Pointers to Good Presentations

Preparing a Scientific Presentation

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A Good presentation brings a change in our Audience

4 ways to bring that change

<table>
<thead>
<tr>
<th>Change in what they know</th>
<th>Change in what they can do: Ability</th>
</tr>
</thead>
</table>

### Connecting to the Grid

<table>
<thead>
<tr>
<th>State</th>
<th>Un-electrified households on Oct 10, 2017</th>
<th>Households electrified since</th>
<th>Un-Electrified households as on date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh</td>
<td>1,47,09,624</td>
<td>13,82,497</td>
<td>1,33,27,127</td>
</tr>
<tr>
<td>Bihar</td>
<td>38,74,284</td>
<td>6,76,174</td>
<td>31,98,110</td>
</tr>
<tr>
<td>Other States</td>
<td>1,79,56,351</td>
<td>29,47,532</td>
<td>1,48,40,755</td>
</tr>
<tr>
<td>TOTAL (INDIA)</td>
<td>3,65,40,259</td>
<td>50,06,203</td>
<td>3,13,65,992</td>
</tr>
</tbody>
</table>

Source: Saubhagya Dashboard, Union Ministry of Power

**Source:** [https://5.imimg.com/data5/NC/UF/MY-7405152/rain-water-harvesting-500x500.jpg](https://5.imimg.com/data5/NC/UF/MY-7405152/rain-water-harvesting-500x500.jpg)
To Bring a change in our Audience

Change in what they do

Listing 1: Plotting in Python

```python
import numpy as np
import matplotlib.pyplot as pl

aa = 1.0
theta = np.arange(0, 2*np.pi, 0.01)
yy = aa*np.cos(theta)
pl.plot(theta, yy, 'r', lw = 3)
pl.show()
```

plot and \( y = x^2 \) curve

Change in what they believe

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2 Source: https://i.ytimg.com/vi/qkRnJutL5ko/hqdefault.jpg
Changing Belief or Mythbusting: How does a wing really work

Equal Transit time is wrong explanation

Shape: Curvature causes pressure differential

like a tornado Watch the Cambridge video:

https://www.cam.ac.uk/research/news/how-wings-really-work

3 Source: https://i.stack.imgur.com/xgvJC.png
3 Principles by Don Roam (back of the napkin)

1. Lead with **truth** and heart will follow - **Gives you confidence**
2. Lead with a **story** and understanding will follow - **Captures attention**
3. Lead with the **eye** and the mind will follow - **using visuals to capture attention**
Which Truth should I tell?

- Are you asking your audience to believe?
- Are you forcing your thinking on the audience?
- Are your enabling your audience to decide?

What do you think will have a greater impact?

Heart: I believe it is True
Head: I think it is True
Fact: The Data tells me that it is True
Lead with truth: base your statements on facts
A Story has a clear beginning and an end

Problem: Event

creates

Undesired Response

leads to

Attempts

produces

Consequence 1

forces to

Consequence 2

Consequence 3

Reflect

leads to

Finale
You have an exciting story to tell...hence the presentation

The Research Question

Image for Topic 1
Why does a superconducting material float over a magnet

Say it with pictures

The Research Question
What happens to the magnetic field inside the superconductor?

Source: Super Conducting levitation
A Picture speaks a thousand words

Source: Earth at Night by NASA
Development of a population has strong correlation to its electricity consumption
Planning the introduction of a scientific talk

Breaking some rules here

- As a Speaker you are putting on a show...
- Your Audience expects a good story: A beginning.......middle......an end.
- Talks should not be too long or too short
- Never overestimate your audience. Even experts like clear explanations. You want your audience to feel intelligent: "I understood what she was talking about"
What is at stake for you?

You want to convey

- that you know your field
- that you have intellectual curiosity - Use rhetoric questions
- that you plan to convey some useful and interesting information
- Describe the big picture

Treat every talk as a job interview.
Do not bore your audience with a table of content slide...unless

- Do not tie yourself to a rigid structure....
- But have an organic structure
10 mins presentation with 7-8 slides..unless

- Start story-boarding on paper...with pencil
- don’t even think of touching the powerpoint (software)
- Technical Presentation will be 15 min + 5 min Q & A
● Problem occurs
● Conventional method makes problem worse
● Possible solutions
● Great idea propels
● Final victory...aims high

Problem starts

Problem worsens: Nadir

Inventive input

Attempts to improve

Final Victory: Success
Plan each slide based on which question you are answering.
A good presentation has a clear storyline

Change
  How much?

Method
  How?

Movement
  When?

Space
  Where?

Context
  What/Who?

Problem
  Why?
Questions and Story Time line

Problem Definition: why?
Context - What/Who?
Where? - Location
when? relative time
How? Method, process
Success How Much?
Visuals for Questions: Why

Output result $\neq$ Desired Results
Visuals for Questions: What? Who

**What**

- PINION
- PLANET CARRIER
- ANNULUS (RING GEAR)
- SUN GEAR

**Who**

- Mutual Flux
- Slot Leakage Flux
- Rotor
- Stator
- Stator Slots
Where in function diagram

Where in network?
Visuals for Questions: When?

- Use time line (x-axis time)
- Show cause and effect - state machine
• Usually describes a process
• Flow chart
• Process flow
• Cause and effect diagram

Visuals for Questions: How?

Practical Problem: Output $\neq$ Desired Result

Research Problem - Why?

Hypothesis - What if?

Methods: How?

Results: Evaluate - How much?

New Research Questions: Why?
Visuals for Questions: How Much?

![Graph showing efficiency vs load before and after a method]

![Bar chart showing performance before and after a method]

*Your Magic Method*
Fast current control in Overmodulation region causes current transients

Say it with pictures

The Research Question
Current controller creates oscillations in overmodulation region
Why?

Jumps
Overmodulation is the operation in region between $0.90 < m < 1$ (What ?)

Overmodulation region
is between green circle $m = 0.905$ red circle $m = 1$
When in overmodulation, voltage is non sinusoidal - 5th, 7th harmonics present
By cancelling the 6n harmonics - current controllers sees only DC

With compensating current control
When unintentional islanding occurs, de-energize the micro-grid (When?)

De-energization sequence

Example slide: When? Time sequence or cause and effect

- **DSO**
- **MGCC**
- **Breaker**
- **Dispatch**
- **(P,Q)@POI**
- **DER_i**

1. **check request()**
2. **check request(grid connect)**
3. **PQ@POI()**
4. **PQ@POI(P,Q)**
5. **dispatch-gc()**
6. **dispatch-gc(1)**
7. **openB()**
8. **island(1)**
9. **de-energize()**
10. **V,I@DER(=0)**
11. **de-energize(1)**
India gets around 4-5 sun hours (How Much?)
India gets around 4-5 sun hours (How Much? Compare)

\[ \text{Sun Hrs [h]} = \frac{\text{kWh}}{\text{kWp}} \]
India gets around 4-5 sun hours (How Much? compare with)
Picture speaks thousand words? You should not need thousand words to explain it

- Equations in a conference talk may not help your audience - (keep back-up)
- If you really, really, really must......Use equations judiciously
- You can’t impress your audience with Equations
Short Demo
Parasitics in Power Electronics Design have major influence on performance
High Overvoltage across IGBT during turn-off adds to losses

The Problem

\[ V_{CE} = V_{DC} - L_\sigma \frac{0 - I_o}{t_{fi}} \]
\[ V_{CE} = V_{DC} + L_\sigma \frac{I_o}{t_{fi}} \]

Higher the \( L_\sigma \) - parasitic inductance, larger the Overvoltage

\footnote{http://www.edn.com/Home/PrintView?contentItemId=4371098}
Bad designs do not pay attention to parasitics (What ?)
Area enclosed by the current causes parasitic inductance (where?)
Parasitic Inductance depends on the flux linkages: Parallel Busbar

Dimensions \( d = 20\text{mm}, \ w = 200\text{mm}, \ t = 20\text{mm} \)

Inductance \( L = 239\text{nH/m} \)
Dimensions $d = 20\text{mm}, w = 350\text{mm}, t = 30\text{mm}$
Inductance $L = 34.5\text{nH/m}$
Sandwiched bar limits flux to overlap volume

\textsuperscript{5} using software Argos2D, https://www.agros2d.org/
Good Designs follow fundamental principles
Commercially available low inductance assemblies

900A, 3.3kV, 3-phase building block

SEMISTRANS 20
(2 parallel x 3 phase)

capacitor
heatsink
AC busbar
GDU control board
DC +/- terminal

6 www.semikron.com
It is also important to have low inductance design inside the device packing (approx 5 nH @ 700A)
Tell your story with story boarding
Appendix: On Style of Presentation
Be judicious with use of color

This is bad
Do not use serif fonts
and avoid color green
Some colors that work
  • Burgundy
  • Maroon
  • Dark Green

This is good, use sans serif font family
Use minimum font size 18 on slide
Size the figure when you draw it

Demand Met

made with Matplotlib package in python, figure size 6 x 3.5 inches, fontsize = 20, linewidth = 3pt, legend font = 16pt
## Comparison Table: Shows How Much and compares

<table>
<thead>
<tr>
<th>Drive Train</th>
<th>Fuel</th>
<th>$E_{inICE}$</th>
<th>$\eta_{pt}$</th>
<th>FC</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[kg]</td>
<td>[MWs]</td>
<td>%</td>
<td>[Wh/km]</td>
<td>[km]</td>
</tr>
<tr>
<td>ICE Petrol</td>
<td>2.38</td>
<td>101.38</td>
<td>20.4</td>
<td>512</td>
<td>692 (40 L)</td>
</tr>
<tr>
<td>BEV</td>
<td>-</td>
<td>28.82</td>
<td>84.6</td>
<td>146</td>
<td>485 (60 [kWh])</td>
</tr>
<tr>
<td>Series HEV</td>
<td>1.84</td>
<td>78.38</td>
<td>26.4</td>
<td>396</td>
<td>895</td>
</tr>
<tr>
<td>Series/Parallel</td>
<td>1.487</td>
<td>63.34</td>
<td>32.7</td>
<td>320</td>
<td>1108</td>
</tr>
<tr>
<td>FCEV</td>
<td>0.3666</td>
<td>44</td>
<td>47.1%</td>
<td>222</td>
<td>750 (5kg)</td>
</tr>
</tbody>
</table>
Colormaps: Use Divergence to show variation
Colormaps: Sequential not suitable for showing extremes
Colormaps: Qualitative can be used to see means
Appendix: Equations or no Equations
Animating math equation: Only if you must

- Coriolis acceleration

\[ a_p = a_o + \frac{b d^2}{dt^2} r + 2\omega_{ib} \times \frac{b d}{dt} r + \alpha_{ib} \times r + \omega_{ib} \times (\omega_{ib} \times r) \]

- Transversal acceleration

- Centripetal acceleration

\[ \text{Source: } \texttt{http://www.texample.net/tikz/examples/beamer-arrows/} \]
• Coriolis acceleration

\[ a_p = a_o + \frac{b d^2}{dt^2} r + 2\omega_{ib} \times \frac{b}{dt} r + \alpha_{ib} \times r + \omega_{ib} \times (\omega_{ib} \times r) \]

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- Transversal acceleration

- Centripetal acceleration

\[ \text{Source: http://www.texample.net/tikz/examples/beamer-arrows/} \]
Planning your diagrams will make them effective

Poincaré Diagram: Classification of Phase Portraits in the \((\det A, \Tr A)\)-plane

- \(\Delta = 0\): \(\det A = \frac{1}{4} (\Tr A)^2\)
- \(\Delta = 0\) with \(\det A = 1\)

- degenerate sink
- spiral sink
- spiral source
- degenerate source
- uniform motion
- center
- sink
- source
- line of stable fixed points
- saddle
- line of unstable fixed points

Source: [http://www.texample.net/tikz/examples/poincare/](http://www.texample.net/tikz/examples/poincare/)
Craft of Scientific Presentations


Craft of Scientific Presentation Templates

Craft of Scientific Presentation Model Talks

Presentation Zen: Website of two contrasting Philosophies