Requirements Handbook Companion

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1. Disclaimer

Work in progress!

Here is a list of warnings:

- This work is in progress and subject to constant improvements, so pay attention to dates and versions.
- If you read the `PDF` version of this material on a browser, the links might not be clickable. Download it instead in your machine and open it with a PDF viewer. The links should be clickable there.

Conventions for this book:

Table 1. Icons signification

Icon	Signification
✓	A precisely referenced requirement this section is satisfying
🐞	A precisely referenced requirement this section is related to

Icon	Signification
⊗	No corresponding requirement for this section (should be fixed)

2. Context

This repository constitutes the companion of the book: Handbook of requirements and business analysis. It serves as the basis for the future Handbook’s site: http://requirements-handbook.org/

3. Overview of PEGS

> Work in progress!

This chapter is an overview of PEGS. It aims at making this companion book self-content. We highly recommend, for more details and a full description of the subtleties of PEGS, to read the corresponding handbook. Besides, this chapter does not cover the following aspects of PEGS that handbook fully addresses:

- General principles of requirements (see handbook, chapter 2)
- Quality criteria for requirements (see handbook, chapter 4)
- How to write requirements (see handbook, chapter 6)
- Completeness (see handbook, chapter 11)
- Verification (see handbook, chapter 12)

3.1. Basic principles

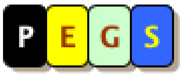


Figure 1. The PEGS logo

PEGS takes its name from the proposed organization of requirements in four books (Section 3.2 will detail this books' structure):

Process

dedicated to…

Environment

Goals

System

Bla

> All this document will follow, as much as possible, the color convention illustrated by the logo (see Figure 1).

3.2. Overall structure

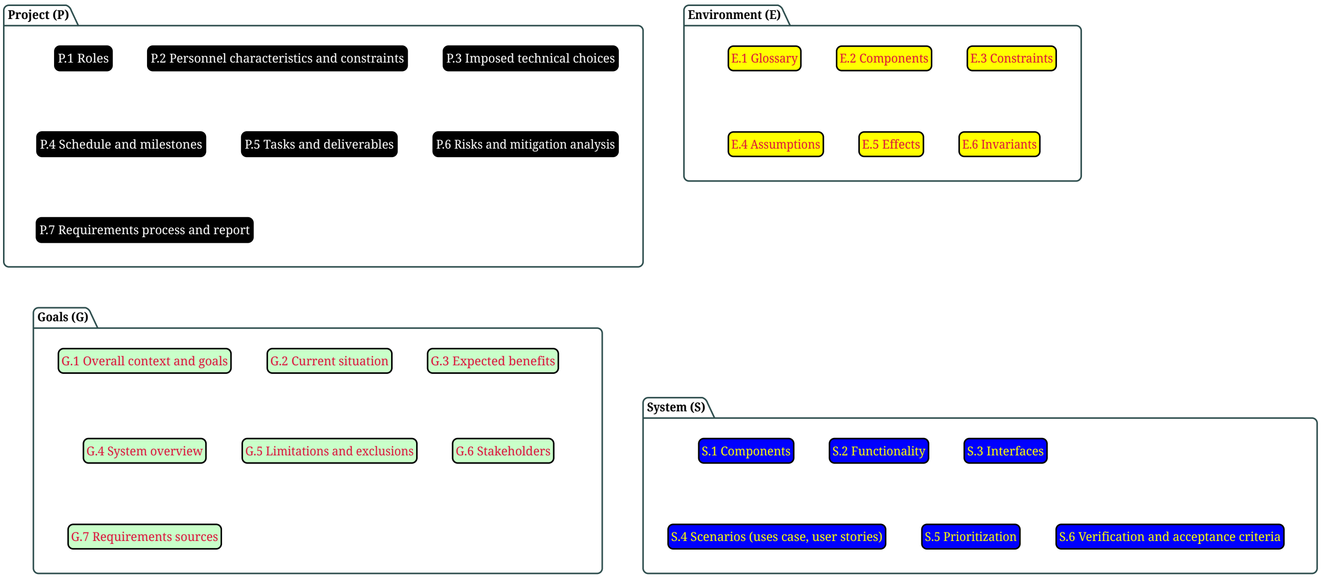

Project (P)
P.1 Roles
P.2 Personnel characteristics and constraints
P.3 Imposed technical choices
P.4 Schedule and milestones
P.5 Tasks and deliverables
P.6 Risks and mitigation analysis
P.7 Requirements process and report
Environment (E)
E.1 Glossary
E.2 Components
E.3 Constraints
E.4 Assumptions
E.5 Effects
E.6 Invariants
Goals (G)
G.1 Overall context and goals
G.2 Current situation
G.3 Expected benefits
G.4 System overview
G.5 Limitations and exclusions
G.6 Stakeholders
G.7 Requirements sources
System (S)
S.1 Components
S.2 Functionality
S.3 Interfaces
S.4 Scenarios (uses case, user stories)
S.5 Prioritization
S.6 Verification and acceptance criteria

Figure 2. The four books of requirements

This structure can be used to organize a document in books, but also requirements in packages (for example in SysML) or in folders (for example in a spreadsheet).

3.3. Links between the four PEGS

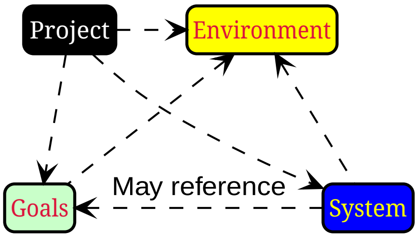


Figure 3. Reference links

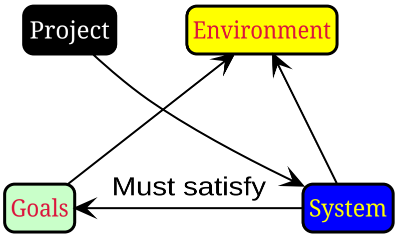


Figure 4. Verification obligations

3.4. The lifecycle model

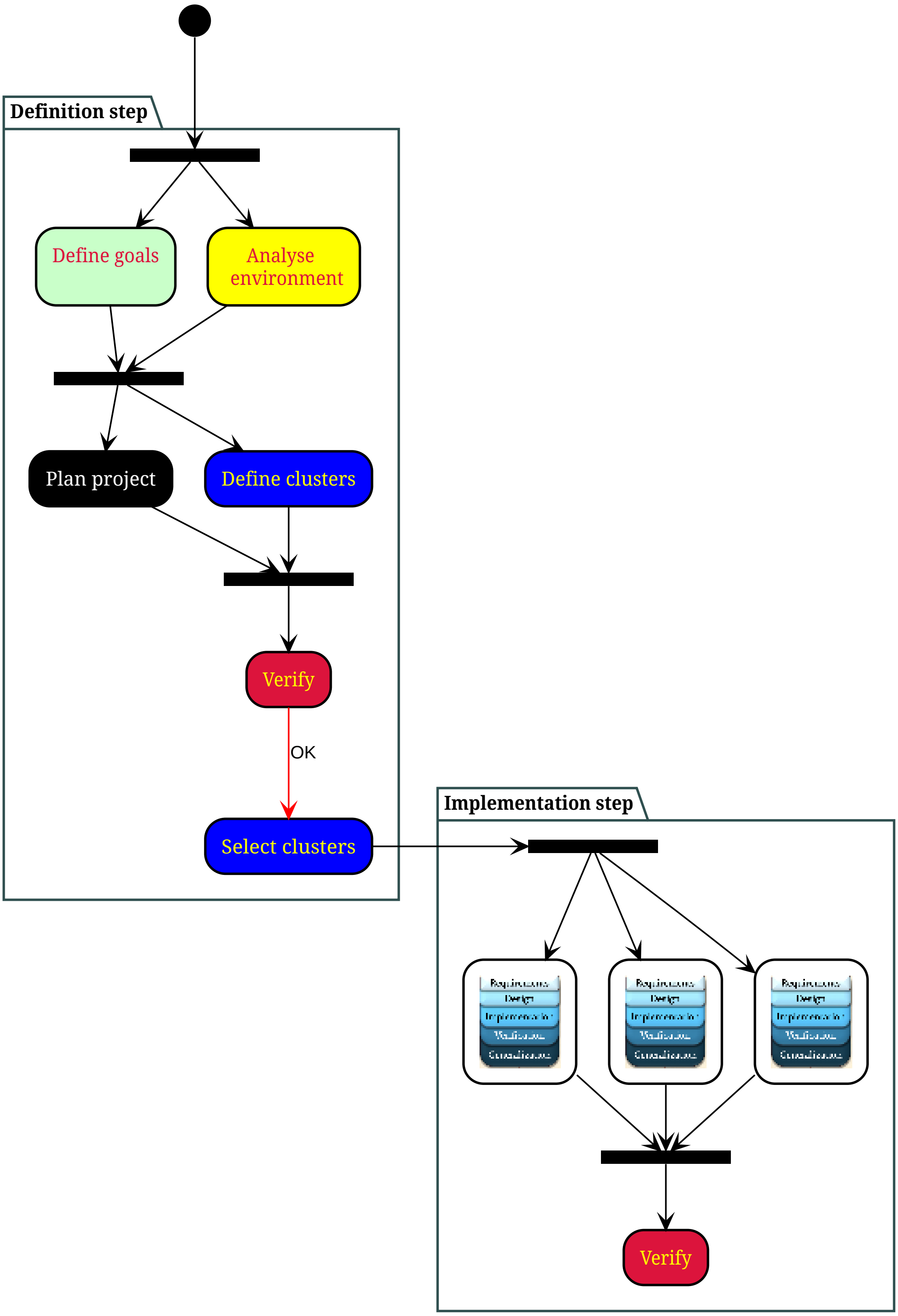


Figure 5. The lifecycle model

4. Case studies

We illustrate the use of PEGS through the following case studies:

Work in progress

1. The Roborace (see the dedicated repo here)
2. A more information-system-oriented example (one option is this library example)
3. This Companion Book' requirements (see the dedicated repo here)

5. Book templates

We provide a set of Book templates in this companion web site to help you apply PEGS and organize your requirements. Here is the list of the available templates (feel free to contribute by submitting additional templates):

> ⚠ Work in progress

1. DOCX
2. Google Doc (see this example for now)
3. LaTeX (see IEEE example)
4. GitHub
5. SysML

✓ *Corresponding Requirement*

This section satisfies this requirement.

6. Verification rules

This section provides some implementation examples of the verification rules described in the {Handbook}.

6.1. Books mutual references

One of the requirements for this book, taken from the {Handbook}, says (see here):

> The books may reference each other, but not arbitrarily.

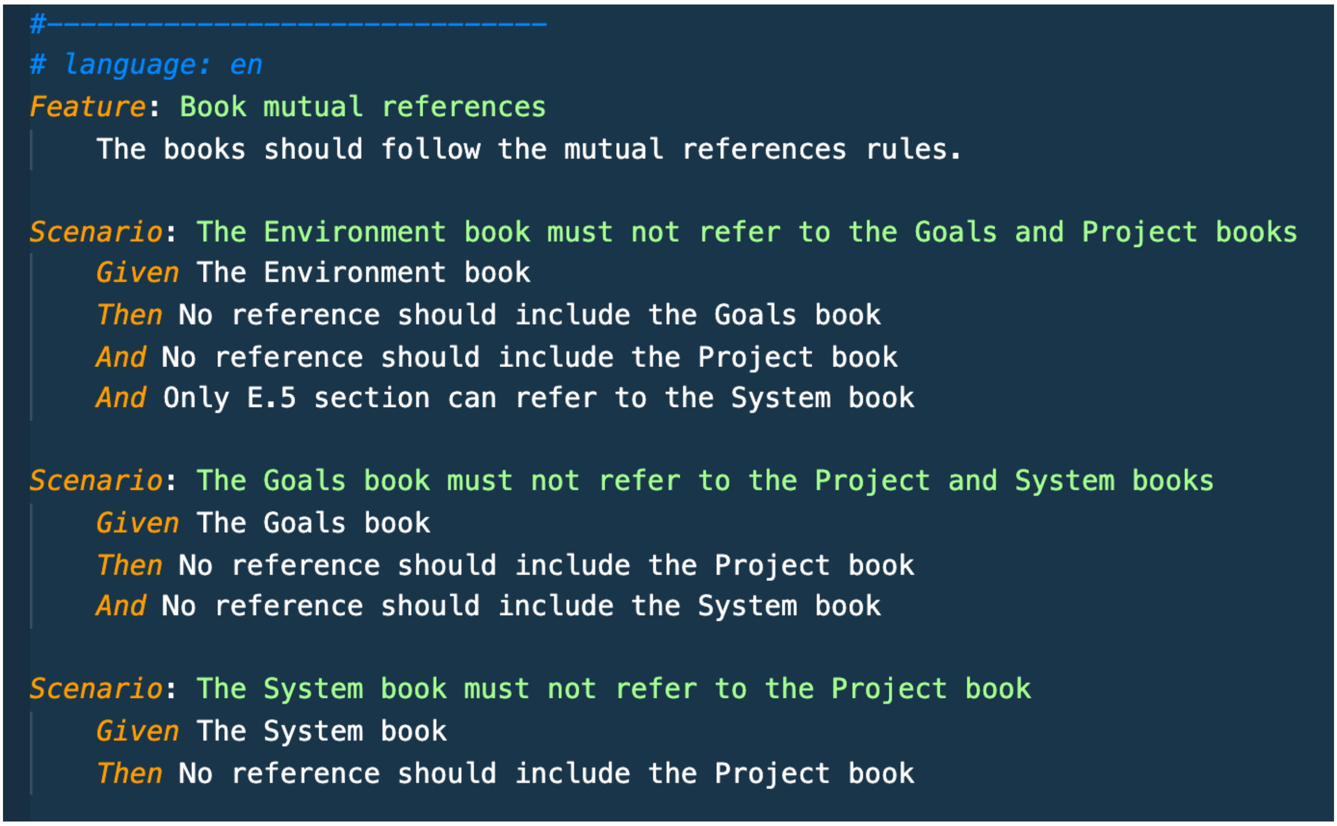
The Figure 6 shows which books may refer to which.

[Reference links] | *https://raw.githubusercontent.com/FormalRequirements/requirements-handbook-*

companion/9f100f121c15772b07cc2bdc3d25afee587784fe/images/links.svg

Figure 6. Possible references between the books

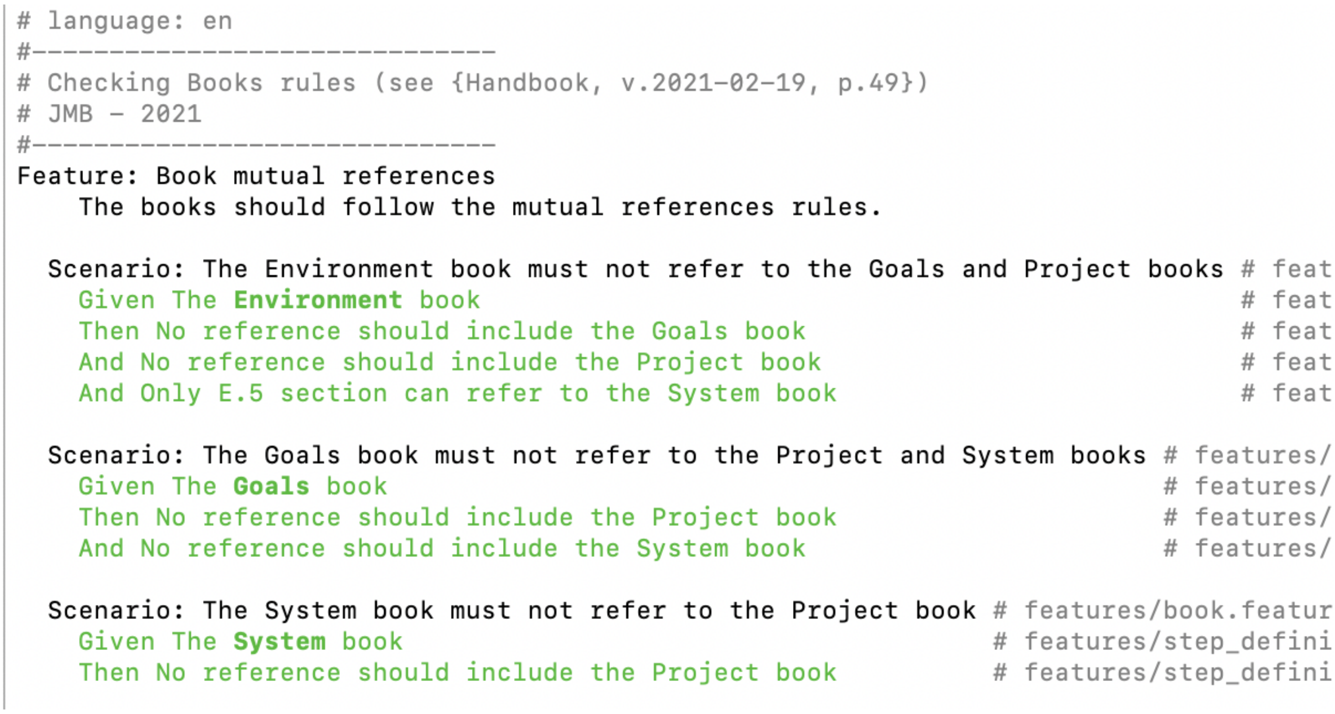
From this mutual references rule, a concrete implementation, written in Gherkin, enforces its application:



```
#------------------------------
# language: en
Feature: Book mutual references
    The books should follow the mutual references rules.

Scenario: The Environment book must not refer to the Goals and Project books
    Given The Environment book
    Then No reference should include the Goals book
    And No reference should include the Project book
    And Only E.5 section can refer to the System book

Scenario: The Goals book must not refer to the Project and System books
    Given The Goals book
    Then No reference should include the Project book
    And No reference should include the System book

Scenario: The System book must not refer to the Project book
    Given The System book
    Then No reference should include the Project book
```

Figure 7. Verification rule as a BDD feature (see this file)

Here is the execution, using `cucmumber`, of the corresponding tests, showing that they all pass (green lines):



```
# language: en
#------------------------------
# Checking Books rules (see {Handbook, v.2021-02-19, p.49})
# JMB - 2021
#------------------------------
Feature: Book mutual references
    The books should follow the mutual references rules.

  Scenario: The Environment book must not refer to the Goals and Project books # feat
    Given The Environment book                                                 # feat
    Then No reference should include the Goals book                            # feat
    And No reference should include the Project book                           # feat
    And Only E.5 section can refer to the System book                          # feat

  Scenario: The Goals book must not refer to the Project and System books # features/
    Given The Goals book                                                  # features/
    Then No reference should include the Project book                     # features/
    And No reference should include the System book                       # features/

  Scenario: The System book must not refer to the Project book # features/book.featur
    Given The System book                                      # features/step_defini
    Then No reference should include the Project book          # features/step_defini
```

Figure 8. tests execution

References

- Sommerville & Sawyer
- Axel van Lamsweerde
- Klaus Pohl

Appendices

Appendix A: Useful links

- The draft of the Method Book: PDF
- The draft of the Companion Book: Google Doc

Appendix B: Specific implementations

Here is a list of potential mappings between the PEGS:

SysML

- Each PEGS could be a package
- Requirements could be stereotyped (e.g., `[Goals]` or `[System]`)

FORM-L

- M. Thuy could be interested in providing a template for the PEGS in Form-L

RSML

- Florian could integrate the PEGS in the editor

Appendix C: Checks results and issues

URLs

Checking URLs result (last update: 2021-02-26):

```
Ven 26 fév 2021 11:11:04 CET

FILE: README.adoc
[▯] http://se.ethz.ch/~meyer/down/requirements_handbook/REQUIREMENTS.pdf
[~] http://requirements-handbook.org/
[▯]
https://docs.google.com/document/d/1HrWCRzyW_iTf1QXFFzEoDvvc66IzMCDb3uXGS5GRWz8/edit?u
sp=sharing
[▯] https://github.com/FormalRequirements/requirements-handbook-companion
[▯] https://P.1
[▯] https://formalrequirements.github.io/companionRequirements
[▯] https://github.com/formalrequirements/companionRequirements
[▯] https://gist.github.com/rxaviers/7360908
[▯] https://github.com/FormalRequirements/requirements-handbook-
companion/workflows/Check%20URLs/badge.svg
[▯] https://github.com/FormalRequirements/requirements-handbook-companion/actions
[▯] https://img.shields.io/badge/License-MIT-yellow.svg
[▯] https://opensource.org/licenses/MIT
[▯] https://img.shields.io/badge/Gitpod-ready--to--code-blue?logo=gitpod
[▯] https://gitpod.io/#https://github.com/FormalRequirements/requirements-handbook-
companion
[▯] https://img.shields.io/badge/PDF-Download-blue
[▯] https://github.com/FormalRequirements/requirements-handbook-
companion/blob/main/README.pdf
[▯] https://github.com/FormalRequirements/roboraceRequirements
[▯] https://github.com/ddd-by-examples/library?ref=hackernoon.com#domain-description
[▯] https://github.com/FormalRequirements/companionRequirements
[▯] https://github.com/jpeisenbarth/SRS-Tex
[▯] https://raw.githubusercontent.com/FormalRequirements/requirements-handbook-
companion/9f100f121c15772b07cc2bdc3d25afee587784fe/images/links.svg
[▯] https://github.com/FormalRequirements/requirements-handbook-
companion/blob/main/check-results.txt

FILE: githubImpl.adoc
[▯] http://se.ethz.ch/~meyer/down/requirements_handbook/REQUIREMENTS.pdf
[▯] http://requirements-handbook.org/
[▯]
https://docs.google.com/document/d/1HrWCRzyW_iTf1QXFFzEoDvvc66IzMCDb3uXGS5GRWz8/edit?u
sp=sharing
[▯] https://github.com

FILE: overview.adoc
[▯] http://se.ethz.ch/~meyer/down/requirements_handbook/REQUIREMENTS.pdf
[~] http://requirements-handbook.org/
[▯]
https://docs.google.com/document/d/1HrWCRzyW_iTf1QXFFzEoDvvc66IzMCDb3uXGS5GRWz8/edit?u
sp=sharing
```