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

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Lawrence Berkeley National Laboratory

BERKELEY LAB

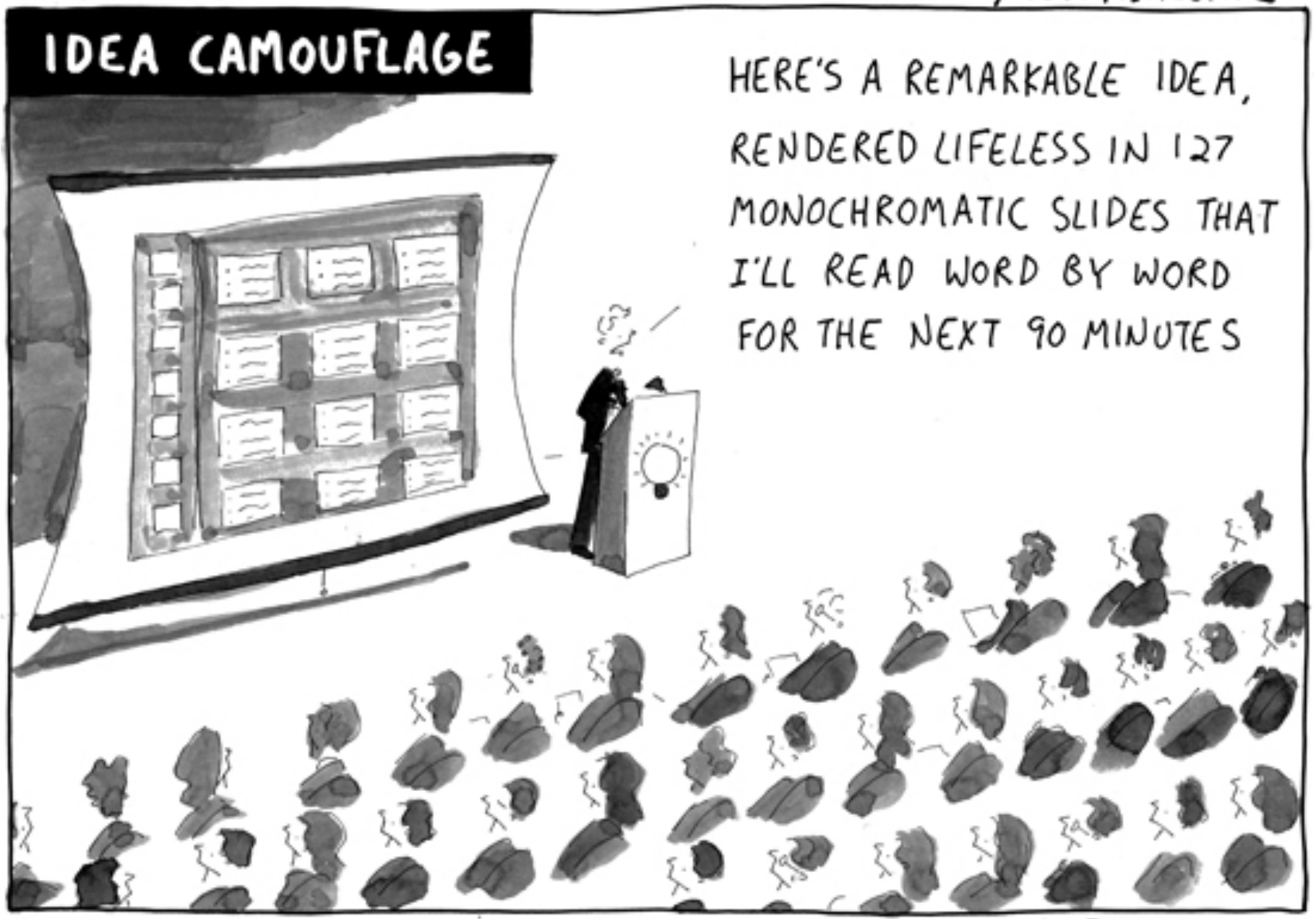
U.S. DEPARTMENT OF ENERGY | Office of Science

Career Development Workshop for Women in Physics
Trieste, 9-13 October 2017

BRAND CAMP

by Tom Fishburne

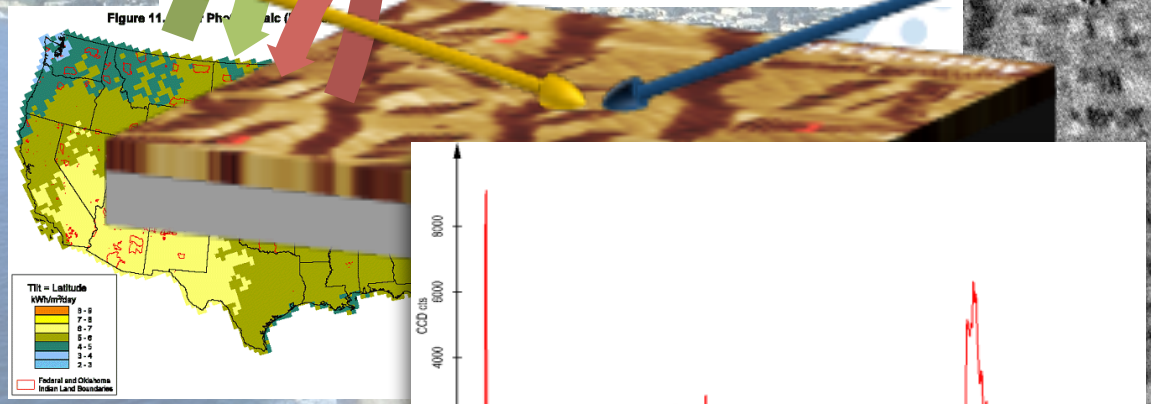
IDEA CAMOUFLAGE

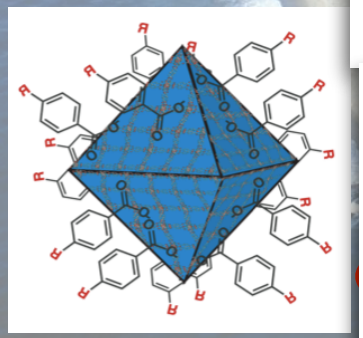


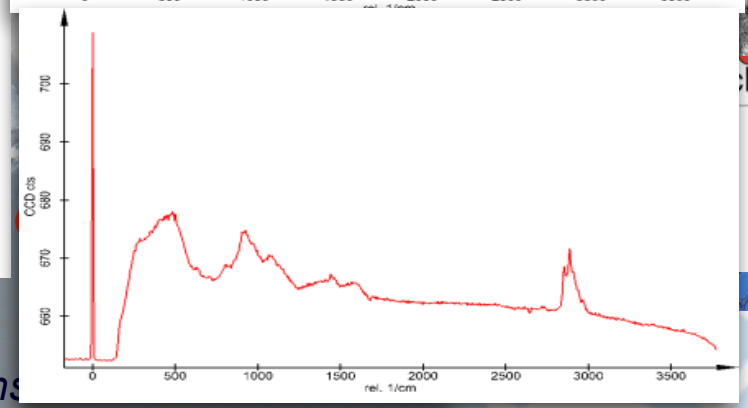
TOM FISHBURNE.COM

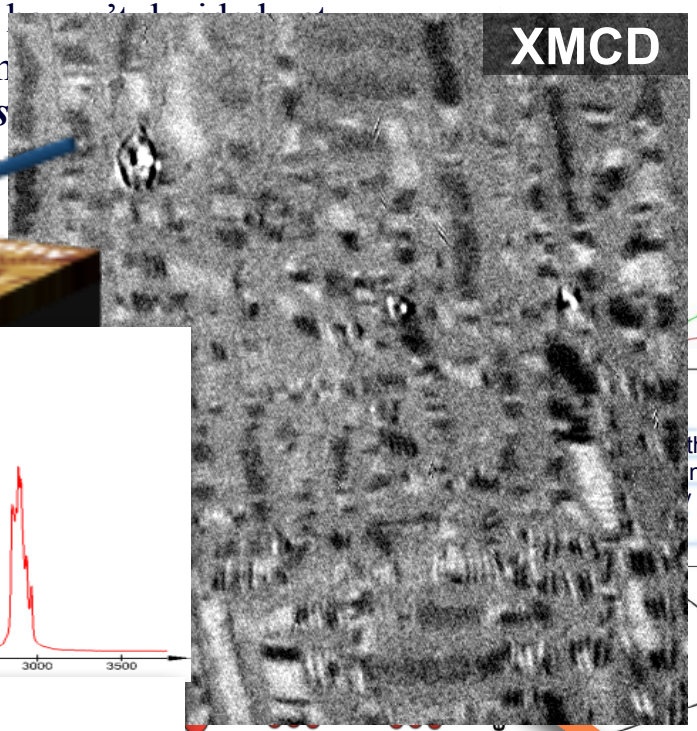
Another approach to camouflaging your ideas using powerpoint overkill….

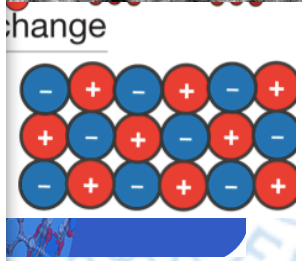
- important fact buried in a long sentence that you won't have time to read
- Another important fact that I will not refer to in the remainder of the presentation
- something that may or may not be important; I
- Yet another bullet that I've included incase som
- O more point, t***his time inexplicably emphas***
- ***its important***

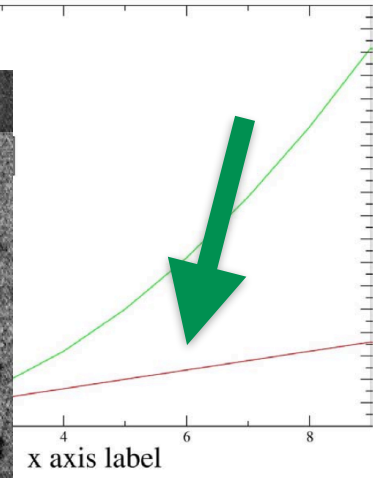




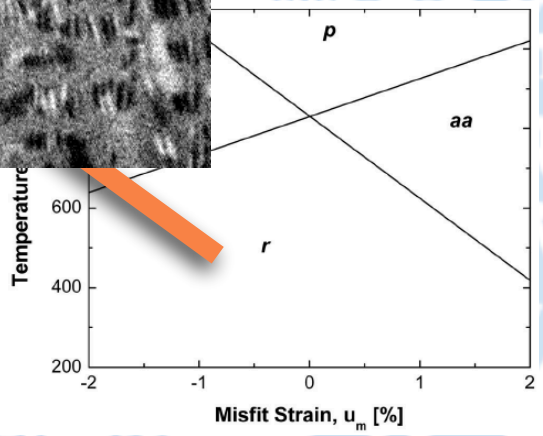








the plot, too small
ncluded anyway
advisor likes



Presenting your research is critical for a successful career in science

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

There are six steps to create and execute an effective oral presentation

Plan the presentation

Design the presentation — **Part 1**

Make the slides

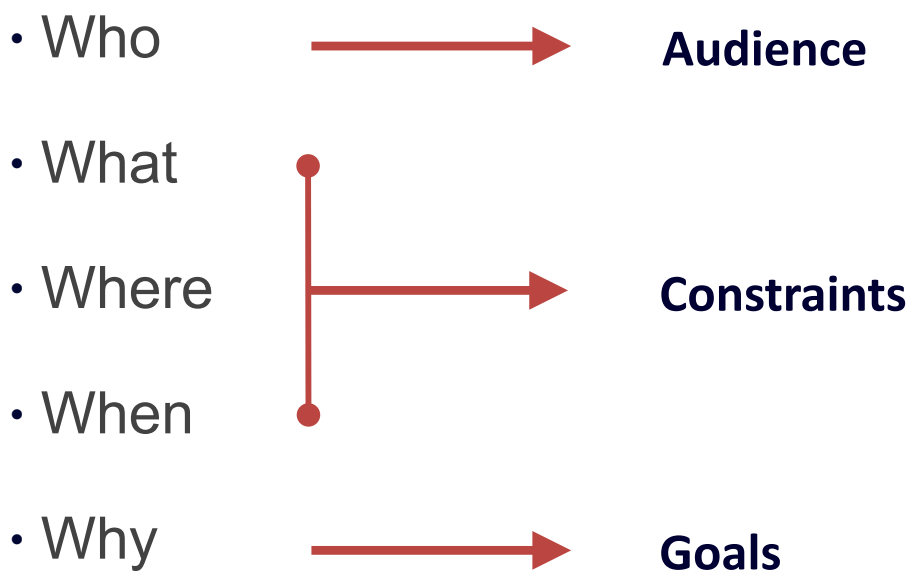
Practice the presentation

Deliver the presentation — **Part 2 (Sinead)**

Answering questions

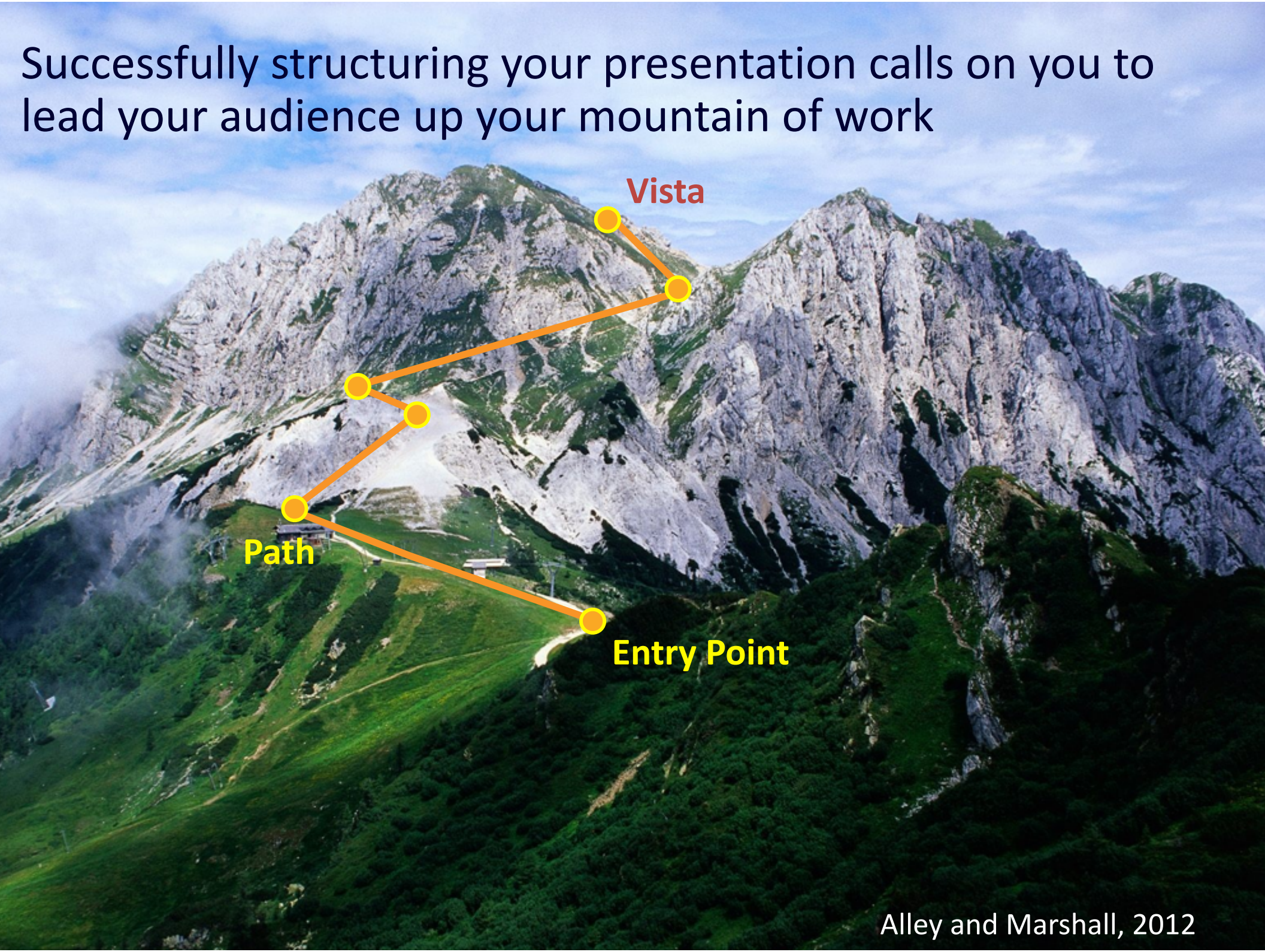
Doumont, 2009

Planning requires identifying your parameters



Doumont, 2009

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

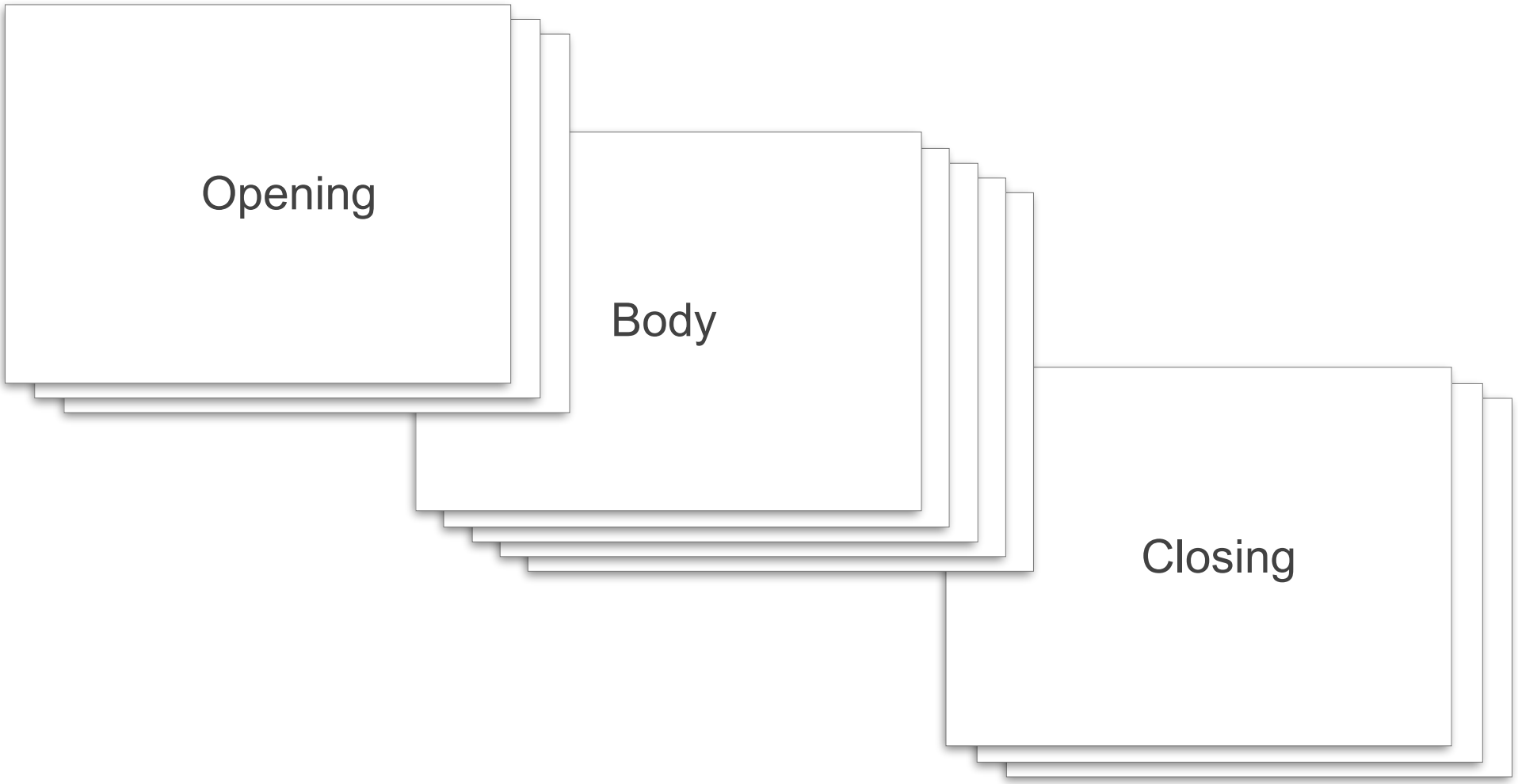


Alley and Marshall, 2012

An effective presentation must have a clear structure

Opening	Attention getter
	Main message
	Preview
Body	Point 1
	Point 2
	Point 3
	…
Closing	Review
	Conclusion
	Close

Use slides to support and reinforce your message



Most slides suffer from the same problems

Too much information

Too much text

Text hard to read

Noisy design

Unsuitable images

Message not clear

Most slides could be improved by following two simple steps

1) Figure out what the message is

2) Make that message as clear as possible

Conventional outline slides are not compelling

Outline

Section I: Semiconducting Polymers for Organic Photovoltaics

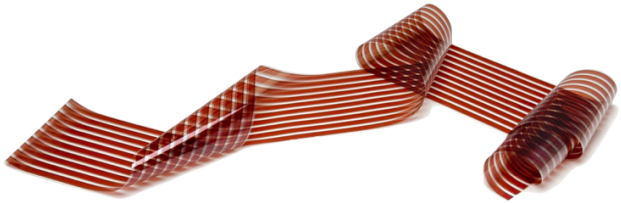
- Background: Conjugated Polymer Photovoltaics
- Methods: Transient and Steady-State Photoconductivity
- Results: Photogeneration of Mobile Carriers
- Future Work

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

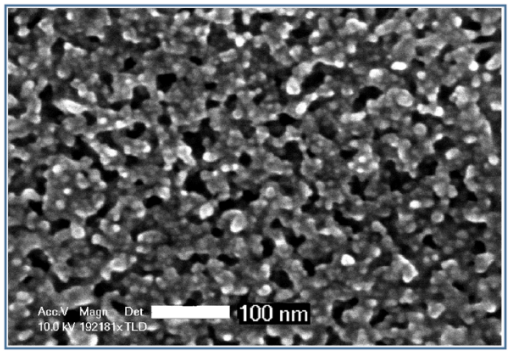
An unconventional outline slide can be much more engaging

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



Section I

Measuring transient and steady-state photoconductivity in organic photovoltaics



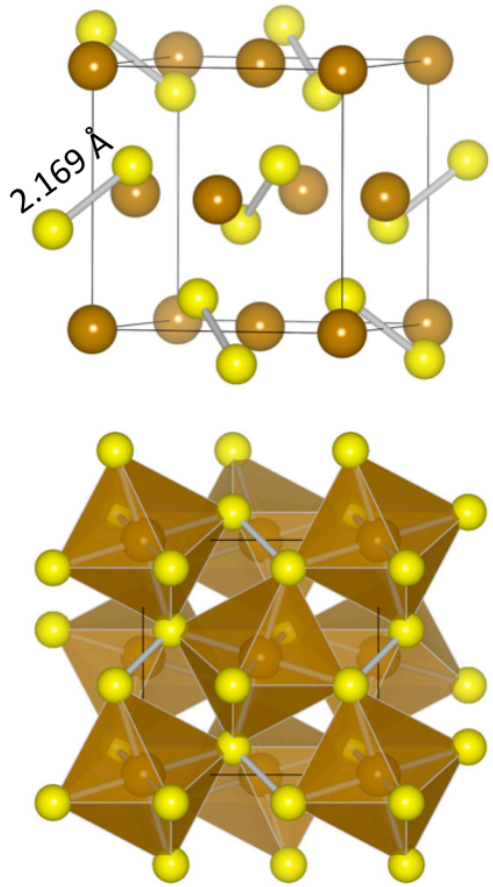
Section II

Detecting photons and neutrons with solution-processed inorganic semiconductors

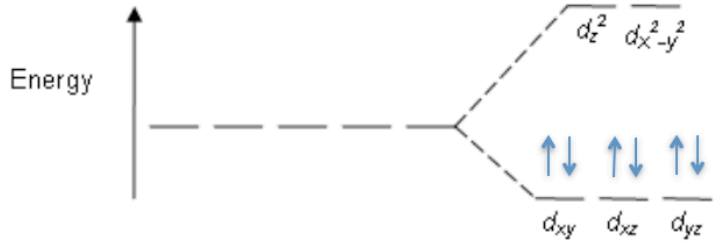
Could this slide be more effective?

FeS_2 Basic Structure

The Molecular Foundry
A Nanostructures User Facility

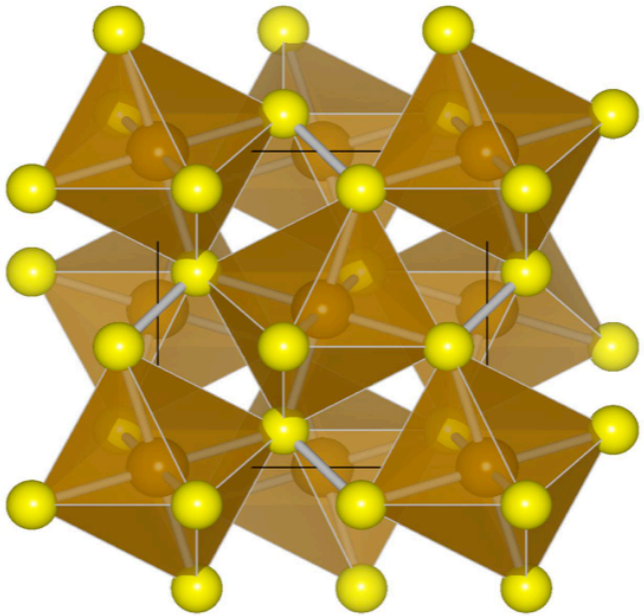


- Face-centered-cubic
- Lattice parameter = 5.416 Å
- Only two unique atom positions
- Low spin semi-conductor
- The Fe^{2+} d-states are split into t_{2g} and e_g states.
  - All six d-electrons fully occupying the t_{2g} states.
  - Empty e_g states

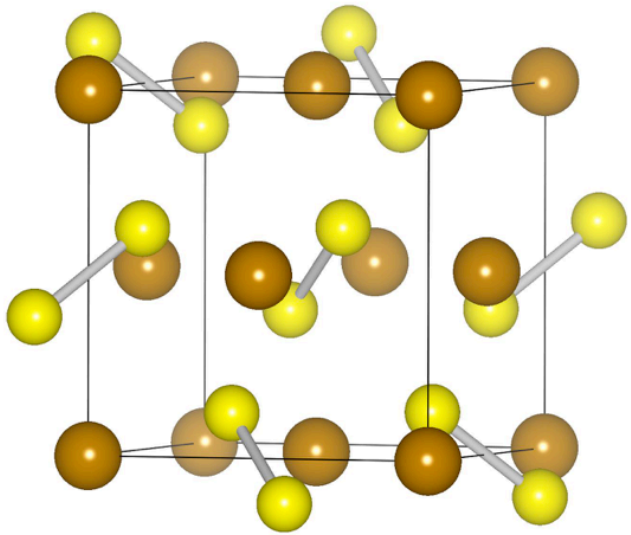


This revised slide has a clear message

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



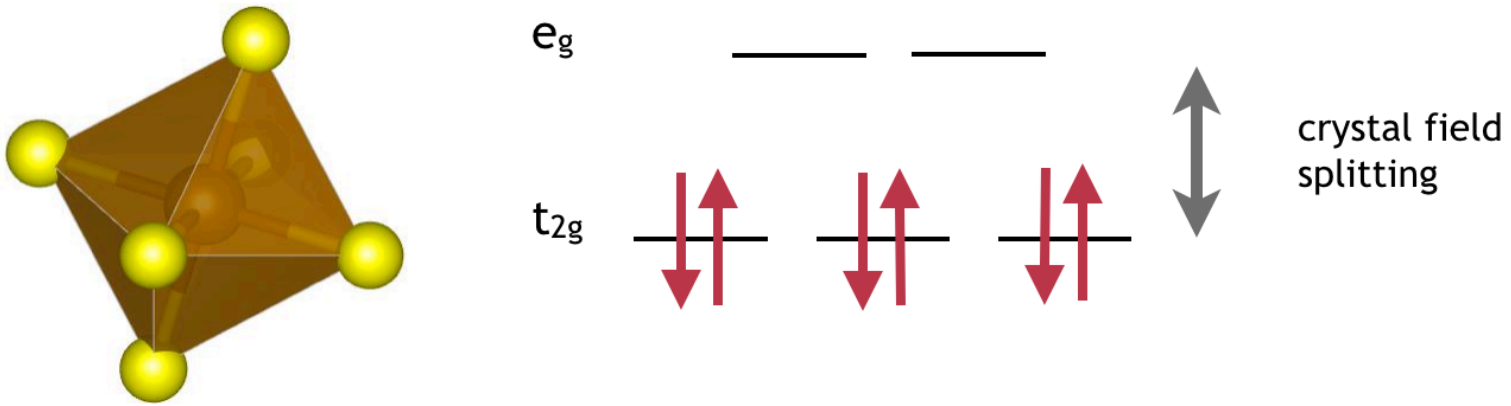
corner-sharing octahedra



network of sulfur dimers

This revised slide has a clear message

The octahedral crystal field splits Fe *d* states into two bands



We see some emerging guidelines for making effective slides

Limit yourself to one or two points per slide

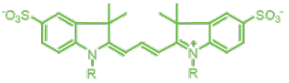
Maximize the signal-to-noise ratio

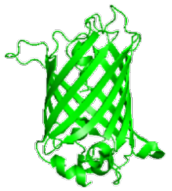
Be redundant with visual, written, and spoken information

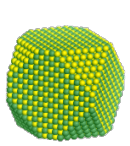
Could this slide be more effective?

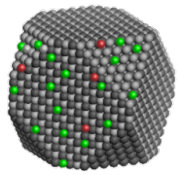
Probes for Single-Molecule Imaging

Pros and Cons









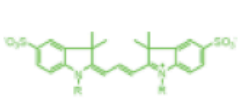
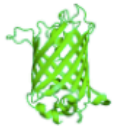
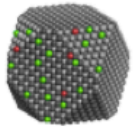
Ideal properties:

	small organics	fluorescent proteins	quantum dots	upconverting nanoparticles
• brightness	☼☼☼	☼☼☼	☼☼☼	☼☼☼
• photostability			☼☼☼	☼☼☼
• emission continuity				☼☼☼
• (lack of) overlap with cellular autofluorescence	☼	☼	☼☼	☼☼☼
• near-IR			☼☼	☼☼☼

MOLECULAR FOUNDRY

This revised slide has a clear message

Upconverting nanoparticles have superior properties for single-molecule imaging

	small organic molecules	fluorescent proteins	quantum dots	upconverting nanoparticles
				
brightness	✓✓✓	✓✓✓	✓✓✓	✓✓✓
photo stability			✓✓✓	✓✓✓
emission continuity				✓✓✓
minimal overlap with cellular autofluorescence	✓	✓	✓✓	✓✓✓
near-IR sensitivity			✓✓	✓✓✓

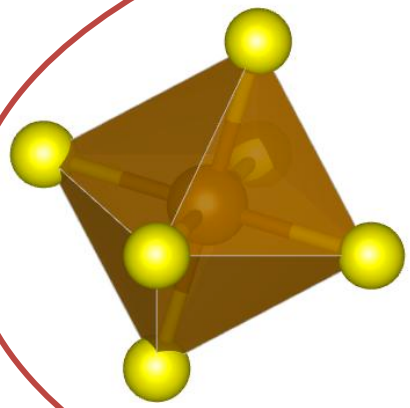
focus of this talk

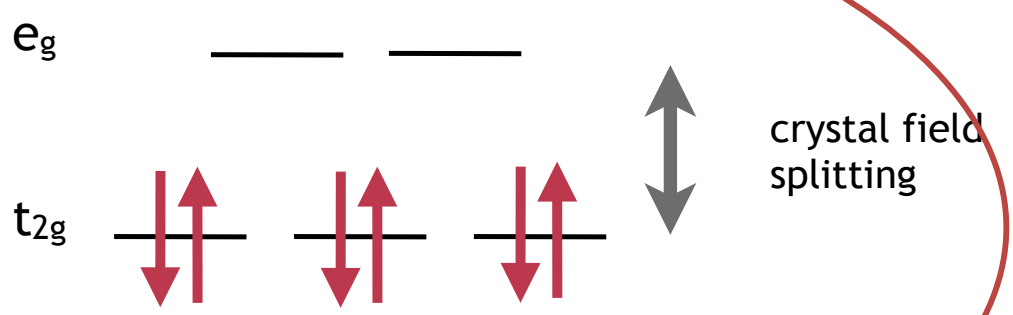
An assertion/evidence slide structure makes the message clear and compelling

Assertion

The octahedral crystal field splits Fe *d* states into two bands

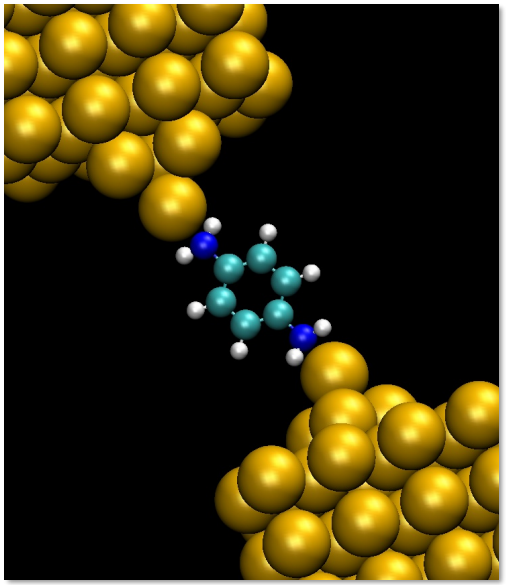
Evidence



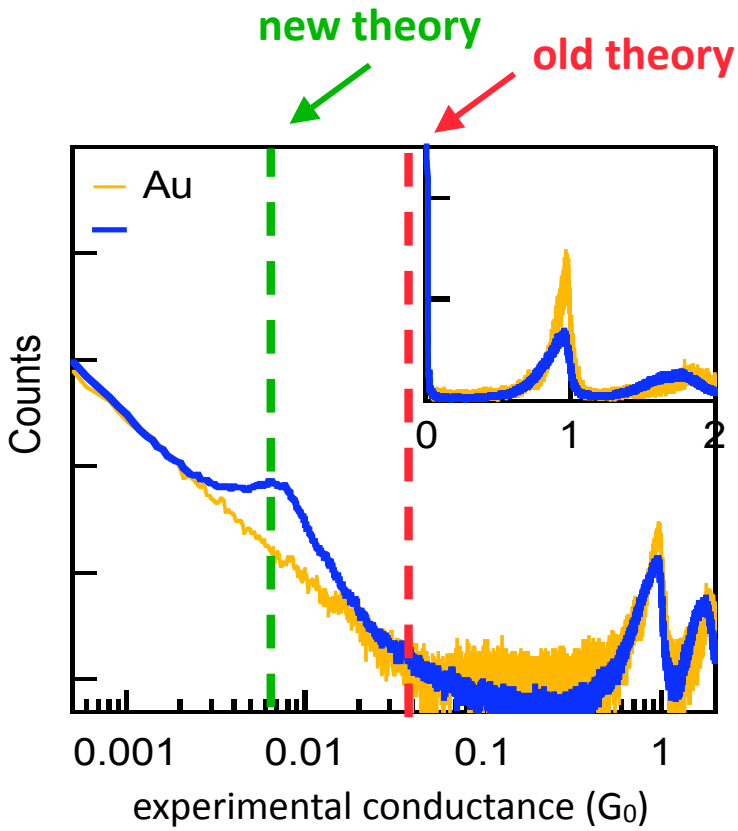


An assertion/evidence structure makes the message clear and compelling

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



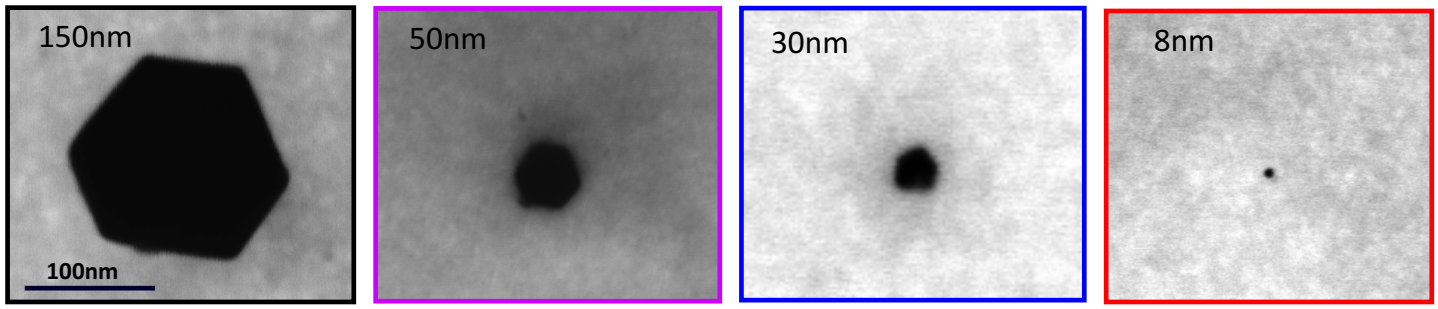
Benzene-diamine between Au electrodes



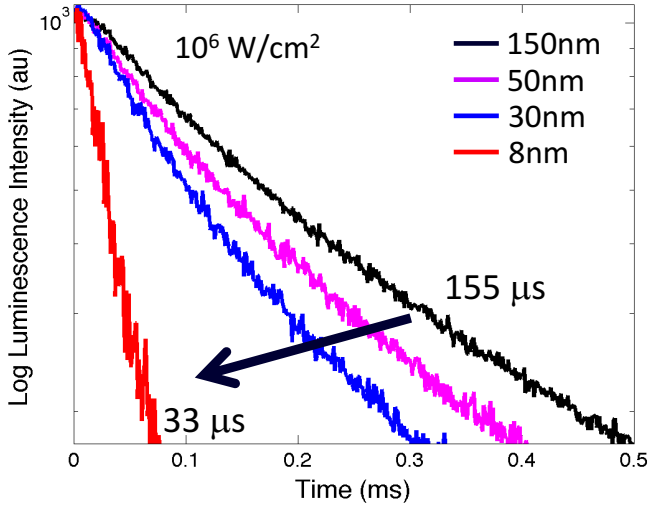
Su Ying Quek, Steve Louie, Jeff Neaton et al.

An assertion/evidence structure makes the message clear and compelling

Surface effects dominate kinetics in small UCNPs

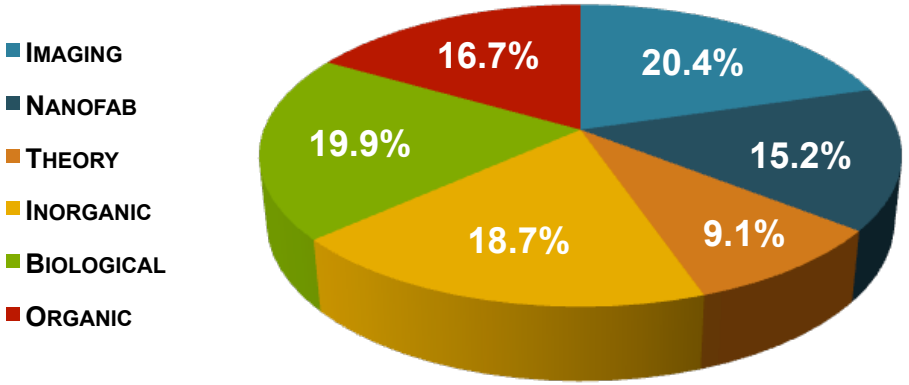


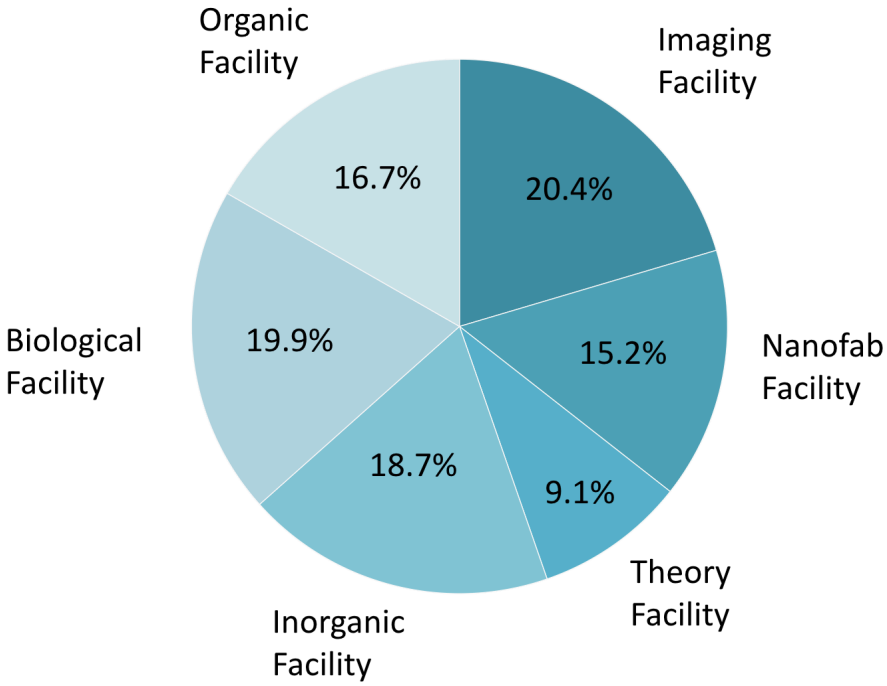
Luminescence Lifetime vs UCNP diameter



Gargas*, Chan*, Altoe, Cohen†, Schuck† *et al.* *Nature Nanotech.* 9, 300 (2014)

Plots should be designed for maximum clarity





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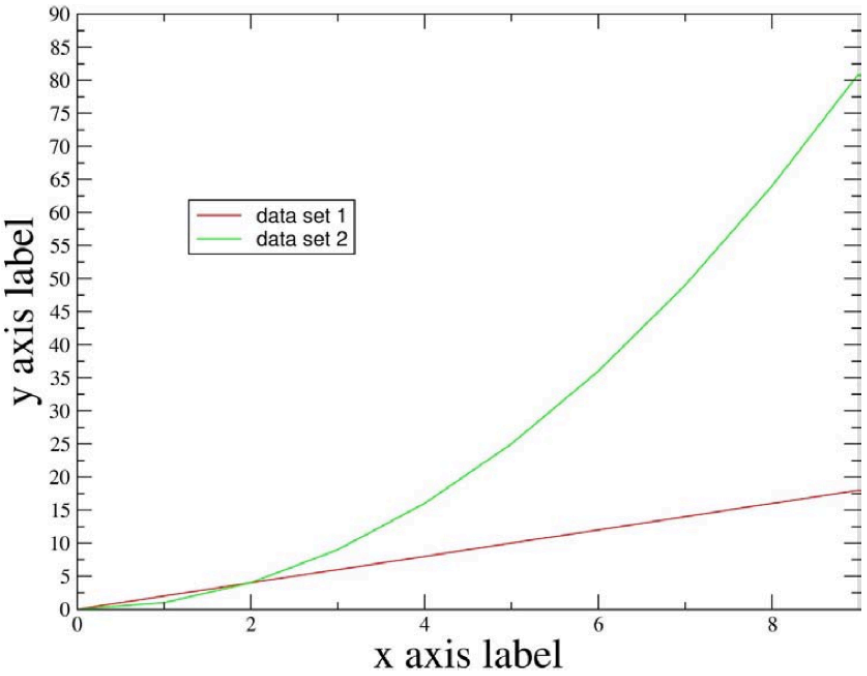
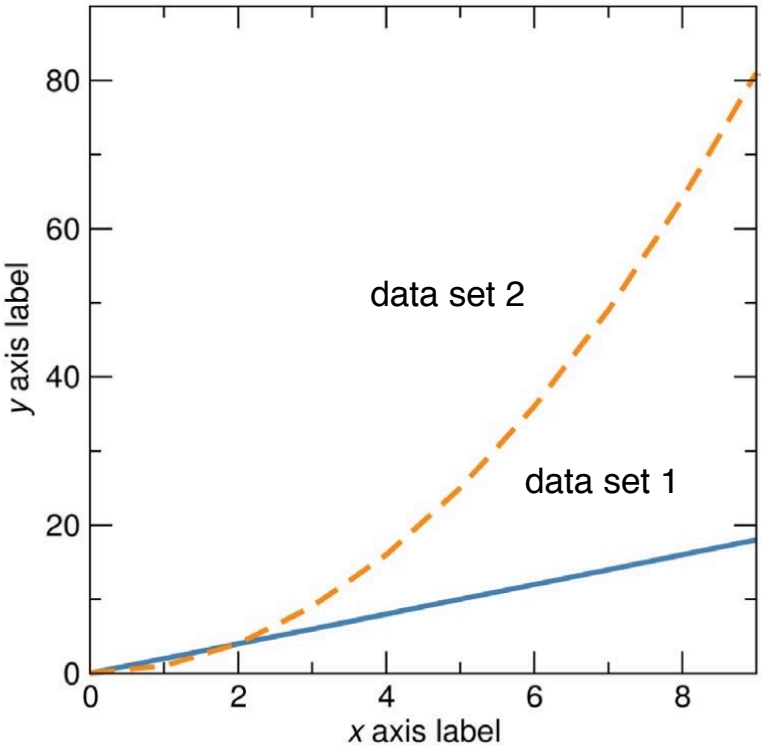
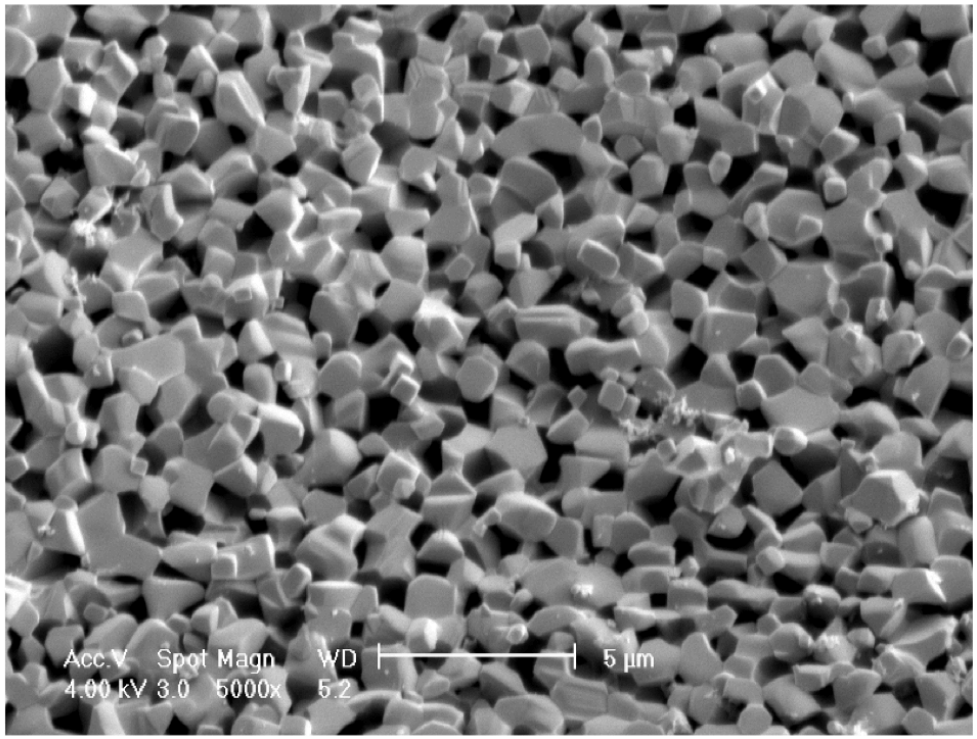


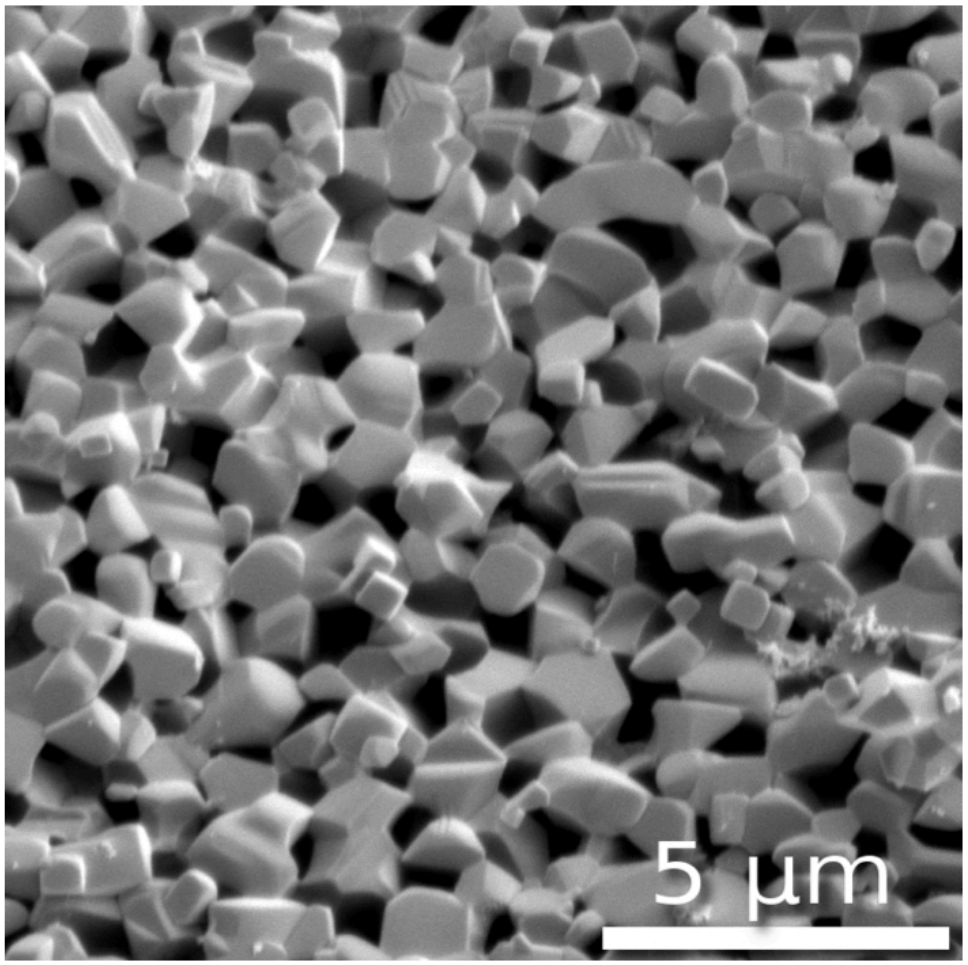


Seshadri, 2010

Microscopy images usually need to be modified



As output from microscope



Modified for presentation

Seshadri, 2010

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

- Planning — **Constraints, goals, message**
- Designing — **Beginning, middle, end**
- Making slides — **Communicate a message**

Resources and References

"Preparing figures for publication and presentations," Ram Seshadri, 2010.
https://www.mrl.ucsb.edu/~seshadri/PreparingFigures.pdf

"Trees, maps, and theorems. Effective communication for rational minds." Jean-luc Doumont. http://www.principiae.be/X0300.php

"The Craft of Scientific Presentations." Michael Alley
http://www.craftofscientificpresentations.com/
See website for templates and tutorials on the assertion-evidence approach.