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Computing 3 Management

Lecture 4
Managing IT Project: Cost

Semester 1, 2021
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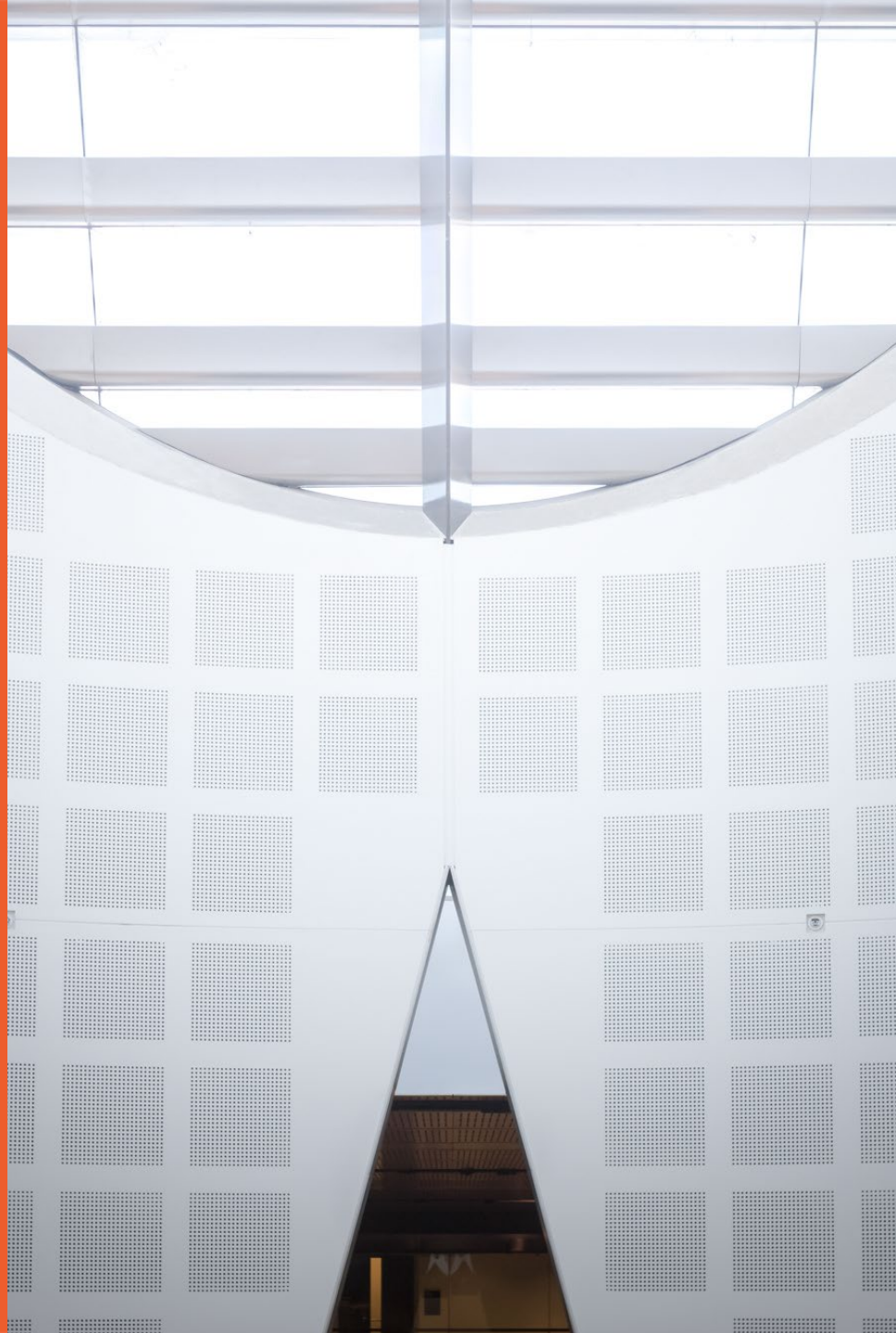
THE UNIVERSITY OF SYDNEY

Source:
Schwalbe, K, Information Technology Project Management (9th Edition). Cengage Learning, 2019



Recapture From Lecture 3

We discussed **Managing IT Project: Time**

- Time Management
- Network Diagram
- CPM
- PERT

Where Are We Now ? -- Course map

Week	Topics/Activities
Week 1	Introduction to IT project management
Week 2	Managing IT project: requirements and scope
	Other: Form Assignment Groups
Week 3	Managing IT project: time
Week 4	Managing IT project: cost
Week 5	Managing IT project: quality
Week 6	Managing IT project: risk
Week 7	Managing IT project: communication, leadership and governance
Week 8	Introduction to services model and services management
	Submission due for Group Assignment
Week 9	IT service management functions and processes
Week 10	IT service lifecycle
Week 11	Knowledge Test
Week 12	IT service delivery tools, standards, and practices
Week 13	Course Review

What Will We Do Today ?

- Lecture
  - Plan Cost Management
  - Estimate Cost
  - Determine Budget
  - Control Costs

- Class activities
  - Critical Thinking / Problem Solving
  - Tools to use: https://padlet.com
    https://answergarden.ch

- Assessment
  - Tutorial: No separate practices provided during the tutorials in weeks 5-8 . All teams will work on their group projects.

  - Assignment: Group project is due in week 8
- Announcement (if any): ?

Learning Objectives

- Discuss the importance of project cost management
- Explain basic project cost management principles, concepts, and terms

- Describe the processes of planning cost management
- Discuss the processes of determining a budget

What is Cost?

- **Cost** is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange

- Costs are usually measured in monetary units like dollars

Project Cost Management

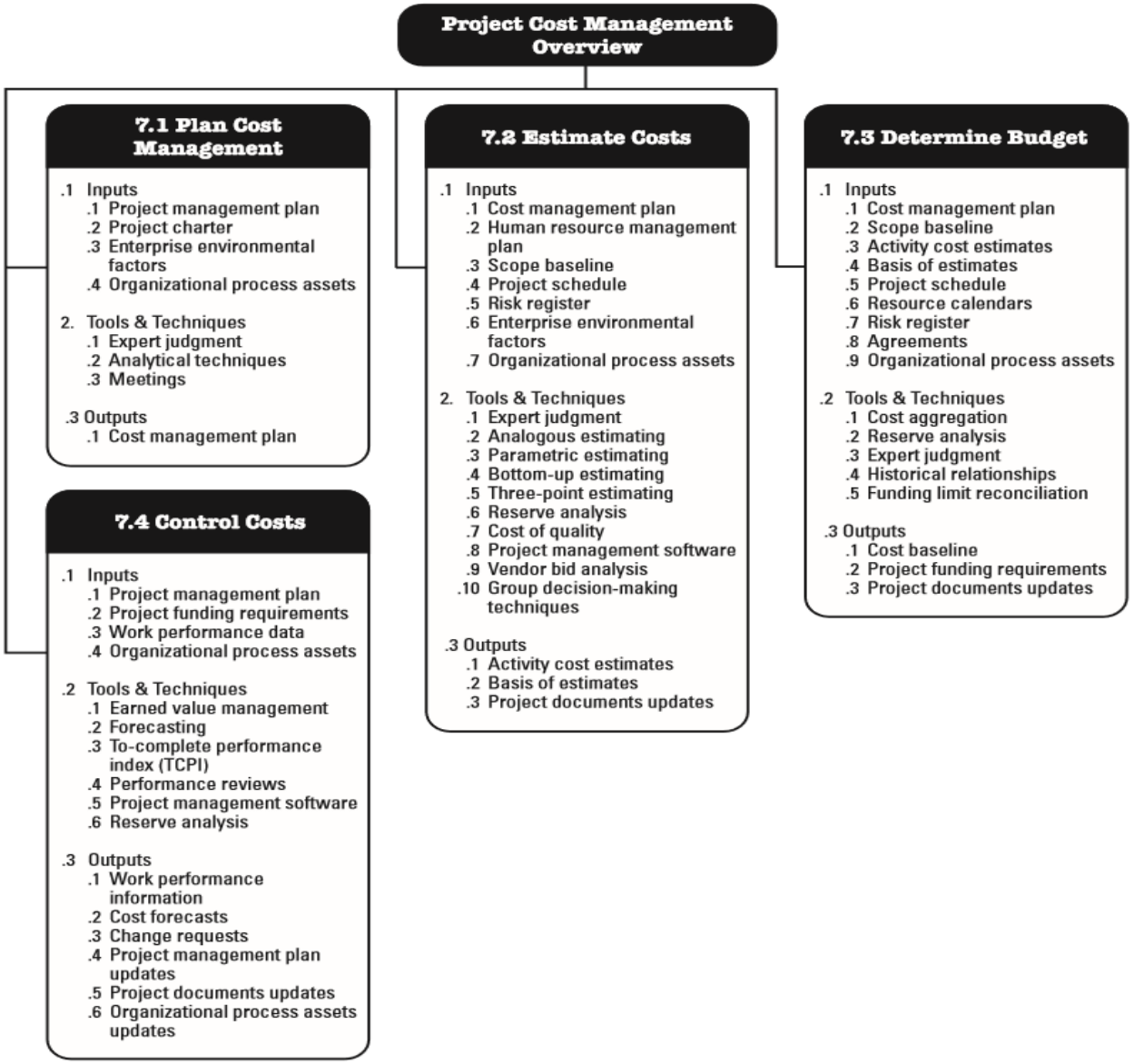
- **Project cost management** includes the processes required to ensure that the project is completed within an approved budget

- IT projects have a poor track record for meeting budget goals. Why?

Write your response here

https://docs.google.com/document/d/1X22Qs-mtIKwIxN-ygDPkpQqOg-w8o5rIHSYKGgnrtAw/edit?usp=sharing

Project Cost Management Overview



Project Cost Management Processes

- **Planning cost management:** determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost.
- **Estimating costs:** developing an approximation or estimate of the costs of the resources needed to complete a project

- **Determining the budget:** allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
- **Controlling costs:** controlling changes to the project budget

Financial Terms To Use

- Most members of an executive board better understand and are more interested in financial terms than IT terms, so IT project managers must speak their language (financial terms)
  - **Profits** are revenues minus expenditures
  - **Profit margin** is the ratio of revenues to profits, net income divided by revenue, or net profits divided by sales
  - **Life cycle costing** considers the total cost of ownership, or development plus support costs, for a project
  - **Cash flow analysis** determines the estimated annual costs and benefits for a project and the resulting annual cash flow

Costs and Benefits

- **Tangible costs** or **benefits** are those costs or benefits that an organization can easily measure in dollars
- **Intangible costs** or **benefits** are costs or benefits that are difficult to measure in monetary terms

- **Direct costs** are costs that can be directly related to producing the products and services of the project
- **Indirect costs** are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project

- **Sunk cost** is money that has been spent in the past; when deciding what projects to invest in or continue, you should *not* include sunk costs

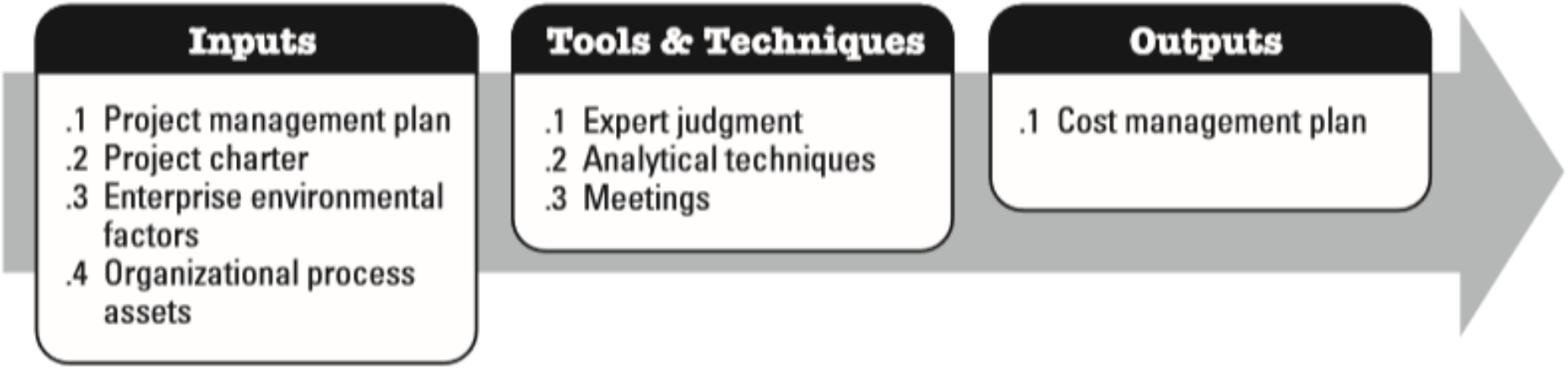
What Is Reserve?

- **Reserves** are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict
  - **Contingency reserves** allow for future situations that may be partially planned for (sometimes called **known unknowns**) and are included in the project cost baseline
  - **Management reserves** allow for future situations that are unpredictable (sometimes called **unknown unknowns**

Planning Cost Management

- The project team uses expert judgment, analytical techniques, and meetings to develop the cost management plan
- A cost management plan includes:
  - Level of accuracy and units of measure
  - Organizational procedure links
  - Control thresholds
  - Rules of performance measurement
  - Reporting formats
  - Process descriptions

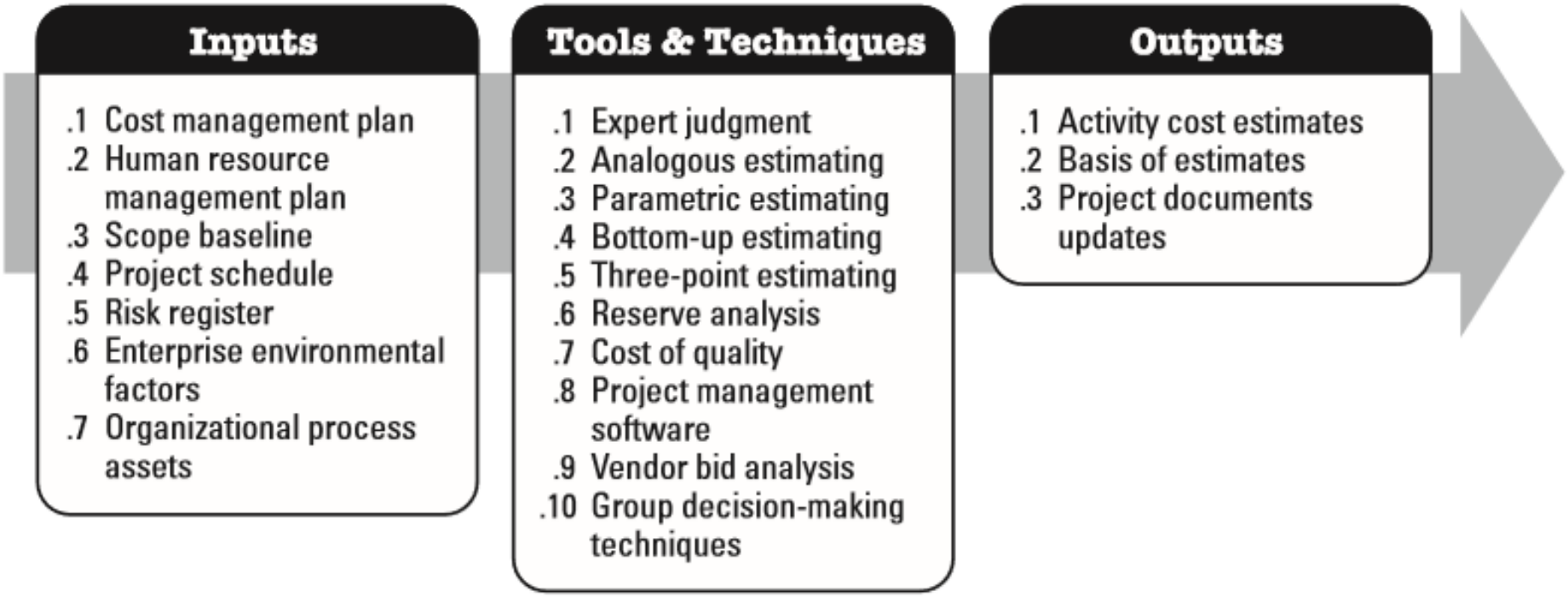
Planning Cost Management



Estimating Costs

- Project managers must take cost estimates seriously if they want to complete projects within budget constraints
- It's important to know:
  - the types of cost estimates,
  - how to prepare cost estimates,
  - typical problems associated with IT cost estimates

Estimating Costs



Estimating Costs -- Tools and Techniques

- Basic tools and techniques for cost estimates:
  - **Analogous** or **top-down estimates:** use the actual cost of a previous, similar project as the basis for estimating the cost of the current project
  - **Bottom-up estimates:** involve estimating individual work items or activities and summing them to get a project total
  - **Parametric modeling** uses project characteristics (parameters) in a mathematical model to estimate project costs

Estimating Costs -- Issues with IT Projects

- Estimates are done too quickly
- People lack estimating experience
- Human beings are biased toward underestimation
- Management desires accuracy

Things to Know for Cost Estimate

- Know what it will be used for,
- Gather as much information as possible,
- Clarify the ground rules and assumptions for the estimate

- If possible, estimate costs by major WBS categories
- Create a cost model to make it easy to make changes to and document the estimate

Sample Cost Estimate

Surveyor Pro Project Cost Estimate Created October 5

	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	WBS Level 2 Totals	% of Total
WBS Items					
1. Project Management				**$306,300**	**20%**
Project manager	960	$100	$96,000		
Project team members	1920	$75	$144,000		
Contractors (10% of software development and testing)			$66,300		
2. Hardware				**$76,000**	**5%**
2.1 Handheld devices	100	$600	$60,000		
2.2 Servers	4	$4,000	$16,000		
3. Software				**$614,000**	**40%**
3.1 Licensed software	100	$200	$20,000		
3.2 Software development*			$594,000		
4. Testing (10% of total hardware and software costs)			$69,000	**$69,000**	**5%**
5. Training and Support				**$202,400**	**13%**
Trainee cost	100	$500	$50,000		
Travel cost	12	$700	$8,400		
Project team members	1920	$75	$144,000		
6. Reserves (20% of total estimate)			$253,540	**$253,540**	**17%**
Total project cost estimate				**$1,521,240**	

*See software development estimate.

Sample Cost Estimate -- Software Development

1. Labor Estimate	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	Calculations
Contractor labor estimate	3000	$150	$450,000	3000 * 150
Project team member estimate	1920	$75	$144,000	1920 * 75
Total labor estimate			**$594,000**	Sum above two values
2. Function point estimate	Quantity	Conversion Factor	Function Points	**Calculations**
External inputs	10	4	40	10 * 4
External interface files	3	7	21	3 * 7
External outputs	4	5	20	4 * 5
External queries	6	4	24	6 * 4
Logical internal tables	7	10	70	7 * 10
Total function points			**175**	Sum above function point values
Java 2 language equivalency value			46	Assumed value from reference
Source lines of code (SLOC) estimate			8,050	175 * 46
Productivity×KSLOC^Penalty (in months)			29.28	3.13 * 8.05^1.072 (see reference)
Total labor hours (27 hours/function point)*			4,725	27*175
Cost/labor hour ($120/hour)			$120	Assumed value from budget expert
Total function point estimate			**$567,000**	4,725 * 120

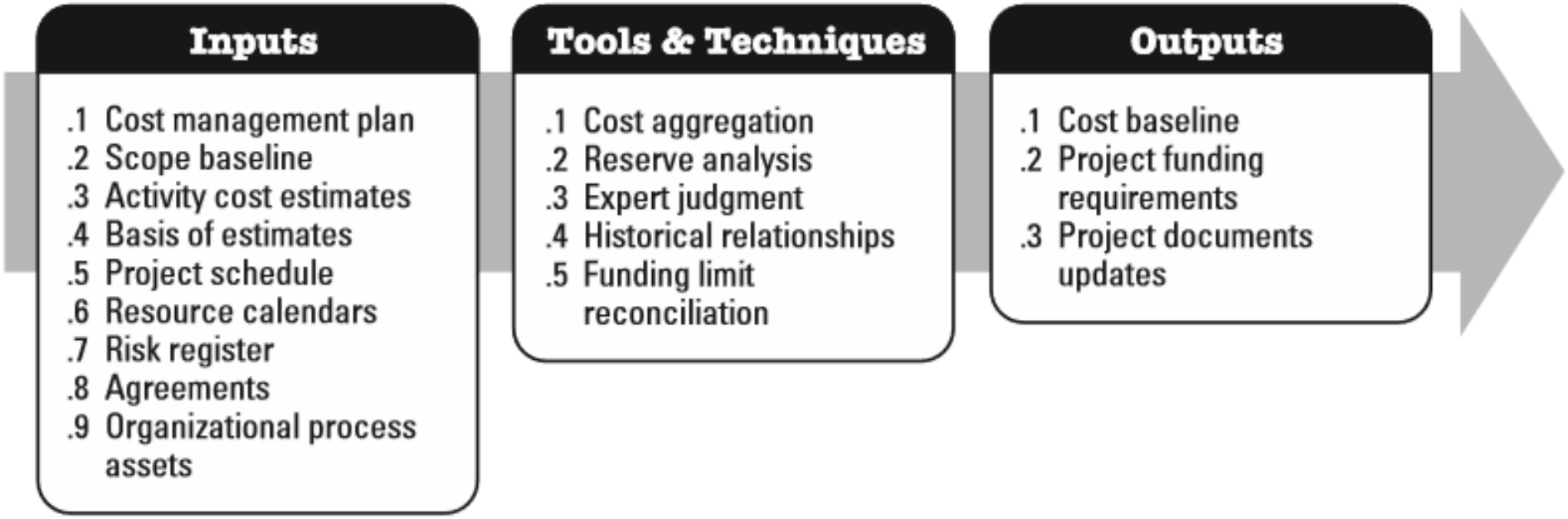
* Based on historical data

Determining the Budget

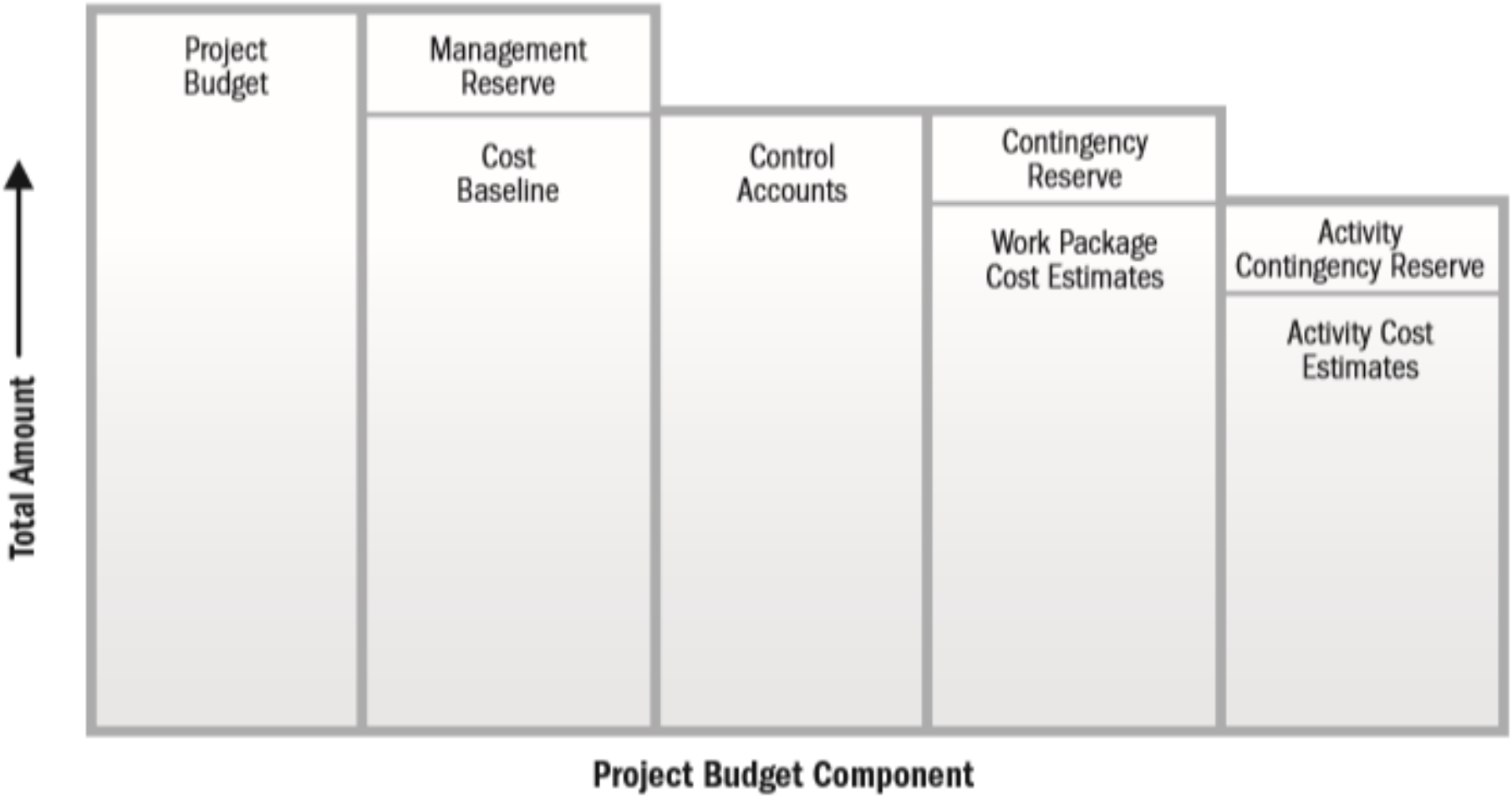
- Cost budgeting involves allocating the project cost estimate to individual work items over time
- The WBS is a required input to the cost budgeting process since it defines the work items

- Important goal is to produce a **cost baseline**
  - a time-phased budget that project managers use to measure and monitor cost performance

Determining the Budget



Project Budget Components



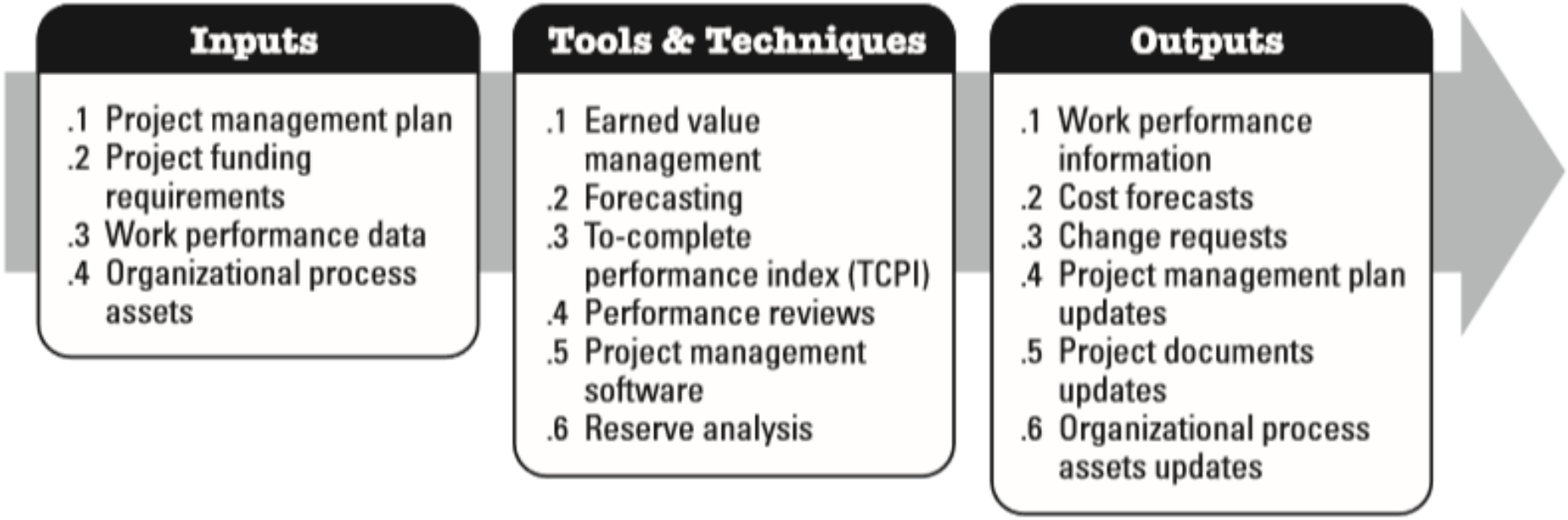
Cost Baseline – Sample Project

WBS Items	1	2	3	4	5	6	7	8	9	10	11	12	Totals
1. Project Management													
1.1 Project manager	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	96,000
1.2 Project team members	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	144,000
1.3 Contractors		6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	66,300
2. Hardware													
2.1 Handheld devices				30,000	30,000								60,000
2.2 Servers				8,000	8,000								16,000
3. Software													
3.1 Licensed software				10,000	10,000								20,000
3.2 Software development		60,000	60,000	80,000	127,000	127,000	90,000	50,000					594,000
4. Testing			6,000	8,000	12,000	15,000	15,000	13,000					69,000
5. Training and Support													
5.1 Trainee cost									50,000				50,000
5.2 Travel cost									8,400				8,400
5.3 Project team members							24,000	24,000	24,000	24,000	24,000	24,000	144,000
6. Reserves				10,000	10,000	30,000	30,000	60,000	40,000	40,000	30,000	3,540	253,540
Totals	20,000	86,027	92,027	172,027	223,027	198,027	185,027	173,027	148,427	90,027	80,027	53,567	1,521,240

Controlling Costs

- Project cost control includes
  - Monitoring cost performance
  - Ensuring that only appropriate project changes are included in a revised cost baseline
  - Informing project stakeholders of authorized changes to the project that will affect costs

Controlling Costs



Earned Value Management (EVM)

- Earned value management (EVM) is a technique that combines **scope, time, cost and resource** measurements to assess project performance and progress.

- You must enter actual information periodically to use EVM

- It is a common method of measuring performance of projects

Earned Value Management

- The **planned value (PV)**, formerly called the budgeted cost of work scheduled (BCWS), also called the budget, is that portion of the approved total cost estimate planned to be spent on an activity during a given period

- **Actual cost (AC)**, formerly called actual cost of work performed (ACWP), is the total of direct and indirect costs incurred in accomplishing work on an activity during a given period

- The **earned value (EV)**, formerly called the budgeted cost of work performed (BCWP), is an estimate of the value of the physical work actually completed
- EV is based on the original planned costs for the project or activity and the rate at which the team is completing work on the project or activity to date

Earned Value Management

- **Schedule variance (SV)** is a measure of schedule performance expressed as the difference between the earned value and the planned value. Equation: SV = EV – PV
- **Cost variance (CV)** is the amount of budget deficit or surplus at a given point in time, expressed as the difference between earned value and the actual cost. Equation: CV= EV − AC.

- The **schedule performance index (SPI)** is a measure of schedule efficiency expressed as the ratio of earned value to planned value. Equation: SPI = EV/PV
- The **cost performance index (CPI)** is a measure of the cost efficiency of budgeted resources, expressed as a ratio of earned value to actual cost. Equation: CPI = EV/AC

Understanding Earned Value Numbers

- Negative numbers for cost and schedule variance indicate problems in those areas
- CPI and SPI less than 100% indicate problems
- Problems mean the project is costing more than planned (over budget) or taking longer than planned (behind schedule)

- The **budget at completion** (BAC) is the original total budget for the project
- The CPI can be used to calculate the **estimate at completion** (EAC = BAC/CPI)—an estimate of what it will cost to complete the project based on performance to date.

Earned Value Calculation

Your budgeted cost of an IT project is $100,000, and it needs to be completed in 6 months. After two months of completion, you, as an IT project manager, wish to assess the project performance and progress. You have found that your team has completed 30% of the project works and spent $40,000. At this stage, your planned completion is 35%. How is your project performing?

Budget at Completion **(BAC)=** 100,000
AC = 40,000
PV = Planned Completion (%) * BAC = 35% * $100,000 = $35,000
EV = Actual Completion (%) * BAC = 30% * $100,000 = $30,000

CPI=EV/AC = 30,000/40,000 = **0.75,** this means that for every 1 dollar your team spent, the project is producing only 75% of project work.

SPI= EV/PV = 30,000/35,000 = **0.86,** this means that for every hour of work, the project team is completing only 0.86 hours.

Performance: ?

IT Project appraisal – decision-making

Q: Which project should your organization choose?

Net Present Value (NPV)

Benefit Cost Ratio (BCR)

Budget/Cost

IT Project	NPV	B/C ratio	Budget/Cost
Project A	70,000	1.01	200,000
Project B	72,000	1.12	250,000
Project C	80,000	1.20	300,000

Group Exercise -- Cost Modeling, Baseline, Cash Flow

- Prepare cost model for the project. Use the WBS provided, and be sure to document your assumptions in preparing the cost model.
- Assume a labor rate of $100/hour for the project manager and $60/hour for other project team members.
- Assume that none of the work is outsourced, labor costs for users are not included, and there are no additional hardware costs. The total estimate should be $200,000.

1. Project management
2. Requirements definition
3. Web site design
   - 3.1 Registration for recreational programs
   - 3.2 Registration for classes and programs
   - 3.3 Tracking system
   - 3.4 Incentive system
4. Web site development
   - 4.1 Registration for recreational programs
   - 4.2 Registration for classes and programs
   - 4.3 Tracking system
   - 4.4 Incentive system
5. Testing
6. Training, rollout, and support

(a) Cost Modeling

You may use following structure to prepare cost model/budget

Cost/Budget table

WBS/Category	Effort or hours	Cost/hr.	Type of Cost	Additional Cost	Contingency	Total
Grand Total						

(b) Cost Baseline

- Using the cost model you created earlier, prepare a cost baseline by allocating the costs by WBS for each month of the project.
- The following is a sample structure provided to guide you, your team may choose a different structure.

Cost baseline

WBS item	month1	Month2	Month3	Month4	Total

(c) Cash Flow

- Your team should now develop a cash flow table. The following is a sample structure provided to guide you, you may choose a different structure.

Cash Flow Table:

Month	Planned Spending	Accumulative Spending	Contingency	Total Planned Spending

Class Quiz

- What would you need to determine the budget for your project?

- Write your response here:

https://docs.google.com/document/d/16LF79F49etAwtrzMwUL3xHsG44bLI3t1tAcem9EAkrM/edit?usp=sharing

Scenario Analysis

- Review the scenario of Self-driving Uber Issue, in week 4 module on Canvas

Room A: write your response here

https://docs.google.com/document/d/1SP46mlufH20BkBUK3KTXSFfLaCM9kumSMuTMv4j6VXQ/edit?usp=sharing

Room B: write your response here

https://docs.google.com/document/d/1rPf-4APbFX5-LAf7CRb409LIkHAxv7wpxF7Ysi32ghE/edit?usp=sharing

Discussion on Group Projects

4.5. MARKING CRITERIA

Assessment Element	Sub-Elements	Weight
1. Project Charter	• Project details (Brief background and objectives) • Project deliverables • Project cost (Total cost) • Project time (Total time) • Roles and responsibilities of each student	**/10**
2. Scope	• Project scope statement • Milestones	**/10**
3. Literature Review	• Appropriate literature selection • Identification of knowledge gaps • Analysis and consolidation • Summary of literature review • Citation (appropriate, extensive use)	**/15**
4. Work Breakdown Structure *(3 level)*	• Work Packages/ Activities/Tasks • Provide a brief description of each of the activities	**/10**
5. Project Schedule/Time Modeling	• Detailed schedule (Gantt chart) • Proper sequencing and task Dependencies	**/10**
6. Cost Modeling	• Detailed budget table • Identify cost types and briefly describe them • Direct or indirect project costs • Detailed cost baseline	**/10**
7. Communication	• Communication plan	**/10**
8. Quality Management	• Quality management plan	**/10**
9. Risk Management	• A brief risk register, see the example provided on Canvas	**/10**
10. Reflections of leadership practices on teamwork	• Briefly describe how each member played a leadership role in the teamwork. Provide 1-2 sentences from each team member while keeping them anonymous (e.g., member A, member B, etc.).	**/5**
	Total	**/100**

Lecture Summary

- Project cost management is a traditionally weak area of IT projects, and project managers must work to improve their ability to deliver projects within approved budgets

- Project cost management processes include
  - Plan cost management
  - Estimate costs
  - Determine the budget
  - Control costs

Announcement (if any)

Q &A?

Thanks everyone !