



MSD Materials Sciences Division

Clear, Concise, Compelling. How to Present Your Science to Best Effect

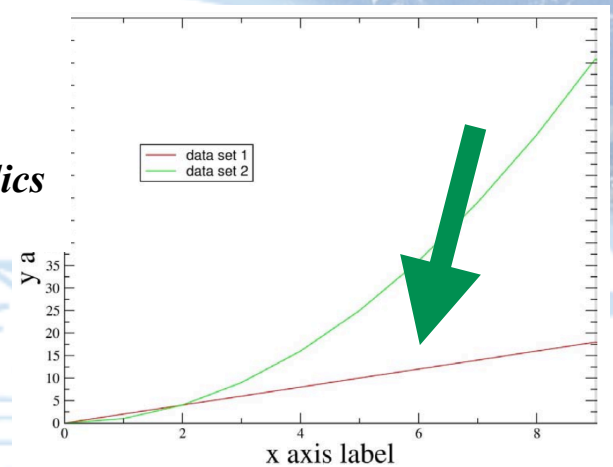
Alison Hatt, PhD

Public Affairs Specialist
Lawrence Berkeley National Laboratory

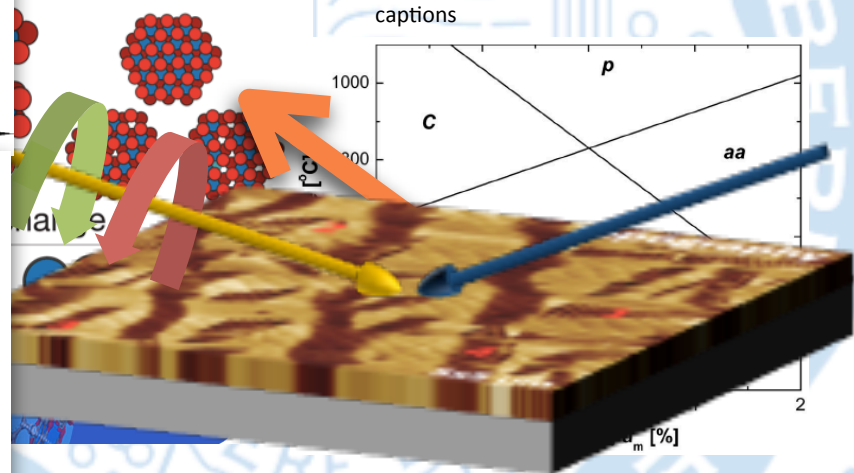
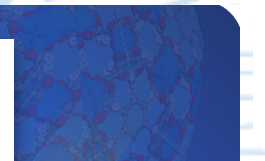
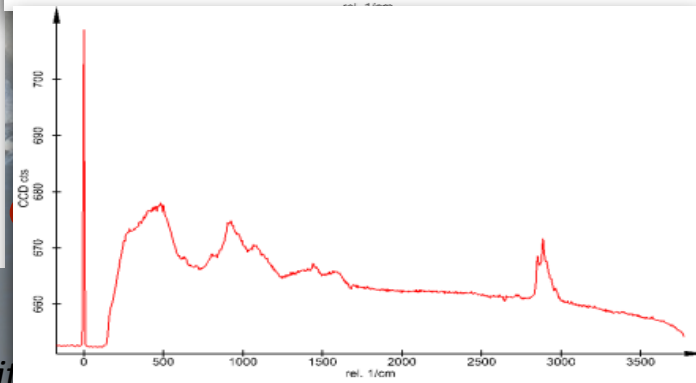
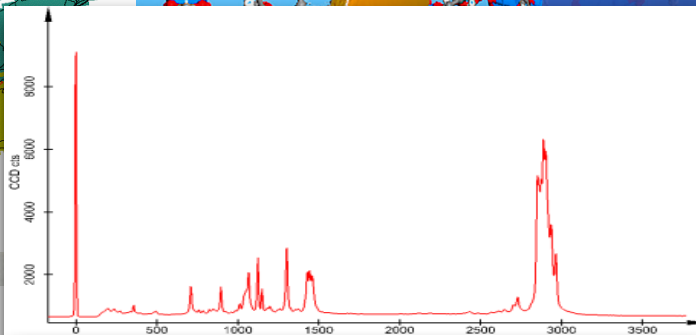
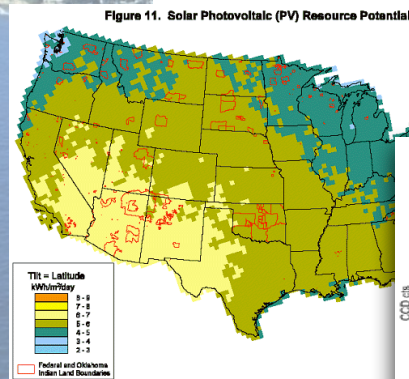
Career Development Workshop for Women in Physics
Trieste, 16-19 September 2013

Exhaustive introduction to complicated subject

- important fact buried in a long sentence that you won't have time to read
- Another important fact that I will not refer to in the remainder of the presentation
- something that may or may not be important; I haven't decided yet
- Yet another bullet that I've included incase someone asks a question
- One more point, ***this time inexplicably emphasized in bold font and italics so you know its important***



Caption for the plot, too small to read but included anyway because my advisor likes captions



Presenting your research is essential for a successful career in science

- Seminars
- Conferences
- Meetings
- Job interviews
- Dissertation defense
- Teaching
- Funding proposals/renewals
- Public lectures

There are six steps to giving an effective oral presentation

Plan the presentation

Design the presentation

Make the slides

Part 1

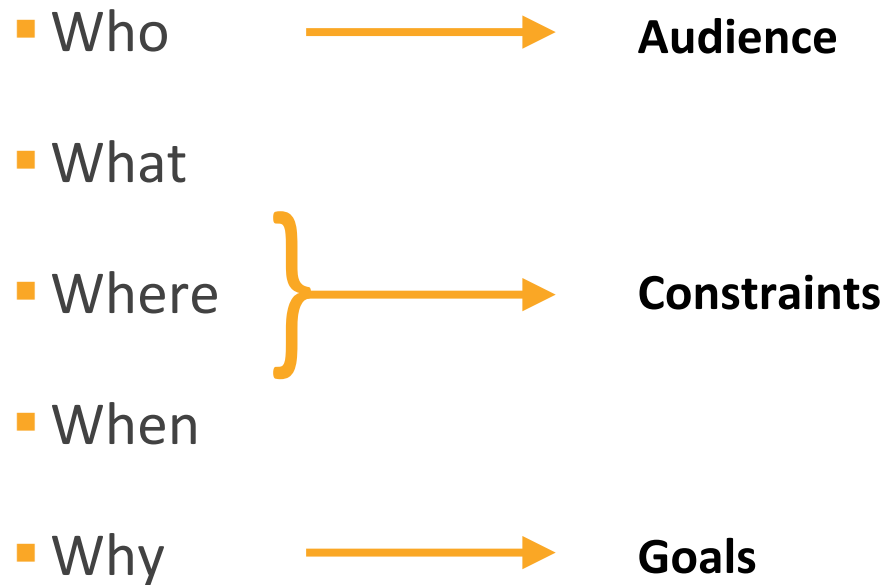
Practice the presentation

Deliver the presentation

Answering questions

Part 2 (Sinead)

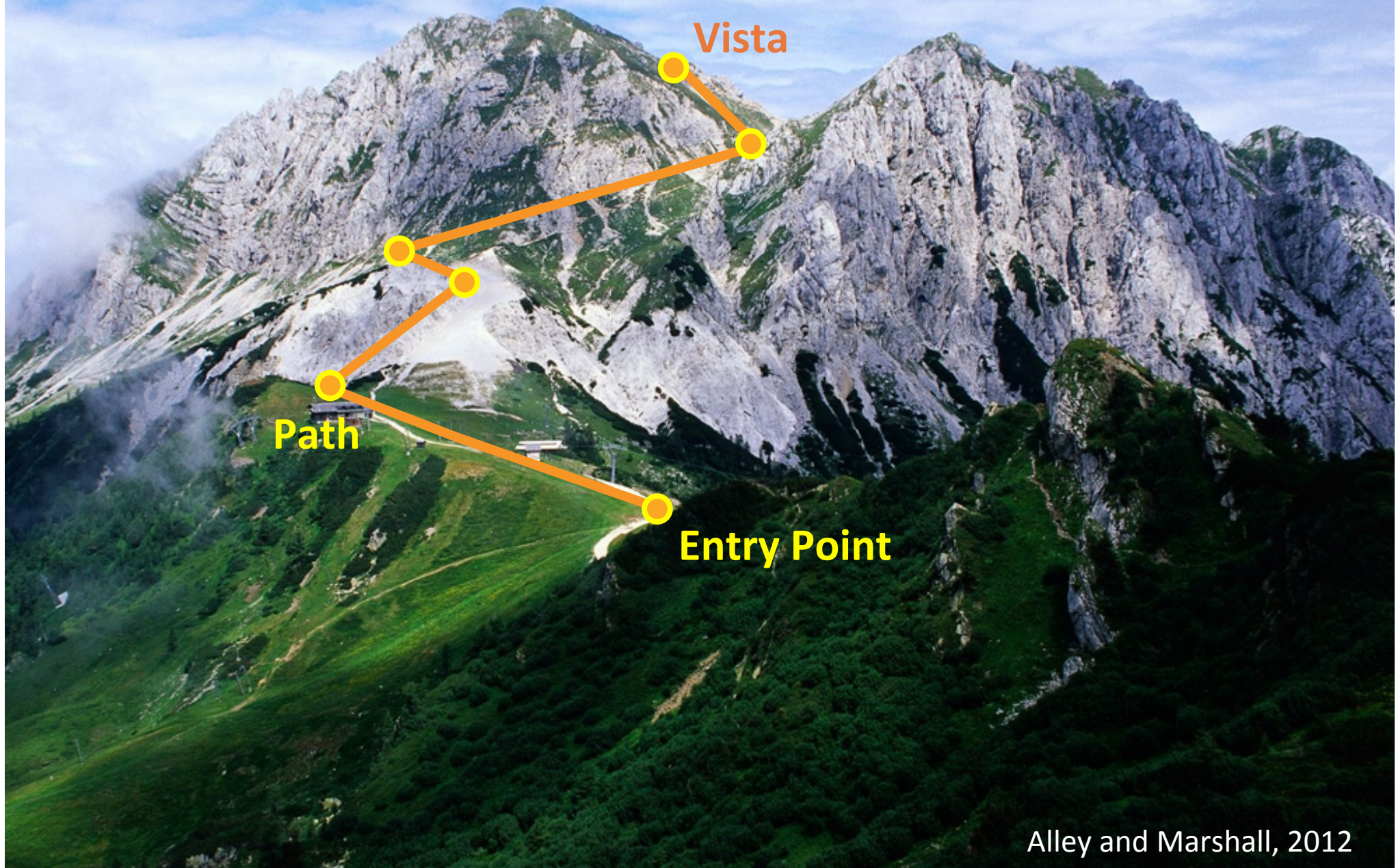
Planning requires identifying your parameters



Good communication means getting a message across to the audience

What **So what**
Information → Message

“Successfully structuring your presentation calls on you to lead your audience up your mountain of work”



An effective presentation must have a clear structure

Opening

Attention getter

Main message

Preview

An effective presentation must have a clear structure

Opening

Body

Point 1

Point 2

Point 3

...

An effective presentation must have a clear structure

Opening

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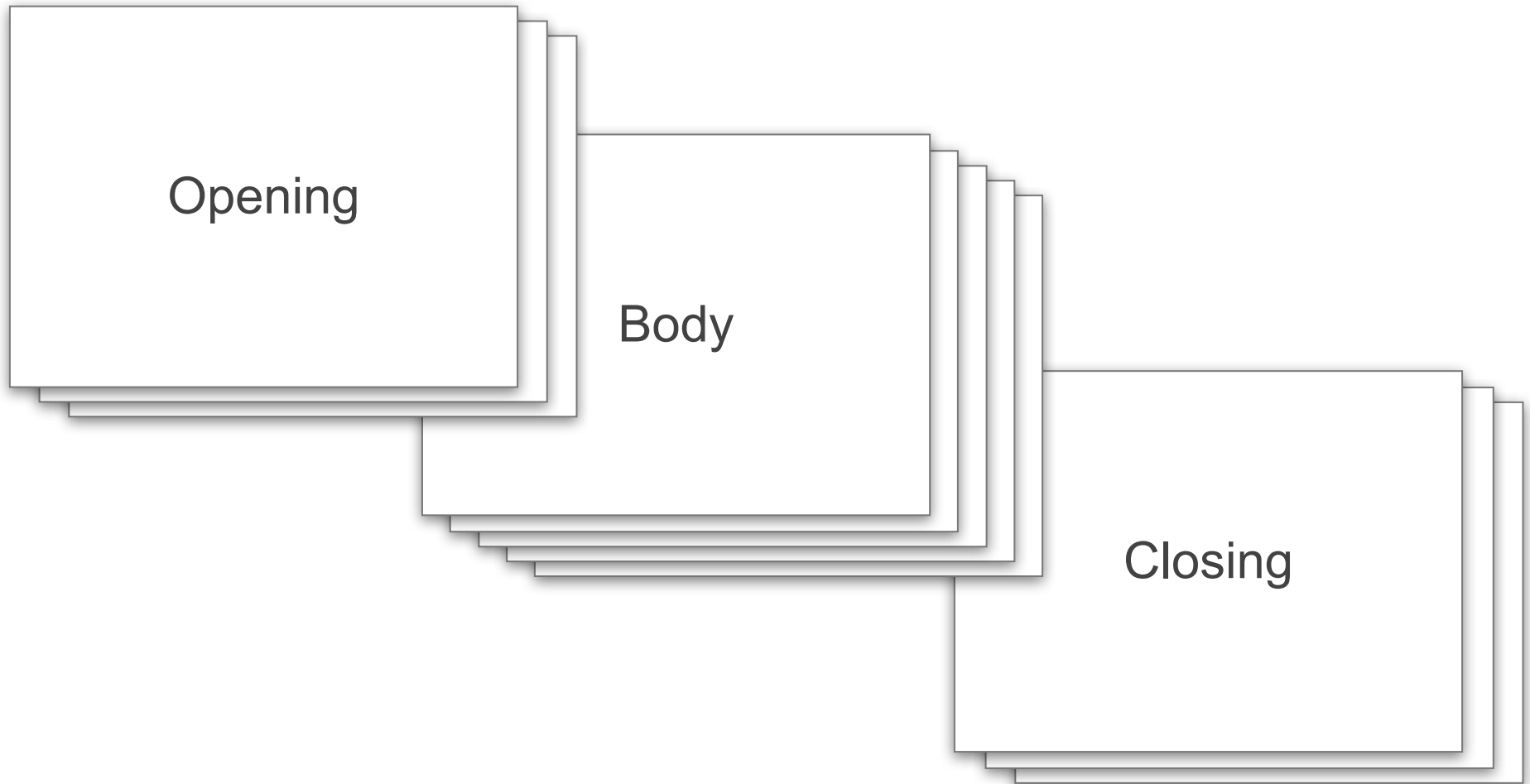
Closing

Review

Conclusion

Close

Use slides to support and reinforce your message



“Bad slides are worse than no slides”

Google

site:berkeley.edu filetype:ppt



Powerpoint templates encourage sub-optimal slides

Summary

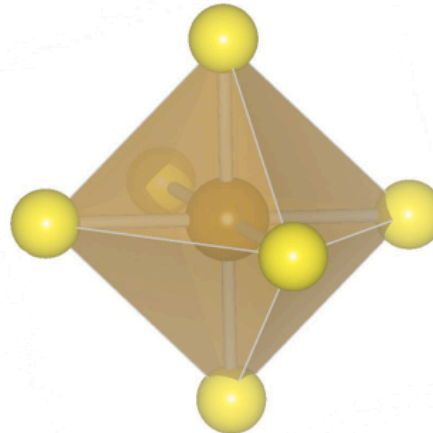
- ◆ Existence of tetragonal phase in highly strained BiFeO_3 thin films.
- ◆ BiFeO_3 is a G-type antiferromagnetic in Rhombohedral phase and C-type antiferromagnetic in Tetragonal phase.
- ◆ The interface between Rhombohedral and Tetragonal phases is magnetic! And it is electrically controllable.
- ◆ Pinned magnetic moments can be caused by the increasing of oxygen octahedral rotation, thus, a larger D-M effect.

Tiresome
to read

Powerpoint templates encourage sub-optimal slides

Difficulties with Doping

- Limited symmetry in doped structure octahedra.
 - Average S-S interaction?
 - Max S-S interaction?
 - Min S-S interaction?
- Still gives accurate ranges
- Our model is $\frac{1}{4}$ doping:
Lower dopant level= less octahedral distortion?



Unclear
message

Most slides suffer from the same problems

- Too much information
- Too much text
- Noisy design
- Unsuitable images
- Message not clear

Two guiding principles will fix most of those problems

- Use effective redundancy
- Maximize signal/noise ratio

Clear slides help convince the audience of your message

Cognitive ease → belief and understanding

**Black text on a white background
is the best choice for legibility**

Red on green is very hard to read -- impossible for some people

Purple on blue looks better, but is not optimal

Yellow on black is legible, but requires advanced design skills

Black on white is the best choice for effective slides

Sans-serif fonts work best for projectors.

Serif fonts, like Times New Roman, are harder to read.

ALL-CAPS LETTERING IS HARDER TO READ.

*Stylized fonts, like Comic Sans, are
distracting and harder to read.*

Font size is relative to slide size

36-point font on a 720×540 px slide

Old Powerpoint default

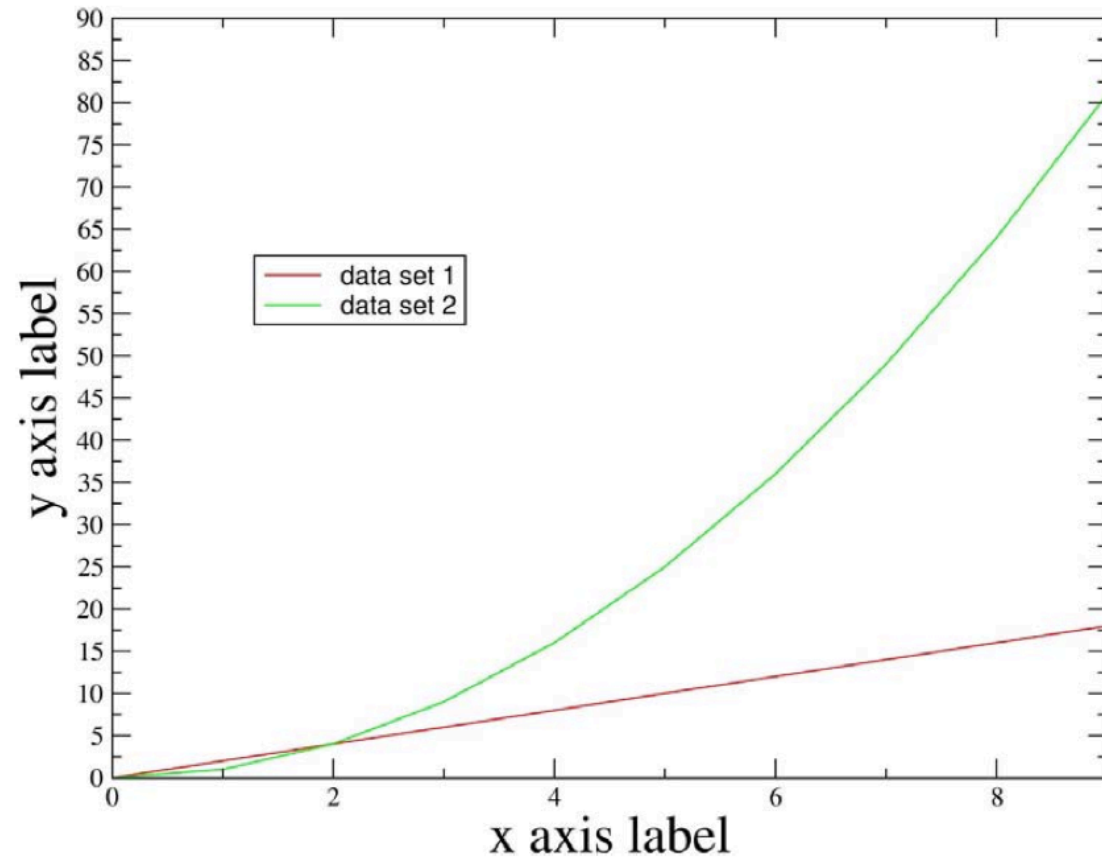
18-pt minimum

36-point font on a 1024×768 px slide

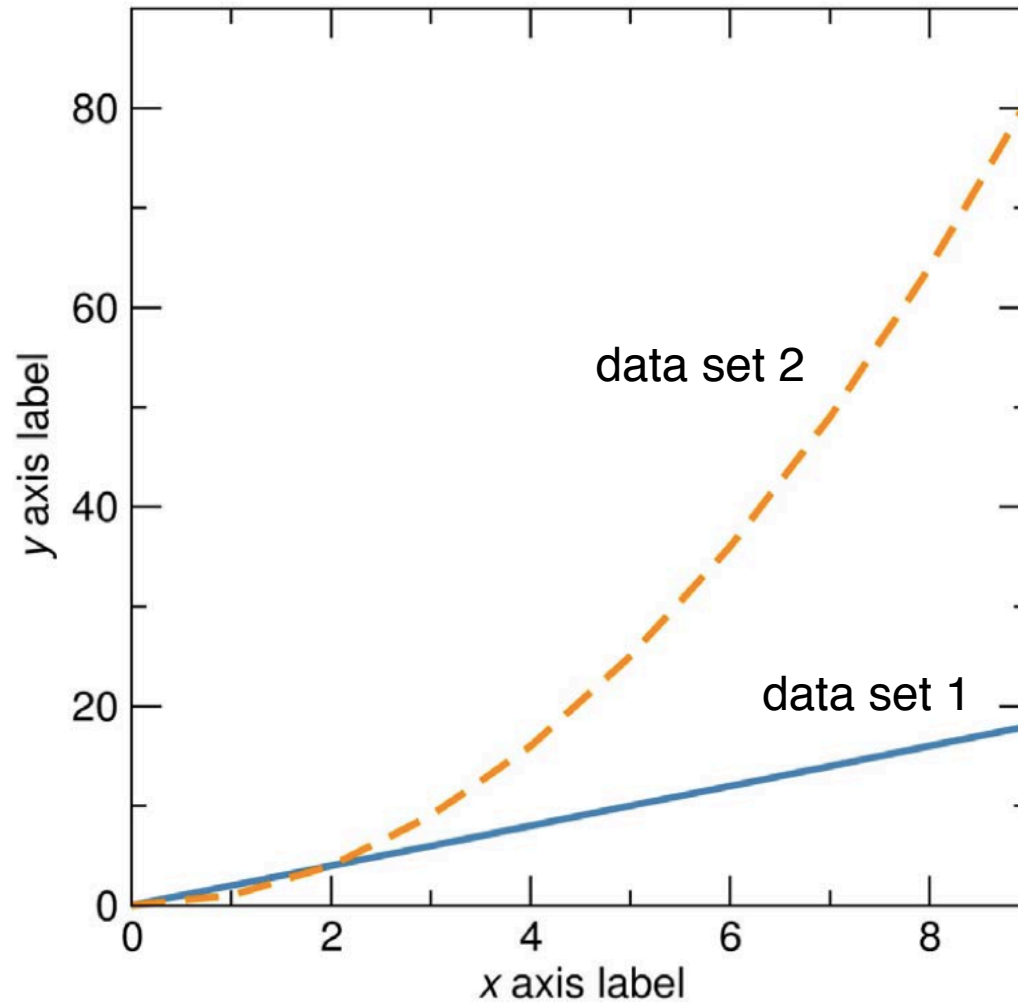
Keynote and new Powerpoint default

22-pt minimum

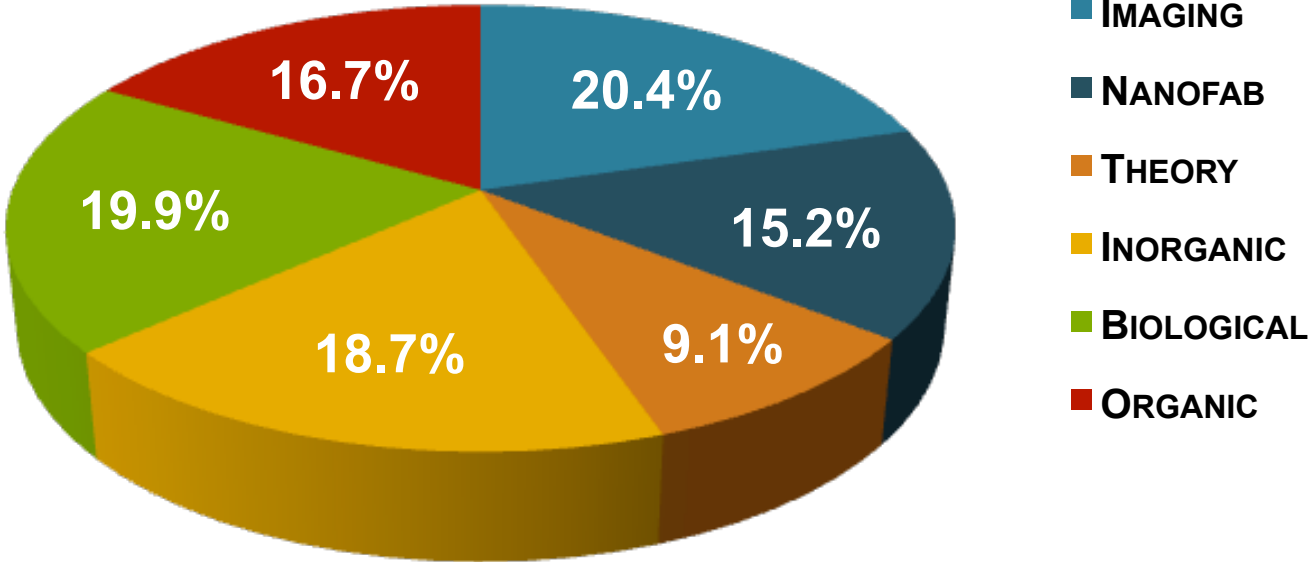
**Plots should also maximize cognitive ease;
this one does not**



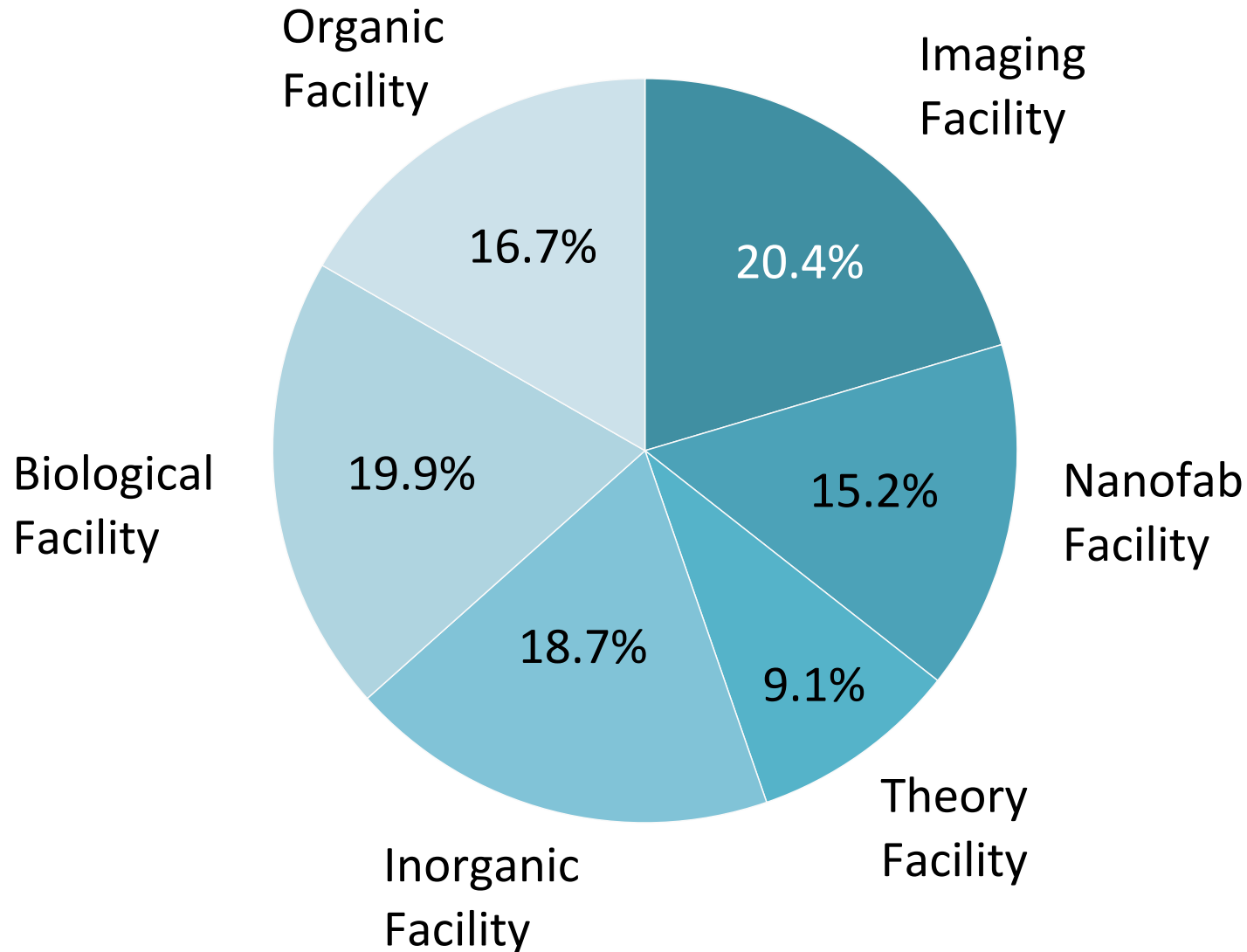
Plots should also maximize cognitive ease;
this one *does*



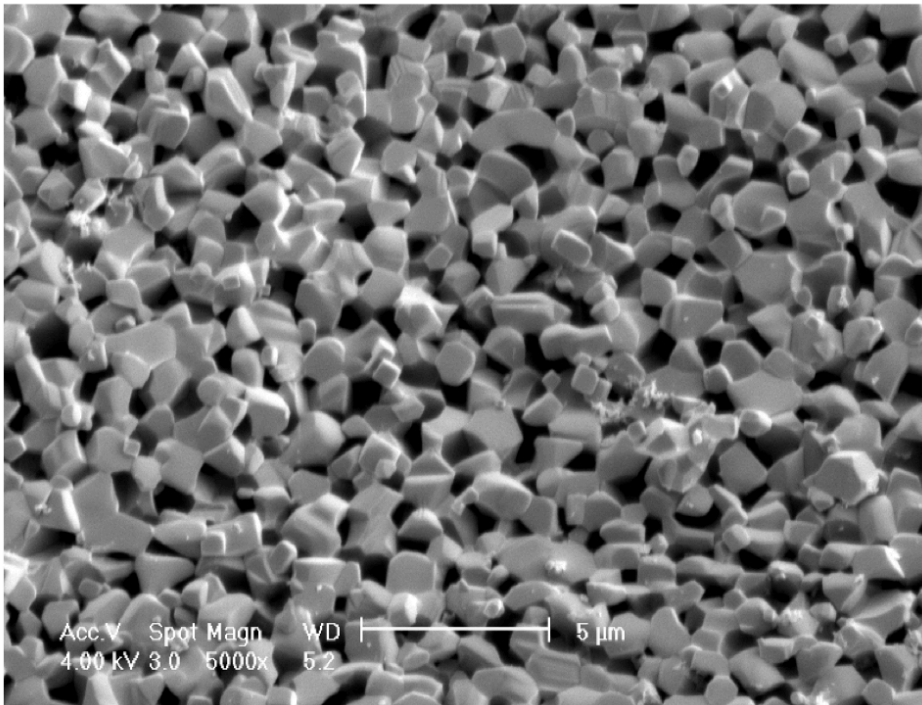
Visual representations of data should be quickly and accurately understandable; this one fails



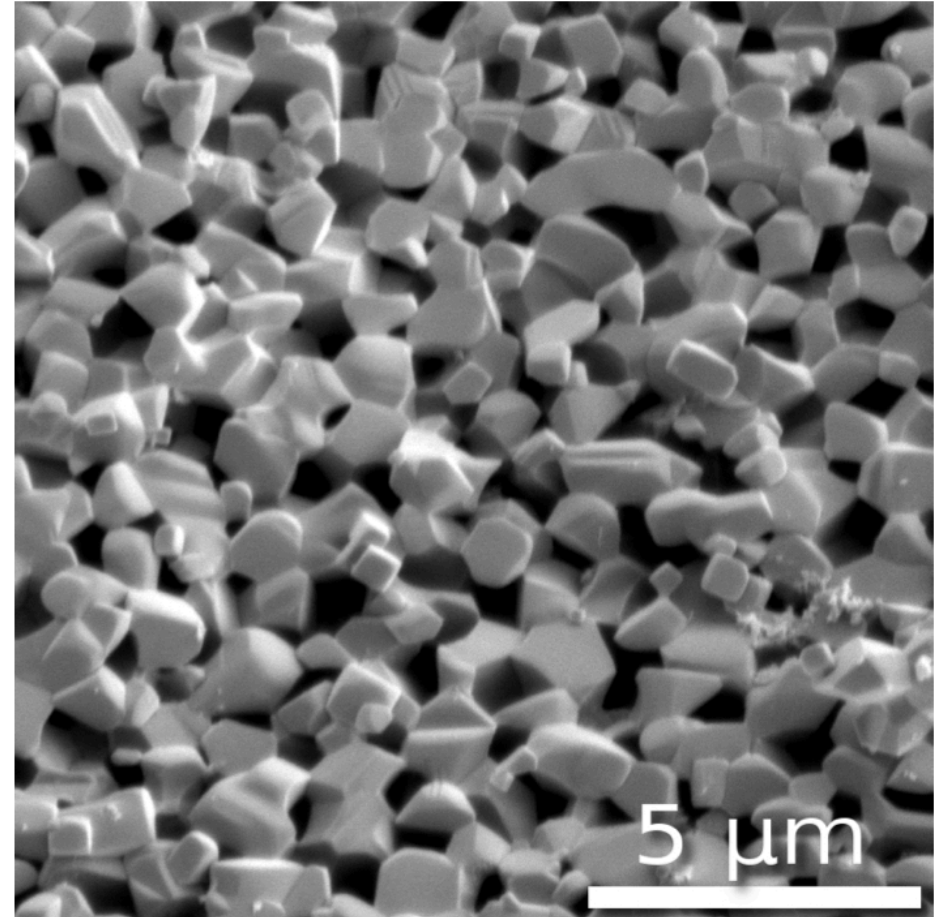
Visual representations of data should be quickly and accurately understandable; this one succeeds



Microscopy images usually need to be modified



As output from microscope



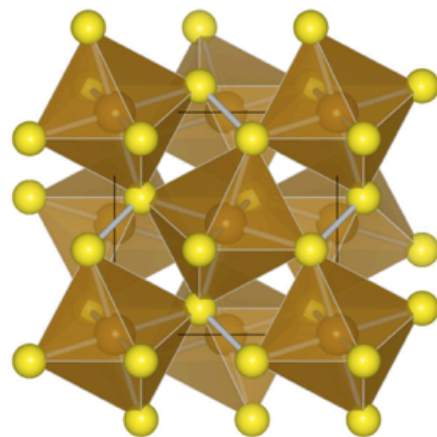
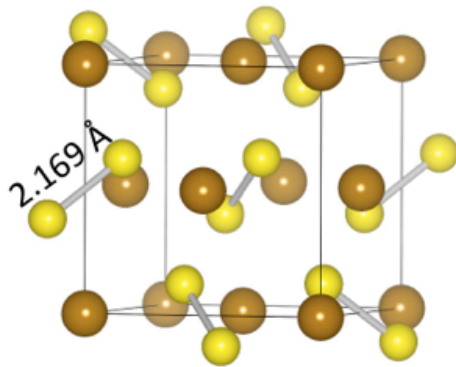
Modified for presentation

This body slide has an unclear message
and a noisy design

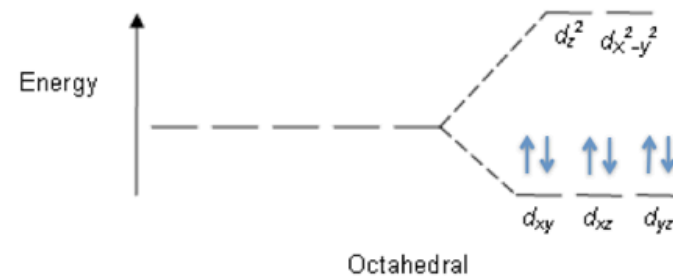


FeS₂ Basic Structure

The Molecular Foundry
A Nanostructures User Facility

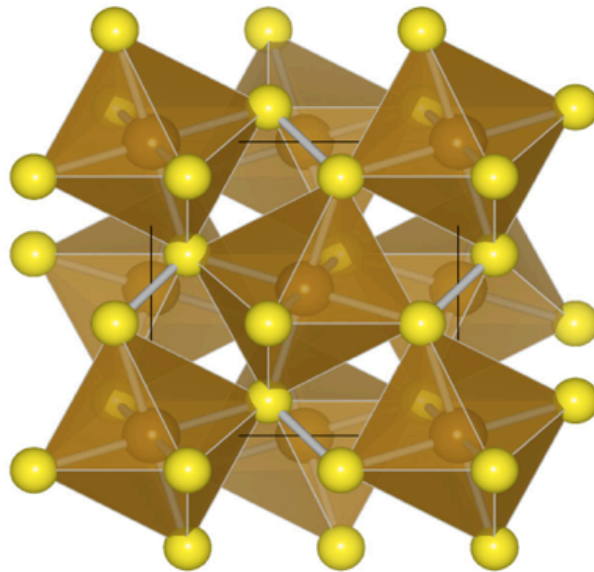


- Face-centered-cubic
- Lattice parameter = 5.416 Å
- Only two unique atom positions
- Low spin semi-conductor
- The Fe²⁺ d-states are split into t_{2g} and e_g states.
 - All six d-electrons fully occupying the t_{2g} states.
 - Empty e_g states

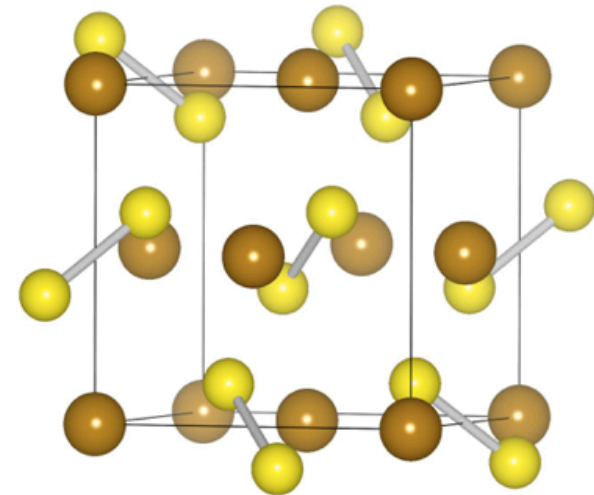


This body slide clearly states the first of two messages from the previous example

The pyrite structure can be described as a system of corner-sharing octahedra or as a network of sulfur dimers



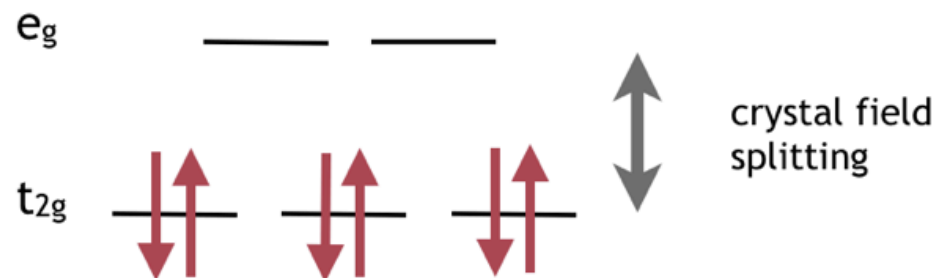
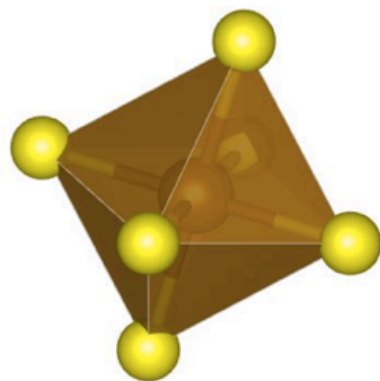
corner-sharing octahedra



network of sulfur dimers

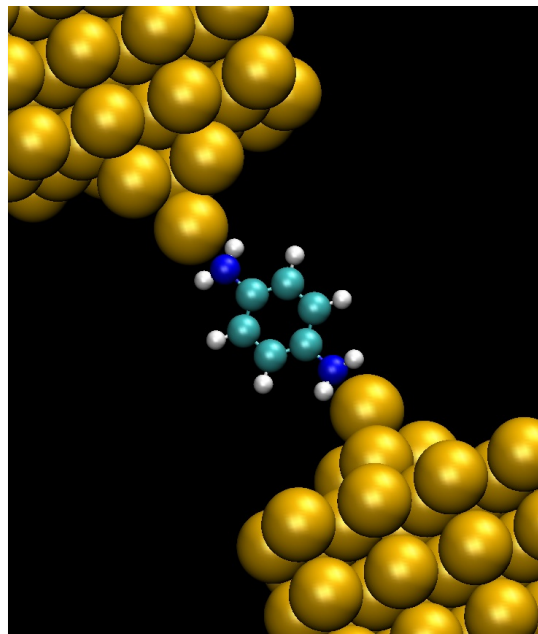
This body slide clearly states the second message from the previous example

The octahedral crystal field splits Fe d states into two bands

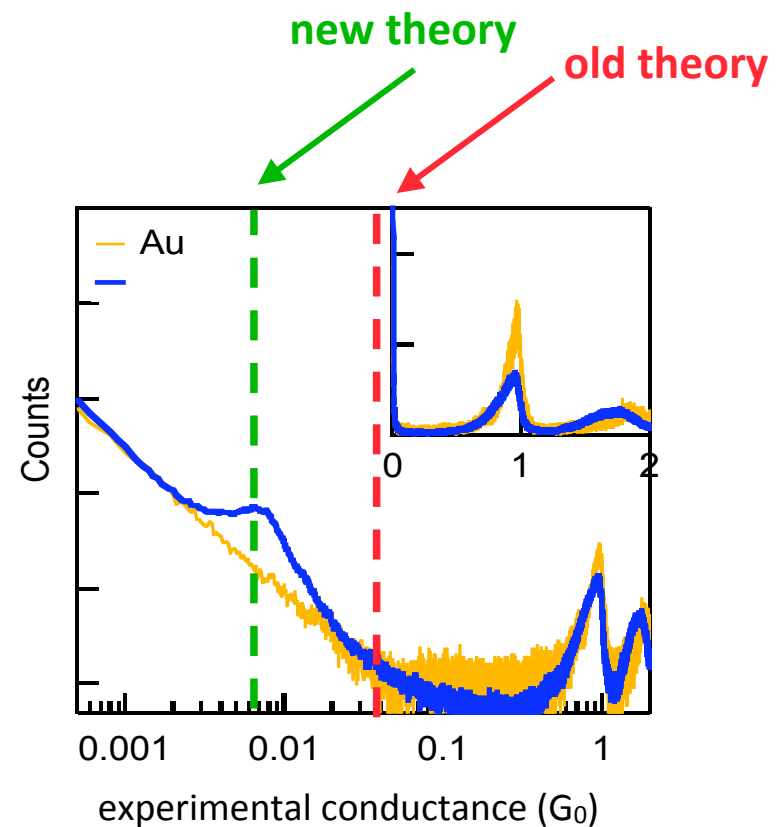


An assertion/evidence slide structure makes the message of this slide clear and compelling

Understanding charge transport across single-molecule junctions required advances in theory

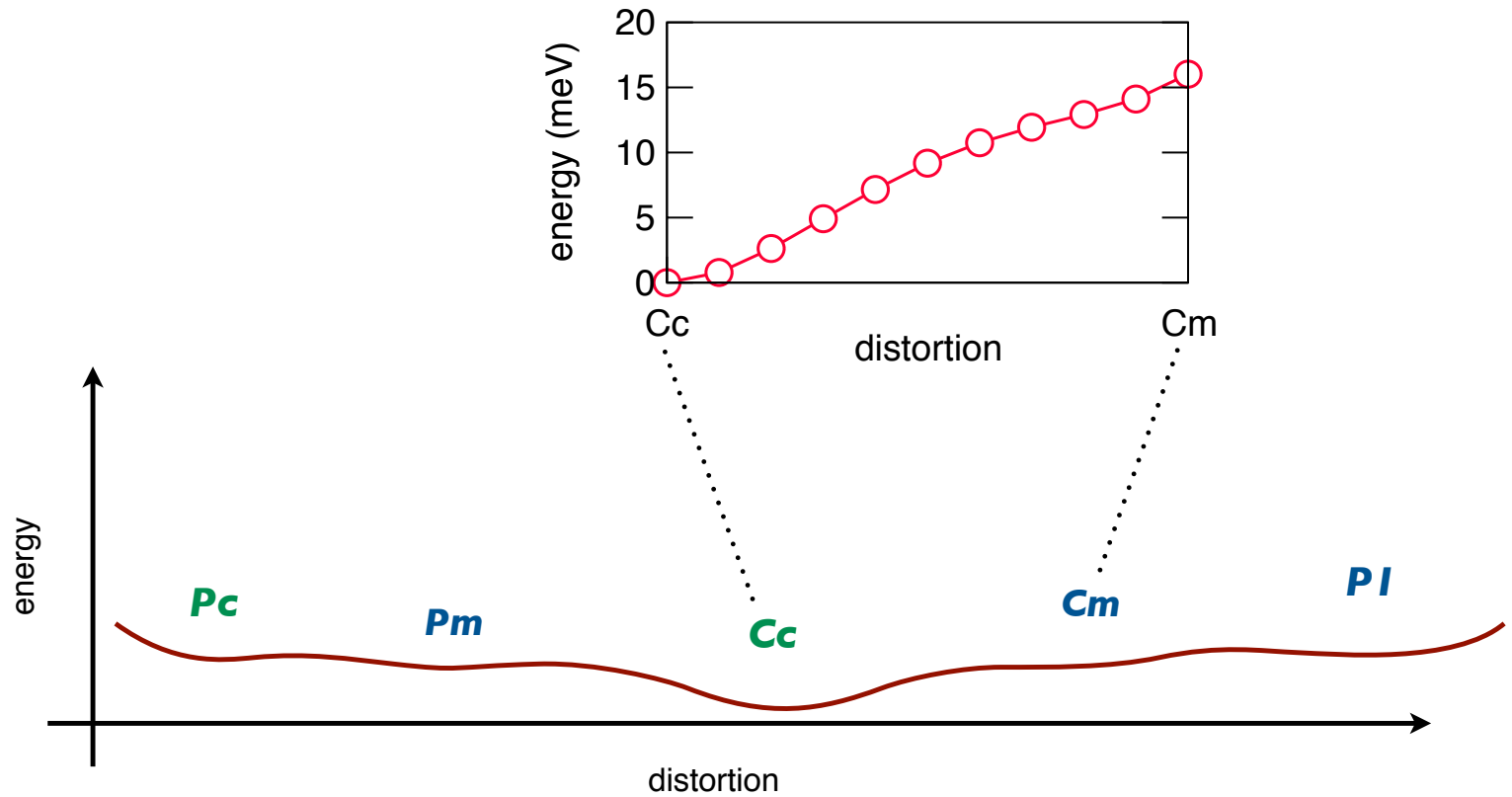


Benzene-diamine between Au electrodes



Slides can also be effective with a question in the title area

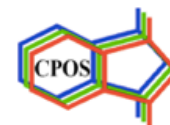
How flat is the energy landscape?



This outline slide is generic and boring

UCSB

Outline



Section I: Semiconducting Polymers for Organic Photovoltaics

- Background: Conjugated Polymer Photovoltaics
- Methods: Transient and Steady-State Photoconductivity
- Results: Photogeneration of Mobile Carriers
- Future Work

Section II: Solution-Processed Inorganic Semiconductors and Neutron Detectors

- Background: Neutron Detector Principles
- Methods: Radiation Sensing
- Results: Synthesis and Fabrication of Films,
- Results: Photodetectors
- Future Work

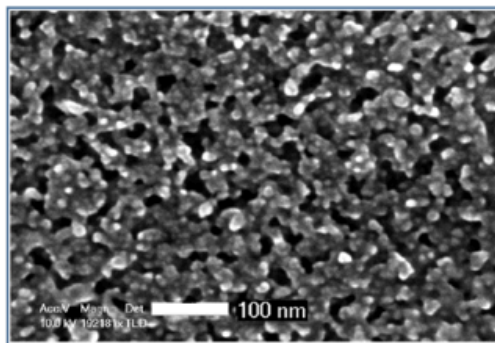
This outline slide is more interesting and memorable

This talk addresses photonic and electronic properties of solution-processed semiconductors



Section I

Measuring transient and steady-state photoconductivity in organic photovoltaics



Section II

Detecting photons and neutrons with solution-processed inorganic semiconductors

In summary, slides should maximize signal/noise ratio and use effective redundancy

- Design principles:
 - Legibility
 - Clarity
 - Simplicity
- Content guidelines:
 - Assert message clearly
 - Support assertion with evidence
 - Exclude extraneous information

In section one, we have discussed the first three steps for effective presentations

- Plan the presentation

Constraints, goals, message

- Structure the presentation

Beginning, middle, end

- Make the slides

Maximize signal/noise

Consult these resources and references for more information

- “The Craft of Scientific Presentations”
<http://www.writing.engr.psu.edu/csp.html>
- Rethinking the design of slides (PDF)
<http://www.writing.engr.psu.edu/presentations/speaking.pdf>
- Jean-luc Doumont. *Trees, Maps, and Theorems*. Principiae bvba: Kraainem, Belgium, 2009.
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