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HUMAN RESOURCES

1. PM Roles are integrator, communicator, team leader, decision maker, & climate creator.

2. Power Types are *reward*, *expert*, legitimate, coercive, & referent. (* = Best are reward and expert, use expert when dealing with upper management).

3. Conflict Management methods are: problem solve, compromise, smooth, w/draw, & forcing

4. Project manager has most conflict over: personnel, program, tech issues, & schedule problems.

5. Four project manager functions are: plan, organize, lead, and control.

6. Human Resources is the art and science of directing human resources throughout the life of a project by using administrative and behavioral knowledge to achieve project objectives of Scope, Cost, Time, Quality, and the participant's satisfaction.

7. The management styles are: Autocratic (tight controls), Laissez Faire (nobody's in charge), and Democratic (participative).

8. Herzberg's Theory = Hygiene Factors and motivating agents. Hygiene Factors are necessary but are not sufficient for a contented worker. The Hygiene Factors are: Administrative Policies; Working Conditions; Salary; Personal Life; Peer, Superior, Subordinate Relationships; Status; and Security.

9. Herzberg also stated that achieving positive motivation results from the opportunity to achieve and experience "self actualization".

10. Maslow's Hierarchy of Needs are: Physiological, Safety, Social, Esteem, and Self Actualization.

11. McGregor's Theory X = average worker is lazy and needs supervision (relies on external motivation).

12. McGregor's Theory Y = workers are willing to do the job without continuous supervision (relies on self motivation).

CONTRACTS

1. Seller (low risk)————————>Buyer (high risk) = in this order: CPPC, CPFF, CPIF, FPPIF, FFP.

2. CPPC = Used in construction industry.

3. CPFF = Used in R&D project due to the risks.

4. CPIF = Contracts with long performance periods.

5. FPPIF = ship building, long term products.

6. FFP = Projects with definite specifications and certain costs.

7. Negotiation meeting = protocol, probing, scratch bargain, closure, & agreement..

8. Contract process = requirement + requisition + solicitation + award + contractual cycles.

9. Contract origination = unilateral (e.g. Purchase Order), bilateral (RFQ and RFP).

10. Contract Administration = funding, procedure, performance/financial control, modifications, disputes, and close-out.

11. Contract Procurement Management = Objectives, QA, Quality specs, supplier selection, motivate supplier, and supplier quality.

12. In a Fixed Price Contract (lump sum) the contractor (seller) agrees to perform a service or furnish materials at an established contractual price.

13. When entering into a contract, the objective of the buyer (client) is to place the seller into the maximum performance risk while maintaining a degree of incentive for efficient and economical performance.

14. Fixed Price and Cost are the two major types of contracts.

15. Cost Plus Percentage of Costs contracts places the greatest amount of risk on the buyer.

16.Cost Plus Fixed Fee contract places the greatest amount of risk on the seller.

17. Materials management is critical to the success of the project when resources are needed at a specific time and place to ensure the continued progress. When assessing the materials costs, one should keep in mind the cost of purchase for: transportation, storage, and shortage.

18. To keep the contractor on track and to control their expenditure rates under any type of contract one should track and pay the costs of the contract by phases or stages and evaluate the costs at each review/decision point.

RISK

1. Measure Risk by calculating one Standard Deviation which is SD = [Pessimistic - Optimistic] divided by 6.

2. Risk Event = what might happen to detriment of project.

3. Risk handling = avoidance, control, assumption, and transfer (deflect).

4. Types of Risk Events = External unpredictable + external predictable + internal + technical + legal.

5. Risk Mitigation = insurable + impact analysis + response planning + response system + data application.

6. Expected Value = (Value 1 x probability 1) +...(Value N x probability N).

7. Expected Value = probability of the risk event occurring x potential loss or impact.

8. Risk Types = Business + pure(insurable).

9. Risk tied to Cost, Schedule, & Quality.

10. Retention = Assume

11. Deflect = Transfer

12. Risk's 3 factors = probability, impact, and the event itself.

13. BCR(benefit cost ratio)= NPV of revenue divided by NPV of cost...if = to 1 or more, do the project.

14. Risk management = identify, analyze, respond to risk factors and document.

15. Risk Event Status = probability of occurrence + severity of consequence.

16. Response planning = mitigation deflection, and contingency planning.

17. Method of reducing risk is to hold functional managers accountable for time/cost estimates. Hire an expert to produce better estimates of the future costs. Perform statistical analysis to improve quality of forecasts.

18. A project manager's objective when sub-contracting is to shift as much of the risk possible to the sub while maintaining some degree of incentive for improved efficiency and economic performance.

19. When entering a contract with a buyer, a project manager should try to shift as much risk to the buyer as possible.

20. During what phase is the risk the highest? Conceptual.

21. During what phase is the amount at stake the highest? Termination.

22. Uncertainty = the complete absence of information.

23. Certainty = all information for making the right decision is available.

24. Know how to calculate a decision tree's cumulative probability.

25. PV = amount of payment in N years divided by (1 + interest)^N

26. IRR = that rate of discount at which the sum of the positive present values is equal to the sum of the negative present values.

COST

1. Cost Estimating = Assembling and predicting project costs

2. Cost = cash value of project activity

3. BCWS = planned costs

4. ACWP = Actual Costs

5. BCWP = Budgeted Cost of Work Performed or EARNED VALUE (how much work is done).

6. Budget @ Completion (BAC) is what the total job is supposed to cost..

7. Estimate @ Completion (EAC) is what you expect the job to cost after some portion of the work has been completed. EAC=(ACWP/BCWP) X BAC.

8. Percent Completion = BCWP divided by BAC

9. Variance @ Completion (VAC) = BAC - EAC

10. Scheduled Variance (SV) = BCWP - BCWS (negative is behind schedule)

11. SV % = (SV / BCWS) X 100 or [(BCWP - BCWS) / BCWS] X 100

12. BAC = Budget @ Completion or what job is supposed to cost or total budget.

13. Cost Variance = over run CV = BCWP-ACWP

14. CV % = [CV / BCWP] X100

15. Percent Over (positive)/under(negative) = [(ACWP-BCWP) / BCWP] X 100

16. Process Analysis = Development of performance indices = CPI & SPI

17. CPI = BCWP / ACWP (means that $1 spent will generate)

18. SPI = BCWP / BCWS (more than 1 is good)

19. Future Value (FV) = $PV(1+r)^n$

20. Discount rate (DR) = 1 divided by (1 + Interest)

21. Break Even = Fixed Cost divided by contribution margin

22. Order of Magnitude =-25% to +75%

23. Budget Estimate =-10% to +25%

24. Definitive Estimate =-5% to +10%

25. Simple Interest I = P x R x T

26. ROI = (Net income + interest expense) – Average Assets

27. Straight Line Depreciation = (asset-residual) divided by life

28. Life cycle cost = develop, procurement, and operations/maintenance

29. Material Cost = Transportation, storage, and shortages

30. Cost estimating can best be described as the process of assembling and predicting costs of a project over its life cycle.

31. Cost forecasting can be best described as the process of developing the future trends along with the assessment of probabilities, uncertainties, and inflation that could occur during the project.

32. Cost budgeting is the process of establishing budgets, standards, and a monitoring system by which the investment cost of the project can be measured and managed.

33. Cost control is the process of gathering, accumulating, analyzing, monitoring, reporting and managing the costs on an on-going basis.

34. The WBS purpose is to describe the total program as a summation of the subdivided elements of the project.

35. Which type of cost estimate is the most accurate? Definitive estimate.

36. What is an example of direct project cost? Cost of project materials.

37. Which of the following is not a tradeoff decision that must be made in the development of the project plan? The amount of profit vendors should make versus the profit other vendors have received in the past.

38. Productivity is defined as the measurement of labor efficiency when compared to a baseline and the measure of the effectiveness of equipment.

39. Key factors that govern how an estimate is prepared are: end use of the estimate, tools available, time available, and information available.

40. The purpose of the contingency money in the cost estimate is to provide funds to cover the uncertainties in the estimate within the defined scope and schedule and to cover unforeseen natural disasters.

41. The reason that cost management is so difficult is that many activities have never been done in the same manner and under the same environment, or with the same project team members.

42. If the variable cost of producing a unit equals $100 per unit and all fixed costs are equal to $2500, what is the cost of producing ten extra units? $1,000.

43. The project manager's responsibilities for Cost Management include: evaluating the economic feasibility of a project, establishing project budgets and cost tracking mechanisms, monitoring/managing costs as the project progresses, and reporting the project's actual cost performance to management.

44. ROI is an economic evaluator that represents value added to the shareholders' wealth.

45. Know how to identify variable costs.

46. On what should the project budget be based? Use the WBS to identify all project activities. Obtain the expected value cost estimates provided by the functional managers, costs that can be measured, tracked, and managed. Use historical data from analogous projects.

47. Cost elements not typically found in a project's budget include: capital equipment depreciation expenses.

48. A time phased budget is useful for determining if an activity will complete on time and meet its budget. It is also useful for determining if a project will complete on time and meet the budget.

49. Variance analysis is used to interpret time phased budget/actual data.

50. Sunken costs are those costs already invested in the project that are not recoverable. It is usually not relevant to making a financial decisions.

51. Accelerated forms of depreciation are double declining balance and sum of the years.

52. Cost management includes those processes that are required to maintain financial control of a project's: economic evaluation, cost estimating and cost forecasting.

53. The techniques that can be used to determine the total income of a project compared to the total funds spent at any period in time are: ROI, NPV, and Discounted cash flow.

54. Life cycle costing includes all costs within the total life of a project. These include: development, procurement and operation/maintenance.

55. Managerial reserves are funds that are allocated and maintained for contingency reasons.

56. Benefit cost analysis is used as a project selection technique and to decide whether to end a project or continue with it.

57. Present value = the value in terms of today's future cash flows.

58. Parametric costs = using a statistical model to assist in preparing cost estimates.

59. Cost management must look at future cost projections, and the controls exercised over the estimates. There are three different cost estimates: Order of Magnitude, budgetary, and definitive, in the order of increasing accuracy.

60. The reserve for cost variances from the plan due to inaccurate estimates or pricing and cost overruns is handled from the management reserve.

61. The reserve to accommodate costs for project work that were not included in the plan through error or oversight is the contingency allowance.

62. A cost control system is established by matching the needs to the work packages. The direct mapping of the work packages is accomplished via the establishing a Code of Accounts.

63. As the project nears completion and no large expenditures have been spent, the remaining contingency allowance dollars should be reduced to a percentage of the remaining work.

64. Historical records is the best source of project information for costs, planning, etc.

65. In the earned value system, the status of the project is reported as BCWS = 100, ACWP = 110, BCWP = 95. The project is "behind schedule and overspent".

66. The tool that best facilitates the pricing of a project by a structured decomposition of the total into individual elements of labor, material and equipment is the WBS.

67. The project manager has the best control of costs such as: labor, materials, and equipment.

68. A method of encouraging early payment of invoices is to offer a discount for payment within a few days. The method "2 / 10, net 30" means that if the invoice is paid within ten days, there is a two percent discount, if not, pay the invoice in full within 30 days. A $1,000 invoice if paid within ten days, would save the payee $20.

69. A financial audit is used to determine if a project is viable. A computer system is not an area that would be audited. The first audit is conducted at the end of the planning phase.

70. Cost increases are an important aspect of budgeting. The areas that usually have budget escalation's are: labor rates, materials, and interest rates.

71. Know and understand the cumulative cost curve.

72. Variance = Planned - Actuals

73. Opportunity costs = costs of not pursuing a course of action.

74. Control is the process whereby the project manager determines the degree to which the project plan is being met with a focus on schedule, budget, and resources. In reality, managing the specifications, project variances, and customer satisfaction.

Cost Formulas Quick Reference Sheet

1. Simple Interest Rate Calculations: Interest = Principal X Rate X Time

2. Compound Interest Rate Calculations: Future Value = Deposit $(1 + \text{rate})^n$ where n is the # of time periods.

3. Present Value: $PV = FV / (1 + r)^n$

$$\text{Annual Depreciation} = \frac{\text{Asset Value When Purchased - Salvage Value}}{\text{Total Number of Depreciation Periods}}$$

5. Straight Line Depreciation: Use Formula #4 above to calculate annual depreciation rate, apply this same annual depreciation rate equally for number of years from the asset's value until the Salvage Value is reached.

6. Double Declining Balance: Utilized as twice the rate of the Straight Line Depreciation method and apply as in the Straight Line Depreciation method.

7. Sum of the Years Depreciation: Add the number of years for the life expectancy, e.g., if 3 years 3 + 2 + 1 = 6. Use this sum, 6, as the denominator and each year 3, 2, and 1 as the numerator. Multiply this value times the asset's value, e.g., in year 1, 3/6 X asset's value. Repeat the procedure using the next fraction of 2/6 X the same asset value. Reiterate until the last year for depreciation is used. Subtract the accumulated sum of the calculated years of depreciation from the total initial asset's value to obtain the Salvage Value.

8. Budget Cost of Work Scheduled (BCWS)

9. Actual Cost of Work Performed (ACWP)

10. Budgeted Cost of Work Performed (BCWP) = Earned Value

11. Cost Variance (CV) = BCWP - ACWP

12. Schedule Variance (SV) = BCWP - BCWS

13. SV% = (SV/BCWS) X 100 or [(BCWP - BCWS)/BCWS] X 100

14. CV% = (CV/BCWP) X 100 or [(BCWP - ACWP)/ BCWP] X 100

15. Cost Performance Index (CPI) = BCWP / ACWP

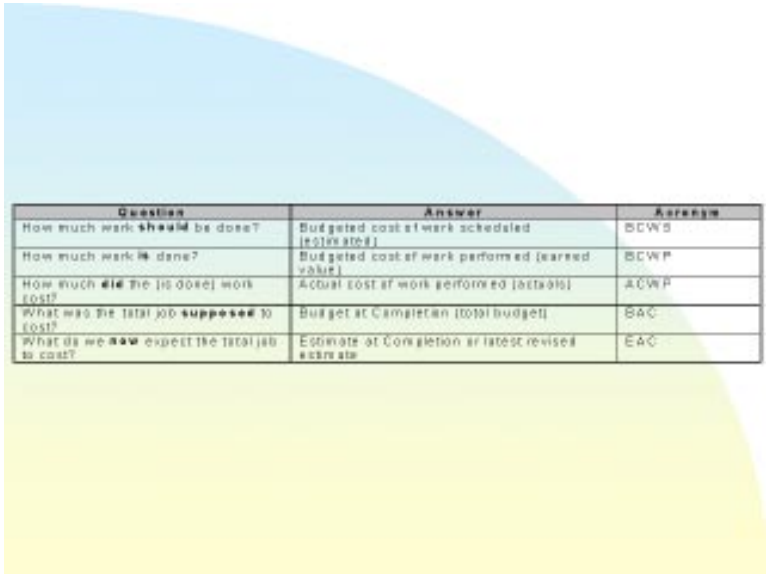
16. Schedule Performance Index (SPI) = BCWP / BCWS

17. Budgeted at Completion (BAC) = å of All the Budgets (BCWS)

18. Estimate at Completion (EAC) = [(ACWP/BCWP) X BAC]

19. Variance at Completion (VAC) = BAC – EAC

20. Earned value questions [96]-



Question	Answer	Acronym
How much work **should** be done?	Budgeted cost of work scheduled (estimate)	BCWS
How much work **is** done?	Budgeted cost of work performed (earned value)	BCWP
How much **did** the [is done] work cost?	Actual cost of work performed (actuals)	ACWP
What was the total job **supposed** to cost?	Budget at Completion (total budget)	BAC
What do we **now** expect the total job to cost?	Estimate at Completion or latest revised estimate	EAC

(Dr. Harold Kerzner, Project Management, A Systems Approach to Planning, Scheduling, and Controlling, Fifth Edition, Van Nostrand Reinhold Publishing, New York, 1995, pp. 811-812.)

Heuristic factors about Schedule Variance (SV) and Cost Variance (CV) are:

If the CV is positive and the SV is negative, either the task has not started or it has started and not enough resources have been applied.

If the CV is negative and the SV is negative the costs are overrun and the schedule is slipping.

If the CV is negative and the SV is positive, this indicates that money was spent to crash the schedule.

If the CV is positive and the SV is positive the project is under budget and ahead of schedule.

QUALITY ASSURANCE

1. Cost of Quality = Management's Responsibility.

2. Normal Distribution = Bell Curve

3. One Standard Deviation = 68.3% of population

4. Two Standard Deviations = 95.5% of population

5. Three Standard Deviations = 99.7% of population

6. Rule of 7=1.56% probability

7. Cost of Conformance (proactive)= Planning + Training + Control + Validation + Tests + Audits.

8. Cost of Conformance is cost of conforming to specifications.

9. Cost of Non-conformance(failure)= Scrap, Rework, Additional work, Warranty, Complaint Handling, Product recall, Expediting.

10. Reliability = primary measure is mean time between failures

11. Quality cost for a project = 3% to 5% of project's total value & nonconformance cost 12-20% of project's total value (Source = Ireland)

12. Quality Control = Established Base line measures conformance against base line.

13. Variance = measurable in increments

14. Variance = Standard Deviation squared: also called Kurtosis

15. Attribute = Go/No Go decision

16. Probability = Chance it will happen

17. Uncertainty = probability not known

18. UCL (upper control limit) = mean LCL (lower control limit) + Standard Deviation = Mean - Standard Deviation.

19. Zero Defects = Standard + communicate

20. Before quality was emphasized, 20 to 30 thousand per million defects now it is 20 to 50 rejects per million or less.

21. Quality = Conformance to requirements or specifications.

22. Cost of Quality = Nonconformance to specifications.

23. Statistical Process Control's main tool is control charts.

24. Regression analysis = function in form

25. Correlation analysis = strength, direction, and form.

26. Sample size increase will decrease the control band.

27. Customer expects producibility, usability, reliability, availability, maintainability, flexibility, social acceptability, operability, and affordability.

TIME

1. Expected Mean Value =[optimistic + (4 x most likely) + pessimistic] / 6

2. Resource Leveling = use resources effectively, however will normally change the critical path and will lengthen the project's duration.

3. Standard Deviation =(Pessimistic Estimate - Optimistic Estimate) / 6

4. Cumulative Cost Curve = Best tool for tracking project cost

5. Slack = Early Start -Late Start

6. Early Finish = Early Start + Duration

7. Late Start = Late Finish-Duration

8. Gantt Chart = Used to track actual vs. planned, good for schedule control.

9. PERT = Best for what if, measures future consequences of activities.

10. Fast Tracking = used in order to speed up those critical tasks...doing tasks in parallel with each other.

11. Crashing the Schedule Rules - Only crash those on the critical path and begin crashing only those tasks which cost the least amount first.

12. AOA = Event Oriented

13. AON = Activity Oriented

SCOPE

1. The major scope management processes consist of 1) Project Initiation, 2) Scope Planning, 3) Scope Definition, 4) Scope Verification, and 5) Scope Change Control.

2. Product Scope refers to the features and functions of the product delivered by the project, while Project Scope refers to the work required to deliver the product.

3. Project Initiation results from management's recognition of a problem, opportunity or a business requirement.

4. Preliminary work (i.e., feasibility study, preliminary plan or some other form of analysis) is often completed prior to project initiation.

5. The Project Charter clearly defines the duties and authority of the project manager, the functional managers and the project team. It also gives the project manager the authority to apply resources to project activities.

6. Constraints are a factor that will limit the team's options.

7. Assumptions are factors that, for planning purposes, will be considered to be true, real or certain.

8. The Scope Statement is a narrative document which provides a basis for 1) a contract between the project team and the customer, 2) confirming a common understanding of the project scope, 3) change control and 4) making future project decisions.

9. Decomposition involves identifying the major project elements, developing cost and duration estimates, and identifying specific results for each level of the WBS.

10. Scope verification is the process of obtaining formal stakeholder acceptance of the project scope.

11. Scope change control is concerned with 1) influencing factors which create scope changes to make sure they are beneficial to the project, 2) determining when a change has occurred, and 3) managing actual changes when and if they occur.

12. The Scope Management Plan is a high-level process for scope change control. It is developed during the scope planning phase, as part of the Scope Statement document.

INTEGRATION

1. Life cycle = Conceptual, develop, implementation, termination.

2. Project Charter = Delegate authority, Organization concerns, Cost Estimates, Schedule, Justification of project, Approval of project, Resources available, Scope of project.

3. Life Cycle Conflict = project priority + Administrative procedures + Schedule (as conceptual); Implementation (schedule + tech issues + resources); Termination (schedule, personal conflicts, resources).

4. Configuration Management = General Design + Detail Design + Implement & Test System.

5. WBS Levels = Project, Sub-project, task, work package, and work element.

6. Know the types of organizations such as: Functional, Projectized, Matrix, Project Coordinator, and Project Expediter.

7. What is another name for Responsibility Matrix? Linear Resource Chart or Resource Matrix or Cross Impact Matrix.

8. When is the Project Charter completed? At the end of the conceptual phase.

9. When is the WBS developed? Planning Phase.

10. What are the three top sources of conflict during each phase? Conceptual: Project priorities, Administrative procedures, and Schedules. Planning Phase: Project priorities, Schedules, and Administrative procedures. Implementation Phase: Schedules, Technical, and Resources. Close-Out Phase: Schedules, Personality, and Resources.

11. Eighty hours of work makes-up a Work Package.

12. Know the importance of a WBS.

13. When does the project manager most likely encounter problems during the Planning Phase? When developing the WBS and Schedule since it requires the scheduling of resources.

14. What creates the biggest problem for the PM? Motivating people.

15. The typical role of the project manager is to plan, organize and control project activities from the conceptual phase through the closeout phase.

16. The Project Plan, a roadmap to follow through each project phase, pulls all parts of the project together into one cohesive document.

17. The three types of planning are: strategic, tactical and operational. Strategic is long-term, top down planning; tactical is bottoms-up for a shorter term, and operational is a quick response with a shorter timeframe than tactical.

18. The rolling wave approach is an iterative planning process which starts when little actual information is available and continues to be modified and refined as additional information is obtained.

19. The three components required for project plan development are: objectives, assumptions and estimates.

20. The Statement of Work (SOW) is a narrative of project work requirements, developed at the beginning of the process. It should include project objectives, a description of the work, specifications, funding constraints, a high level schedule and a work breakdown structure.

21. What is the least performed of all project life cycles? Project Termination or Closeout.

COMMUNICATIONS

1. Communication Model = Communicator, Message, Medium, and Recipient.

2. Audience = Customer, Top Management, and Team.

3. Communication Process = Transmit, Filter, Receive, and Understand.

4. Communication Environment = Communication Channels, Logistics and Personal Contact.

5. Four Communication Types = Formal (written/verbal) and Informal (written/verbal).

6. Communication Barriers = No Channels, Distance, Noise, and Attitudes.

7. Project manager's main effort is to integrate, plan, and communicate.

8. Communication Basic Model = Sender, Receiver, and Message.

9. Number of lines of communication = [n(n - 1)] / 2 where n = number of members.

10. Management Styles = Authoritarian, Combative, Conciliatory, Ethical, Facilitating, Intimidating, Judicial, Promotional, and Secretive.

11. Three Common Media Use = Visual, Audio, and Touch (tactile).

12. Sender Transmits and Receiver Interprets.

13. Conflict = Win-Lose(0,9) ; Lose-Leave (0,0); Yield-Lose (9,0); Compromise(5,5); Integrative (9,9). 9,9 is better than 5,5.