**Requirement Decomposition**

Higher level requirements, either for the system or a sub-system, need to be matched to the chosen system architecture and components. Not every system-level requirement is implemented in a particular component. Also, higher-level requirements may be met by multiple components, each of which performs part of the functions.

When a system-level requirement is allocated to system components, the component requirements need to specify what that component does to support the system requirement. For example, a mobile system has a requirement to stop the system within 5 seconds of a user request. Components of the system that related to motion, such as a motor controller, braking sub-system, and speed detection sub-system, all have a part to play. Other sub-systems, such as for imaging or communications, have no requirements that relate to the system requirement.

Requirement decomposition stops at whatever level the project considers appropriate. Factors that define what level is appropriate include:

* System size and complexity
* Level of insight required by designers
* Requirements imposed by external organizations
* Internal organization policy

For many projects that include complex electronics, the requirements decomposition stops somewhere higher than the device level. When a requirements document exists for complex electronics, it may still be less-specific than desired. In particular, the document may be lacking in complete interface specifications, requirements imposed by technology constraints, and testability requirements.

Because the higher-level system design is taking place concurrently with the decomposition of requirements to the component level, the requirements specification for complex electronics may be a moving target. However, it is important that everyone involved have a clear understanding of what the complex electronic device *will*, and *will not*, perform, and to what levels, voltages, timing, etc. the device has to operate.

Excerpt from **System-Level Requirements:**

1. Mobility Requirements
   1. Max Off-Road Speed: **30mph**
   2. Max On-Road Speed: **45mph**
   3. Acceleration: 0-20mph in < 8 sec
   4. Max obstacle height: 24in
   5. Min turn radius: <= 0.7m
   6. Range: >= 300 nautical miles
   7. Fuel efficiency: >= 2 mpg
   8. Ground pressure: <= 15.4 psi
   9. Speed on 60% slope: >= 4.1 mph
   10. Speed on 10% slope: >= 17 mph
2. Weight limit: shall weigh between 40-45 tons

**Decomposed for Power Train** (prefix PT):

1. The power train shall distribute the weight of the vehicle such that its average ground pressure is 17 PSI or less. (Derived From Platform Requirement 3.8)
2. The engine shall operate with a fuel efficiency of better than 1400 grams per kilowatt. (Derived from Platform Requirement 3.7)
3. The power train shall be capable of simultaneously propelling the vehicle at its maximum required speed, powering all electronic systems, and swiveling the turret at a rate of 60 degrees per second.