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Value Management - Function Analysis: Basic characteristics, requirements and guidance for implementation

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Value Management - Function Analysis: Basic characteristics, requirements and guidance for implementation

Management par la valeur - Analyse Fonctionnelle: caractéristiques fondamentales, exigences et recommandations pour la mise en œuvre

Value Management - Funktionenanalyse: Grundlegende Merkmale, Anforderungen und Leitlinien für die Umsetzung

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European foreword

This document (EN 17952:2024) has been prepared by Technical Committee CEN/TC 279 “Value management, value analysis, function analysis”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2024, and conflicting national standards shall be withdrawn at the latest by December 2024.

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Introduction

This document sets out requirements for Function Analysis (FA). FA is used to define and validate needs, prioritize requirements, assess performance, stimulate innovation, guide design and support procurement and inform decisions to use, reuse, and recycle parts and products.

FA provides people in different fields of application with a proven method for defining needs, developing an offer, improving purchases, contracting a partnership or increasing the efficiency of activities. FA is a process that describes completely the functions and their relationships which are systematically characterized, classified and evaluated.

0.1 General

The purpose of this document is to provide effective support to any person or organization wishing to improve its effectiveness or performance or operational activities and in the definition, development or the realization of any action or project.

FA makes an effective contribution in fields of quality management (EN ISO 9001), environmental management systems (EN ISO 14001), configuration management (ISO 10007, EN 9223-100), dependability management (EN 60300-1), circular economy (EN 62309), systems and software engineering (ISO/IEC/IEEE 15288) and performance management. It is essential for Value Management (EN 12973) and successful application of a Functional Performance Specification (EN 16271).

FA involves and relies upon a way of thinking, based on a continuous process, with or without a dedicated team, that encourages the search for the goal and the need to be fulfilled, before looking for ways to achieve it that applies at any level and in any process.

FA firstly, defines the objective in a concise and clearly expressed way, independent of any solution, and secondly, provides support and assistance in the process to effectively achieve the defined need. FA activities support enhanced teamwork, assists in gaining a consensus agreement and collaboration in the collective pursuit of the chosen goal.

FA is a standalone method and is used by many disciplines, for example, concurrent or simultaneous engineering, systems and software engineering and risk management. This document specifies that the practice of FA meets specific requirements to ensure the validity of the expected results in the intended usage context. FA is a fundamental component in improving performance of organizations, allowing the pursuit of opportunities while identifying and significantly reducing threats throughout the life cycle. FA is linked to Value Management, Value Analysis and Value Engineering. FA is a specific method; it should not be confused with classic methods such as the Functional Analysis in applied mathematics.

This document describes the global structure of FA, how it is situated in the organizational environment and how it links to other management and engineering practices.

In addition, it provides recommendations for the implementation of commonly used FA methods and tools (Annex A).

0.2 Function Analysis at the heart of Management

For any management activity it is imperative to differentiate systematically the two distinct areas, in one area, the goal to be achieved (the objective) and need to be met, using Functional Need Analysis (FNA) and in the other area, the way to achieve it (the means and resources, the process or the solution) using Technical Function Analysis (TFA).

FA, with its two distinct areas, provides an effective and strong methodological support at any level and in any field, when dealing with challenges of whatever complexity. It could be used for example, in strategic planning, business and project management, product and market development, or in any process of problem solving. It provides you with the opportunity to improve the performance of your organization.

0.3 Contributions for the different users of the standard

FA helps different users to clarify and define problems of any kind that concern an organization, thus contributing to their definition and resolution.

The benefits from effectively applying Functional Need Analysis include:

— the identification and description, in a concise language, without any ambiguity, the need to be satisfied for a given study subject (the aim to be reached); and

— the assurance of improved communication between everyone in the team involved in the project, within a common vision, free from unnecessary specialist jargon.

The benefits of the TFA include:

— a controlled traceability between the identified need and how this is satisfied by the proposal or solution;

— the supply of rational choices for a solution, supported by the identification and evaluation of the benefits and impacts induced and an assessment of the ability to meet the identified need; and

— a systematic method to facilitate the treatment of complexity, risk and uncertainty.

0.4 Key roles and responsibilities

A prerequisite for FA lies in the clarity of the roles, field of activity and the responsibilities of each person involved, whether formalized or not.

In the case of a FA action, the following roles are fundamental:

— the “Decision-maker”, who defines the purpose, objectives, resource allocation and ultimately will be responsible for decision-making, the definition of the need and for the specified objective, which procures the resources;

— the “FA Project Leader” or facilitator, person who is responsible for selecting the FA approach, methods and tools and who has the knowledge, competence, and personality to organize, lead and coordinate a FA team in a professional and successful way, and as such has been put in charge of this responsibility by management; and

— the “FA team”: chosen for their knowledge of the subject, the object of the action, which could be integrated within any team.

FA can be used continuously as an effective support for any reflection.

0.5 The two distinct areas of Function Analysis

FA assists in interrogating a challenge in two distinct areas, firstly by clarifying the goal to be achieved and need to be met, and secondly, by searching, researching and establishing the best solution to the identified need and goal.

FA applies to all processes and tasks, involving contributors inside and outside the organization. It requires setting aside technical solutions to understand and interpret the objectives and aims of the proposed action in order to promote creativity in the search and evaluation of the solutions.

FA enables:

— the identification of the functions of any object such as a product or an organization;

— the quantification of the performances to be achieved;

— communication between all the people in a multidisciplinary team involved in the project with a common language;

— the identification of the principles of solutions and the benefits, impacts and risks which they generate;

— the establishment of the required performances of the solution providing a basis for the establishment of a Product Function Architecture;

— the evaluation of the capacity of a product to meet the expressed need; and

— a common understanding of the challenge posed and potential solutions considered to solve it.

This is why FA, as a process, has its place upstream, alongside and downstream of any project. FA result is the input datum in processing of any problem (the issue to resolve): be it evolution, creation, innovation, dysfunction, obsolescence, etc., for which one wishes to obtain the most effective response to satisfy the expressed need, while dispensing with a priori solutions.

Functional Need Analysis (FNA area) identifies the User Related Functions (URFs) and is intended to take into account all the needs and expectations of the different users, customers and selected stakeholders that are interested in the product throughout its life cycle.

Technical Function Analysis (TFA area) identifies the Product Related Functions (PRFs) and defines a Function Structure, provides a logical description of the technical functions and their relationships in order to examine alternatives and to propose a solution.

From an economic point of view, FA has proven to be very useful, if not essential, as it improves the return on investment which can be achieved (with shorter development time, improved performance obtained, adequacy of solutions to the expressed need, etc.), even if an existing or potential solution may often suffice.

FA, when timely and appropriately applied, assists in achieving the most appropriate proposal or potential solution.

FA, with its method and tools, is referenced in Value Management (EN 12973) and Functional Need Expression and the Functional Performance Specification (EN 16271). Additionally, European Union (EU) directives such as the EU Public Procurement Directive 2014/24 and update notices, have also encouraged the market in the wider use of the Functional Performance Specification.

0.6 Conditions for success

The participants in any FA action need to be familiar with the general area of application. In order to be efficient, the FA team will be aware that the success lies in the clarity of the roles, field of activity and the responsibilities of each person involved, whether formalized or not. An organization that implements the FA approach is liable to see the creative skills of their people improve which should enhance their organization’s competitiveness. FA can be integrated into in any process in an organization.

The people involved are required to follow a path which allows scope for creativity in the pursuit of the appropriate solution. It is important to measure the effectiveness of the team over time with respect to the project or action type. Some people may need to be familiar with the area of activity for which an action is required. The range of applications that can be assessed are infinite, with a particular choice of action based on priority and the availability of skilled staff that are familiar with the FA approach.

0.7 Function Thinking

There is “Function Thinking” capability when people are able to first, in a reflective way, think of the purpose of any action, before, second, seeking a solution, while doing this in a formal or informal way.

1 Scope

This document presents Function Analysis (FA) and specifies requirements for Function Analysis and its deliverables. It presents the two distinct areas of application, namely, Functional Need Analysis (FNA) relating to understanding the need, setting goals and Technical Function Analysis (TFA) relating to selecting and developing a solution. It specifies requirements for the basic characteristics of the deliverables within FNA and TFA and expands requirements, guidance and recommendations about FA expressed in the Functional Performance Specification Standard (EN 16271) and in the Value Management Standard (EN 12973).

This document provides an essential reference and support for any person wishing to improve the efficiency, effectiveness and overall performance of their organization. It aims to support sustainable development in an organization. FA offers an opportunity to enhance skills of people involved.

In order to present the conditions for implementation and development of FA deliverables, this document:

- introduces the interests and fields of application and presents a variety of situations in which FA is used in support of projects of all types and sizes;
- specifies essential conditions for successful FA, including roles and responsibilities of the people involved, monitoring the performance of the FA team, processes for validation and verification and supply of valid and verified deliverables; and
- specifies requirements for FA and the basic characteristics of FA deliverables whilst outlining methods, and tools for the realization of the deliverables.

FA is progressed using the following:

- FNA: support for the process of identifying and understanding the need, defining objectives, and setting the goal to be achieved;
- TFA: support for design or research processes and evaluation of solutions; and
- Iteratively focusing on the FNA and TFA by revisiting the identified need, balancing capabilities of available technologies, resources and constraints, achieving the most desirable outcome.

In the area of FNA, this document sets out FNA requirements for the deliverables to establish the Functional Need Expression (FNE). The FNE can serve as a basis for establishing an understanding of the expressed need, the complete list of User Related Functions (URFs), constraints and interfaces. These deliverables serve as a basis for identifying, organizing, characterizing and prioritizing functions and function interfaces. These deliverables can also support preliminary risk and reliability studies, economic studies, impact assessments and development of Functional Performance Specifications (FPSs).

In the area of TFA, this document sets out requirements for TFA deliverables which aim to satisfy the need, expressed in the FNE. The TFA deliverables are focused on analysing existing and potential solutions, identifying a complete list of the Product Related Functions (PRFs) to meet the FNE; evaluating concepts and making a choice for a solution then optimizing the Product Function Architecture (PFA) to identify the “best” solution.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16271, *Value management - Functional expression of the need and functional performance specification - Requirements for expressing and validating the need to be satisfied within the process of purchasing or obtaining a product*

EN 12973, *Value Management*

EN 1325, *Value Management - Vocabulary - Terms and definitions*