



How To Give a Talk

Tammy Kolda
Sandia National Labs
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Before it's time to interview, look for opportunities to get experience

- Internships
 - End of summer presentation
- Student seminars **
 - Graduate student seminar series
 - Journal clubs (present others' work)
- Local & national meetings
 - Contributed poster or talk
- Toastmasters Organization
 - General public speaking help
 - <http://www.toastmasters.org>



** This is an opportunity you may need to create yourself!



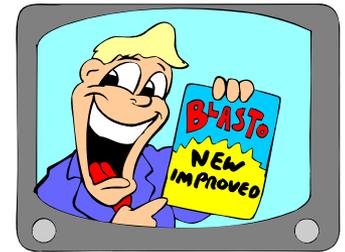


Planning for a Talk



Your technical talk should have a central message

- Not the same as a classroom lecture
 - E.g., leaving out details can improve it!
- It's an advertisement (of sorts)
 - For your work (read the paper!)
 - And you (hire me!)
- Even in an hour-long seminar, it's impossible to cover all details
 - Focus on big ideas and major impact
 - Use simplifying assumptions
- **Avoid** a chronological description of your work!

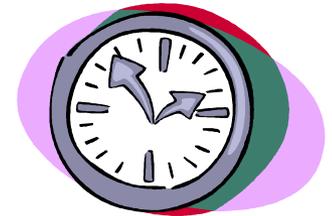


What's your elevator speech?
2-3 sentences at most!



Plan how you can convey your message in the allotted time

- Avoid too much background
- Estimate 2-3 minutes per slide
 - 15-minute talk = 5-7 slides
 - 50-minute talk = 15-25 slides
- Prioritize the details
 - If main message is a faster algorithm, focus on method and numerical results rather than theory
- Audience has only allocated a certain amount of time for your presentation
 - Don't go over!





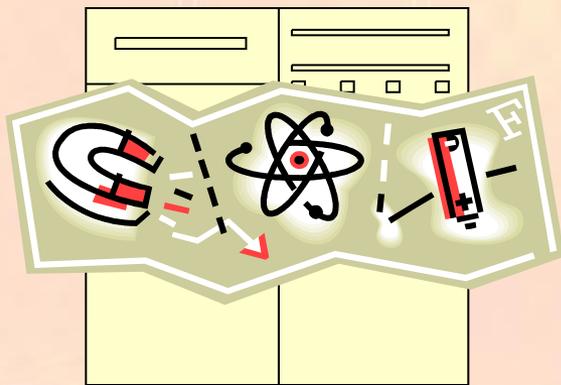
Tune your message and your timing to your audience

- Who will the audience will be? (Ask!)
 - Students or not?
 - Technical or not?
- Don't assume their knowledge overlaps with yours
 - Know less about your specialty
 - May know more about related areas
- Set the context (in plain English)
 - How does this help save the world?
 - Exactly how is the science, engineering, or mathematics advanced?



User Tuning of Simulations can be Inefficient

Run Simulation



Determine New Inputs



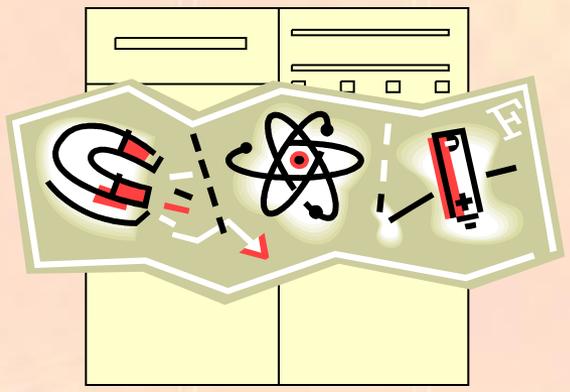
Evaluate Result

(i.e., determine the value of the objective function)



Optimization tunes parameters automatically!

Run Simulation



Determine New Inputs



Evaluate Result

(i.e., determine the value of the objective function)



← You slacking off while the optimization algorithm does your work automatically





Components of a Talk

“Tell ‘em what you’re gonna say, tell ‘em, and tell ‘em what you said.”



There are Typical Components to Technical Talks (e.g., CS&E)

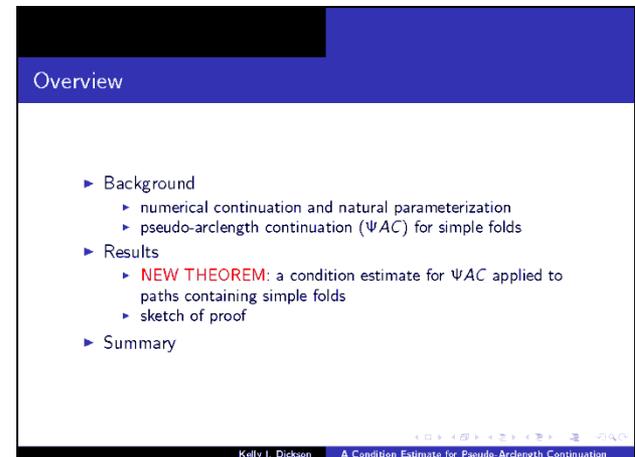
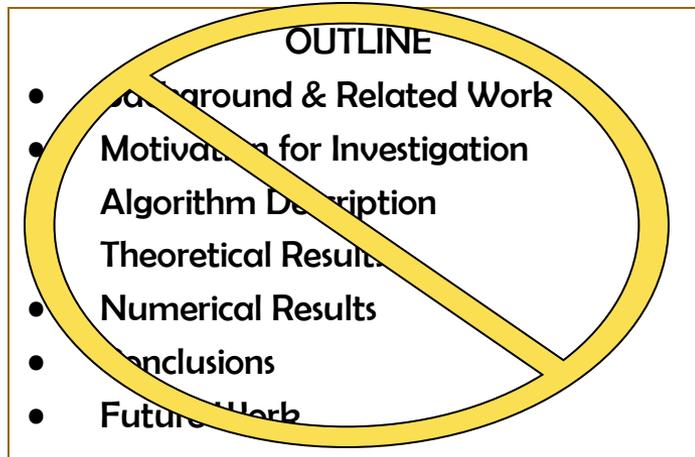
- Outline
- Background & Motivation
- Experiment / Algorithm Description
- Theoretical Results
- Experimental / Numerical Results
- Conclusions
- Future Work





Avoid Outline Slides (Generally)

- 99% of outline slides are identical, so they don't add anything to the presentation
- **Alternative:** Substitute “transition slides”
- The exception is outlines that don't fit the typical mode and support the thesis of the talk; see Kelly Dickson





Outline Slides that support the thesis are Good!

Overview

A good example of a useful outline slide.

- ▶ Background
 - ▶ numerical continuation and natural parameterization
 - ▶ pseudo-arclength continuation (ΨAC) for simple folds
- ▶ Results
 - ▶ **NEW THEOREM**: a condition estimate for ΨAC applied to paths containing simple folds
 - ▶ sketch of proof
- ▶ Summary

From: Kelly Dickson, SIAM Annual Meeting, 2006



Kelly I. Dickson

A Condition Estimate for Pseudo-Arclength Continuation



Background & Motivation < 33%

- Minimize background to leave time for your contributions
- **Do** cite related work by the authors' names
 - Sets the context (and shows you understand it)
 - Big-time brownie points if you mention folks in the audience
- **Too much background?**
Work it into the middle of the talk

Oooh. He's spent more than half his talk on background! When will I hear about his work??





Experiment/Algorithm Description: Highlight Newness

- Use simplifying assumptions
 - E.g., no constraints for an optimization problem
- Keep notation simple and standard
- Focus on what's new in your version
- **Challenge:** Try to describe the experiment or algorithm in words in addition to (or rather than) technical jargon
- **Challenge:** Ditto for pictures

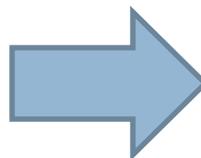
Shifted S-HOPM Converges

S-HOPM

For $k = 1, 2, \dots$

$$\mathbf{x}_{k+1} = \frac{\mathcal{A}\mathbf{x}_k^{m-1}}{\|\mathcal{A}\mathbf{x}_k^{m-1}\|}$$

$$\lambda_{k+1} = \mathcal{A}\mathbf{x}_{k+1}^m$$

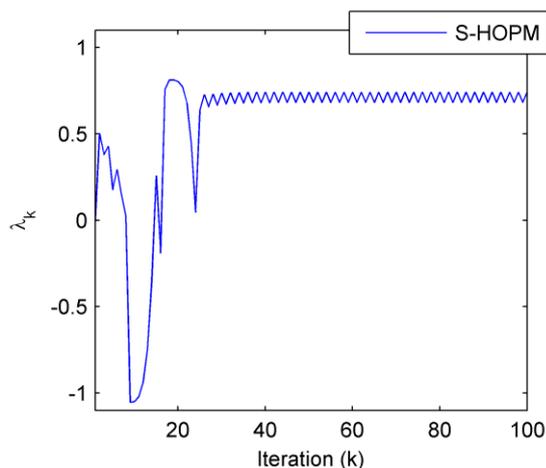


SS-HOPM

For $k = 1, 2, \dots$

$$\mathbf{x}_{k+1} = \frac{\mathcal{A}\mathbf{x}_k^{m-1} + \alpha\mathbf{x}_k}{\|\mathcal{A}\mathbf{x}_k^{m-1} + \alpha\mathbf{x}_k\|}$$

$$\lambda_{k+1} = \mathcal{A}\mathbf{x}_{k+1}^m$$



For suitably large α ...

- Nondecreasing λ_k
- $\lambda_k \rightarrow \lambda_*$
- \mathbf{x}_k has a limit point \mathbf{x}_*
- $(\lambda_*, \mathbf{x}_*)$ is an eigenpair

Making Pattern Search Asynchronous

- **Trial Point Generation:**

$$Y = \{ x + \Delta d_i : d_i \in \text{Search Pattern} \}$$

- **Trial Point Evaluation:**

For each $y \in Y$, evaluate $f(y)$ } **Main Idea: Don't wait!**

- **Decision:** If there is a trial point $y \in Y$ such that y is “better than” x , then the iteration is successful; otherwise, it is unsuccessful.

- **Successful:** $x \leftarrow y$

- **Unsuccessful:** $\Delta \leftarrow \frac{1}{2} \Delta$

- **Stop:** When $\Delta < \text{Tolerance}$

Making Pattern Search Asynchronous

- **Trial Point Generation:**

$X = \{ x + \Delta_i d_i : d_i \in \text{Search Pattern and inactive} \}$
Submit X to evaluation queue

- **Trial Point Evaluation:**

Collect a set of evaluated points, Y

- **Decision:** If there is a trial point $y \in Y$ such that y is “better than” x , then the iteration is successful; otherwise, it is unsuccessful.

- **Successful:** $x \leftarrow y$, reset Δ_i 's, and prune evaluation queue

- **Unsuccessful:** $\Delta_i \leftarrow \frac{1}{2} \Delta_i$ for evaluated directions

- **Stop:** When $\Delta_i < \text{Tolerance}$ for all i



Theoretical Results: Help Audience Untangle the Science

- Theoretical results tough to follow
 - Especially for non-specialists
- Explain impact as well as the results themselves
- Only present proofs if key to central message
- **Idea:** Highlight key variables/ideas/etc. in color

Tensor-matrix-products

Matrization and vectorization obscure the structure.

Basic rule: **Matricize and vectorize as late as possible!**

Lemma 1. Let \mathcal{B} and \mathcal{C} be 3-tensors of conforming dimensions.

$$\begin{aligned}\langle \mathcal{B}(X_1)_{\{1\}}, \mathcal{C}(X_2)_{\{1\}} \rangle &= \langle X_1, \langle \mathcal{B} \otimes \mathcal{C}(X_2)_{\{1\}} \rangle_{\{2:3\}} \rangle \\ &= \langle X_1, \langle \mathcal{B} \otimes \mathcal{C} \rangle_{\{2:3\}}(X_2)_{\{1\}} \rangle\end{aligned}$$

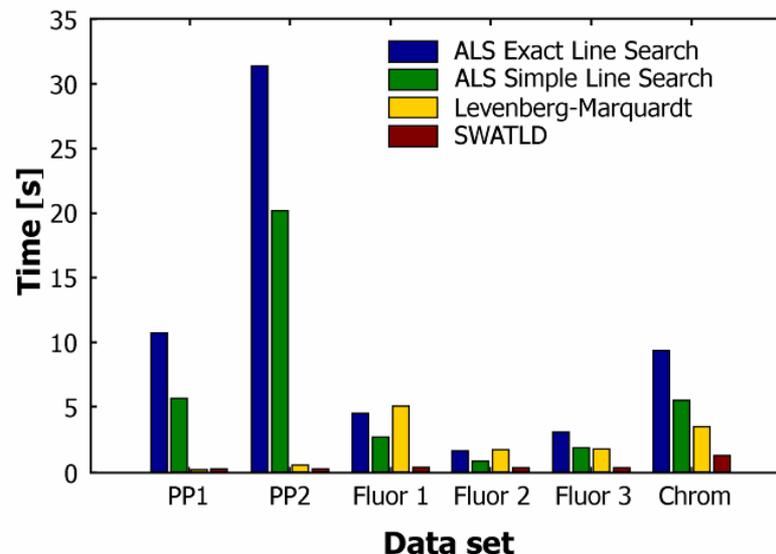
Matrix factors can be “pulled out” of the inner product.

From: *Computing the best rank-(r_1, r_2, r_3) approximation of a tensor*, Lars Elden, Workshop on Algorithms for Modern Massive Data Sets, June 2006.



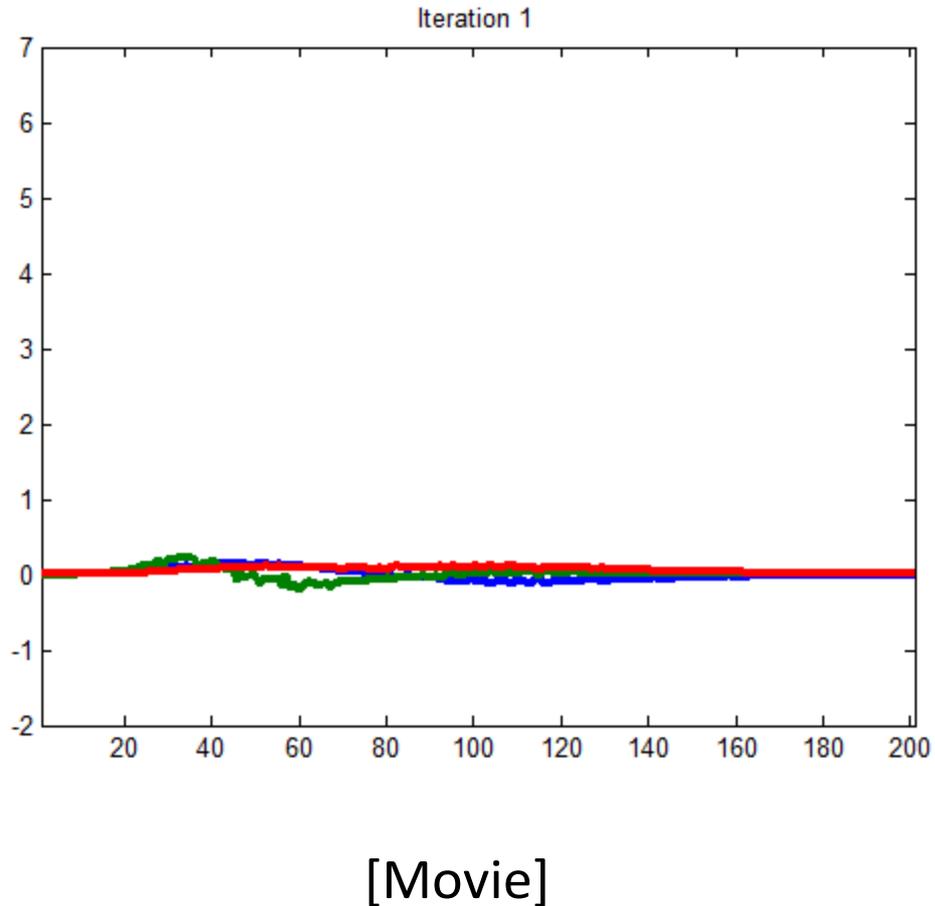
Experimental/Numerical Results: Make it Clear What's What

- Avoid showing tables of numbers
- **Idea:** Use bar charts and graphs
- Clearly label the axes & provide a legend
- Make sure it's clear which method is yours!

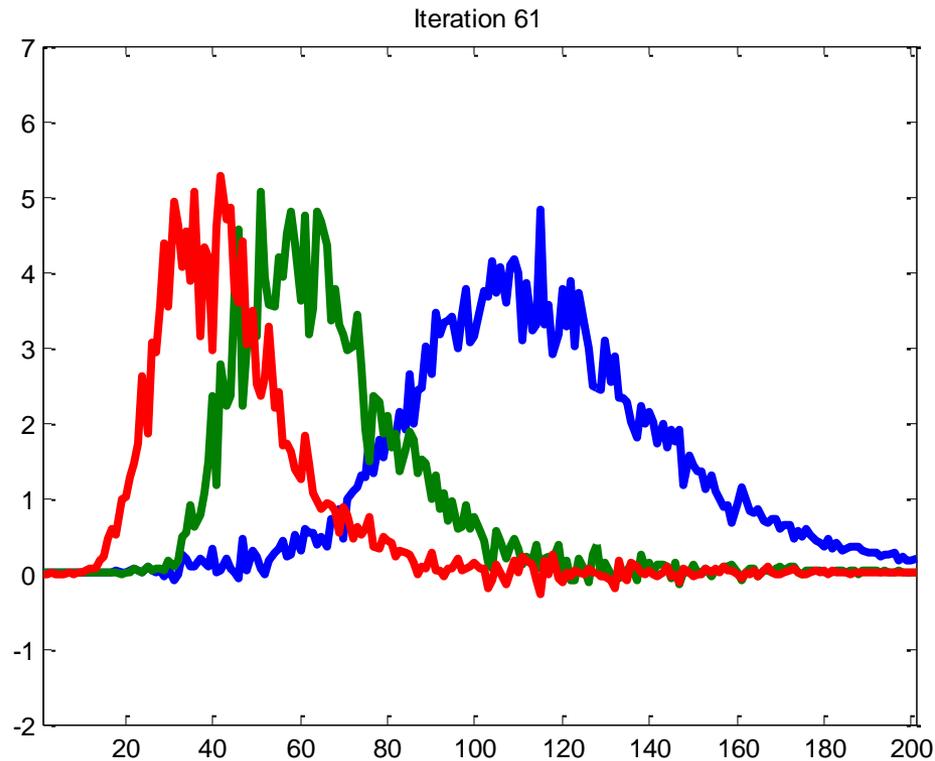


From: Computational Tools for PARAFAC models, G. Tomasi, Workshop on Algorithms for Modern Massive Data Sets, June 2006.

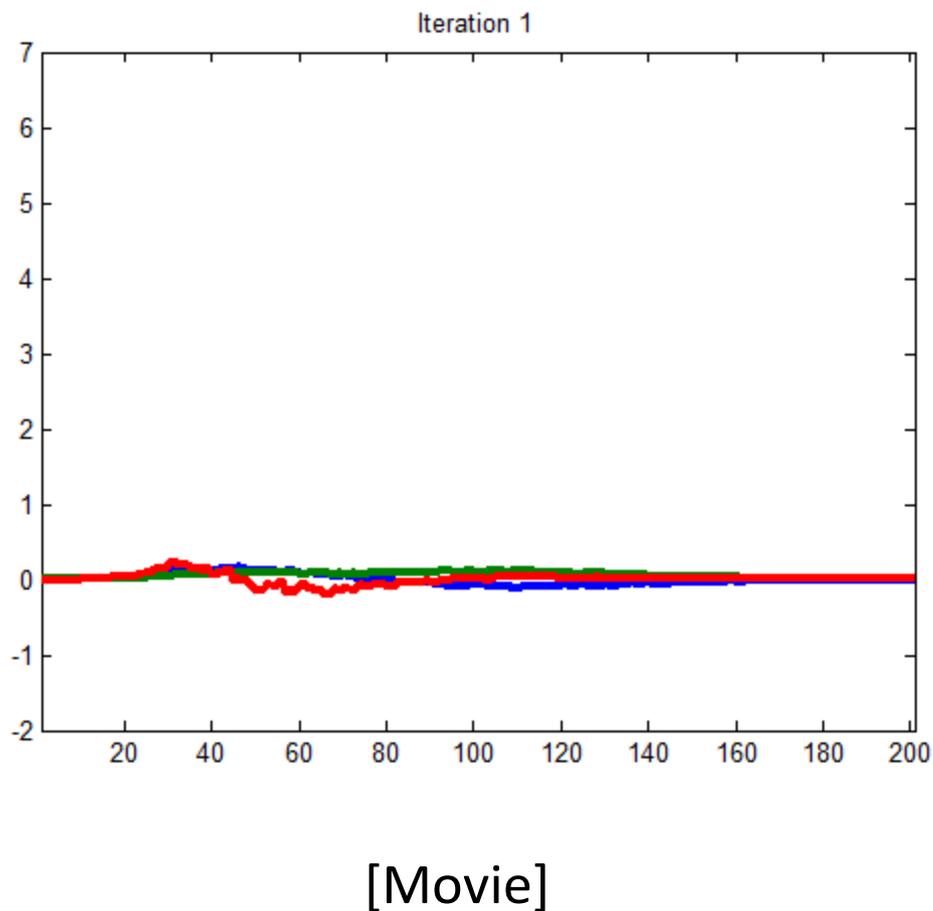
Replacing 50% Missing Values with Mean



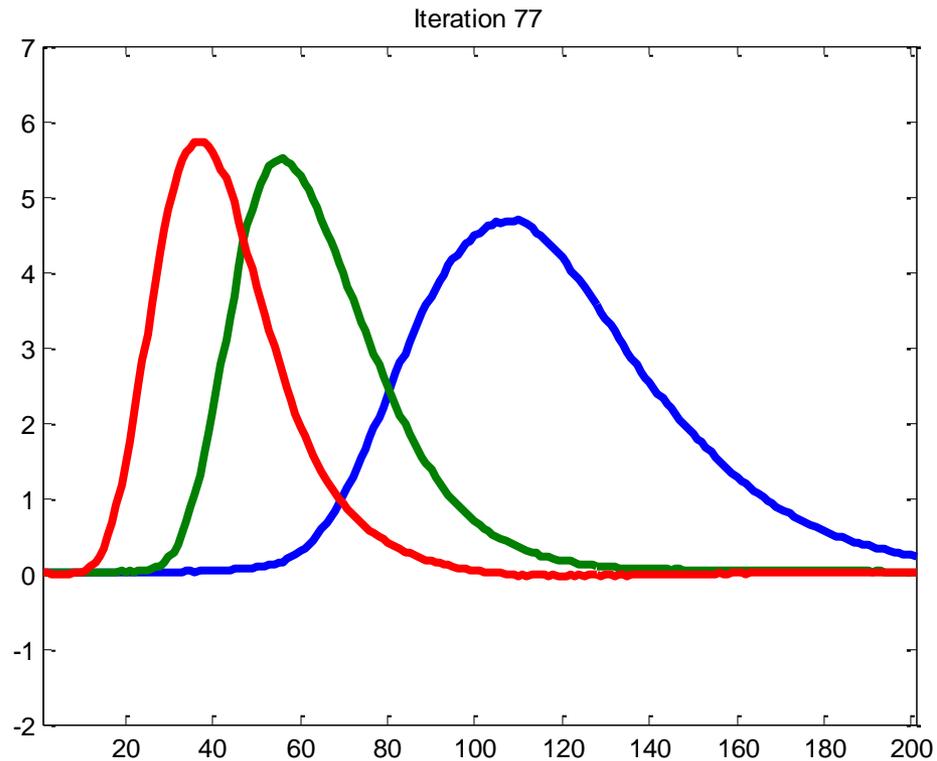
Replacing 50% Missing Values with Mean



50% Missing Data using Sensible Approach



50% Missing Data using Sensible Approach





Conclusions & Future Work: Tell 'Em What You Said

- Succinctly restate your main points
- Remind the audience of the...
 - Motivation for the research
 - Supporting evidence
- Future work (maybe its own slide)



- Be sure to also include a slide at the end with your name, email, and URL

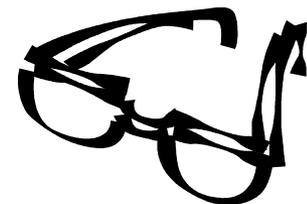


Creating Your Slides

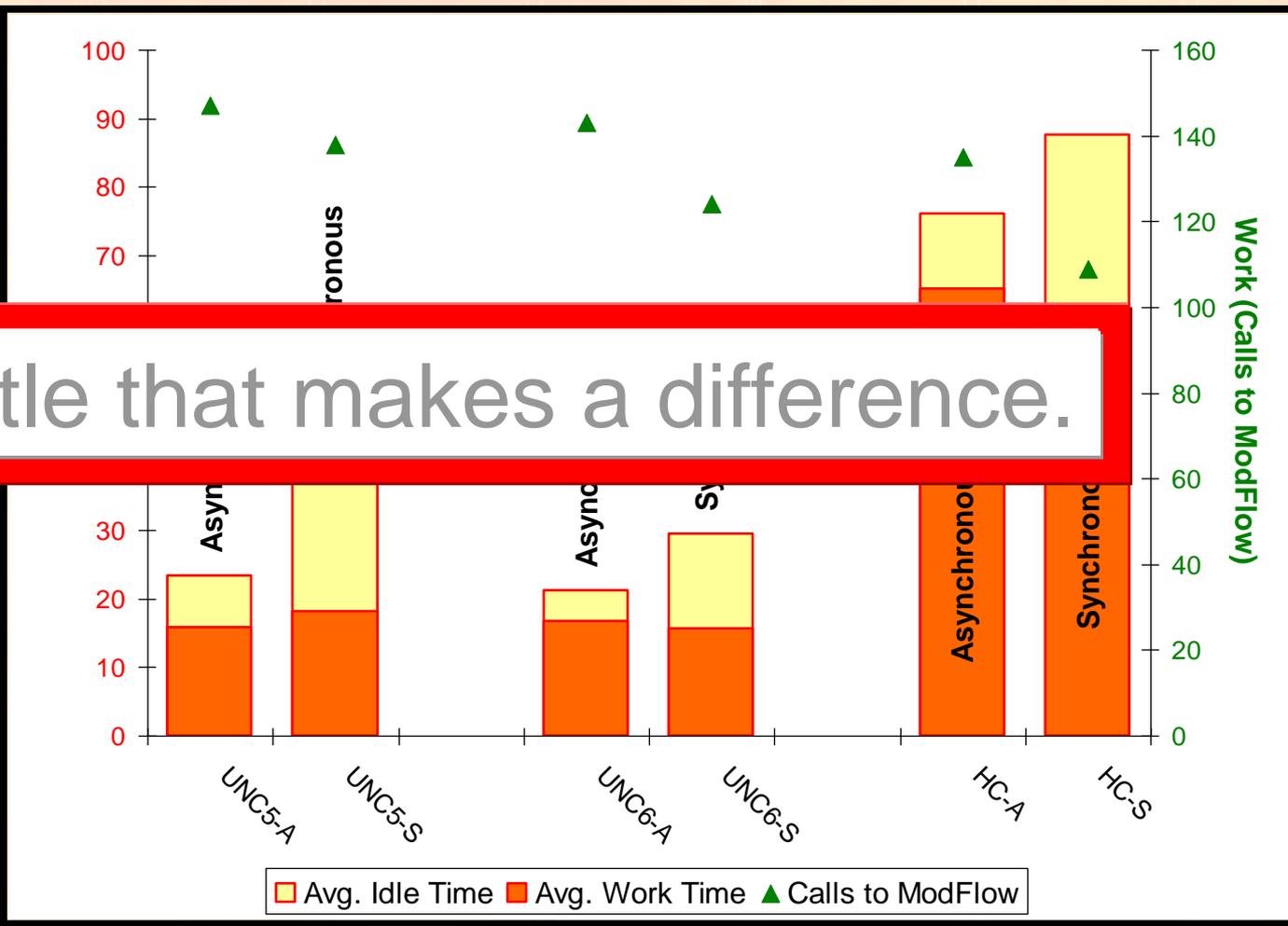


Make Your Slides Readable

- **Do:** Make fonts large (use at least 14pt font)
- **Do:** Use lots of pictures, including general pictures
- **Do:** Use titles that say something (e.g., “Experimental results show new technique is more accurate”)
- **Don't:** Use yellow on a white background (or green text on blue, or blue on black, etc.)
- **Don't:** Forget to check grammar and spelling
- **Don't:** Overcrowd the slide



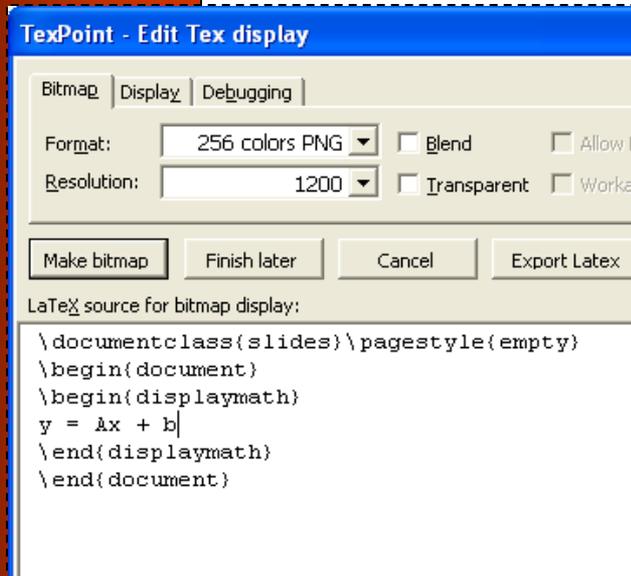
Load Balancing Makes a Difference



In 3 different groundwater problems, the asynchronicity improved the overall run time.



My recommendation: PowerPoint + TexPoint



$$y = Ax + b$$

- Pros (versus LaTeX)
 - No compilation (except TexPoint)
 - Easy to add pictures
 - Easy to add animation
 - Easy to add equations
- Cons (versus LaTeX)
 - No Linux support
 - TexPoint costs \$30
- Other
 - PowerPoint is ubiquitous
 - Management requirement(!)



Colors and Animations: Be Wary

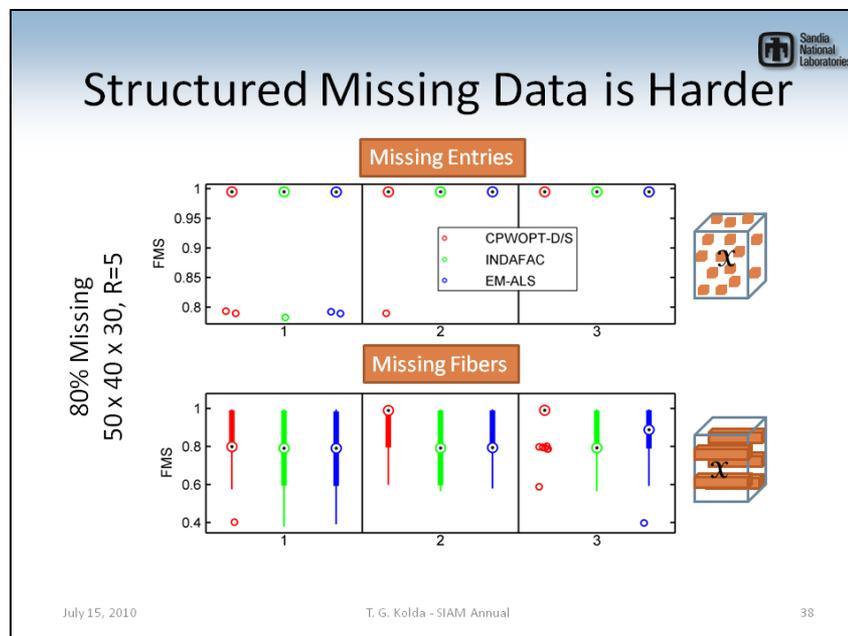
- **Use color** for emphasis and connections
- **Avoid** more than 4 colors
- **Use animations** for emphasis and clarity
- **Avoid** all gratuitous animation
 - Including page transitions, which PPT likes to sneak in
- **Avoid** the “strip tease”
 - Generally best to put all information up at the front



Generating Pictures for Slides

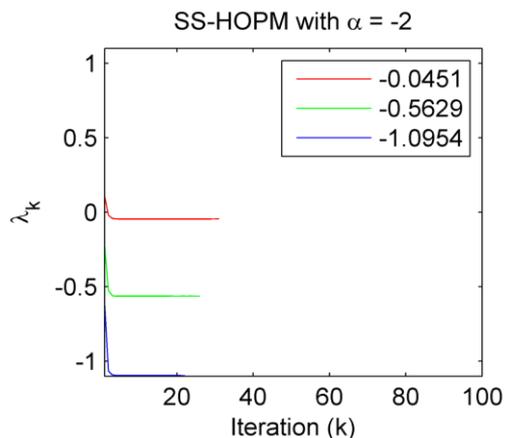
Tools for generating pictures: MATLAB, Excel, bargraph.pl (*), LaTeX picture env.

- Be sure that the axes are labeled and the legend is clear
- Use thick lines and colors that show up well



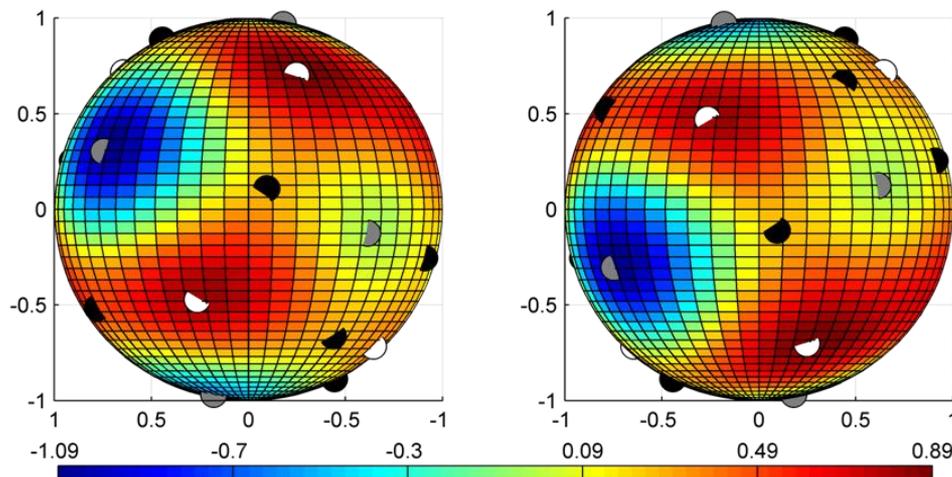


More Examples of Pictures from MATLAB



In a line plot, make sure the text is large and the lines are thick.

In a colored plot, include a legend.





Presentation Tips

**“Every talk is an interview talk” – JC Meza,
Department Head and
Senior Scientist, LBNL**



Before the talk: prepare, practice, and get organized

- Prepare your talk at least one week in advance
- Practice! Practice! Practice! (that means 3 times)
- Choose a professional outfit
 - Can it accommodate a microphone?
- Make backups (USB stick)
- Bring a pointer & water





During the talk: Speak clearly, stay calm, look at the audience

- Speak slowly, clearly, and loudly
 - Avoid um, ah, so, and, ...
- Nerves are natural
 - Take a deep breath or a drink of water
- Face the audience, not the projection
 - **Trick:** Look at the laptop screen
- Avoid reading the slide
 - Think of why you added that slide!
- Don't block the audience view
 - Try to stand next to the screen





Tips and Tricks for Q&A

- Repeat the question
- Take the question seriously, even if it seems stupid
 - May not fully understand the true question
- It's okay to say you don't know the answer
 - But this is a last option!
- Write down the questions during or immediately after the talk
- Don't be surprised if you get a comment that your work has already been done
 - But ask for a reference!





Wrapping Up



Closing Words of Wisdom

- Objective: Maximize conveying a key idea
 - Subject to time and audience constraints
- Preparation is key and practice makes perfect
- For an interview talk, do more than educate me about a subject – tell me what you did!
- Consider the larger context of your work – how will help solve global warming or cure cancer?





Please Contact Me With Questions

- Tammy Kolda, tgkolda@sandia.gov,
<http://csmr.ca.sandia.gov/~tgkolda/>
- Speakers who teach me (very different styles):
Dianne O'Leary, Juan Meza, Margaret Wright,
Nick Higham (see his Handbook of Writing) ,
Rosemary Chang, Ilse Ipsen, Pete Stewart, Philip
Kegelmeyer, Tim Kelley, etc.

THANK YOU!