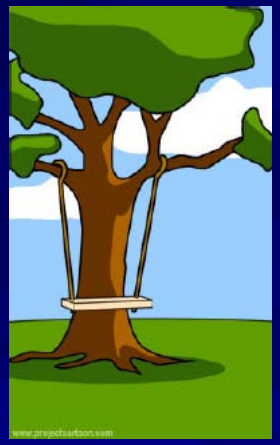
I Don’t Need Requirements – I Know My System

PM Challenge 2012

Lisa Moore

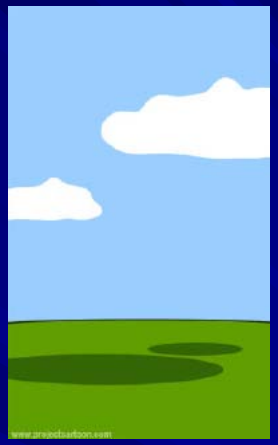
The Tree Swing

What the customer wanted



What the PM envisioned

How the engineer saw it

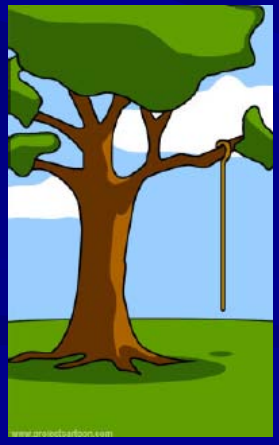


How the requirements were documented

After PDR...

After CDR...

What the project was going to cost



What the project could afford

What the PM prayed for

What the customer really needed

Why They Don’t “Need” Requirements

- It’s more fun to design and build the system
- This is the next system in a series, we just need to make a few tweaks
- It’s an “in-house” build, we’ll just tell the designers what we need
- We don’t have time
- We don’t need them, they’ll hinder innovation

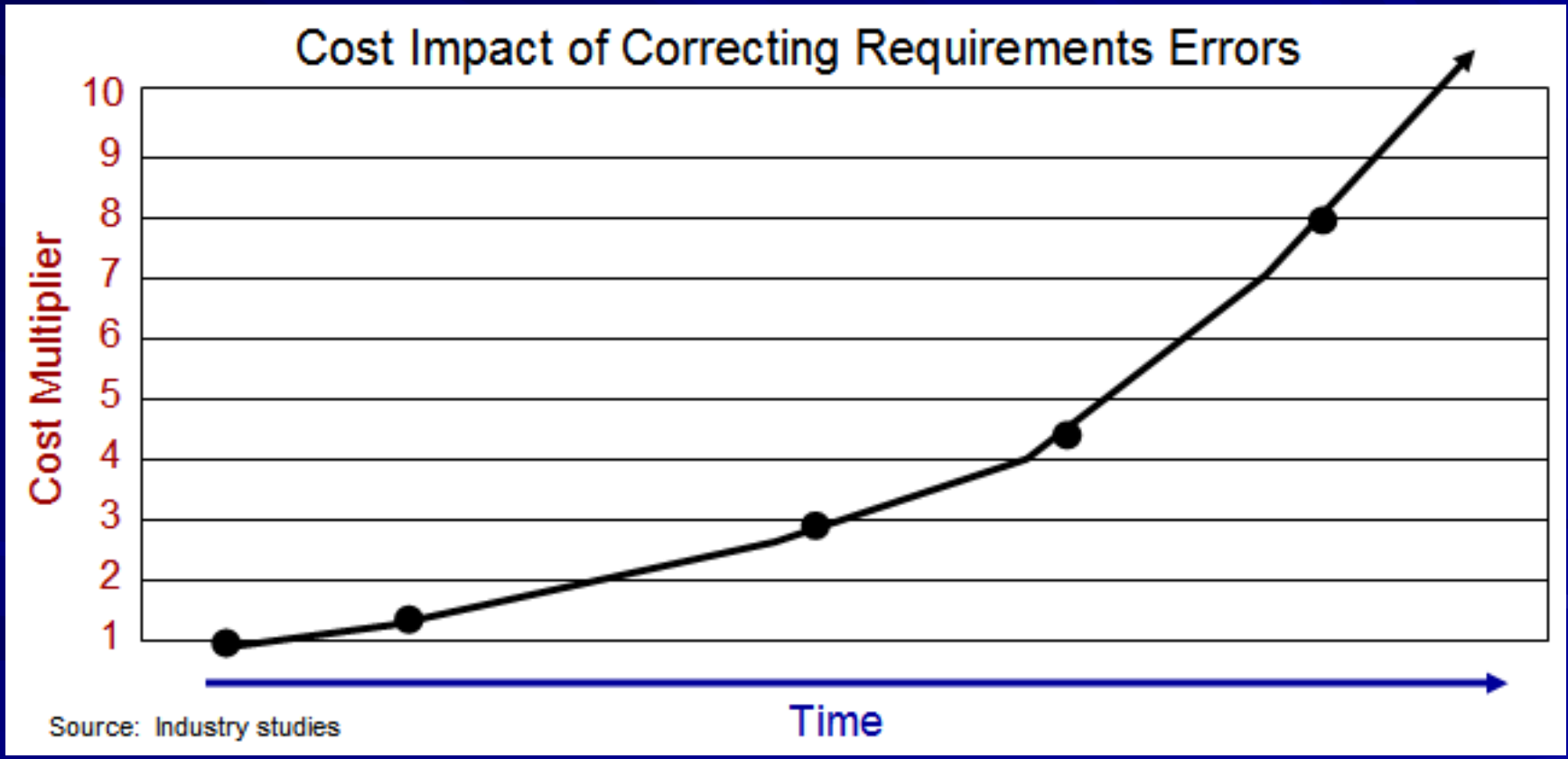
What the Project Does

- Copy requirements from past systems
- Develop requirements without proper systems engineering
- Develop requirements in parallel with trade studies and Concept of Operations
- Proceed to design without requirements

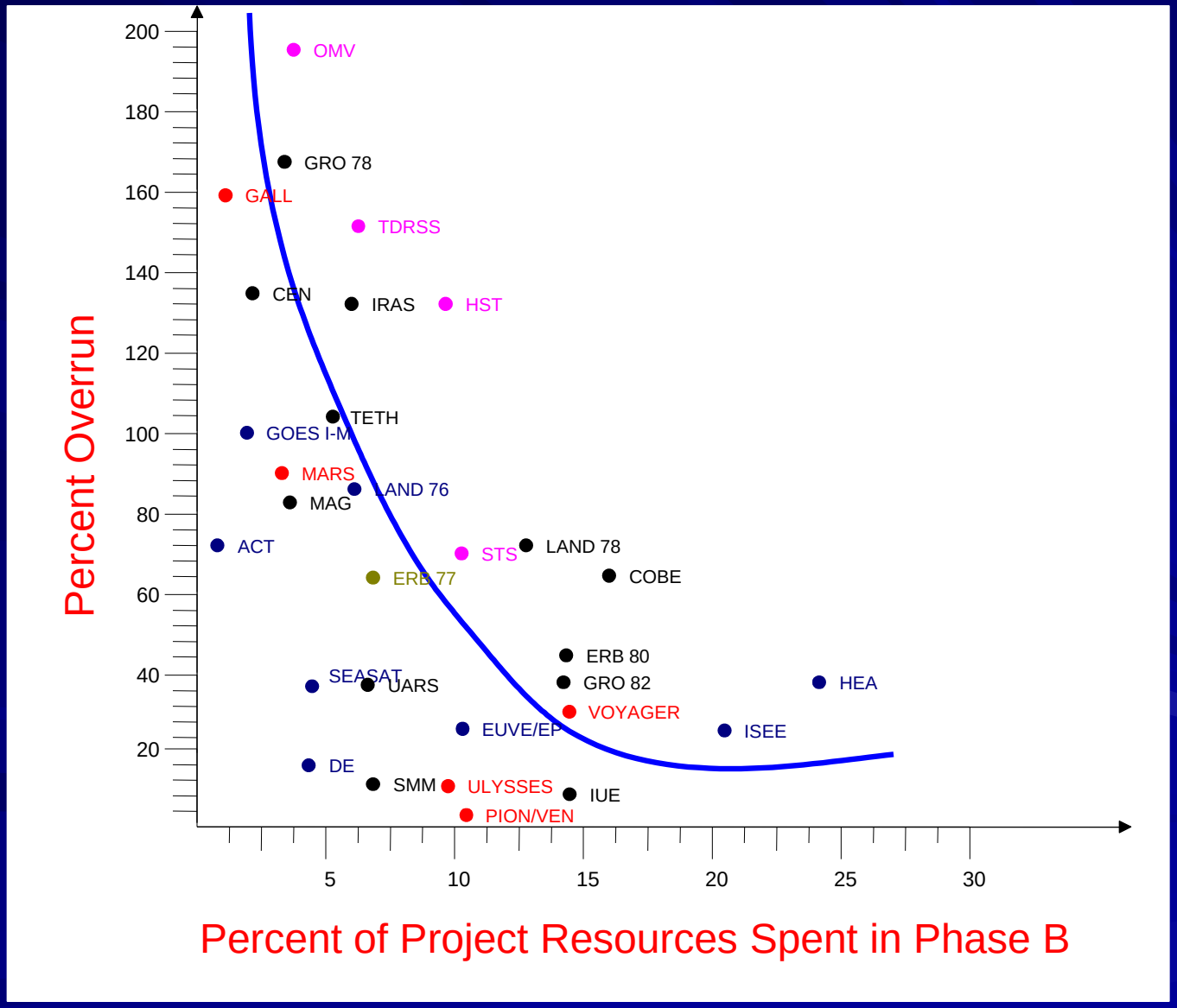
What Happens

- Systems that meet requirements but fall short of meeting customer expectations
- Systems that are difficult to verify
- Systems with interface issues
- Projects cancelled due to failure to stay within budget and schedule limitations

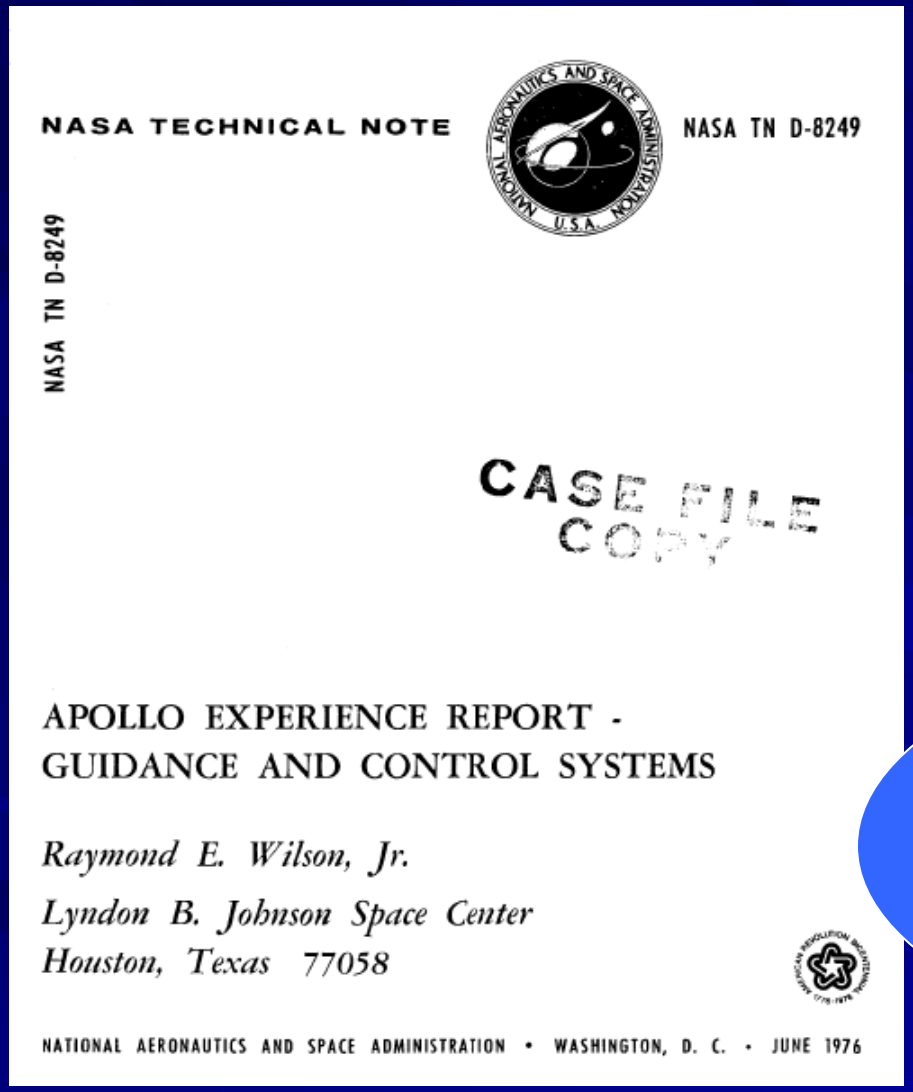
Pay Me Now or Pay Me More Later



Project Overruns



Lesson Captured – Apollo 1976



NASA TECHNICAL NOTE

NASA TN D-8249

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APOLLO EXPERIENCE REPORT - GUIDANCE AND CONTROL SYSTEMS

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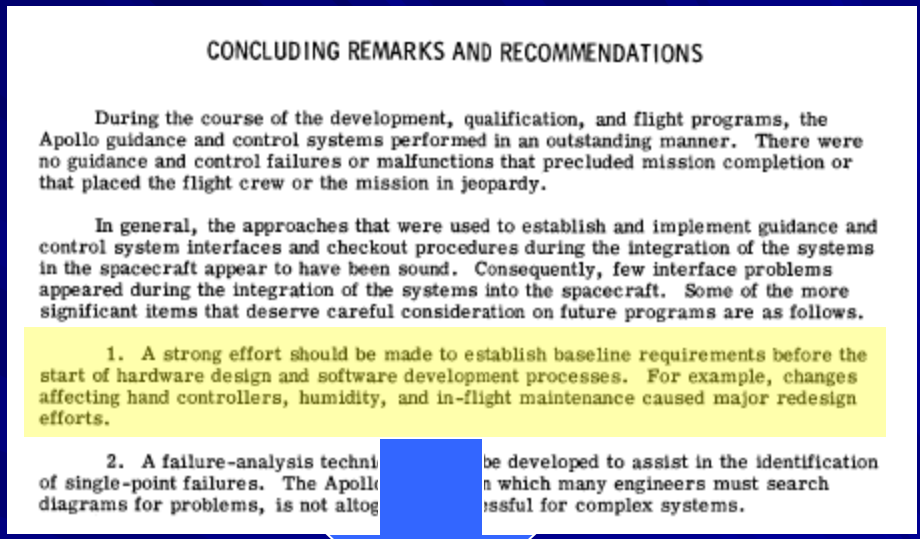
Houston, Texas 77058

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • JUNE 1976



CONCLUDING REMARKS AND RECOMMENDATIONS

During the course of the development, qualification, and flight programs, the Apollo guidance and control systems performed in an outstanding manner. There were no guidance and control failures or malfunctions that precluded mission completion or that placed the flight crew or the mission in jeopardy.

In general, the approaches that were used to establish and implement guidance and control system interfaces and checkout procedures during the integration of the systems in the spacecraft appear to have been sound. Consequently, few interface problems appeared during the integration of the systems into the spacecraft. Some of the more significant items that deserve careful consideration on future programs are as follows.

1. A strong effort should be made to establish baseline requirements before the start of hardware design and software development processes. For example, changes affecting hand controllers, humidity, and in-flight maintenance caused major redesign efforts.

2. A failure-analysis techni be developed to assist in the identification of single-point failures. The Apoll n which many engineers must search diagrams for problems, is not altog ssful for complex systems.

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Why Requirements?

- Ensure that you deliver the right system that meets your customer's vision
- Avoid scope creep and gold plating
- Bound your system to fit your cost and schedule constraints
- Minimize change traffic that results in increased costs and delays in the schedule

How do you get there?

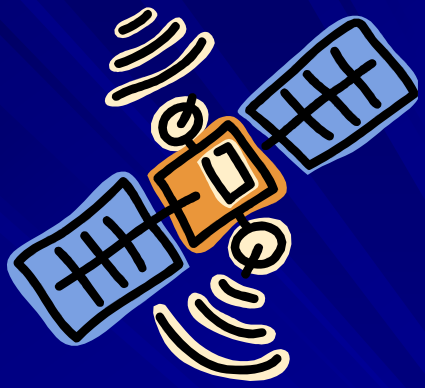
- Define the vision of your system
- Develop a Concept of Operations to capture the system vision
- Secure stakeholder agreement on the vision
- Develop requirements documenting characteristics, features and functions that your system must have in order to meet the Concept of Operations
- Validate the Requirements

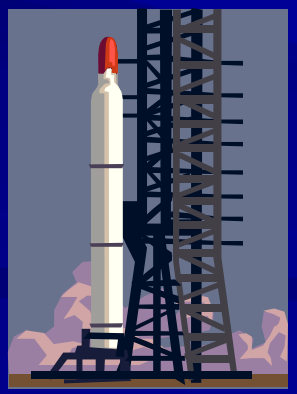
Define the Vision

- What is the need for the system?
- What is it going to do?
- What are the constraints?
- Who are the stakeholders?

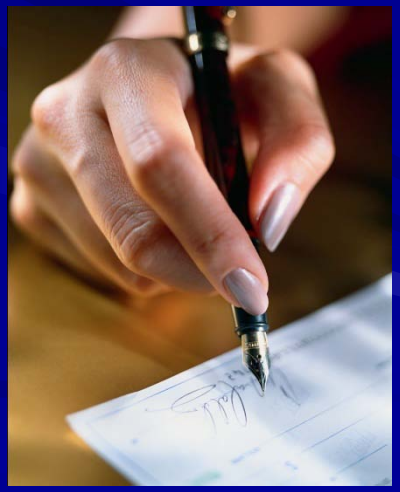
Develop the Concept of Operations

- Operational Scenarios
- Interfaces
- Candidate Architectures
- Prototypes
- Trade Studies





Secure Stakeholder Agreement



Develop Requirements

- Characteristics, features and functions that your system needs to meet the vision
- Attainable
- Necessary
- Verifiable
- Unambiguous

Validate the Requirements

- Ensure that the requirements correct and complete
  - Characteristics, features and functions required to meet the system vision
  - Interfaces
  - Proper traceability to parent requirements
  - Attainable, verifiable and necessary
  - Unambiguous

Final Thoughts

- Requirements Development is key to ensuring
  - The system will meet your customer's needs
  - The system will be delivered within the cost limit
  - The system will be delivered on time
- It's not Rocket Science if you follow Systems Engineering Best Practices

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