Introduction to Atomic Requirements

William L. Honig
Loyola University Chicago, whonig@luc.edu

Follow this and additional works at: https://ecommons.luc.edu/cs_facpubs

Part of the Computer Engineering Commons, Electrical and Computer Engineering Commons, and the Software Engineering Commons

Recommended Citation
Honig, William L.. Introduction to Atomic Requirements. , , : , 2016. Retrieved from Loyola eCommons, Computer Science: Faculty Publications and Other Works,

This Presentation is brought to you for free and open access by the Faculty Publications at Loyola eCommons. It has been accepted for inclusion in Computer Science: Faculty Publications and Other Works by an authorized administrator of Loyola eCommons. For more information, please contact ecommons@luc.edu.

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 License. © 2016 William L. Honig
Introducing Atomic Requirements...

Dr. William L Honig
Software Engineering
Guest Lecture
19 April 2016

William L. Honig, Ph.D.
Associate Professor
Department of Computer Science
Loyola University Chicago
Visiting Researcher, Keio University
Tokyo, Japan
Requirements == Hard Work

- No single approach works all the time
- Most common cause of development failure is incorrect, incomplete, inconsistent (or non-existing) requirements

- Agile developers may try to avoid creating requirements
  - If you don’t know where you’re going, any road will do!
Objectives ...

1. Introduce Atomic Requirements
2. Why they are Useful
3. Current State of Understanding

Atomic ➔
A single complete requirement documented as a whole (i.e., indivisible or atomic)

Why? Know what “A Requirement” is? Then can track, count, number,....
Initial Definition

- A single complete requirement documented as a whole (indivisible or atomic)
- IEEE Standard 29148 Systems and software engineering — Life cycle processes — Requirements
  - Requirements should be “singular” and include only one requirement with no use of conjunctions
- Also Individual, Single, Complete, and Cohesive Requirement
- No standard definition exists
More Definition...

One atomic requirement completely describes a single function, feature, need, or capability, including all information, details, limits, and characteristics.

A single feature or function from a single Use Case

How to and hints:
1. Use judgement / common sense
2. Remember the goal is UNDERSTANDABILITY
3. When in doubt, more individual requirements instead of larger and broader statements
What do we want?

• IEEE Standard 29148 Systems and software engineering — Life cycle processes — Requirements

• Individual Requirements (i.e. atomic) should each be (see section 5.2.3)
  • Necessary
  • Implementation Free
  • Unambiguous
  • Consistent
  • Complete
  • Singular
  • Feasible
  • Traceable
  • Verifiable

Atomic → Supports many of these characteristics and other engineering processes
Why might we want to use Atomic Requirements?

Atomic requirements support other aspects of SE especially metrics and quality

<table>
<thead>
<tr>
<th>Numbering</th>
<th>Unchanging numbered requirements provide traceability, reference integrity, measure, ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent</td>
<td>Individual atomic requirement can be tested for consistency with all other requirements</td>
</tr>
<tr>
<td>Singular</td>
<td>Atomic is singular</td>
</tr>
<tr>
<td>Complete</td>
<td>Everything relevant to a single capability is there</td>
</tr>
<tr>
<td>Verifiable</td>
<td>Trace and reference history of changes, tests, validations...</td>
</tr>
<tr>
<td>Necessary</td>
<td>An atomic requirement can be ranked for importance and included / removed from plan</td>
</tr>
</tbody>
</table>
More advantages of atomic requirements...

Better Requirements

• Focus on one feature at a time. Get it right.
• Requirements change (“Churn”) can be easily measured
• Easily related to individual Use Case analysis
• Allow clear importance ranking

Better Development

• Each requirement separately implementable and testable
  • Testing will either pass or fail
  • Easy to identify changes in project scope or schedule

Better Management

• Basis for clear agreement with customer
• Can be used for clear contracts and payment structure
• Value can be assigned to each requirement

More advantages of atomic requirements…
Remember, Requirements are Hard to Do Well!
Let’s Try It

Write atomic requirement(s) for a typical login screen
Summary ...

• Atomic Requirements may help improve requirements creation
  • Metrics and traceability easier
  • Focus your requirements thinking
  • BUT, the concept is new, not completely clear

• You are NOT REQUIRED to use or generate atomic requirements
  • It is a decision for your team