



## **Water Biology PHC 6937**



# **Outreach and Scientific Communication Strategies**

**Andrew S. Kane, Ph.D.  
Environmental Health Program  
College of Public Health & Health Professions**

This PowerPoint presentation will cover basic principles of outreach and scientific communication. These subjects are relevant to our course since it is important for toxicologists, healthcare professionals and environmental outreach persons to be able to clearly communicate technical information to a variety of different audiences. It will also serve as a model for you as you develop your assigned presentation that you will present later in this course.

Emphasis in this PowerPoint presentation will be on developing outreach materials using PowerPoint. However, many of the same principles apply to developing presentation materials using other outreach methods.

This PowerPoint presentation was designed to provide you with inspiration and a conceptualized framework from which to develop well-organized, meaningful technical presentations.

The purpose of presenting is to actuate. You want to persuade people to think or act in response to your message. Otherwise there is no point in making the effort of preparing and delivering your presentation. This may sound straightforward, but good communication of technical information remains both an art and a science.

In order to open a dialog with an audience, we need to address the concept of **perception**.

## Perception is often more powerful than fact.

There is no mistaking the imperative of truth and the importance of unbiased observation of people, chemistry and nature. However, a corollary principle of persuasion is *perception*. How an audience perceives a presenter can persuade them or dissuade them from listening, interpreting and responding. Effective presenters are aware of this power of perception and deliberately design themselves and their messages accordingly. Although this is a principle of business and marketing, scientists and healthcare providers should not forget that their professions are businesses too. And effective communication is part of that business.

An audience receives, processes and judges your presentation. Presentations are perceived not only through words, but how you sound vocally (in the case of an oral presentation), how it looks visually, and the entire package. In many respects, presenting is an art. The whole presentation is your canvas; the facts are the fibers of your paintbrush... and brush strokes alone do not make a masterpiece... it's how the brush strokes are applied that richness and complexity (of data) come through.. Artful combination of all presentation elements create a product of perceived value.

Good presentation skills and the *perception* of credibility, authority, control, and being on top of the knowledge base may represent **90%** of what it takes to make an excellent presentation. The other 10%, good content, is obviously also very important.

## Questions to ask yourself when putting together a presentation

1. How can I limit my presentation content so that my objectives, methods, results and conclusions can be seen with clarity and ease of understanding?

The best way to limit your presentation is to try and address a singular concept, with a singular take-home message. The reason for this simple-minded notion is that our minds are full of information. All the time. If you can develop a presentation that revolves a singular message, and be good at it, there is a better likelihood of that message getting through and being remembered.

Regardless of whether or not you are presenting a scientific paper (with clear objectives, methods, results and conclusions) or a focused risk communication seminar to your peers, there are several basic constructs that should be followed to foster ease of understanding. These include good organization, a singular take-home message, appropriate key supporting points,

## Questions to ask yourself when putting together a presentation

2. How can I make my message more meaningful and memorable?

### **Repetition is a valuable aid in getting your singular message across.**

Repetition does not mean “dumbing down” your presentation. However, repetition is an excellent tool for helping your audience “see” your content framed within your presentation structure. It also helps get your singular message “stuck” in your audience’s mind. After all, if your presentation is not memorable, then what’s the point in presenting?

So, a good ideology for giving a good talk is the **Three Ts**:

1. **Tell them what you are going to tell them** (a preview, i.e., a brief introduction including big picture relevance and an organized preview of what’s coming);
2. **Tell them** (the body of your talk, delivered with the same organization and order as mentioned in the preview); and
3. **Tell them what you’ve told them** (summarize your key points and restate the take home message).

## Questions to ask yourself when putting together a presentation

3. How will I relate my information to this specific audience?

Know your audience. *Repeat:* know your audience (use of repetition to provide emphasis). Insights about your audience will allow you, the presenter, to appropriately gauge the level of your presentation and the depth of necessary content to get your message across. Being informed about your audiences lends additional credibility to you.

Most importantly, presentations do not necessarily need to be meaningful for you (the presenter). You already know the meaning of your message. Deliver the message from the audiences' point of view. Another way to say this: What you want to present is not as important as *what the audience needs to hear* in order for your message to come across clearly and simply. Remember that an audience will judge a presentation on the basis of *how meaningful it was for them*.

## Questions to ask yourself when putting together a presentation

4. What will get and keep the attention of my audience?

In the case of delivering an oral presentation, there are many obvious factors that will lead to getting **and keeping** your audience's attention. These include, but are certainly not limited to, being dynamic, enthusiastic, well-organized, energetic, and using appropriate visual aids. In oral presentations, there are a myriad of other factors, some subtle, that also aid or hinder good presentations. These include manner of dress, posture, vocal projection and intonation, etc.

In an online or PowerPoint presentation, many of the in-person factors no longer count. But the same concepts about use of space, information transfer, information content and organization, and aesthetics count. Logical ordering of information is helpful for any audience. Take your audience by the hand. Spoon feed them. Nothing should be over their heads. Don't make them *work* to glean your information.

## Preparing your presentation

The order that you prepare your presentation elements is not necessarily the same as the order that you present it.

In order to help you organize your presentation and prepare it with a singular message, develop your presentation in the following order:

1. Your objective
2. Limited key points with supporting material (and transitions)
3. Preview and Summary
4. Brief opening and closing remarks/slides

However, you should organize and deliver your presentation in the following order:

1. Brief opener (if relevant)
2. State the objective of the presentation
3. Provide a preview of the presentation
4. Deliver the body of the presentation (bring in key point #1, a transition to key point #2, key point #2, a transition to key point#3 (if needed), and so forth)
5. Provide a summary of the presentation
6. Brief closing (possibly including a “to do” or “homework” for the audience).

## Defining your objective

*Ask yourself:*

“What do I want to accomplish  
by delivering this presentation?”

Literally, prior to going further in developing your presentation, go ahead and fill in the blank for yourself.

**By the conclusion of this presentation, my audience should/will:**  
\_\_\_\_\_ (what?).

Stating an objective this way helps to focus attention on what you want your audience to do with the message. Typically, a presentation is geared at getting people to:

- Understand something, or
- Be able to do something, or
- Do it.

# Again, simplicity

## The K-I-S-S Principle

**KISS** - Keep it simple, speaker! Again, since our minds are filled with facts and people tend to be quick to forget, use three or fewer key points help to keep it simple for your listeners. They will be able to retain more of less. Therefore, ask yourself: "What points will best lead to my objective?" and "What points do I most want the audience to remember?" Delete the extraneous.

On the other hand, do not let the KISS principle get in the way of clearly portraying complex data sets or ideas. Find a creative way of getting the data across. **GOOD DATA PRESENTATION DESIGN IS CLEAR THINKING MADE VISIBLE** (bad data presentation design is poor thinking made visible). The presentation of data (yours or from the literature) supports your mission statement with needed facts that help build your argument.

## Media Elements

**In traditional oral/platform presentation venues, there are many effective media types:**

- PowerPoint slides
- Ektachrome 2 x 2 slides
- Overhead transparencies
- Video, film
- Flip charts, large posters
- Handouts, models, props

Supportive media elements should be graphic and creative. They should fit the setting, support the message, awaken the audience, and be used appropriately and in moderation. *Visuals which portray data should show causality.* Use of color should be used only to help the data speak for itself. Avoid glitz.

Remember, visual aids should be visual and should aid. If the visuals *become* the presentation, rather than supporting elements for key points in the presentation, they may detract from your message.

## **Media Elements**

**(some nuts and bolts)**

**In PowerPoint there are a variety of media elements that are typically used. These include but are not limited to:**

**Text**

**Photographic images**

**Other graphics**

**Charts and graphs**

**Tables**

For many of you, this may be the first time developing a PowerPoint presentation of your own. As such, it may be initially challenging to figure out how to import media elements, other than text, into your presentation. Text can be directly generated or copied into PowerPoint. You may want to develop your text, without formatting, in a word processing program (that has the benefits of easier editing) and then copy and past into PowerPoint.

Digital images, including photographs, scans of graphs, pictures, etc., can be imported into PowerPoint from other files. JPEG files are a good file type for importing graphic media elements since they are compressed and take up less memory. Also, the file size of imported graphics is important. You want the image to be of sufficient quality to look good without having “wasted” extra resolution (this can use up additional, unnecessary memory and bog down your computer). For example, a full screen RGB color JPEG image, 10 by 7.5 inches at 72dpi could be as large as 350kb. Smaller images should be smaller file sizes. File size is a function of both image size and resolution. Adobe Photoshop is an excellent software package for adjusting image quality (although it has a steep learning curve).

New graphs and tables can be generated in Excel (and imported) or directly in PowerPoint. There are many other software packages that can assist you in developing graphs, tables and other graphics. A digital camera or flatbed scanner are good tools with which to obtain digital images of pre-existing graphics. Adjust image size, resolution and image quality accordingly.

# **Use of slides (1)**

## **General Principles for creating PowerPoint slides**

Check for spelling errors. A typo projected onto a large screen is genuinely avoidable and can be a distraction. Use a spell checker. And, no matter how many times you proof them, have someone else take a look at them as well.

In the event that you have to go to bat with a slide containing a spelling error, don't point it out to the audience. Chances are that they won't see it. If it's a glaring error, obfuscating the meaning of the slide, don't use it.

Avoid using all upper-or lowercase text, except for titles. Avoid more than two colors on any text slide. Avoid mixing more than two fonts or three point sizes. Avoid extravagant fonts (i.e., use conservative fonts without major flair or serifs such as Helvetica, Arial and Geneva that are easy to read).

Don't use too much text. One rule of thumb is not to exceed 20% of the total slide area with text. Consider the 5 x 5 rule... Limit the slide to 5 lines with no more than 5 words per line.

## **Use of slides (2)**

### **General Principles for creating PowerPoint slides**

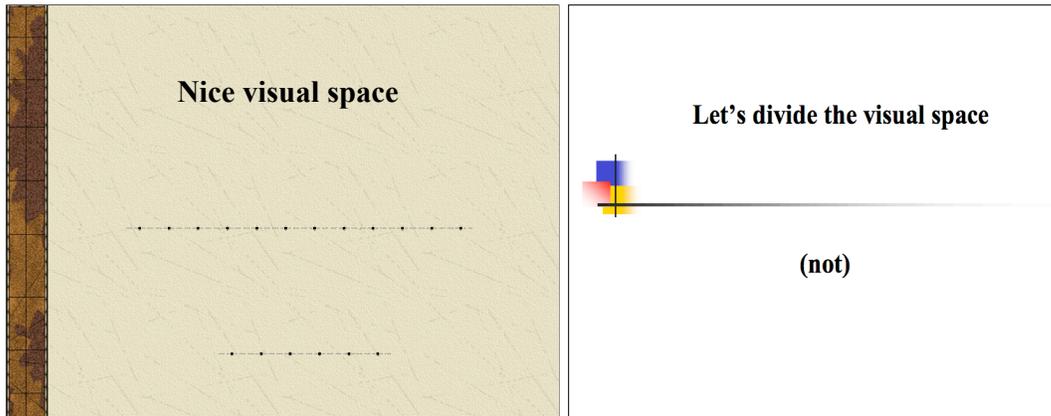
Be consistent with your visuals - try to maintain use of a single template. For example, it is distracting to have a series of nicely colored slides, and then have several black and white slides thrown in the middle.

In PowerPoint, there are a multitude of different backgrounds and templates that you can choose from. Microsoft and Bill Gates even provide you with a little animated, hyperactive paper clip (or a little computer on the Macintosh platform) that offers advice! Pay these little animated icons no mind. Although some of the suggestions offered by the PowerPoint software are handy and provocative, they are not necessarily a “best bet.” For example, PPT “suggests” the use of dark colored backgrounds with light colored text. Although this may have great visual appeal in certain combinations, it is actually more difficult to read on a monitor, and if you are projecting it onto a screen in a darkened room, dark slides give off much less light! This translates to less light getting into your audience's eyes. In turn, this literally translates to less stimulation of retinal nerves and the CNS (also, one way to help prevent your audience from falling asleep, particularly after lunchtime, is to not have the room too dark!). Just food for thought.



This slide is the first example of one of many templates available in PowerPoint. When initially setting up the presentation file, one may choose to apply a design template, that remains consistent throughout the presentation.

In this example, there are at least two elements to the background design that are worth considering. First is the left vertical bar. This part of the template is distracting relative to the larger, central portion of the slide which is where the information goes... Also, the vertical bar would likely not get used for anything and therefore it is a waste of your precious space. The other element is the larger, central area that fades from black on top to bright blue on the bottom. A nice visual effect. This type of color fading works well on most computers (with sufficient video memory) and projectors, but may not so well on older computers that cannot display millions of colors. Again, with a darker background, light lettering is required to provide contrast. If you decide to use a dark background (for whatever reason) the “two-color fade” concept can work if you choose two colors that have similar values (i.e., dark blue to slightly lighter blue). This can be done without a template by defining slide or presentation color schemes. However, don’t make the background the visual highlight of the slide.



The template on the left shows a nice rice paper-like design, with left vertical border. Although this border has aesthetics for the slide background, it nevertheless takes up your space. This template could be really nice for Asian menus or recipes, for example.

The template on the right is one example of a pre-designed space that provides separators-- that divide the "title" area from the "text body" area. Some of the dividers are visually appealing and not terribly distracting. But they can be placed too low on the template! If you found a divider you like, you could take a screen capture of it, and save only the divider to use as part of your own, unique master template. Experiment and design your own.

UNIVERSITY OF MARYLAND  
COLLEGE PARK CAMPUS



**Aquatic Pathobiology Center** 

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

# **Mycobacteriosis in Chesapeake Bay Striped Bass: Effects on Fish and People**

**Andrew S. Kane, Ph.D.**

Here is a template header that was custom-developed to provide a needed sense of place for the title slide of an old presentation. For this presentation, the politics of both the VMRCVM and the University of Maryland College of Agriculture (little yellow, red and black globe logo) were important. A thin separator bar below the header text and graphics (composed of yellow, black and red colors; the colors of the Maryland flag), separated the header from the body of the slide. This header was used only for the title slide so as not to visually interfere with the text and pictures of the presentation content in the remaining slides. To maintain continuity throughout the presentation, however, the separator bar alone was used on subsequent slides to separate the slide header text from the body of the slide.



Here is yet another background template from PowerPoint that could just as well be a photographic image that you imported. Some presenters tend to put a nice ending slide in their presentation, thinking that their audiences want to “cleans their palette” after you have served the presentation meal.

This way of ending an otherwise good presentation is not an appropriate way to keep your singular message clear and present. Why change the subject completely at the end of your presentation time by showing an unrelated visual? Your audience needs to walk out of your presentation remembering your singular message!

Alternatively, a slide like this could work well if your topic was about diurnal fluctuations occurring within in a subject of island biogeography. Appropriate bullets on this slide might include a concise recap of your successfully completed objective. Or an empowerment statement directed toward your colleagues relative to the need for additional efforts or funding on the same subject (i.e., a take-home message or homework assignment to keep them thinking about your message...).

## **Use of slides (3)**

### **General Principles for creating PowerPoint slides**

If possible try to have all your slides oriented similarly, i.e., landscape, not portrait (portrait slides, amidst an otherwise landscape slide presentation, will distractingly go off the screen). We will look at an example portrait slides shown in the landscape environment of PowerPoint in the next three slides.

## **Data should show causality**

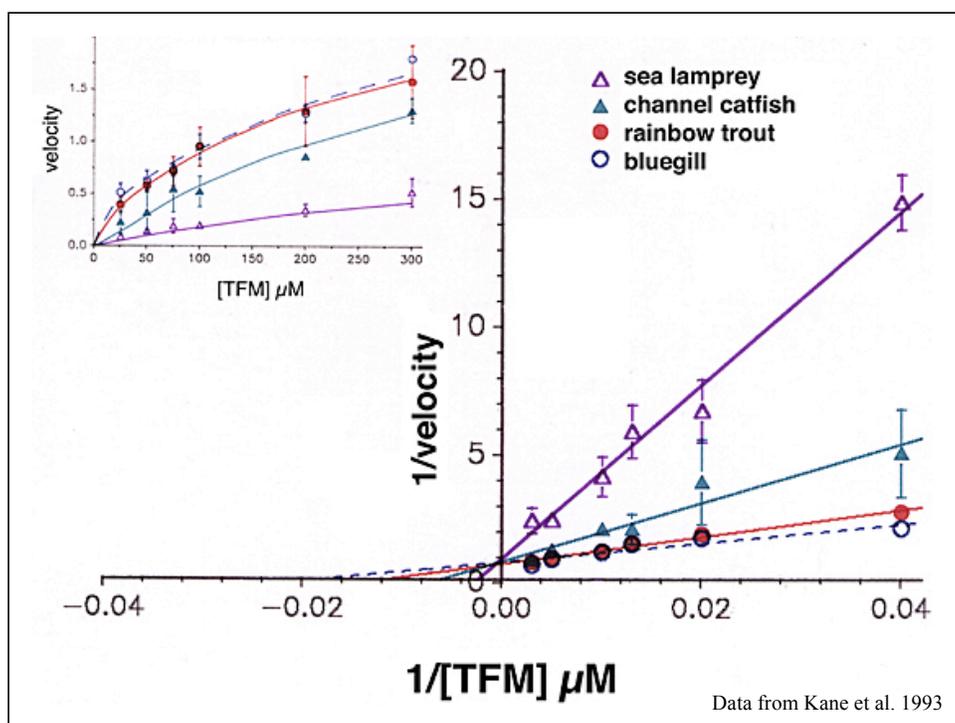
**Part of many scientific or technical presentations will contain data. The data should be supportive, relevant and show causality.**

Datasets included in outreach presentations may be original, they may come from a manuscript or book, or be synthesized from multiple sources.

If you have a poorly designed or illegible table or graph from another source, don't use it. Re-create it (or parts of it) if necessary. If it's too big to read on a small screen (i.e., there is too much information in a single table or graph), cut it up into digestible pieces.

Decide if a table is a better way to get across causality than a graph.

Presenters should not assume that their audience is familiar with your type of data or the way it is presented. For each graph or table presented, all elements should be easily readable. The presenter should clearly let their audience know the purpose of each graph, table or data element. Again, in the case of a graph, take your audience by the hand and begin by saying what this graphs tells us (don't say "As you can see here..."). Then define the axes. Then show the datapoints. Then show the trend in the data and what it means. Do the same thing for tables.



Here is an example of a relatively complex graph that is likely not familiar to most audiences or healthcare professionals. However, with a descriptive introduction and a little hand holding, the data can come across:

These graphs show liver metabolism for a pesticide, TFM (3-trifluoromethyl-4-nitrophenol), in four species of fish. TFM is a selective pesticide that has been used to control parasitic lamprey in Great Lakes since the 1950's. TFM is metabolized by the liver enzyme, glucuronyltransferase, to become a TFM-glucuronide. This metabolic product is more polar (water soluble) than the parent compound and hence more readily excreted. Rapid excretion facilitates reduced toxicity. The inset in the upper left corner shows that the velocity of the conjugation reaction increases (in nanomoles per minute per mg protein; Y-axis) as the concentration of TFM in micromoles increases (X-axis). The same data is shown in a reciprocal plot in the central part of this figure, where the Y-axis is now 1/velocity and the X-axis is 1/TFM concentration. By showing the data in a reciprocal plot the response curves become straight lines, and the Y-axis intercept and the X-axis intercept can be revealed. Mathematically, the inverse of these intercepts represent the maximal velocity and the binding affinity for the enzyme system in each of the fish species examined. The maximal velocity and the binding affinity tells us the "relative efficiency" the conjugating enzyme system in each of the fish species. These data show us that the maximal velocities for each of the fish species is similar (similar Y-intercepts). However, the binding affinity for bluegill is significantly greater than rainbow trout, which is greater than channel catfish, which is greater than lamprey. These differences in metabolism account for why this pesticide can be used selectively against lamprey without causing notable mortality other fish species.

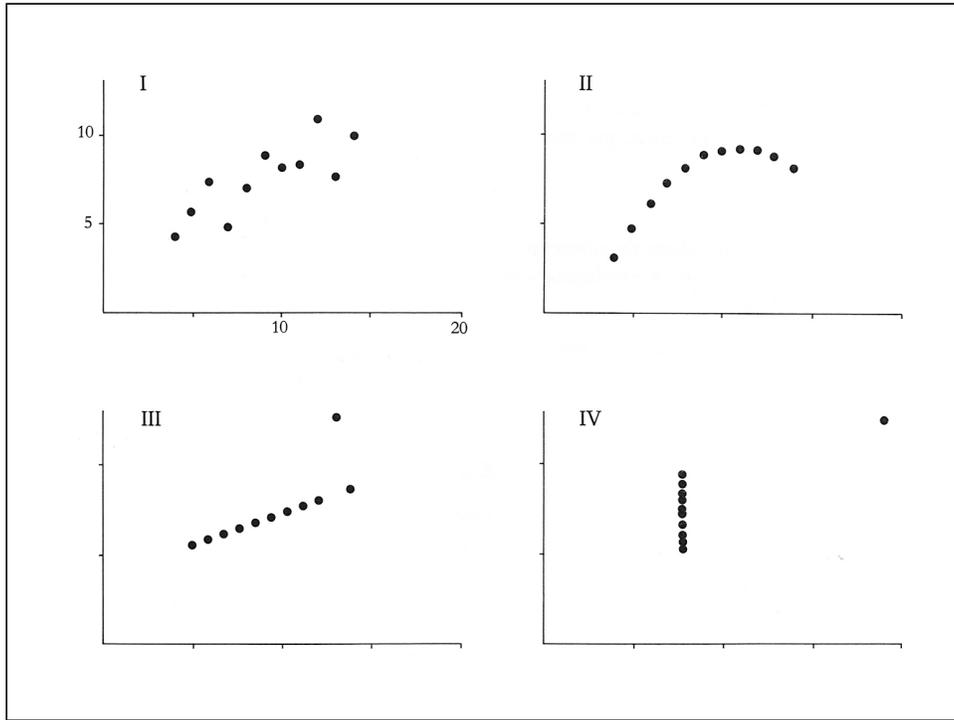
I		II		III		IV	
X	Y	X	Y	X	Y	X	Y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

**This slide illustrates the importance of showing relationships in your data.** It is good to format data to make wise and appropriate comparisons. Comparisons to what (you should ask yourself)? Decide best format for presenting the relationships. Make side-by-side comparisons if possible. Take your audience by the hand.

The four datasets above are known as *Anscombe's Quartet*. All four data sets have a **sample size=11**. **The mean of each dataset's Xs=9**. **The mean of each dataset's Ys=7.5**.  **$Y=3+0.5X$**  is the equation for each of the dataset's regression lines. Each dataset has the same correlation coefficient (0.82) and can be described by exactly the same linear model.

Yet, by looking at the table of datasets, it is nearly impossible to decipher similarities or differences between dataset I, II, III or IV. In the next slide, let's look at the same data presented graphically as scatter plots.

Data graphs derived from E.R. Tufte, 1983. *The Visual Display of Quantitative Information*. Graphic Press.



Here are the same four datasets graphically presented.

How they differ!

**Talent imitates.  
Genius steals.**

*T.S. Elliot*

Regardless of what data, pictures or constructs you need to include in your presentation to make your message come across, do it well.

It is reasonable for “young” presenters to not have instantaneous deftness in their ability to craft and develop concise, visually appropriate graphics the first time. However, T. S. Elliot suggests a good solution.

As long as your are not plagiarizing, when you see graphic formats for expression of information or data, hold on to them. Learn from the pros. Paraphrase, or make appropriate citations or quotations as necessary.

# Final thoughts about the PowerPoint development platform (1)

Here we are in the new millennium. PowerPoint is the most common and available software tool to assist with the delivery of technical information using a variety of media elements. It allows for rapid development of presentations in short periods of time and the ability to make changes just prior to presenting. There are also disadvantages to using this software, much of which lies in how it is used. Too much glitz, such as slide-to-slide transitions, flying text and sound effects can be major distractions to your audience. Sure, they can show off your digital prowess, but they can also seriously battle for the mind of your audience. In using PowerPoint with a live audience you obviously need a computer and a projector. There are many cases where technical errors can delay or prevent you from delivering your presentation. If you are using this outreach mode with live audiences, consider bringing your own equipment that you are familiar with, and arriving early to set up and test it. Or have great trust in your host's technical personnel and their assistance. Be prepared to be able to deliver your presentation without the PowerPoint support (heaven forbid!). You can have other backup, such as a handout. Or, in theory, you should be able to deliver your talk with sufficient organization and verbal imagery to cover yourself. Don't apologize for it; just do it and do it well. Practice it. Know it. Flight time helps. Take every opportunity to give presentations. This will upgrade your ability to communicate and enhance your professional outreach skills that are integral with many professions.

## Final thoughts about the PowerPoint development platform (2)

Take the time to properly develop your presentation. Make bulleted list of notes to help you initially organize your presentation content and elements.

For traditional outreach presentations it would not be unreasonable to spend 10 or more hours developing and preparing for every hour of presentation time. The development time can get more extensive if you want to have really good graphics and other media elements.

Leave sufficient time to develop your presentation. Weeks and month are much better than days. This is particularly true when research time is required. Last minute efforts do not allow for adequate development.

Back up your presentation and supporting media files on removable media (CDs, thumbdrive, external hard drive, etc.) as you develop it. There is nothing like losing your data mid-stream. That makes for a bad day.

## **SUMMARY SLIDE**

**A quick review of some of the important concepts associated with successful, technical outreach presentations.**

Have a clear, singular objective.

Develop your outreach presentation with limited key points to support your objective.

When appropriate, use visual aids and supporting graphics.

Visual aids should be visual and should aid.

Know your audience.

Present not what you want to present. Present what your audience needs to hear.

Strive not to be understood, but for it to be impossible to be misunderstood.

Be creative and energetic in developing your presentation.

Trust that, even though it may take a lot of work to develop a good presentation, the effort will be a reflection of you, and it will be noticed by your audience.

You will get better and developing outreach presentations as you get more “flight time.”

Take every opportunity to present. Enjoy it and the challenge.

*--Andy Kane*

## Notes About This Presentation

- Microsoft Word was used to develop much of the text for this presentation.
- PowerPoint was used as the development platform.
- Adobe Photoshop was used to manipulate the graphical images.
- PowerPoint was “printed” using Adobe Acrobat (to provide you with a pdf file for easy downloading) in **notes format**, to give the feel of a slide presentation with associated verbal narrative (i.e., the notes).

Instead of verbally narrating this presentation and delivering it live (or using a computer interface with Flash or RealPlayer), it was presented as PowerPoint slides with **Notes**. The notes substitute for narration. Throughout the presentation, observe how the notes generally *complemented* the slides to provide associated, necessary information. Also, note the use of transitions between slides (referring to verbiage in the notes, not PowerPoint “slide-to-slide transitions”).

As you deliver your presentation remember that PowerPoint is not presenting your presentation. You are. You, as the presenter, will look better and maintain greater credibility when you can deliver your talk to your audience with good eye contact and supportive PPT elements.

## Selected Bibliography

Arrendondo, Lani. 1991. *How to Present Like a Pro (Getting People To See Things Your Way)*. McGraw Hill, NY.

Beveridge, W.I.B. 1957. *The Art of Scientific Investigation*. Vintage Books (Random House), New York.

Ciba Foundation. 1987. *Communicating Science to the Public*. Conference on the Communication of Science, Ciba Foundation, London 14-16 October 1986. John Wiley & Sons, Ltd., NY.

Gibaldi, Joseph and Achtert, Walter S. 1988. *MLA Handbook for Writers of Research Papers*, 3<sup>rd</sup> Edition. Modern Language Association of America, NY.

Kushner, Malcolm. 1996. *Successful Presentations for Dummies*. IDE Books Worldwide, Inc., Foster City.

Mira, Thomas. 1995. *Speak Now or Forever Hold Fall to Pieces*. Random House, NY.

Milo, Frank. 1986. *How To Get Your Point Across in 30 Seconds Or Less*. Pocket Books, NY.

Nelkin, D. 1995. *Selling Science: How the press covers science and technology*. W.H. Freeman and Co., New York.

Ries, Al and Jack Trout. 1986. *Positioning: The Battle for Your Mind*, revised 1<sup>st</sup> Edition. Warner Books, NY.

Sindermann, Carl. 1982. *Winning the Games Scientists Play*. Plenum Publishing. ISBN: 0306410753

Strunk, W. and White, E.B. 1979. *Elements of Style*, 3<sup>rd</sup> Edition. MacMillan, NY.

Tufte, Edward R. 1983. *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, CT.

Tufte, Edward R. 1990. *Envisioning Information*. Graphics Press, Cheshire, CT.

Tufte, Edward R. 1997. *Visual Explanations: Images and Quantities, Evidence and Narrative*. Graphics Press, Cheshire, CT.