Thermal Testing Short Course

Why Do You Test? / “Foundations” of Test

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Course Objectives

- Become familiar with a systems engineering approach to thermal testing
- Understand the different types of thermal testing
- Understand the process for planning, preparing, and executing a thermal test including those involving flight hardware
- Understand methods of test environment simulation & temperature control
- Understand the role of analysis in test planning and preparation
- Examine how the elements of planning, preparing, and executing are exercised in a case study

A Good Test is Worth 1000 Analyses

- **The operative word is "good"**
  - **A good test is one that singly focuses to meet your primary objectives & accommodates the needs of secondary objectives including functionality**
  - **Primary objectives are synthesized by asking yourself why are you conducting a test?**
  - **Generally, an empirical test is performed to improve your knowledge of some hardware of design aspect**
  - **A poorly conceived test is practically worthless**

Why Do We Perform Tests?

- To characterize parameters that are difficult to quantify analytically
- To characterize design performance/behavior

Typically, non-flight H/W

DEVELOPMENTAL TESTING

- To demonstrate in-specification hardware performance beyond allowable flight temperature range
- To uncover design or workmanship defects

Flight or QUAL H/W

ASSEMBLY PROTOFLIGHT/ QUALIFICATION

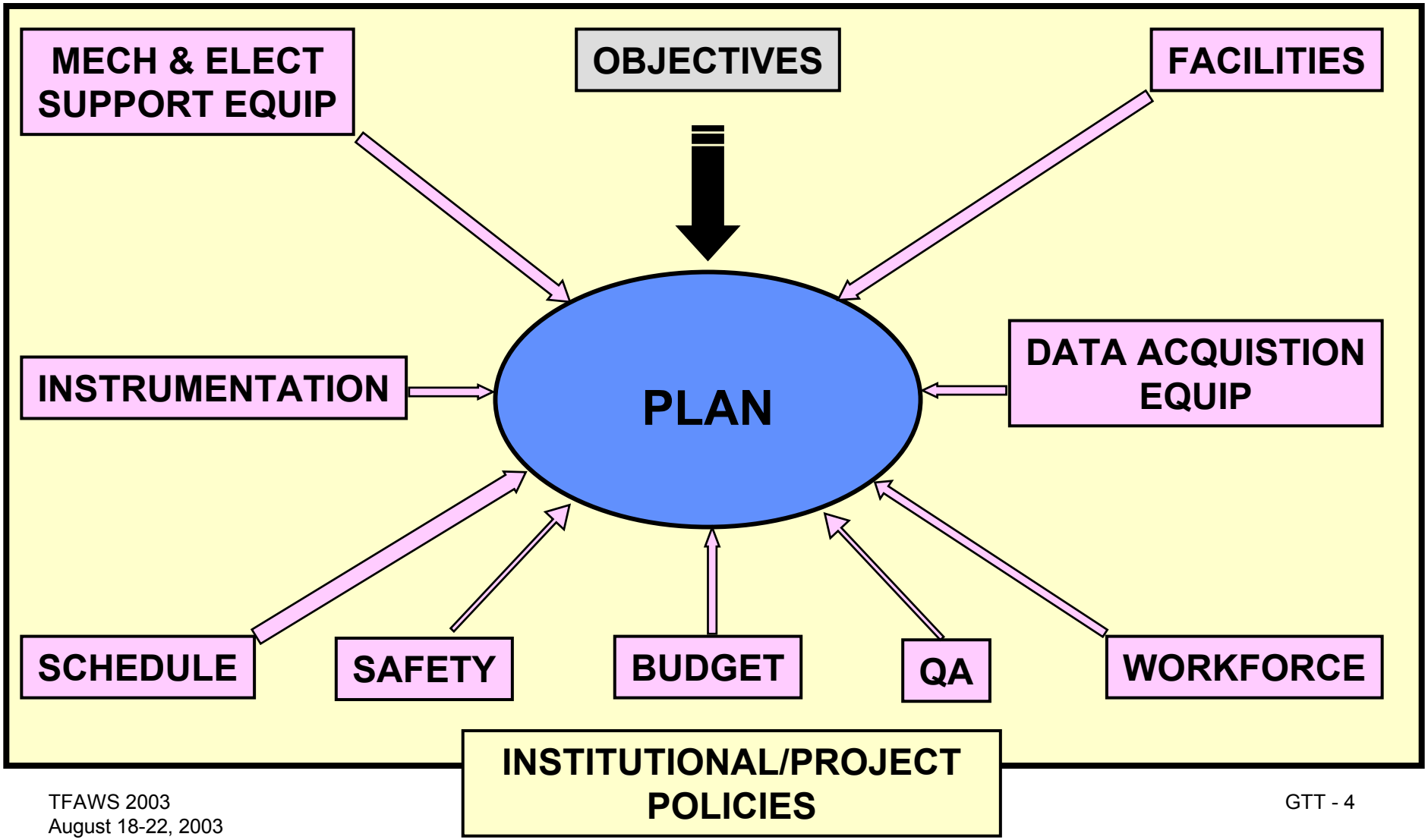
- To validate a thermal design
- To demonstrate functionality at expected temperature

Flight or QUAL H/W

SYSTEM- OR ASSEMBLY-LEVEL THERMAL BALANCE

We Don't Plan to Fail, We Fail to Plan

- At the heart of a "good" test is a good test plan



What Makes a "Good" Test

- **Well defined objectives (primary & secondary)**
- **A test case matrix that directly maps into the objectives**
- **Understanding your role & duties in planning, preparing, executing, and documenting the test**
- **Understanding your resource constraints**
  - **Financial budget**
  - **Schedule**
  - **Facilities including instrumentation & data acquisition**
  - **Mechanical & electrical ground support equipment**
  - **Workforce**
- **Tapping into the test experiences of others**
  - **Conduct peer reviews of your plan & approach**