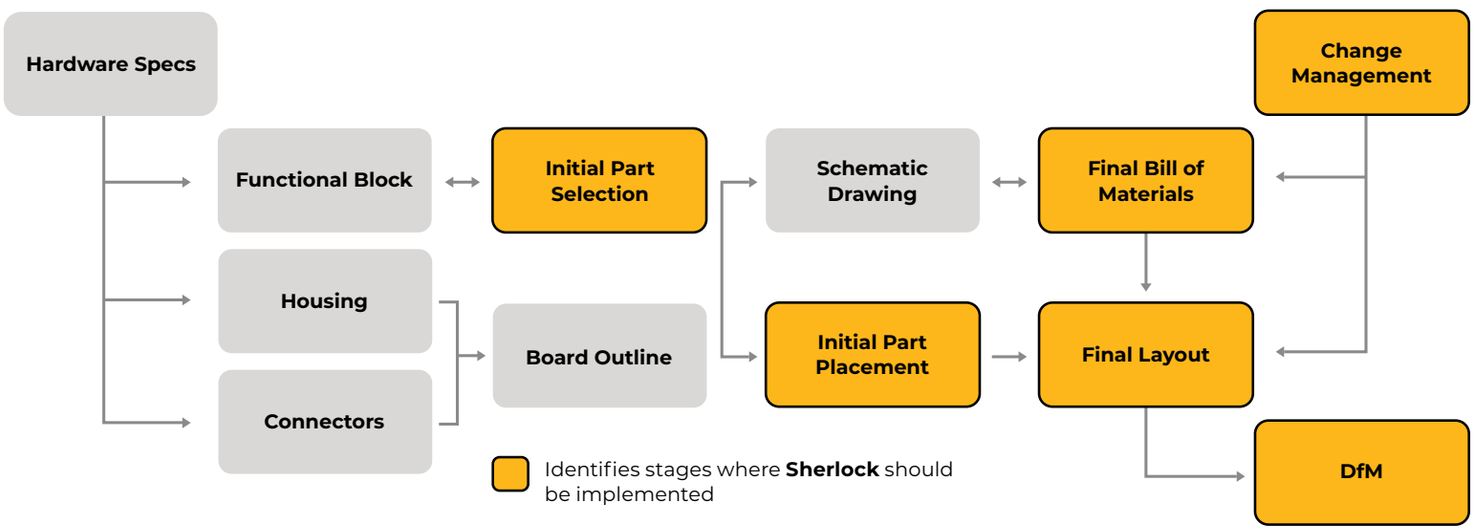
Ansys

STRUCTURES

ANSYS Sherlock— Reliability Physics in Your Design Process

Standard Hardware Design Process



Minor Alterations to Your Current Design Process

1. **Enhances your current design process**
2. **Seamlessly integrates with already occurring simulation**
3. **Prevents costly "test-fail-fix-repeat" cycle**

Sherlock Automated Design Analysis™ Software is the only Reliability Physics-based electronics design tool that provides fast and accurate reliability predictions in early design stages

Initial Part Selection (Critical components)

- When designing functional block diagram, identify critical parts
- Determine which Sherlock analysis to perform
- Benchmark Sherlock analysis to existing data (test, field, etc.)
- Re-run Sherlock analysis based on environmental requirements

Initial Part Placement (Pre-layout!)

- Perform part-level Sherlock analysis with temperatures from Icepak thermal analysis
- Place parts based on risk of failure due to vibration, mechanical shock, thermal cycling, and bending

Final BOM

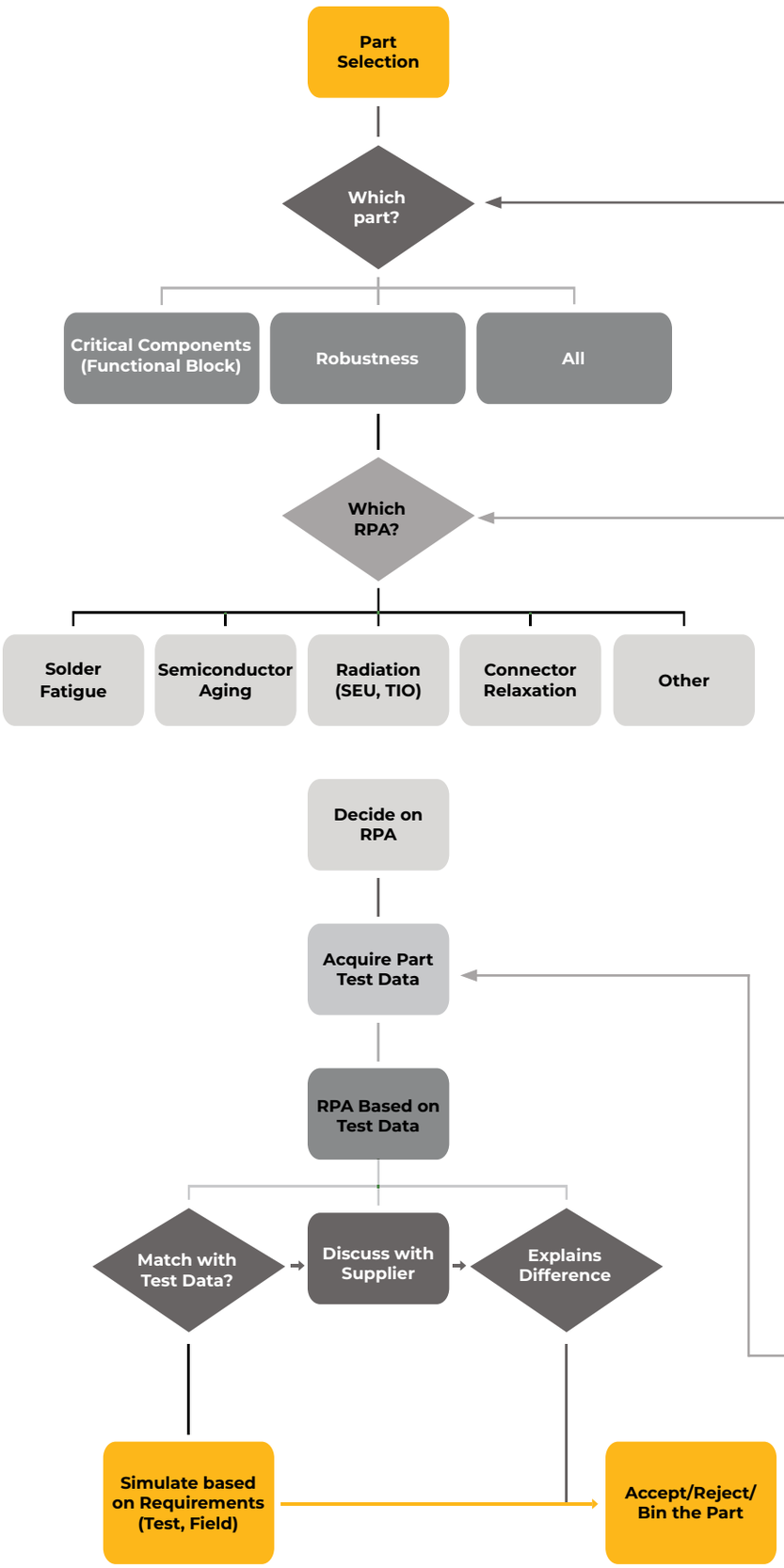
- Run Sherlock analysis on piece parts (discretes, passives)
- Identify problem parts before test
- More valuable than a simple derating table

Final Layout

- Perform Sherlock analysis with all design features
- Perform optimization studies
- Risk of failure? Identify mitigations before test

Manufacturability

- Evaluate all post-assembly manufacturing processes
- Establish load limits to prevent solder fracture, pad cratering, and component cracking



Decide which 'Critical Components' should be subjected to RPA?

Within an analog/digital circuit, the critical components is almost always an integrated circuit

Option 1:
All 'Critical Components'

- Relatively few critical components (5 to 20) in most systems
- Financially painful if components need to be replaced

Option 2:
Critical Components most likely to fail

- Integrated circuits have three to four different reliability risks
  - Aging/Wearout of Silicon Transistors (EM, TDDB, HCI, NBTI)
  - Cracking of Low-K Dielectric
  - Radiation-Induced Failures of Silicon Transistors (SEU, TIO)
  - Solder Fatigue of the Semiconductor Packaging (Thermal Cycling, Vibration)
- Evaluate critical components based on their susceptibility to these risks

Decide Which RPA to Run:

- Aging/Wearout of Silicon Transistors (EM, TDDB, HCI, NBTI)
- Cracking of Low-K Dielectric
- Radiation-Induced Failures of Silicon Transistors (SEU, TIO)
- Solder Fatigue of the Semiconductor Package (Thermal Cycling, Vibration)

Acquire Selected Part Test Data and Benchmark to Test Data

Option 1:

- If simulation does not match, test data, discuss with supplier
- After benchmarking to test data, model components to environmental conditions
- Accept/Reject/Bin the part

Ansys, Inc.
www.ansys.com
ansysinfo@ansys.com
866.267.9724