SCIENTIFIC PRESENTATIONS: DELIVERY SKILLS AND SLIDE DESIGN

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Topic, audience and purpose

You are an expert in your subject area.

You certainly know your topic.

Your audience should:

- Understand your work
- Be INTERESTED in it
- Think you're a good presenter

Engage your audience

- Be excited about your topic
  - Are you interested in your topic? If yes, ACT LIKE IT.

  If ***YOU*** aren't excited, you can't expect ***OTHER*** people to be!

- Develop effective delivery skills
  - **Appropriate** orientation towards the screen
  - Immediate **positive** connection through eye contact
  - **Adequate** voice projection
  - **Confident** and unambiguous body language
  - **Energetic** and upright posture


90°


180°

Body language and voice projection

- Is your back to the audience?
- Are you hiding behind the podium?
- Are your hands/face motionless?
- Are you staring at
  - your instructor/supervisor?
  - your laptop?
  - at the screen?

Voice

- volume, pitch, enunciation, pace

Use appropriate hand gestures

- Videotape yourself
- Practice with friends
- Don’t point with your finger
- Do not keep repeating the same gestures as you talk
- Make sure that your gestures are appropriate for a specific culture

eye contact	indirect, not sustained, looking at the screen/laptop, staring at somebody	direct, sustained
facial expression	none or distracting	natural
gestures	“closed”, repetitive, lecturing, too few or too small, pointing	appropriate
posture	tilted, slumped, leaning away, “closed”, unnatural, hands in pockets, turning your back to the audience	“open”, confident,
voice	inaudible (poor projection)	clear; audible
tone	monotonous or “pitching up”	varied
pace	too slow; “speeding up”	varied, with adequate pauses
language	fillers; jargon; clichés	crisp; effective
slides	too many slides, irrelevant animation, sloppy images, cluttered slides, lack of parallelism or poor proofreading	clear; relevant; professional looking

Guidelines from previous comprehension research can be confusing

- Dense text slides (only) combined with narration promote higher comprehension and retention

but

- Visualization (graphics but no text) with narration creates a more favorable impression

Traditional guidelines for speakers

- Face the audience, not the visual (Pickett & Laster, 1993)
- Present words by audio narration rather than as on-screen text [when displaying visuals] (Clark & Mayer, 2008)
- "No more than **three bullets per slide**, no more than **five words per bullet**" (Typical textbook guidelines)

Are traditional guidelines deficient for scientific presentations?

1. Difference in purpose

2. Evolution in visual technology

3. Difference in language proficiency
   (globalization affects both speakers and listeners)

1. Difference in purpose

- General/Motivational: personality-based
- Academic: evidence-based
- STEM evidence is data-rich

2. Difference in visual technology

- Pre-war, flip charts
- Post-war, overhead projector
- 1983s onward, PowerPoint (etc.)
- Currently, multi-media, online connectivity

3. Difference in language proficiency

- ESL speakers face challenges in **pronunciation**
- Both NS and ESL audiences face challenges in **comprehension** (ESL listeners face the most challenges)

Presentation guidelines for ESL speakers

- Use one message per slide
- Limit words, numbers, or symbols per slide
- Don’t read your presentation from your notes
- Face
  the audience
- Be interactive

Experienced computer scientists were observed during a presentation

- They were both native speakers and ESL speakers
- They did not follow traditional guidelines
- They flexibly changed their speaking style to respond to the needs of the audience
- They used visuals and body language to overcome pronunciation challenges to comprehension
- They displayed content appropriate to the level of the audience

(Orr et al., 2009)

Journal Bearings – Reynolds Equation

Reynolds theory (1886) is based on the following assumptions :

(1) The continuum description is valid.

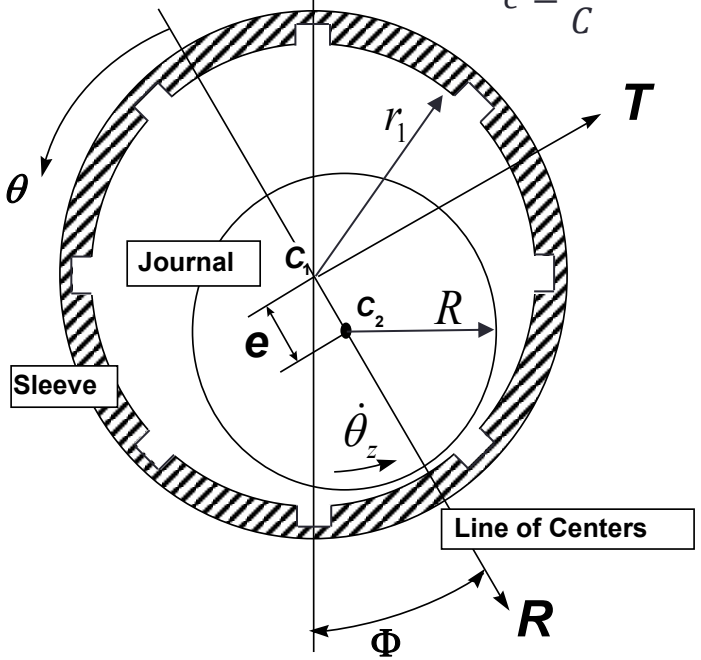
(2) The Navier–Stokes equations hold.

(3) Compressibility is ignored.

(4) The viscosity is constant.

(5) The film is thin, therefore:
- (a) Laminar Flow
- (b) No inertia effect.

$$h = C(1 + \varepsilon \cos\theta)$$
$$\epsilon = \frac{e}{C}$$



Reynolds Lubrication Equation:

$$\frac{\partial}{\partial x}\left(\frac{h^3}{\mu}\frac{\partial p}{\partial x}\right) + \frac{\partial}{\partial z}\left(\frac{h^3}{\mu}\frac{\partial p}{\partial z}\right) = 6R\omega\frac{\partial h}{\partial x} + 12\left[\dot{e}\cos\theta + e\dot{\phi}\sin\theta\right]$$

Steady state $\Rightarrow \dot{e} = \dot{\phi} = 0$

Non-dimensionalize by

$$H = \frac{h}{C}\ ;\ \bar{z} = \frac{2z}{L};\ \bar{p} = \frac{1}{\mu N}\left(\frac{C}{R}\right)^2 p$$

$$\frac{\partial}{\partial\theta}\left(H^3\frac{\partial\bar{p}}{\partial\theta}\right) + \left(\frac{D}{L}\right)^2\frac{\partial}{\partial\bar{z}}\left(H^3\frac{\partial\bar{p}}{\partial\bar{z}}\right) = 12\pi\frac{\partial H}{\partial\theta}$$

No Analytical solution exists.
- Numerical modeling
- Simplifying

Long Bearing (L/D > 2)

$$\frac{\partial}{\partial\theta}\left(H^3\frac{\partial\bar{p}}{\partial\theta}\right) = 12\pi\frac{\partial H}{\partial\theta}$$

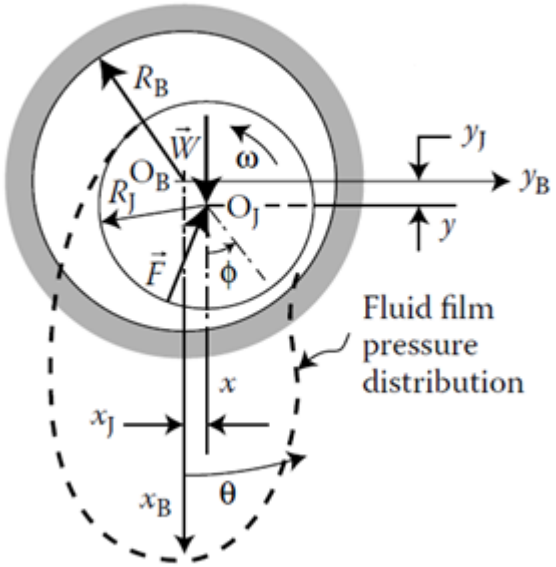
Short Bearing (L/D < 1/4)

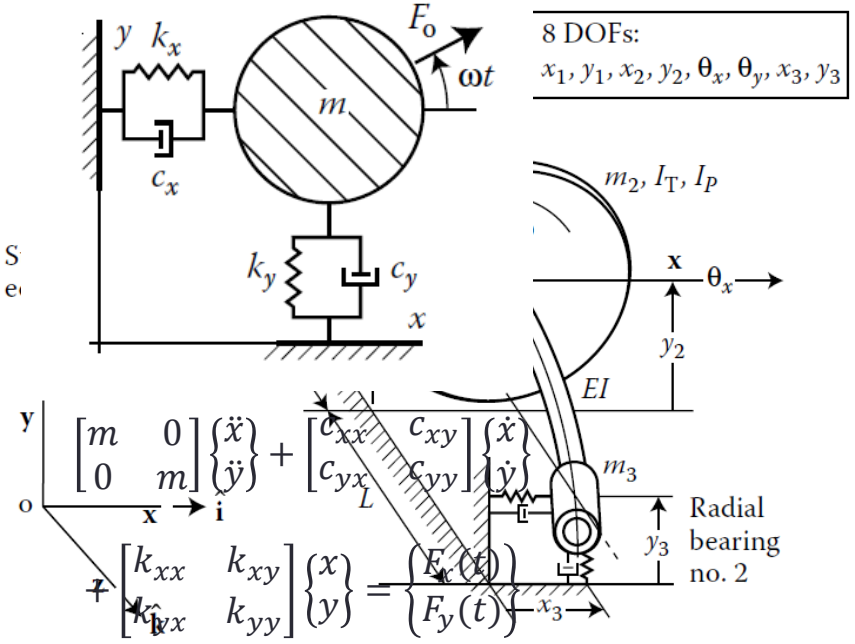
$$\frac{\partial}{\partial\bar{z}}\left(H^3\frac{\partial\bar{p}}{\partial\bar{z}}\right) = 12\pi\left(\frac{L}{D}\right)^2\frac{\partial H}{\partial\theta}$$

README.TXT

- Do not attempt to put all the text, code, or explanation of what you are talking about directly onto the slide, especially if it consists of full, long sentences. Or paragraphs. There's no place for paragraphs on slides. If you have complete sentences, you can probably take something out.
- If you do that, you will have too much stuff to read on the slide, which isn't always a good thing.
- Like the previous slide, people do not really read all the stuff on the slides.
  - That's why it's called a "presentation" and not "a reading" of your work
- Practice makes perfect, which is what gets you away from having to have all of you "notes" in textual form on the screen in front of you.
- Utilize the Notes function of PowerPoint, have them printed out for your reference.
  - **The audience doesn't need to hear the exact same thing that you are reading to them.**
  - The bullet points are **simply talking points** and should attempt to summarize the big ideas that you are trying to convey
- If you've reached anything less than 18 point font, for God's sake, please:
  - Remove some of the text
  - Split up the text and put it on separate slides
  - Perhaps you are trying to do much in this one slide?
- **Reading a slide is annoying**. We *can* do that (even if we don't).

Rotor Bearing models for Linear Lateral Vibration Analysis





$$F_x + W_x = f_x = \frac{\partial F_x}{\partial x}x + \frac{\partial F_x}{\partial \dot{x}}\dot{x} + \frac{\partial F_x}{\partial y}y + \frac{\partial F_x}{\partial \dot{y}}\dot{y} + (higher\ order\ terms)$$

$$F_y + W_y = f_y = \frac{\partial F_y}{\partial x}x + \frac{\partial F_y}{\partial \dot{x}}\dot{x} + \frac{\partial F_y}{\partial y}y + \frac{\partial F_y}{\partial \dot{y}}\dot{y} + (higher\ order\ terms)$$

$$k_{ij} \equiv -(\partial F_i/\partial x_j) \qquad c_{ij} \equiv -(\partial F_i/\partial \dot{x}_j)$$

$$\begin{Bmatrix} f_x \\ f_y \end{Bmatrix} = -\begin{bmatrix} k_{xx} & k_{xy} \\ k_{yx} & k_{yy} \end{bmatrix} \begin{Bmatrix} x \\ y \end{Bmatrix} - \begin{bmatrix} c_{xx} & c_{xy} \\ c_{yx} & c_{yy} \end{bmatrix} \begin{Bmatrix} \dot{x} \\ \dot{y} \end{Bmatrix}$$

M. L. Adams, Rotating machinery vibration: from analysis to troubleshooting: CRC, 2001.

J. W. Lund, "Self-excited Stationary Whirl Orbits of a Journal in a Sleeve Bearing," Rensselaer Polytechnic Institute, PhD Thesis, 1966

The defaults of PowerPoint are not based on research in communication or cognitive psychology

Default slide layouts in PowerPoint result in an ineffective topic-subtopic structure.

It is often easy to identify the best slide design given alternatives, but developing effective slides takes time.

The relative approach to business valuation

- Based on principle of substitution
  - Pay no more than the cost for an equally desirable alternative.
- First step is selection of comparables
  - Companies in same sector and sub-sector tend to serve as good comparables.
  - Ex. Canned vegetables as analogy for business
    - Canned green beans vs. canned corn vs. canned peas

Slide inspired by Matthew Curtis, University of Dallas, 2012

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Slide inspired by Matthew Curtis, University of Dallas

Even with a professional theme and relevant images, topic-subtopic slides are extremely text-heavy.

TOPIC

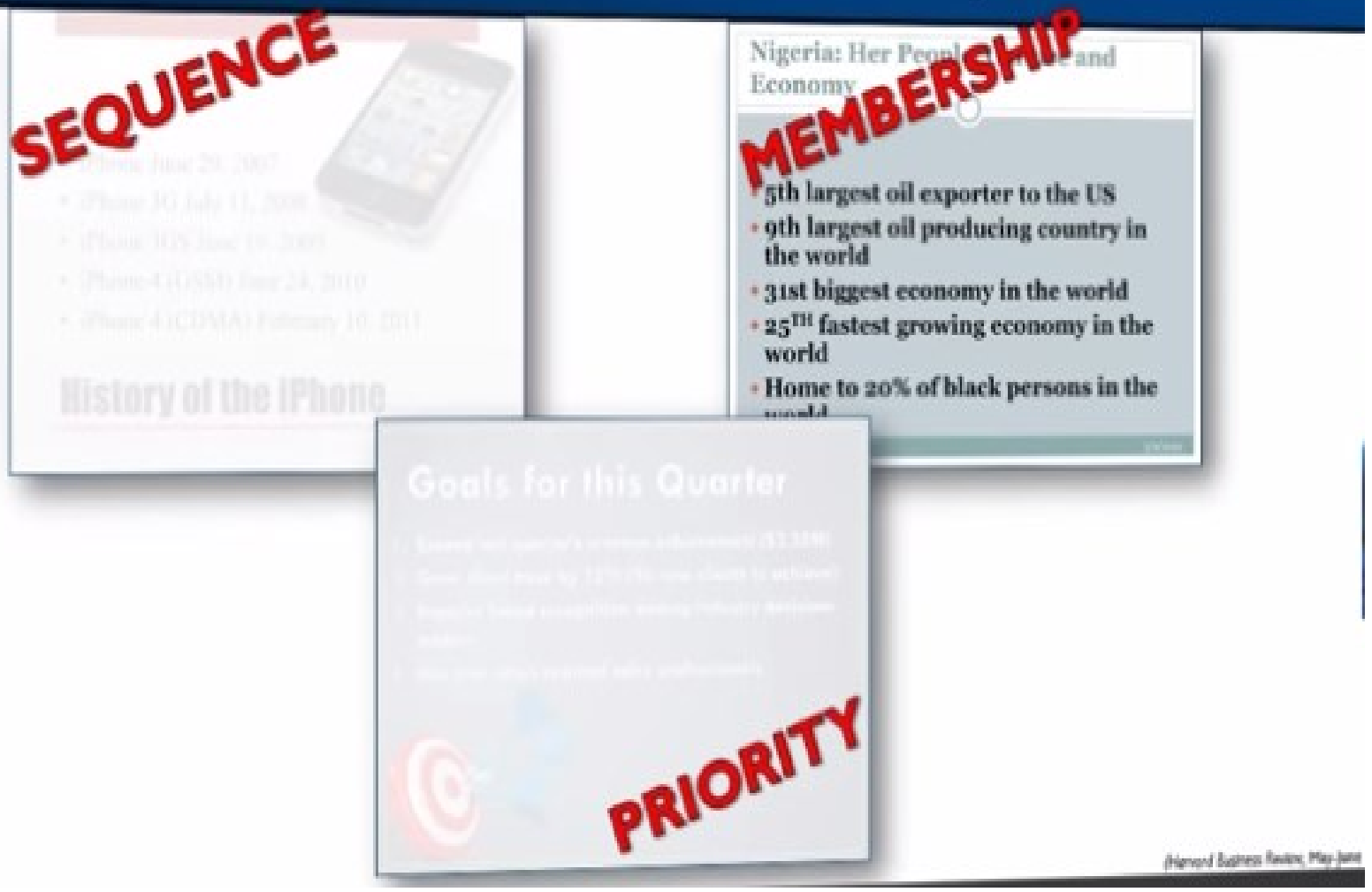
Benefits to the Company

SUBTOPICS

- Decrease absenteeism
- Increased employee Productivity

- An obese person will have an average of $8,315 in medical bills a year by 2018
- Compared with $5,855 for an adult at a healthy weight.
- That's difference of $2,460 a year!

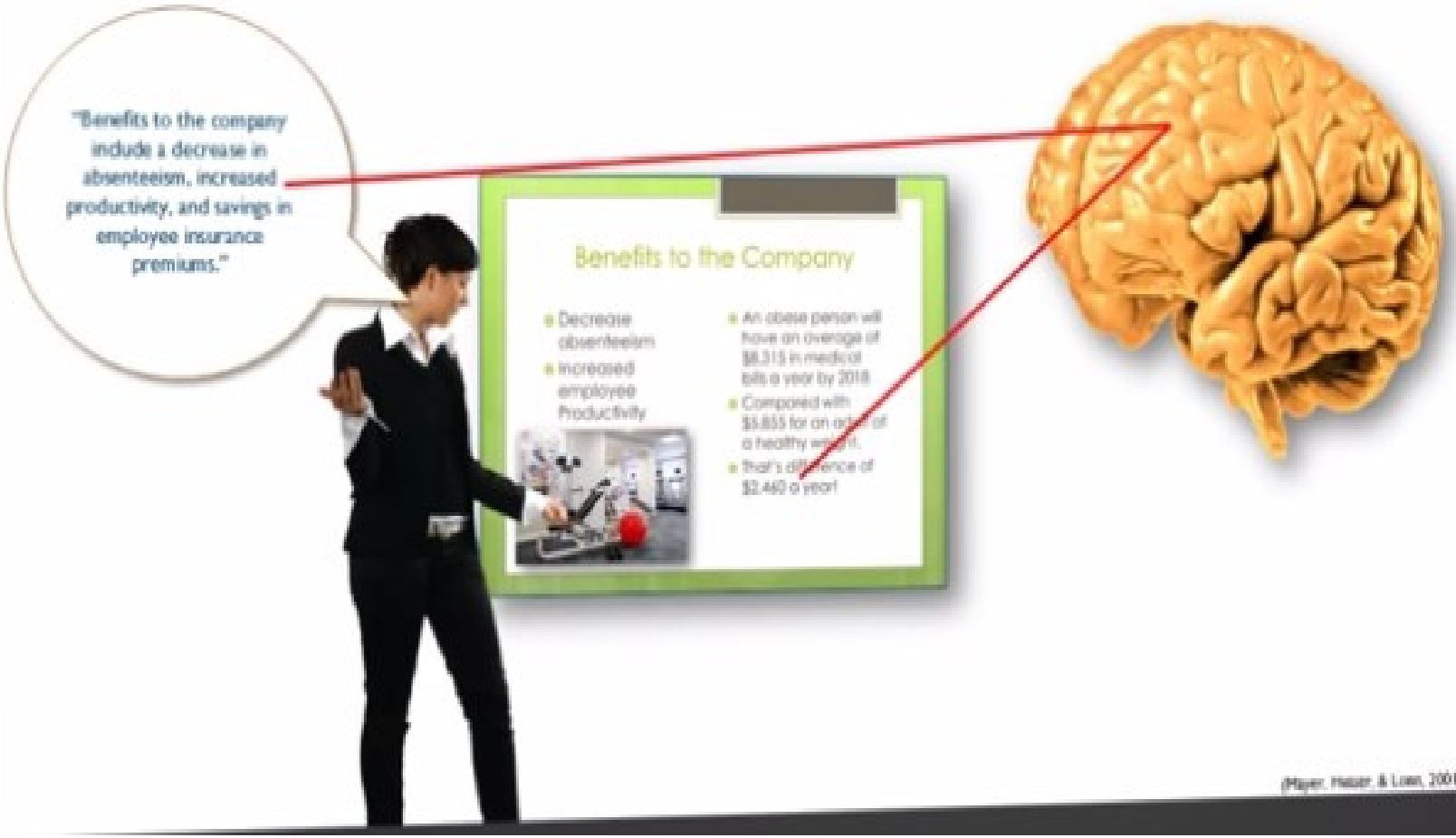
Topic-subtopic lists dilute thought because they can communicate only three logical relationships.



Presenters often deliver verbal content that mirrors slide text.

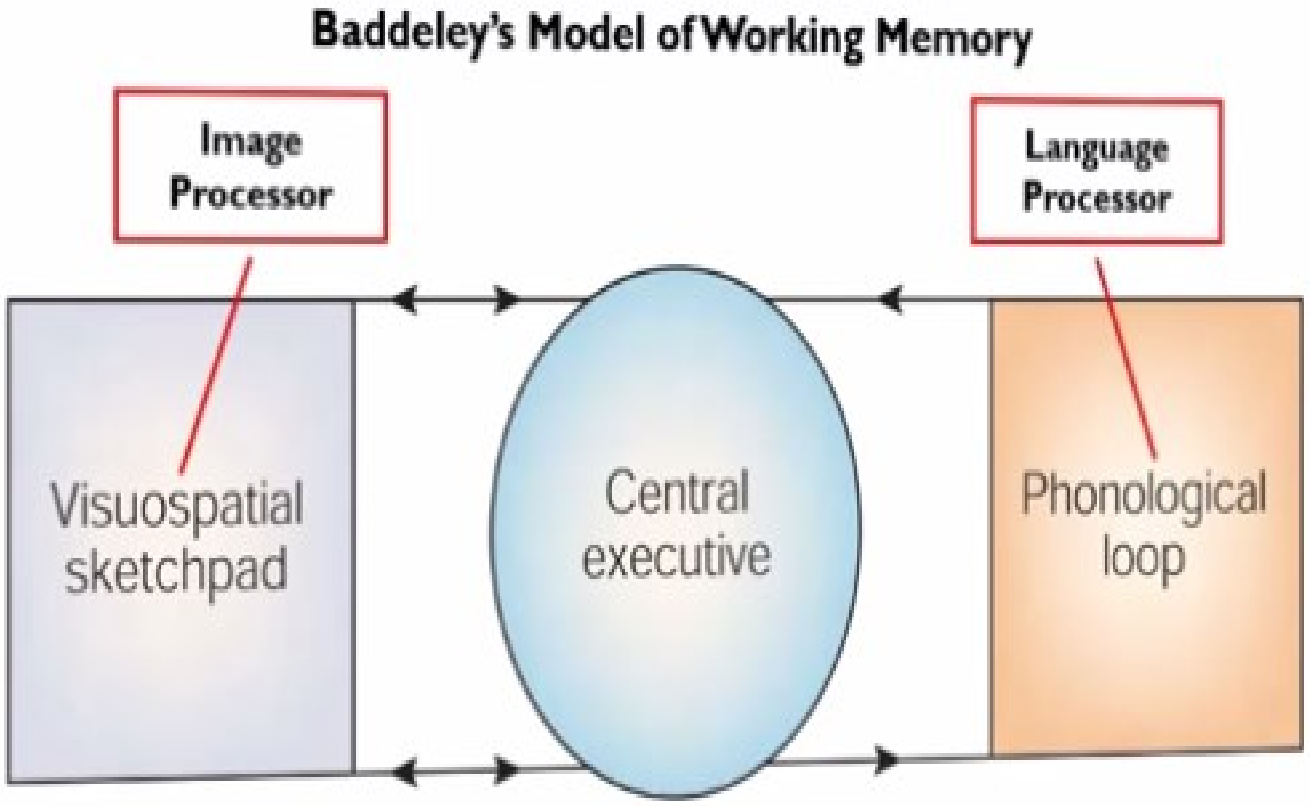
"Benefits to the company include a decrease in absenteeism, increased productivity, and savings in employee insurance premiums."

Simultaneous speech and text are processed by the same part of the brain, splitting attention.



(Mayer, Heiser, & Lonn, 2001, Journal of Educational Psy

Working memory models suggest presenting information both visually and verbally.



The common practice of using PowerPoint has received harsh criticism

January 16, 2003

Review of Test Data Indicates Conservatism for Tile Penetration

- The existing SOFI on tile test data used to create Crater was reviewed along with STS-87 Southwest Research data
  - Crater overpredicted penetration of tile coating significantly
    - Initial penetration to described by normal velocity
      - Varies with volume/mass of projectile (e.g., 200ft/sec for 3cu. In)
    - Significant energy is required for the softer SOFI particle to penetrate the relatively hard tile coating
      - Test results do show that it is possible at sufficient mass and velocity
    - Conversely, once tile is penetrated SOFI can cause significant damage
      - Minor variations in total energy (above penetration level) can cause significant tile damage
  - Flight condition is significantly outside of test database
    - Volume of ramp is 1920cu in vs 3 cu in for test

BOEING 2/21/03 6

January 24, 2003

February 1, 2003

[Tufte, 2003]
[Schwartz, 2003]
[Keller, 2003]

Review of Test Data Indicates Conservatism for Tile Penetration

- **The existing SOFI on tile test data used to create Crater was reviewed along with STS-107 Southwest Research data**
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      - Minor variations in total energy (above penetration level) can cause significant tile damage
  - **Flight condition is significantly outside of test database**
    - **Volume of ramp is 1920cu in vs 3 cu in for test**

Data on danger to shuttle is inconclusive

Recommendation: Visual inspection via space walk or spy satellite photography

Modelling Program: Crater modeled damage caused by foam chunk equal to size of ramp that struck *Columbia* ↓	Prev. Flight (STS-87) Data: Analysis of foam impact that occurred on previous shuttle flights ↓	Physical Testing: MOD study (1999) analyzed damage to thermal protection system from collisions with objects ↓
<u>Key Data:</u> Shows potential for dangerous damage in thermal protection titles ↓	Found an unacceptable level of damage in a non-critical area ↓	None relevant ↓
Inconclusive: Predicts more damage than has occurred in actual conditions; only predicts tile damage and fails to provide data on leading edge of wing	Inconclusive: Represents only a single flight; circumstances on *Columbia* flight are different	Inconclusive: Assumes debris chink striking spacecraft has volume of 3 in^3 vs actual of 1920 in^3

Experts advocate an assertion-evidence slide structure

- The structure calls for a succinct **sentence headline** that states the main assertion of the slide
- The structure also calls for supporting that sentence-assertion headline with **visual evidence**
- The goal is to **overcome the weak defaults** of PowerPoint

Xenon headlights illuminate signs better than halogen headlights do

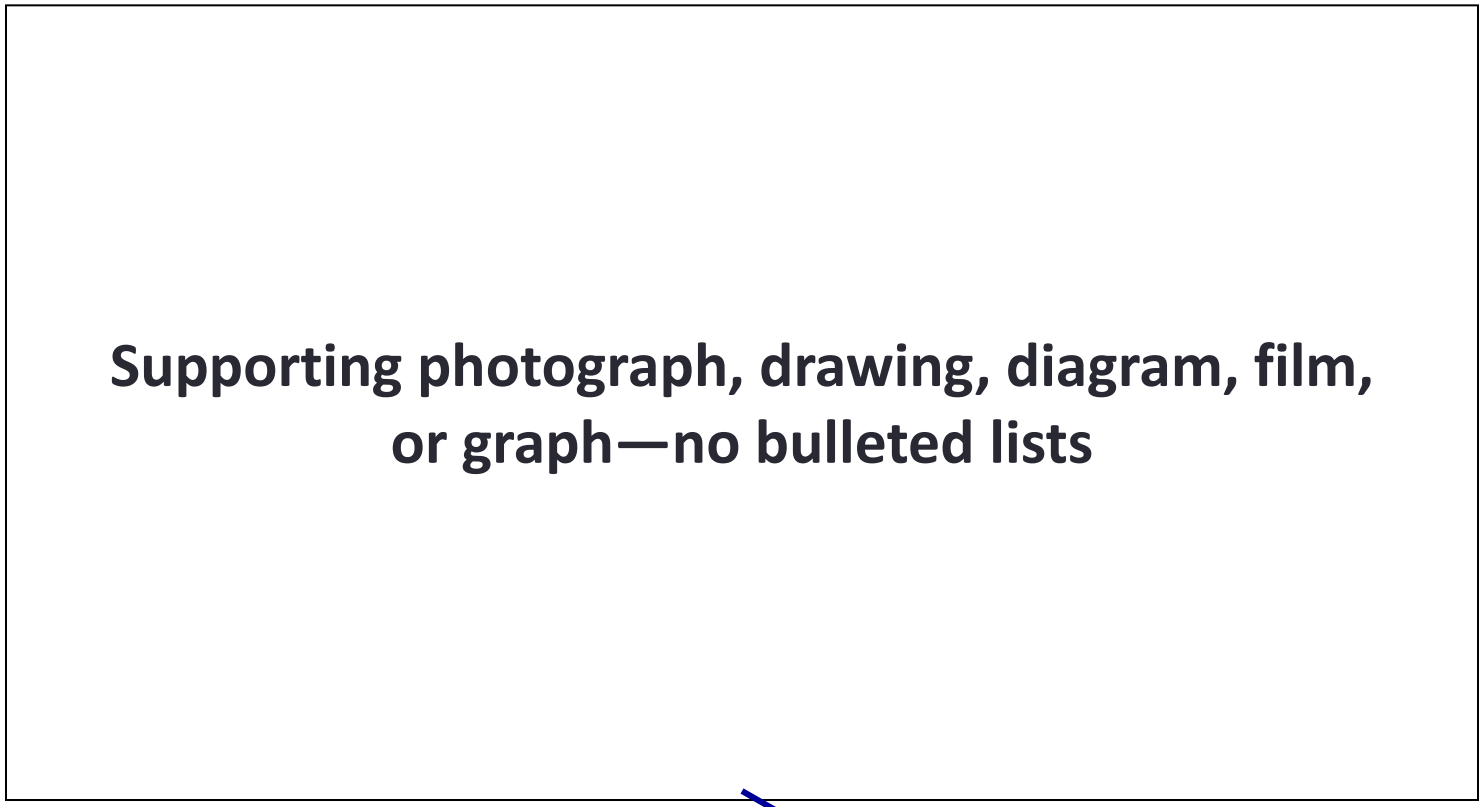
Halogen Headlight

Xenon Headlight

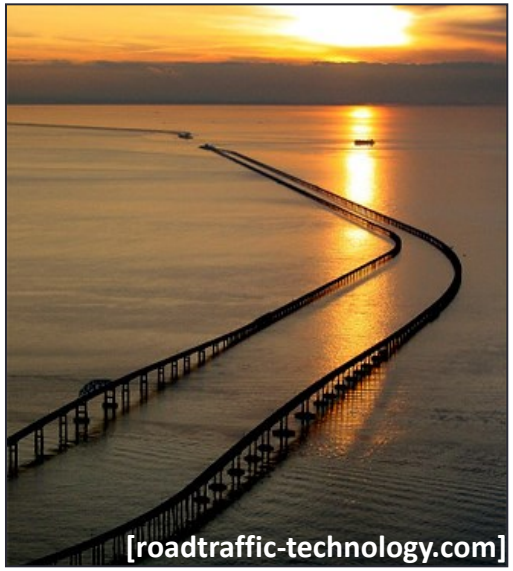
[Sylvania, 2008]

PENNSTATE
1855

In an assertion-evidence slide, the headline is a sentence, no more than two lines, that states the slide's message



The Chesapeake Bay, which is the largest estuary in the US, has only two places for traffic to cross

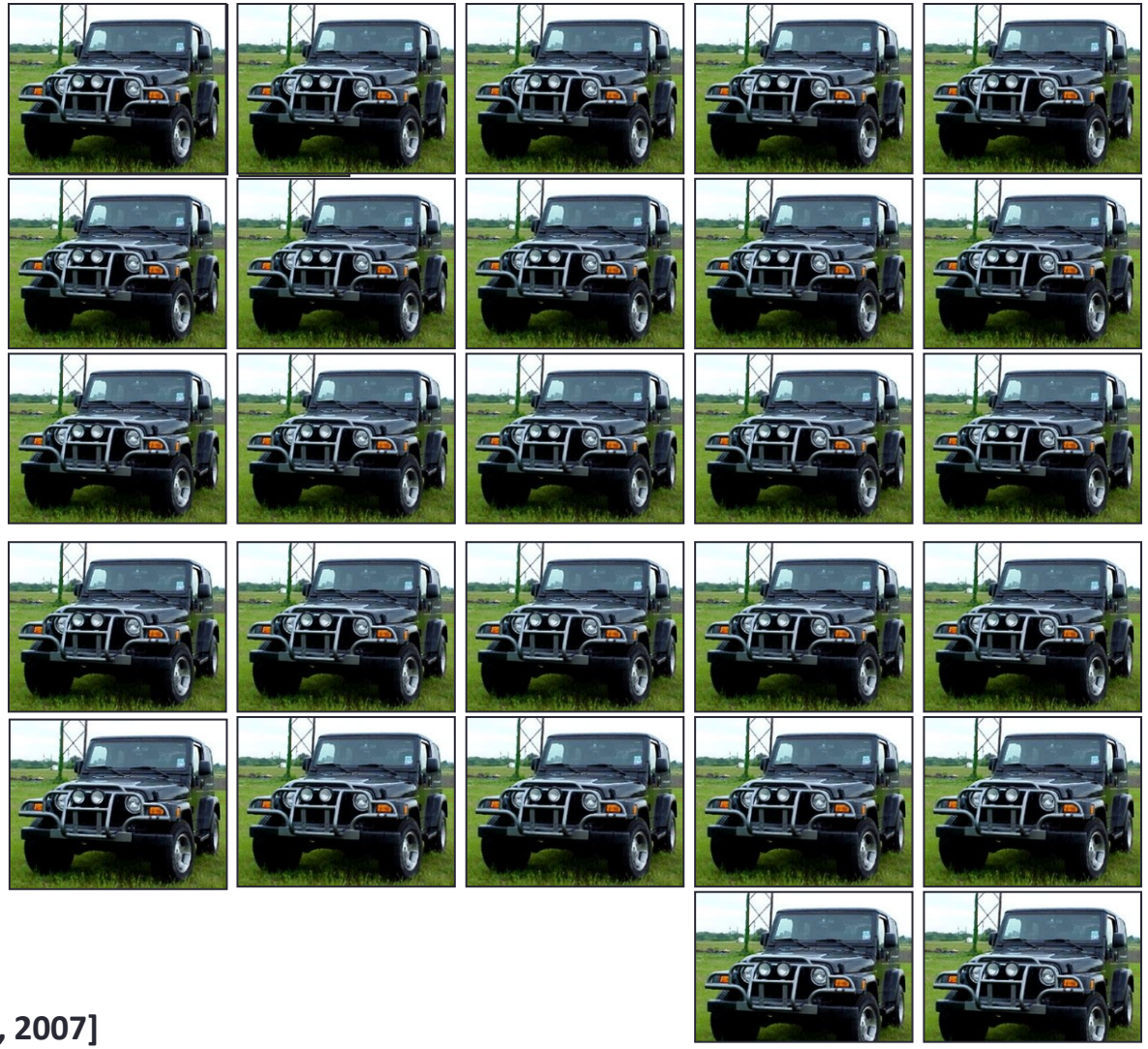


In the past 25 years, traffic has significantly increased on the Chesapeake Bay Bridge

1952
Traffic: 1.1 million

1961
Traffic 1.5 million

2007
Traffic: 27 Million



[Maryland Transportation Authority, 2007]

Title of Presentation in Initial Capitals: 36 Points, Calibri Bold

Name
Name
Name

Department
Institution

Date

Replace this box with key image to introduce talk's scope, importance, or background

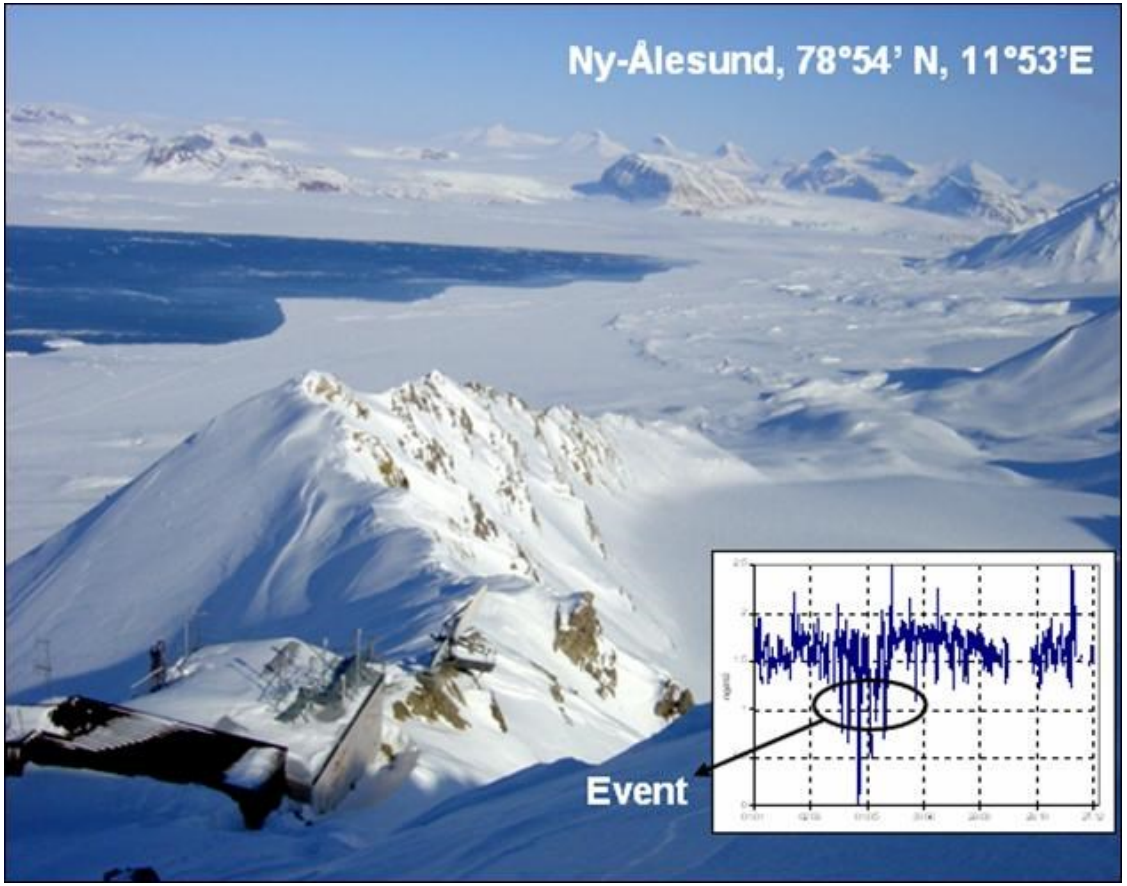
Replace with your Logo

Atmospheric Mercury Depletion Events in Polar Regions during Arctic Spring

Katrine Aspmo
Torunn Berg
Norwegian Institute for Air Research

Grethe Wibetoe
University of Oslo, Dept. of Chemistry

16 June 2004



Outline

- Title Slide
- Introduction
- Research Objectives
- Your Work
- Results
- Conclusions

How to make the outline useful

- The previous slide didn't "help" your audience
- If you have an outline slide, make it USEFUL
  - Everyone introduces their topic (hopefully)
  - Everyone explains their work and gives results
  - What is specific to YOUR talk?
- Talk length determines the need for an outline
  - If your talk is 45 minutes, maybe you need an extensive outline!
  - If your talk is 5 minutes… probably not.

This presentation focuses on… (complete this sentence, but go no more than two lines)

Image for Topic 1

Topic 1

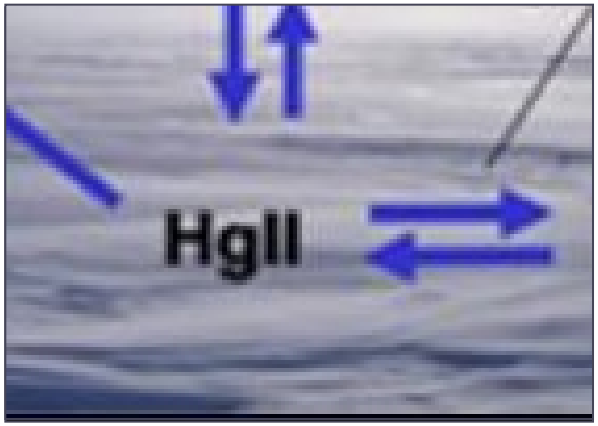
Image for Topic 2

Topic 2

Image for Topic 3

Topic 3

This talk traces what happens to mercury after it depletes from the atmosphere in arctic regions



Theory for mercury cycling

Measurements from Station

Environmental implications

This headline makes an assertion on the first topic in no more than two lines

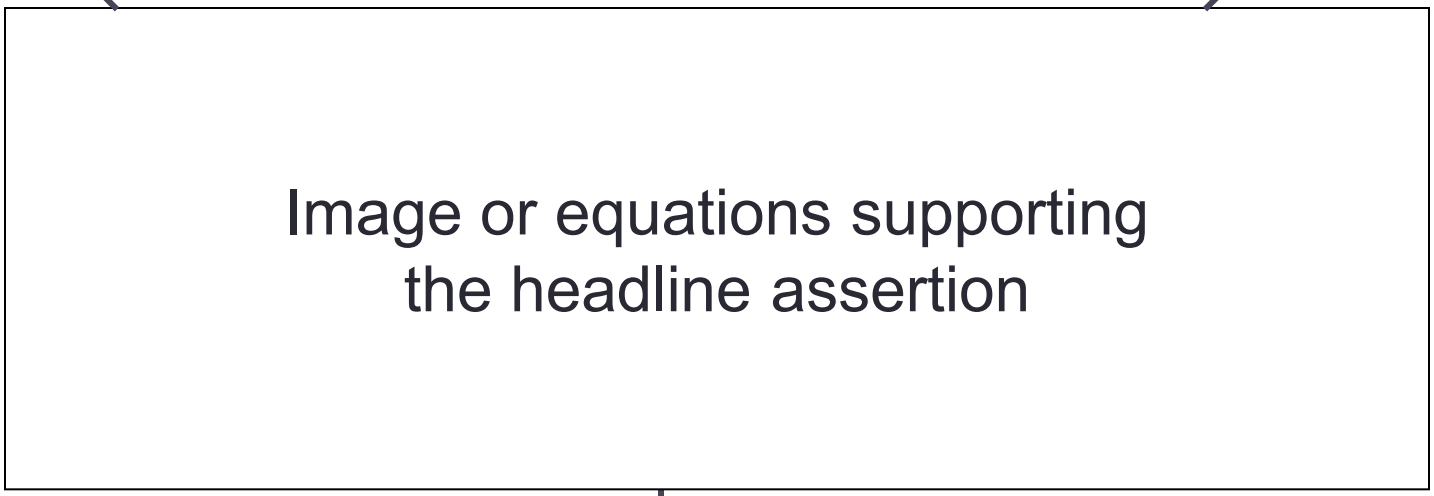
If necessary, identify key assumption or background for the audience— but keep it to two lines (18–24 point type)

Fragments quickly outpace the blast wave and become the primary hazard to personnel

This sentence headline makes an assertion on the second topic in no more than two lines

Call-out, if necessary: keep to one or two lines

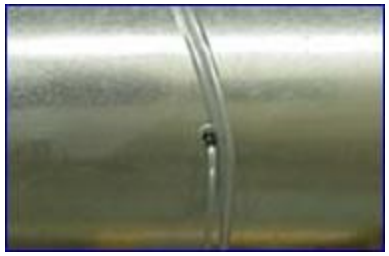
Call-out, if necessary: keep to one or two lines



Call-out, if necessary: keep to one or two lines

Normalized friction factors and Nusselt numbers correlated our data with the data of others

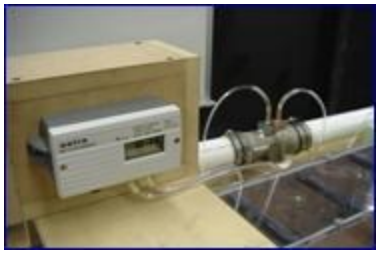
Pressure Taps



Pressure Drop

$$f = \frac{dP_{tap} \cdot D_h}{2 \cdot \Delta x \cdot \rho_{air} \cdot u_{bulk}^2}$$

Venturi Meter

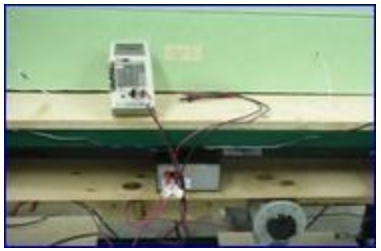


Reynolds Number

$$f_0 = 0.046 \cdot \mathrm{Re}^{-0.2}$$

$$Nu_0 = 0.023 \cdot \mathrm{Re}^{0.8} \cdot \mathrm{Pr}^{0.4}$$

Voltmeter



Heat Flux, q″

Thermocouples

T_{inlet}

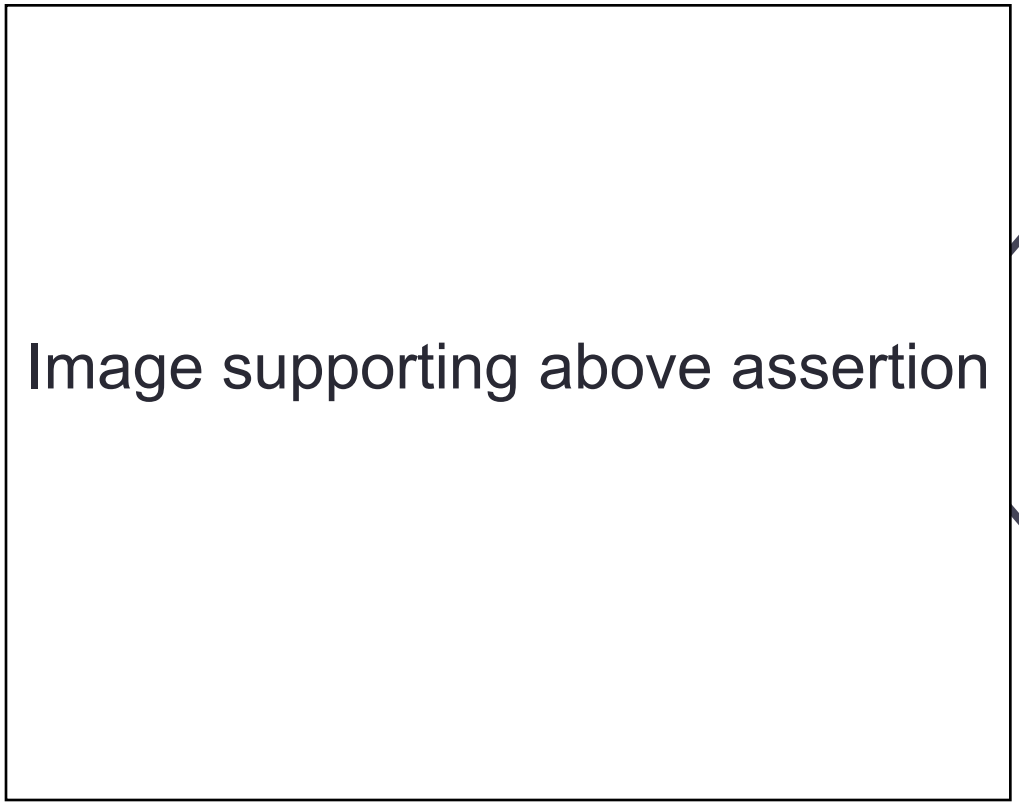
T_{wall}

T_{bulk}

h

$$Nu = \frac{h \cdot D_h}{k_{air}}$$

This sentence headline makes an assertion on the third topic in no more than two lines



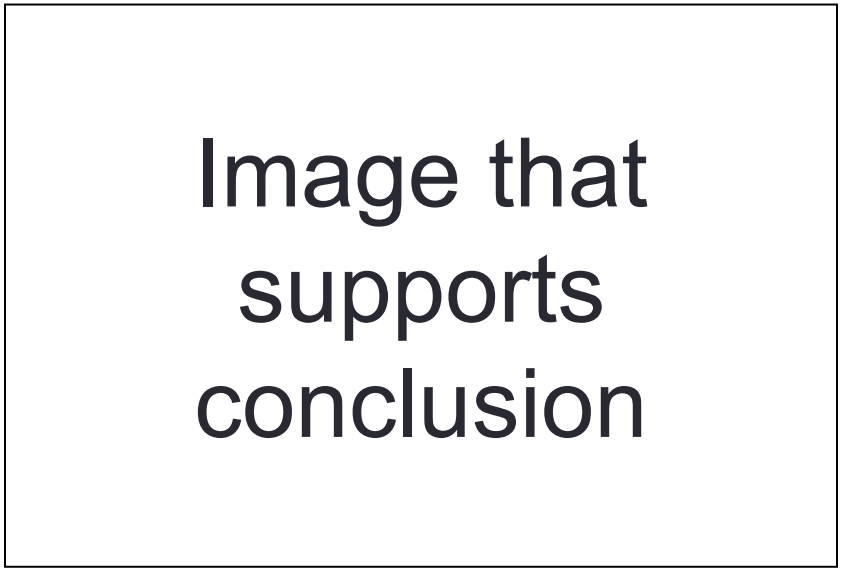
Feature or call-out—no more than two lines

Feature or call-out—no more than two lines

In summary, this sentence headline states the most important assertion of the presentation

Supporting point (no more than two lines)

Another supporting point (parallel to the first)



Questions?

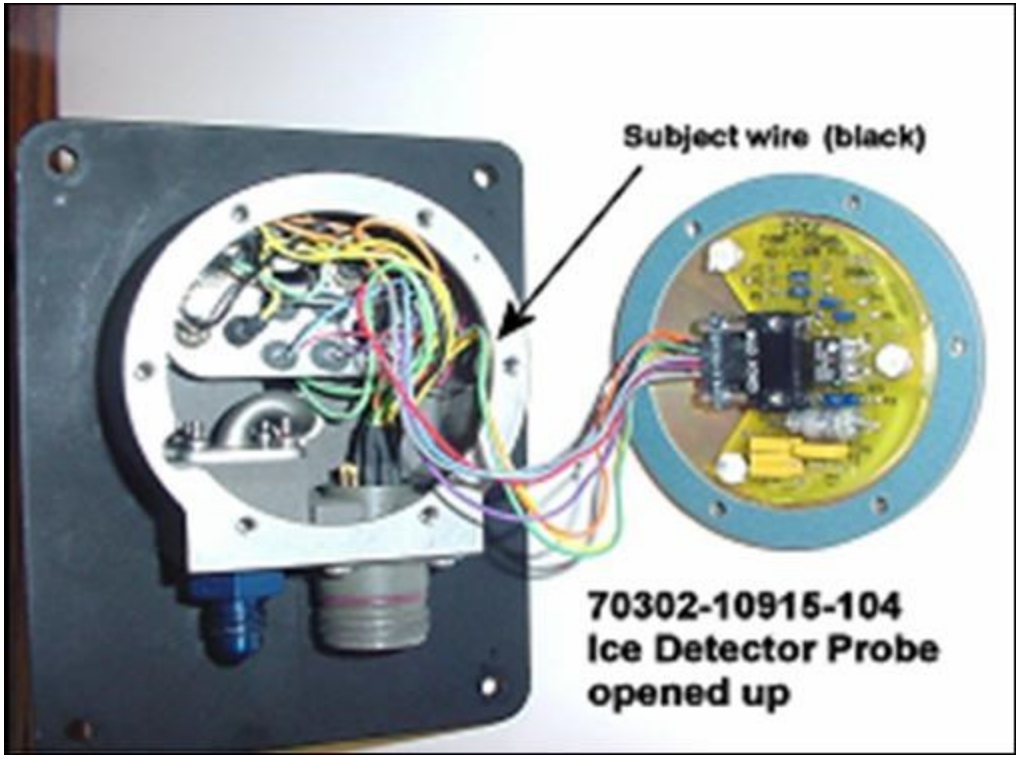
Logo

In summary, the detector failed because of a short-circuit created by the abrasion of wire insulation

Wires not harnessed to prevent contact with housing

⬇

Short circuit to ground created where wire contacted housing



Questions?

References

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