FUNCTIONAL SPECIFICATION

The Functional Specification (FS or Functional Requirements Specification) is a formal statement of the functions required to be implemented in a specific physical form or technology for a business proposal[1].

There are several elements common to the design process. The first is conceptual (logical or essential) planning of requirements: sometimes known as conceptual design, but more usefully referred to as Analysis— the detailed conceptual planning that is documented in the Business Requirements Specification. This is significantly different from physical design of the product features, and styling of the product to meet fashion, market, emotional and other drivers. These two elements are the domain of the Functional Specification. Finally, the detailed technical design will specify the construction requirements, documented in the Technical Specification.

Accordingly, the Functional Specification is an intermediate document between the Business Requirements Specification (or BRS, which documents the complete set of business needs, both existing needs and also the changes that are required in the status quo) and the Technical Specification(s) (which documents the implementation-specific details[2]).

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[1] Some other definitions...

- Webopedia at http://www.webopedia.com/calls it "...a formal description of a software system that is used as a blueprint for implementing the program...".
- http://www.whatis.com/ describes it as "...a formal document used to describe in detail for software developers a product's intended capabilities, appearance, and interactions with users...".
- The IEEE Std 830-1998 defines it as "a specification for a particular software product, program, or set of programs that performs certain functions in a specific environment".

2 For a computer application this would include programming language implementation, the datatype of the individual data elements, the RDBMS structure, particular algorithms to be used for processing and all other technical (implementation-specific) aspects). For hardware-based or infrastructure and communications-related projects, other technical details would be specified.

Broadly speaking, the difference between these three documents could be understood as follow:

- The Business Requirements Specification will specify for example, that customers shall be able to provide new personal details for validation and storage;

- The Functional Specification will specify that Customer Details Maintenance shall be selected via a menu item available for the operator;

- The Technical Specification will describe the object classes, the relevant RDBMS tables, data items (possibly with names like "CustomerFirstName") and so on.

The Functional Specification does not stand alone, but must be distributed, understood and managed in the context of the Business Case, the Business Requirements Specification and other project documentation. The Functional Specification does not address project constraints such as resources, budget or schedule: these are addressed in the Business Case and in the Project Plan[3]. It will, however, document relevant technological or design constraints. It is required for design to occur, and thus is preliminary to the system architecture and high-level design of system components which then lay the foundation for detailed technical design[4]. Functional Specification must have occurred for costing, scheduling and implementation planning to proceed.

The Functional Specification describes all *external* user and programming interfaces that the product must support. This raises a further way of thinking about the distinction between the various Specification documents:

- The BRS describes WHAT must be delivered to achieve the objectives of the project

- The FS gives a "black box" description of HOW it is to be delivered.

- The Technical Specification gives a "white box" description of HOW it is to be delivered.

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[3] While many definitions and suggested models include the delivery schedule in the Functional Specification, the IEEE standard (op cit) is very clear that project requirements such as schedule are not included.

[4] Again, many authors and templates include system architecture and high level design in the Functional Specification. However, they are more appropriately placed in a separate document, namely the Technical Specification, and again, the IEEE standard is consistent with this recommendation.

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This implies that there are two key aspects to the Functional Specification.

Firstly, it places a clear automation boundary around the requirements documented in the Business Requirements Specification[5]. Usually, only a subset of the Business Requirements is to be automated. Some requirements will be implemented manually, whilst some may be implemented on new or existing platforms with which the new requirements must interface. Accordingly only those inputs and outputs (Dataflows and corresponding Data Dictionary entries) and the details of the business Processes to be automated are specified. However, these functions must be specified in detail.

Secondly, it describes how the functions will appear to the direct system user or interface. Accordingly, it will include usability features and requirements as well as technical interface considerations, such architectures, protocols, and standards.

Where does it sit in the Project Team?

Clearly, the skills required to develop this document are not those of a tester, a programmer, a technical writer or a business analyst. They will require a good understanding of how people work, communicate, think and undertake tasks. This is required, firstly, to ensure the user interface design skills needed for the user interface specification, and secondly, in order to communicate effectively through the functional specification process. However, they will also require good technical knowledge: firstly, in order to understand and be able to recommend options available to meet these user interface needs from within the platforms; and secondly to address the technical interface needs. Accordingly they will in practice have a foot in both the business camp and the technical camp. They should therefore be independent of both camps: they should not be working in or supervising analysis or technical functions.

What then are the attributes of the writer? Language fluency and communication skills; market empathy and awareness; strong inter-

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[5] The term and definition of "Functional Specification" have come from the computer industry. In principle, however, all technical and manual implementations would benefit from an equivalent document.

personal and negotiation skills; a strong understanding of user interface design principles, skills and knowledge; and a sound understanding of the selected platform(s).

What is in the Functional Specification?

The information presented in the Functional Specification falls into four key areas.

Firstly, identification and control information: this includes the author's name and contact details, version number, date of issue.

Secondly, information to assist the reader to navigate the document. This includes references to other project documents such as the Project Plan, the Business Requirements Specification and the Business Case[6] . As well, it includes a glossary, where all terms, abbreviations, synonyms and aliases are defined. Finally, an Overview of the proposed product may be included. This could be a descriptive chart such as a functional hierarchy showing the relationships between sub-systems and functions. The purpose is to assist readers of the document (reviewers, designers and analysts) to navigate through the Functional Specification easily. It does not presuppose physical design and implementation decisions, and it does not replace any of the detailed specification.

Thirdly, the business requirements to be taken into account when designing the product.

Fourthly, styling considerations to be taken into account after the physical design has been established. The "look-and-feel", the interface metaphor, are addressed here. As well, screen colour (after accessibility considerations), logo and branding will be considered. Finally, the emotional impact to be conveyed to meet the client's needs and desired image must be discussed.

A checklist of the matter covered in the Functional Specification follows:

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6 Do NOT "cut and paste" material out of these documents into the Functional Specification. These grafts will go out of date, and the technical crew will be left with stale information. Instead, reference these other documents so that when required, up-to-date versions can be retrieved.

FUNCTIONAL SPECIFICATION

Functional Specification

- Author's name and contact details.
- Version Control details
- References to other project documents
- An overview of the proposed product
- Features and functions including
  - Screens required for each function
  - Screen layout including placement of screen elements
  - Screen sequence
  - Navigation between screens, and points of access to screens
  - Menu structure
  - Report layout
  - Dialog boxes
  - Error messages
  - Error handling
- The data captured from the user at each screen, including data types, validation rules and constraints; source and destination containers for the data;
- Data processing logic and business rules, algorithms, formulae
- Priority of feature (Mandatory or Optional) and Dependencies between features
- Quality Criteria relating to system users
  - Operability considerations not already addressed, including response times
  - Help functions and other user documentation needs
  - Requirements for selection lists
  - Searching and Navigation requirements
  - Job Impact
- Other Quality Attributes
  - Portability
  - Maintainability
  - Flexibility
  - Accuracy
  - Reliability, including times of availability and recovery times
  - Security and auditability
- Styling considerations...illustrated with screen shots or screen grabs
- Standards to which the product must conform on implementation, such as:
  - data interchange protocols
  - implementation language or tools
  - operating environment
- Glossary of terms used

FUNCTIONAL SPECIFICATION

The Functional Specification must be read and reviewed by people with widely differing backgrounds and interests, ranging from business analysts to technical people. Accordingly, it must be clear, unambiguous and understandable. To achieve this:

- Be consistent in style and layout, to minimise misinterpretation, and to assist readers.

- Use headings and formatting to structure the requirements and be consistent in their use.

- Numbering items rather than setting them as bullet points is less ambiguous for requirements; however bullet points may be appropriate to link items for background and explanatory material

- Diagrams are preferable, as they can be easier to read for visually-oriented readers, and generally take up less space that the equivalent text. However, they must be structured and unambiguous: DataFlow Diagrams, State Diagrams and other formal modelling tools are appropriate. Highly technical models such as UML may disenfranchise non-technical stakeholders including the business analysts, and may be unsuitable for some implementations.

- Use abbreviations where they are short and therefore easier to read. Ensure that they are meaningful and acceptable to the business area. If used, ensure that they are all clearly defined in a glossary.

- Break up text with screen shots, tables, and other graphical material that clarifies and assists understanding.

- Develop detailed light-hearted scenarios to use as case study material. Providing examples will assist comprehension; if the example is fun it is more likely to be read.

- Do not use ambiguous terms or words such as: better, and/or, etc, ought, may, but not limited to, support, assist, improve, easy-to-use, fast, adequate, user-friendly, funky. These terms are unverifiable, and therefore not requirements. Some may be design goals, or strategic objectives: more likely, they reflect that insufficient time was spent on specification, and nobody really knows what the requirement is.

- Be consistent with terms: do not change terminology referring to the same thing or concept.

- Long, complex sentences can be confusing or ambiguous. Keep sentences simple.

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