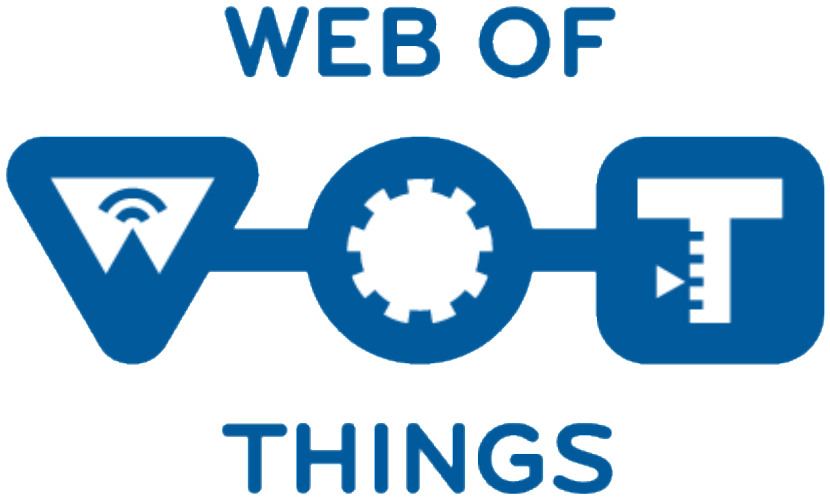

Requirements

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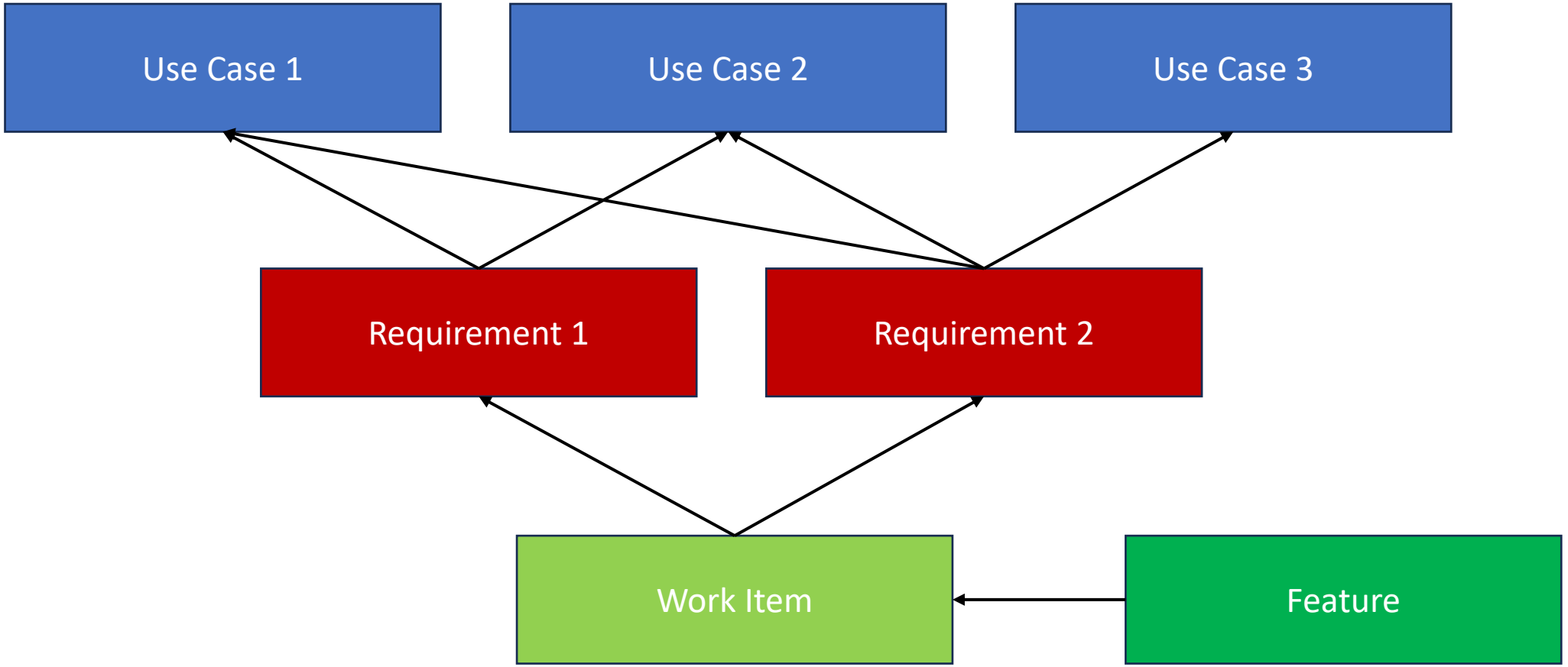
Outline

- Purpose
  - Connecting use cases to features
- Format
  - User stories
  - Function vs technical
  - Examples
- Categories
- Security and Privacy
  - Relationship of requirements to risks
- Suggested Plan

UC → Req → WI → Feature



Requirements: Definition

From IEEE SWEBOK:

- a **condition or capability** needed by a **user** to **solve a problem or achieve an objective**;
- a **condition or capability** that must be **met or possessed by a system or system component** to **satisfy a contract, standard, specification or other formally imposed document**

- **Summary:**
  - Condition or capability: What
  - User or contract/specification (from some stakeholder…): Who
  - Solve a problem or achieve an objective: Why

Requirements: Format

User Story Template:

As a **STAKEHOLDER**, I want **CAPABILITY** so that **PURPOSE**.

STAKEHOLDER: Who (As a…)

- Identifies primary user or beneficiary.
- Secondary stakeholders may also be identified in **PURPOSE**.

CAPABILITY: What (I need…)

- May or may not map onto a single specific work item or feature (discuss).
- Should be specific enough that it is clear when it is satisfied.
- Should be satisfiable with finite effort.

PURPOSE: Why (so I can…)

- Larger context of goal, other stakeholders (e.g. support another SDO)
- May not be finitely satisfiable.

Requirements: Template

See https://github.com/w3c/wot-usecases/issues/308

- **Who: Stakeholder (As a…)**
  - User or Org (e.g. SDO)
  - *Entity that needs stated capability*
  - Note: there may be other impacted stakeholders, e.g. implementors
- **What: Capability (I need…)**
  - Technical requirement
  - May also be a Condition that needs to be satisfied (e.g. “minimize size”)
  - *Link to at least one work item/issue/PR/assertion*
  - *Optional Details*
- **Why: Purpose (so I can…)**
  - Functional requirement
  - Solve a Problem
  - Meet an Objective
  - *Link to at least one Use Case or Use Case Category (e.g. “ease of use”)*
  - *Optional details*

Functional vs. Technical Requirements

Functional: Why

- ***Purpose*** of needed functionality

Technical: What

- ***Capability*** to support needed functionality

- Don’t need to separate functional and technical requirements
  - User story format includes both!
  - Tends to form a natural hierarchy: many “capabilities” may support one “purpose”
- Technical requirements (capabilities) should be finitely satisfiable!
  - For example, “WoT systems should have good security” is a bad technical requirement, it’s unclear when it is (or can ever be) fully satisfied.
  - It *may* be acceptable as a functional requirement, although it’s still a bit vague

Requirements: Examples

- As a ***consumer of WoT TDs***,
  I want ***the ability to poll the status of actions***
  so that ***I can take corrective action or cancel unneeded actions.***
- As a ***WoT System Owner***,
  I want ***to be able to control who has access to individual entries in a WoT TD Directory and revoke their access at any time***
  so that ***the security of my system can be maintained.***
- As a ***producer of WoT TDs,***
  I want ***to be able to publish a short form of TDs specifying only the variables to be filled into a TD Template***
  so that ***network bandwidth can be minimized.***

Requirements: Examples

Based on https://github.com/w3c/wot-thing-description/issues/2039

- As a ***consumer of WoT TDs***,
  I want ***to know when or if writing a property returns a value***
  so that ***I can understand when I can use this value to confirm writes.***
- As a ***producer of WoT TDs***,
  I want ***to be able to specify simple security schemes inline***
  so that ***TDs are less verbose and easier to write in simple cases.***
- As a ***consumer of WoT TDs,***
  I want ***to identify TDs limited to a finite feature subset***
  so that ***I can ensure interoperability.***
- As a ***producer of WoT TDs,***
  I want ***to signal when TDs have been limited to a finite feature subset***
  so that ***I can ensure interoperability.***

Requirements Test Case 1

See https://w3c.github.io/wot-usecases/#sec-user-stories

5.1.1 Connection Oriented Protocols

- **Who (As a...):**
  - Deployer of devices with connection oriented protocols.
- **What (I need...):**
  - Reusable Connection descriptions in a TD.
  - **Details:** For protocols that are based on an initial connection and then subsequent messages, a Consumer can reuse the initial connection rather than opening a new connection each time.
- **Why (so that I can...):**
  - Better describe connection oriented protocols such as MQTT and WebSockets.
  - **Motivating Use Case:** Open Field Agriculture

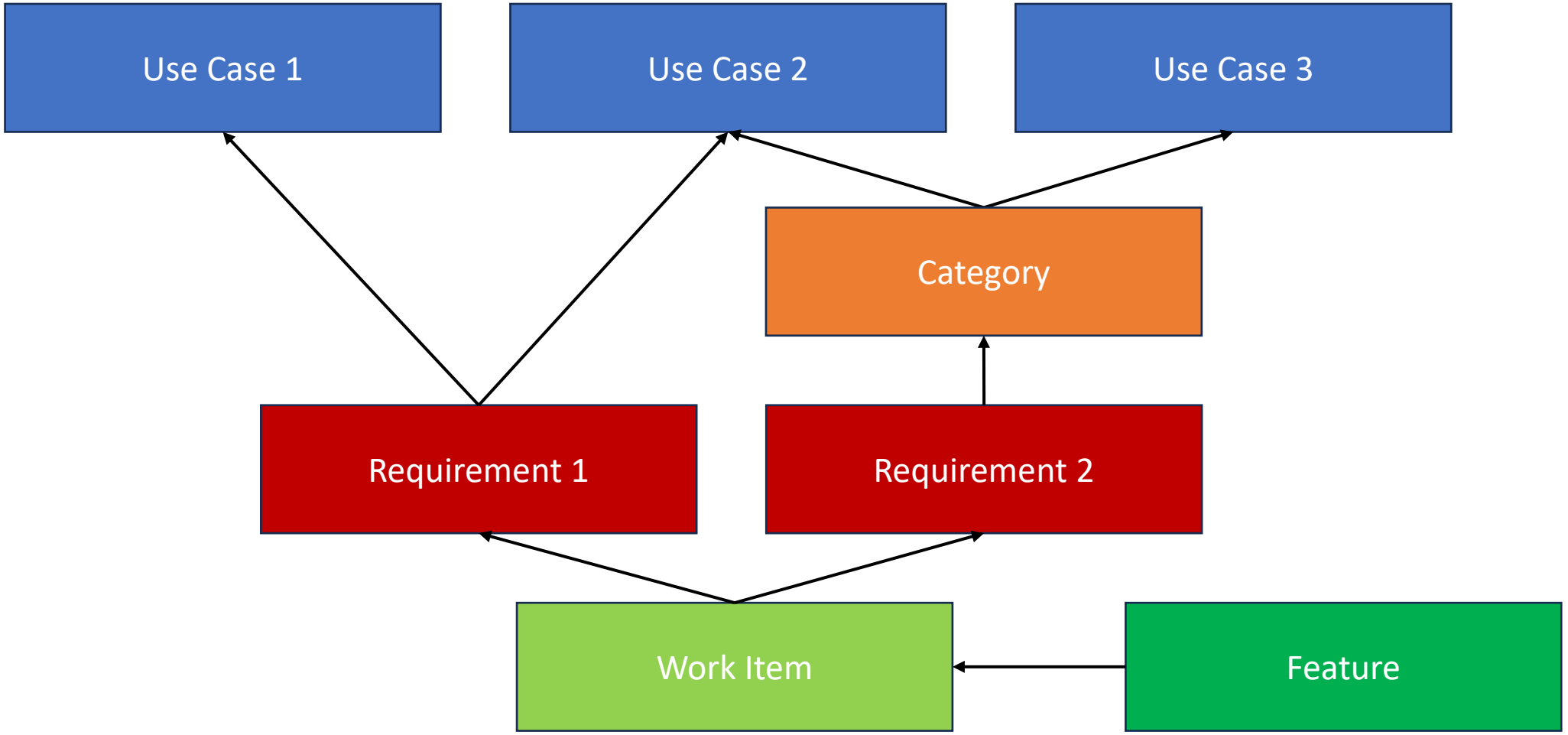
Requirements Test Case 2

See https://w3c.github.io/wot-usecases/#sec-user-stories

5.1.2 Reusable Defaults per TD

- **Who (As a...):**
  - Designer/Developer of TDs
- **What (I need...):**
  - Reusable Connection descriptions in a TD
- **Why (so that I can...):**
  - Simplify TDs in cases without usage of default terms or to avoid redundancy
  - **Motivating Use Case Category:** TD Creation Simplification.
  - **Details:** There are at least three sub-problems that motivate this feature:
    1. If the media type is common across forms but is not application/json, it otherwise needs to be repeated in each form.
    2. If there are common protocol stack configurations such as different default verbs, baud rates, and endianness, they otherwise need to be repeated in each form.
    3. Multiple bases are not otherwise possible, so each form repeats multiple bases. This is relevant (for example) when a TD has both local and public IP addresses.

UC → Cat → Req → WI → Feature



Categories

See https://w3c.github.io/wot-usecases/#sec-use-case-categories

- Intermediate, *optional* step but allows for generalization
  - Avoids having to constantly update “requirement” to “use case” mapping
  - ***JUST A CONVENIENCE*** when many use cases share common requirements

Some possible categories:

- Private (handles personal or confidential information)
- Flexible Protocol Usage (use multiple protocols)
- Cloud Integration (shares data with remote servers)
- Local Access (needs to operate without a global connection)
- Mobile (location is subject to change)
- Resiliency (needs to be robust to failures and attacks of various kinds)

Workflow Considerations

- It is up to each TF to decide how to organize work items
  - MD files → issues → PRs → assertions
  - End state should be an assertion, however (e.g. a feature in a specification) for "capabilities”.
- For Use cases
  - If one does not exist, it should be created
  - Keep it abstract
  - Don't need a ton of implementation details in use case, it should just state the purpose
  - A category can be suggested in the user story
    - Give a definition or link to at least one use case in the "details" section

Security and Privacy Requirements

Special case:

- Security/Privacy features are generally to mitigate “risks”
  - S&P sections generally each have a defined risk
  - … then list mitigations for each risk, some of which may be normative
  - In general, mitigations map to capabilities and avoiding risks are purposes
- Risks are documented in “Security and Privacy Guidelines” document
  - Stakeholders need to be made consistent with other documents
- ***Need to identify which use cases have which risks***

Suggested Plan

- Expand “Requirements” Section in Use Cases and Requirements document to define requirements and connect them to use cases.
  - Want to avoid editing use cases themselves for authorship and consolidation reasons
  - Consolidate: move requirements out of other documents, e.g. Architecture
- Keep it simple:
  - A named requirement and a user story defining each one is enough.
    - Optionally can have additional description paragraph
  - Can link to another document for more detailed definitions, e.g. security risks.
    - Ideally, linked details should be in a “published” document, not a random MD file somewhere…
  - Links to use cases motivating each requirement
  - Do not have to link each requirement to ALL use cases motivating it
    - Use categories *only* if requirement is motivated by large set of use cases

Discussion