Software Project Management (9 – 20191204)

Mohammed Seyam

Assistant Professor
Information Systems Department
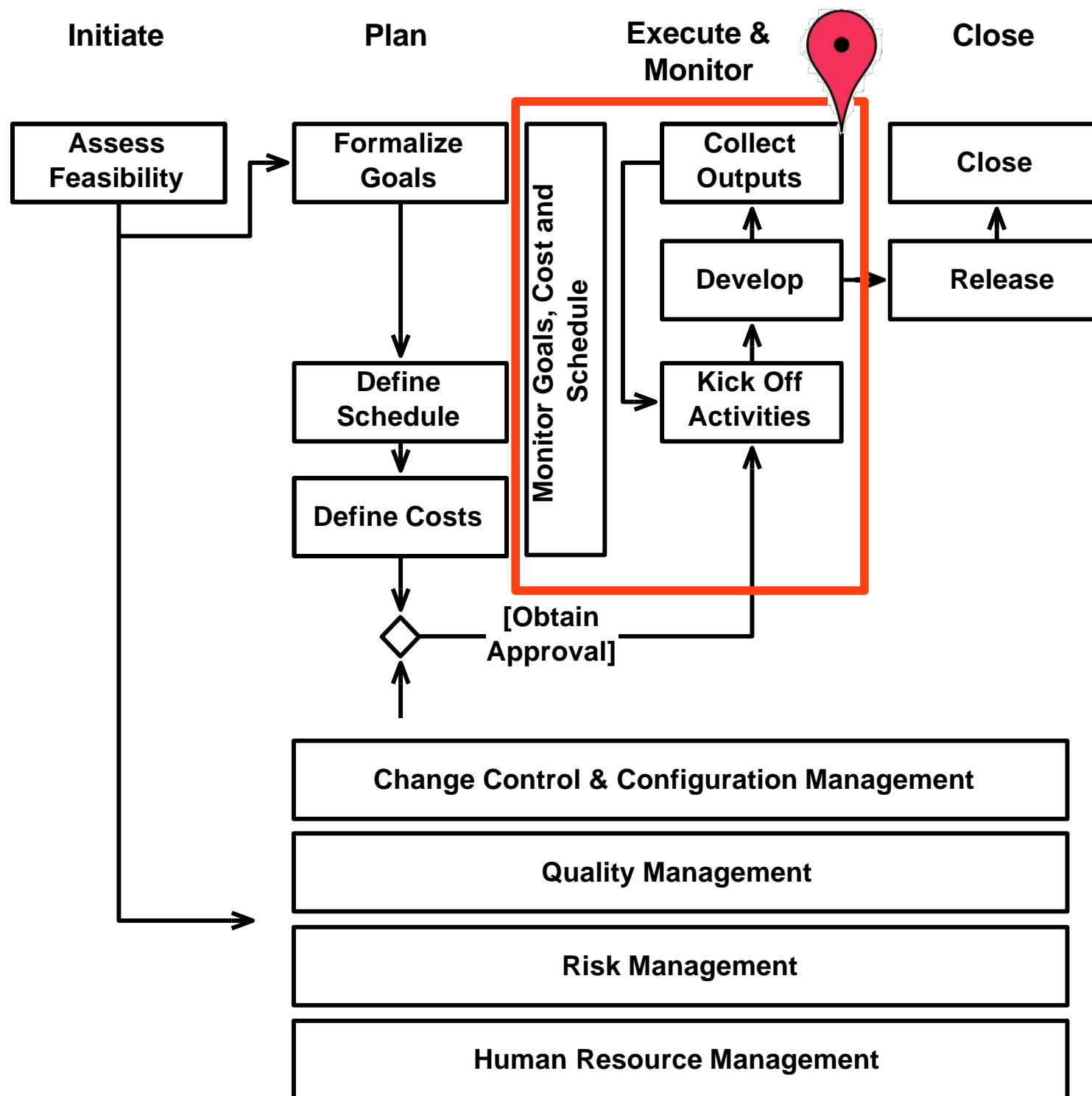**Faculty of Computers & Information**
Mansoura University

seyam@mans.edu.eg
http://people.cs.vt.edu/seyam

Project Execution, Monitoring, and Control

Project Execution

Project Execution

- Project execution is where work is performed

- There are three main management activities:
  - Kicking activities off
  - Collecting the output of activities
  - Collecting information about the project health

Kicking Activities Off

- Goal:
  - Ensure there is a formal start for a significant portion of a project
  - Ensure the team is aligned on the goals and modalities of the activities being started

- The main mean is a kick-off meeting

- In general, any communication mean can be used (but it risks being less effective than a kick-off meeting)

Collecting the Output of Activities

- Goal:
  - Systematic collection of project outputs (deliverables)
  - Occasion to assess the lesson learned

- For software projects the main mean to collect project outputs is a repository + tagging/versioning
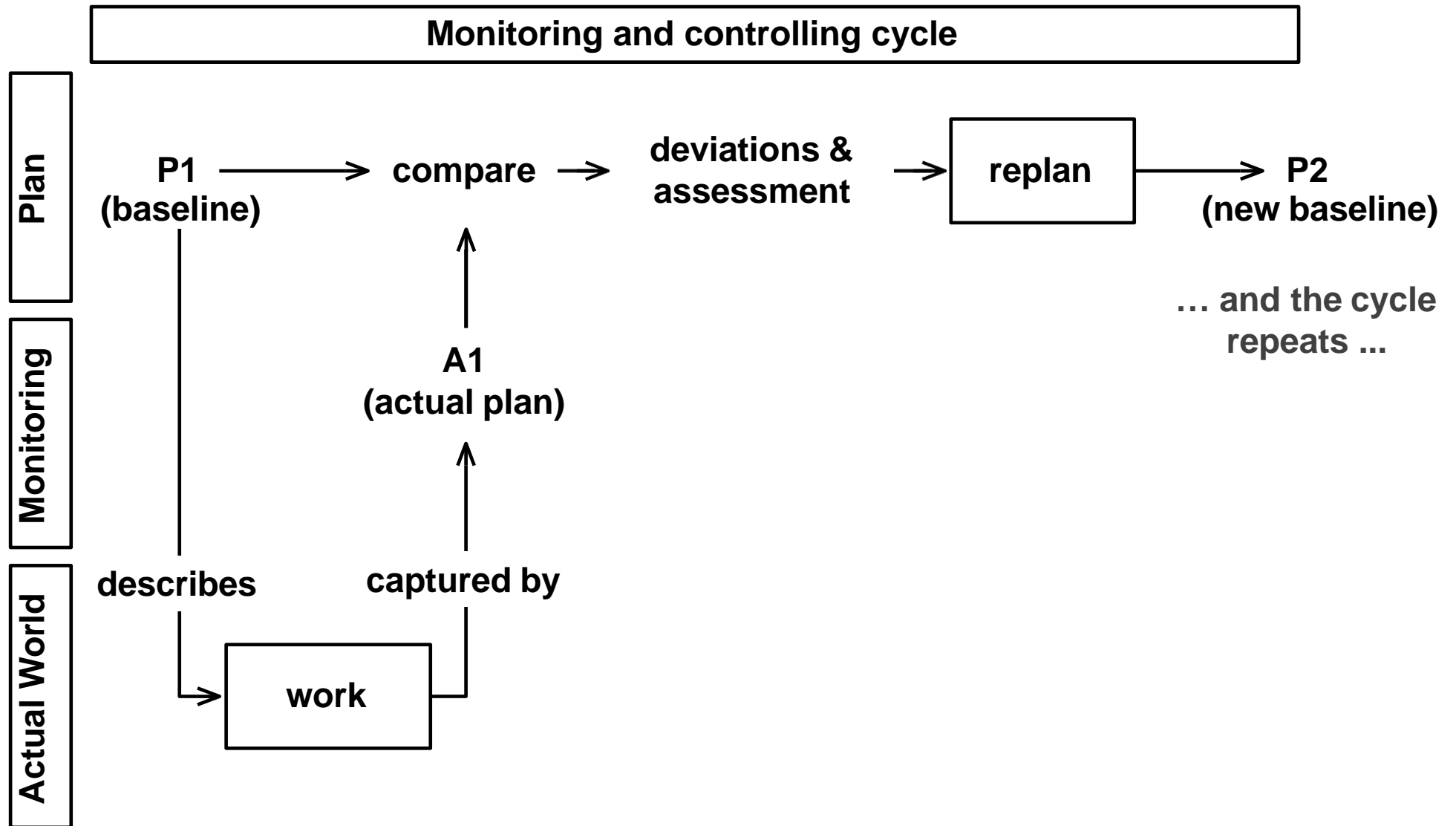
Collecting Information about the Project Status

- Goal:
  - Systematic collection of data to assess the project status

- It can be performed on a regular basis (in which case the frequency has to be chosen according to the project size)

- It can be performed on a need basis (for exceptional events, e.g., risks)

- Quantitative data can be collected based on the monitoring means

- Qualitative data (e.g., team morale, "feeling" about the status or difficulty of a given task) must also be collected

Project Monitoring and Control

Introduction

- Goals:
  - **For the project:** assessing project status (scope, time, cost, quality, ...), analyzing deviations, and taking corrective actions, if necessary
  - **For the organization:** collecting data helps building a better and more accurate plans for future projects

- Process (on a regular basis):
  - **Collect.** Get the data about the current status of your project.
  - **Measure and Compare.** Compare with baseline plan, highlight any deviation, make a projection based on current data.
  - **Assess and Re-plan.** Decide whether corrective actions are necessary. If so, plan, document, and take the corrective actions.

Monitoring and controlling cycle

Plan

Monitoring

Actual World

P1
(baseline) → compare → deviations & assessment → replan → P2
(new baseline)

A1
(actual plan)

describes   captured by

work

… and the cycle repeats …

Approaches

- Focus:
  - Here we focus on schedule, costs, and progress

- Non-integrated approach:
  - Monitor schedule: understand whether we are late or early
  - Monitor costs: understand whether we over or under budget
  - Simple, but partial views

- Integrated approach:
  - Earned Value Analysis: measure schedule, costs, and progress together
  - More complex, but a more comprehensive view

Monitoring Schedule

Basic Concepts

- Baseline (planned values):

  - A snapshot of the plan at a given time
    (plan at t1, plan at t2, …)

  - Many baselines can be taken

- Actual Values

  - Actual status of the schedule

  - Actual start, actual end, actual effort/actual progress

planned start   **planned end**

actual start   **actual end**
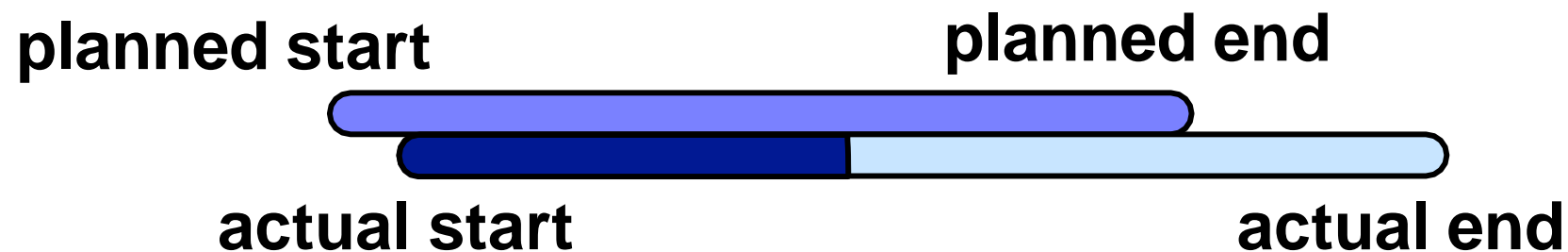
The Process

1. Build the plan

2. Save a baseline

3. On a regular basis, assess the plan:

    1. Actual start and end of an activity
    2. Actual effort spent on the activity
    3. Technical progress (**may be difficult to assess**)

4. Re-plan:

    1. Estimate effort and duration to end
    2. Technique 1: efficiency with which actual effort has been expressed w.r.t. planned effort
    3. Technique 2: efficiency with which technical progress is expressed w.r.t. planned progress
    4. Share the new plan, and GOTO 2

Monitoring Costs

Cost control, the simple approach

- The budget table defines your baseline

- Actual costs define your current status

- It can be split over years (or reporting periods)

CBS Item	Budgeted	Actual	Status	New Budget
Hardware	€10,000.00	€5,000.00	€5,000.00	€5,000.00
Software	€4,000.00	€2,000.00	€2,000.00	€2,000.00
Travel	€5,000.00	€6,000.00	**-€1,000.00**	**€1,000.00**
Project Bfr	€3,000.00		€3,000.00	**€1,000.00**
Total	€22,000.00	€13,000.00	€9,000.00	€9,000.00

Overruns drawn from other funds (e.g. project buffer, a different CES item) or from other projects

Remarks

- **Advantages:**

  – Relatively simple (however, delays between commitment of expenditures and cash flow)

- **Disadvantages:**

  – Not sufficient to have an idea on the overall status of the project (will we make it with the remaining money?)

Earned Value Analysis

Earned Value Analysis

- **Earned Value Analysis (EVA)** provides an integrated view of the project by measuring **planned effort (costs), actual progress (earned value), and effort (actual costs)** in terms of **monetary values**

- Measuring plan, work, and progress with the same unit makes them comparable

- Useful because:
    – Progress becomes comparable with effort
    – Budget and actual costs are put in context (being under budget is not necessarily good, if the technical progress is even lower)

Assumptions and Definitions

- Assumptions:
  - **Manpower = Cost:** plotting effort or cost is equivalent
  - Corollary: **Actual manpower = Actual Cost**
  - **Progress = Money**

- Definitions:
  - **Planned Value:** the cumulative costs planned for the project. Also called: **Budgeted Costs of Work Scheduled**
  - **Actual Costs:** the cumulative costs actually incurred into. Also called: **Actual Costs of Work Performed**
  - **Earned Value:** the actual progress, expressed as the quantity of planned value which has generated results

Agile Monitoring and Control
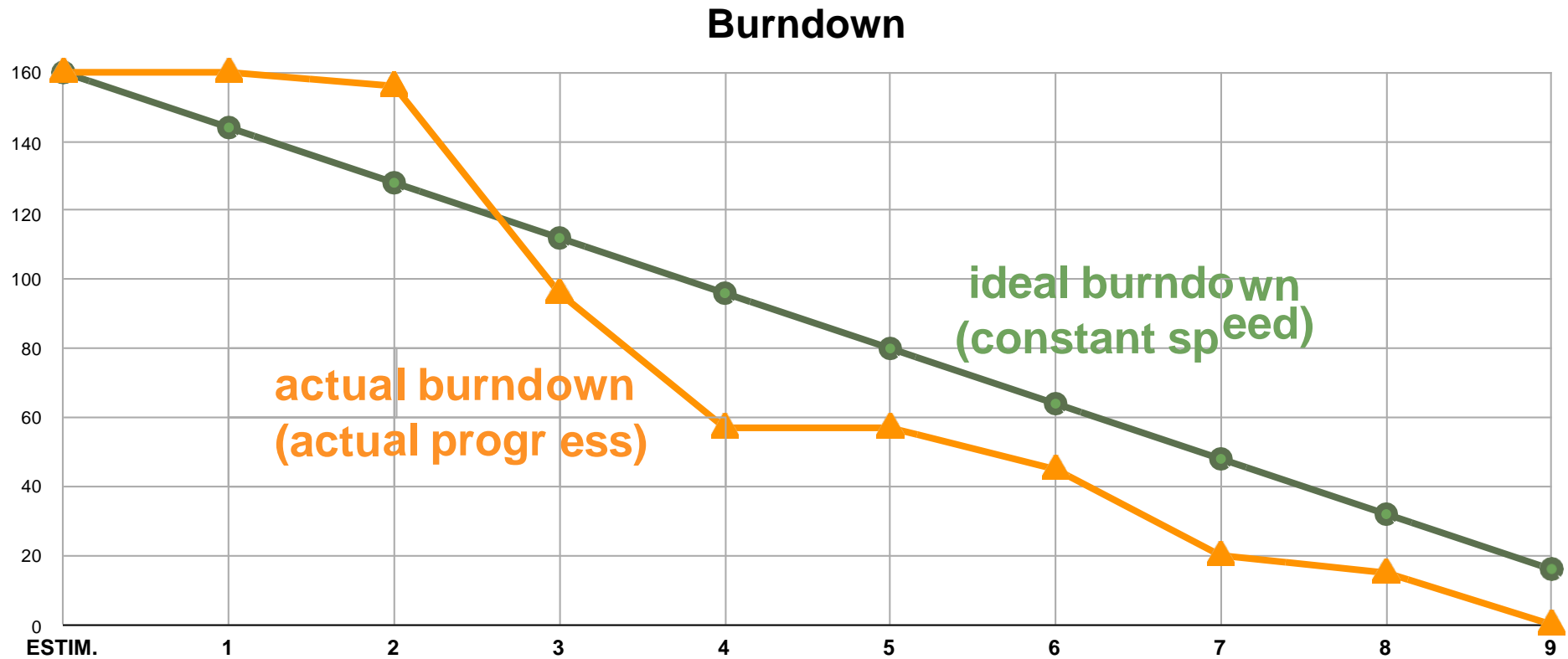
Agile Estimation Practices

- Simplifying a bit, SCRUM and other agile methodologies:
  - Move away from the effort as a perfect measure
  - Structure development in sprints of fixed duration
- Example:
  - <u>SCRUM</u> estimates using "points" (an abstract measure, which deliberately moves away from traditional effort estimations)

Burndown Chart

Agile Estimation Practices

- The estimation process assigns a number of ideal hours or points to each feature to be implemented

- Features are then assigned to a sprint, determining the number of points to be **burned**

- During the sprint points are "burned" as features are delivered.

- One management goal is measuring the **speed** at which features are delivered and ensuring the estimation process keeps the speed constant between sprints

Agile Progress Monitoring

Burndown

The chart shows two lines. The "ideal burndown (constant speed)" is a straight green line descending from 160 at ESTIM. to about 16 at point 9. The "actual burndown (actual progress)" is an orange line starting at 160, staying near 160 through points 1 and 2, then dropping steeply to about 57 at point 4, plateauing at point 5, and declining to 0 at point 9.

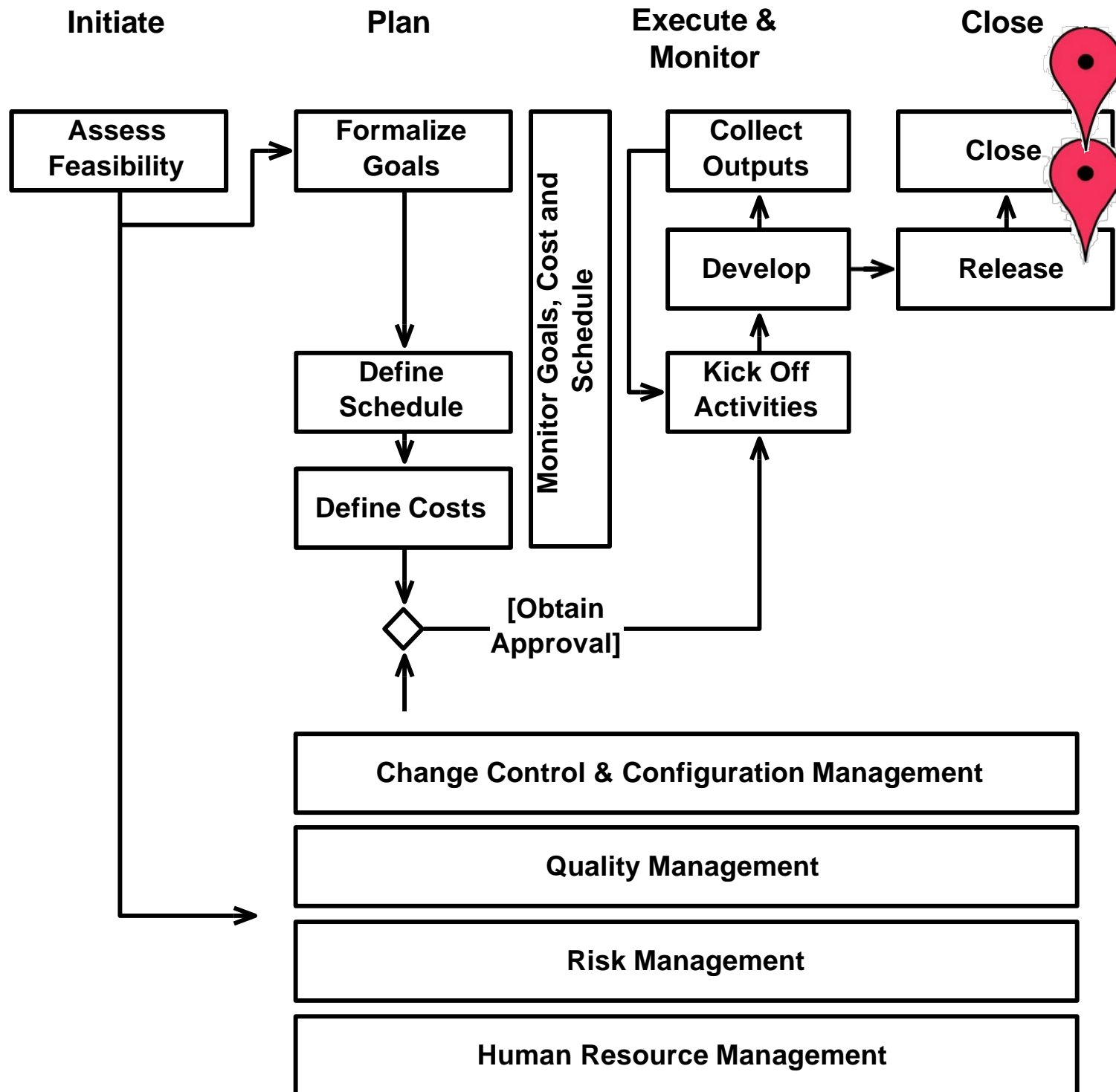Y-axis values: 0, 20, 40, 60, 80, 100, 120, 140, 160

X-axis values: ESTIM., 1, 2, 3, 4, 5, 6, 7, 8, 9

Project Closing

Goals of the Unit

- All projects come to an end

- Many project, however, live a long period in "limbo" land, not active but neither properly closed

- The goal of a good project manager is ensuring projects are properly closed

Initiate

Assess Feasibility

Plan

Formalize Goals

Define Schedule

Define Costs

Monitor Goals, Cost and Schedule

⬦ [Obtain Approval]

Execute & Monitor

Collect Outputs

Develop

Kick Off Activities

Close

Close

Release

Change Control & Configuration Management

Quality Management

Risk Management

Human Resource Management

Types of Project Closing

- **Termination by integration and termination by addition**
  Successful cases: project outputs integrated and/or used as input for another project/production

- **Termination by starvation**
  Project ends because resources run out.

- **Termination by extinction**
  Termination by management because the project failed (objectives not met, superseded, not profitable)

Project Closing

Project closing is the last phase of a project, when the project outputs are handed over to the stakeholders, contractual agreements properly taken care of, and project records elicited and stored for future reference

- Main goals:
  - Ensuring project outputs can be used
  - Ensuring there are no pending/further obligations
  - Taking stock and learning

Project Closing Process

- <u>Getting client acceptance</u>

- Installing Project Deliverables

- Archiving old Deliverables

- Documenting the Project

- Performing a Financial Closure

- <u>Performing Post-Implementation Audit</u>

- <u>Releasing Staff</u>

Getting Client Acceptance

- ## Ceremonial acceptance
  - No formal procedure or formal record for accepting project deliverables
  - Scenarios: gentlemen agreement; reaching project deadlines

- ## Formal acceptance
  - Formal procedure for accepting project deliverables
  - System testing/client approval

Post-Implementation Audit (Post-mortem)

- We hate doing the same mistakes over and over again

- The goal of a post-mortem is a critical analysis of the project in order to learn and improve, avoiding to repeat the same mistakes

- Different formats and levels of formality are possible

- Unsuccessful projects provide a lot of information

- Useful lessons also from successful projects (what worked, what we could have done better)

Structure of a Post-Mortem

- **Conduct project survey**
  Elicit main issues and strengths of the project

- **Collect objective information**
  Elicit quantitative measures about the project

- **Hold a debriefing meeting**

- **Conduct a project history day**
  Find the root causes of problems

- **Publish the results**
  Make sure your organization, your team, and you can learn from the experience

Post-Mortem Results Structure

- The outputs of a post-mortem audit are published in a document

- The document can be used to disseminate the lessson learned and to work as a reference for future similar project

- A post-mortem report can be organized as follows:
  - Project description: information about the project, to give context
  - The good: what worked well
  - The bad: the three worst factors that impeded the teams to meet goals
  - The ugly: a prescription for improvement

Releasing Staff

- Transition to new activities can be disruptive for the team (consider, e.g, a project lasting for years)

- Two important aspects:
  - Ensuring proper recognition to experience gained in the project and results obtained
  - Ensuring proper tasks are assigned to the team members

Questions

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