3. PLANNING & PROCESSES

**PROGRAM PLAN**

- **BASE DOCUMENTS:**
  - BID PROPOSAL: overview
  - CONTRACT: what we promised, schedule, price
  - PROGRAM PLAN: schedule and document format

- **TEAM:**
  - Program Manager, Contract Manager
  - Chief Engineers

- **OUTPUT:**
  - PROGRAM PLAN, reviewed by QA and approved by business director

- **KEY CONTENTS:**
  - Objectives and reference projects
  - Scope and process Selection
  - Budget: Material (LAB), manpower, Travel cost
  - Project schedule and Cash Flow
  - Skill set and manpower distribution
  - Contract & subcontract management
  - Quality Control
  - Project management (program level emergency plan)
  - Kickoff and review schedule and milestones
  - Contract BID plan
  - Contract Book structure

**ENGINEERING PLAN**

- **BASE DOCUMENTS:**
  - BID PROPOSAL: solution
  - PROGRAM PLAN: schedule
  - REFERENCES: experiences and document format

- **OUTPUT:**
  - ENGINEERING PLAN, reviewed by QA and approved by Program Manager and Engineer Manager

- **TEAM:**
  - Chief Engineer, Network Engineer, Software Engineer

- **KEY CONTENTS:**
  - High level overview
  - System architecture
  - Software architecture
  - System operation
  - Technology and Prototype
  - Tasks and quality control in every step of the process: requirement to acceptance test
  - Integration test methodology
  - Devices
  - CMMI execution plan
  - Subcontract items list
  - Major material selection

**PROJECT PLAN**

- **BASE DOCUMENTS:**
  - PROGRAM PLAN: schedule, manpower,
  - ENGINEERING PLAN: solution

- **OUTPUT:**
  - PROJECT PLAN, reviewed by QA and approved by Program Manager

- **TEAM:**
  - Project Manager, Program Manager, Chief Engineers

- **KEY CONTENTS:**
  - Schedule
  - Skill set and manpower management
  - Process execution
  - Lab establishment
  - Miscellaneous (deliverable) management
  - Risk management
  - Requirement management
  - Relation with other functions: QA, PM, Monthly and weekly report plan

**REQUIREMENT PLAN**

- **BASE DOCUMENTS:**
  - PROGRAM PLAN: schedule
  - ENGINEERING PLAN: solution

- **OUTPUT:**
  - REQUIREMENT PLAN, reviewed by QA and approved by Project Manager

- **TEAM:**
  - Engineers, Chief Engineer, Project Manager

- **KEY CONTENTS:**
  - Schedule
  - Questionnaires for all parts
**CONTRACT MANAGEMENT**

- Contract manager is specialized in contract execution and has legal background and sufficient knowledge of company’s charging structure.
- When risks caused by customers, he/she must evaluate the impact and estimate its associated cost, and sends memorandum to customer. A personal visit may be necessary, get layer involved when issues become serious.
- Know the process and procedures of arbitration and suit
- Participate in milestone review meeting with the Program Manager.

**SUBCONTRACT MANAGEMENT**

- With combined functions of a program manager and a contract manager, but at a smaller scale
- Identify potential vendors
- Access vendors profiles and evaluate their qualification
- Contract negotiation: price, schedule
- Supervise the vendor’s activities
- Risk management

**WATERFALL MODEL (1)**

(Winston Roy 1970)

1. Requirement
2. Design
3. Coding & unit test
4. System Integration
5. Operation & maintenance

**WATERFALL MODEL (2)**

(Winston Roy 1970)

- **Advantages:**
  - A better model than the primitive model: code/fix
  - Recognize the need for feedback loops between stages.

- **Disadvantages:**
  - When requirements are huge, a project may never get into the design phase before deadlines.
  - Does not reference prototyping activities.

**V-SHAPE DEVELOPMENT PROCESS**

- Requirement
- Test Plan
- Design
- Test Model
- Test Case
- Test Data
- Custom & unit test
- System Integration
- Operation & maintenance

**CODE INSPECTION AND UNIT TEST**

- Design
- Coding
- Unit Test Plan
- Unit Test
- Code Inspection
- Unit Test Plan
- System Integration
- Operation & maintenance
DEVELOPING PROCESS

Requirements specification
Inception
Elaboration
Construction
Transition

Inception: focus on understanding the business of the project, project scope and feasibility; define constraints, schedule, budget, risk; feasibility document is created.

Elaboration: Refine the requirements, assessable architecture, early prototype is developed and demonstrated for validation.

Construction: Focus on implementation, architecture and design are fully developed; most of code is done.

Transition: alpha, beta (testing) releases are done and deployed for use internally or by customers.

CHANGE CONTROL

New change request or issue
Change Control Board

Evaluation

Design & Modification

External Agreements

Fix

Fix & Release

Fix & CLOSE

SPiral MODEL (1) (Barry Boehm 1988)
Risk-Driven and Incremental Model

• It works for large projects with complicated requirements that can be divided into phases
• It is driven by a series of risk-driven prototype followed by a structured waterfall-like process
• Multiple feedback opportunities with the users and customers to get “Yes. Buts” out early

SPiral MODEL (2) (Barry Boehm 1988)
Risk-Driven and Incremental Prototype Model

ITERATIVE MODEL (1) (Krutchten 1995)

ITERATIVE MODEL (2)
**THE DOOD PROJECT**

**DEDUCTIVE OBJECT-ORIENTED DATABASE**
- Based on Predicate Logic
- Support recursion
- Data, rules, queries are in the same format

**M-GATE BUSINESS OBJECTIVES**

- M-Gates define a set of requirements that must be satisfied by all proposed solutions from different sectors/business units enabling the selection of cross-sector solutions that are the best fit for the company and its customers.
- Clearly define roles and responsibilities that are cross-sector and cross-functional to enable efficient and sound decision-making.
- Clearly identify and document M-Gate decisions that allow all sectors and business units to understand why certain solutions are selected and why others are not, which helps sectors understand the overall strategy of the company.

**SPD M-GATE PROCESS (2)**

**Key Notes:**
- These deliverables are based on the formal contract that defined the project's commitment to deliver the specified system, product, or platform within the identified schedules and cost targets.

**SPD M-GATE PROCESS (3)**

**Key Notes:**
- All critical success factors, schedule, etc. and this condition can occur due to one or a combination of reasons
- Majority of the requirements and associated criteria have been evaluated and are completed

**Significant Issues - this status arises when the project is deviating from the intent (e.g., critical success factors, schedule, etc.) and this condition can occur due to one or a combination of reasons**
- A risk assessment has been performed and an action plan developed, with owners, complete with triggers and final due dates that are tracked in a solution level. The review board at the specific M-Gate will approve these action plans, owners, complete with triggers and final due dates that are tracked at a solution level.
M-GATE IN SPIRIL LIFECYCLE MODEL

Gate 10
Definition Phase
Gate 9
System Requirements Baseline
Gate 8
System Requirements Allocated
Gate 7
Contract Baseline & Approved
Gate 5
System Validation & Verification
Gate 4
Start Next Level Requirement Design Implementation & Evaluation
Gate 3
Launch & Closeout Phase
Gate 2
Volume Development & Retirement Plan Approved
Gate 1
End of Life Ready for Controlled Information

LINEAR CHAIN FOR MULTIPLE PRODUCT GENERATIONS

Initial Product Development
Definition Phase
Gate 10
Gate 7
Launch & Closeout Phase
Product Enhancement
Definition Phase
Gate 10
Gate 7
Gate 5
Gate 2
Gate 1
Gate 0