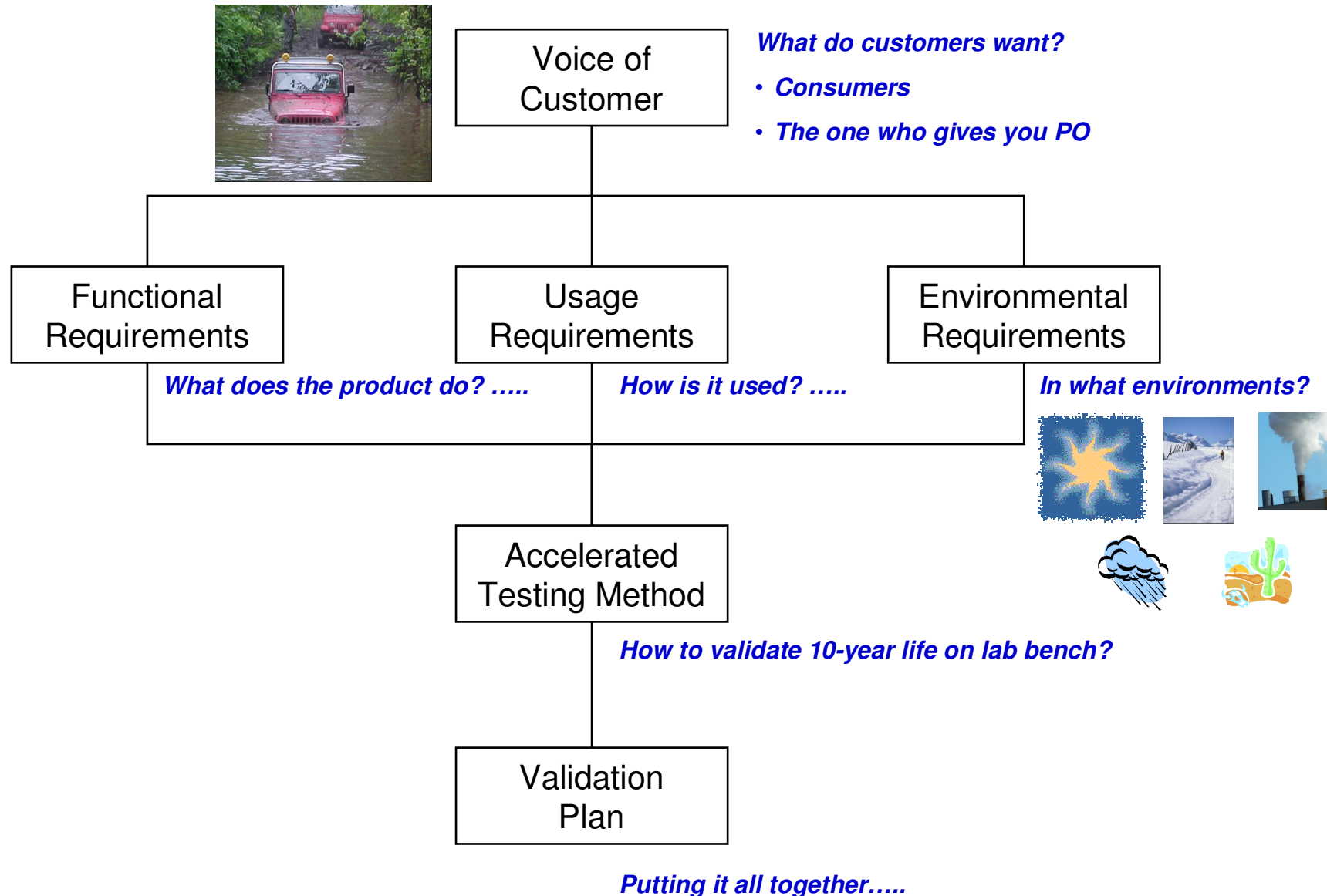


How to Develop Electrical/Electronic Module Validation Plan

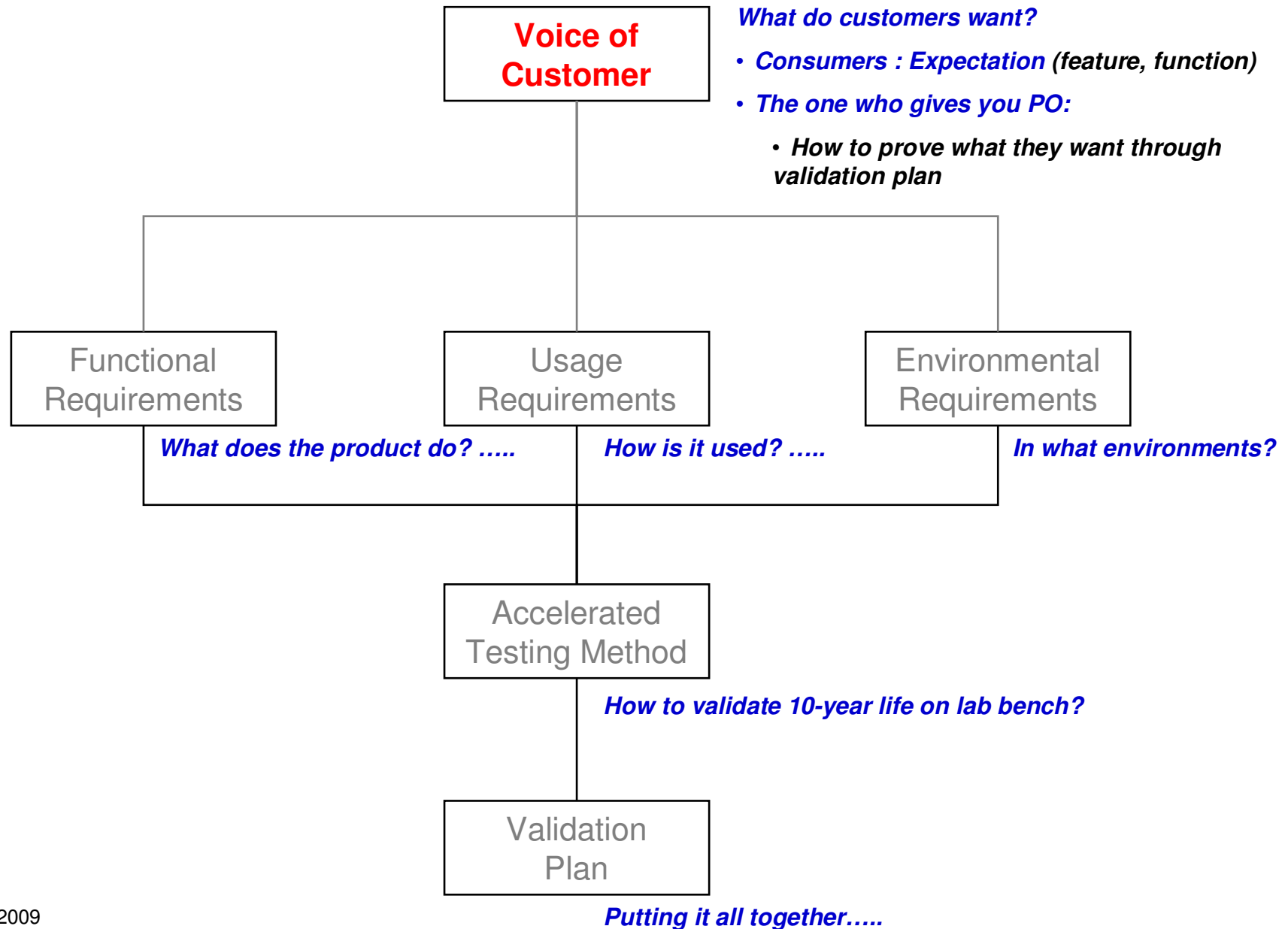
C. Julius Wang

July 22, 2009

Agenda – We will go through the following flowchart

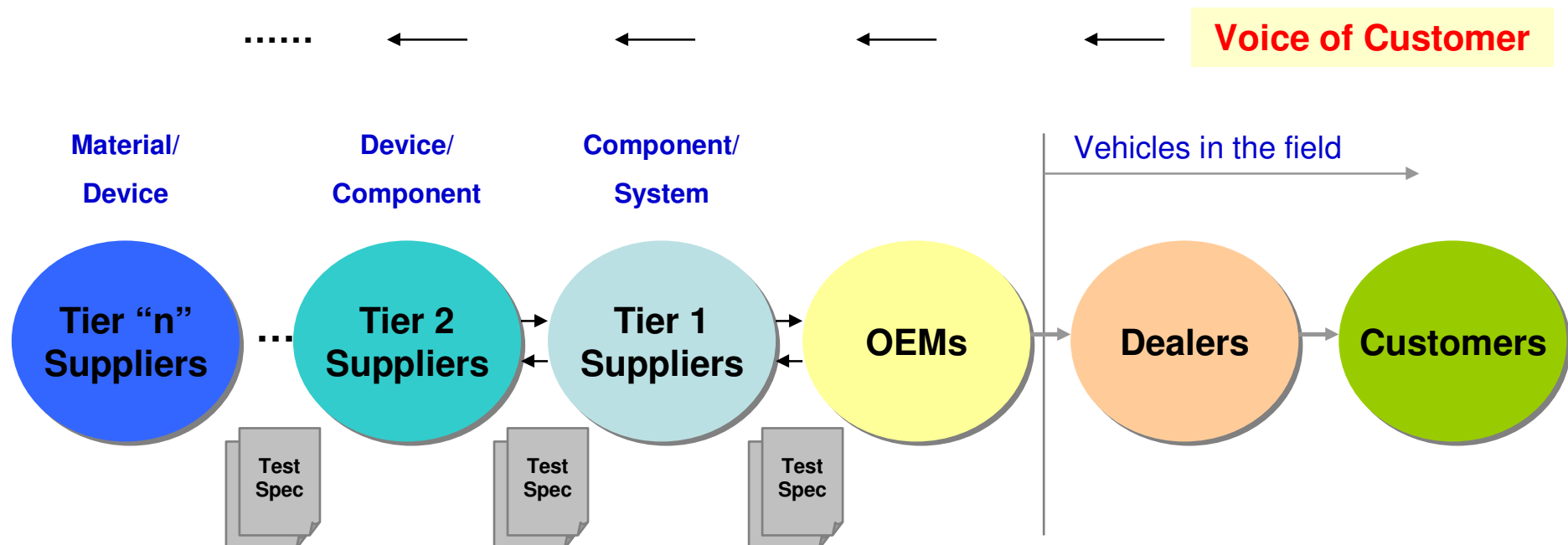


Voice of Customer



Purpose of Validation Testing in Automotive Industry

- Testing is about generating useable, relevant, and timely information for sound business decision making.
Engineering is only one part of business, not the whole.
- Testing is **NOT** about conducting scientific experiments.



Testing Specifications

- Testing Specification is a balancing act between “Technical” and “Administrative” needs.

Technical

- Based on physics laws
- Support by measured data
- Scenario duplication
- Stress simulation
- Stress combination
- Fatigue accumulation
- Reliability estimation

Administrative

- Facility cost
- Resource cost
- Program schedule
- Program timing
- Legality

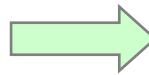
Challenge of doing the “Impossible”!!

Testing **D**ata, **I**nformation, and **D**ecision Making (**DID**)

- Testing “Data” must be converted into “Information” for Decision making.
- We are data rich but information poor!!

Data

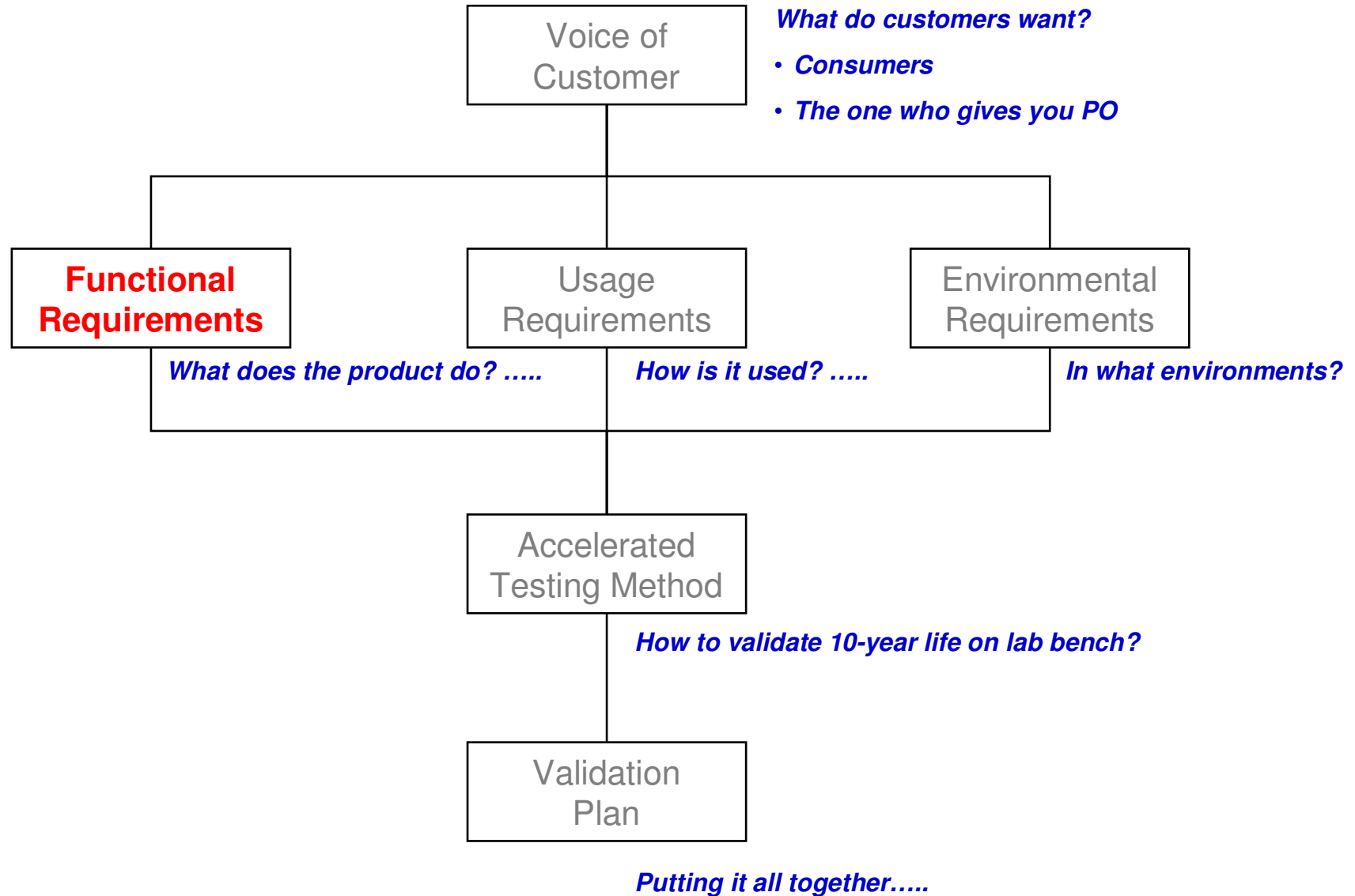
- Hard physical evidence
- Typically measured in scientific units (e.g., lb, degree C, Hz, g, Volt, Amp, m/sec)
- More than one data point



Information

- B10 Life
- Life improvement (% better)
- Reliability at Life
- Gross Profit/Margin
- Operating Income/Margin
- ROI (Return on Investment)
- Payback period
- Breakeven Volume
- Net Present Value

Functional Requirements

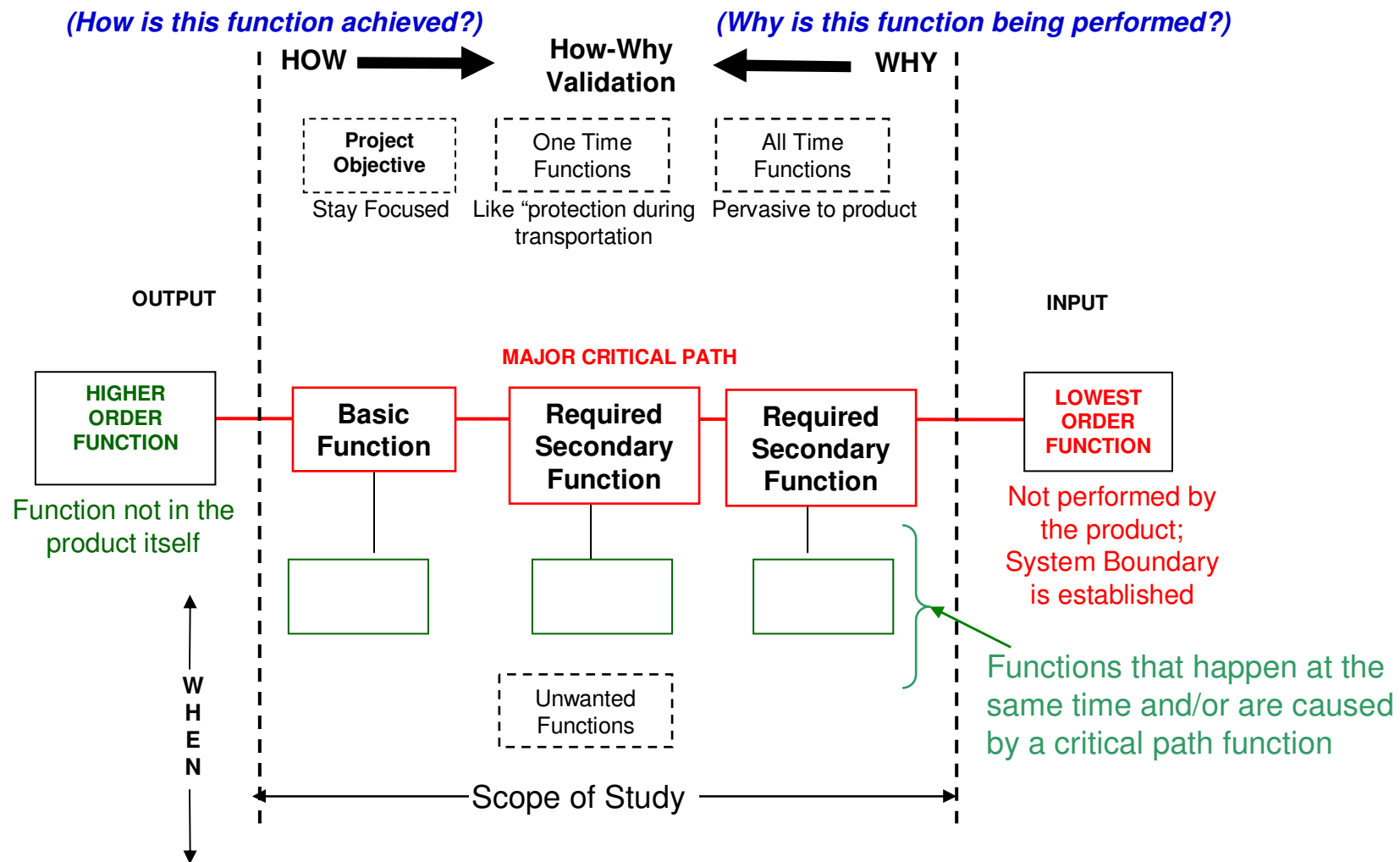


FAST (Function Analysis System Technique) Method

The FAST method can be used to define, analyze, and understand product functions and how they relate to one another. This will help direct attention to functions that increase the product value and satisfy the customer needs.

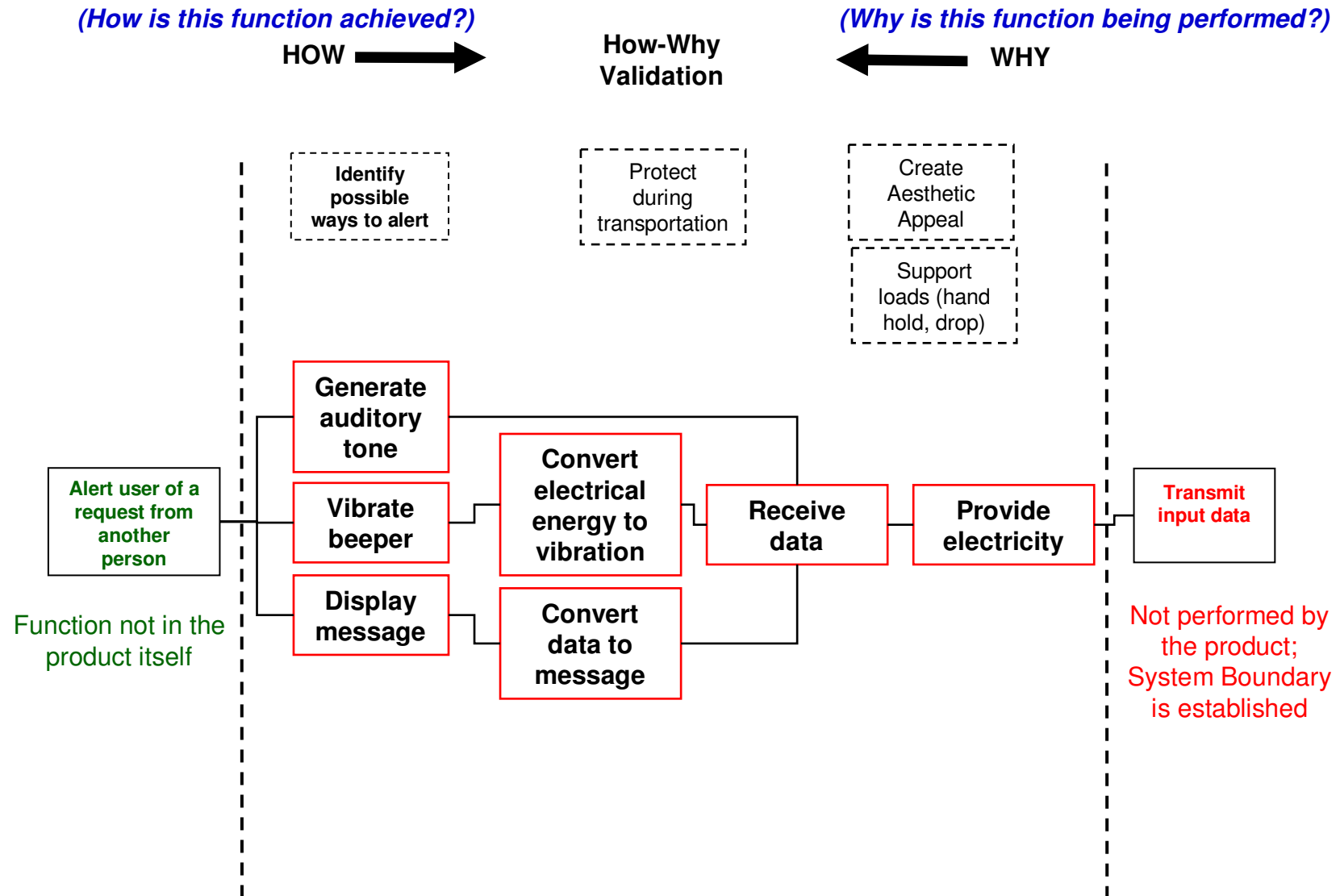
- Brainstorm all functions the product will serve in the eyes of the customer.
 - Ask “**What the product does**” rather than “What the product is.”
 - Use a simple “verb + noun” structure to describe a function.
 - emit light
 - generate audible alarm
 - produce torque
- Select the “Basic Function”.
 - This is the main reason that the product exists in the eyes of the customer.
 - A product may have more than one Basic Function under different conditions. Example - Fuse.
- See next slide.

FAST (Function Analysis System Technique) Method



Three types of Secondary Functions: Required, aesthetic (housing, packaging, color, etc.), and unwanted (noise, vibration, etc.).

FAST Example - Beeper



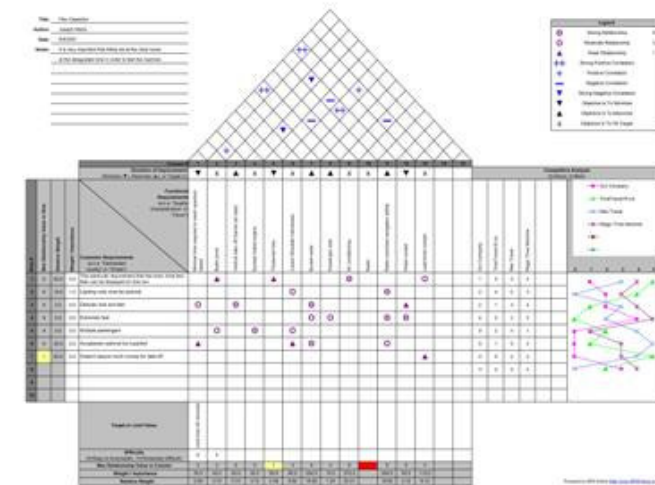
Quality Function Deployment – House of Quality

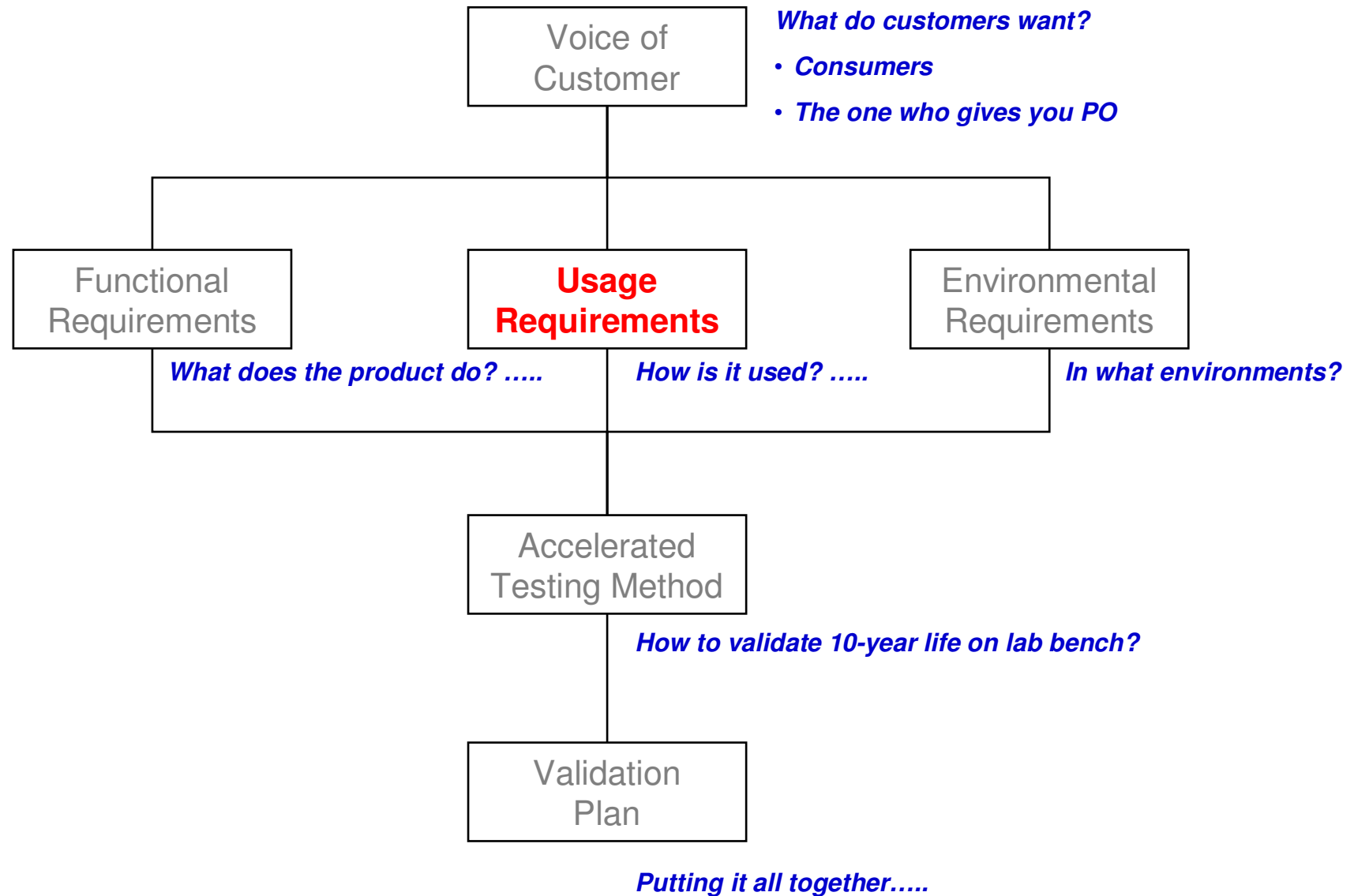
House of Quality is a graphic tool for defining the relationship between customer desires and the firm/product capabilities.

It looks like a House with correlation matrix as its roof, customer wants versus product features as the main part, competitor evaluation as the porch etc. It is based on "the belief that products should be designed to reflect customers' desires and tastes" (Hauser & Clausing 1988).

It also is reported to increase cross functional integration within organizations using it, especially between marketing, engineering and manufacturing.

The basic structure is a table with "Whats" as the labels on the left and "Hows" across the top. The roof is a diagonal matrix of "Hows vs. Hows" and the body of the house is a matrix of "Whats vs. Hows". Both of these matrices are filled with indicators of whether the interaction of the specific item is a strong positive, a strong negative, or somewhere in between. Additional annexes on the right side and bottom hold the "Whys" (market research, etc.) and the "How Muches". Rankings based on the Whys and the correlations can be used to calculate priorities for the Hows.





Usage Requirements

