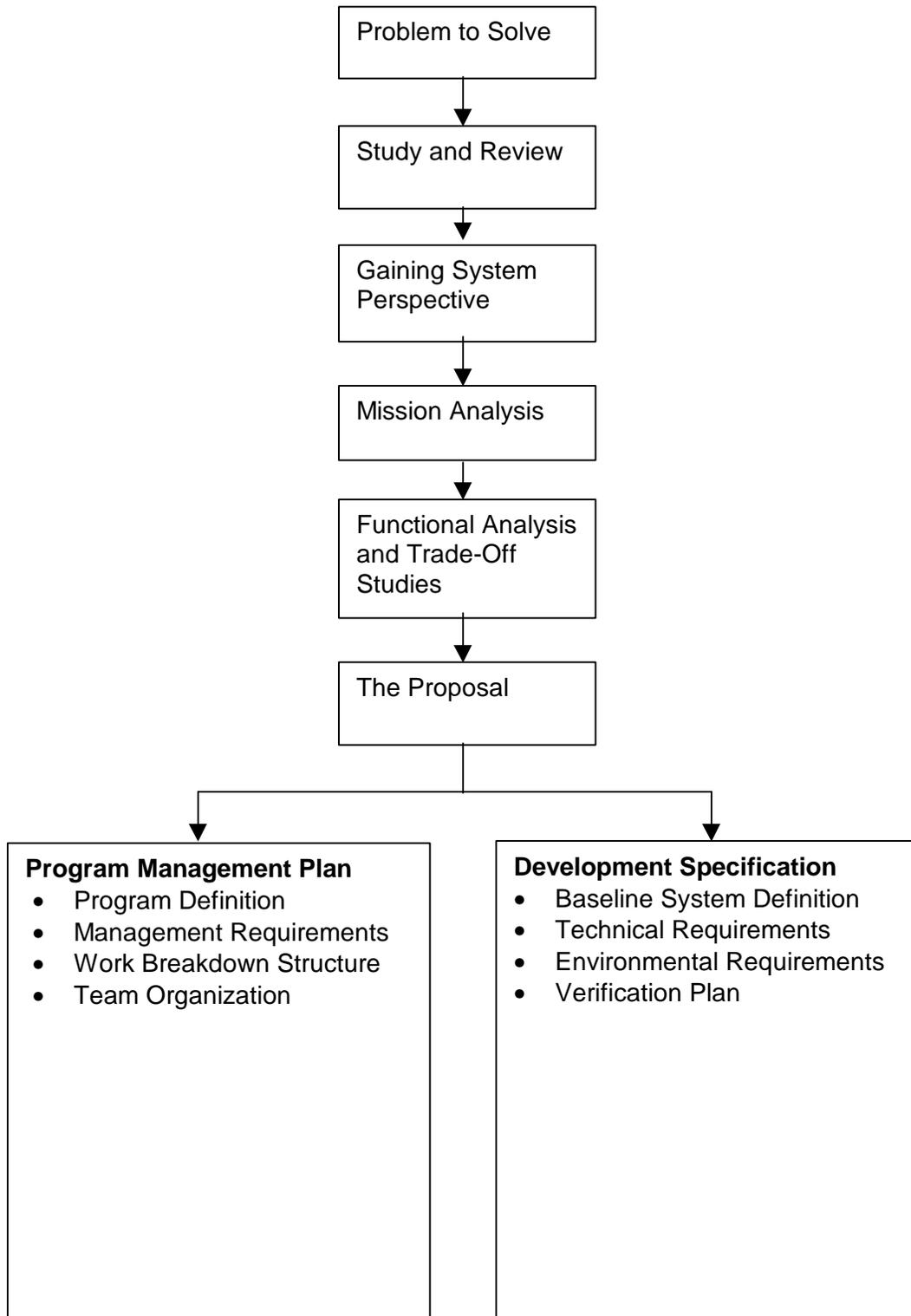


Up-Front System Engineering Process



Problem to Solve

RADAC Redesign
Technology Upgrade
Problems w/ current system
 Maintenance
 Operational
 Cost
 More?

Study and Review

Understanding of current system
Similar systems
Technology survey

Gaining System Perspective

1. *Heirarchy* - where does the new system fit in? What "major system" is it a subsystem of? What are the interfaces?
2. *Time Line/Life Cycle* - what should life cycle look like from
 Concept -> Demonstration -> Development -> Build -> Deploy -> Decommision
3. *Physical Attributes* - High level identification of H/W, S/W, Documentation, People, Facilities
4. *Constraints* - Preliminary identification of technical and programmatic constraints.
 Technical - performance, size, ...
 Programmatic - time, money, personnel allocations to development program
5. *Actions* - What has to happen to fulfill development program? What is the plan?
6. *Specific time and cost goals* - Initial capability, demonstration schedule,

Mission Analysis - Technique for rooting out requirements!!

What to analyze:

1. Major System 'sortie'
2. Major System life mission
3. RADAC system sortie
4. RADAC system life mission
5. Component sorties
6. Component life

How to analyze:

1. *Scenario sketch with time line notation* - Develop picture of various missions/tasks expected from system. Walkthrough analysis.
2. *Time Line Diagram* - Use for random event impact analysis. Failure mode and effects analysis.
3. *Time Segmentation* Divide typical sortie into phases for detailed analysis:
 - Set-up
 - Test
 - Simulations
 - System certification
 - Configuration freeze
 - Countdown
 - Launch
 - Flight
 - Flight termination
 - Post-flight
4. *Checklists* - Canned question checklists exist to root out requirements during various life cycle phases.
5. *Flow Diagrams* - Trace data sequentially/chronologically through system. Trace decisions through system. ...

Functional Analysis and Trade-Off Studies

Use the data collected by doing the foundational work of the previous steps to organize and determine the actions and elements required by the system to perform the sortie and life missions. This process develops the functional architecture required to execute the mission.

Tools:

- Functional Hierarchy - organize, partition and decompose required functions
- Functional Block Diagrams - show how functions interact with each other
- Functional Flow Diagrams - show sequential relationship between functions

Trade-Off Studies used to objectively assess the relative merit of alternate architectural solutions.

1. Set decision making priorities (cost, schedule, performance, ...)
2. Select feasible solution alternatives
3. Assess alternatives using priority based criteria
4. Rank
5. Select
6. Document
7. Implement

The Proposal - The results of the functional analysis and trade off studies can be used to define a baseline system.

- Scope the system
- Timeline of system mission
- Top-level functional block diagrams
- Specification tree
- Interface diagram
- Mechanical sketches and installation drawings
- Detailed block diagram
- Bill of material/components
- Attributes table

Program Management Plan - Includes program definition (goals, schedules, costs, work breakdown structure, staffing assignments, fund allocations). Details specific management requirements (monitor/control process, team building, communications,

Development Specification - Includes the baseline system definition. Compilation of specific technical requirements. Verification matrix for requirements.

Work Breakdown Structure - Includes Work To Do requirements.