Abstract

Requirements engineering is one of the systems engineering pillars. In this document we discuss the fundamentals of systems engineering, such as the transformation of needs into specification, the need to prescribe what rather than how, and the requirements when writing requirements.
# Definition of “Requirement”

<table>
<thead>
<tr>
<th>Requirements describing the needs of the customer:</th>
<th><strong>Customer Needs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements describing the characteristics of the final resulting system (product):</td>
<td><strong>System (Product) Specification</strong></td>
</tr>
<tr>
<td>The <em>requirements management process</em> recursively applies this definition for every level of decomposition.</td>
<td></td>
</tr>
<tr>
<td>Requirements describing the needs of the company itself over the life cycle:</td>
<td><strong>Life Cycle Needs</strong></td>
</tr>
</tbody>
</table>
Flow of Requirements

What

choices
trade-offs
negotiations

What customer needs:
What is needed by the customer?

product specification:
What are we going to realize?

system design:
How are we going to realize the product?

What What What
What are the subsystems we will realize?

How How How
How will the subsystems be realized?

up to "atomic" components
System as a Black Box

- System seen as black box
- Inputs
- Functions
- Quantified characteristics
- Outputs
- Interfaces
- Restrictions, prerequisites
- Boundaries, exceptions
- Standards, regulations
Stakeholders w.r.t. Requirements

- **Customer**
  - (purchaser, decision maker, user, operator, maintainer)

- **Company**
  - Policy and Planning
    - (business, marketing, operational managers)
  - Customer-Oriented Process
    - (sales, service, production, logistics)
  - Product Creation Process
    - (project leader, product manager, engineers, suppliers)
  - People, Process, and Technology management process
    - (capability managers, technology suppliers)
The “Formal” Requirements for Requirements

Specific
Unambiguous
Verifiable
Quantifiable
Measurable
Complete
Traceable
The Requirements to Enable Human Use

- Accessible
- Understandable
- Low threshold