**Organizational Structure Types:** Affect how PM manages projects

* Functional and Multidivisional are essentially the same in terms of PM power and role: they actually have no project teams and thus no PM. PM role is more like a coordinator
* Project team starts to form up since Matrix structure
* Table ordered by the power of PM except for Virtual and Hybrid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Organizational Structure** | **Characteristics** | **PM Power** | **PM Role** | **Who Manages Budget** |
| Organic / Simple | People work side by side | None to little | Part-time; like coordinator | Owner or operator |
| Functional / Centralized | People arranged by work being done | None to little | Part time | Functional manager |
| Multidivisional | Decentralized, replication of functions in the organization | None to little | Part time | Functional manager |
| Weak Matrix | Team members from all over organization | Low | Part time | Functional manager |
| Balanced Matrix | Team members from all over organization | Low to moderate | Part time | Functional manager & PM |
| Strong Matrix | Team members from all over organization | Moderate to high | Full time | PM |
| Project-Oriented | Team purely work on the project for the duration of the project | High to almost total | Full time | PM |
| Virtual | Network structured | Low to moderate | Full time or Part time | Functional manager & PM |
| Hybrid | Mixture of functional, matrix and project-oriented | Mixed | Mixed | Functional manager & PM |

**Leadership Styles**

* Laissez-faire
* Servant
* Charismatic
* Transformational
* Transactional
* Interactional

**Reserve**

* Contingency reserve: Account for risks (i.e. known unknowns). Counted in the baseline of cost and schedule
* Management reserve: Account for unknown unknowns. Not counted in the baseline, but counted in overall project duration and budget

**Checklist of Risk**

* **VUCA:** Volatility, Uncertainty, Complexity, Ambiguity
* **TECOP:** Technical, Environmental, Commercial, Operational, Political
* **PESTLE:** Political, Economic, Social, Technological, Legal, Environmental

**PM Power Types**

* Positional
* Informational
* Referent
* Situational
* Personal / Charismatic
* Reward
* Ingratiating (False power)
* Pressure-based
* Guilt-based
* Persuasive
* Avoiding

**Cost Estimate Range**

* Rough order of magnitude: -25% to 75%
* Budget estimate: -10 to 25%
* Definitive estimate: -5% to 10%

**Integrated Change Control Workflow**

**Change Requests**

* Scope
* Cost
* Schedule
* Contract
* Corrective action
* Preventive action
* Project policies
* Procedures
* Resources

**Configuration management**

**system**

**Change management**

**system**

**Integrated Change Control**

**Change Control Board**

* Scope
* Schedule
* Cost
* Quality
* Resource
* Communications
* Risk
* Procurement
* Stakeholders
* Approved, declined, deferred change requests
* Project management plan updates
* Project document updates
* Change log updates

**Schedule Network Diagram**

Understand each cell in the box

|  |  |  |
| --- | --- | --- |
| Early Start | Activity Duration | Early Finish |
| **Activity Name** | | |
| Late Start | Float | Late Finish |

Fill in the network diagram:

* First, find the critical path: i.e. CFIH = 20
* Second, complete forward pass
  + Start = Day 0, all the subsequent activities have their **Early Start = 1**
  + **Early Finish = Early Start + Duration – 1**
  + If an activity has multiple immediate prior activities: **Early Start = Latest of Early Finish among all prior activities + 1**
* Third, complete backward pass
  + **Late Finish of all last activities = End date of Critical Path**
  + **Late Start = Late Finish – Duration + 1**
  + If an activity has multiple immediate subsequent activities: **Late Finish = Earliest of Late Start among all subsequent activities - 1**
* Fourth, calculate free float = **Late Finish – Early Finish,** or = **Late Start – Early Start**
  + **Free Float:** Regarding an activity, the delay without delaying the early start of any successor activities
  + **Total Float:** Regarding an activity, the delay without delaying the project completion
  + **Project Float:** Regarding a project, the delay without delaying passing customers’ expected completion delivery

A diagram of a network

Description automatically generated

**Measure Project Performance**

EV: earned value, PV: planned value, AC: actual cost, BAC: project cost baseline

* Cost Variance = EV - AC
* Schedule Variance = EV - PV
* Cost Performance Index (CPI) = EV/AC
* Schedule Performance Index (SPI) = EV/PV
* Estimate at Completion (EAC)
  + Using formula: BAC/CPI
  + Current performance: AC + (BAC – EV)
  + Using CPI and SPI factor: AC + (BAC – EC)/(SPI + CPI)
* Estimate to Complete (ETC) = EAC - AC
* To-complete Performance Index (TCPI): **Smaller values mean easier to meet**
  + Can meet BAC: (BAC – EV)/(BAC – AC)
  + Can meet EAC: (BAC – EV)/(EAC – AC)

**Organizational Theories of Needs/Motivation**

* Maslow’s Hierarchy of Needs: 5 needs
* Herzberg’s Theory of Motivation: demotivator vs motivator
* McGregor’s X and Y: X people are bad and Y people are good
* McClelland’s Theory of Needs: needs are acquired by life experience over time, which involves achievement, affiliation, power
* Ouchi Theory Z: lifelong employment (workers involved in management process)
* Vroom’s Expectancy Theory: people behave based on what they expect what their behaviour will bring
* Halo effect: Believe that one person who performs good at one aspect will be good at the other aspect (false perception)

**Tuckman Model of Team Formation**

Forming 🡪 Storming 🡪 Norming 🡪 Performing 🡪 Adjourning

**Tools for Quality Control**

|  |  |
| --- | --- |
| Cause-and-effect chart (Fishbone/Ishikawa) A diagram of cause and cause  Description automatically generated | Flowchart  A diagram of a flowchart  Description automatically generated |
| Control chart  A diagram of a graph  Description automatically generated | Pareto diagram  A graph with different colored bars  Description automatically generated |
| Histogram | Scatter diagram |
| Run chart | Check sheets |

**Response to Risk**

* Escalate: to negative or positive risk
* Avoidance: to negative risk
* Transference: to negative risk
* Mitigation: to negative risk
* Acceptance: to negative or positive risk
* Exploiting: to positive risk (ensure it will be realized)
* Sharing: to positive risk
* Enhancing: to positive risk (increase the probability, but may not be realized)

**Contract Type**

* Firm Fixed-Price contract, plus variations:
  + Incentive Fee
  + Economic Price Adjustment
* Cost Reimbursable contract, plus variations:
  + Fixed fee
  + Incentive Fee
  + Award (subjective review by buyer)
* Time and Material contract

**Stakeholder Engagement Level**

* Unaware
* Resistant
* Neutral
* Supportive
* Leading

**Type of Effort**

* Level of effort: Non-value added effort. Work to support the project (e.g., management, budget) and not directly contribute to the project
* Discrete effort: Work required to complete project scope
* Apportioned effort: Non-value added effort. Project management work

**Agile Manifesto (4)**

* Individuals and interaction > Processes and tools
* Working software > Comprehensive documentation
* Customer collaboration > Contract negotiation
* Respond to changes > Follow a plan

**12 Agile Principles Behind Manifesto**

* Customer satisfaction
* Welcome changes
* Frequent delivery
* Collated team
* Motivated individuals
* Face-to-face conversation
* Working software
* Constant pace
* Continuous attention
* Simplicity
* Self-organization
* Regular reflection

**3 Pillars of Agile Project**

* Transparency
* Inspection
* Adaptation: Not “adaption”, adaptation is to actively accommodate the new environment, while adaption is to passively accommodate

**Core Values of Extreme Programming (XP)**

* Simplicity
* Communication
* Feedback: feedback early, fail early
* Courage: make work visible to others, “pair programming”
* Respect

**5 Categories of Customer Preferences**

* Must-be quality
* One-dimensional quality: Spoken attributes that are promised
* Attractive quality: Not necessarily required
* Indifferent quality
* Reverse quality: Someone like, someone dislike

**Continuous Integration System**

* Pros:
  + Discover issues in time
  + Easy to revert
* Cons:
  + Setup time is lengthy
  + Need to build a suite of automatic tests
  + Cost of dedicated server

**Customer Collaboration In Terms of Conflict Resolution**

* Accept
* Avoid
* Ameliorate: reduce the impact
* Cover: make it invisible to users
* Resolve: eliminate it once for all

**Time**

* Lead time: how long to go through the entire process to get a thing done
* Cycle time: subset of lead time, how long to go through part of process to get a thing done
* Project cycle time: cycle time for entire project
* Defect cycle time: how long for a defect from being discovered to being resolved

**Methodology Success Pattern**

* Larger team need heavier method
* Project with greater criticality requires greater ceremony
* Feedback and communication reduce the need for intermediate deliverables
* Discipline, skill and understanding counter process formality and documentation
* Efficiency is expendable on bottleneck activities

**Agile Method**

Extreme Programming (XP)

Dynamic System Development Model

Feature-Driven Development

Crystal

Internal dependency belongs to Hard logics

Resource smoothing: limit resource except for the critical path and try to adhere to deadline

Total productive maintenance: Arrange maintenance in advance to avoid errors occurring

Project resilience: Awareness of unknownable unknowns

Trial engagement: Initial deliverable and work products on a paid basis, the full commitment is based on performance

Large agile project might use Master Service Agreement for vendor’s engagement. It addresses total fee, but still allow changes in agile projects

Sapir-Whorf Hypothesis: Need to understand other’s language in order to understand what they think

Ethnocentrism: Use one’s own culture to measure other’s culture

Product owner can cancel a sprint, but items “done” still need to be reviewed

Product owner is responsible for: product backlog, measuring project performance, and forecasting completion date and making it transparent

Product owner is to create and own product vision, product roadmap and release planning

Graduated fixed-price contract: Hour rate is higher if the work is done earlier, but lower if later. No sandbagging is involved.

Little’s Law: Limit the number of WIP, because the more things left on the list, the more work you need to complete

Dreyfus Model of Adult Skill Acquisition: greenhands follow the rule 🡪 advanced persons follow the rule with better understanding 🡪 Competent decides the best rule for the situation 🡪 Proficient determines best strategy instead of relying on the rule 🡪 Expert’s decision-making becomes intuitive