PMP Class Notes: Monitoring & Controlling Process Group + Closing

Overview: Monitoring and Controlling Process Group

The monitor and controlling process group is where we're looking at the project as it unfolds and determining what's going wrong, where are the problems, and how can we fix it.

Oftentimes we have this plan, and then as the project is going on, we realize the plan isn't working. Then we have to either **rewrite the plan to make it look like reality, or kick reality in the pants until it looks just like the plan** - called motivation!

Every knowledge area has the same look and feel - scope management, cost management, schedule management, quality management, risk management. It's looking at the plan, looking at reality, and determining if those things match up. **If it doesn't, we create a change request and fix it.**

4.5 - Monitor and Control Project Work

What this process is about: Creating reports. This is the big "so what" from the entire process group. We're taking all the information (at least the information that's important to that audience) and creating a report.

Key Concepts:

Work Performance Reports

Work performance reports are a summary of project information. It could be very involved (tons of information about risk, quality, schedule) or very narrow (only about cost management).

Real Examples:

- **"I have a report due every Thursday. It's a cost report. Goes to Accounting USA. Only about money we've spent that week. That is a work performance report by definition."**
- **"I also have a report due every quarter to one of our biggest customers - biggest pipeline companies in the world. Includes everything - risk, quality, schedule, cost. Much more involved, several levels of approval."**

Tools & Techniques:

- **Earned Value Analysis** - for forecasting, determining project health, creating EAC (estimate at completion)
- **Root Cause Analysis, Trend Analysis, Variance Analysis** - for forecasting
- **Cost Benefit Analysis** - "Is it worth it to keep going or should we cut sling and say project over?"

Decision Making: Sometimes the reports go hand in hand with decisions and decision meetings. **Change requests generated here can be scary ones - like "cancel the project" or "fire the project manager" change requests. Those are the ones that keep you up at night.**

Outputs:

- **Work Performance Reports** - summary of information for audience
- **Change Requests** - could be anything, including re-baselining (hitting delete on everything and starting over)

4.6 - Perform Integrated Change Control

What this process is about: How we're allowing the project to change, but we don't want just any old body to make that change. We want controlled change that doesn't negatively affect the project.

Mike Tyson Quote: "Everyone has a plan until they get punched in the face. All projects have plans until reality punches the project in the face."

Change Control System Example:

Real organizational example: "You type in employee ID, project number. Form asks: What's the problem? What's your suggested fix? Primary impact? Secondary impact? Color indicator - Green (routine), Yellow (elevated), Amber (emergency calls within hour), Red (decision within hour - you're waking people up)."

After submission: "You get email with ID number, can see all change requests ahead of yours, all approved/denied ones, can figure out if they'll get to yours in next meeting."

Key Process Flow: Analyze → Document → Action

"When question says 'what should happen next,' attack with analyze document action. That's half the test!"

For Change Requests:

1. **Bob (team member):** Analyze situation → Document with change request → Submit (action)
2. **Change Control Board:** Analyze change request → Document decision on change log → Action (rollout plan or inform why denied)

Tools & Techniques:

- **Change Control Board** - group where every person represents requirements and stakeholders
- **Autocratic Decision Making** - PM makes decisions alone (best practice when PM understands all requirements and has power)

Organizational Change Models:

- **McKinsey 7S** - Strategy, Structures, System, Shared values, Style, Staff, Skills
- **Kotter's Model** - 8 steps (rarely tested anymore)

"For those with PMP - did you see either on your exam? I've been asking for a year. McKinsey shows up maybe 1 out of 200 test takers. Usually 'which is NOT one of the seven S's' with four S's and one fake."

5.5 - Validate Scope

What this process is about: Showing the end user what we've made. They look at deliverable and say "yes, it's what we wanted" - that's how we create **accepted deliverable.**

When This Happens:

Could be best day: "It took forever, we finally made this thing, show end user - 'It's perfect. Make us 1 million more!' High-fiving, popping bottles!"

Could be worst day: "Show end user - 'What the heck is that?' We're like 'Oh that? That's...' Uh-oh. We missed it, got to start over."

Key Strategy:

When do you want customer to say "yes, make more"? Early as possible! But can't validate until we've created deliverable and tested it (verified deliverable input).

Skyscraper Example: "Can't wait until all 100 floors built then show customer and they say 'No, don't like it. Burn it down.' Lost 5 years of work!"

Better approach: Blueprint → AutoCAD model → 1/75th scale model → Break ground sign-off → Basement sign-off → First floor sign-off → Keep bringing them in every step.

That's Agile! "Agile uses Validate Scope to transition phases. Been in PMBOK since first edition, always called Adaptive Project Management. Now we got to say the word Agile."

Tools & Techniques:

- **Inspections** - by customer/user (hopefully person with power to sign off)

- Sometimes group voting

Outputs:

- **Accepted Deliverable** (hopefully!)
- **Change Requests** (when they say no - could be nasty ones)
- **Work Performance Information** - understanding variance between our testing and their inspection

Marker Example: "Customer brings in box of school supplies, slides marker in - 'Oh look, it fits! Good job!' We're like 'Box? We measure with ruler!' Then they sniff the marker - 'Delicious!' We weren't even testing for smell!"

5.6 - Control Scope

What this process is about: Looking at project to determine how much **scope creep** has happened.

Scope Creep Definition:

Two definitions in PMI literature:

1. **PMBOK (narrow):** Change of scope without correction to schedule or cost
2. **Quality definition (broader):** Change of scope over time

Reality: "Even though we try in predictive projects to prevent it with scope statement, sometimes scope creep is shoved right down your throat from customer or boss. That's just world we live in. Do it."

Tools & Techniques:

- **Variance Analysis** - figure out how much scope creep occurred
- **Trend Analysis** - forecast how much more could happen

Key Concept: Gold Plating ⭐

Gold plating is scope creep from within the team - team members add things no one asked for, not approved. **Worst kind of scope creep.**

Coffee Shop Example: "Coffee shack put candy thing on coffee cup spout. 'What's this?' 'It's flavor, keeps coffee from spilling.' Didn't ask for it but liked it. Became our place, went every Sunday. Then pandemic, no more candy thing. 'This place is going downhill.' Stopped going because they stopped giving us free thing we never asked for to begin with. **Gold plating. Always considered bad, even when customer likes it.**"

Stracken's Law:

"80% of your scope creep comes from 20% of your stakeholders" (actually Pareto's law, but I ripped it off). Start tracking where scope creep comes from, understanding your scope creepers.

6.6 - Control Schedule

What this process is about: Looking at schedule to determine are we ahead, behind, on schedule, and by how much.

Tools & Techniques:

Earned Value Analysis

Schedule variance and schedule performance index for ahead/behind schedule.

Iteration Burndown Charts ⭐ Shows up more and more on exam!

"For those with PMPs - how many saw burndown chart questions? We have to interpret the chart or understand what term means."

Two Variants of Agile:

1. **Iterative-based Agile:** Sprint always same time period, forecast how much work done in sprint
2. **Flow-based Agile:** Code until done, know amount of work, forecast when sprint ends

Key Difference:

- **Iterative:** "How much work will be done within sprint?" (10 days known)
- **Flow:** "When will this thing end?" (Don't know if 10, 20, 30 days)

Other Tools:

- **Critical Path Method** - redo critical path to forecast when project ends
- **Schedule Compression** - crashing, fast tracking

Outputs:

- **Schedule Forecast** - when whole project might end based on what we're seeing
- **Change Requests** - typically schedule compression (throw money at it, do two things at once)

7.4 - Control Costs ⭐ MAJOR EXAM SECTION!

"This is the one everyone sticks around for because they want more information. Extra people jump in class right now because they want to hear earned value again!"

Important Reality Check:

"Typically one or two questions max on exam. We'll spend lot of time here, but it's not that many questions. People spend lot of time studying mathematics - I'm trying to reduce your study time by over-teaching the math intentionally."

Test Reality: "On exam you're not calculating it. They usually tell you 'this is what we calculated, what does this mean?' You have to understand what it means and how it affects project."

🔥 EARNED VALUE ANALYSIS - THE BIG KAHUNA

"If you understood that conversation, then you're done. Hooray! Problem is when I flip the slide to formulas - people lose it."

STEP 1: Determine Units (CRITICAL!)

"If you struggle at earned value, most likely because you didn't do step one and step two. Most likely because you didn't understand concept of taking time, turning into dollars, work turn it into dollars. Explain everything in dollars."

1. **What is unit of time?** (months, weeks, days, hours - they'll say it over and over)
2. **What is unit of time worth?** (according to plan)
3. **What is unit of work?** (cars, homes, walls - what are we making?)
4. **What is unit of work worth?** (according to estimate)

The Wall Painting Story 🎨

"I'm in sound studio. Imagine pulling all foam off walls, putting drywall up, painting it. Four walls, all same size. Contractor comes in: 'I paint at $100/day daily rate. These four walls should take me four days to complete.'"

Key Setup:

- **Unit of time:** Day = $100
- **Unit of work:** Wall = $100 (logically, takes 1 day at $100/day)
- **Four walls total**

The Four Basic Values:

1. Budget at Completion (BAC)

"Budgeted value of all work according to this fool's estimates once completed."

- 4 walls × $100/wall = **$400**

- "That's what I'm telling my wife. 'Honey, costs us $400. This contractor paint these four walls. That's my budget.'"

2. Planned Value (PV) ⭐ MOST CONFUSING CONCEPT

"Number one mistake - people learn as singular. It's NOT. It's planned valueS plural. Multiple planned values - one for every unit of time."

Timeline Breakdown:

- End of Day 1: Should have 1 wall done, spent $100 ($PV_1 = \$100$)
- End of Day 2: Should have 2 walls done, spent $200 ($PV_2 = \$200$)
- End of Day 3: Should have 3 walls done, spent $300 ($PV_3 = \$300$)
- End of Day 4: Should have 4 walls done, spent $400 ($PV_4 = \$400$)

"Each dot represents a planned value. Line through them = performance measurement baseline - what's supposed to happen according to plan."

3. Earned Value (EV)

"Value of work that has been completed. What's done right now?"

Day 1 Surprise: "I come downstairs expecting one wall painted. SURPRISED! Not only wall 1 done, but wall 2 done too! He painted two walls on day one! We're crushing it!"

- **Schedule Status:** Two walls done vs. one planned = **$100 ahead of schedule**
- **Earned Value:** 2 walls × $100 = **$200**

4. Actual Cost (AC)

"Money actually spent. We're not paying by wall, paying by day."

- Day 1: Paid **$100** (one day's work)
- **Result:** Spent $100, got $200 worth of work!

Project Health Analysis:

Cost Health (EV vs AC):

"Compare earned value to actual cost. Spent $100, achieved $200 worth of work. For every $1 spending, getting $2 of work out of it. If that continues, we'll be under budget!"

Schedule Health (EV vs PV):

"When earned value dot above planned value dot, we're ahead of schedule. When comparing earned value to planned value, you determine scheduling health."

Variance vs. Index:

Variance (Dollar Amounts):

- **Cost Variance (CV):** EV - AC = $200 - $100 = **$100** (under budget)
- **Schedule Variance (SV):** EV - PV = $200 - $100 = **$100** (ahead of schedule)

Zero dollars = perfect. Positive = good. Negative = bad.

Index (Percentages):

- **Cost Performance Index (CPI):** EV ÷ AC = $200 ÷ $100 = **2.0**
- **Schedule Performance Index (SPI):** EV ÷ PV = $200 ÷ $100 = **2.0**

"CPI of 2.0 means for every dollar I spend, I'm getting $2 worth of work. That's 200% productivity! SPI of 2.0 means every day we're completing 200% of planned work."

One = perfect. Greater than one = good. Less than one = bad.

Why Two Systems?

"Variance for talking within team ('We're $100 ahead of schedule'). Index for comparing projects ('Miguel says he's $1200 ahead, but his project's $10 billion, mine's $400 - I'm crushing it more!')."

Forecasting:

Estimate at Completion (EAC):

Two scenarios based on why we got ahead:

Option A - Continue the Trend: "Look, he painted two walls day one. Probably paint two walls day two, we'll be done. Spend $200, project over."

- Formula: BAC ÷ CPI = $400 ÷ 2.0 = **$200**

Option B - The Anomaly: "Walk downstairs, he's putting away brushes. 'Bro, you crushed it! How'd you paint so fast?' 'Well, my brother's best friend's nephew stayed home from school and helped me paint.' 'GRADE SCHOOL?! That's child labor! You can't do that!' 'Is that wrong?' 'YES, against the law!' 'My bad, maybe tomorrow no child labor?'"

Now we know why he got ahead - he cheated! He's never doing that again.

- Day 1: 2 walls done (cheating)
- Day 2: 3 walls total (back to 1 wall/day)
- Day 3: 4 walls total (project complete)
- **EAC = $300**

The Vacation Story - TCPI Explained 🏝️

"TCPI baffles students everywhere because they see formula and lose it. But you've done TCPI - most likely on vacation when you weren't calling it TCPI."

Fictional Army Officer Story: "Fictional person (hand grenade proof from Fallujah) into adventure tourism. Hears about fictional embargoed island. $88.16 to Cuba Airlines from Cancun, stamp card not passport, lose card - looks like you're in Cancun entire time."

The Setup:

- 10-night vacation
- $100/night fun fund budget
- $1,000 total fun fund
- Night 1: Had $400 of fun (oops!)
- 9 nights remaining, $600 left

The Question: "How many dollars fun per night to stay under $1,000?" **Answer:** $600 ÷ 9 nights = **$66.67/night**

"That's TCPI! As long as spending less than $66.67/night, will bring vacation in under $1,000."

TCPI Application:

In our project: We're ahead, want to slow down to use full budget.

- 2 walls remaining, 3 days left
- Need to paint 2/3 of wall per day
- **TCPI = 0.66** (work at 66% rate)

"Divide walls into thirds. Day 2: paint two top thirds. Day 3: bottom third + top third. Day 4: last two thirds. Project over right on time, spent $400 just like we said!"

TCPI Interpretation:

- **Less than 1.0:** Ahead, slow down (crew happy - long lunches, no Friday)
- **Equal to 1.0:** On track
- **More than 1.0:** Behind, speed up (crew mad - working overtime, lunch breaks gone)

"TCPI is the fixer. Doesn't fix overnight - fixes over remainder of timeline."

🔥 EARNED VALUE FORMULAS - MEMORIZE OR UNDERSTAND

"If you don't like formulas, DON'T USE THEM. Replace with sentences. I'd rather you memorize zero formulas but understand all of them than memorize formulas without understanding any."

The Four Basic Values:

- **BAC:** Value of work × Number of units

- **PV:** Value of time × Time subscript
- **EV:** Value of work × Units completed
- **AC:** They tell you this (or solve backwards)

Project Health:

Variance (Dollar amounts, zero = perfect):

- **CV = EV - AC** (positive = under budget)
- **SV = EV - PV** (positive = ahead of schedule)

Index (Percentages, 1.0 = perfect):

- **CPI = EV ÷ AC** (>1.0 = under budget)
- **SPI = EV ÷ PV** (>1.0 = ahead of schedule)

Forecasting:

- **EAC Option A:** BAC ÷ CPI (use when "variances expected to continue")
- **EAC Option B:** (BAC - EV) + AC (use for anomalies - they'll make it obvious)
- **ETC:** EAC - AC (how many MORE dollars needed)
- **VAC:** BAC - EAC (how far off from original estimate)
- **TCPI:** (BAC - EV) ÷ (BAC - AC) (optimal rate to hit budget)

Test Question Examples:

Classic Question Format:

"Schedule variance is $5. Cost variance is negative $1,000. Describe the project."

- **SV = $5** (positive) = **ahead of schedule**
- **CV = -$1,000** (negative) = **over budget**

Tricky Mix-and-Match:

"Schedule variance negative $100. Cost performance index 1.4. Describe project."

- **SV = -$100** (negative) = **behind schedule**
- **CPI = 1.4** (>1.0) = **under budget**

The Trickiest:

"Cost variance $1. Schedule performance index 1.0. Describe project."

- **CV = $1** (positive, remember zero is perfect for variance) = **under budget**
- **SPI = 1.0** (perfect for index) = **on schedule**

"Everyone falls for that. Watch out for mixing variance and index. Under/over is zero for variance, one for index."

8.3 - Control Quality

What this process is about: Test the widget! This is what we've been talking about since beginning - testing widget to make sure it meets requirements. If doesn't pass test, it's a defect.

Key Flow:

Deliverables → Testing (following quality management plan) → Quality Control Measurement (form filled out) → Verified Deliverable OR Defect

Tools & Techniques:

- **Checklists vs. Check Sheets:** Checklist = check off as done. Check sheet = check off AND annotate information
- **Inspection** - main tool (can't really test you on how inspection is done)
- **Control Charts, Histograms, Scatter Diagrams** - fill out information in systems

Key Concept: Corrective vs. Preventive Action

Tricky exam concept they love to tie to quality:

Corrective Action Examples:

- Measure widget → defective → submit change request to fix = **corrective** (happened AFTER defect)
- Bob out sick, Janice (untrained) did his job → defect → institute cross-training plan = **corrective** (even though prevents future defects, the fix happened AFTER defect was found)

Preventive Action Example:

- Measure widget → NOT defective but outside normal range → fix to prevent future defects = **preventive** (no defect yet, foreseeing possibility)

Approved Change Requests as Input:

Hidden concept: Sometimes we look at approved change request to see if it worked.

- Widget defective → add indigo dye to make it bluer → approved change request → test next widget to see if it's bluer
- **If fix works = "validated change"** (major lesson learned)

12.3 - Control Procurements

What this process is about: Managing the vendor from contract signing until final payment processed. **You're acting like the sponsor here - that flips everything upside down!**

"Typically on test questions we're PM dealing with sponsor. Now everything's backwards - everything sponsor was doing for PM, now you're doing for your vendor."

Key Concepts:

- **Write statement of work** to set them up for success
- **Do quality audits** to make sure they have quality plan and actually checking stuff
- **Do risk audits** to see if they have plan for risk events
- **You're the sponsor for their mini-project**

Tools & Techniques:

Claims Administration

"How we solve problems before they get legal. When problem with contract, vendor submits claim. Goes to legal eagles, they iron it out before someone sues someone else. Usually not PM involved - someone in procurement office or legal handles it."

Inspections and Audits

"You're going to inspect deliverable they give you - creating accepted deliverable for them because you're acting like sponsor."

Procurement Audit ⭐ Special audit!

"Hidden in depths of PMI literature. Procurement audit is special - happens AFTER contract closed and vendor is GONE. PM sits down with procurement office: 'How can we buy things better next time?' It's audit of procurement PROCESSES, not inspection of widget."

Outputs:

- **Closed Procurement** (eventually)
- **Work Performance Information** (throughout entire procurement)
- **OPA Updates** - "Figure out when vendor says $1 million, they really mean $5 million. Learn how they operate. Could put vendor on 'we will not buy from' list."

13.4 - Monitor Stakeholder Engagement

What this process is about: Ensuring stakeholder engagement plan is working. When it's not working, we fix it.

Tools & Techniques:

Main test concept: Stakeholder engagement assessment matrix - does strategy work? Should be moving needle on desired engagement level as project progresses.

Real-World Example Gone Wrong:

**"We had protesters in New Jersey. Show up for town hall meeting - they'd chained themselves to gymnasium door. 200 of them, signs out, yelling 'No pipeline!' Someone grabbed paver from garden, threw it at our truck. Wasn't most athletic throw, barely got to vehicle. We just reversed and drove away."

Result: "Change request: Cancel town hall meetings, these guys aren't worth it. Let's buy airtime on two radio stations, blast same commercial three hours every day. Wasn't worth getting people hurt."

"Sometimes stakeholder engagement strategies don't work, require change request because of cost associated."

4.7 - Close Project or Phase ⭐ CRITICAL!

"Highlight 'or phase' right now and circle it! You'll see this in notes later like 'why did I highlight that?' Oh that's right, because Mike said that. First thing you see on exam is closing a phase - 'Oh thank God I remembered that!'"

Why Close Phases?

- **Agile:** Closure per sprint with retrospective
- **Rolling Wave:** Every phase has closeout and formal kill point
- **Practical reason:** "If you wait to very last minute for lessons learned meeting, no one's showing up. It's going to be you by yourself, project manager."

Key Concept: Project Artifacts

"Project artifacts includes plans and documents. Called artifacts because you're going to save them, they're going to be like relic in next project."

The Most Tested Page in PMI Literature:

"Page 123 of PMBOK guide - there will be 14 exam questions on that one page! Most tested page in all of PMI's literature."

Mike's Summary of Page 123 - Closing Procedures:

1. **Ensure deliverable signed off by appropriate party**
2. **Gather lessons learned from your team AND customer's perspective**
3. **Create final report**
4. **Archive all project records**
5. **Close all contracts ⭐ WEIRD PART!**
6. **Release the team**
7. **Project over**

The Fiction: "Close all contracts is pure fiction in real world. Contracts stay open between projects - we talked about service level agreements. Where PMI gets that, I don't know. On test day sure, PMI, that's what happens. I close all contracts then release Janice. Just drink the Kool-Aid, get question right, forget about it after test."**

The Final Report:

"Final report is ying to yang of charter. Charter made project real, transitions power from sponsor to you. Final report does opposite - upon approval is formal closure, transitions power from you back to sponsor."

What it looks like: "Everyone's different. Ones I interface with are templates - project name, technology, customer, location, time of year, general information, then high-level project plan, then what actually happened, then root cause analysis from failures and best practice discovered."

🔥 EXAM STRATEGY FOR MONITORING & CONTROLLING:

Most Heavily Tested:

1. **Earned Value** - understand what numbers mean, not just calculations
2. **Change Control Process** - analyze → document → action
3. **Validate Scope timing** - as early as possible (that's Agile!)
4. **Gold plating** - always bad, even if customer likes it
5. **Corrective vs. Preventive action** - tied to quality control
6. **Page 123 closing procedures** - 14 questions from one page!
7. **McKinsey 7S** - know the seven S's for "which is NOT" questions

Critical Formulas (Understand, Don't Just Memorize):

- **CV = EV - AC** (positive = under budget)
- **SV = EV - PV** (positive = ahead of schedule)
- **CPI = EV ÷ AC** (>1.0 = under budget)
- **SPI = EV ÷ PV** (>1.0 = ahead of schedule)
- **EAC Option A = BAC ÷ CPI** ("variances expected to continue")
- **TCPI = (BAC - EV) ÷ (BAC - AC)** (optimal rate to hit budget)

Key Phrases to Remember:

- "Kick reality in pants until it looks like the plan"
- "Everyone has plan until reality punches project in face"
- "Gold plating always bad, even if customer likes it"
- "TCPI is the fixer - doesn't fix overnight, fixes over remainder of timeline"

- "Earned value light" vs. real-world complexity
- "That's Agile!" (validate scope to transition phases)

Common Exam Traps:

- **Don't mix variance and index** - zero perfect for variance, one perfect for index
- **Planned values are plural** - one for every unit of time
- **Remember "or phase"** in close project or phase
- **Procurement audit ≠ widget inspection** - it's audit of procurement processes
- **Close all contracts** - pure test fiction, just accept it
- **Corrective action** - happens AFTER defect (even if prevents future ones)

Test Question Patterns:

- **"What should happen next?"** → Analyze → Document → Action
- **Earned value interpretation** - given numbers, what does it mean?
- **Validate scope timing** - when should this happen?
- **Change request scenarios** - who does what when?
- **Gold plating identification** - team adds unapproved stuff
- **McKinsey 7S** - which is NOT one of the seven?

Remember: "I'd rather you memorize zero formulas but understand all of them than memorize formulas without understanding any. Understanding gets you the question right!"