Motivation

Documents associated with a Software Project

- Communication medium between team members (e.g. UML Diagrams, ER Diagrams, etc.)
- System information repository to be used by maintenance engineers.
- Risks, costs, and other management concerns.
- Installation instructions, administration, and troubleshooting guides.

Motivation

Satisfying these requirements requires different types of document from informal working documents through professionally produced user manuals.

Motivation

Agile Manifesto

Working Software over Comprehensive Documentation

However, a certain amount of documentation is still important!

- Reference guide to developers and stakeholders
- Learning material for newcomers

CS 192 Lecture - Software Documentation

March 6, 2015

Introduction

- Different kinds of documentation may be produced during the development process.
  - Project Plan
  - Requirements Specifications
  - Design Specifications
- Some kinds of documentation are produced even before the start of development.

Introduction

- It is not possible to define a specific document set.
- Set of required documents may depend on the following:
  - Contract with client
  - Type of system
  - Expected lifetime of system
  - Culture and size of company
  - Development schedule
- However, we can generally say that the documentation produced falls into two categories:
  - Process Documentation
  - Product Documentation

Process Documentation

- The documents that record the process of development and maintenance.
  - Effective management requires visible processes, and this can be achieved through process documentation.
- The value of these documents decrease through time, as most of it becomes outdated.

Process Documentation

Process Documentation Categories

Plans, Estimates, and Schedules - produced by managers to predict and control the software process

Reports - reports how resources were used during the process of development

Standards - sets how the process is to be implemented

Working Papers - technichal communication documents, implementation strategies, rationale for design decisions, ideas and thoughts of engineers

Memos, Emails - record the details of everyday communication

Product Documentation

- Concerned with describing the delivered software product.
- Unlike process documentation, it has a relatively long life, and it evolves along with the product.
- Components

  User Documentation Tells the users how to use the product
  System Documentation Intended for maintenance engineers

Product Documentation

User Documentation

Users of a system are not all the same.

Different users have different tasks and different levels of expertise and experience.

End-users use the software to assist with some task. They are not interested in computer and administrator details.

System Administrator are responsible for managing the software used by end-users.

- Operator
- Network Manager
- Tech Support
- Troubleshooters

Product Documentation

User Documentation

Types of User Documentation

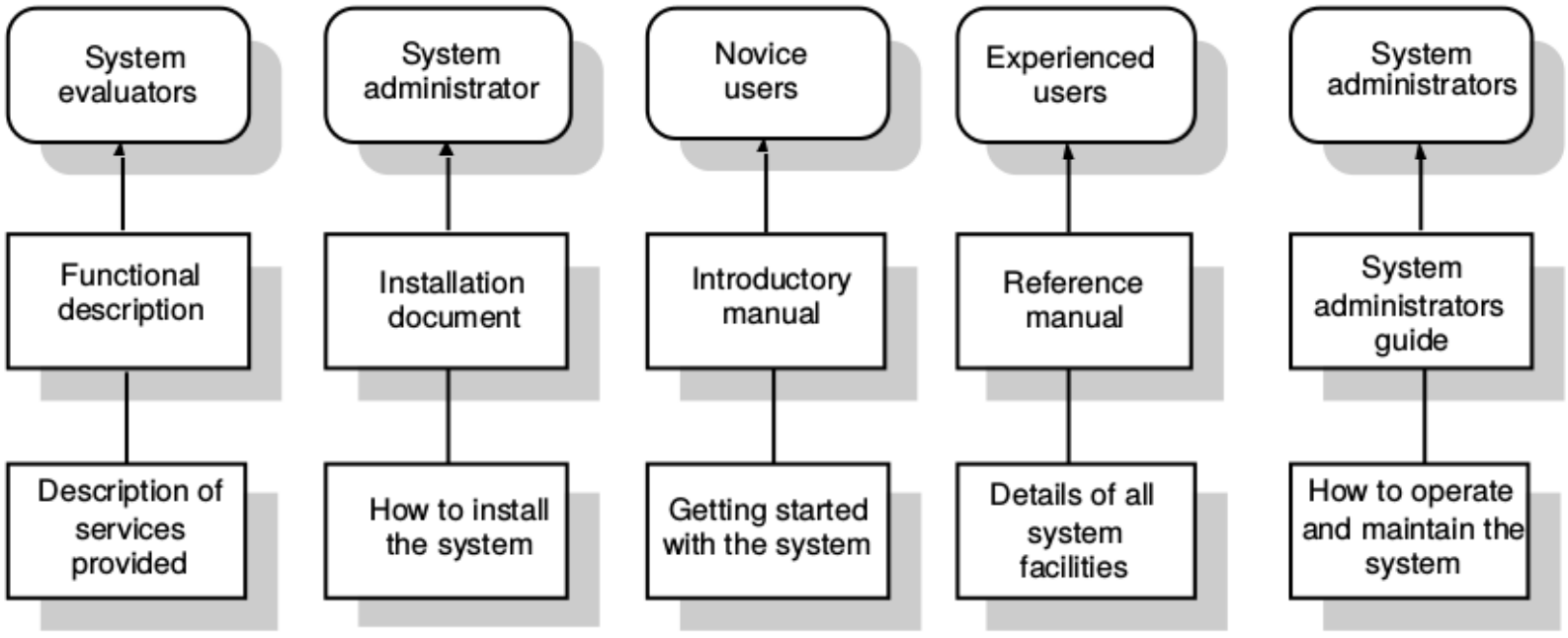
functional description - overview of the system: system requirements and features. Users read this along with the *introductory manual* to decide if the system is what they need.

system installation document - for system administrators. Installation, startup, and configuration instructions, hardware requirements, description of files

introductory manual - an informal introduction to the system, describing its 'normal' usage. *Getting Started*, common system facilities and features, common errors in usage. Must be liberally illustrated with examples.

Product Documentation

User Documentation



Different Types of User Documentation

Product Documentation

System Documentation

- The documents describing the system itself from the requirements specification to the final test plan.
- Documents on the design, implementation, and testing of a system are essential if the program is to be understood or maintained.
- Includes the following:

  requirements document and rationale

  system architecture

  programs - must include architecture

  subsystems/components - must include functionality and interfaces

  source code listings

  validation documents - how is it validated, how does validation information relate to the requirements

  system maintenance guide

Good Practices

Problem with Documentation

- Documentation is often neglected
- Natural tendency is to meet a deadline by modifying code and modify the documentation later
  - Modifying documentation is usually set aside until change becomes difficult!

Good Practice

- support document maintenance
- notify engineers when changes to one document affect another and
- record possible inconsistencies with the documentation.

Document Quality

- Document quality is as important as program quality.
- Utility of a system is degraded in the absence of a good documentation.

Document Quality

- Unfortunately, many software professionals lack the writing skills to create professional-level documents.
  - Many software engineers find it more difficult than producing good quality programs.
  - Some organizations hire technical writers to help software engineers in writing documentation.

Document Structure

Document Structure

- The way in which the material in the document is organized into chapters, sections, and subsections.
- Has a major impact on *readability* and *usability*.
- All documents for a given product should have a similar structure.
- **IEEE 2001** - Defines the superset of what most documents need.

Document Structure

- Some people find IEEE 2001 to be restrictive.
- If IEEE 2001 is not totally followed, minimal guidelines must be followed:
  - **Cover page** on all documents.
  - Divide documents into **chapters** with **sections** and **subsections**.
  - If a document contains a lot of detailed, reference information it should have an **index**.
  - Add **glossary** to define technical and domain-specific terms.

Document Standards

Document Standards

- Play an important role in the development, maintenance, and usefulness of documentation.
- Provide documents with consistent appearance, structure, and quality.

Document Standards

Types of Documentation Standards

Process Standards - define the process which should be followed for high-quality document production.

Product Standards - standards which govern the documents themselves.

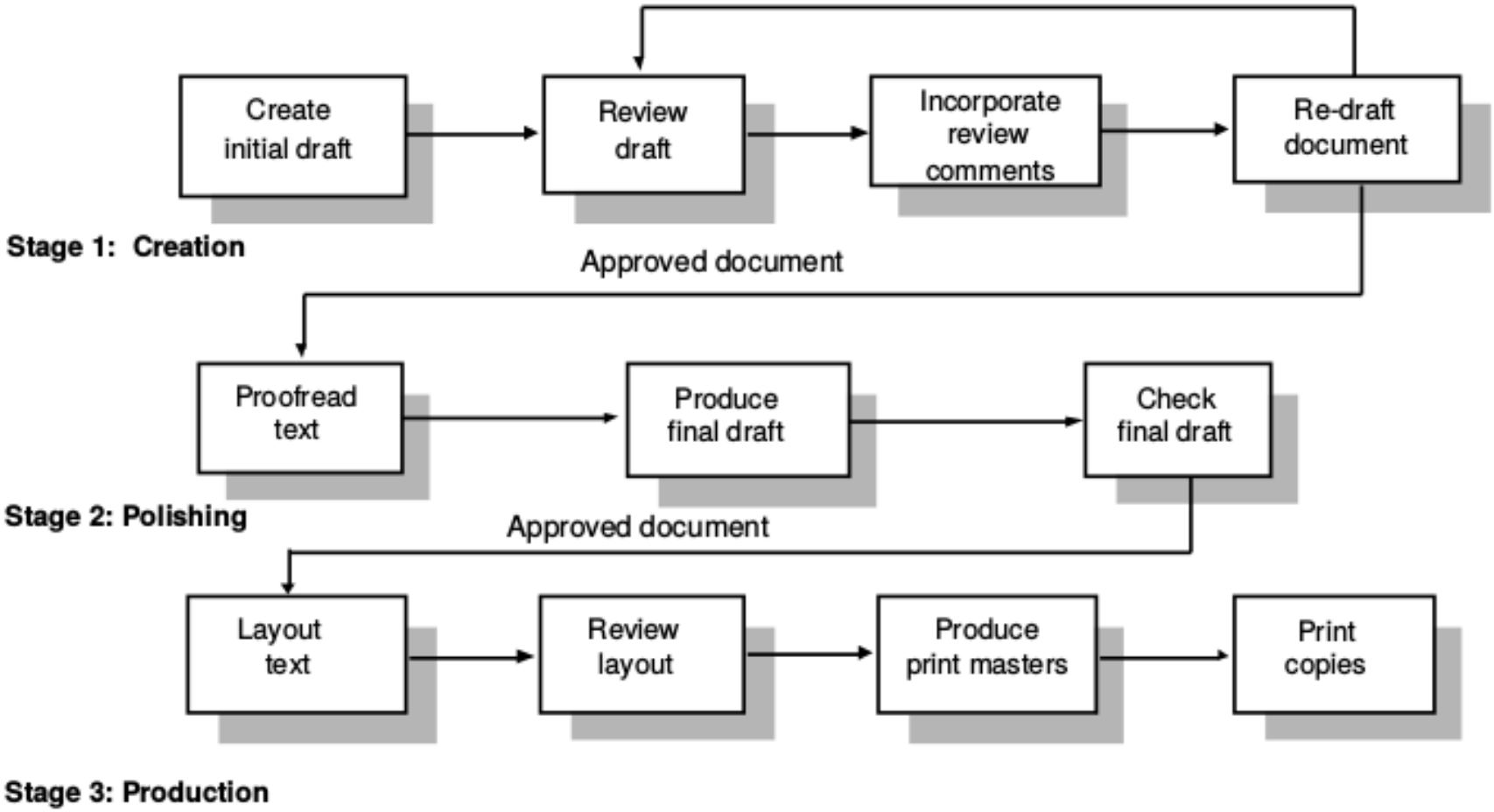
Interchange Standards - It is increasingly important to exchange files of documents visa electronic mail and to store documents in databases. Interchange standards ensure that all electronic copies are compatible.

- Appropriate standards must be chosed and modified to suit a particular project.
- It must not be forced!

Process Standards

- Define the **approach** (process) and **tools** to be used when creating documentation.
- Must be **flexible** and must be able to cope with all types of document.
- Must be **iterative**. Continue until quality is acceptable.

Process Standards



An Example of a Document Process

Product Standards

- All documents must attain a **consistent appearance** and
- All documents of the same class should have a **consistent structure**.
- **Project-specific**, but should be based on more general organizational standards.

Product Standards

Examples of Product Standards

Document Identification Standards - how to uniquely identify a document

Document Structure Standards - discussed earlier

Document Presentation Standards - 'house style,' includes definition of fonts and styles, logos, company names, and colors

Document Update Standards - how to track and indicate changes in a document

Product Standards

Caveat in Product Standards

Documentation should be presented in a form appropriate to the user rather than the project. In the end, it is the users who consume the documentation.

Interchange Standards

Interchange Standards

- **Deals with creation of documents in a format that allows others to effectively use.**
  - PDF is commonly used if documentation is delivered along with the software system.
  - .doc format may be good if documentation is exchanged by the development team.
- Conventions for using the tools defined in process standards.
- Examples are agreed templates for writing, fonts, and text tiles.
  - May affect Document Presentation Standards

Document Quality

IEEE Standards

IEEE Standards for User Documentation

- A **superset** of all accepted standards for writing documentation.
- Must not always be followed. Standards must be adapted depending on the nature of the project.

Writing Style

Good Documentation Requires Good Writing

Document quality is fundamentally dependent on the writerś ability to construct clear and concise technical prose.

Writing Style I

1. **Use active rather than passive tenses** It is better to say You should see a flashing cursor at the top left of the screen rather than A flashing cursor should appear at the top left of the screen.
2. **Use grammatically correct constructs and correct spelling** To boldly go on splitting infinitives (like this) and to misspell words (like mispell) irritates many readers and reduces the credibility of the writer in their eyes. Unfortunately, English spelling is not standardized and both British and American readers are sometimes irrational in their dislike of alternative spellings.
3. **Do not use long sentences which present several different facts** It is better to use a number of shorter sentences. Each sentence can then be assimilated on its own. The reader does not need to maintain several pieces of information at one time to understand the complete sentence.

Writing Style II

4. **Keep paragraphs short** As a general rule, no paragraph should be made up of more than seven sentences. Our capacity for holding immediate information is limited. In short paragraphs, all of the concepts in the paragraph can be maintained in our short-term memory which can hold about 7 chunks of information.
5. **Dont be verbose** If you can say something in a few words do so. A lengthy description is not necessarily more profound. Quality is more important then quantity.
6. **Be precise and define the terms which you use** Computing terminology is fluid and many terms have more than one meaning. If you use terms like module or process make sure that your definition is clear. Collect definitions in a glossary.

Writing Style III

7. **If a description is complex, repeat yourself** It is often a good idea to present two or more differently phrased descriptions of the same thing. If readers fail to completely understand one description, they may benefit from having the same thing said in a different way.
8. **Make use of headings and sub-headings.** These break up a chapter into parts which may be read separately. Always ensure that a consistent numbering convention is used.
9. **Itemize facts wherever possible.** It is usually clearer to present facts in a list rather than in a sentence. Use textual highlighting (italics or underlining) for emphasis.
10. **Do not refer to information by reference number alone** Give the reference number and remind the reader what that reference covered. For example, rather than say In section 1.3 ... you should say In section 1.3, which described management process models, ...

On-line Documentation

On-line Documentation

- Either **HTML-based** or specialized.
- **Increases accessibility** and may provide navigation features.
- **Requires rethinking** the presentation style since it is different from paper.
- Should act as a **supplement** to paper documentation.
- **Can be updated frequently.**

Document Preparation

Document Preparation

- The **process** of creating a document and formatting it for publication.
- Three Stages:

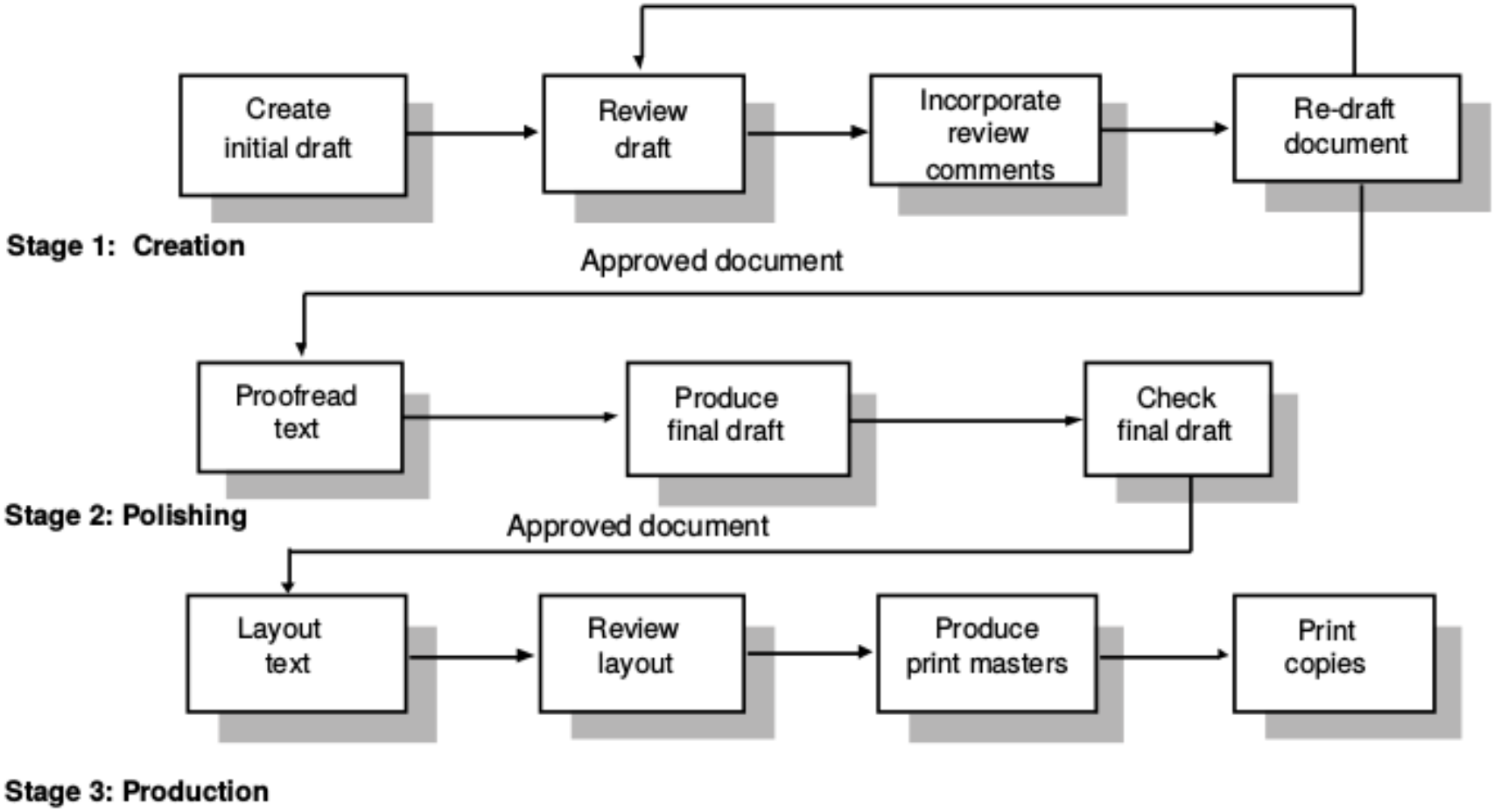
  Document Creation - Initial input of information

  Document Polishing - Improving the writing and presentation of the document : spell checking, punctuation and grammar correction, removing redundancy, etc.

  Document Production - Preparing the document for professional printing.

Document Preparation

Example



An Example of Document Preparation Process

Document Preparation

Document Creation and Polishing Tools

Word Processors

e.g. MS Word

Advantage - WYSIWYG

Disadvantage - You create the layout decisions.

Text Formatting Systems

e.g. LaTeX

Advantage - does the formatting for you.

Disadvantage - compile "code" first to see output.

Document Production

- Requires a lot of skill, should be left to publishers/printers.
  - *How do you print a book?*
- Desktop publishing systems are available.

Document Storage

How/where do you store a document and track versions of it?

- SCM software (Git, CVS, SVN) are good candidates.
- How about cloud services such as Google Drive/Dropbox?

Summary

- There are many kinds of documentation, each targeted to specific people with different skill levels.
- The amount of documentation depends on the client and/or on the organizational rules.
- Good documentation requires good writing. Several standards in writing documentation must be followed and adapted depending on the project.
- Writing documentation is like writing code. It goes through a process.

References

- http://www.literateprogramming.com/documentation.pdf