Chapter 5 : Cost Management

1. Estimating
2. Budgeting
3. Control

Cost management is one of the fundamental and yet most challenging tasks for a project manager.

Chapter 5 : Cost Management

- **What is cost management in project management?**
  → Cost management is the process of estimating, budgeting and controlling the costs in a project.

  It allows a business to predict coming expenses in order to reduce the chances of it going over budget.

- **Projected costs** are calculated during **the planning phase of a project** and must be approved before work begins. As the project is executed so **in the execution phase** , expenses are documented and tracked, called **actual costs**.

- Once the project is completed, **projected costs vs. actual costs are compared**, providing benchmarks for future cost management plans and project budgets.

Chapter 5 : Cost Management

1. **Estimating**
2. **Budgeting**
3. **Control**

5.1 Cost Estimating

- Estimate Costs(= **Projected costs)** involves developing an estimate of the costs of the resources (ALL resources, not only human) required to complete project activities

  It builds **a Cost baseline** → ie original plan with an approved + / - approved changes (+/- % of variation allowed)

  Estimate costs is needed to :
  - Decide to pursue or not
  - Define the Project Profit (part of Return On Investment(ROI))

- There are **two main approaches** you can take when creating a budget:

  - **Top-down approach**: deciding how much the project will cost and dividing the amount between the work packages.

  - **Bottom-up approach**: estimating the total cost of the project by costing the lowest-level work packages and rolling up.

  → Both approaches have their advantages and disadvantages and as a project manager, you will be faced with both at some time in your career.

5.1 Cost Estimating

- **Top-Down Budgeting Approach** :
  - The decision is made, often by senior project managers / PMO manager, about how much the project should cost.

  - This amount is divided between the work packages.
    Comment : this approach is more than guessing; you need to explain how you will do the work within the allocated amount of budget for each work package. Prior experience from other projects will play a part in validating the budget allocation for work packages. It should be asked whether the budget looks realistic based on experience from past projects.

  - The advantage of the top-down budgeting approach is that it focuses on achieving the project within the budget allocated and **leads to efficiencies and reduction in wasteful practices**.

  - A disadvantage of the top-down budgeting approach is that it assumes that the person creating the budget has enough knowledge and expertise to make a reasonable cost estimate. If they do not, conflict may occur when a person required to execute the project is given an unrealistic budget that is insufficient to deliver the project. There is a risk of deliberately low budgets created to encourage cost savings.

5.1 Cost Estimating

- **Bottom-Up Budgeting Approach**
  - The project cost is based on the lowest-level work packages and rolled up to arrive at the total project cost. The direct and indirect costs are calculated for each work package.

  - The advantage of the bottom-up budgeting approach is its accuracy (as long as you have not missed any task or activity). It is good for team morale because the project manager involves the team in budget creation. This approach is sometimes called participative budgeting for this reason.

  - A disadvantage of the bottom-up budgeting approach is the difficulty in getting a full list of tasks and activities needed to complete the project. It is easy to miss some that will be needed and that will later throw the budget out.

5.1 Cost Estimating

- In addition to the top-down and bottom-up budgeting approaches, there are a number of other techniques that project managers use to create their budgets.
  These are several alternative approaches used to create budget estimates:
  - **Analogous Estimating**:
    - This approach uses history from similar projects to create an estimate → the estimator compares the similarities and differences and after he makes adjustments to the costs from the past project to reflect the current project.
    - It is useful in the beginning of the project when there is a minimal amount of information.

  - **Expert Judgment**: linked to Analogous Estimating. This approach can be useful because, with the aid of expert knowledge and experience, you can account for factors that are not always apparent to non-experts.

  - **Supplier Bid Analysis**: This approach compares bids from different suppliers to arrive at a cost estimate for the project.

  - **Parametric Estimating**: This approach uses a statistical relationship between historical data and other variables, such as lines of code in a software application or square footage of a building to calculate an estimate.

5.1 Cost Estimating

- **Three-Point Estimating**: This approach uses the weighted average of three estimates - best-case, most likely case and worst case -to gain a greater degree of control over how the value of a task or activity is calculated.

  - **Most Likely (cM)** : the cost of the activity, based on a realistic effort assessment for the required work and any predicted expenses
  - **Optimistic (cO)** : The activity cost based on analysis of the best scenario for the activity
  - **Pessimistic (cP)** : The activity cost based on analysis of the worst-case scenario of the activity

  Two commonly used formulas are :
  - **Triangular Distribution** : cE = (cO+cM+cP)/3
  - **Beta Distribution** (from a traditional PERT analysis) : cE = (cO+4cM+cP)/6

- **Reserve analysis** : used to determine how much contingency reserve and manage reserve should be include in the project :
  - **Contingency reserve** (also called contingency allowances) = budget allocated for identified risks / part of the budget to address the “knowns/unknowns” (for ex, rework for some project deliverables could be anticipated but the amount of the rework is uncertain) . It can be a percentage of the estimated cost .
  - **Management reserves** = budget allocated for the “unknowns/unknowns” of the project as unforeseen work in the scope of the project.

5.1 Cost Estimating

- Different sources of costs :

  - Human resources
    → associated Man/days or Man/months or FTE (Full time equivalent)
  - Consultant fees
  - Raw materials
  - Software licences
  - Travel
  - Trainings
  - …

  DIRECT COSTS

  - Telephone charges
  - Office space (rent)
  - Office equipment
  - General administration
  - Company insurance

  INDIRECT COSTS

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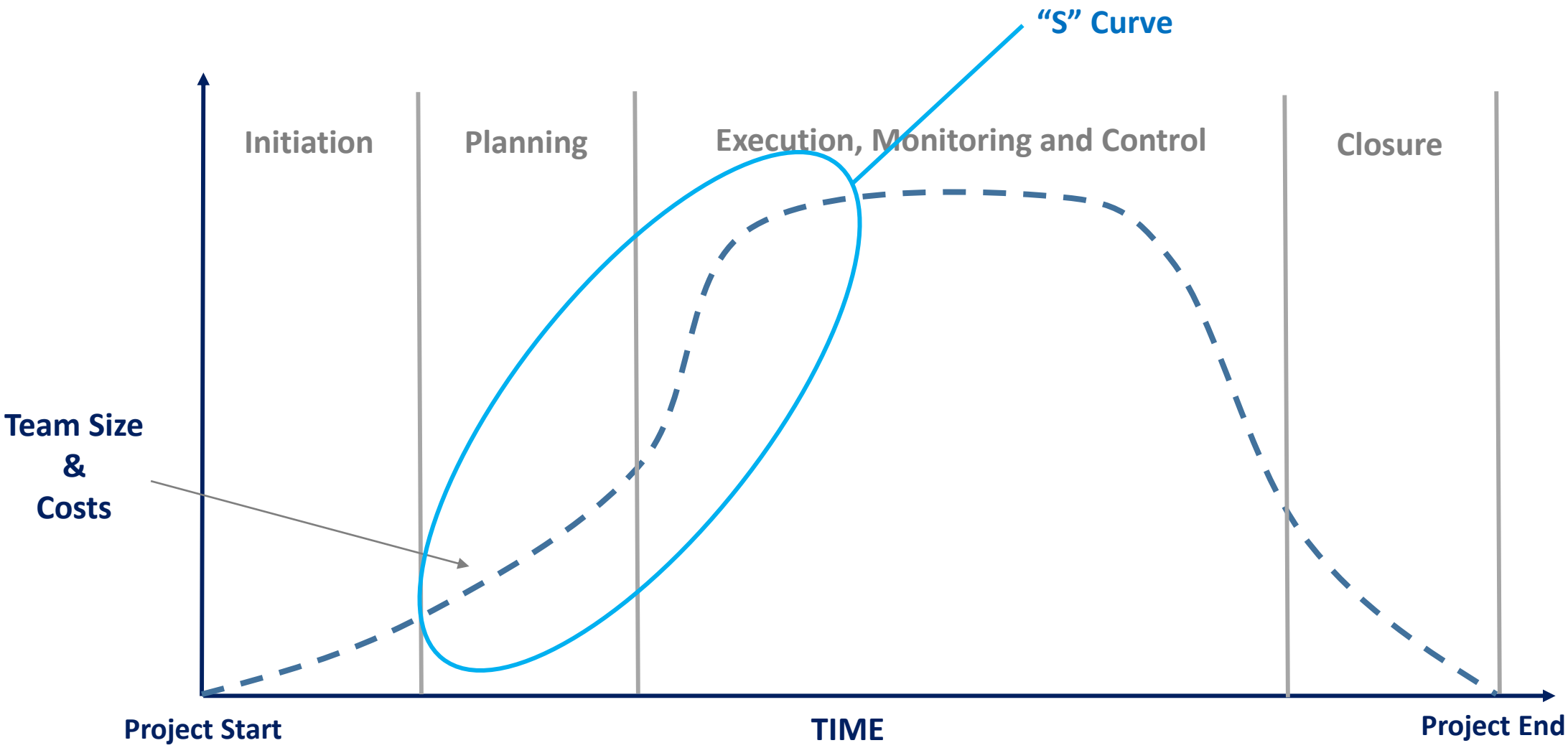
5.2 Cost Budgeting

- **Cost baseline** :
  - according PMBOK ® Guide : « It is the approved version of the time-phase project budget, excluding any management reserves (...) » but **including Contingency reserves**
  ➔ Any change in the baseline is managed through a formal change procedure
  ➔ Basis of comparison versus actuals.

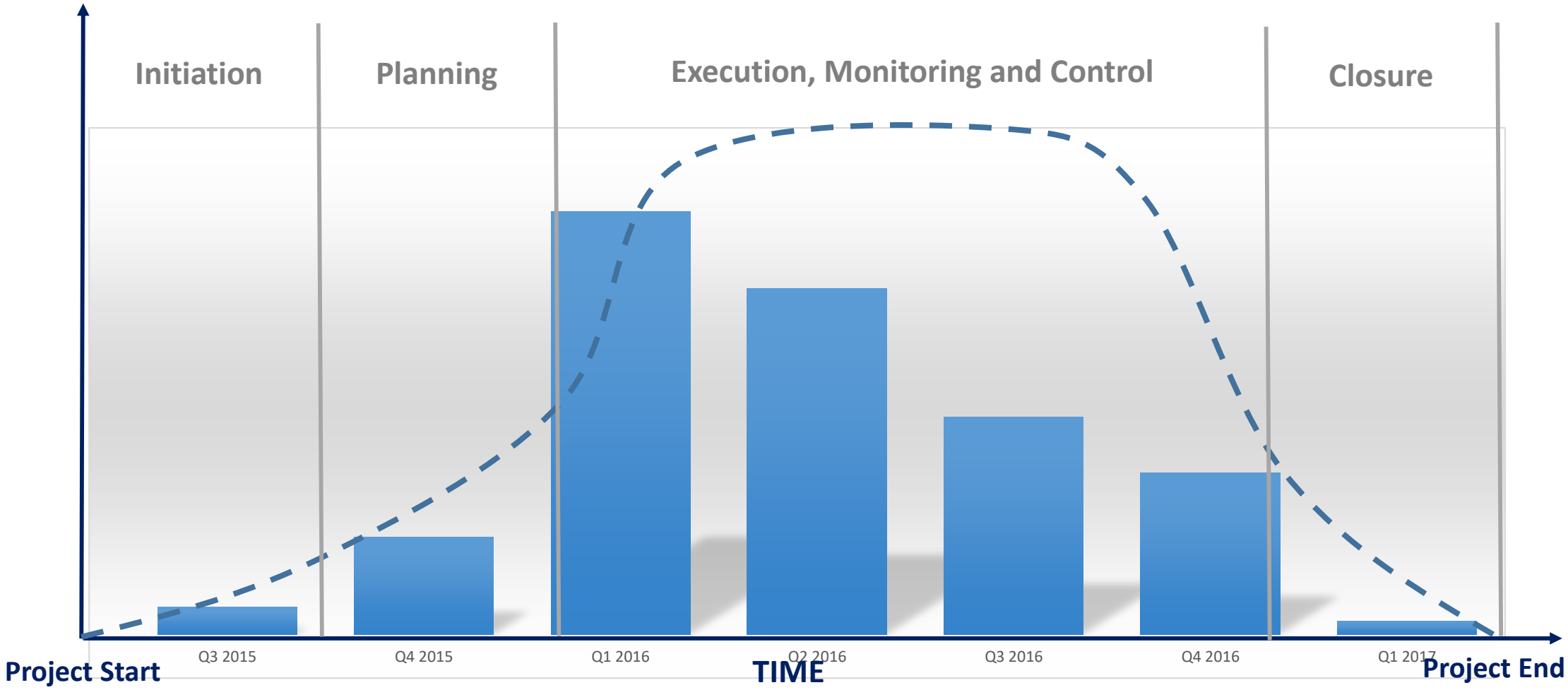
  - It is the total cost estimated of the project

  - Project cost performance will be monitored and controlled against the cost baseline.

5.2 Cost Budgeting



5.2 Cost Budgeting



5.2 Cost Budgeting

EXERCICE (Exercice 3 - CP and Cost_final with correction)

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5.3 Cost Control

- In the **Execution Phase** : **Monitor the status of the Project to update the project costs and manage the changes to cost baseline** → ensure that cost expenditures do not exceed the authorized costs (approved Baseline) and if it is the case, manage the cost baseline change

- **Cost control basics :**

  - Establish cost performance thresholds

  - Monitor cost performances for variance
    - A variance is a deviation from the plan.
    - Variance analysis is a comparison of plan vs actuals to determine where deviations occurred and to take appropriate corrective actions
    - For ex we can define as cost variance threshold :
      - 0 to 5% is acceptable
      - 5 to 10% is a warning
      - 10% ins unacceptable
    - Take corrective actions if the variance trend is deterioring

  - If needed, accurately record changes to baseline

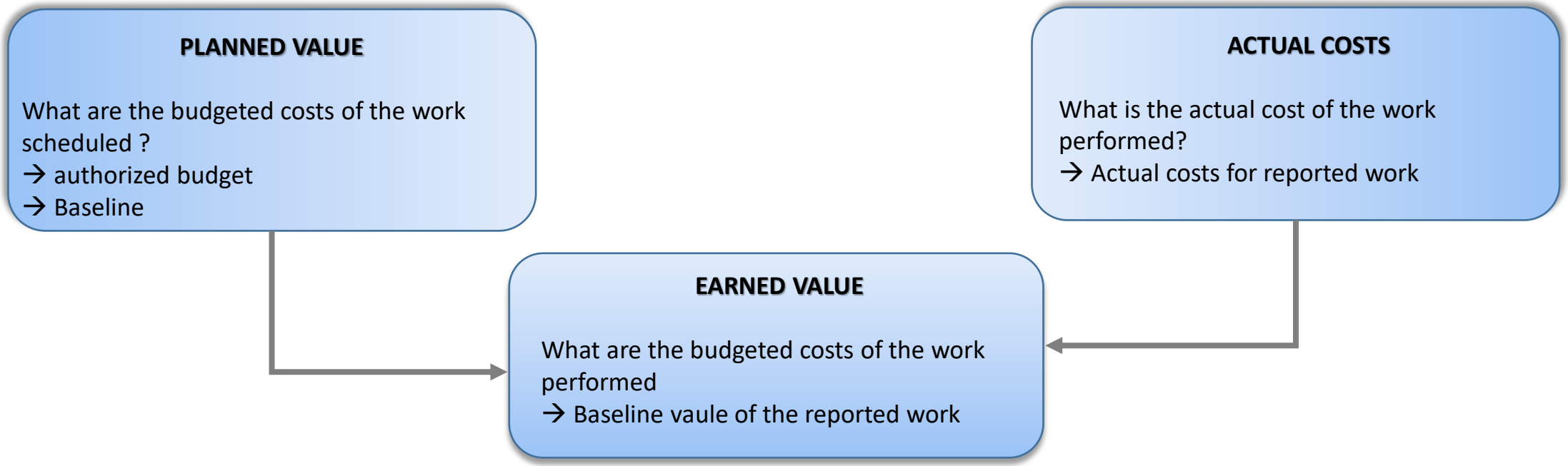
  - Inform stakeholders of changes

5.3 Cost Control

- **Managing Variance includes different steps** :
  - Identify the Variance
    - Earned Value Management
  - Assess the Impact
  - **Identify the rootcause**
  - **Evaluate Corrective action options**
  - **ACT**

5.3 Cost Control

- **Earned Value Management**
  - Earned Value Management has **three basic elements**:
    - **Planned Value (PV)** : Planned Value is the scheduled cost of work planned in a given time. Planned Value is also known as Budgeted Cost of Work Scheduled (BCWS).
    - **Earned Value (EV)** : Earned Value is the budgeted cost of the work performed in a given time. Earned Value is also known as Budgeted Cost of Work Performed (BCWP).
    - **Actual Cost (AC)** : Actual Cost is the actual amount of money spent to date. Actual Cost is also known as Actual Cost of Work Performed (ACWP).



5.3 Cost Control

- **Earned Value Management :**

  With the help of these three elements, you can calculate the following variances and performance index:

  - **Schedule Variance (SV)**= Earned Value – Planned Value

    SV = EV – PV

  - **Cost Variance (CV)** = Earned Value – Actual Cost

    CV = EV – AC

  - **Schedule Performance Index (SPI)** = (Earned Value) / (Planned Value)

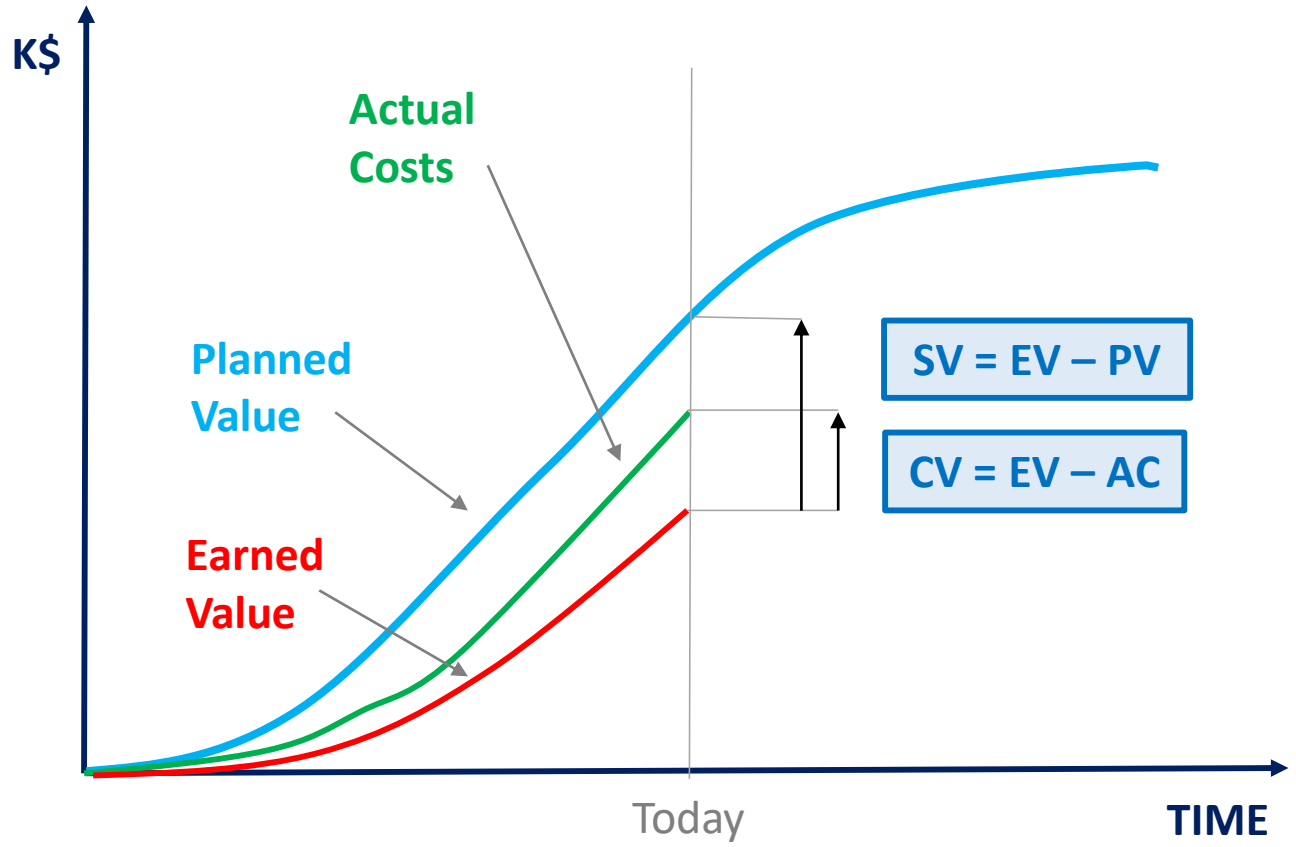
    SPI = EV/PV

  - **Cost Performance Index (CPI)** = (Earned Value) / (Actual Cost)

    CPI = EV/AC

5.3 Cost Control

- **Earned Value Management :**



Conclusion from this graph :

- The project is behind schedule (SV)

- The project is over budget (CV)

5.3 Cost Control

- **Earned Value Management :**

EVM Formula	Good	Bad
SV = EV – PV	+ Variance(ahead of Schedule)	- Variance (behind schedule)
CV = EV – AC	+ Variance (under budget)	- Variance (over budget)
SPI = EV / PV	>1 (ahead of Schedule)	<1 (behind schedule)
CPI = EV / AC	> 1 (under budget)	< 1 (over budget)

5.3 Cost Control

- **Earned Value Management : Exercice 4 - EVM**

5.3 Cost Control

- **Earned Value Management** : It will help you to answer two questions :

  - **Where are we today ?** — - Most frequently you address them, the easier it becomes to take the appropriate corrective actions
  - **Where will we end up ?** — - Variances from a baseline are easier to manage when the variances are small and are detected early

- EVM helps you in Forecasting as well as you can forecast the following:
  - **Estimate at Completion (EAC)** : the total expected budget for the project.
  - **Estimate to Complete (ETC)** : the amount of money from a given point which tells you how much it will cost you complete the rest of the work.
  - **Variance at Completion** : it tells you how much you are under budget or over budget when the project completes.
    Variance at Completion (VAC)= Budget at Completion (BAC) – Estimate at Completion (EAC)

    VAC = BAC – EAC
  - **To Complete Performance Index** : it is the estimate of the cost performance required by the project to meet the project's budget goal.
    TCPI can be calculated by dividing the remaining work by the remaining funds.

    TCPI = (Remaining Work)/(Remaining Funds)

5.3 Cost Control

For your information only

- **Earned Value Management :**

EVM Formula	Good	Bad
SV = EV – PV	+ Variance	- Variance (behind schedule)
CV = EV – AC	+ Variance	- Variance (over budget)
SPI = EV / PV	>1 (ahead of Schedule)	<1 (behind schedule)
CPI = EV / AC	> 1	< 1 (over budget)
EAC = AC+BAC-EV	<BAC	>BAC
VAC=BAC – EAC	+Variance	-Variance
TCPI = (BAC=EV)/(BAC-AC)	<1	>1

Management Costs – Summary