



Development (Design and Build)

Presented to:

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By:

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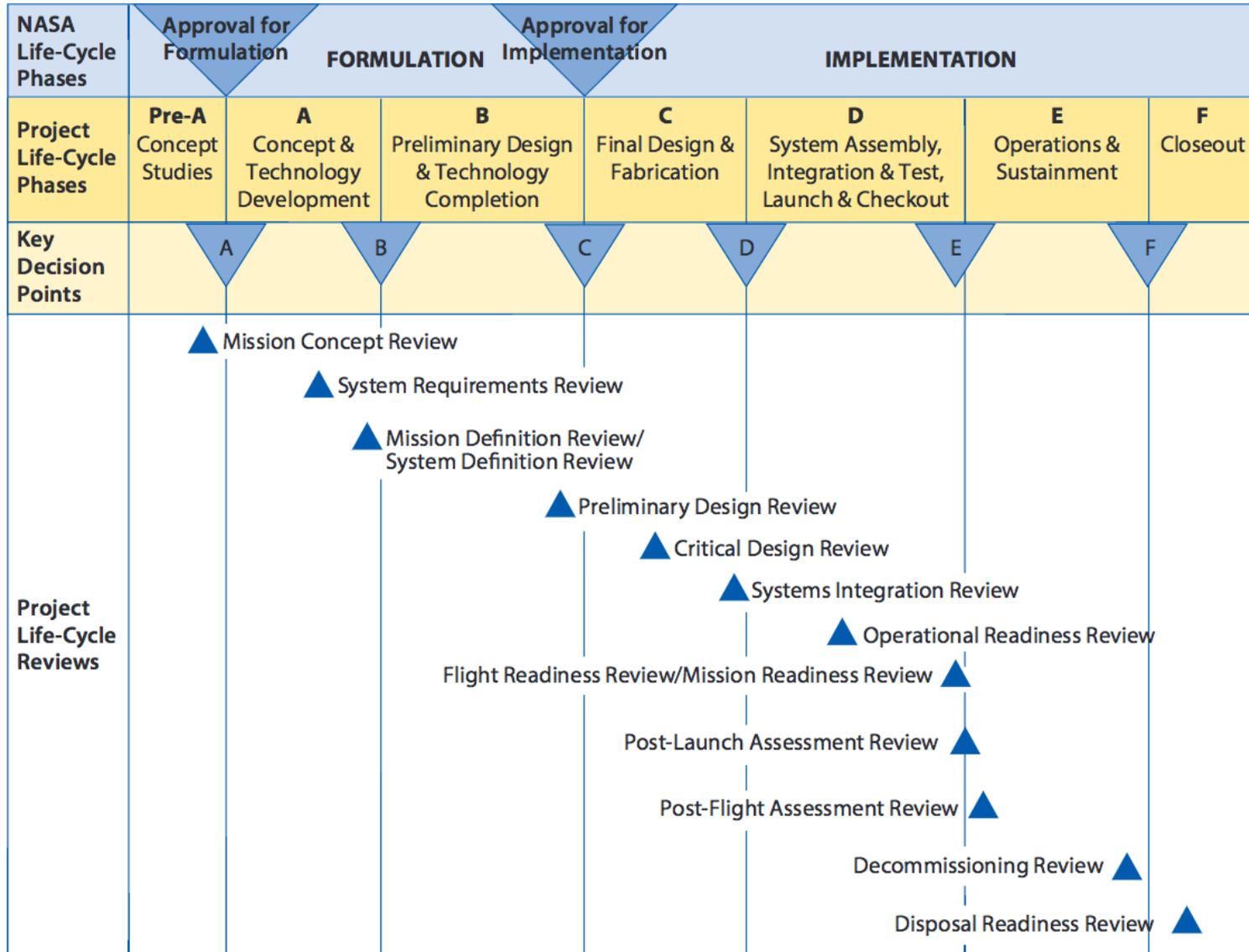
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Tuesday, 09 May 2017



From Concept to Reality: Design and Build

Simplified Project Life-Cycle

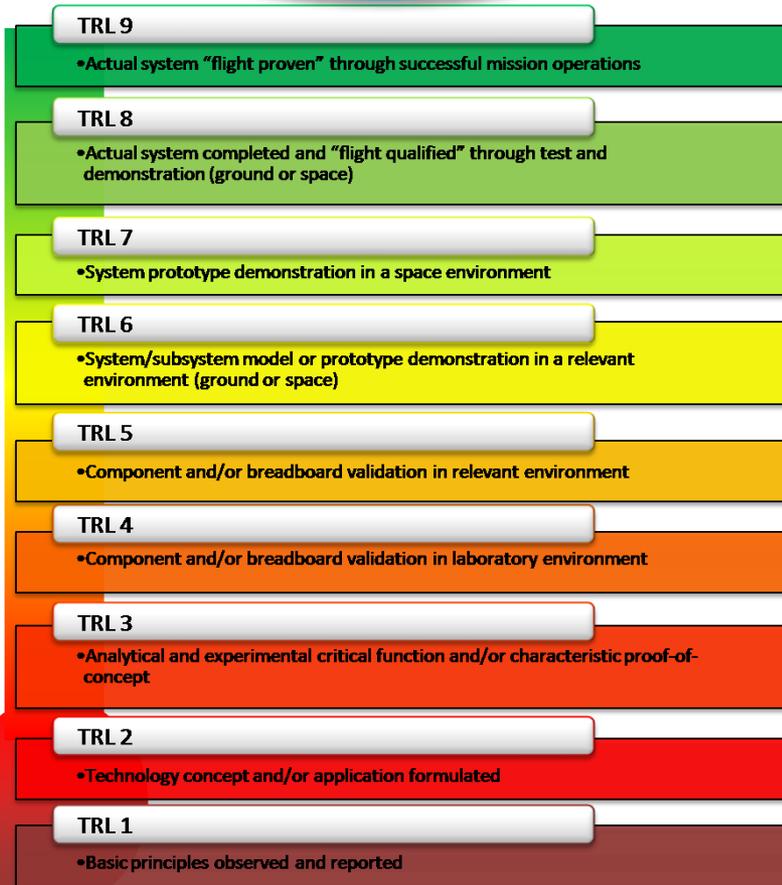


Lifecycle Technical and Cost Summary

Phase	Milestone	Key Activities	Technical Product	Cost Estimation
Concept	Mission Concept Review	Establish feasibility: Fulfill the stakeholder needs and objectives	Paper Design, Basic System Analysis	Historical Analogy, Rough Parametrics
Formulation	Mission Requirements and Definition Review	Requirements/constraints: Technical, Programmatic (Risk, Cost, Schedule)	Architecture, Sizing, Refined Analysis, Requirements, Trades, Technology Development	Updates of Historical Analogy, Refined Parametrics
Formulation	Preliminary Design Review	Paper and electronic designs, prototype builds, complete technology risk reduction	Documents, Models (physical, virtual), Prototypes	Grass Roots, Refined Analogy, Risk and complexity based models
Implementation	Critical Design Review	Build and test engineering models	Engineering Model build, specifications, prototype software	Updated Grass Roots, Prototype build actuals, Risk and complexity based models
Implementation	Manufacturing Readiness	Build and test final Hardware/Software (Flight Units)	Final Fabrication drawings, specifications, Flight Hardware/software	Updated Grass Roots, Engineering Model build actuals, Risk and complexity based models
Implementation	Test Readiness	Test, Test, Test, ...	Problem Reports, Troubleshooting and fixing	Updated Grass Roots, Actuals from Engineering Model Testing

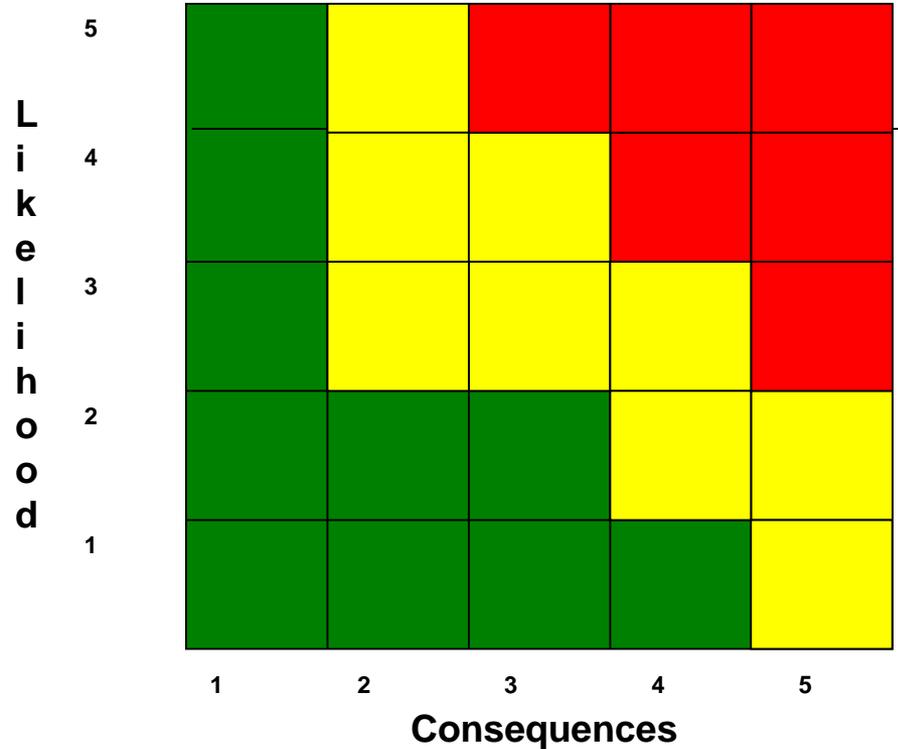
Key Processes over the project life-Cycle

Technology Readiness



Keep it Simple
Reduce Complexity

Risk Management



Robust
Margins

Challenges and Mitigations

- There is a process, procedure for everything, So what could go wrong...?
- Challenges, particularly for new, one of a kind designs:
 - Things never go exactly as planned
 - Requirements creep
 - Cost estimates are immature
 - Aggressive/optimistic stakeholder and user expectations
 - Technology is immature,
- Thoughts on mitigations:
 - Invest early/heavily in risk reduction (Technology, Prototypes, Models, simulators, small demonstrators/pilot experiments)
 - Frequent/On-going dialog with science/user community
 - Make simulators and analysis tools available for user community
 - Continually exercise risk management, proactive contingency planning
 - Partner with and leverage talent and experience (internal, external, commercial, international)