Technical documentation management

About this document

This document presents the main components of technical documentation management based on my experience as technical writer in the semiconductor industry.

The first two chapters catalogue the set of document attributes commonly used and the main actors involved in technical documentation. The two following chapters relate the main stages of product and document development. Chapter 6 details the document contents, showing the relation between product maturity level and information availability. Chapter 7 tells of the document delivery plan that uses the set of attributes, actors and maturity levels explained earlier. Resource management is discussed in chapter 8, followed by quality management, style guide and templates in chapter 9. Finally, chapter 10 recounts error management tracking.

Terms in use

Product: piece of hardware, software or tool that is delivered or distributed to clients, and identified with a unique code and version.

System: set of products delivered or distributed to customers, and identified with a unique code and version.

Client: requester of product or system documents, accountable for their release.

Customer: end-receiver of the product or system, end-user of the documents.

Table of content

About this document	1
Terms in use	1
Chapter 1 - Document attributes	4
Section 1.1 - Document types	4
Section 1.2 - Confidentiality level	5
Section 1.3 - Reference/Identification	5
Section 1.4 - Revision or version #	5
Section 1.5 - Related product(s)	5
Section 1.6 - Title	5
Chapter 2 - Actors	6
Section 2.1 – The clients	6
Section 2.2 – The technical writers	6
Section 2.3 – The contributors	7
Section 2.4 – The reviewers and approvers	7
Chapter 3 - Document development cycle	8
Section 3.1 – Document request	8
Section 3.2 – Request assessment	8
Section 3.3 – Document editing	8
Section 3.4 – Document review(s)	8
Section 3.5 – Corrective, additional, final editing	9
Section 3.6 – Document approval/sign off	9
Chapter 4 - Product life cycle development	10
Section 4.1 – Hardware development life cycle	10
Section 4.2 – Software Development Life Cycle (SDLC)	11
Chapter 5 - Document contents	12
Section 5.1 – Project documents	12
Section 5.2 – Requirement specifications	12
Section 5.3 – Design specifications	12
Section 5.4 – Test files and characterization reports	.12
Section 5.5 – End user/customer documents	.12
Chapter 6 - Document delivery plan	13
Chapter 7 – Document management	14

Section 7.1 - Version control	14
Section 7.2 - Review and approval cycles	14
Section 7.4 - Document management system (DMS)	14
Section 7.3 – File attributes	15
Section 7.5 - Images, audio and video files	15
Section 7.6 - Topics, text files, project files, book files, map files	15
Section 7.7 - Output files	15
Section 7.8 – Document archiving	
Chapter 8 – Style sheets, style guides and templates	17
Master pages and templates	17
Style sheets, cascading style sheets	17
Style guides	
Chapter 9 – Error management tracking	
References	
Glossary	

Г

Chapter 1 - Document attributes

The document attributes or properties are usually defined at company level and used in the document management system (DMS).

Section 1.1 - Document types

The documents generated during the product development life cycle are mainly project documents, requirement specifications, deign specifications, test files, characterization reports, validation reports, end-user/customer documents.

Table 1 lists some usual types of hardware customer documents and their definition:

Document type	Definition	
Application note	Describes how to achieve a specific task or some tasks using one or some products. It does not include detailed instructions and does not include information about the product that is already in user manuals or product data sheet(s).	
Data brief/ Product preview	Lists the key features and description of the product, and may also include some electrical characteristics and package information. Usually an extra and early version of the data sheet.	
Data sheet/datasheet	Contains the technical specifications of a product or family of products.	
Die description	Technical specifications for an unpackaged die.	
Errata sheet	List of known limitations and available workarounds for a product or family of products	
Help files	Indexed content with search functionality.	
Programming manual	Information for programmers on how to use the instruction sets of programmable products.	
Reference manual	Detailed product specifications such as register descriptions, instruction sets, commands, and API (Application Programming Interface) functions. Information is presented by functional block. Contains little or no 'how to' information, examples or tutorials.	
Technical article	Technical advantages and potential applications of a new product line or technology. Written in journalistic style.	
Technical note	Contains extra/additional information that is not provided in a datasheet or user manual. Conveys some specific technical information about a product or family of products to customers.	
User manual	Contains "how to" information on using a product, product family, software product, development tool or any other type of product. The title can include precisions about the purpose of the manual, for example user guide, tutorial, getting started.	

Table 1 – List of hardware customer document types

Section 1.2 - Confidentiality level

The level of information disclosed in the documents must be evaluated and properly classified so it is not mistakenly published within the wrong legal statement.

The following is an example of classification for documents:

- **Public**: can be viewed by all employees and shared outside the company
- **Restricted**: can be viewed by all employees but requires a Non Disclosure Agreement (NDA) prior to being shared with a third party
- **Confidential**: can be viewed only by document actors, and is company internal
- Secret: very limited and declared access, stored separately

Public and restricted technical documents are shared with customers while confidential technical documents are for internal use only.

Section 1.3 - Reference/Identification

The unique reference or identification for a document item is usually provided by the resource management system or the version control system. The resource system may be set to assign significant identification, where every letter and number relate to a scheme, or on the opposite distribute non-significant series of numbers or combinations of numbers and letters.

Section 1.4 - Revision or version

As for the identification reference, the document revision or version is a key indicator, and is provided by the version control or document management system. There is often a relation between the status of the document and its version or revision number. For example the successive draft versions may be numbered as minor revisions and the approved version becomes a major revision.

Section 1.5 - Related product(s)

Documents that include information about a product, a set of products or a family of products may be delivered within a customer package delivery or published on the company website.

Companies use enterprise software and databases to record the product information such as the identification, maturity level, standard and customerspecific options, inventory level. Configuration management associates the product data with the documents attributes and keeps records of customer deliveries. When the product database is accessible through the document management system, it is possible to link a document to the related product(s).

Section 1.6 - Title

The document title or description that is shown on the cover page is also a key attribute for search engines and document management systems. From the title we can deduce a list of keywords, and add precisions about the document purpose and scope.

Chapter 2 - Actors

We class the actors involved in technical documentation as:

- The clients
- The technical writers
- The contributors
- The approvers

The following sections detail the roles for each of the four classes of actors.

Section 2.1 – The clients

The clients define the list of documents that are needed for a given product or system and posts the requests for their creation and delivery, indicating the document properties as well as the names of the contributors and approvers.

The client is usually the project manager, program managers, application engineer, software engineer or marketing engineer responsible for the product.

Section 2.2 – The technical writers

The technical writers work with the clients to build the document delivery plan^[1] for a given product or system, which gives them some visibility on the amount of information that needs to be collected. Once the plan is validated, the technical writers edit the content of the documents working in priority on the items for which the input is available, and the delivery date is the closest.

Technical writers act as coordinators for the execution of the document delivery plan, interfacing with the contributors and the clients. They regularly report to the clients on the status and progress of the document delivery plan, highlighting delays due for example to late reviews and/or lack of information.

One essential role of the technical writer is to assess the kind of information that is needed for each document item in the document delivery plan, and prepare interviews or working sessions with the subject matter experts (SME) to retrieve the information that is adequate for the document purpose and scope.

Once all or most of the needed information is available, the technical writer starts working on the first draft, taking care of the content consistency, readability and adequacy versus the customer expectations, as well as the conformance with the company guidelines and templates.

Upon finalizing the initial editing phase of the document item, the technical writer organizes a first review workflow to collect feedback from the list of reviewers defined in the document delivery plan.

In most document delivery plans, a few documents have the same target delivery date, and require strong planning and organizational skills from the technical writer who handles multiple editing tasks and review workflows at once.

At the end of each review workflow, the technical writer implements the feedback, generates new drafts and launches their review. When all reviewers declare that the content is finalized, the technical writer submits the final draft to the approver(s) declared in the document delivery plan for final sign off.

Section 2.3 – The contributors

The contributors are the subject-matter experts (SME), software developers, architects, designers, test engineers, quality engineers, application engineers, and marketing engineers who provide the information to the technical writers, and act as reviewers for the successive drafts.

Section 2.4 – The reviewers and approvers

The client defines the list of reviewers and approvers for each item in the document delivery plan, taking into consideration the type of document and the content maturity versus the associated product development stage.

Some reviewers may only look at the sections of the documents for which they have provided some information while other may check the consistency of the overall content of the document.

The approvers are responsible for the final sign off prior to delivery to customers or e-publication. Their signature is recorded in the document management system.

The clients are often key reviewers as they have the knowledge of the product features and list of changes to implement. They will check the overall consistency of the document contents and give the green light for final approval or sign off.

Chapter 3 - Document development cycle

The same document development cycle applies for a document creation (initial revision) or a document update. Document creations often have longer development cycles, although some new documents derive from existing ones and only require slight changes in some sections.

Section 3.1 – Document request

When requesting a new revision of an existing document, or the first revision of a new document, the client details the document type, document title, revision/version number, names of the contributors, reviewers and approvers, the audience (public/internal/customer-dedicated) and the target delivery date^[3].

Section 3.2 – Request assessment

The technical writer evaluates the request to assess how much information needs to be retrieved from the SME and other contributors, how many sections need creating or updating and how much time there is to complete the editing, the review and sign off phases to reach the targeted deadline.

If the editing task requires a lot of time, and the technical writer has other editing tasks to complete, one possibility is to negotiate the delivery date with the client or reset the priorities for ongoing editing tasks.

Section 3.3 – Document editing

Following the assessment of the request, the technical writer first works with the SMEs and other contributors to retrieve the relevant information for the sections that need creating or updating. Sometimes the SMEs provide a whole document to the technical writer whose tasks are then to check through the whole resource content, assess the relevance of the information, work on the content, format and illustrations so the first draft complies with the targeted audience and company standards.

Section 3.4 – Document review(s)

The review workflows are essential to detect errors, improve the content and ensure the overall consistency of the document item.

The review phase requires strong coordination to ensure that all the reviewers have checked their respective part of the document and provided their feedback within the agreed deadline.

If possible, all the review comments should be collected in a single file such as a PDF or a spreadsheet^[2] and there should be a quick meeting with all the reviewers to sort conflicting comments, answer the questions and go through the unclear comments so everyone agrees on the final changes to implement. This method saves numerous review workflows and gains a lot of time.

Section 3.5 – Corrective, additional, final editing

Once the final set of corrections and changes to implement is agreed at the end of the review, the technical writer goes through the list, collects additional material if required and implements the changes.

A final review is essential to validate that all the changes were correctly applied and nothing else needs modifying.

To help and accelerate this final workflow, the technical writer should set the track changes in the editor, or use an application that compares document contents.

Section 3.6 – Document approval/sign off

The formal document approval and sign off marks the end of the document development cycle, and the release of the document major revision.

There is often very little time left for the approval workflow after the successive editing and review phases. It helps when the client or a key contributor confirms that the document is finalized and can be released.

Still, the approver is welcome to cross check the content and request additional changes even if there is very little time left as this can avoid having to go through a whole development cycle for a new document revision later on.

As a rule, any comment is worth considering and implementing even on the day of the delivery.

Chapter 4 - Product life cycle development

This chapter depicts the product development life cycle and shows how the content evolves for some product specifications with the product development stage. The development life cycles for hardware and software are very similar.

Section 4.1 – Hardware development life cycle

The main phases of development life cycle for an hardware device are:

- Definition
- Specification
- Development including design, verification, validation
- Testing and characterization
- Production and maintenance
- End of life and termination

A significant number of internal and customer documents are produced during the product definition, the development and characterization phases.

The design specifications, characterization reports and package information include most of the information required to build the customer documents.

The product data sheet is a contractual document between the IC manufacturer and the customers. The data sheet naming and content evolve with the component maturity. When reaching the end of the component characterization, most changes in the content relate to the electrical characteristics chapter while the rest of the content remains unchanged.

Table 2 shows the evolution of the product data sheet naming and content with the product development phase.

Product development phase	Data sheet name	Product data sheet content
Definition and specification	Target specification	Draft functional description of the component with target values
Development	Preliminary data	Alignment of the content with the design specifications. Addition of information about functionality, package(s), electrical characteristics
Characterization	Reference data	The component functionality and performance are validated. Only the characterization values change.
Production	Production data	Any limitation/change of the component characteristics and behavior must be communicated through an errata sheet
End of life	Obsolete data	The document content is for reference, for a product no longer produced

Table 2 - Product data sheet naming and content evolution with the component maturity

Section 4.2 – Software Development Life Cycle (SDLC)

There are six main phases for software development:

- Gathering and analysis of the requirements
- Design
- Development, implementation or coding
- Integration and testing
- Deployment
- Maintenance

Examples of project-related documents created during the first stage of the product development are:

- Cost benefit analysis
- Risk management plan
- Feasibility study
- Market analysis
- Project management plan.

The detailed functional requirement specification is delivered at the end of the definition phase and used to generate the system design specification for the software design phase, and the use cases for the testing phase.

The test case procedures and test files are prepared for the integration and testing phase at the end of which test reports are generated.

Technical writers generate software manuals and help files for end users, with the help of the software developers and using the internal specifications.

The content of the end user documents is often extracted automatically from the software specification. It includes the description and purpose of the functions, subroutines and variables. When both the code and the descriptive content are included within the same document, the software developers maintain some consistency between the descriptive content and the code when applying changes to the source code.

The help files are useful when the source code is very long. End users can navigate through the indexed content and use the search functionality to find information.

Chapter 5 - Document contents

Section 5.1 – Project documents

The program and project managers gather the information related to the product development cost, the planning, the resources, the risk assessment, the market research and potential customers during the initial phase of the product development. Upon approval of the project, they track the product development progress and deliverables versus the plan.

Section 5.2 – Requirement specifications

The gathering and analysis of all the requirements are important phases of the product development as they help to refine the features and functionalities of the product considering the customer expectations, the technical feasibility and other challenges.

For most requirements it is possible to associate some use cases and build user acceptance tests for the validation and characterization phases.

The list of requirements for systems can be very long and tedious to analyze as in addition to each system entity specific requirements, it includes the targets and the performance levels of the overall system and the interfaces.

Section 5.3 – Design specifications

The developers are the owners of the design specifications. They use the requirement specification as a reference and develop the product in accordance to what has been validated and agreed in terms of features, functionalities, characteristics and performance.

The design specifications are reference material for the customer documents.

Section 5.4 – Test files and characterization reports

The test files are used internally to test and characterize the product.

The characterization reports include all the test and characterization results. The qualification reports measure the compliance between the characterization results and the initial requirements.

The characterization results are used in the electrical characteristics chapter of the product data sheet.

Section 5.5 – End user/customer documents

The customer documents include some description of the product (features, functionalities. Hardware customer documents also include the electrical and mechanical characteristics, and some guidelines on how to use the device.

Any change in the product specification must be communicated to the customers through new revisions of the documents after the characterization/deployment phase.

Chapter 6 - Document delivery plan

The documentation is often part of the configuration management plan where the customer documents are part of the delivery packages. For a new product launch on a company website, the main customer documents must be released at a given date, often non negotiable.

Whether the document delivery plan addresses one or a few products, having the full visibility of what is expected and when helps the technical writers to set their priorities, and organize the various document development phases. Also, once a document delivery plan is validated, it is used to follow up on the status of each item.

See the document delivery plan skeleton ^[1] and the document delivery plan follow-up skeleton^[3].

Chapter 7 – Document management

Technical writers rarely edit files stored locally unless these result from a check out from a version or resource control system.

Keeping the files on a server that is setup with regular backups is a safe way of storing and sharing files. However, it requires changing the file name in order to keep successive versions a document, and there is no way of knowing when a file is already opened by someone until we try to open it.

Section 7.1 - Version control

Keeping successive versions of a file in a version control system allows to keep trace of the changes applied, and to revert to a previous version if needed. Often, the configuration of the version control system lets a few people edit the same file, although someone has already locked it; all the changes applied during the check out can be analyzed and accepted or rejected when the user applies a check in. This way of editing can prove very efficient when time is limited and many contributors are expected to edit the same document such as a requirement specification.

Section 7.2 - Review and approval cycles

The review and approval cycles of a document or topic are launched on a specific file version. The file can be a topic that is a small part of a document, or it can be the whole document. It is safer to wait until the review/approval is over and all the comments are received to start a new editing phase of the item or document, on a new version.

If the review is run on a topic, and the comments are very specific and may endanger the reusability of the topic, the technical writer needs to check with the client and the reviewer about the need to implement the change as such, and come with a solution to make it device-specific, for example by using conditional text.

Reviews can be launched by sending a file for annotation (PDF review), or by sending the file to review with a review-logging sheet^[2] in which the reviewers list all their comments. At the end of the review, all the comments are gathered in one file (PDF or Excel). In case the reviewed file includes some conflicting or unclear comments, the technical writer must consult with the client and the review team about the changes to apply.

Section 7.4 - Document management system (DMS)

Document management is a requisite for ISO9001 quality compliance. The document management system allows to store successive versions of documents, run reviews and approval cycles, keep the history of the reviews and approvals, and archive documents which are no longer active (end of contract, obsolete product, etc.).

Companies define their document management process and configure the document management system for many document categories such as legal, human resource, product development, quality, or customer documents. The properties of the documents, and the workflows differ between the categories, and some document categories may only be visible to a few authorized users.

Section 7.3 – File attributes

When storing files in a version control system or in a document/content management system, the users indicate values for some key properties, which are used for searching, filtering, reporting and monitoring purposes later on.

Section 7.5 - Images, audio and video files

The graphics, audio and video files should also be managed in a resource management system, so they can be searched, and shared among projects.

Building a repository of audio, graphics and video files taking care of filling in the attributes and keeping a change history with the successive versions can seem tedious but it may save a lot effort and time to project teams who can search and use the shared content, for example a block diagram in promotional and presentation material.

Section 7.6 - Topics, text files, project files, book files, map files

Depending on the editing process and on the editing tool, documents can be made of one or multiple files. For example, a document can be made of a book, a project, or a map, with links to files or snippets, or topics, or a document can be single file. The files can embed graphics, or they can include links to graphic files that are stored in a repository or folder.

The same files or topics or graphics can be used in multiple projects at the same time. Impact analysis, version control and change tracking are key considerations when editing with a single source/content reuse approach.

Section 7.7 - Output files

While the most common output file for a document is the PDF, other output formats like HTML are more suitable for web content and online Help file.

The term "single sourcing" refers to the capability to generate multiple output files from the same content.

For example, MacCap Flare can generate PDF, MSWord, HTML5, DITA output files. RoboHelp can also generate HTML5 and PDF output files.

Section 7.8 – Document archiving

One main advantage of having all the latest versions of the files related to one project stored locally, for example following a check out from the version control system, is that we can build an archive and keep it safely in the document management system, with its review/approval history.

Another use of the archives is localization projects where the translators can check the approved status of the document in the DMS, access the source files stored in the archive, and create another archive with the translated content.

ISO9001 defines the archiving time for source files of the document categories such as SOP, procedures, process descriptions, legal documents, quality and customer documents.

Chapter 8 – Style sheets, style guides and templates

Master pages and templates

The master pages and templates include pre-defined page layouts and predefined paragraph formats and character formats. Technical writers use exclusively the pre-set formats. The page breaks are the sole compromise on overrides.

By using the same format for all technical documents, we respect the company's image and deliver a unique, consistent layout with identification like the company logo and chapter heading in document headers, and the document ID, revision number and page numbering in the footers.

Style sheets, cascading style sheets

Converting content to the latest template, and applying the relevant master pages can be very tedious and cost a lot of time that could be spared for editing and proofreading. Another way of editing is to separate the format and the content by using style sheets (XSLT) or cascading style sheets that will apply the pre-defined format and company branding to the content when creating the output files (PDF and/or HTML).

Style guides

The style guide gathers the rules to be followed by the editors for all the documents. The rules address for example the use of uppercase, lowercase in headings, captions and acronyms, some specific spelling for terms much used as related to the company products, bulleted and numbered lists. The editorial manager makes sure that all technical writers have read the company style guide and follow the recommendations.

Companies may choose to follow standard style guides like the Chicago Manual of Style^[4] and Microsoft Manual of Style^[5].

Chapter 9 – Error management tracking

Despite the review workflows, the documents may still include some errors once they have been released. Also, some characteristics of the products may not have been available when the documents were due for the release. In addition, endusers may complain about lack of clarity or missing instructions in some documents.

The client may not yet request a new revision of a document but it is safer that the technical writers are notified of the requested changes. They may create a new draft of the document and implement the changes in the content, or insert comments with the corrections to apply in the new draft, or prepare a list of changes to apply for the next revision of the document.

Ideally, technical writers should use a defect tracking system (DTS) to get notified of corrections to implement, and to update the error status when the changes are applied in the content.

References

- [1] Documentation plan skeleton Link
- [2] Review Logging Sheet (RLS) Link
- [3] Document delivery plan follow-up skeleton
- [4] The Chicago Manual of Style The University of Chicago Press
- [5] Microsoft Manual of Style Microsoft Press

Glossary

DMS	Document Management System
DTS	Defect Tracking System
IC	Integrated circuit
SDLC	Software development life cycle
SME	Subject-matter expert
TW	Technical writer