feature	20		5		11		15		5		56	
	Assignment feature	15		2		11		15		7		50	
	Gradebook feature	10		2		11		15		8		46	
	Other features	10		5		15		10		10		50	
Testing													
	Unit testing	5		10		5		3		10		33	
	Integration testing	15		15		1		3		10		44	
	System testing	3		15		1		3		10		32	
	Acceptance testing	5		10		1		3		10		29	
Documentation	User manual	2				5		3		4		14	
Overhead	Project Management	20	1	5	0.5	5	1	5	0	15	1.5	50	4
	Other random overhead	10	0.5	10	0.5	10	1	10	0	10	0	50	2
TOTAL ESTIMATED and ACTUAL EFFORT per student		158	10.5	123	5	137	8	138	2	147	6.5	603	26

RISK MANAGEMENT

- Helps deal with uncertainties and unexpected events in the project
- Risk management activities:
  - Anticipate risks
    - Estimate their probability of occurrence (likelihood) – e.g., very low, low, moderate, high or very high
  - Understand the impact of these risks on the project, the product and the business
    - Impact magnitude – e.g., serious, tolerable or insignificant
  - Plan and execute steps to avoid risks

```
Risk              Risk           Risk            Risk
identification →  analysis  →    planning   →    monitoring
     ↓               ↓              ↓                ↓
List of        Prioritized     Risk avoidance    Risk
potential      risk list       and contingency   assessment
risks                          plans
```

Risk management activities must be performed at the beginning AND throughout the project
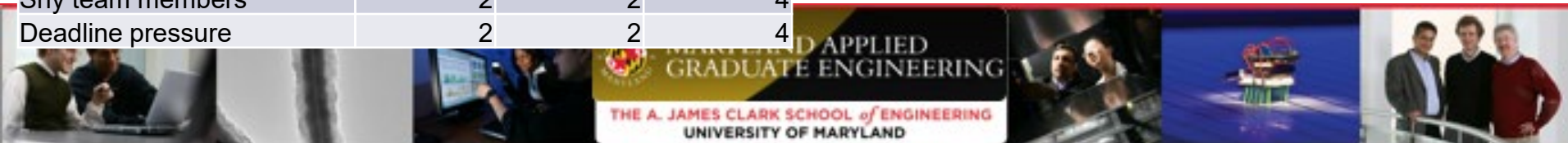
RISK PROBABILITY AND IMPACT
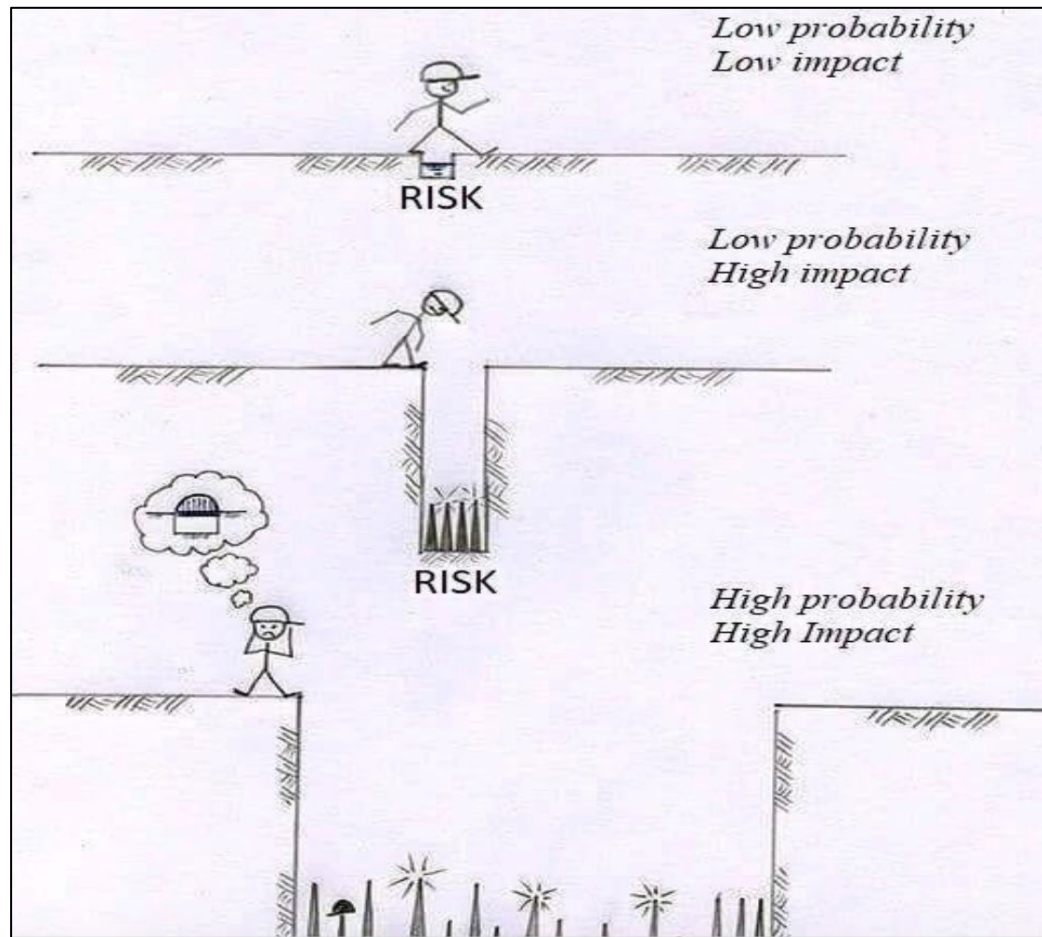
RISK MANAGEMENT EXAMPLE

Risk Management worksheet in the class template

Risk description	Probability (Low=1, Medium=2, High=3)	Impact (Low=1, Medium=2, High=3)	Score (Probability x Impact)	Top 5 Priority Risks	Mitigation actions
				Miscommunication	Record all project meetings and document decisions and action items
Technical Risk				One of the team member drops the course	Negotiate project scope with instructor
Unfamiliarity with Java Spring	2	3	6	Availability of team members	Discuss and work out a time slot that works for everyone
Unfamiliarity with Angular.js	2	3	6	Unfamiliarity with Angular.js	Learn angularjs basic concepts and conduct knowledge sharing sessions
Complex design	1	3	3	Unfamiliarity with React	Learn React and conduct knowledge sharing sessions
Component Integration Failure	2	3	6		
Management Risk					
Inclement weather	1	2	2		
One of the team member drops the course	3	3	9		
Team Communication	1	3	3		
Availability of team member	3	3	9		
Scope creep	1	3	3		
People Risk					
Miscommunication	3	3	9		
Shy team members	2	2	4		
Deadline pressure	2	2	4		

PEOPLE MANAGEMENT

- Team assembly
  - Right number of people with with right skills
- Team management

- Team efficiency factors
  - Good communication - crucial
  - Individuals' motivation
    - Interaction with other people
    - Recognition of management and their peers,
    - Being given opportunities for personal development

PEOPLE MANAGEMENT EXAMPLE

- Worksheets *Skills*, *Roles and Responsibilities*, *Team Operating Procedures* in the class template

Skills	Team member Name
HTML+CSS, Project Management, JS/Node.js, Java, C++/.net	Jane
Angular, HTML/CSS, Node.js, Docker, Java Servlet, MySQL, Mongo	Hong
Java, Python, Angular	Mary
C, Java	Fred
Java Some experience with C++, Python3, HTML, CSS, Javascript, Work experience as software Tester	Maya

PEOPLE MANAGEMENT EXAMPLE (CONTINUED)

Role	Team Member Name (Primary, Backup)	Responsibilities
Project Manager	Mary(Primary), Hong(Backup)	Work with the team to make sure software artifacts are completed and submitted by the deadline. Serve as the main point of communication with the instructors. Ensures team building and communication. In charge with the Project Plan. Collects effort from team members and records in the tracking sheet. Monitors risks.
Ux Lead	Jane(Primary), Fred(Backup)	Coordinate Ux activities. Responsible for integration and submission of Ux artifacts.
Architecture Design Lead	Fred(Primary)	Coordinate design and documentation of the architecture of the system and SAD submssion.
Detailed Design Lead	Maya(Primary), Jane(Backup)	Coordinate design and documentation of the detailed design of the system and SADD submssion.
Implementation Lead	Hong (Primary)	Coordinate implementation and integration of all components and submit code
Test Lead	Jane(Primary), Fred(Backup)	Coordinate development, documentation, and execution of system test cases. Submit test cases.
Database Lead	Fred(Primary)	Work with design and implementation leads to design and implement database
Documentation Lead	Maya(Primary)	Compile, review, and submit documentation

PEOPLE MANAGEMENT **EXAMPLE** (CONTINUED)

Team operating procedures

How will the team communicate?	Google Hangouts/Piazza
How often?	Weekly
Meeting times?	Weekends/ before the class
How will the team collaborate?	GitHub/ Jira
How are decisions made?	Team discussions; Majority agreement (or Activity lead can veto...)
How are decisions documented?	Google docs

PROJECT ENVIRONMENT EXAMPLE

Management/Collaboration/Communication Activity	Selected Tool(s)
Management/Collaboration	Google docs/drive
Communication	Wechat
Engineering Activity	Selected Tool(s)
Version Control	GitHub
Modeling	Lucidchart

PROJECT MANAGEMENT FOR THE CLASS PROJECT

- Develop and revise your Project Plan

- Revisit your Project Plan at the end of each phase
  - And revise - if needed

- Track effort and progress
  - Keep collecting and recording (individual) and team effort for each activity

- Monitor and update risks - periodically
  - *Perform* risk mitigation, as needed

- Report at the end of each phase
  - Report overall analysis at the end of the project

www.shutterstock.com · 127880048