



FITMAN Verification & Validation Handbook

Annex to D2.5

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1. Introduction

The purpose of this handbook is to collect the main features of the FITMAN Verification & Validation (V&V) package into one document from a user point of view. The handbook presents an overview of the method and the main content of each section of the assessment. For details on development rationale and theoretical frameworks, as well as for a detailed description of the method, readers are advised to refer to FITMAN WP2 Deliverables.

There are two perspectives in the FITMAN V&V assessment: 1) **Trial specific perspective**, which assesses whether the IT and **business requirements** and domain's needs are met, and 2) **Product-specific perspective**, which describes how to **verify and validate the product** during its development.

2. FITMAN V&V Methodology Overview

In FITMAN V&V assessment can be presented to be composed of four different sections described in the figure below. Each of these is described more in detail in the following chapters.

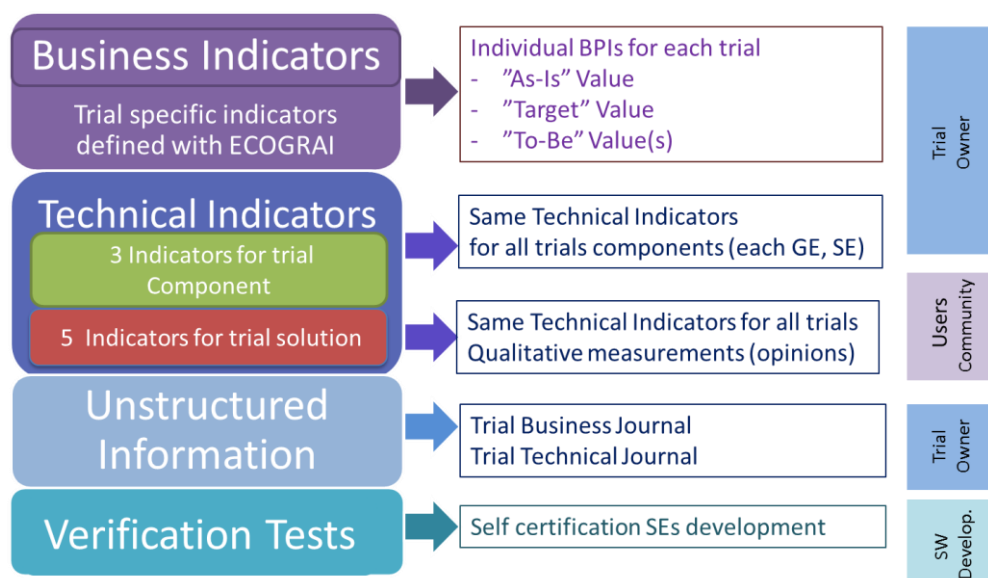


Figure 1. FITMAN V&V assessment overview

- **Business Performance Indicator** system, specific to each trial, assessed by the end users, through "as-is", "to-be" and target values.
- **Technical Indicator** system, made of two groups of indicators, i.e. three indicators for the software components (i.e. generic enablers (GEs) and specific enablers (SEs)), implemented as evaluation through a scale of different values, and five indicators for the whole trial solution, implemented as community-based collection of users' opinions
- **Trial Journal** for collection of unstructured information for each Trial, addressing both Technical and Business aspects.
- **SEs Verification and Self-certification** system, a set of tests aiming at improving the quality of the SEs. After the development phase, each SE is certified by the software development partner using their own testing methods. The reporting of results is then channelled through a self-certification mechanism.

3. Assessing Business Impact

Business Performance Indicators are identified for each trial through a simplified ECOGRAI Method, in the frame of trials objectives and according to identified decision variables. For each Business Performance Indicator, the trials are required to report;

- The current value (AS-IS)
- The target value they want to achieve (Target) and
- The values after the solution implementation (TO-BE).

The simplified ECOGRAI method has been elaborated from the original ECOGRAI method, and contains three phases. They are the following:

- **First Phase:** Description of the system in order to determine:
 - the elements which compose the system and the relation between these elements
 - the objectives assigned to the system
 - the functions which allow to reach the objectives
 - the processes which support the dynamic transformations
 - the boundary which delimits the elements which don't belong to the system
 - the dynamics of evolution of the system particularly in the case of the evolution from AS IS to TO BE.
- **Second phase:** Determination of potential actions called Decision Variables (DV) or Action Variables (AV) by the owner of the system to reach the objectives assigned to the system. In FITMAN it is the implementation of the platform developed with GE and SE. In this phase the following are to be defined:
 - the constraints, which represent the limits of the DV/AV
 - the criteria, in order to choose the DV/AV (Quality, Time and Cost).
- **Third phase:** Determination of Performance Indicators (PIs) which indicate or characterize reaching the objectives by using the DV/AV.

According to the nature of the indicator and the expectations of the trials, it has to be specified when and how many times TO-BE value has to be reported. Furthermore, the trial has to identify the TARGET value of each indicator, which represents the expected value coming from the implementation of the solution.

4. Verification & Validation of Software Components and Trial Solutions

In FITMAN the Verification & Validation of Software Components is done through:

- **Technical Indicator** system, made of two groups of indicators 1) three indicators for the software components (i.e. generic enablers (GEs) and specific enablers (SEs)), implemented as evaluation through a scale of different values, and 2) five indicators for the whole trial solution, implemented as community-based collection of users' opinions
- **SEs Verification and Self-certification** system, a set of tests aiming at improving the quality of the SEs. After the development phase, each SE is certified by the software development partner using their own testing methods. The reporting of results is then channelled through a self-certification mechanism.

4.1. Technical Indicator system

Two subsets of technical indicators are selected which for simplicity reasons are common among all the FITMAN components and all the FITMAN trial solutions respectively;

- The **Trial Components Indicators**, consisting of 3 indicators, common for all Specific Enablers, Generic Enablers and
- **Trial Solutions Indicators** one consisting of 5 indicators, common for all Trials.

The following table presents the selected Trial Components Indicators of the simplified V&V approach.

Technical Indicators for GEs/SEs	Levels per Indicator
Openness	<ul style="list-style-type: none"> • Level 0: Open specifications –Developers can view & study the requirements posed and implement them as they wish • Level 1: Enablers as a Service – Developers can utilize software provided as a service through open interfaces • Level 2: Releasing code as open source - Developers can inspect, download, run and improve the open source code according to their needs. • Level 3: Consulting with the use cases about their needs and collaboratively contributing to the source repository, design documents, and bug reports
Interoperability maturity	<ul style="list-style-type: none"> • Level 0: Isolated Approach (No API exposing the GE / SE functionalities) • Level 1: Baseline Unified Approach (International Standard exists) • Level 2: Open Unified Approach (No International Standard exists) • Level 3: Standardized Integrated Approach
Ease of application	<ul style="list-style-type: none"> • Level 0: No applicability in our environment without extra applying actions or means • Level 1: Applicable with significant amount of work • Level 2: Applicable with some amount of work • Level 3: Easily applicable in our environment

Technical Validation of the complete Trial Solutions is done by using indicators described in the table below. It has to be noted that these indicators, due to the nature of the solutions, are based on qualitative measurements and on the opinions of the users' communities.

Trial Solutions' Technical Indicators	Statement to be examined / evaluated based on users' perspectives
Fulfilment of requirements	<i>The solution fulfils all the Trial requirements</i>
Learnability	<i>It is easy to start to use the solution and learn functionalities</i>
Understandability	<i>The solution is easy and self-clear to understand and the concepts and terminology are understandable</i>
User's attraction level	<i>The solution is attractive to the user. I feel satisfied and comfortable when using it</i>
Efficiency	<i>The time and resources required to achieve the objectives of the solution are reasonable, the solution is fast enough and does not require too many steps</i>

4.2. SEs Verification and Self-certification system

In FITMAN almost no components are built from scratch – they are built by configuring, customising and integrating already available software components. Based on this, self-certification in FITMAN is done by reporting whether each V&V step of the method (the steps are described in FITMAN WP2 public deliverables) has been applied for a Specific Enabler and which techniques have been selected and applied. This is done using forms available in Survey Monkey.

5. Unstructured Information - Trial Journal

Unstructured information for each Trial is collected according to the FITMAN V&V Methodology. The Trial Journal supports this collection. The Trial Journal is available for each Trial in Survey Monkey. It collects unstructured feedback from each Trial, addressing both Technical and Business aspects.

6. Performing the assessment in practice

The FITMAN V&V Assessment Package has been customized and made available for each trial by means of a set of different forms implemented and distributed online with SurveyMonkey. The form categories are General Forms, Community-based Forms and Self-certification Forms. They are organized according to whom each is addressed. The forms of the trials and the target user groups are described in the figure below.

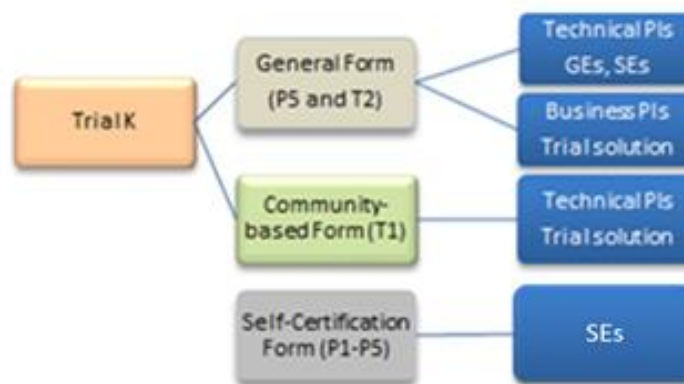


Figure 2. FITMAN V&V Assessment Package

An overview of the SurveyMonkey Forms is presented in the figure below. After that is presented an example of a view concerning technical indicators assessment for the trial solution.

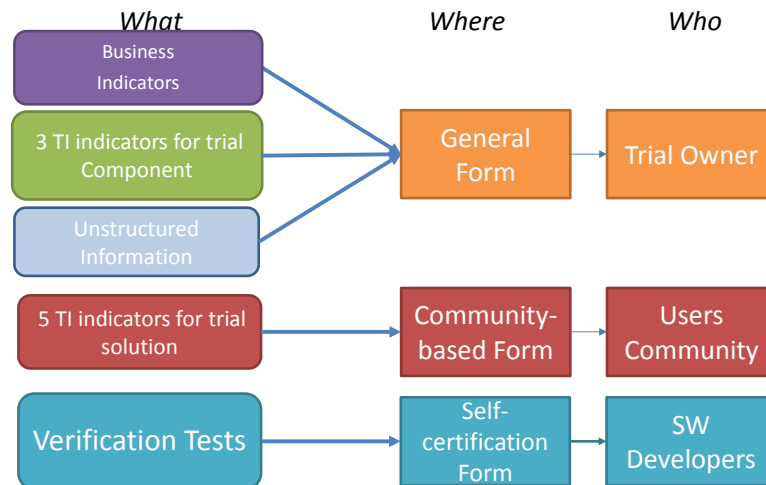


Figure 3. Overview of the Survey Monkey forms.

Volkswagen Trial - Community-based Form

Technical Indicators - Trial Integrated Solution

Please indicate your role in the Trial.

01000009 - User's Role

☐ Product Owner

☐ Trial Solution Owner

☐ Member of the Trial Team

Comments (if any):

STATEMENT: "The solution fulfils the trial requirements".

01000010 - Fulfillment of requirements

☐ I strongly agree ☐ I agree ☐ I disagree ☐ I strongly disagree

Comments (if any):

Figure 4. Example of a Survey Monkey form: Statement to be examined / evaluated based on users' perspective.

7. Data analysis

In order to run the data analysis data can be extracted from the Survey Monkey repository utilizing the specific functions. For each survey data are extracted in MS Excel (.xls) format. Data are then imported in a MS-Access database available for reporting and consolidation. The main functions made available in the MS Access Database are depicted in the figure below.

The available functions allow to:

- Launch reports from data collected from General Surveys including:
 - Analysis of BPI values and progress versus the initial values before implementation
 - Analysis of TI for the various components of the FITMAN Platform and for the specific trial
- Launch reports from data collected from Community
- Launch the procedures for loading data generated by "Survey Monkey" (General Surveys and Community Based Surveys)

FITMAN SURVEYS REPORTS and PROCEDURES

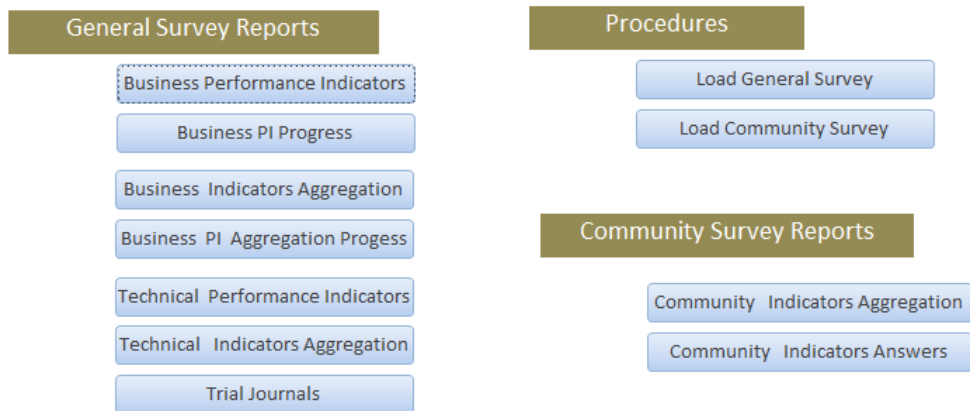


Figure 5. FITMAN V&V method survey reports and procedures.

8. Contact information

The FITMAN V&V method is supported during the FITMAN project. More information is available in the deliverables of WP2 of FITMAN. The deliverables are public and available on FITMAN web pages <http://www.fitman-fi.eu/>. FITMAN partners associated with the V&V method can also provide more information:

- V&V method in general: Kim Jansson, VTT, kim.jansson@vtt.fi
- V&V Assessment Package and Survey Monkey: Giacomo Tavola, Polimi, Giacomo.tavola@polimi.it
- ECOGRAI: Guy Doumeingts, IV-LAB, guy.doumeingts@interop-vlab.eu
- Self-certification: Fenareti Lampathaki, NTUA, flamp@epu.ntua.gr