

Uncertainty

Learning Objectives

1. Sources of Uncertainty
2. Clarity Test
3. Taxonomy of Uncertainty for aerospace products
4. Uncertainty and Risk
5. Treatment of Uncertainty in space companies
6. Advanced Discussion of Uncertainty
 - a. Irreducible Uncertainty inc human agency
 - b. Portfolio Theory
 - c. Portfolio Applications

Required Reading

1. Uncertainty Framing (09010 Uncertainty_frame.doc)
2. DSB/AFSAB report (09020 dsb_space.pdf)
3. Framework for uncertainty (09030 McManusframework.doc)
4. Management of Uncertainty (09040 Uncertainty Mgt.doc)
5. Uncertainty & Risk (09050 Uncertainty_Risk.doc)
6. Uncertainty into conceptual design (09060 Uncertainty.doc)
7. Human Agency (09070 Human_Agency.doc)
8. Design Margins (09080 Design_Margins.doc)
9. Dispersing teams as source of uncertainty (09090Team_Dispersion.doc)
10. Portfolio Theory (09110 Uncertainty_theory.doc)
11. Portfolio Applications (09120 Uncertainty_app.doc)

Homework

1. The DSB report points out that risk (the downside of uncertainty) is the implicit variable when performance, cost and schedule are constrained on state of the art space systems. Undertake a historical review of how risk has been mitigated (or not) in the human space program. What lessons can be learned from the success of Apollo and the relative failure of the STS program. Analyze the relationship between technical, organizational and cultural risk. You might find the Columbia Accident Investigation report helpful.