

## CHAPTER FIVE

# ORGANIZATION AND LAYOUT OF INFORMATION

### GENERAL OVERVIEW<sup>1</sup>

- **Format:** the way a document or presentation is arranged  
title  
author(s)  
headings and sections (i.e., Introduction, Materials and Methods, Results, Discussion, Conclusion)  
equations  
tables  
figures  
references/bibliography  
acknowledgments  
presentation time limits  
...
- **Language:** the way words are used - language is more than vocabulary  
the order of words  
the lengths of sentences  
the use of examples
- **Limitations:** the aspects of a document that will NOT be COVERED  
i.e., assumptions
- **Mechanics:** grammar  
punctuation  
spelling
- **Scope:** the boundaries of a document or presentation, the material that will be COVERED in the document or presentation
- **Structure:** the strategy of your writing  
organization of details ↔ emphasis of details
- **Style:** the way you present your information in a document or presentation  
organization of details  
words you choose/use

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<sup>1</sup> M. Alley. "The Craft of Scientific Writing Workbook." Mechanical Engineering Department, The University of Texas at Austin, USA, 1991.

illustrations you choose/use

...

- **Tone:** your attitude towards the subject in writing or speaking

## DOCUMENT APPRAISAL - A CHECKLIST

### ✓ Before you begin working on a S&T document, have you...

- ① **defined** the problem?
- ② **compiled** all the necessary information?
- ③ checked the **accuracy** of all information to be presented?
- ④ taken into account previous and related **studies in the same field**?
- ⑤ learned all about **who** will read/listen to your document/ presentation?
- ⑥ determined **why** they will read it?
- ⑦ tried to **anticipate questions** your readers/listeners will want answered?
- ⑧ determined your readers'/listeners' **attitude** toward the objective of your document/ presentation?
- ⑨ decided on the **slant** or **angle** you want to play up?
- ⑩ checked the **conformity** of your approach with company policy and aims?

### ✓ In making a plan, have you...

- ① planned an **introduction** that will introduce the subject matter and the presentation itself?
- ② **arranged** the parts of the presentation so that one part leads naturally and clearly into the next?
- ③ included enough **background** information?
- ④ excluded unnecessary and irrelevant **detail**?
- ⑤ planned a strong, forceful **conclusion**?
- ⑥ clearly determined the **conclusions** and **recommendations**, if any, that should be presented?
- ⑦ settled on a **functional format**: headings, subheadings, illustrations, and other details?

### ✓ In writing, have you...

- ① **expressed** yourself in language that conveys exactly what you want to say?
- ② used language that is **adapted** to the principal readers?
- ③ used the **fewest possible words** consistent with clearness, completeness and courtesy?
- ④ achieved the **tone** to bring about the desired response?
- ⑤ tried to produce a **style** that is not only accurate, clear and convincing, but also readable and interesting?

- ⑥ presented all the **pertinent facts** and commented on their **significance** where necessary?
  - ⑦ made clear to the reader **what action** you recommend and **why**?
  - ⑧ correlated **illustrations** and **art work** closely with **text**?
- ✓ **In reviewing and revising, have you...**
- ① fulfilled your **purpose** in terms of your readers' needs and desires?
  - ② proofread painstakingly for **errors** in grammar, punctuation and spelling?
  - ③ weeded out **wordy** phrases, **useless** words, **overworked** expressions?
  - ④ broken up unnecessarily **long sentences**?
  - ⑤ checked to see if **headings** serve as useful labels of the subject matter treated?
  - ⑥ deleted words and phrases that might be **antagonistic**?
  - ⑦ honestly judged whether your **choice of words** will be clear to the reader?
  - ⑧ checked whether **transitions** are clear?
  - ⑨ double-checked to see that the **introduction** sets forth clearly the purpose, scope, and plan of the presentation?
- ✓ **FINALLY, have you...**
- ① finished your presentation **on time** (🕒) ?
  - ② produced a piece of writing that you can be **proud** (👍) of?

## ORGANIZATION AND LAYOUT OF INFORMATION

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- ★ There is **NOT** a **clear-cut one ideal way** of organizing a S&T document, whether a paper, a report, an instructions manual or a proposal.
- ★ There are **tactics** of arrangement and physical layout to be used according to the **task involved** and the **needs of your audience**.

# The Initial Impact

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- Your readers/listeners look for *information* to help focus quickly on the **orientation** and **content** of your document.
  - They look for a prominent (= readily noticeable, standing out), succinct (= short, exact) and apt (= appropriate) **title**.
  - They want to find quickly a terse (= elegant, concise) but reliable summing up of the **essence** of the work.
  - They want a clear **summary** of the **conclusions** drawn from the work and of the **recommendations** consequent upon these conclusions.

#### THUS IF

you want your document to get off to a good start

#### THEN

give your readers the information they want in the quickest and most accessible way

#### ELSE

they may not be interested in it and they may not carefully read it

#### ENDIF

- Your readers/listeners check the **organization**, **cover**, **headlines** and **size** of your document.
  - They debate the **attractiveness of reading** the paper.
  - They estimate the resources of **time and effort** that will be needed **to deal** with it.

## A GENERAL RESPONSE-TO-PAPERS METER'S SCALE

- Is that really so, how interesting!
- Looks very interesting.
- Interesting.
- Could just be interesting.
- I wonder if it is worth reading.
- Looks damned heavy going.
- Have I really got to read all this?!

### FACTORS THAT GIVE EMPHASIS:

#### ★ Title - recall WRITING THE OUTLINE

- Pick a **tentative title** that is **informative** so that your audience knows precisely what subject you will discuss/address.
- Compose the **final title** after you write your document/prepare your presentation, because the focus of your topic may change as you gather and assemble information.

#### ★ Author(s) - place under the title, leave at least one or two blank lines between title and author(s).

- **Order of listing of authors** - has been the focus of many fights between otherwise reasonable and rational people, including professors and their students!
- List the **head/supervisor** of the laboratory/research group/project as an author whether or not she/he actively participated in the research.
  - Currently the most popular convention is placing the supervisor's/head's name **last**, unless she/he is the primary progenitor of the work being presented/ reported.
- In modern times, the primary progenitor of the work being presented/reported is defined the **first** author (= senior author).

Eyal, O., Zur, A., Shenfeld, O., Gilo, M. and Katzir, A. "Infrared Radiometry Using Silver Halide Fibers and a Cooled Photonic Detector," Optical Engineering 1994: 33(2): 502-509.

- Listing of the **rest of the authors** should include those, and only those, who **actively contributed** to the overall design and execution of the work being presented/reported.
- For a paper to be published, the present addresses of all the authors should be listed in the same order as the authors. The addresses serve two purposes:
  - Mailing addresses identify the authors (educator, physician, R&D -research and development- scientist, lab technician, design engineer, software/hardware engineer, consultant, etc.)
  - Mailing addresses denote the source of reprints.

Example:

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## Comparative OCT Imaging of Human Esophagus: How Accurately Can We Localize the Muscularis Mucosae?

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★ **Summary/Abstract** - place it either on the title page or on the page immediately following.

- More about how to write a summary and/or abstract later on!

- Experienced writers prepare their title and summary/abstract after the paper is written.

★ **Introduction** - recall WRITING THE OUTLINE

- Present **background information** and an **introduction to your paper/presentation** (= review the pertinent literature to orient the reader towards your work).
- State the **objective/purpose** and the **theme** clearly so that the audience will know the **definition of your problem** and your **intentions** (= rationale for and scope of the present study, the purpose in writing the paper, and your method of investigation).
- State **principal results and conclusions** - do not leave your most important findings until late in the document.
- **Define** any **specialized terms** or **abbreviations** that you intend to use.

★ **Body of Presentation** - recall WRITING THE OUTLINE

- Present the **major thrust of the subject** as well as the **general and specific points** that will be discussed.
- Present the **materials and methods**, complications, problems and how you dealt with those during your study/experimental work, etc.
- **Compare** your MATERIALS AND METHODS, your RESULTS and OBSERVATIONS to **previously published work**. Objectively DISCUSS similarities, superiorities, limitations, advantages, and disadvantages.

★ **Body of Presentation** - MATERIALS AND METHODS

- Give full details of the **methodology** employed in your study.
- ✓ The main purpose of this section is to describe (and if necessary to defend) the experimental design and procedures, and to provide **enough detail** that a competent worker can repeat them. Do not forget to use past tense!
- ✓ Careful writing of this section is **critically important** because the cornerstone of the scientific methodology *requires* that your results, **to be of scientific merit**, must be **reproducible**.

**MATERIALS**

- Include and identify the exact technical specifications, quantities and source or method of preparation.
- Use generic names for materials used, but include brand/trade names and/or manufacturers in brackets.

“... an argon ion laser (Coherent, Innova 100, 3210 Porter Drive, Palo Alto, CA 94303, USA) was used...”

## METHODS

- Present your methods chronologically, yet, describe related methods together.
- Use **subheadings**, such as MEASUREMENTS AND ANALYSIS. Your subheadings should **“match”** those to be used in RESULTS. **Internal consistency** will make it easy for the reader/listener to quickly grasp the relationship of a particular methodology to the related RESULTS.
- Be **precise**. Methods are like cookbook recipes. The reader/ listener should not puzzle over anything.

“How much salt shall I put into the soup? Is a cupful enough?”

- Be careful of your **syntax**.

“... after standing in boiling water for one hour, examine the flask ...”

- Me? I am already well cooked like roast beef! I died from severe burns!

- If your method is new (unpublished), provide all of the needed detail for reproducibility.
- If you are using a previously published method, the method should be briefly described, and the literature reference given.

“... The experimental procedures were the same as in our previous study [13] except that (1) once ...; and (2) ...”

- Do not make the **common error** of mixing some of the RESULTS in this section.
- Do not omit details essential to the meaning.

“... Having completed the study, the bacteria were of no further interest ...”

- Hmm... Did the bacteria “do the study”? If so, their lack of “further interest” is really an act of ingratitude!



- Watch for **spelling errors**.

"... We rely on **theatrical** calculations to give the lifetime of a star on the main sequence..." (Annu. Rev. Astro. Astrophs. 1:100, 1963)

### ★ Body of Presentation - RESULTS

- ✓ This is the **core** of your document - the data or your findings.
- ✓ This may also be one of the **shortest** sections in your document, particularly if it is preceded by a well written MATERIALS AND METHODS section and followed by a well written DISCUSSION section. Do not forget to use past tense in this section.
- You may give an **overall description** of your experiments, providing the "big picture", without repeating the experimental details provided in MATERIALS AND METHODS.
- Present data. Data should be **representative** rather than endlessly repetitive. Bring forward just the main facts and figures that you found during your study.
- State the facts and figures **simply** and **clearly**.
- If you used statistics to describe your findings, they should be **meaningful statistics**.

"33<sup>1</sup>/<sub>3</sub>% of the mice used were cured by the test drug. 33<sup>1</sup>/<sub>3</sub>% of the mice used were unaffected; and the third mouse got away."

- State what you expected, but did not find under your experimental conditions. Someone else may find them under slightly different conditions.
- It is important to define even the **negative aspects** of your experiments. Mention complications, difficulties, problems, and how you dealt with those during your study/experimental work.

### ★ Body of Presentation - DISCUSSION

- ✓ This is the **hardest** section to write.
- Present the principles, relationships and generalizations shown by the RESULTS without recapitulating the RESULTS. Thus **interpret** your RESULTS.
- Point out any **exceptions** or any lack of correlation and define **unsettled points**.
- Show how your RESULTS and interpretations **agree/contrast** with previously published work. Discuss the **significance** of your RESULTS.
- Discuss the theoretical **implications** of your study, as well as any possible practical **applications**.
- Use **simple statements**, because they evoke the most wisdom!

★ **Conclusion(s)** - recall WRITING THE OUTLINE

- Repeat succinctly the **logical outcome** from all that was presented before.
- **Summarize** your evidence for each conclusion.
- **Recommendations** for action to be taken are often **beneficial**, and they should be clear-cut.
- State your conclusions as **clearly** as possible.

★ **Acknowledgments**

- Acknowledge any **help** you have been given (financial, equipment, technical, physical or else) in the course of your work/study.

"This work was supported in part by TÜBİTAK grant number \_\_\_\_ and in part by \_\_\_\_ Incorporated."

"We would like to thank \_\_\_\_\_ and the whole staff at \_\_\_\_\_ for \_\_\_\_\_; and Mr./Ms. \_\_\_\_\_ for his/her assistance with manuscript preparation."

★ **References/Bibliography**

- List only significant, published references.
- Check all parts of every reference against the original publication. There are far more mistakes in this section of a paper than anywhere else.
- For styles see pp. 49-50 and the end of the references of this chapter.

★ **Abstract**

- ✓ An abstract should be viewed as the **mini version** of your document.
- ✓ An abstract is a **condensed version** of information in a document. Thus an abstract should
  - state the principal objectives and the scope of the investigation/study presented in a document
  - describe the methodology employed
  - summarize the findings and the problems encountered
  - state the principal conclusions
- ✓ A well prepared abstract enables the readers/listeners to identify the contents of a document quickly and accurately.
- ✓ An abstract is frequently requested by conference organizers as part of the proposal to give an oral presentation.
- ✓ An abstract is required by most professional journals as part of the submitted publication.

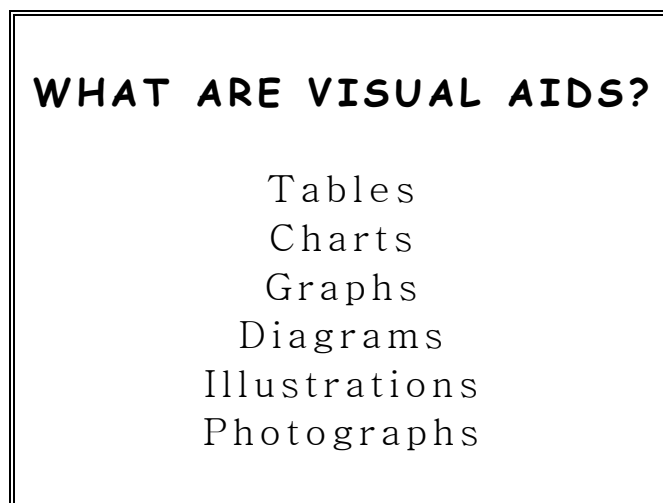
- Write the abstract of your document after you finish writing your document like most professional writers.
- Your abstract should be short (80-250 words depending on journal/conference/symposium), but informative. All information pertinent to your study should be included in the abstract.

### ★ Key words

- ✓ An **essential** part of your document, particularly if to be published, because key words are used by **Information Retrieval Systems** (whether computerized or not) to **access databases and indexes**.
- ✓ Choice of key words is essential for orienting your potential audience towards your work.
  - Place your key words just beneath the listing of authors.
  - List words, phrases, and terminology pertinent to your work/study/document as key words.

### SUPPLEMENTING WITH VISUAL AIDS AND GRAPHIC ART

- ✓ Whether written or oral, material presented in S&T documents is most effective in a visual format.
- ✓ A clear diagram, chart or graph as well as a neat illustration can be a positive supplement to the text or speech. Occasionally, the visual aid can be a stand-alone piece of information.



- Visual aids should be eye-catching, neat and easy to interpret.
- Visual aids should represent the best way to convey the **meaning of data** to the audience.

- Visual aids should represent the best way to convey the **meaning of written information** to the audience.
- Visual aids should be **clear** to the audience.
- Place your visual aids as close as possible in the text after the point at which you refer to them.

## Types of Visual Aids

### ★ Tables

- ✓ one of the **easiest** forms of presenting information
- ✗ one of the **most abused** forms of presenting information
- ✓ Systematic and orderly arrangement of items of information
- ✓ Tabular layout has the particular virtue of juxtaposing items in two dimensions for easy comparison and contrast.
- ✓ Tables eliminate tedious repetition of words, phrases and sentence patterns that can instead be put at the tops of columns or at the sides of rows in a table.
  - Do not construct a table unless repetitive data must be presented.
  - In presenting numbers in a table, give only significant figures.

### ★ Graphs

- ✓ viable means to present numerical results
- ✓ similar to tables as means of presenting data in an organized way
- ✗ scientific/technical data is frequently dressed up using graphs
  - The axes of a graph must be labeled with a description of the measurement and the appropriate units, if any.
  - The graph must have a title or caption that should not repeat what is plotted on the axes.
  - The axes must be numbered, and the spacing on the axes should be in equal increments.
  - Data points on the graph should be visible and not obscured by lines, unless there are too many data points to present individually.
  - The graph should be expanded as much as possible to fill the page.
  - Multiple lines can be plotted on a single graph using different symbols for different variables for comparison and contrast purposes.

### ★ Charts

- ✓ Flow charts are used to indicate steps in a process.
- ✓ Pie charts are used when dealing with percentages that sum up to 100%.
- ✓ Bar charts are used as alternative ways to tables for presenting numerical data.

**★ Illustrations**

- ✓ usually the best way to show the layout of an experimental set-up, an electronic chip, an electrical circuit, etc.

**★ Photographs**

- ✓ sometimes the best way to inform the reader

**References:**

Beer, D. F., Ed. (1992). Writing & Speaking in the Technology Professions: A Practical Guide. IEEE Professional Communication Society Selected Reprints. New York, NY, IEEE Press, pp. 38-56, 63-68, 71-78, 182-193.

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Turk, C. and J. Kirkman (1991). Effective Writing. London, UK, E. & F. N. SPON, Chs. 4, 9-10.

Woelfle, R. M., Ed. (1992). A New Guide for Better Technical Presentations: Applying Proven Techniques with Modern Tools. IEEE Professional Communication Society Selected Reprints. New York, NY, IEEE Press, pp. 91-137.

**Sample citation format:**Citation:

[Bibliography Number]

Books:

Author, *Title*, vol. Volume, Edition ed. City: Publisher, Year.

Journal Article:

Author, "Title," *Journal*, vol. Volume, pp. Pages, Year.

Conference Proceedings:

Author, "Title," presented at Conference Name, Conference Location, Year of Conference.

**Report:**

Author, "Title," Institution, City, Type Report Number, Date Year.

**Book Section:**

Author, "Title," in *Book Title*, vol. Volume, *Series Title*, Editor, Ed./Eds., Edition ed. City: Publisher, Year, pp. Pages.

**Generic:**

Author, "Title," in *Secondary Title*, vol. Volume, *Tertiary Title*, Secondary Author, Ed./Eds., Edition ed. Place Published: Publisher, Year, pp. Pages.