Project Management

A Practical Guide From Principles to Strategic Impact

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Today's Mission:

Understand how disciplined project management transforms technical skill into reliable capability

- Bridge theory with real-world stakes
- Learn from global productivity challenges
- Apply frameworks to mission-critical work

The Stakes in Engineering

Consequences of Poor Management:

- Cost Overrun ➔ Diverts funds from other critical capabilities
- Schedule Delay ➔ Creates a dangerous capability gap
- Quality Failure ➔ Risks safety and mission success
- Stakeholder Mistrust➔ Breaks the user-developer chain

Your role: Steward of national resources and security

Universal PM Framework

The Iron Triangle & Beyond

- Core Constraints: Scope - Schedule - Cost (Quality at the center)

- Defence
  - Operational Effectiveness (Does it work on the ground?)
  - Sustainability (Can we maintain and upgrade it?)
  - Security & Classification
  - Strategic Deterrence Value

Management is the art of balancing the competing priorities

Case Study Lens: Stagnant Productivity

Key Global Finding (From KLEMS Data):

- US / Japan / EU: Flat or declining construction productivity for decades
- Paradox: Occurs despite new tech (prefab, automation)
- Core Lesson: Technology alone fails without systemic management

If an entire industry can stagnate, imagine the risk to a single defence project

Root Cause Analysis

Why Does Stagnation Happen?

1. Fragmentation: Many teams, misaligned incentives

3. Inconsistent Processes: Reinventing the wheel each project

5. Risk Aversion: Fear of failure stifles innovation

7. Contract Misalignment: Rewriting inputs over outcomes

9. Defence Parallel: Multiple agencies (Services, DRDO, industry) + rigid standards + high stakes = similar systemic risk.

Methodology 1: Waterfall

The Sequential Approach

- Phases: Requirements → Design → Build → Test → Deploy
- Best For: Projects with stable, clear requirements (e.g., infrastructure, platform upgrades)
- Defense Example: Building a new naval dockyard
- Risk: Inflexible to change, "Big bang" testing at the end

Methodology 2: Agile/Iterative

The Adaptive Approach

- Cycles: Plan → Develop → Test → Review → Repeat (Sprints)
- Best For: Projects with evolving needs (e.g., software, C2 systems)
- Defence Example: Developing a new command & control application
- Risk: Requires intense user collaboration; hard with strict contracts

The Smart Hybrid

Structured Flexibility

- Overall Architecture: Waterfall for major milestones and hardware
- Subsystems/Software: Agile sprints within phases
- Example: A new vehicle platform (Waterfall) with its modular electronic warfare suite (Agile development)
- Key: Clear integration points and interface control

Critical Tool: Work Breakdown Structure (WBS)

From Vision to Manageable Parts

- What it is: A hierarchical decomposition of total project scope
- Rule: 100% Rule – The WBS includes 100% of the work
- Critical: Prevents "scope creep" (see: Future Combat Systems case)
- Outcome: Clear ownership, budgets, and schedules for every component

Critical Tool: Risk Register

Proactive, Not Reactive

- Process: Identify → Analyze (Probability/Impact) → Plan Response → Monitor
- Specific Risks:
  - Technology Maturity (TRL levels)
  - Single-Point Supply Chain Failure
  - Changing Threat Landscape
  - Integration Complexity
- Lesson Learned: F-35's "concurrency risk" – building before testing was catastrophic

Critical Tool: Stakeholder Map

Power vs. Interest Grid

- High Power/High Interest: Manage Closely (User Services, Top Brass)
- High Power/Low Interest: Keep Satisfied (Finance, Parliament)
- Low Power/High Interest: Keep Informed (Technical teams, maintenance)
- Low Power/Low Interest: Monitor (General public)
- Goal: Tailor communication and engagement for each group

Success Story: P-8 Poseidon

Applied Best Practice

- Project: Maritime Patrol Aircraft from Boeing 737
- PM Win: Modified Commercial-Off-The-Shelf (COTS) approach
- Strategy: Used a proven airframe; focused innovation on mission systems only
- Result: On-time, on-budget, highly effective global capability
- Takeaway: Smart scoping and risk reduction win

Cautionary Tale: Future Combat Systems (FCS)

A Lesson on Scope

- Project: US Army's "system of systems" (18+ new techs)
- PM Failure: "Death by Scope Creep." Unbounded requirements, immature technologies all at once
- Result: Cancelled after $20B+, with little to field
- Takeaway: A WBS is useless if the top-level scope is fantasy

Your First 90-Day Battle Plan

Phase 1: Understand (Days 1-30)

- Map stakeholders & the Operational Requirement (OR).
- Learn security protocols.
- Ask: "Who is the user, and what problem are we solving?"

Phase 2: Integrate (Days 31-60)

- Decode the Test & Evaluation (T&E) plan.
- Identify key technology risks.
- Build your cross-agency network.

Phase 3: Contribute (Days 61-90)

- Propose one process improvement.
- Volunteer for a test/integration event.
- Transition from learner to contributor.

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Tech & Digital Tools

Modern PM Enablers

- Digital Twins: For simulation, training, and predictive maintenance
- Modular Open Systems Architecture (MOSA): Design for future upgrades
- Secure Cloud Collaboration: Share data across classified domains
- AI for Logistics: Predict parts failure, optimize supply chains
- Remember: Tools support the process; they don't replace clear thinking

Your Mindset Shift

From Graduate to Engineer

- Then: Solve the problem on the paper
- Now: Solve the right problem, within real constraints, for the actual user
- Your New Metric: Not just "does it work?" but "is it available, affordable, and effective?”. And is it sustainable?
- Ultimate Goal: Mission Assurance.

Conclusion & Call to Action

The Force Multiplier

- Technical excellence × Disciplined management = Strategic advantage
- Learn from past projects—both glorious successes and costly failures
- Apply the frameworks to bring order to complexity
- Your first task: Be a student of the process as much as the technology

Cautionary Tale – The Perils of an Unclear Baseline

Project: INS Vikramaditya Aircraft Carrier Refit

- A contract to refurbish and modernize a former Russian carrier based on an initial, incomplete assessment
- The PM Failure: "The Black Box Baseline”
- The agreed scope and price did not match the actual work required
- The Consequence: A classic "discovery" project. Years of re-negotiation, a near-tripling of cost, and significant delays
- The PM Lesson: You cannot manage what you have not measured

Cautionary Tale – Concurrency & Integration Risk

Case 1: F-35 Joint Strike Fighter

- The Risk: "Concurrency" – Building production aircraft in parallel with ongoing development and testing
- The Consequence: Testing revealed major design flaws, aircraft already built required billions in costly, time-consuming retrofits
- The PM Lesson: Never let schedule pressure shortcut the test-fix-prove cycle

Case 2: Australian Collins-class Submarines

- The Risk: "Incomplete Prototype" – Committing to a scaled-up, unproven design before critical systems were validated
- The Consequence: Years of severe "teething problems" with noise, propulsion, and combat systems led to low availability and high sustainment costs
- The PM Lesson: Prove your technology and integration before full-scale production

Success Story – The P-8 Poseidon Program

Applied Best Practice: Leveraging Proven Platforms

- Project: Development of a next-generation Maritime Patrol & Anti-Submarine Warfare aircraft
- PM Strategy: Modified Commercial-Off-The-Shelf (COTS). Used the Boeing 737-800 airframe as a stable, certified foundation
- Key PM Win:
  - De-risked Schedule & Cost: Avoided the massive complexity of a clean-sheet aircraft design
  - Focused Innovation: Concentrated engineering effort solely on the militarized mission systems (radar, sensors, weapons)
  - Lifecycle Advantage: Inherited the global 737 support ecosystem for easier maintenance and training
- Result: A global success. Delivered a high-performance, reliable capability on time and on budget to the U.S., Indian, other allied navies

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Q & A

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