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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

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

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

Management par la valeur - Expression fonctionnelle du besoin et cahier des charges fonctionnel - Exigences pour l'expression et la validation du besoin à satisfaire dans le processus d'acquisition ou d'obtention d'un produit

Value Management - Funktionale Beschreibung der Bedürfnisse und funktionale Leistungsbeschreibung - Anforderungen an das Beschreiben und Validieren der Bedürfnisse, die während der Erstellung oder des Erwerbs eines Produktes zu befriedigen sind

This European Standard was approved by CEN on 27 October 2012.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 16271:2012) has been prepared by Technical Committee CEN/TC 279 “Value management, value analysis, functional analysis”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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0 Introduction

0.1 General

This European Standard states the conditions for the successful implementation of the Functional Need Analysis, Functional Need Expression and Functional Performance Specification and determines the compliance requirements for the parties involved. It extends the generic standard on Value Management, EN 12973. It separately presents the requirements applicable to the processes that have to be implemented and those applicable to the deliverables derived from these processes.

0.2 Basis

In highly competitive markets, the durability and the development of organisations depend on their capacity to provide competitive products which are best suited to satisfy the need, whether expressed or implicit, of the users.

The statement of the need in a functional form, i.e. in terms of purpose, without reference to solutions (technical, administrative, procedural, and organisational, etc.) likely to satisfy it, ensures there is every chance that competitive and innovative solutions will emerge at the design stage.

The statement of the need in a functional form is essential. It permits the expression of the:

— reference of this need in validated terms (in terms of obligations, expected services, rather than in terms of means) which can be used to control the evolution of this reference at the later stages of the product's life;

— level of importance of the main requirements which make up the cost of a product.

Using a structured need statement approach in a functional form promotes the:

— offer of competitive and innovative products;

— mobilisation of all the interested parties to obtain a unified expression of the need which can be used at each step - from the development to the evaluation of offers satisfying the same need;

— dialogue between the partners, while respecting the responsibilities of each partner and with a clearer relationship between the customer and the provider.

This European Standard addresses the quality of specification under the responsibility of the enquirer, the handling of the customer/provider relationship and the search for the optimum solution in relation to the expressed need. The standard also addresses the performance levels and the grade of quality required by the enquirer.

0.3 Organisation and presentation of processes and deliverables

Figure 1 below shows schematically the relationship between the three key processes (Functional Need Analysis (FNA) process, the Process for drawing up the Functional Performance Specification (FPS), and the FPS utilisation process:

— The Functional Need Analysis (FNA) process: this enables the defining of the result named Functional Need Expression (FNE).

— The process for the drawing up of the Functional Performance Specification (FPS) from the FNE: this process generates a document (FPS) used within the framework of external enquiries, calls for tenders, the Design To Objective (DTO) approach, or internally by certain organisations.

— The FPS utilisation process: this enables, from the initial FPS, a stabilised and final version of the selected need (FPS reference version) to be defined so that the future product shall satisfy.

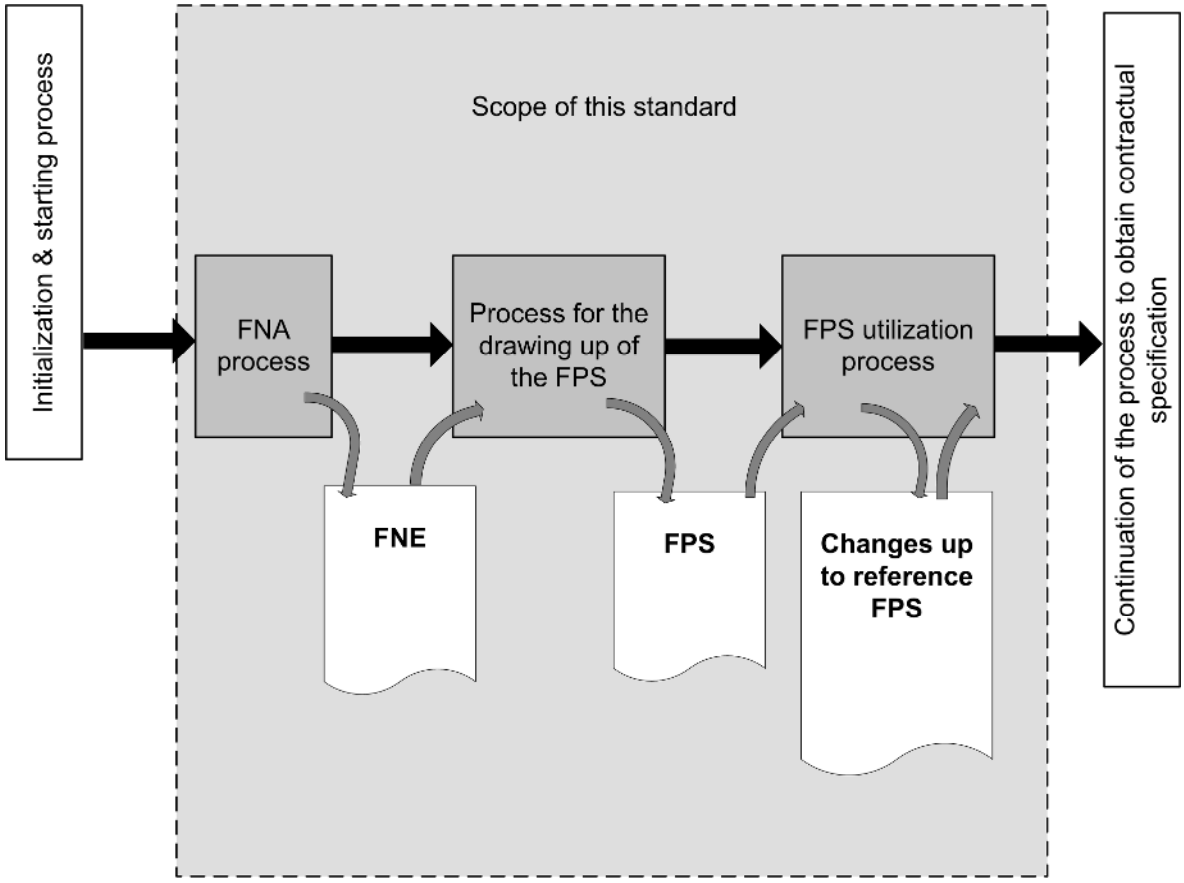

Figure 1 — Process organisation and relations between deliverables

Annex B proposes a detailed presentation of the processes and deliverables highlighting the respective roles of the owner or project manager and of designers/producers.

0.4 Functional need analysis (FNA)

The FNA is a process which applies to a physical object, as well as an organisation, a service, an intellectual service, a process, software, an information system or any combination of the preceding elements. The functions (User Related Functions) that any product provides shall be defined before it is made, thus justifying its acquisition or, more generally, its procurement. The FNA:

— highlights and takes into account the point of view of all the interested parties involved;

— relates to the entire life cycle, from upstream (supply, storage etc.), utilisation, to downstream (maintenance in operational conditions, upgrading and end-of-life operations) phases, and thus introduces the consideration of time;

— defines the expected results and not the means to be implemented. The FNA makes it possible to avoid the premature freezing of technical solutions.

Therefore, the FNA is fully in line with the perspective of a sustainable development since it takes account of all the interests involved and contributes to optimising resources by focusing on what is essential: to determine sound and acceptable objectives prior to any action.

0.5 Functional Need Expression (FNE)

The FNE materialises the results obtained with the FNA. The FNE:

— organises information according to a rigorous and detailed explanatory logic. It gives an assessment of the elements, enabling decision-making with full knowledge of the facts;

— makes it possible to initiate the design and the making of the product which is the most appropriate to provide the desired service, the most suitable for the expected use, with the best suitable performance;

— is a reference of the customer need for all the product development steps.

Seen from this perspective, the FNE complies with the transparency or visibility principle defined in the sustainable development approaches.

0.6 FPS

The FPS is a structured and detailed presentation of the need based on the FNE. It enables inquirers to begin a dialogue (or even an initial negotiation) with providers or developers responsible for meeting an identified and specified need. The FPS:

— is used to introduce and make competitive dialogue easier between owners or project managers and providers since they raise a legitimate issue and require a tailor-made response;

— leaves to the provider a broad initiative in the search for original and efficient solutions with regard to the quality/price/lead-times/risks ratios;

— allows all parties to appreciate the differences between the solutions and the need, and makes comparisons easier between competing solutions;

— allows verification and evaluation of the effective results by reference to an expressed expectation.

The implementation of an approach with the FPS changes the 'customer-provider' relationship from an obligation to respond to a predetermined technical specification to an obligation to achieve a result.

0.7 Fields of use

The FNA, FNE and FPS concepts are applicable whenever any entity (organisation or an internal department thereof etc.) expresses a request to another entity which has sufficient capacities and competences to propose to it a product as a response.

The FNE establishes the accurate definition of the need to be satisfied by the product:

— either within the framework of relationships between a customer and their providers; or

— between two entities belonging to the same organisation; or

— within the framework of work groups where it is an integral part of various methods (value analysis, dependability, security analysis, etc.); or

— within the framework of larger and 'integrating' managerial policies and approaches, such as sustainable development, system engineering, design to objective, etc.

These concepts are applicable to all economic sectors, including the service sector. The desired end products or projects may be intended for public or professional use, for investment or for consumption, based on current or future needs. The required products/services may consist of mature products (consisting of subsets at different levels of maturity) as well as products that come from research and exploration.

The FNE may be successfully applied to projects of any size and complexity by adapting this approach.

0.8 Relationships with Value Analysis and Design To Objective (DTO)

The processes and documents produced in compliance with the recommendations of this standard are also integrated into other Value Management approaches. The Value Analysis and Design To Cost/Objective which are core methods of the Value Management (EN 12973) are particularly concerned.

1 Scope

This European Standard is a tool to be used by any partner wishing to draft and make use of the reference of any need to be satisfied. In light of this purpose, it:

a) states the interests and fields of application of the Functional Need Analysis, Functional Need Expression and Functional Performance Specification concepts;

b) determines the contents requirements of the functional need expression structured in four main bodies:

   1) global definition of the need;

   2) definition of the strategic elements and the consolidation of needs;

   3) highlighting of principles, and concepts chosen beforehand, if any;

   4) description of the functions to be provided and of the constraints to be complied with.

c) determines the requirements on the composition and contents of a functional performance specification and those used to assess its quality, i.e. requirements concerning:

   1) its contents and structure;

   2) the assessment of the characteristics which define its quality.

d) precisely specifies, in the form of requirements:

   1) the conditions for a successful Functional Need Analysis (FNA) action producing a deliverable called Functional Need Expression (FNE);

   2) the conditions for drawing up a successful functional performance specification (FPS) based on the available functional need expression (FNE);

   3) the conditions of use of the FPS by the inquirer and the various partners involved (the provider for example);

e) specifies the various conditions of use of these concepts.

This European Standard is applicable in principle to all product types and dimensions (from the elementary tangible object to the definition of an organisation and its strategy, including the systems or processes and activities implemented by an organisation) and to all sectors of activity (including the service sector). Lastly it is applicable within the framework of relationships between external partners (between a customer and its providers) or internally (between two entities of the same organisation for example).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1325-1:1996, *Value Management, Value Analysis, Functional Analysis vocabulary — Part 1: Value Analysis and Functional Analysis*

EN 1325-2:2004, *Value Management, Value Analysis, Functional Analysis vocabulary — Part 2: Value Management*

3 Terms and definitions

For the purposes of this document, the terms and definitions in EN 1325-1:1996 and EN 1325-2:2004 and the following apply.

3.1
user
person or organisation for which the product is designed and which exploits at least one of its functions at any time during its life cycle

Note 1 to entry: A user can be an external or internal customer.

3.2
need
what is necessary for or desired by the user

Note 1 to entry: A need can be declared or undeclared; it can be an existing or a potential one.

3.3
product
result of activities or processes

Note 1 to entry: A product can include service, hardware, processed materials, software or a combination thereof.

Note 2 to entry: A product can be tangible (e.g. assemblies or processed materials) or intangible (e.g. knowledge or concepts) or a combination thereof.

Note 3 to entry: A product can be either intended (e.g. offering to customers) or unintended (e.g. pollutant or unwanted effects).

[SOURCE: EN ISO 9000:2005, modified]

3.4
constraint
characteristic, result or design feature which is made compulsory or has been prohibited for any reason, with no alternative possibility being left

Note 1 to entry: Constraints are generally restrictions on the choice of solutions in a VA project.

Note 2 to entry: The constraints can result from laws, from standards, from the demand of the market. These elements contribute to the characterisation of the functions. It is wise to record the relationship between them and the functions to which they apply (traceability).

Note 3 to entry: Given the importance which the constraints can have on the definition of the product, it is good practice to justify any specified constraint.

Note 4 to entry: To facilitate the reading of the results of the Function Analysis, constraints can be included in a particular chapter.

3.5
enquirer
person or organisation in search of a product and who is responsible for issuing the Functional Performance Specification, with a view to its purchase or requisition and use by itself or by others

3.6
designer - producer (of a product/system)
entity responsible for the design of a product/system which, in addition to the technical requirements, takes the risks, the costs, and the realisation and development times into account

Note 1 to entry: The designer - producer is either an external organisation, or a department from the same organisation as the inquirer.

Note 2 to entry: In certain trades, he/it is generally called a ‘consulting engineer’.

3.7
project owner
entity responsible for the definition of the need and for the specified objective, which takes charge of the management of the project, the selection of the designers, pilots the action in partnership with them, and assures the finances of the activity

Note 1 to entry: If it is not the end user of the studied product, the project owner will give the designer(s) all the information available on needs to be satisfied to allow the search for a real optimisation.

Note 2 to entry: The entity name used can vary according to the particular business sector. In its function of entity in charge of the definition of the need, it is also called "an enquirer” or "Project owner".

3.8
function
effect of a product or of one of its constituents

3.9
Function Analysis
FA
process that describes completely the functions and their relationships, which are systematically characterised, classified and evaluated

Note 1 to entry: The function structure is a part of the result of Function Analysis.

Note 2 to entry: Function Analysis covers two approaches: the Functional Need Analysis (or External Function analysis) and the Technical Function Analysis (or Internal Function analysis).

Note 3 to entry: Function Analysis combines problem definition and problem solving.

3.10
Functional Need Analysis
FNA
part of function analysis which describes the need that the product shall satisfy in the form of user-related functions and constraints

Note 1 to entry: Sometimes FNA is referred to as 'External Function Analysis' or ‘Customer Function Analysis’.

3.11
Technical Function Analysis
TFA
part of function analysis which contributes to studying and formalising the product architecture by identifying the product-related functions of the sub-assemblies or components

Note 1 to entry: Sometimes TFA is referred to as ‘Internal Function Analysis'.

3.12
Functional Need Expression
FNE
result of a Functional Need Analysis and the reference in obtaining a product

Note 1 to entry: The Functional Need Expression is used as a basis to draw up the main part of the FPS, if formalised.

Note 2 to entry: Obtaining a product may consist for example in the acquisition, in exploratory studies, or in a development followed by a supply.

3.13
User Related Function
URF
effect expected of a product, or performed by it, in order to meet a part of the need of a definite user

Note 1 to entry: The users and the market are only interested in user related functions.

Note 2 to entry: Customer needs and specifications may be expressed as a set of user related functions.

Note 3 to entry: User related functions are either use or esteem functions.

3.14
product related function
PRF
effect of a constituent of a product or the effect between the constituents of the product for the purpose of performing user related functions

Note 1 to entry: When choosing an overall solution, the designer or organiser determines the product related functions sometimes called internal functions.

Note 2 to entry: The product related functions of a complete product or system can be the user related functions of a constituent element used into the composition of this product.

Note 3 to entry: The product related functions can be related to the available technology.

3.15
Function Structure
arrangement of functions resulting from Function Analysis, which can be presented in the forms of a tree, or of a diagram, giving a complete, visual, written presentation

Note 1 to entry: When product related functions are considered, the function structure shows the way in which the functions interact.

3.16
Functional Performance Specification
FPS
document in which the enquirer expresses his needs (or those which he is instructed to express) in terms of user related functions and constraints

Note 1 to entry: For each of these functions, evaluation criteria are defined together with their performance levels. A certain degree of flexibility is assigned to each one.

Note 2 to entry: In its role as need definition manager, the inquirer is also called ‘owner or project manager' or 'procuring authority' or “contracting authority”.

3.17
granulation
measure of fineness, detail level (zoom, magnifying glass, etc.), richness of the elementary information chosen to make an FNE

Note 1 to entry: Granulation needs to be chosen carefully: a too coarse granulation gives a simplistic description with no added value. On the one hand, a too fine granulation may implicitly impose solution groups, restricting the solution search field; on the other hand it may require hardly justifiable heavy work.

Note 2 to entry: In theory, proposed by the action manager to reach the expected results; it will be validated by the decision-makers.

Note 3 to entry: The project maturity and progress stage are essential elements upon which the chosen FNE granulation level depends.

3.18
life cycle
evolution undergone by a product studied in the course of time, from its conceptualisation to its withdrawal

Note 1 to entry: 'Withdrawal' needs to be understood as the final elimination of the product beyond its withdrawal from service.

[SOURCE: ISO/IEC 15288:2002, modified]

3.19
life situation
product usage condition (for transport, handling, storage, maintenance, various missions, etc.) with the respective occurrences and duration

[SOURCE: NF X 50-144-1:2000, modified]

3.20
interactive agent
element of the product environment interacting with the product during its life cycle (systemic point of view)

Note 1 to entry: Two interactive agent types can be distinguished. Human interactive agents: individual: called Interested party, and tangible and intangible interactive agents: called environmental interactive agents.

Note 2 to entry: The interested parties are the people or groups of people involved or affected by a product from the time when it exists, which includes the:

— stakeholders, which include the customers, users of this product and organisations contributing to its distribution, maintenance in working order until the withdrawal from service and possible dismantling of the product;

— impacted parties which includes those in relationship with it without using it or supporting it.

Note 3 to entry: Some interactive agents are stable. Others are flexible and will take part in the adjustment between the Need (from the initial Need to the selected Need) and the ability of the Product to deliver.

Note 4 to entry: The tracking of evolution for an interactive agent contributes to the traceability of requirements.

3.21
evaluation criterion
characteristic used to evaluate the performance expected from, or provided by the VA subject

Note 1 to entry: Evaluation criteria can be specified for one or more functions or for the whole product.

Note 2 to entry: Several evaluation criteria are generally necessary to precisely specify a function.

3.22
level of an evaluation criterion
position on the scale of measurement or estimation for a function evaluation criterion

Note 1 to entry: This level can be the one sought as a goal set in the functional performance specification for instance. Alternatively, it can be the level reached by a proposed technical solution which is used to formulate a judgement of the solution.

3.23
flexibility of a level
set of indications given by the enquirer regarding the possibility of adjusting the level sought for an evaluation criterion

Note 1 to entry: This flexibility can be expressed in:

— a qualitative way ("classes" of flexibility);

— a quantitative way (in particular in terms of cost-benefit).

3.24
class of flexibility
indication allocated to the level of an evaluation criterion to clarify the degree according to which it is imperative or negotiable

Note 1 to entry: For example, define four classes of flexibility:

— no flexibility (F0): imperative level;

— low flexibility (F1): little negotiable level;

— moderate flexibility (F2): negotiable level;

— large flexibility (F3): optional level.

Note 2 to entry: The qualitative aspect of such an indication allows an easier expression of the levels of the evaluation criteria and is often adopted by the enquirer.

3.25
limit of acceptance
level of a criterion of acceptance below which, or above which according to the case, the need is considered unsatisfied

Note 1 to entry: Any solution not respecting a limit of acceptance of a user related function is unacceptable. Therefore, the enquirer needs to be extremely aware of the consequences of the choice of the limits.

Note 2 to entry: A limit of acceptance can also be defined by a deviation, absolute or relative, positive or negative, with regard to the requested level of the evaluation criterion.

Note 3 to entry: In certain sectors, the choice of the limits of acceptance can be expressed by means of standard classes.

3.26
trade off rate or “exchange rate”
ratio declared acceptable by the enquirer between the variation of the price (or cost) and the corresponding variation of the level of a function evaluation criterion, or ratio between the levels variations of two or more function evaluation criteria

Note 1 to entry: In the case of a Function Performance Specification, the reference point of the variations is defined by the objectives of costs and levels of evaluation criteria; these variations are the deviations.

Note 2 to entry: It is acceptable to express the deviations in relative value.

Note 3 to entry: The specified trade off ratio relationships can result from calculations of optimisation, from enquiries with users, with desires of incentive, or other consideration of the enquirer.

4 Requirements applicable to the deliverable “Functional Need Expression”

4.1 General

This section draws up the list of requirements that shall be satisfied by any Functional Need Expression (FNE) resulting from a functional need analysis.

This section draws up the list of requirements that any Functional Need Expression (FNE) resulting from a functional need analysis shall satisfy.

These requirements are distributed in the four following themes which structure the FNE result.

a) Global need definition (see 4.3)

This theme groups all the requirements relating to the synthetic need expression, to the presentation of the expected product competitive advantage, to the definition of the system in the broad sense of the term into which this product will be integrated and the stability and possible level of questioning of this environment. The targeted objective of the global need definition is to have elements used to quickly assess the relevance of the request and of the suitability for the provider to make an offer.

b) Reminder of the strategic elements of the target market and of the product outlet (see 4.4)

In addition to the preceding theme, this theme groups all the requirements, making it possible to position the future offer in economical, timely, competitive and strategic terms. The targeted purpose of these requirements is to place at the disposal of the decision-maker the economical elements both external (targeted market) and internal (desired return on investment, consistency with the organisation strategy) to be used to decide whether to undertake or not to undertake the project.

c) Highlighting of the principles and solution concepts already selected, if any exist (see 4.5)

The main objective of these requirements is to clarify the responsibilities of the Customer and Providers with regard to the chosen solutions to meet the specific problem.

d) Definition of the functions to be provided and of the constraints to be complied with (see 4.6)

The set of requirements defined in this section makes it possible to establish a rigorous functional expression consistent with the project objectives (inquirer) and in accordance with the usage that will be made of it by the project partners (inquirer and designer).

Each requirement is presented as follows:

— requirement title expressing the purpose and its number in brackets;

— the requirement to be complied with (shall +verb);

— notes used to detail the requirements (should + verb);

— purpose that bears out the interest of the requirement by formalising the aimed objective.

At the end of the document, a detailed summary will be presented, in an informative annex, listing all the requirements with their numbering.

4.2 Adaptation of the requirements to the FNE usage context

The compliance with all the requirements applicable to the FNE contents shall be adapted to the expected usage context.

Purpose: to adapt the efforts and results to the usage expected for the FNE.

4.3 Global Need Definition

4.3.1 (FNE.01) Global need formulation

The FNE shall give a synthetic presentation of the Need that the product shall meet to satisfy the targeted Market.

NOTE The synthetic need expression describes the bull's eye of the problem to be handled (definition of What).

In the case of a future product to be proposed to the market, the FNE should highlight the competitive advantage expected on the targeted Market. The synthetic expression of the Need describes the centre point of the target (definition of the What).

Purpose: to give the recipients a global vision of the system to be studied, developed, provided, acquired in order to apprehend the project in its entirety through merely reading the FNE.

4.3.2 (FNE.02) Product integration into a 'larger' system

The FNE shall position the product with regards to the upper level system and specify its stability.

For some products known to be autonomous, this requirement does not apply. However, for products belonging to a larger system, the interfacing level with higher or adjacent systems should be precisely specified in the FPS. For this purpose, the interfacing level with higher or adjacent systems should be precisely specified in the FPS.

NOTE The upper level is defined here as being for instance the system, the family or the range into which the searched product will be integrated.

Due attention should be given to the risk, potential risk of disappearance (obsolescence) or change of needs, related for example, to the emergence of a more efficient operating principle of the system.

All the consequences of a technical, economical, regulatory, strategic, political, etc. nature related to the possible environment should be assessed.

The upper level assembly should be specified. This is particularly important when a new product, which shall fit into an existing system, is being developed. If the designer intends to use this possibility later he should inform the owner or project manager.

Purpose: to specify the general context in which the product is made use of: indicate whether it is part of a larger project for which the product would only be a sub-system of a higher level.

4.4 Definition of the strategic elements of the target market and product outlet (Customer side)

4.4.1 (FNE.03) Definition of the economic stakes

The FNE shall give the elements enabling the assessment of the profitability bases, the impact on the market and on the environment.

It should be possible for the Customer — Inquirer, as well as for the Provider, to enable an assessment of the economic stakes, their financing, the investments, and the project's profitability.

NOTE The FNE positions the ‘Time to Market’ of the product imposed by the Market, the competing Offer or the strategy of the organisation.

Purpose: to give a realistic idea of the stakes and confirm the interest of launching the project to the partners involved.

4.4.2 (FNE.04) List of the inquirer's strategic data

The FNE shall list all of the inquirer's strategic data which may affect the envisaged offer.

The data of a strategic nature may be of a technical nature (will to innovate in a field, usage of tried and tested solutions in other fields), external economic nature (staying on a market, positioning on a new market), internal economic nature (cost reduction), and/or of a nature that concerns the environment and the society, etc.

Purpose: to take account of the strategic directions of the organisation in the offer and ensure their reciprocal consistency.

4.4.3 (FNE.05) Fields of processed needs

The FNE shall state, in a functional form, the fields of potential covered and targeted needs which characterise the entire market, consistent with the objectives (and/or the strategy) of the organisation.

NOTE A potential need corresponds to all expectations (identified, not identified or implied); a covered need is more or less satisfied by an existing offer and the targeted need is that selected by the inquirer.

For each need field, the deliverable should:

— present the perimeter or domain of the field under consideration;

— describe the services expected by the various parts of this field;

— detail the final objectives pursued by each party (justify the services).

For each need field, the FNE should describe its coverage rate and how the need field is covered on a functional, technical, integration and innovation level in terms of the solution, and also in terms of target cost.

In an exploratory or prospective type situation, and more particularly when applications to a technological advance for example are to be found, these need fields should be explored during the study. These fields can be quite new for the activity sector under consideration.

Purpose: to be able to position the product to be developed in all the need fields to be satisfied.

4.4.4 (FNE.06) study of each targeted functional coverage

The FNE shall identify and describe, in functional and economical terms, the advantages, disadvantages, opportunities and risks of each targeted functional coverage with regard to the strategy of the organisation and of its external environment.

The FNE should determine and validate the deviations between the potential and covered needs on the one hand, and the covered and targeted needs, on the other hand.

This study should also be conducted with regard to the internal environment of the organisation (strategy, availability of resources, know-how, etc.).

Purpose: to determine the necessary elements to choose the possible solution or solutions.

4.5 Highlighting of Principles/Concepts Selected Beforehand

4.5.1 (FNE.07) Statement of principles or concepts selected beforehand

The FNE shall unequivocally clarify the principles or concepts selected beforehand, if any.

The principles and concepts already selected, if any, should under all circumstances be specified and justified. They implicitly direct the choice towards a category of solutions provider and thus limit the global field of investigation or search for solutions. The inquirer should only present choices of principles which are judicious and will last within the time considered.

NOTE These imposed principles or concepts are clearly explained and avoid the providers proposing solutions outside the main strategic lines of the owner or project manager. The statement of these imposed principles or concepts makes it possible for the providers to target their efforts and focus the resources only on solutions that the owner or project manager can accept in theory.

The Customer should be aware that, when it imposes a principle or a concept, the Provider tends more towards an obligation regarding the means than an obligation to achieve a result. That attitude may constrain innovation and thus reduce the richness of the solution.

The inquirer should formalise the consequences of his/her choices.

Purpose: to clarify the responsibilities of the Customer and of the Providers with regard to the chosen response to the problem that was raised.

4.6 Description of the functions to be provided and their compliance with the constraints

4.6.1 Depth, fineness of analysis (granulation) and field to be covered

4.6.1.1 (FNE.08) Identification of the fineness (granulation) of the Need description

The FNE level of detail (granulation) shall be adapted to the project progress level, to the expected results and to the usage which will be made of it.

The FNE should only contain 'what is necessary' to conduct the studies at the required level or to make it possible for the decision-maker to decide to continue or not with development. As an illustration, in the project's upstream phases (opportunity studies or feasibility studies for example), there is no search for the completeness of the functions list or that of the assessment criteria, but essentially for the list of functions and assessment criteria which have a significant impact on the technical, financial, calendar, feasibility, etc.

It is appropriate that the function tree structure be developed up to the level used to identify solution channels or possible concepts. It is to be noted that an overly detailed tree structure is not essential for this type of study and can be detrimental to the clarity of the file contents.

It is recommended that the structure of the FNE and its 'supporting' elements for the description of the surrounding environment, of the listing and the characterisation of the functions and constraints, be consistent with each other.

Purpose: to have an FNE that the Designer can make use of, while limiting the consumption of resources, to make it possible for the owner or project manager to make a decision on the advancement of the project.

4.6.2 Life cycle and interacting agents

4.6.2.1 (FNE.09) Selection and description of life cycle phases

The FNE shall determine and describe the life cycle phases of the product relevant for the study.

The complete list of the life cycle phases should be drawn up first; then, those for which the decision is made to take them into account should be selected and justified.

For each phase of the life cycle, the beginning and end events, the environment and the main characteristics of usage, etc. should be specified.

Purpose: to contribute to the completeness of the list of relevant functions and constraints drawn up in accordance with the expected fineness of analysis.

4.6.2.2 (FNE.10) List and description of interacting agents

The FNE shall present and describe all the interacting agents for the chosen life cycle phases.

The fineness of the description should be adapted to what is necessary in order to obtain the FNE at the required definition level.

The characteristics of the interacting agents that may change over time (during the development, usage, etc.) should be identified and the probability of the occurrence of change should be estimated.

In order to give the reader a better appreciation, the list should be organised according to the following classification: the stakeholders that are customers, users and support teams, parties that are affected, material and immaterial or intangible elements. A distinction should also be made between human interacting agents and non-human factors taking the characteristics of each of them into account (behaviour for example).

The list of interacting agents should be updated concerning the envisaged concepts, then the selected concepts/solutions.

Purpose: to ensure the completeness of the FNE base.

4.6.3 Description of the functions and the constraints

4.6.3.1 (FNE.11) List of user-related functions

The FNE shall list all the user-related functions related to the interacting agents for the selected life cycle phases.

The user-related functions should be described in the form of a short sentence: active verb and object(s).

A distinction should be made between the functions desired by the stakeholders (customers, users) and those expected by the interested parties (support and impacted parties) giving a response in accordance with their expectations.

The functions brought about by a chosen solution concept should be identified and traced.

The user-related functions should be justified or validated.

Purpose: to ensure the completeness of the FNE analysis in accordance with the given mandate.

4.6.3.2 (FNE.12) Technical neutrality of user-related functions

The formulation of the user-related functions shall be neutral from a technical point of view and will not lead to any particular solution direction.

It should be ensured that the transition between two successive functional levels of a function tree does not imply any non-identified solution concept inducing a shift from the Functional Need Analysis towards the technical Function Analysis of the product.

Purpose: to avoid implicitly imposing a technical solution.

4.6.3.3 (FNE.13) Organisation of functions

The FNE shall present all the functions identified in an organised manner which can be understood by a third party.

The functions should be ordered in consistent functional groups (by themes, interacting agents, positions in the life cycle, etc.) and according to a family logic.

During the arranging, shortfalls (a lack, a redundancy, etc.) in the function identification may appear. The list should then be updated.

Purpose: to give a concise and legible presentation of all the user-related functions which make up the FNE.

4.6.3.4 (FNE.14) Function characterisation

All the identified functions shall be characterised in the FNE by using the selected attributes and at least in the form of assessment criteria, levels and flexibilities.

The selection and the description of the assessment criteria should be adapted to the usage that will be made of the FNE. As an example, in the exploratory phase, only the assessment criteria having an impact on the technical, financial, calendar, safety aspects etc. will be selected.

NOTE The glossary (Clause 3) defines terms used to express the flexibility and the exchange rates.

The assessment levels translating the desired performance should be expressed in measurable, assessable, absolute or relative terms. In some cases, and more particularly in the exploratory phase, only an interval or a rough level assessment can be specified due to the maturity level of the studied field.

For preliminary risk studies, it is recommended to search, as early as the characterisation, for potential failure modes, and risk (of damage) to the environment. An evaluation in terms of severity should be conducted.

Purpose: to obtain a clear definition of the functions in accordance with the desired fineness of the analysis.

4.6.3.5 (FNE.15) Function ranking/weighting

The FNE shall define the importance level of the functions.

The level of importance should be expressed with a simple classification (in the form of ranking) of the functions or with a classification highlighting their relative interest (in the form of weighting).

It may be useful to make a distinction in the function classification between the unavoidable functions which justify the existence of the product and the functions which make the difference with other products of the same type and entices purchasing, ownership, etc.

In some cases, various classifications should be made according to different points of view (e.g. usage, purchase, maintenance, etc.).

Purpose: to identify and highlight important functions for the owner or project manager on which the design effort shall bear.

4.6.3.6 (FNE.16) Identification of mandatory and possible additional characterisation elements

In addition to the systematic characterisation elements (assessment criteria, their associated levels and flexibilities), the FNE shall draw up the list of the other elements chosen to characterise the functions on the one part, and constraints on the other.

In addition to the mandatory elements, additional characterisation elements should be selected among the following indicative and open list to specify precisely the targeted objective:

— method for level determination (calculation result, derived from model, prototype, observation, etc.);

— entity or person having made the level proposal;

— entity or person responsible for the set level (contact point for any modification);

— level validation/justification;

— need satisfaction level degradation 'curve' according to the level degradation;

— stability of the level or more generally of the characterisation over time;

— criterion importance level (what makes the difference);

— importance level of the interacting agent (or external actor);

— degree of possible global evolution of the function — stability and interest in time —;

— function and characterisation families;

— date of characterisation.

Purpose: to have a FNE suited to the expected usage.

4.6.3.7 (FNE.17) Possible functional variations

The FNE shall specify the adjustment possibilities, if any, for the need covered by the proposed solution.

The functions that may be impacted should be identified. A justification can also be developed.

The variants may be suggested by the inquirer or proposed by the provider.

Purpose: to make it possible to accept products partly satisfying the expected functions and envisage products which offer services which were not imagined in the initial functional need expression.

4.6.3.8 (FNE.18) Organised list and constraints description

The FNE shall, in a specific part, list, specify and describe all the constraints that are to be taken into account. Constraints brought about by official rules and inquirer requirements should be distinguished.

NOTE The systematic analysis of the life cycle phases and of the interacting agents contributes to ensure the completeness of the list.

The constraints should be grouped and easily identifiable. The constraints brought about by a chosen solution concept should be identified and traced.

Purpose: to develop a product in compliance with all the applicable requirements.

5 Requirements applicable to the deliverable “Functional Performance Specification”

5.1 General

This section determines the list of requirements that a Functional Performance Specification shall satisfy. These requirements are distributed according to two themes:

— sections contained in the FPS;

— characteristics defining the quality of an FPS.

According to the nature of the 'product' which is the subject of the FPS, and of the project development, it may be useful to complete the minimum contents of the FPS with additional sections which enable the recipients (providers) to clearly comprehend the purpose of the FPS. This is the reason for the requirement dedicated to the additional contents of the FPS.

5.2 FPS contents

5.2.1 (FPS.01) Mandatory sections of an FPS

An FPS shall contain at least the following sections taken from the FNE:

— presentation of the project, usage context of the FPS, etc;

— description of the "product" (subject of the FPS) and its field of use;

— presentation of the interested parties;

— description of the associated life cycle phases;

— description of the interacting agents;

— presentation of the principles/concepts already selected;

— list of functions, characterised at least in the form of assessment criteria, levels and flexibilities;

— list of applicable constraints;

completed with:

— section setting a response frame to the providers;

— glossary specifying the terminology used.

Presentation of the project, of the usage context of the FPS. The providers should be given all the information considered useful on the general project background. This information may relate to:

— the project situation (context) in a broader programme;

— the limits of the study;

— the studies already carried out;

— the studies conducted independently on similar topics if they may be disclosed;

— the planned studies which may follow;

— the parties concerned with the project progress and its results (product manager at the inquirer's site, departments or people who will be the actual product users);

— the interest level for new original and non-traditional solutions;

— the confidentiality if necessary.

Product and its field of usage. For an easier, quick and clear knowledge of the request which is submitted to the providers, the FPS should:

— present the definition of the global need;

— outline the general concept of the 'product', the main expected services for which it shall be designed (need formulation synthesis) and its integration level (equipment facilities, assemblies, sub-assemblies, components, etc.);

— give the necessary information to motivate the future partner (expected outlets, commercial life expectancy, existing situation on the market for equivalent products, etc.).

NOTE Response frame. For easier examination, appraisal of the proposals and their comparison, the FPS proposes a response frame to the providers in which they can indicate all the necessary details. This response frame is adjoined to the FPS and only deals with the aspects directly related to the product. The functional presentation used by the inquirer to describe the needs is proposed to the provider to present its proposal. The descriptive and explanatory response frame for the proposed solutions therefore has at least one evaluation grid in which the provider indicates the projected performance of its proposal. If the inquirer intends to determine a cost of ownership, it is advised to specify it.

Purpose: To propose to the writer of an FPS, a minimum framework to make it easier for the providers to understand.

5.2.2 (FPS.02) Other sections of an FPS

In addition to the minimum contents, the FPS shall contain if appropriate:

— additional characterisation elements present in the FNE;

— a presentation of the relative importance of the functions (ranking/weighting);

— call for variance section;

— economic data.

Additional elements present in the FNE. The inquirer should select in the FNE the optional elements he wishes to transmit to the future providers through the FPS.

Call for functional variants. If necessary, each of the providers or approached providers may also be requested to make one or several other proposals (variant) corresponding to its own perception of the need beyond a proposal satisfying the functional expression. The alternatives may be either functional if they introduce or delete functions or 'performance-related' if they propose a criterion level external to the flexibility space. In this case, the provider is prompted to clearly indicate the amendments it proposes to the functional expression. This opportunity stimulates the innovation and may be used to explore more ambitious solution directions. The richness of this approach, promoting a creative dialogue between the inquirer and the provider, is an important contribution from the FPS in order to obtain a competitive 'product'.

Variants with a given orientation. This call for variance may be directed if the inquirer, without being in a position to express precise wishes, wants special attention to be given to one or two functional fields that it will indicate.

Economical data. If necessary, the development, production costs, the expected return on investment, the targeted life cycle ownership cost, etc. should be specified in this section.

In the case of usage in a ‘Design To Objective' (DTO) approach, data, other than economic ones, may be used to determine the designated objective.

Purpose: to provide any information (economical, functional, technical, etc.) regarded as useful to the recipient of the FPS for its action.

5.2.3 (FPS.03) Structure adaptation to the defined usage of the FPS

The structure and the level of detail used to draft the document shall be adapted to its case of use.

The structure of the FPS should be adapted to the type of product being studied, to the project progress (project in the exploratory, structuring or optimisation phase), and therefore to the use that the inquirer wants to make of this FPS.

This fineness may be different (higher level) than that selected for the FNE.

Purpose: to give the provider a document consistent with the project progress level.

5.3 Characteristics defining the quality of an FPS

5.3.1 (FPS.04) Compliance with the processes

The processes implemented shall comply with the requirements.

The process owner should validate the compliance of the processes implemented to draw up the FPS with the requirements.

In order to validate the FPS, a grid should be used to assess the quality of the document and the compliance with the working out process.

Purpose: to ensure the quality of the FPS through compliance with the drawing up processes.

5.3.2 (FPS.05) Legibility and understanding by the recipient

The FPS shall be legible in its entirety and it shall be possible for the recipient to understand the entirety of its contents.

The availability and compliance of terms used with a specific project glossary should be checked.

The same specific term should always have the same meaning in the entire document.

Positive formulations, action verbs describing the expected action should be used to avoid any ambiguity.

Purpose: to make it easier for the recipient to adopt the FPS and its subject.

5.3.3 (FPS.06) Capacity to support the usage phase

The FPS shall be structured and written to facilitate the drawing up of successive versions accompanying the development of the need derived from the inquirer/provider dialogue.

It should be possible for the users of the FPS to clearly visualise the areas of the FPS for which the requirements have been developed.

It should be ensured that the confidentiality of the solutions from which the FPS evolution originate is preserved (preservation of the providers' know-how; formulation neutrality with regards to the envisaged technique).

Purpose: to give the FPS the capacity to support the maturing of the need during the study phase.

6 Requirements applicable to the three processes (the FNA process, the process for the drawing up of the FPS, FPS utilisation process)

6.1 General

This section determines the form of the requirements for:

— the conditions for a successful Functional Need Analysis (FNA) action which produces a deliverable called Functional Need Expression (FNE);

— the conditions for a successful (FPS) drawing up action from the available functional need expression (FNE);

— the conditions for usage of the FPS by the inquirer and the various partners involved (providers for example), the activities used to generate the reference FPS (last agreed FPS) which will be used for the development of the product.

During these various activities, it may be pertinent to record, in addition to the mentioned files, important information, the decision bases, or any other information which, according to the project managers, shall be kept.

The following processes are selected:

— functional Need Analysis process producing the Functional Need Expression;

— process for the drawing up of the functional performance specification (FPS);

— process to make use of the functional performance specification.

6.2 Common requirements applicable to the three processes

6.2.1 (PROC.01) Framing of the subject of the action

The framing of the object shall include at least the definition of the global need to be satisfied, the scope of the study, and the possible identification of upper level systems or adjacent systems.

It should be ensured that the precision of this framing is consistent with the inquirer's project maturity and with the available information.

NOTE The scope of the purpose of the FNA is at least predetermined, and the scope data is refined as the work progresses.

The life cycle phases necessary for decision-making should be identified.

Purpose: to transmit a clear identification of the subject to be prepared to the action managers.

6.2.2 (PROC.02) Supported decision for starting an action

The decision to start an action shall specify the expected usage of the FNE and of the possible FPS to be produced and assess the correlated resources (load and times) to obtain and make use of them with regard to economic issues.

In cases where the action is started following the receipt of a customer product specifying document, written in a more or less functional form, the FNA should be used to enrich the information and result in an FNE.

Purpose: to validate the implementation of the FPS process and to specify precisely how it can be used.

6.2.3 (PROC.03) Mandate of the person in charge of the action

This person shall have a mandate of the empowered authority defining the objectives to be reached and allocating the necessary resources to it, while specifying the reporting and validation conditions.

It should be possible for the person in charge of the action to have access to an identified appeal level to handle any possible conflicts. The empowered authority is most often the appeal body.

Purpose: to make it possible for the partners involved to know the objectives to be reached and the contents of the corresponding mandate.

6.2.4 (PROC.04) Mobilisation of resources and implementation of an operational structure

The person in charge of the action shall have the authority to mobilise the resources, in particular in terms of internal competences with regard to the topic.

An individual with the methodological and leading competences that can conduct the action should be appointed. This person may be internal or external to the organisation.

The deviations between the desirable and available competences should be identified and minimised; and if this is necessary, a 'project' risk analysis should be carried out to assess the possibility of obtaining partial results due, for example, to the lack of particular resources.

The operating rules of the work structure formed by the mobilised human resources should be defined. This consists in defining the group operation type (programmed meetings, workshops, detailed analysis, etc.), the number and frequency of meetings, etc.

Purpose: to identify, from the beginning of the FNA, the competences and the knowledge of the subject to make an FNE which is complete, solid and stable.

6.2.5 (PROC.05) Search for information and consolidation

The person in charge of the action shall collect all the information that the subject control requires.

This information should be well structured for ease of operation.

Purpose: to have the required documentary base to conduct the action.

6.2.6 (PROC.06) Handling of possible conflicts or contradictions

The person in charge of the action shall collect the data required and prepare the arbitrations to be made in case of conflicts or contradictory expectations.

Purpose: to prompt the person in charge of the action to identify possible conflicts and anticipate their handling.

6.2.7 (PROC.07) Traceability of the action

The person in charge of the action shall ensure the traceability of all the expressed requests and of the choices made during the action.

NOTE 1 This traceability consists, for example, of highlighting the links between the interactive agents, which are bases for performance determination, and the levels and flexibilities defined to characterise each of the functions.

NOTE 2 The systematic follow-up of the evolutions for the various interacting agents contributes to the consistency and completeness of the updating of the specification.

Purpose: to be capable of ensuring the follow-up of evolutions.

6.3 Particular requirements applicable to the FNE generation process: Functional Need Analysis

6.3.1 (PROC.08) Adaptation of the resources to the need to be described

The person in charge of the action will make sure that the available resources actually cover the knowledge fields required when formalising the need.

NOTE The resources generally constitute a multi-disciplinary team guaranteeing the objectivity and the exhaustiveness of the described need.

Purpose: to ensure the representativeness of the contributors to the need description.

6.3.2 (PROC.09) FNE validation

The person in charge of the action shall have the produced FNE validated, shall verify that it corresponds to the expected usage, in order to obtain authorisation to make use of it from the decision maker.

Purpose: to verify the operative character of the produced FNE.

6.4 Particular requirements applicable to the drawing up process of the functional performance specification

6.4.1 General

In comparison with the FNE, which is all the information obtained by the work group at the end of the FNA, the FPS is characterised by the fact that it is designed for a third party or third parties which have not taken part in the FNE.

Therefore, the FPS drawing up activities mainly consist in:

— making a distinction between the information that can be transmitted to the recipient and that which shall remain internal in the FNE;

— making a synthesis and structuring work to facilitate document reading;

— adapting the terminology and the explanation level to the targeted recipients;

— completing the various sections of the FPS from the information gathered, and with data specific to the context of usage of the FPS.

6.4.2 (PROC.10) FPS integration into the process used to obtain a product

The inquirer shall determine the interest to integrate the FPS, intended for a third party, into the process used to obtain a product.

The expected FPS usage mode should be specified precisely. It should be possible to either use the typical cases proposed in Annex A, or internally inside an organisational structure.

The methods used for preparing and then for making use of the FPS should be defined and available for use.

In the project development schedule, the times that are essential and required for the writing and usage of the FPS should be planned. It shall be noted that the call for tender procedures may take place over several months.

Depending on the project nature, these approaches should comply with possible regulations (national, European or other).

NOTE The interest to integrate the FPS tool into the process used for obtaining a product is often determined before starting the functional need analysis.

Purpose: to make sure that the drawing up, then usage of the FPS, are consistent with the product's acquisition procedure.

6.4.3 (PROC.11) Selection of the FNE elements to be integrated into the FPS

The person in charge of the action shall define the FNE elements to be integrated into the FPS.

It should be checked that the selected elements given to the designer constitute all of the necessary information.

The person in charge should collect the data which will be used to appraise the responses and suggestions of the providers as soon as the FPS is drawn up, in order to maintain the vitality of the project and to anticipate the preparation of the responses to the most probable suggestions to come from the partners.

Purpose: to clearly specify the part of the need expression to be integrated into the FPS.

6.4.4 (PROC.12) Transmissibility to a third party

The enquirer shall ensure that the draft FPS can be transmitted to a third party in a legible and understandable way.

In the FNE, the information that can be imparted to the recipient and the information that needs to remain internal should be distinguished.

The provider should completely and unambiguously comprehend the need to be satisfied so that he/she can make a suitable proposal. If need be, the enquirer incorporates into the FPS all the reading aids, with the terminology and the synthesis level suitable for the considered recipients.

Purpose: to make the FPS a real dialogue tool.

6.4.5 (PROC.13) FPS validation

The FPS shall be verified then approved by the empowered authority prior to dissemination.

The person in charge should check that the produced document actually covers the defined field and satisfies the requirements of the mandate.

Purpose: to have an FPS that can be disseminated and used.

6.5 Particular requirements applicable to the process implemented to make use of the functional performance specification

6.5.1 General

The functional performance specification may be used to search for and select providers or partners within the framework of a project for the development of products, equipment or services. When a call for tender is made, the functional performance specification is included in a consultation folder. The FPS provides a framework for the assessment of technical proposals from providers.

The tasks related to making use of the FPS consist of searching for and selecting potential providers, preparing the grids used to grade the responses, answering the questions of the approached providers by searching for the requested information if this is necessary, going through and analysing the proposals and making a selection. At the end of the FPS usage phase, the inquirer generally awards a supply or procurement contract.

The following additional requirements concern the conditions in which the FPS is used by the inquirer and the various partners involved (providers for example).

The process ends with the stabilised version of the FPS called reference FPS, which is used as a basis to finalise the obtaining process of the product.

6.5.2 (PROC.14) Search for and selection of potential providers

The inquirer shall search for and select candidates capable of giving proposals, qualified in the competence fields likely to satisfy the identified need.

Identifying the competences before searching for providers is recommended. This search should be made without too many preconceived ideas with behaviour analogous to a creativity approach.

The consultation documents should propose rules for the exchange of information with the providers ensuring that the know-how is preserved. The signature of confidentiality agreements, or even development partnerships, happens frequently in order to preserve the know-how of the partners involved.

NOTE The FPS makes it possible to widen the range of solutions and providers, or potential partners, thus promoting innovation.

Purpose: to make sure that the FPS will find at least one interested recipient likely to respond.

6.5.3 (PROC.15) FPS appropriation by a provider

Each consulted provider shall:

— analyse the FPS and the other documents of the consultation and assure the enquirer that the provider has understood the need well and the various associated constraints (environment, regulations, etc.);

— after analysing the expressed need, prompt the inquirer to give the possible additional information that the good expression of the need requires (consistency, compatibility, completeness, etc.);

— inform the inquirer of the functional fields in which compromises are necessary.

Purpose: the enquirer shall be assured that the provider has understood the need expression well and that there is no information missing for the work to be done.

6.5.4 (PROC.16) Drawing up of the final version of the FPS

The inquirer shall define the final agreed stabilised version of the FPS (reference FPS), after the production of possible intermediate versions:

— for the enquiry in progress;

— or on which the continuation of the development process or the process used for obtaining the product will be based.

NOTE The successive changes of the FPS are supported by an approach making it possible to trace the requirements.

Purpose: to have a stabilised version for the enquiry.

6.5.5 (PROC.17) Suggestion processing recording

The inquirer shall store the basis of the decisions made concerning the providers' suggestions that are within the framework of the flexibility or the FPS 'call for variance'.

Purpose: to define a solid basis for traceability.

6.5.6 (PROC.18) Intellectual property, rights of the partners

The enquirer shall strictly ensure that the know-how and the industrial and intellectual property rights of the providers are preserved. The enquirer shall also ensure that they receive the same information on the same date.

The owner or project manager should ensure that the confidentiality of the solutions from which the FPS developments originate is preserved.

Proposing and implementing rules for the sharing of the industrial and intellectual property is recommended.

Purpose: to establish a climate of confidence between the partners with explicit negotiation rules.

6.5.7 (PROC.19) Arbitration processing

The inquirer shall process the arbitrations to be made between the options of potential providers and the impact on the satisfied need. These arbitrations are based on exchange rates.

It is recommended that the action managers anticipate, in the preparation of the responses, the most probable suggestions to come from the partners.

Purpose: to maintain the dynamics of the inquirer/providers exchanges.

6.5.8 (PROC.20) Examination of proposals

Within the framework of an enquiry to providers, the various proposals shall be examined by using as a base the consultation documents including the final version FPS.

Making an examination plan before receiving the proposals is recommended. This plan is the result of team work (Customer, Technical, Purchasing, management, financial and quality departments).

Purpose: to ensure, through the usage of a single reference, that the examination is unbiased.

Annex A
(informative)

The variety of situations where FNE and FPS can be used

A.1 General

The widespread usage of the functional need expression leads to the envisaging of various need expression conditions. In effect, the resulting process, like the documents mainly depends on these conditions (see Annex B).

A.2 Universality

The functional need analysis, functional need expression and possibly functional performance specification concepts may be applied to many activities defined in the following processes:

— define the objectives and set the strategy of the organisation;

— control the organisation;

— implement the 'core' activities of the organisation;

— control the 'business' activities of the organisation;

— implement the 'supporting' activities of the organisation;

— control the 'supporting' activities of the organisation.

These processes, as referred to in 0.6, may be used on any type of product (or service) within the framework of a future contractual relationship as well as internally within an organisation.

A.3 Initial condition of the object under study

Within the framework of a development project, the Function Analysis may be implemented from the preliminary or exploratory product study phases for the definition of the services expected from a system, sub-system, or equipment. Before starting an FNA, it is desirable or even imperative that the nature and richness (fineness for example) of the deliverable be determined, that deliverable having been provided in order to support the decision-making corresponding to the progress milestone.

As a special case, the acquisition of a product available in an accessible proposal (on-the-shelf product) may be decided after formalising the need.

Using the FNA is all the more efficient when it is implemented early in the project.

The product which is the subject of the action may be the constituent of a higher level product.

A.4 Use of the FNA and FNE in a VA approach

The FNA process is systematically implemented in a 'VA' action to create the FNE which will be used as a reference for the solution study process and the comparative analysis.

Within the framework of a VA action, compliance with the requirements relating to the deliverable which is the Functional Need Analysis is specially required (see Clause 4).

Depending on the case, this FNA may:

— constitute the first function analysis of the subject being processed;

— reuse a FNE already made internally (to change and update it);

— start from an external request written in the form of FPS or a functional performance specification.

NOTE 1 Within the framework of a VA action, the issue of an FPS is optional.

In the Value Analysis approach, the global process proposes to deal with the various study backgrounds according to the following types:

— exploration, with a prospective, anticipation or diagnosis will;

— structuring, in an approach contributing to the design of a solution;

— optimisation, which applies to the need — solution pair;

— redesign, to cause improvements of an existing solution.

These situations are mainly differentiated by their positioning and their objectives. The starting point, the triggering event, the input data, the products and the parties are also characteristics likely to distinguish them.

NOTE 2 Within this framework, the framework elements (subject under study, analysis detail level, expected results, etc.) of the FNA and FNE result from the elements that are more globally set for the VA action.

A.5 Use of the FNE and the FPS in the process used to obtain a product

To acquire or obtain a product, the FNE and the resulting FPS can be profitably used in all the exploratory phases where the requirements concerning the product are not yet frozen, typically:

a) for prospective studies, concept investigations, feasibility assessments;

b) for studies preliminary to the development, of concept finalisation, preliminary definition of the product;

c) for the development of a product and its making or the adaptation of a predefined product;

d) for customised 'service provisions' for which the provider's proposal shall give a service solution customised to the expressed needs.

Reminder: the term 'product' is to be used in the broad sense defined by § 0.6, and may designate a process, a service provision, an organisation, etc.

These typologies are completed and developed in Annex B.

The FPS is used in compliance with all procedures to establish competition, whether these are public or private.

If used inside the same organisation (organisation, industrial group, public body, etc.), the FNE, or even the FPS, may be integrated into a development process, in which a department (typically the Marketing department), calls upon another department, typically the design Office, so that it designs and makes it possible to manufacture a product.

A.6 Use of the FPS with Design To Objective

During a design to objective (including the design to cost), the FPS shall be used in an open and negotiable way with a price based on an objective cost or price.

NOTE Design to objective induces a negotiation on the basis of the edition of the FPS in force at each phase of the project.

Purpose: to precisely support a 'design to objective' type project management.

A.7 Relationships with other methods

The contributions of the FNA and FNE will have a positive effect in the following methods and processes:

— marketing;

— dependability;

— project management;

— sustainable development;

— industrial design (Design);

— ergonomics;

— purchases.

Annex B
(informative)

Conditions of use of deliverables

B.1 Background for the drawing up of a FNE

Depending on the case, the Functional Need Analysis action is the first one carried out by the organisation or it follows previous FNAs. During the successive phases of the same project, the FNA work for the next phase consists of updating the FNE already obtained by taking the results of the ending phase into account.

In cases where the FNA is begun following the receipt by the organisation of a customer specification document of a product, written in a more or less functional form, the work consists in drawing up, from this specification, a complete FNE used as a basis for the design work, whether integrated into a value analysis action or not.

In all the cases, maximum usage should be made of the preceding FNE(s) on the same subject or on similar subjects. For this purpose, the organisation may profitably draw up, for a family of products, a generic FNE which will be used as a basis for the FNE of each particular product.

B.2 Variety of FPS (or FNE) usage cases

The FPS may be used in various situations:

— Situation (a): prospective studies (concept investigations, feasibility assessments, service, etc.).

EXAMPLE 1 An exploratory study on the operation of fully automated future motorways.

— Situation (b): preliminary studies (concept finalisation, preliminary definition of the product).

EXAMPLE 2 The preparatory studies of a new motor vehicle, before a decision on its development; preparatory studies of a new industrial process to assess its operation, performance and cost before developing it.

— Situation (c): a development of a product leading to its completion.

EXAMPLE 3 A development of a new motor vehicle; detailed design and implementation of a new industrial process; development of the system logistical support; construction and validation of a new training.

— Situation (d): request for a product suited to the specific need.

EXAMPLE 4 A travelling platform, the elements of which are supposedly the standard, but for which the manufacturer shall adapt the dimensions to fit the geometry of the premises and a certain number of other characteristics to the wishes of the customer; software to be 'customised' for a customer.

— Situation (e): choice among existing products ('on-the-shelf').

EXAMPLE 5 Choice of a motor vehicle, a machining centre, data processing equipment, a catalogue software package, selection of the certification auditing body, of the bolt provider, of a subcontractor for a standardised surface treatment.

The situations (a), (b) and (c) correspond to possible successive steps in a project knowing that, according to the initial uncertainty level, a determined project may:

— be capable of starting straight off from situation (c) if there is little uncertainty or a similar development experience; or

— shall include a preliminary step (b) making it possible to specify the global design of the future product and to anticipate the development time and cost; or

— first require one or several prospective studies (a) to explore the potential, assess the feasibility of concepts, etc.

Considering the exploratory nature of the situation, an FPS for a prospective study (a) is very open and with few details. The FPS for situations (b) and (c) take the results of the preceding step into account when there is a prior step. The FPSs are increasingly more precise and, for the development, the FPS often turns into a contractual technico-functional performance specification with very little or no flexibility any longer.

NOTE This specification is named differently according to the professional sectors; for example, the armament sector and the aerospace sector call it 'Technical Need Specification' (TNS).

In situation (d) (suitable product), it usually makes way for a contractual technico-functional performance specification of the product.

In situation (e), the FPS is used when the enquirer decides to restrict its choice to products existing on the market. This implies that the enquirer admits to adapt its requirement level if this is necessary, by playing on the flexibilities included in the FPS. The choice ends in the selected product order. Most often, the enquirer issues no specification, insofar as he/she accepts the performance ensured by the selected provider.

B.3 Compatibility with the rules applicable to public contracts

The FPS complies with all of the calls for competition procedures, whether these are public or private.

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