

A photograph showing a group of people in a conference room, all sleeping or resting their heads on their hands. They are seated in rows of grey chairs, facing towards the left of the frame. The room has large windows with white blinds in the background.

Have you ever fallen asleep in a conference talk, lecture, or scientific presentation?

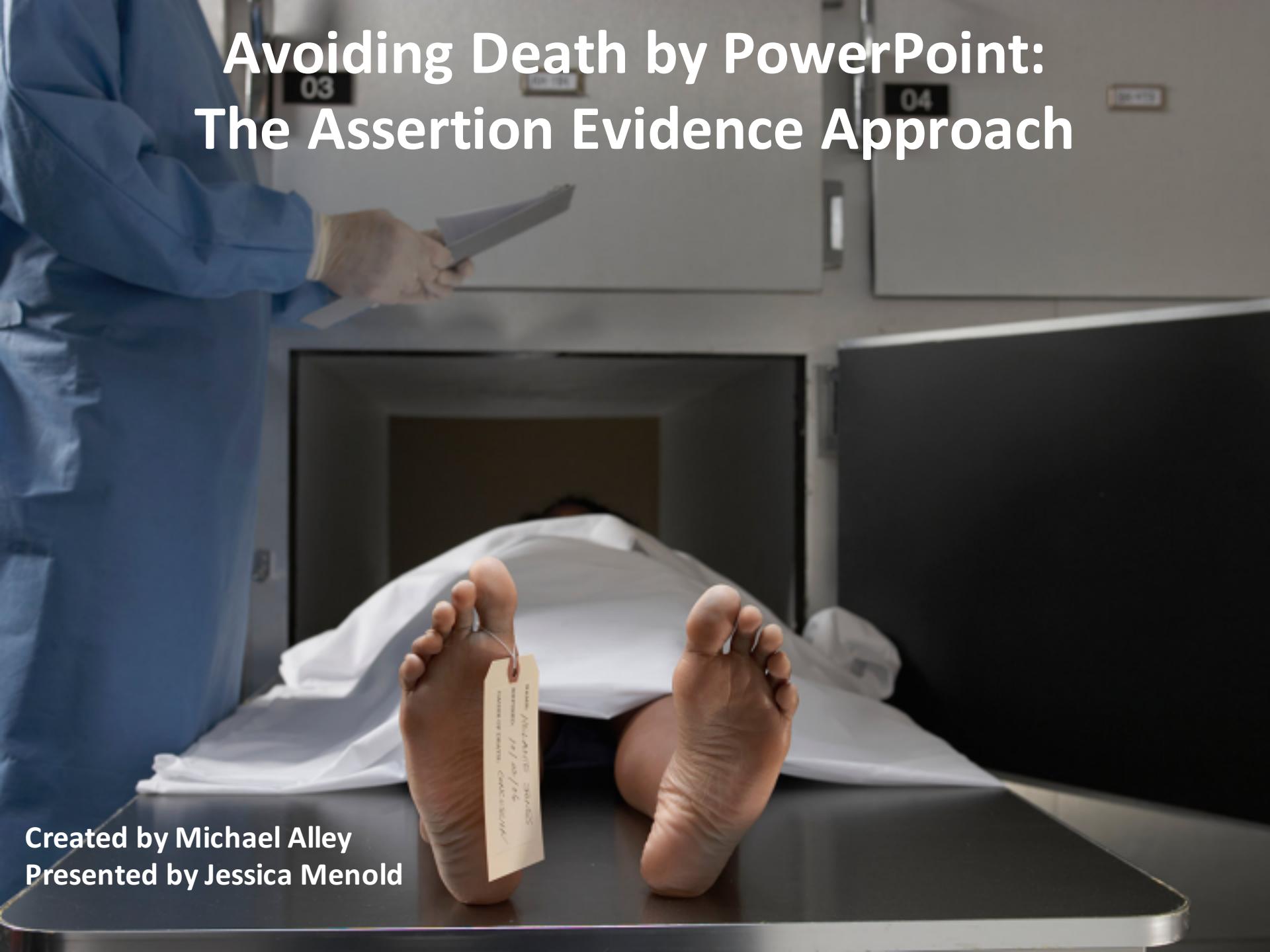
Communicating your science effectively is critical to your success as a researcher and the success of your work

A photograph of a polar bear standing on a small, white ice floe in the middle of a vast, dark blue ocean. The bear is facing right, looking towards the horizon. The sky above is filled with scattered, light-colored clouds.

“the science now shows with 95 percent certainty that human activity is the dominant cause of observed warming since the mid-20th century”

-United Nations' Intergovernmental Panel on Climate Change

Avoiding Death by PowerPoint: The Assertion Evidence Approach



Created by Michael Alley
Presented by Jessica Menold

**How can we effectively
communicate our science?**

**Who are some of the best speakers of
science or engineering you have witnessed?**

This workshop discusses strategies for how to be successful in three critical areas of your presentation



Content



Visual Aids



Delivery

To excel in your presentations, you will need content



To excel in your presentations, you will need content and passion



To excel in your presentations, you will need content, passion, and an acute sense of the audience

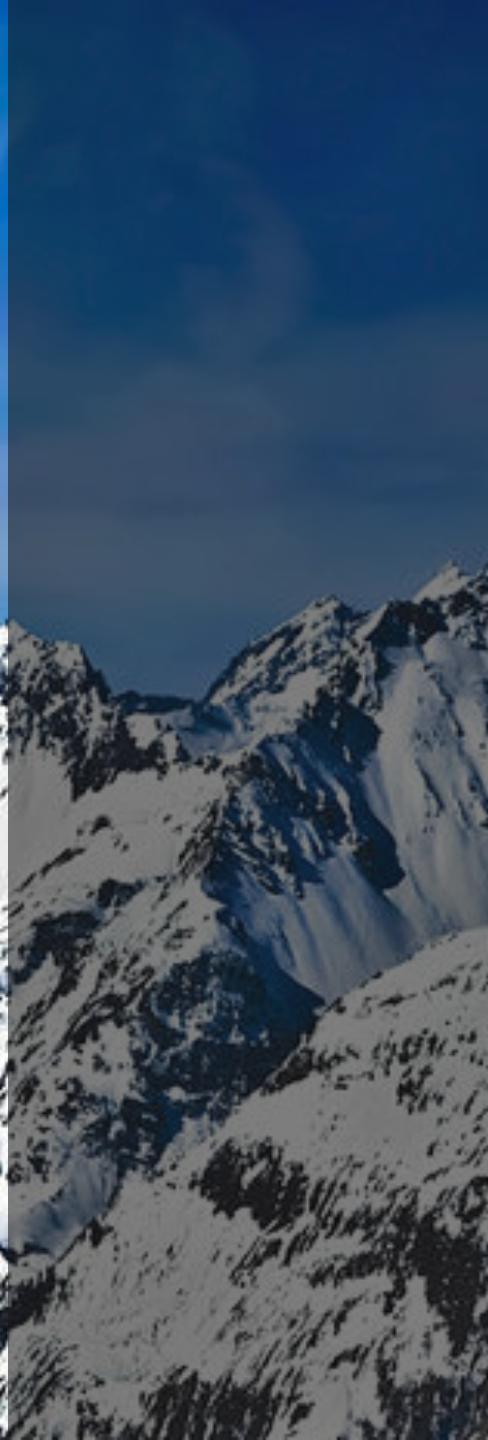
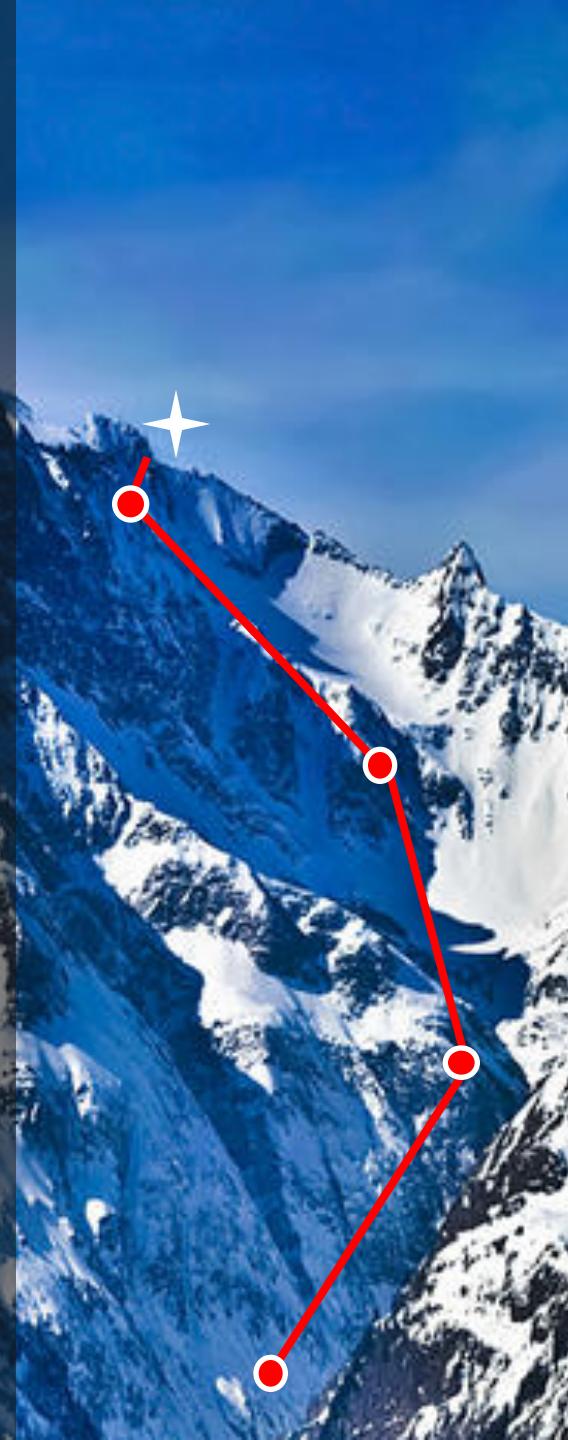


**What do they know
about your work?**

**Why your work
will interest them?**

audience





The goals for a scientific presentation are that it is understood, remembered, and believed



Exercise: With a partner, analyze the audience of your next research presentation

who are they?

what do they know?

why are they here?

audience



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



When you have a varied audience, alternate between shallow and deep dives in your content

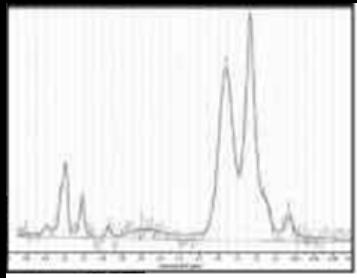
Non-Scientific

General
Scientific

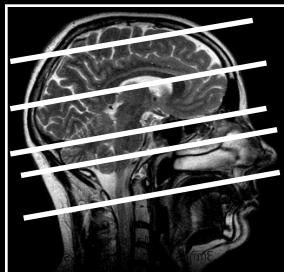
Scientific Experts



Most people do not realize how much slides affect the success, or failure, of scientific presentations



$$\int f d\delta_{x_0} = f(x_0)$$



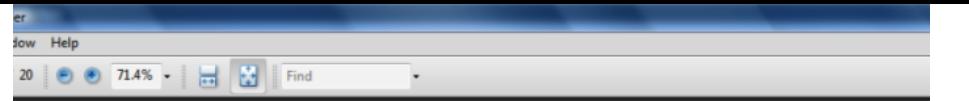
It is hard to have a slide serve the audience both as a projection during the talk and as a handout afterwards



\neq

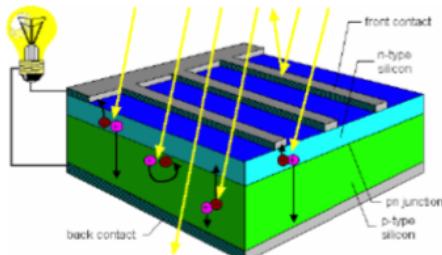


Exercise: With a partner, agree on the three biggest problems with slides that you see in research talks?



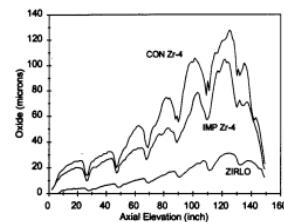
Physics of p-n Junction Based Cells

- A photon of $E > E_{\text{gap}}$ excites an electron into the conduction band, creating an electron-hole pair
- The electric field from the depletion zone separates the pair
- Current goes through a load



Corrosion and Hydriding

- Different alloys have different in-reactor corrosion rates and consequently different degrees of hydriding and degradation of mechanical properties
- => **benefit of designing good alloy** (e.g. M5 (Framatome) and ZIRLO (W) have better corrosion properties than Zircaloy)



Sabol et al. Portland 1999

Oxidation measured by weight gain

Hydrides are brittle and can severely degrade cladding ductility

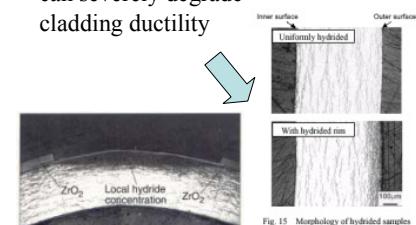


Fig. 15 Morphology of hydrided samples

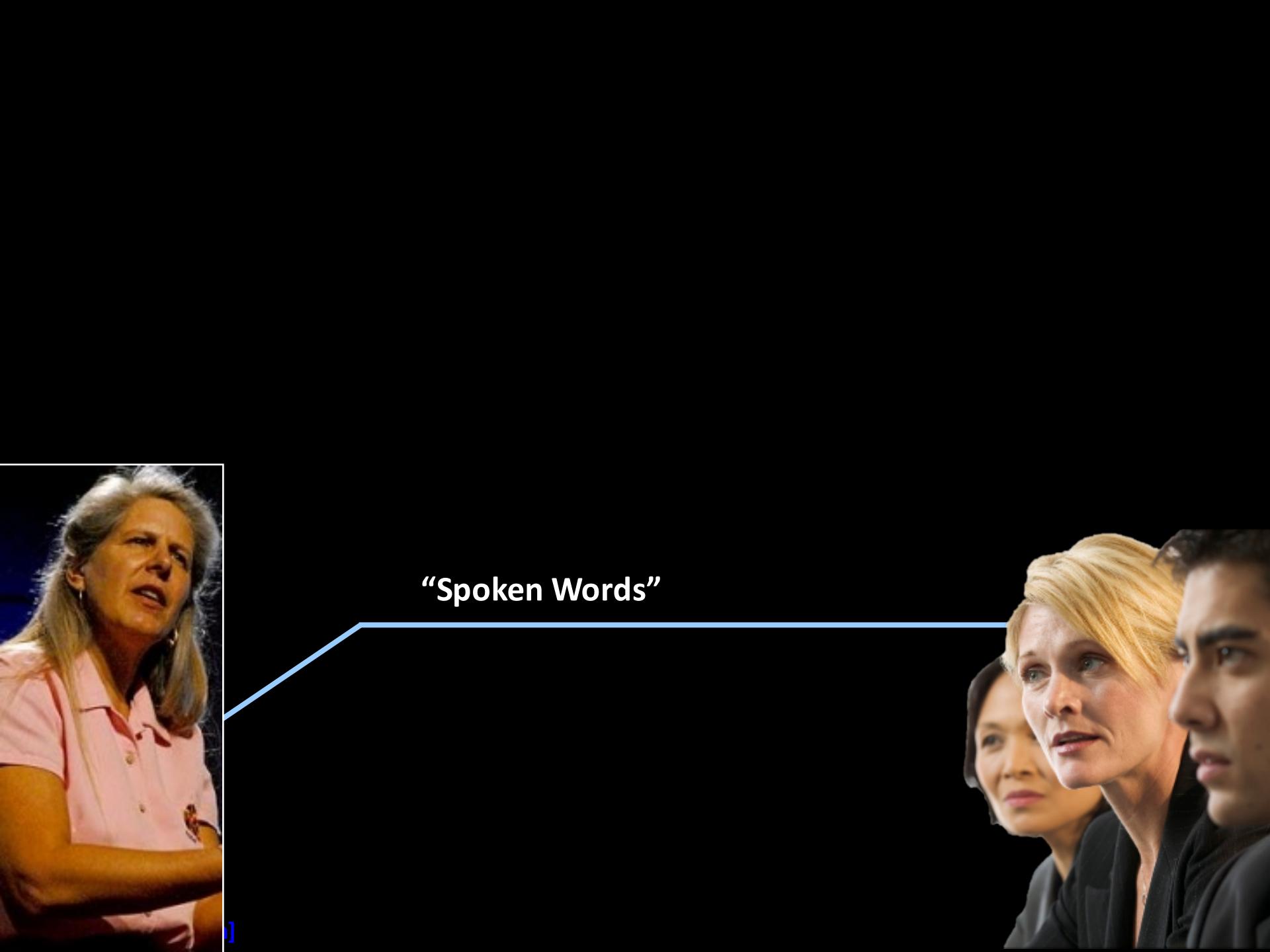
Scientists and engineers often name the same problems with slides

1. Too many words

Functional Decomposition

- Card Identification:
 - Identify specific cards.
 - Identify when cards placed or removed.
- Mode Selection:
 - Change between record/play, put on/stop.
- Sound System:
 - Record/play messages.
 - Access messages dynamically.
- User Interface
 - Present cards in viewable manner.
 - Controls accessible to teacher, cards to students.



A photograph of a woman with blonde hair, wearing a pink polo shirt, speaking into a microphone. She is gesturing with her hands. In the background, several people are seated, looking towards her. A blue line points from the text "Spoken Words" to her mouth.

"Spoken Words"

Right

Parallel
processor

“Spoken Words” + Written Words



If audiences try to process too many words simultaneously, cognitive overload occurs

Order of Analysis

- Orbiter assessment of ascent debris damage includes
 - Evaluation of potential for debris to damage tile and RCC
 - Program "Crater" is official evaluation tool
 - Available test data for SOFI on tile was reviewed
 - No SOFI on RCC test data available
 - Even for worst case, BIP and densified tile layer will remain when SOFI is Impactor
 - Thermal analysis of areas with damaged tiles:
 - Thermal analysis will predict potential tile erosion and temperatures on structure
 - Structural assessment based on thermal environment defined above
 - Basis is previous Micrometeoroid and Orbital Debris (MMOD) study performed in 1998

© NASA

20140

2

“Spoken Words” + Written Words



[Sweller, 2005]

Scientists and engineers often name the same problems with slides

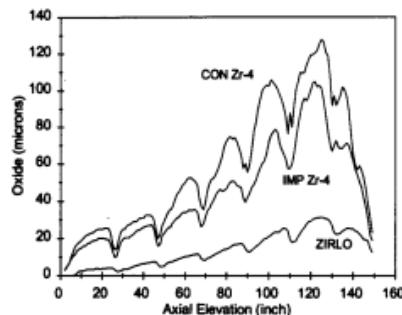
1. Too many words

2. Cluttered—not sure where to look

3. Much text not readable

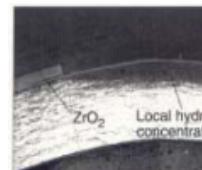
Corrosion and Hydriding

- Different alloys have different in-reactor corrosion consequently different degrees of hydriding and de-mechanical properties
- => **benefit of designing good alloy** (e.g. M5 (Fracture (W) have better corrosion properties than Zircaloy)



Sabol et al. Portland 1997

Oxidation measured by weight gain



ZrO_2 Local hydride concentration

Hydrides and
can severely
cladding damage

PowerPoint's defaults arose before research on slides

Click to edit Master title style

- Click to edit Master text styles
 - Second level
 - Third level
 - Fourth level
 - » Fifth level

(date/time)

Date Area

{footer}

Footer Area

(#)

Number Area

Title Area for AutoLayouts

Object Area for AutoLayouts

2003

Click to edit Master title style

- Click to edit Master text styles
 - Second level
 - Third level
 - Fourth level
 - » Fifth level



9/7/2010

Footer

(#)

1987

2007

Click to edit Master title style

- Click to edit Master text styles
 - Second level
 - Third level
 - Fourth level
 - » Fifth level

(date/time)

Date Area

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Footer Area

(#)

Number Area

Title Area for AutoLayouts

Object Area for AutoLayouts

PowerPoint's defaults run counter to how people learn

Click to edit Master title style

- Click to edit Master text styles
 - Second level
 - Third level
 - Fourth level
 - » Fifth level

9/7/2010 Footer «#»

Does not filter noise

Leads to too many written words

Consumes valuable space that should be used for images

PowerPoint's defaults run counter to how people learn

Click to edit Master title style

- Click to edit Master text styles
 - Second level
 - Third level
 - Fourth level
 - » Fifth level

We can do better

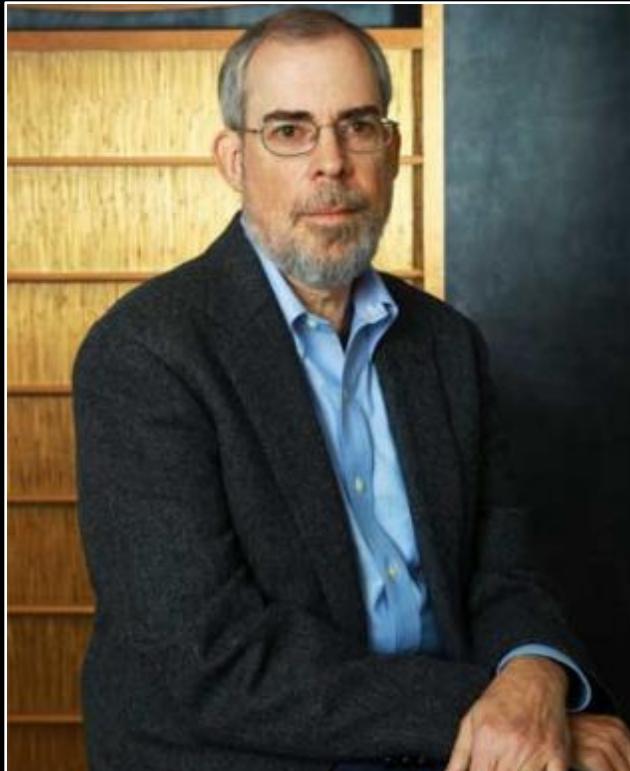
“The real mystery to me is why PowerPoint [default style] has been adopted so widely...”



“...Why do medical researchers use PowerPoint style at academic conferences?”



**“...Why do engineers use PowerPoint style
for technical discussions?”**

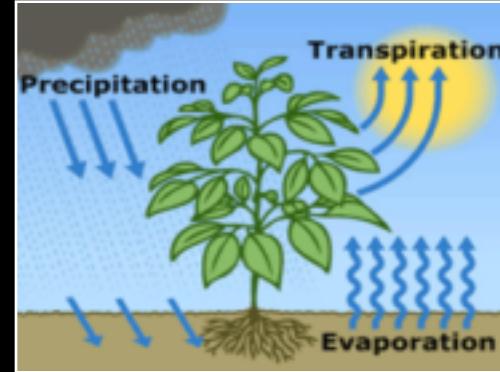
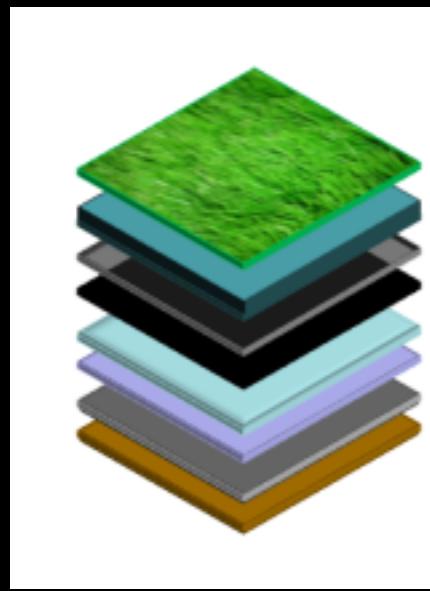




Build your talk on
messages

not
on topics

Support your messages
with **visual** evidence



not
bullet points

Build your talk on messages

Urban Temperatures

- Often warmer than surrounding areas
- Caused by materials in roofs and roads
- Also caused by lack of shade and vegetation
- Lead to higher temperatures in buildings
- Requires more energy



Build your talk on
messages

Urban Temperatures

Temperatures in urban centers are often much warmer than in surrounding rural areas

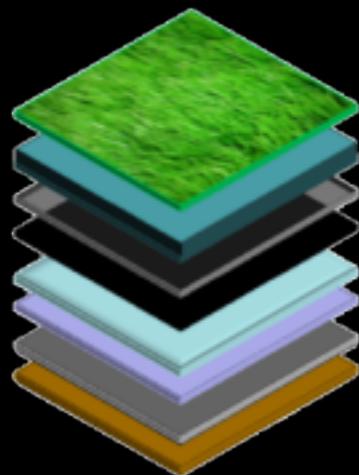
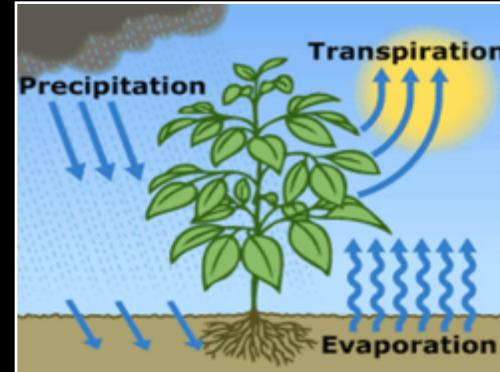


Exercise: On separate sheets, write down essential messages for your next talk

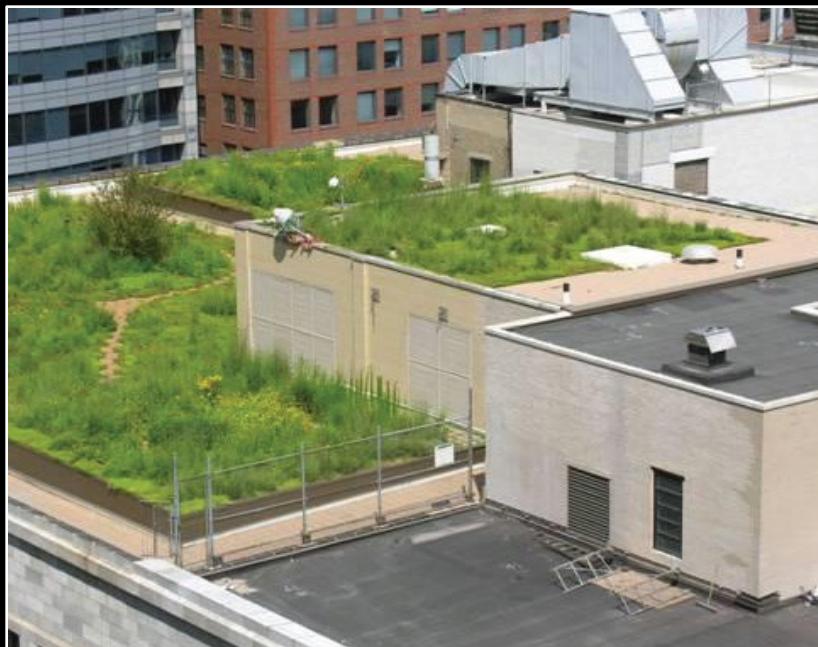
Temperatures in urban centers are often much warmer than in surrounding rural areas



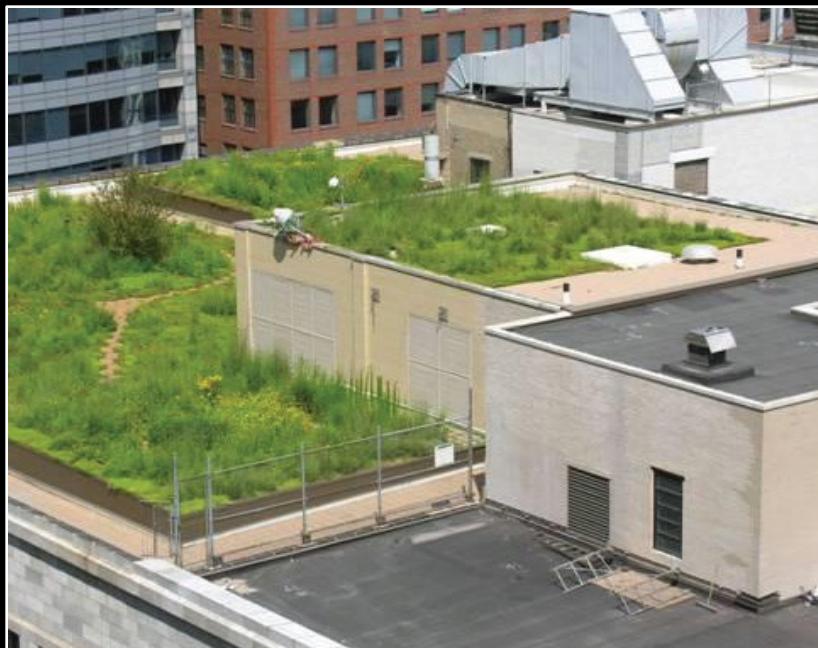
Support your messages
with **visual** evidence



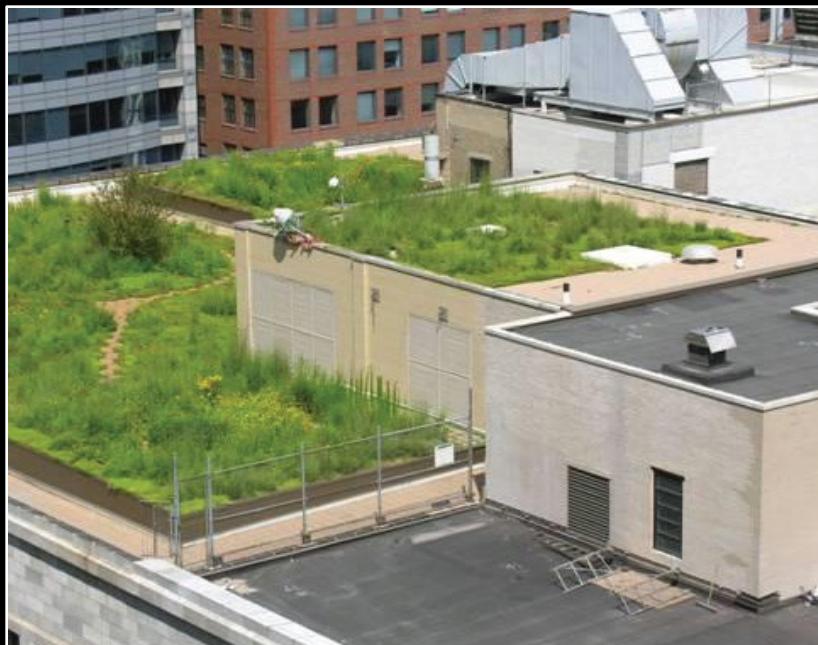
Research shows that green roofs are extremely effective in lowering the roof temperatures of buildings



Research shows that green roofs are extremely effective in lowering the roof temperatures of buildings



Research shows that green roofs are extremely effective in lowering the roof temperatures of buildings



Since its construction in 1952, traffic across the bridge has grown exponentially

1952

1.1 million vehicles

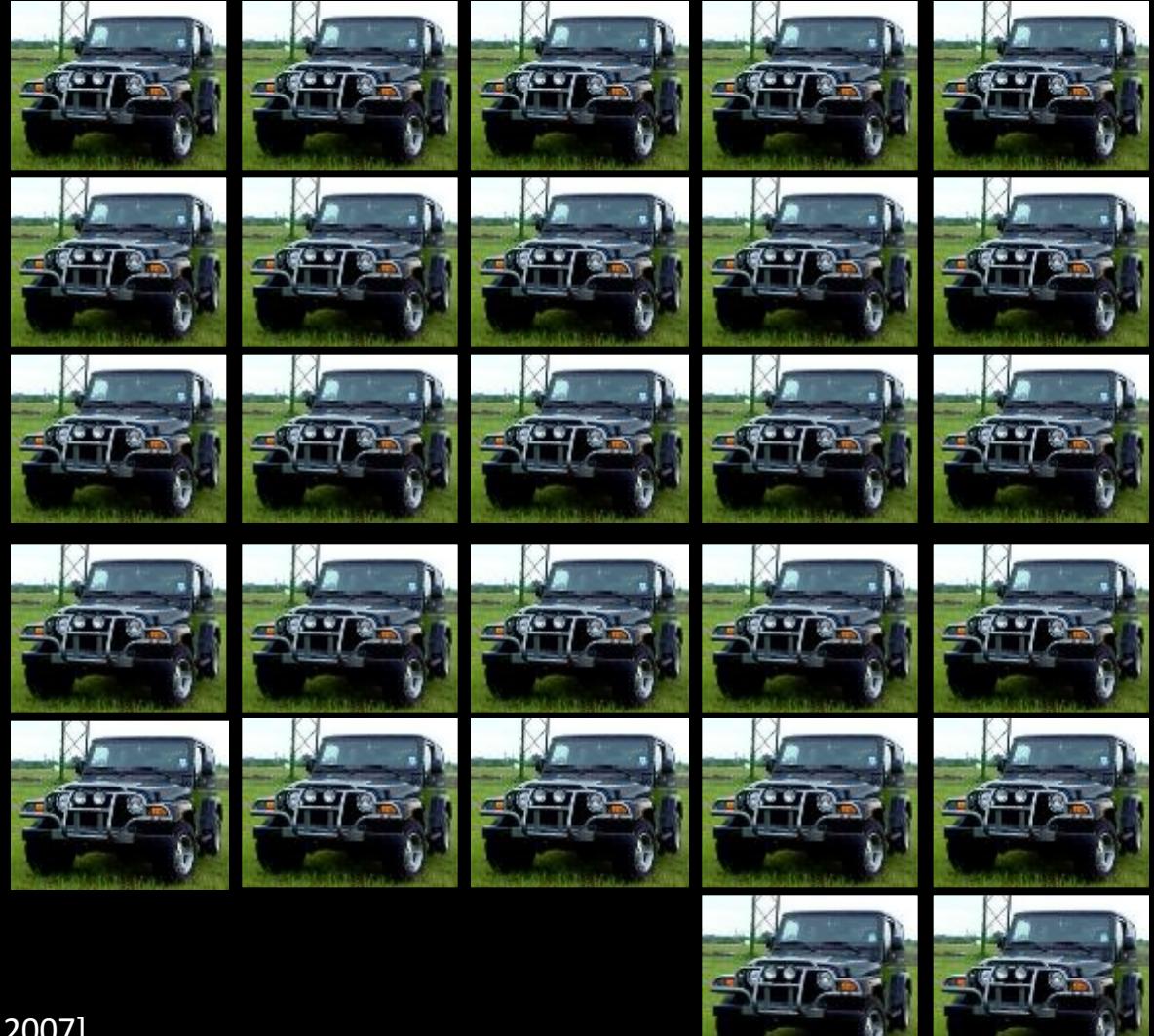
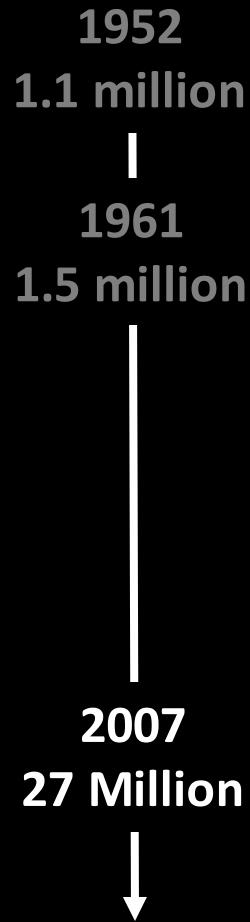


Since its construction in 1952, traffic across the bridge has grown exponentially

1952
1.1 million
|
1961
1.5 million



Since its construction in 1952, traffic across the bridge has grown exponentially



Stream conditions were defined from a set of six criteria

Acidity

Chloride

Sulfate

Total Phosphorus

Total Nitrogen

Average Habitat Score

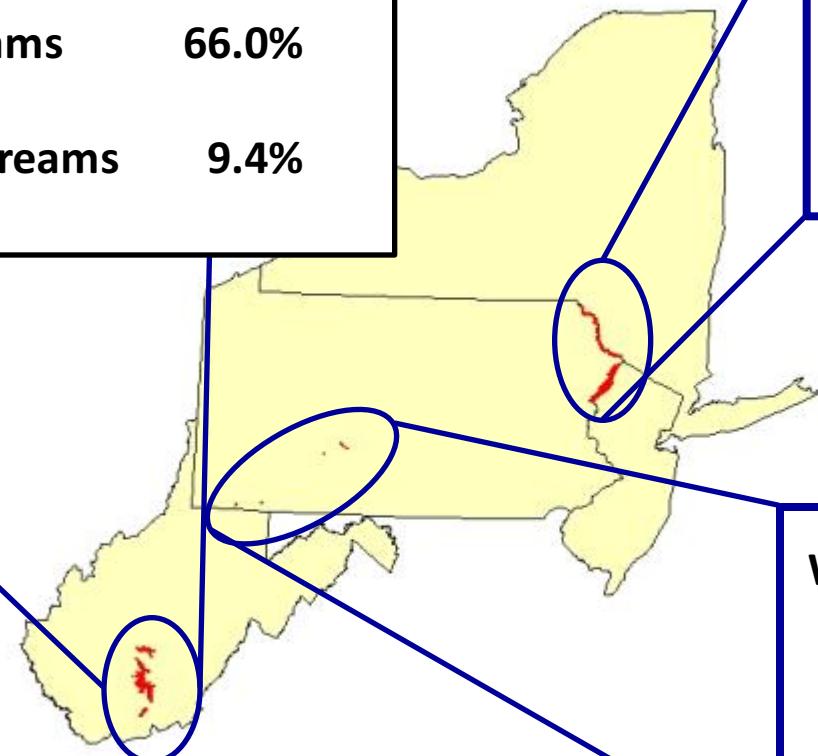
Reference

Fair

Impaired

Most regional streams were classified in fair condition because of high chloride concentrations

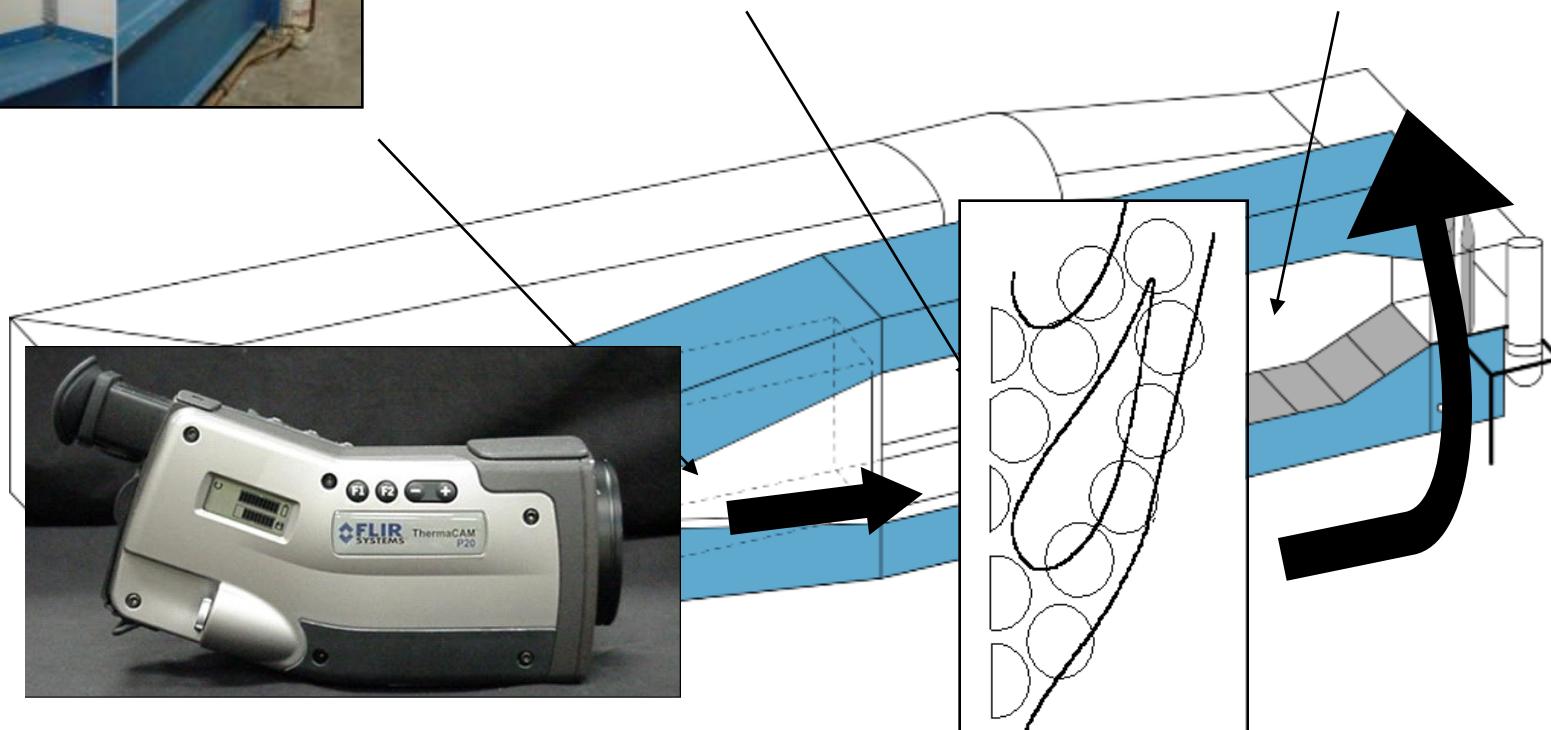
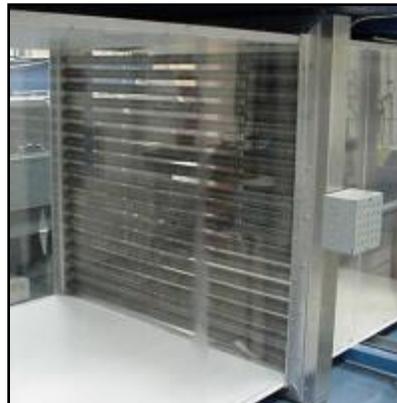
13	reference streams	24.5%
35	fair streams	66.0%
5	impaired streams	9.4%



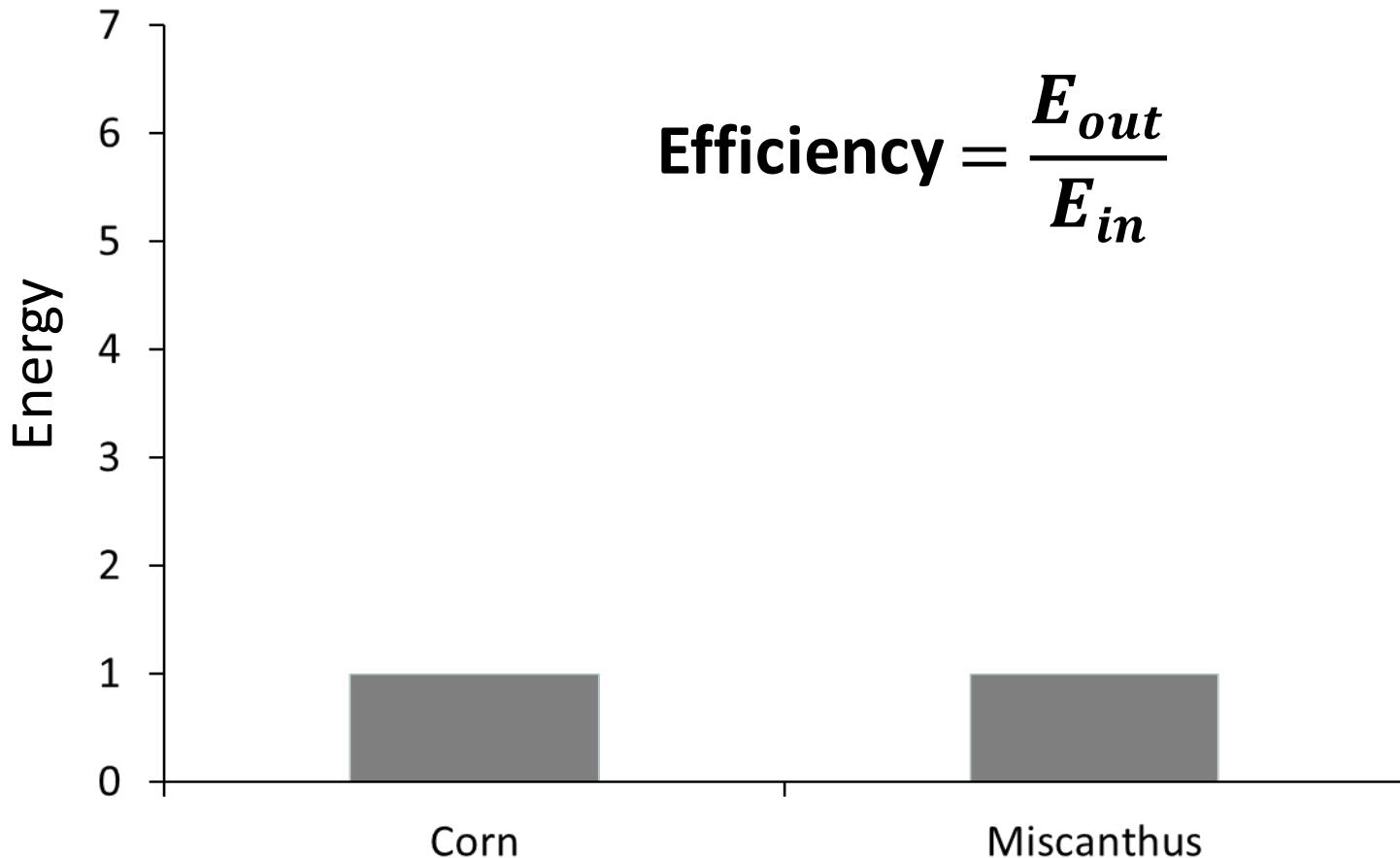
Delaware River Parks:
79% Fair
Chloride caused most problems

Western Pennsylvania Parks:
75% Fair
Chloride caused most problems

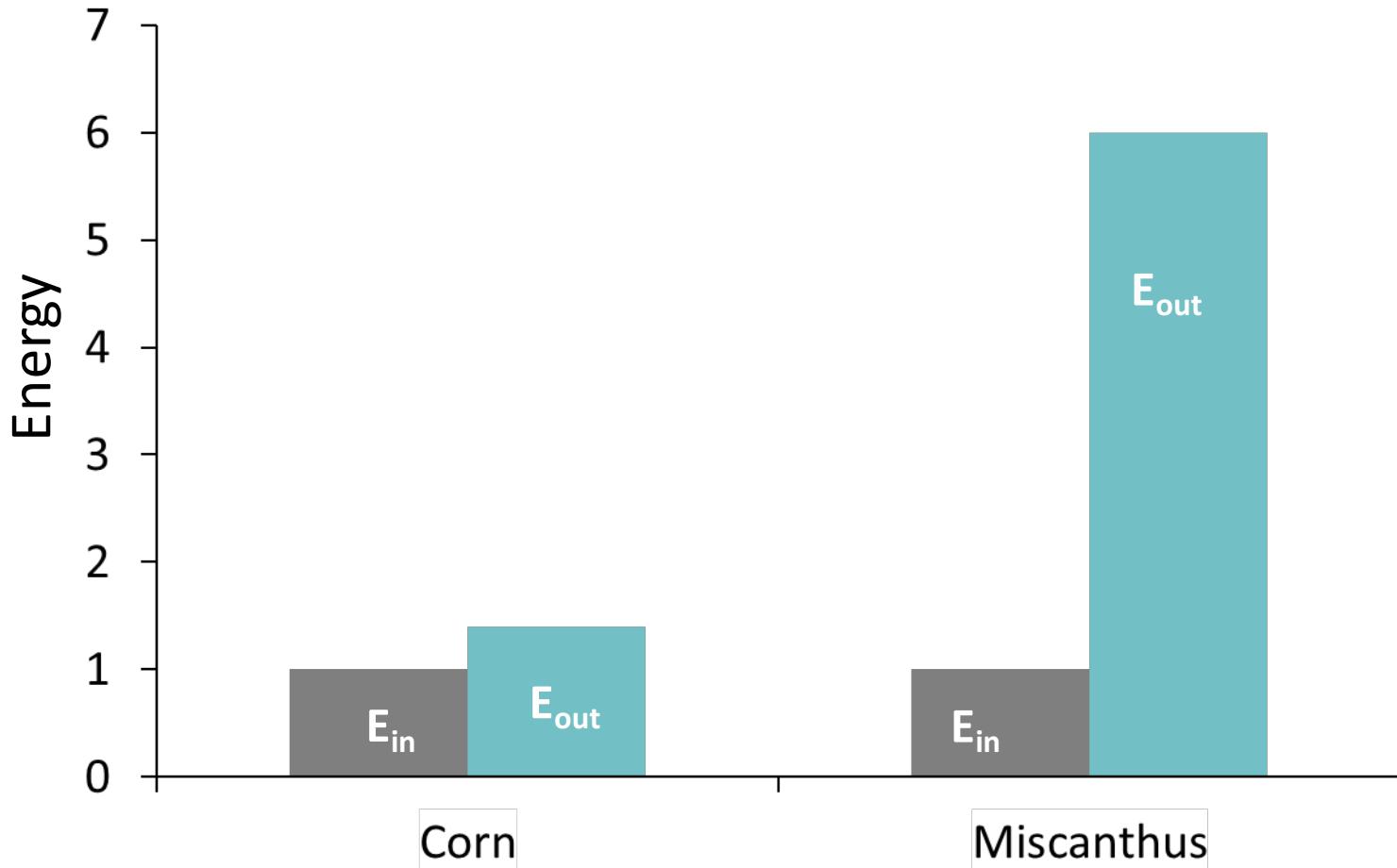
The test section of the wind tunnel featured a heated main flow and a secondary coolant flow

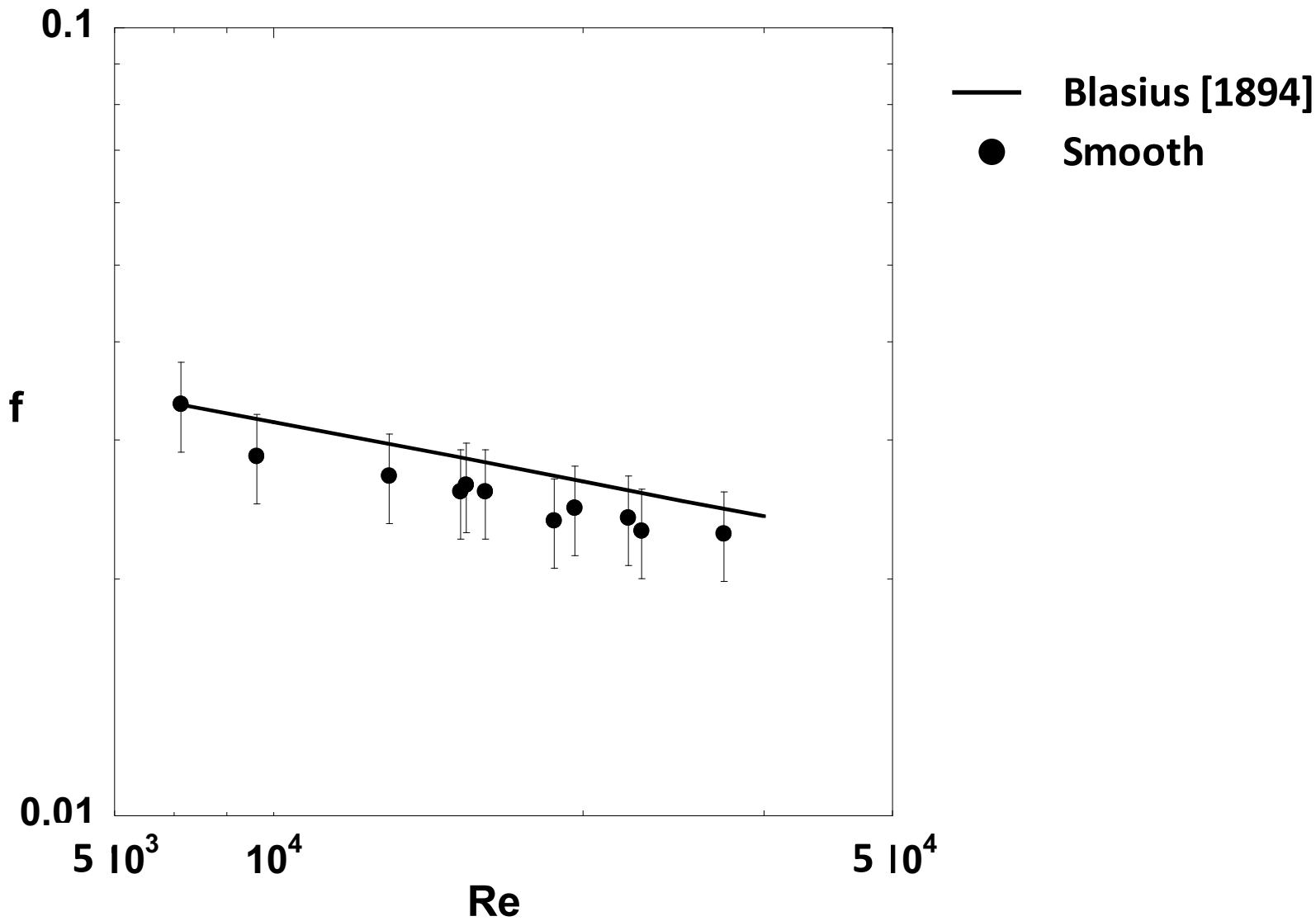


In terms of energy output, miscanthus is four times more efficient than corn



In terms of energy output, miscanthus is four times more efficient than corn

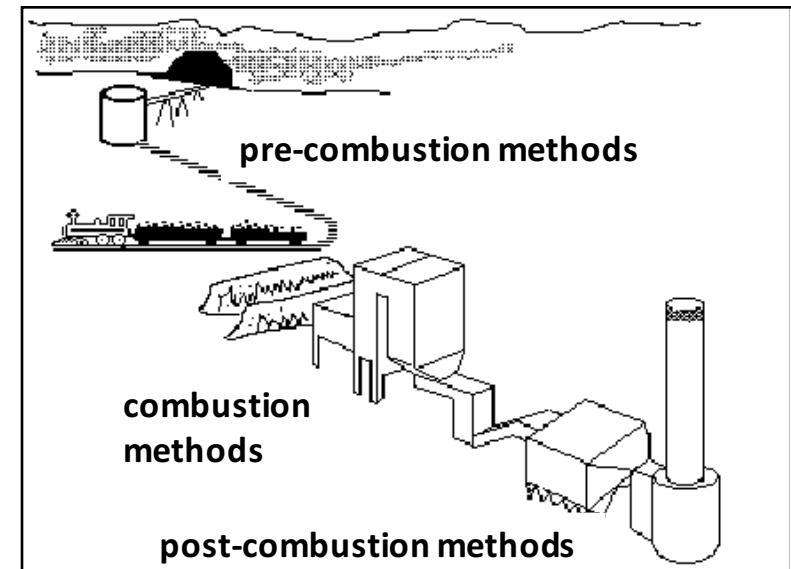
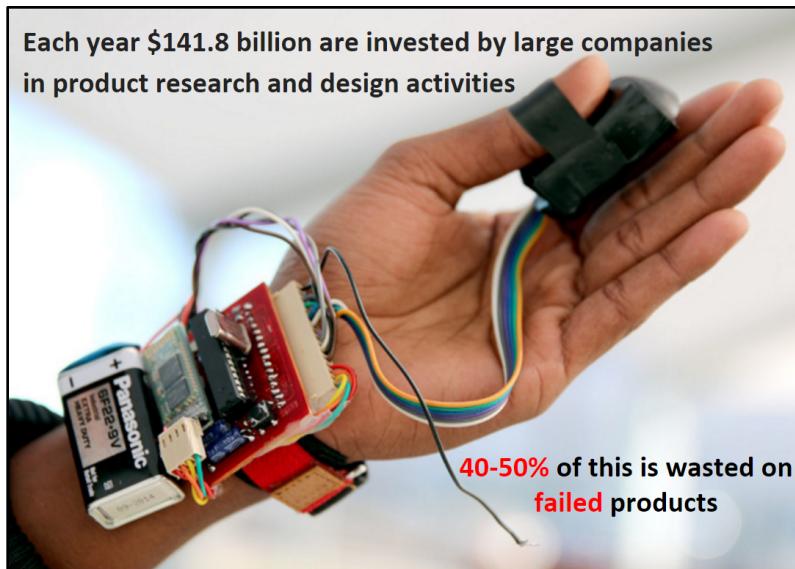
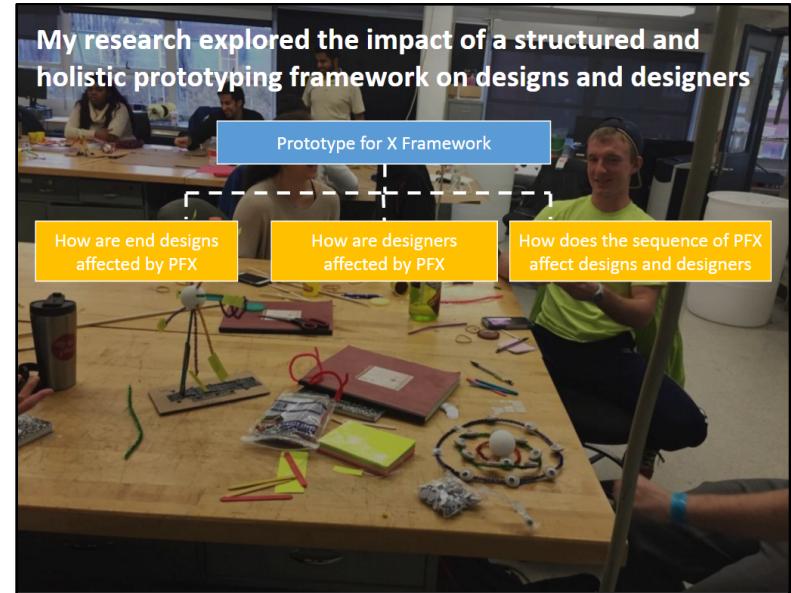
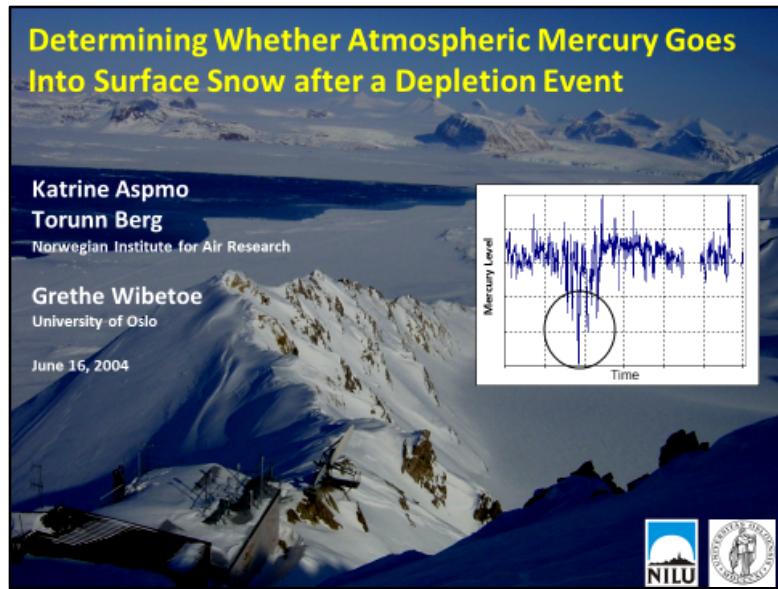




**Successfully structuring your presentation calls on you
to lead your audience up your mountain of information**



What does the audience expect the beginning of a scientific talk to cover?



A common error in the beginning of scientific talks is to leave the audience behind



We can do
better

Determining Whether Atmospheric Mercury Goes Into Surface Snow after a Depletion Event

Katrine Aspmo

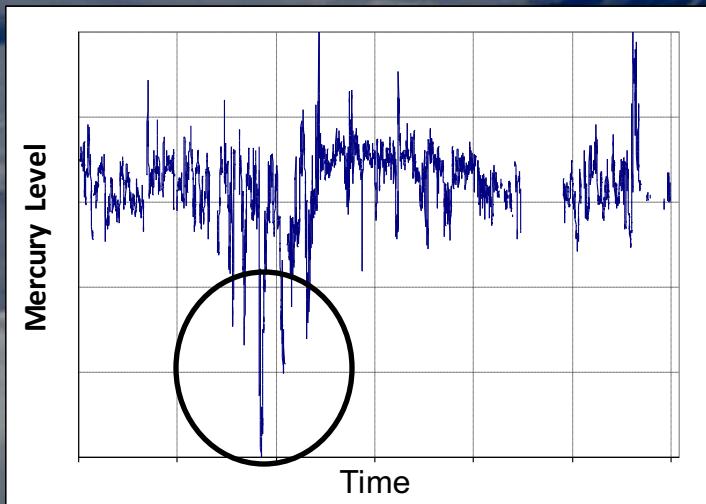
Torunn Berg

Norwegian Institute for Air Research

Grethe Wibetoe

University of Oslo

June 16, 2004

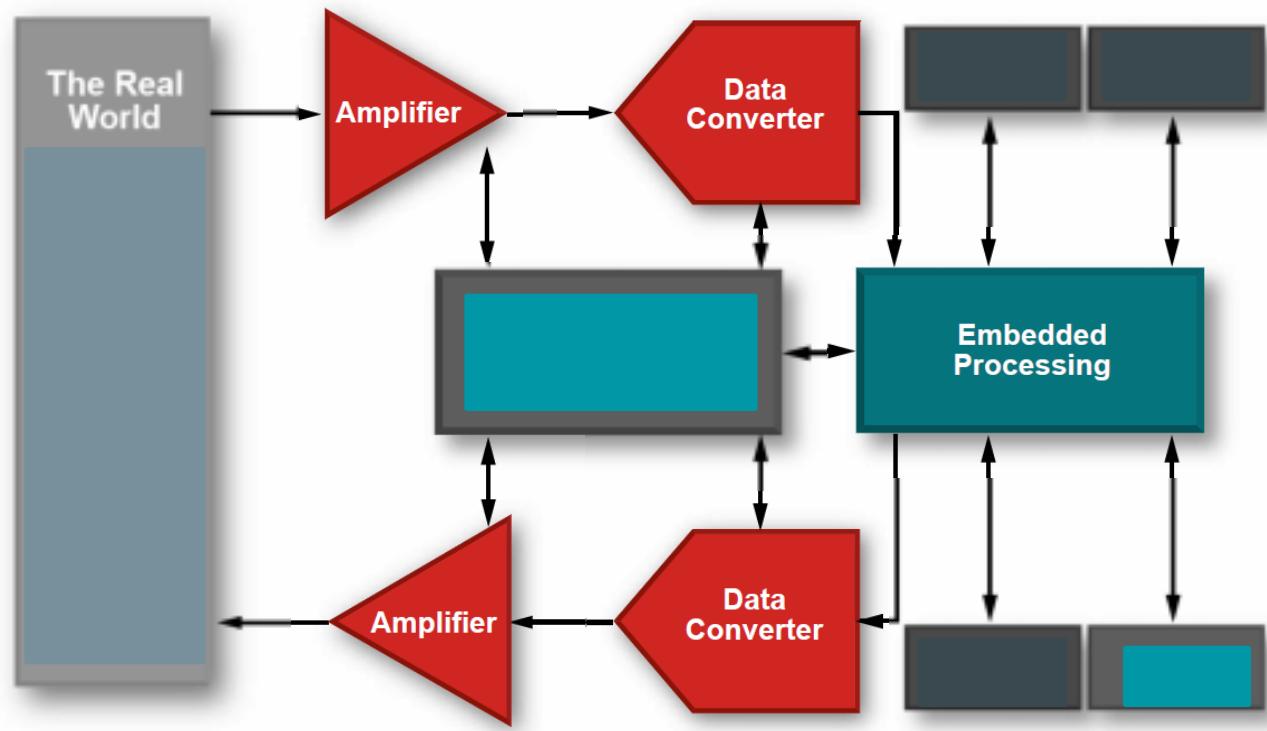


Static and Dynamic Characteristics of Digital-to-Analog Converters (DACs)

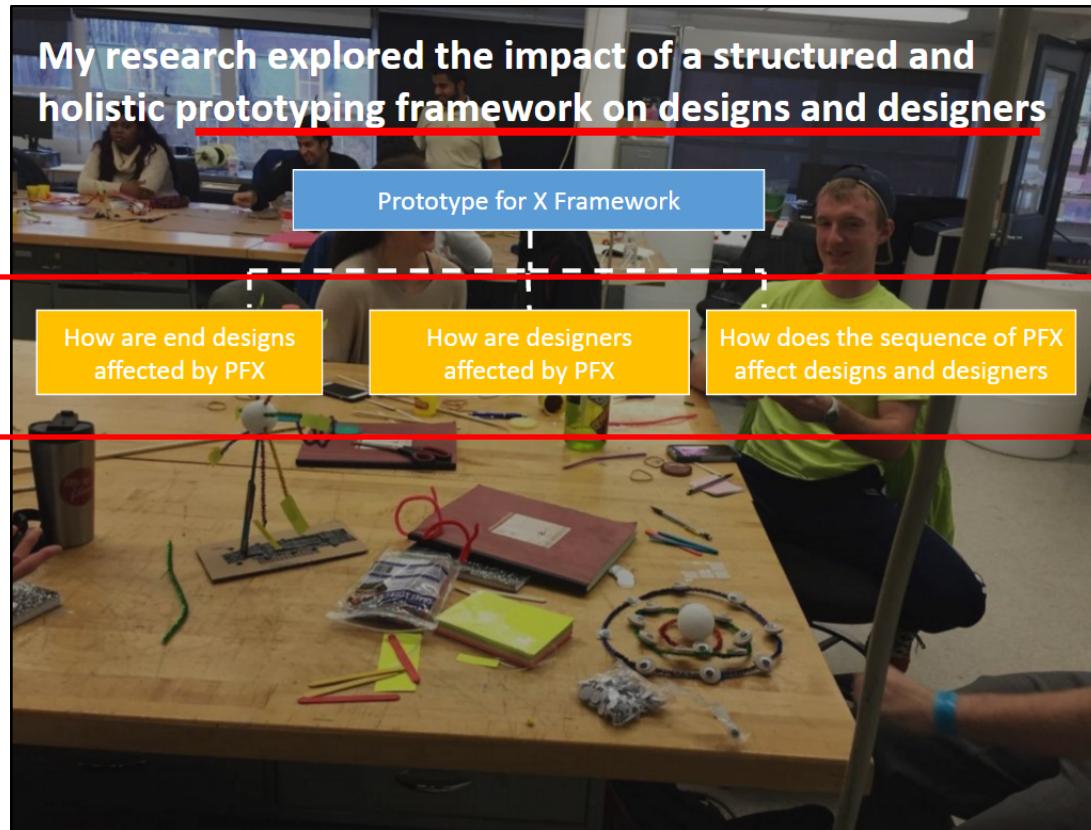
Eugenio Mejia

Precision DAC
Texas Instruments

June 26, 2014



Strong beginnings define the scope and limitations of the topic



Sets the scope of research

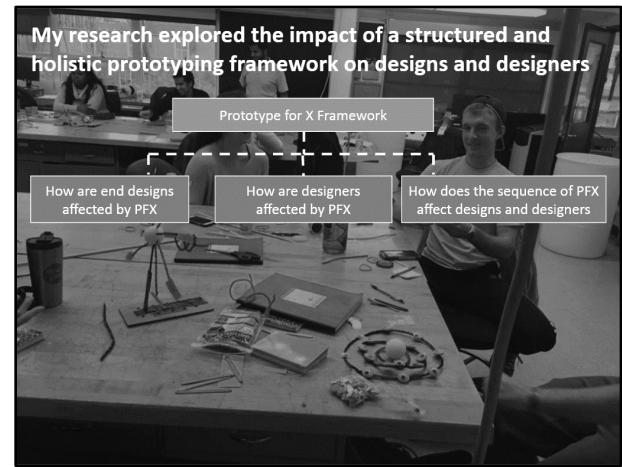
Specifically calls out the research questions of interest

Strong beginnings show the importance of the topic

Each year \$141.8 billion are invested by large companies in product research and design activities



40-50% of this is wasted on failed products



My research explored the impact of a structured and holistic prototyping framework on designs and designers

Prototype for X Framework

How are end designs affected by PFX

How are designers affected by PFX

How does the sequence of PFX affect designs and designers

**Success involves defining a valuable scope
and a satisfying depth**

← → **Valuable**

Satisfying

unknown

Strong beginnings give key background

Based on a literature review of 80 studies we identified three major functions of prototypes



Catalyze learning
during design



Act as milestones to
set objectives



Enable richer
interactions

The United Nations estimates that teacher burnout will increase with increasing influx of refugee children

10 million

1.5 million

780k

Strong beginnings give key background

Based on a literature review of 80 studies we identified three major functions of prototypes



Catalyze learning
during design

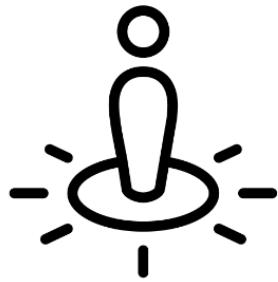


Act as milestones to
set objectives

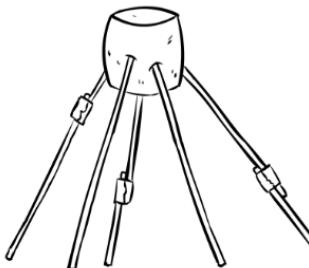


Enable richer
interactions

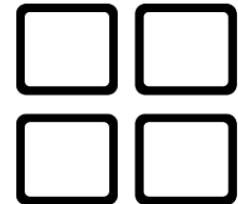
Three critical gaps were identified in the research



Failure to integrate
user-centered design



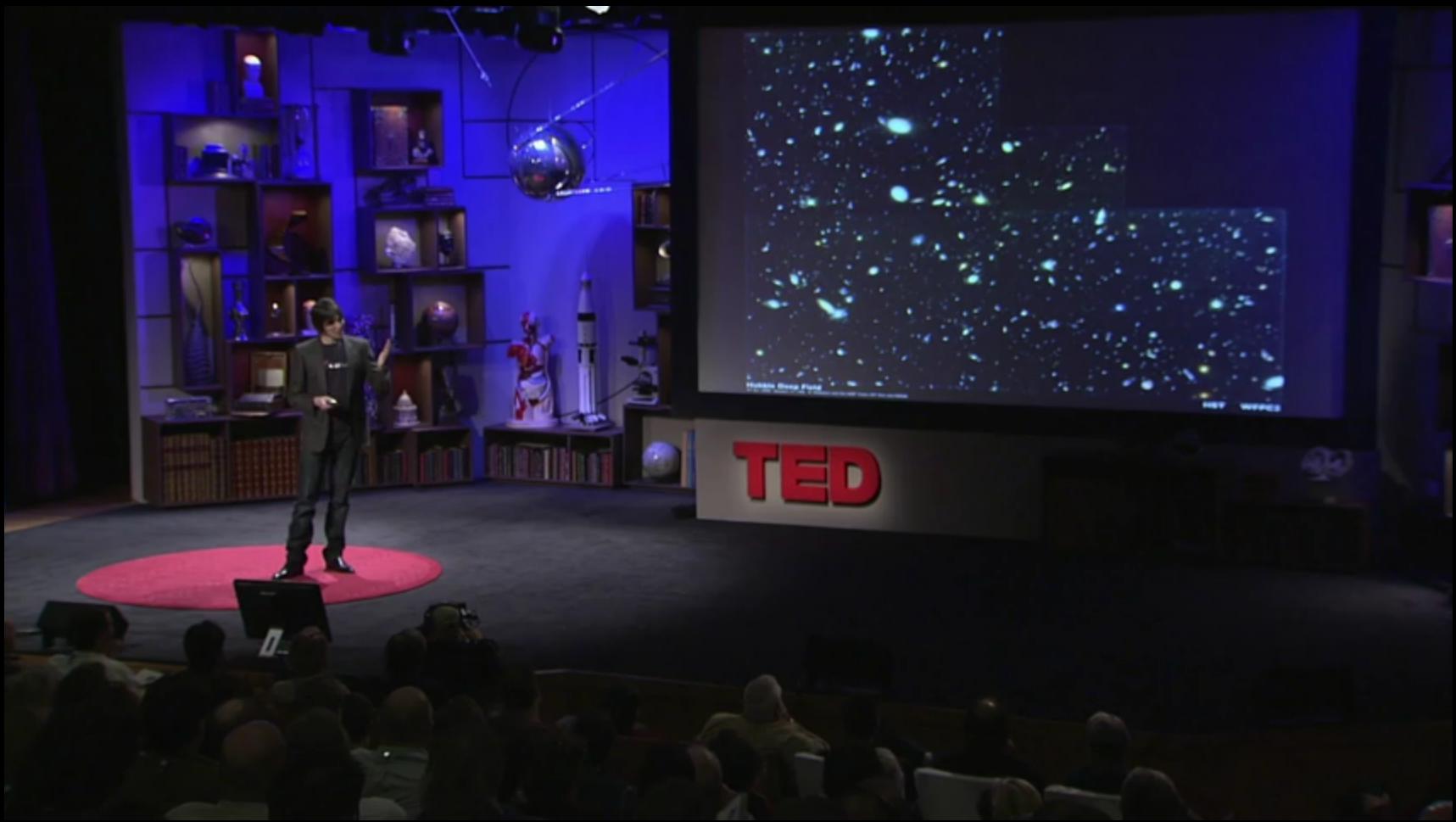
Lack of complexity of
design tasks



No existing framework
with all 4 specs.

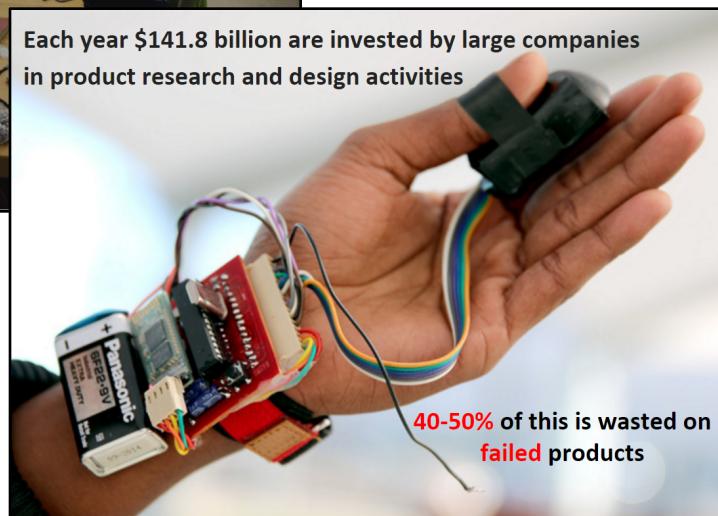
You should anchor what is new
in what is familiar



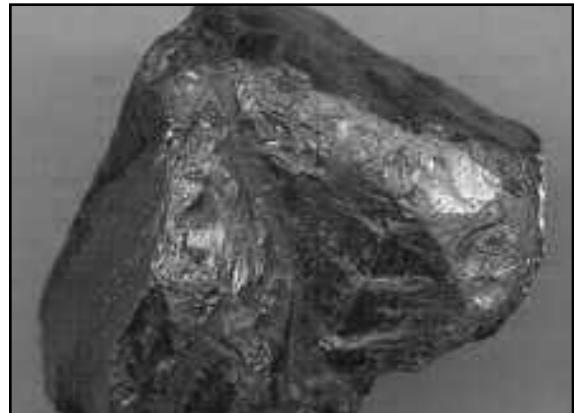
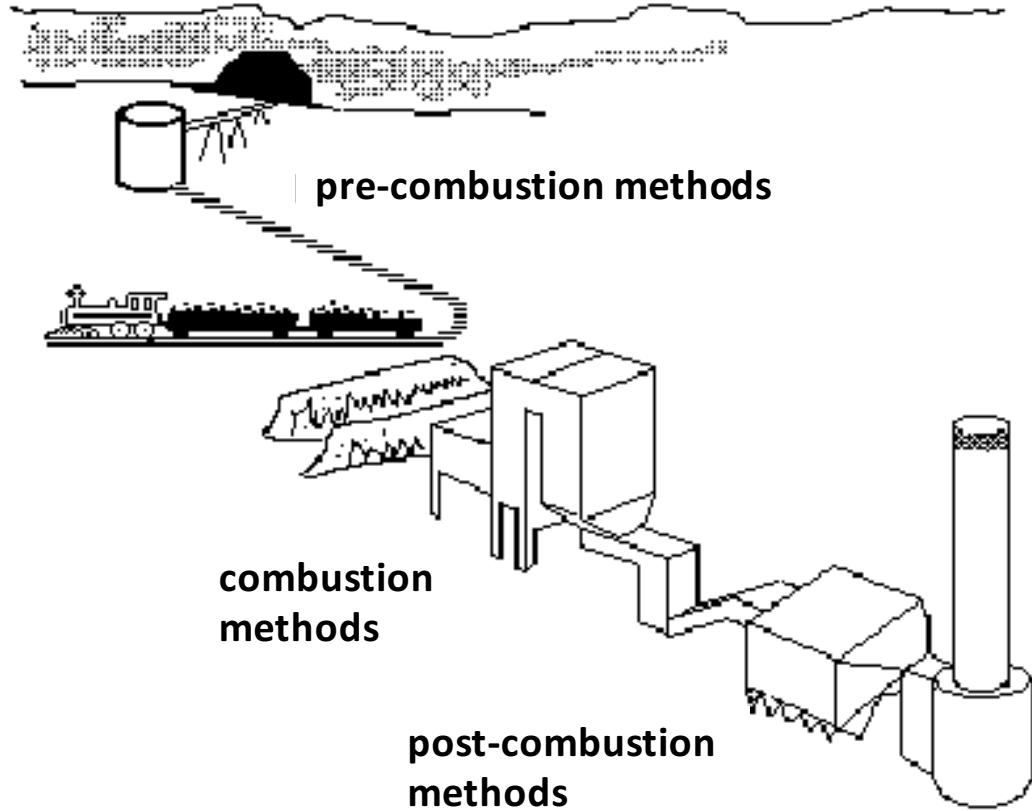


[Dr. Brian Cox, TED.com]

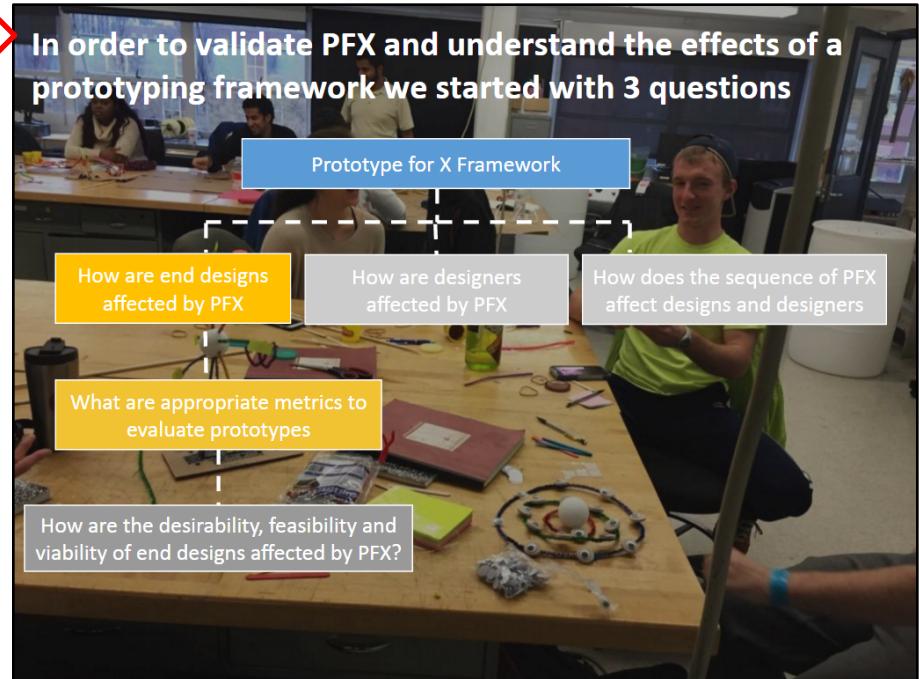
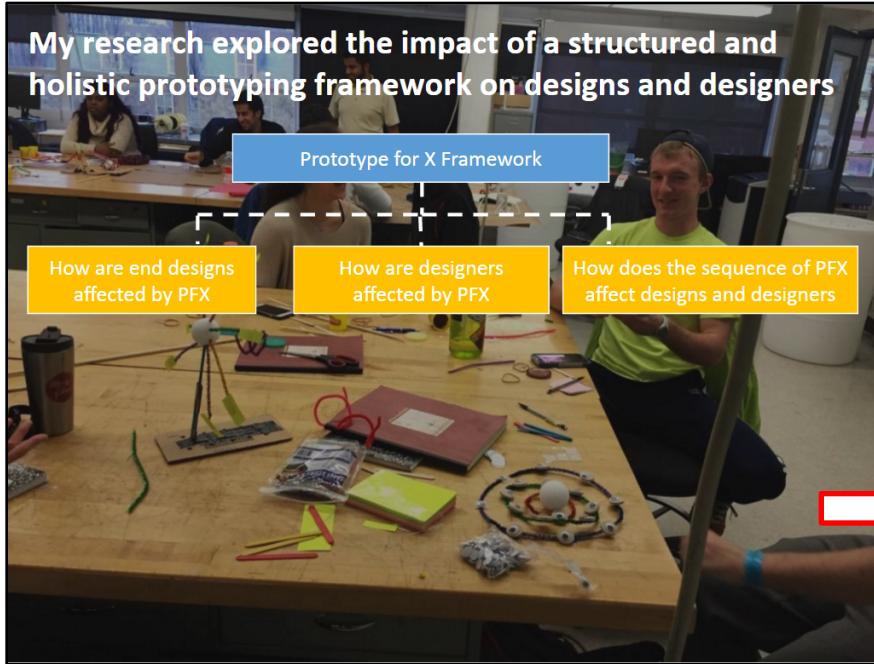
Exercise: For your next talk, brainstorm an entry point and discuss it with a partner



Strong beginnings also map the talk in a memorable way



Strong beginnings also map the talk in a memorable way



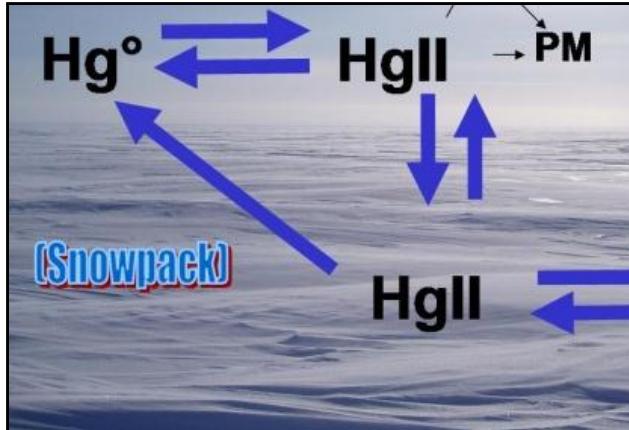
Another common error in the beginning is to map the talk in a way that is not memorable

Outline

- Introduction
- Background
- Theory for Hg Cycling
- Measurements from Station
 ▪ Atmospheric Hg
- Environmental Implications
- Conclusions
- Acknowledgments
- Questions

Not memorable

This talk compares theory with measurements and gives the environmental implications



Theory for Hg cycling



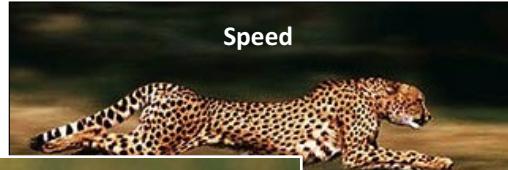
Measurements from station



Environmental implications

Exercise: Draft or critique the title and mapping slides for your next presentation

A cheetah is a great hunter because of its speed, keen senses, and clever strategies

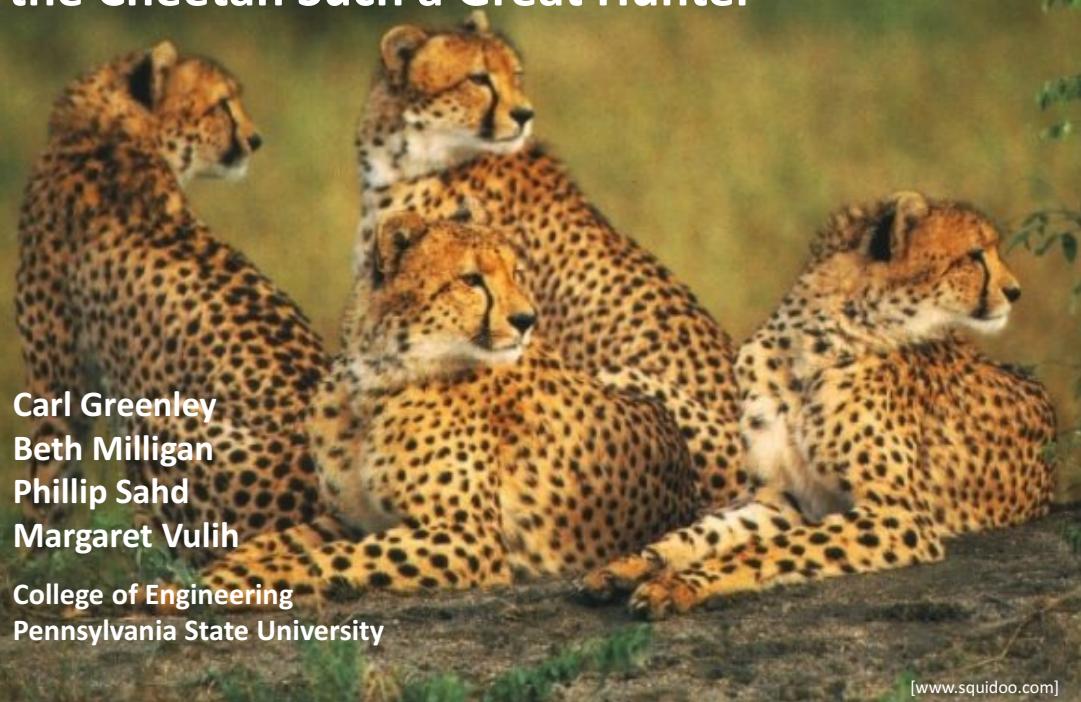


[kreatifdinz.blogspot.com]



[wildencounters.net]

Physical Characteristics That Make the Cheetah Such a Great Hunter



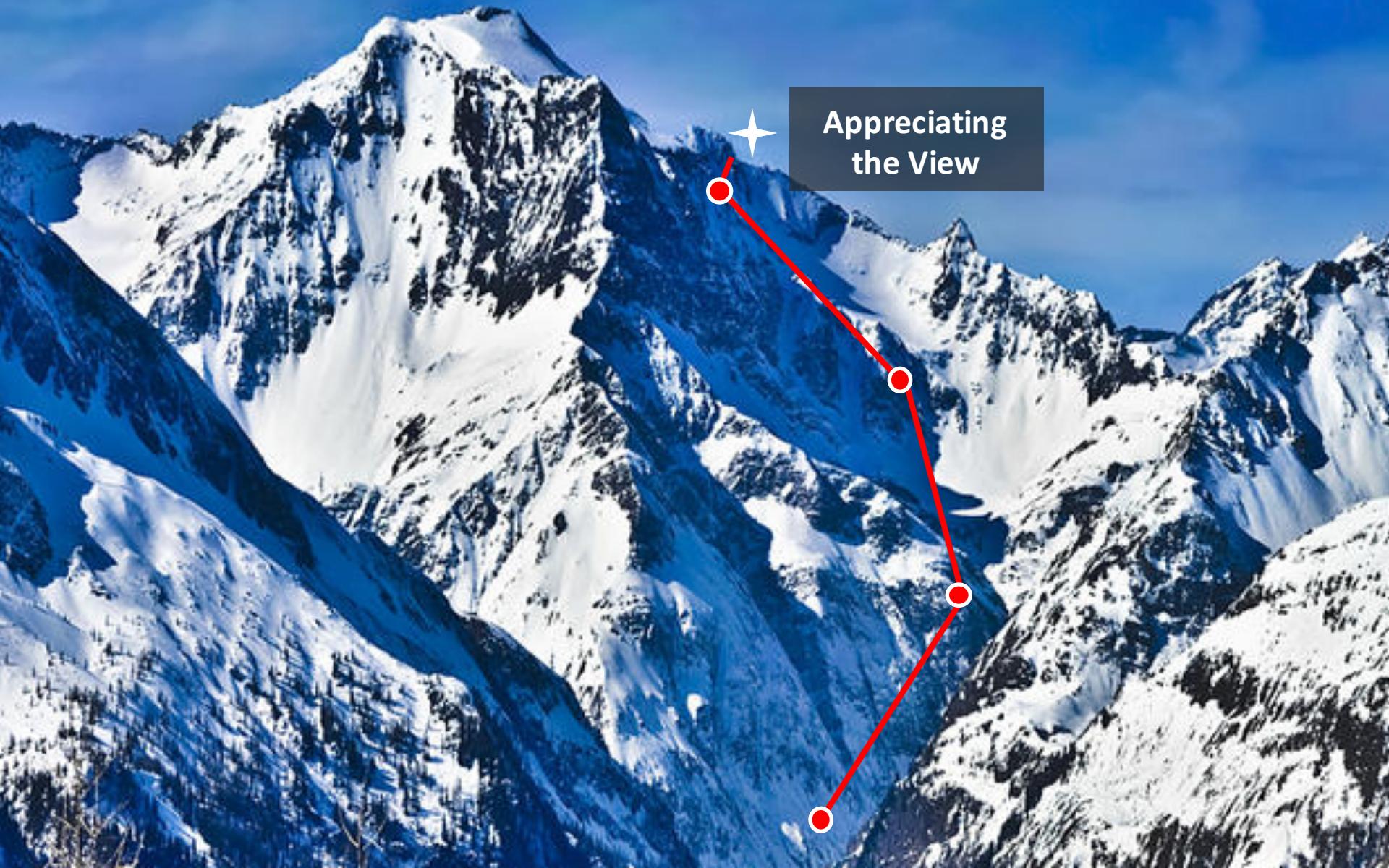
[luxurytravelblog.net]

Carl Greenley
Beth Milligan
Phillip Sahd
Margaret Vulih

College of Engineering
Pennsylvania State University

[www.squidoo.com]

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



A common error in the endings of scientific talks is to waste the last slide



Questions??

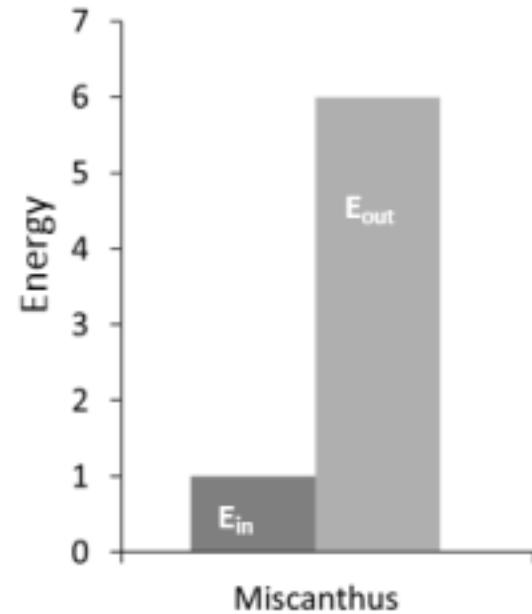
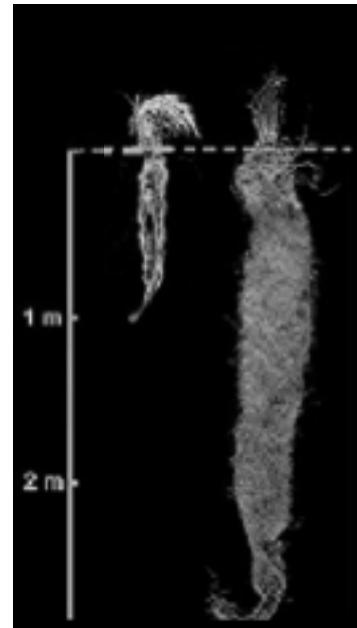
We can do
better



In conclusion, miscanthus is a promising fuel crop for the northeastern United States



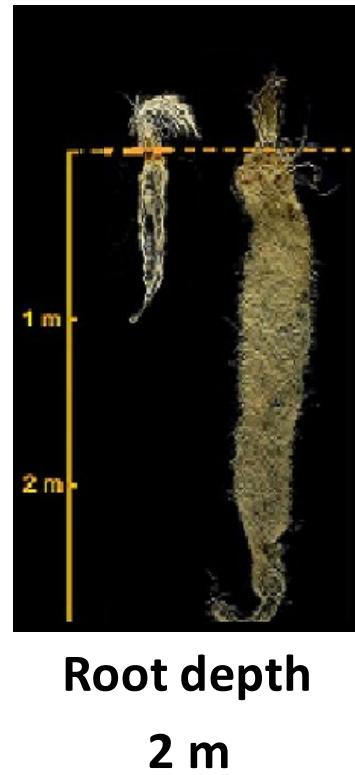
Cold tolerance
 6° C



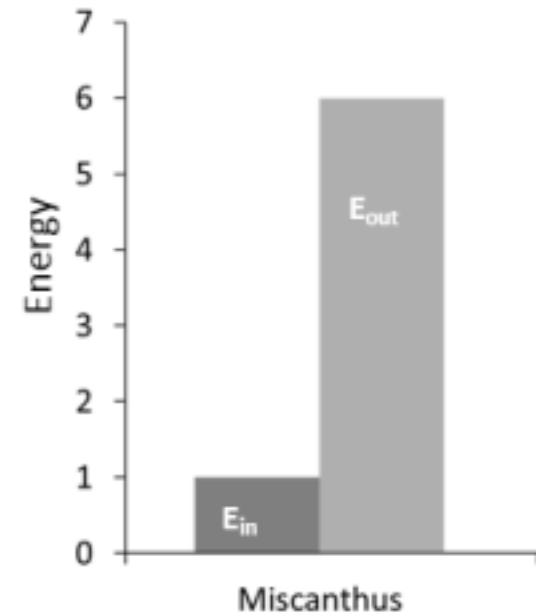
In conclusion, miscanthus is a promising fuel crop for the northeastern United States



Cold tolerance
 6° C



Root depth
2 m



In conclusion, miscanthus is a promising fuel crop for the northeastern United States



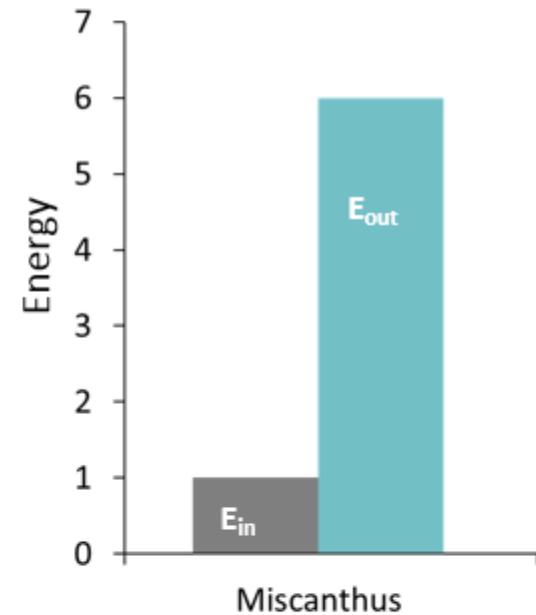
Cold tolerance

6° C



Root depth
2 m

Questions?



Energy ratio

6:1

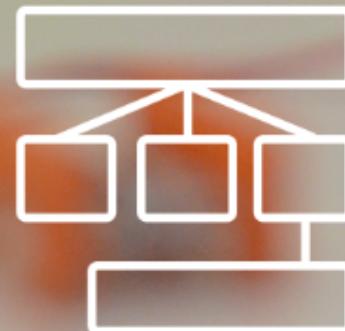
This research contributed a new prototyping framework and explored its impact on designs and designers



PFX can increase the desirability and viability of end products



PFX can shift prototyping awareness in novice designers



Highlighted the need for further studies in prototyping

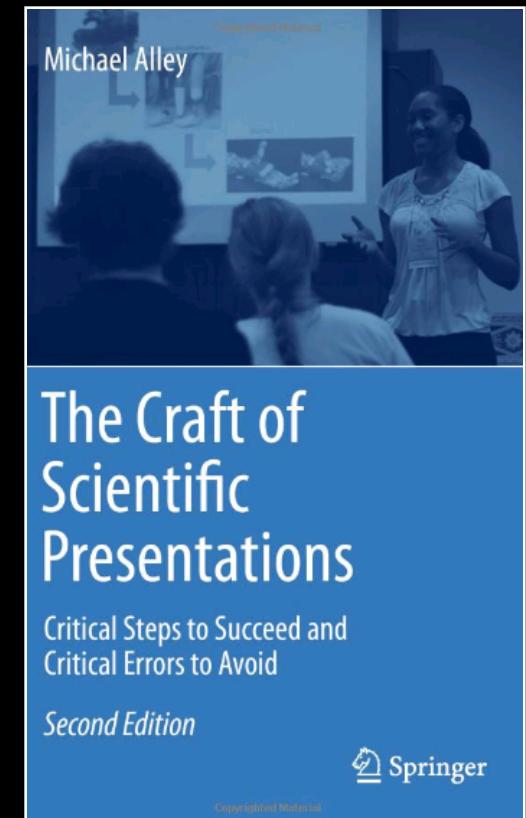
To show ownership of the ideas, the best speakers in engineering and science fashion sentences on the spot



Assertion-evidence presentations are better understood, remembered, and believed



In conclusion as an engineer or scientist, you should experiment with the assertion-evidence approach



www.assertion-evidence.com

