SCIENTIFIC COMMUNICATION
Graphs and illustrations

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The squeletton of your communication

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Images and emotions

[https://ea763594.wordpress.com/2017/02/10/cross-media-advertisement-nespresso/]

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Images and identity

[https://ici.radio-canada.ca/]

https://www.fashiongonerogue.com/

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Is this attractive ?

[https://reasoniamhere.com/]

[https://www.behance.net/]

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A world of images on social networks

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A world of images on social networks

👍 Less text, more images

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The power of illustrations

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The power of illustrations : example

- The building is assumed to be excited by the wind. This causes vibrations which can be measured with dedicated sensors such as accelerometers or strain sensors.

- Our aim is to use the measured data from these sensors in real-time to be able to monitor the structure, i.e. to detect the appearance of damage and possibly locate where the damage has occurred.

- This is an important tool to aid for the maintenance of the building
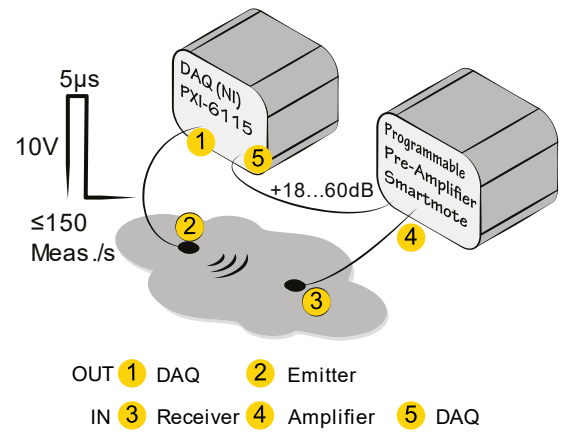
9

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The power of illustrations : example
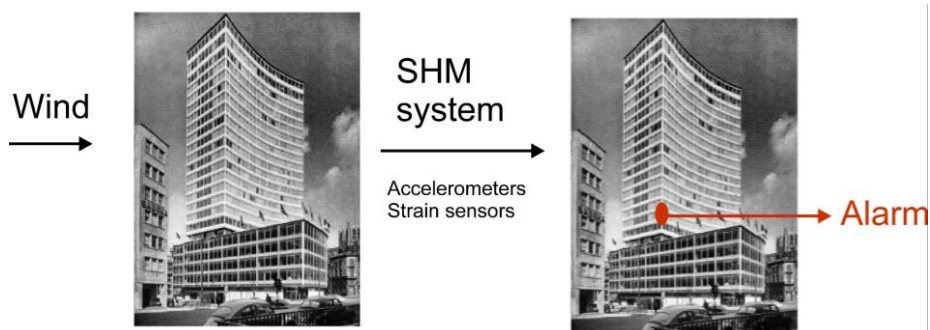
- In a report : support your text description with visual representations
- In a presentation : replace as much as possible text with visual support, and use oral expression to replace text
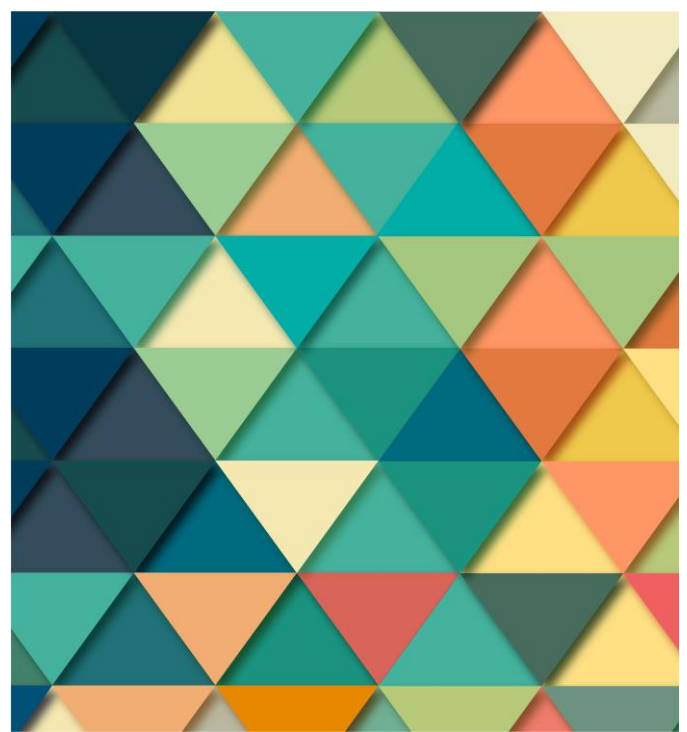
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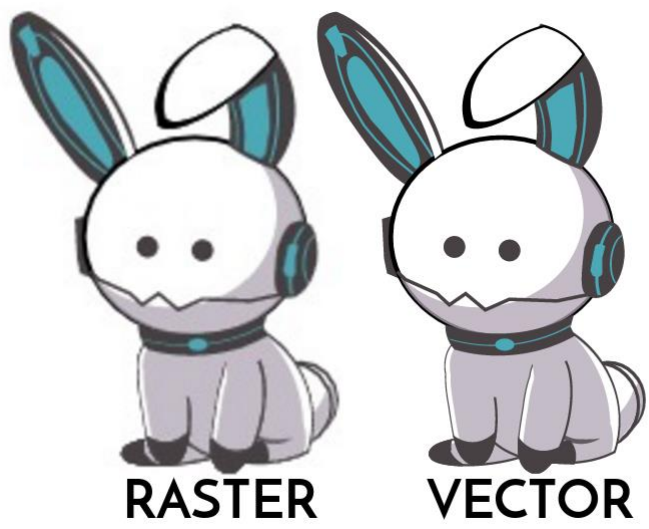## Illustrations : the skeleton of your report/presentation

« A picture is worth a thousand words »

5µs

10V

DAQ (NI)
PXI-6115

Programmable
Pre-Amplifier
Smartmote

+18...60dB

≤150
Meas./s

OUT (1) DAQ   (2) Emitter
IN (3) Receiver (4) Amplifier (5) DAQ

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Vectorial vs pixel graphics

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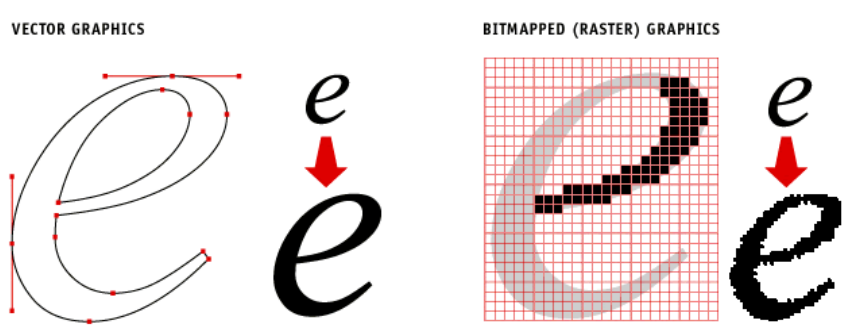## Vector vs pixel images

VECTOR	RASTER
FORMED BY VARIOUS SHAPES	COMPRISED OF PIXELS
SCALABLE	LOSES QUALITY WHEN SCALED
CAN CONVERT TO RASTER	CAN'T CONVERT TO VECTOR
SVG, CGM, EPS, XML	BMP, JPG, GIF, PNG

[https://vectr.com/tutorials/what-are-vector-graphics/]

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Vector vs pixel images

VECTOR GRAPHICS   BITMAPPED (RASTER) GRAPHICS

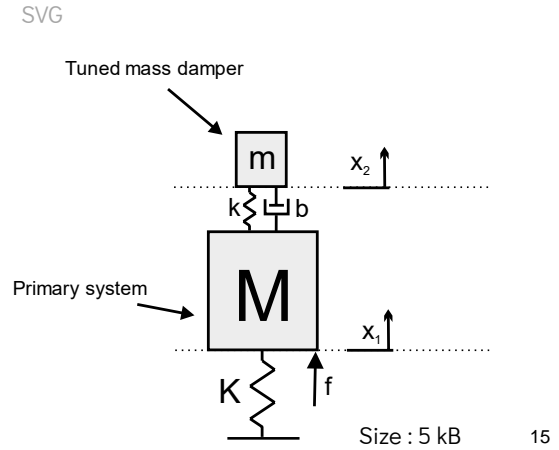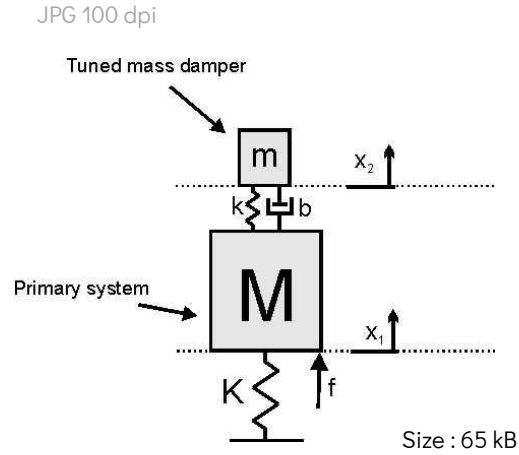[https://sites.google.com/site/btxprojectcomputergraphics/raster-vector-resolution]

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Vector vs pixel images

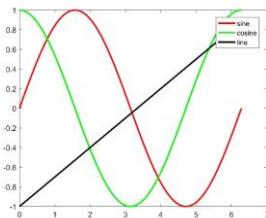Pixel image : jpg, png, gif, tiff, …
(Photoshop, Gimp, Paint, …)

Vector graphic : eps, pdf, svg, ai, cdr, …
(Adobe Illustrator, CorelDraw, InkScape)

JPG 100 dpi

Size : 65 kB
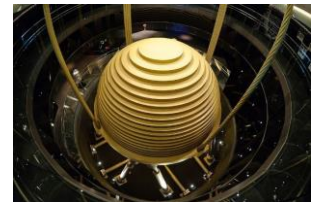
SVG

Size : 5 kB   15

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When to use vector or pixel graphics

Vector graphics :

• For schematics, simple
drawings made of geometric
figures, points, lines, arrows,
etc.

• Main advantages : Small size
of file, can be easily modified
(change color, add element,
etc …)

Pixel graphics :

• Whenever you have pictures
(cameras only work with pixels)

• Main advantages : Compatibility
with most softwares

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Software compatibility

Most modern presentation/reporting software can handle both
vectorial and pixel based illustrations

- Latex historically is vector based but can handle pixel figures
- Word and Powerpoint are historically pixel based but recent versions can handle SVG.
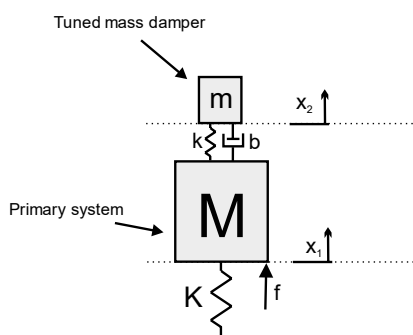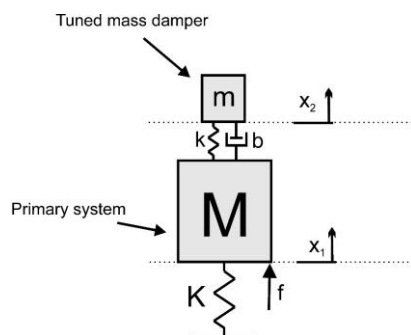- Web pages use mainly pixel based images

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Conversion to high quality pixel graphics

When software does not handle vector graphics (i.e. for webpages), or if
image is too complex (finite element mesh with a lot of elements), export
vectorial representation to high-quality pixel format (>600 dpi).

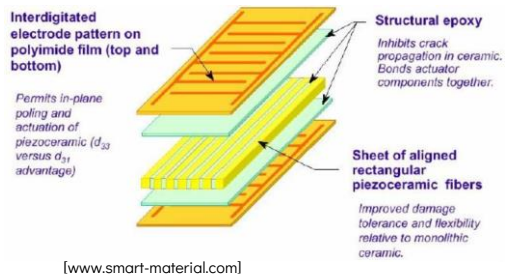SVG   Size : 5 kB

JPG 1200 dpi   Size : 551 kB

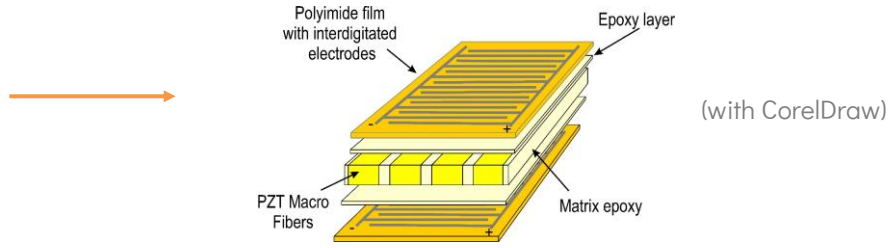18

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Make your own illustrations

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Avoid using illustrations from webpages/articles

Interdigitated electrode pattern on polyimide film (top and bottom)

Permits in-plane poling and actuation of piezoceramic (d_{33} versus d_{31} advantage)

Structural epoxy

Inhibits crack propagation in ceramic. Bonds actuator components together.

Sheet of aligned rectangular piezoceramic fibers

Improved damage tolerance and flexibility relative to monolithic ceramic.

[www.smart-material.com]

- Bad resolution
- Not optimal for your report

Polyimide film with interdigitated electrodes

Epoxy layer

PZT Macro Fibers

Matrix epoxy

(with CorelDraw)

Spend some time to make your own illustrations

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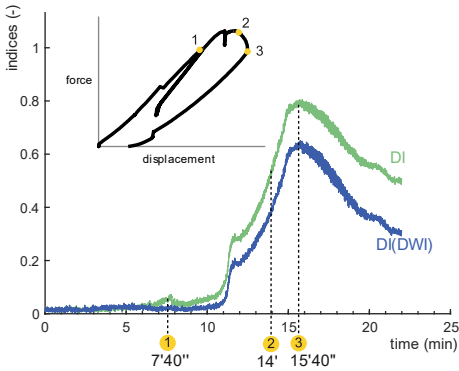# About graphs

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Basics of graphs

- Choose the right type of graph
- Pay attention to axes labels and units
- Improve readability of the graph : highlight information
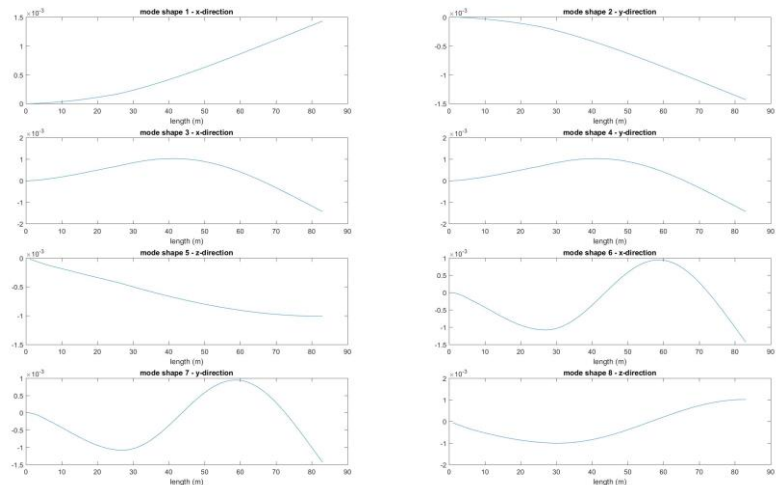 (stay away from default graphs in Matlab, Excel, …)

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Example : representing modeshapes of a cantilever beam
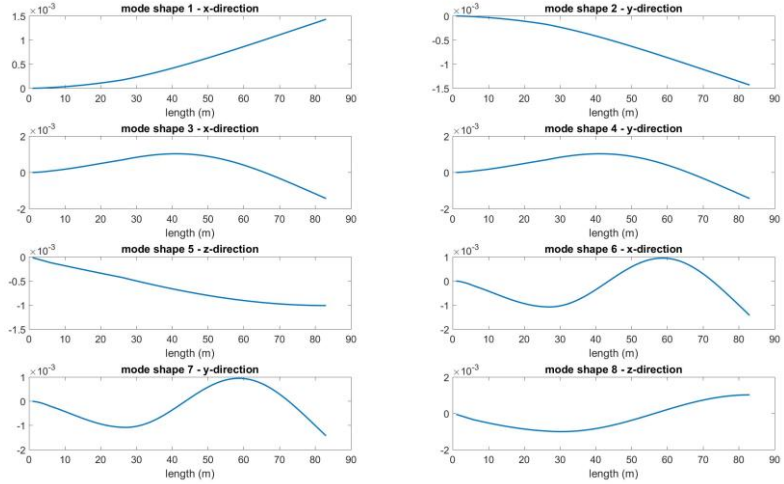
Initial Matlab Figures

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Example : representing modeshapes of a cantilever beam
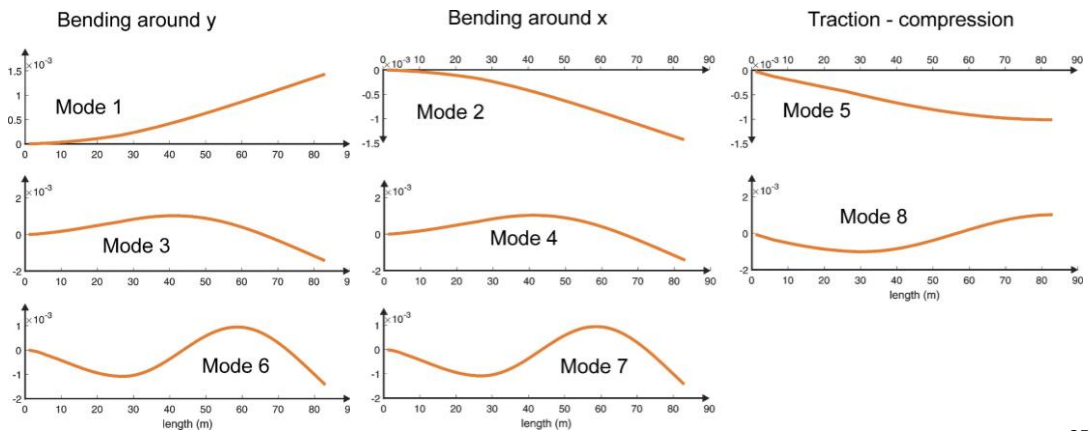
Increase line width, font size

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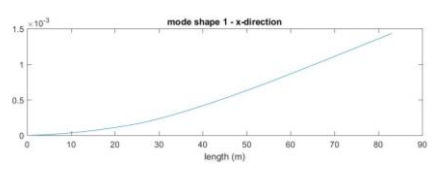## Example : representing modeshapes of a cantilever beam

- Reorganize
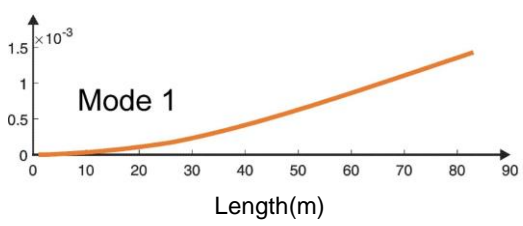- Change axis style -> Engineering style
- Change line color

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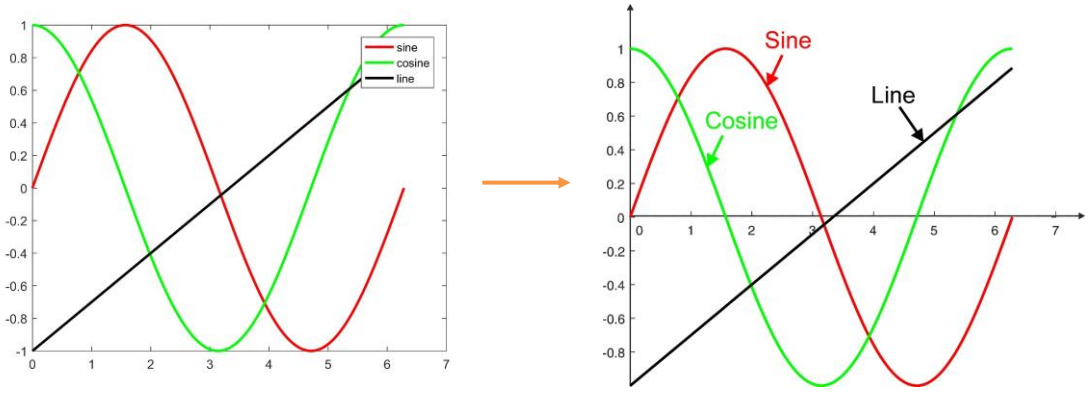## Stay away from default graphs in Matlab/Excel

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Graphs and legends

You may consider putting legend into the Graph (use arrows)
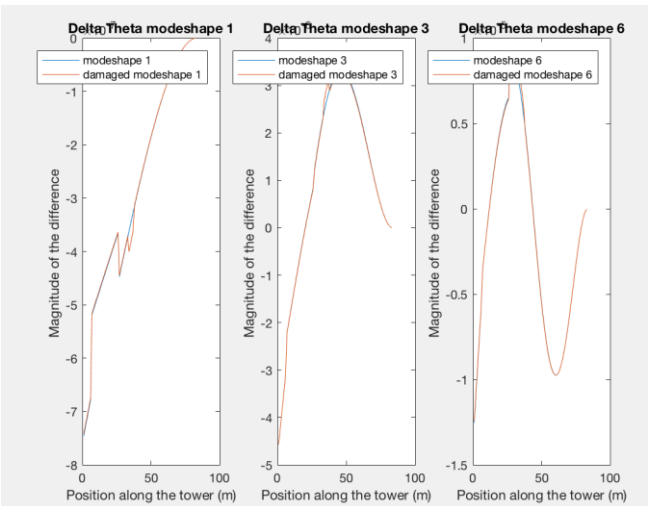

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Graphs and legends

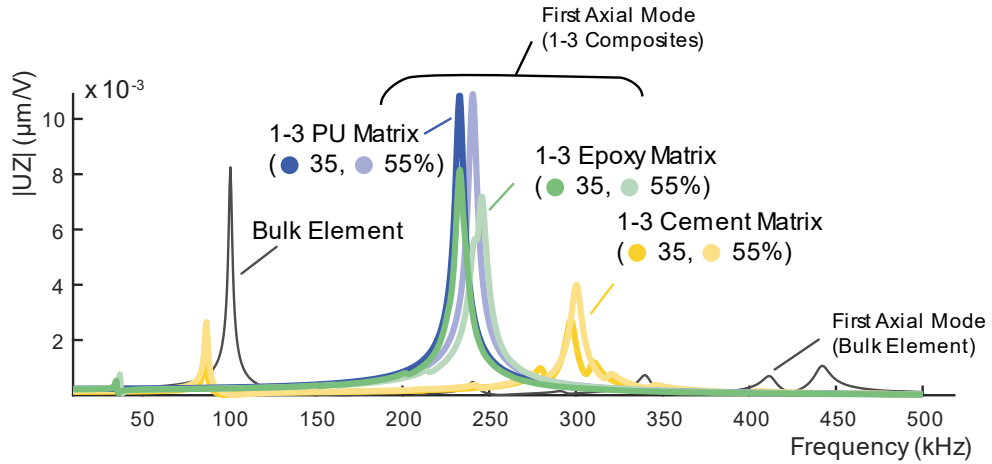Example of a bad use of legend

[from student presentations]   28
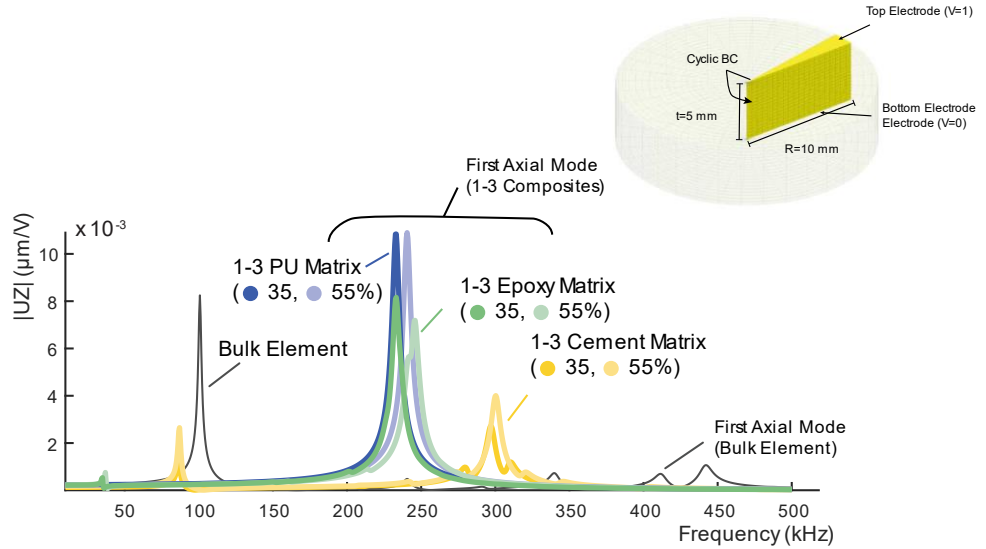
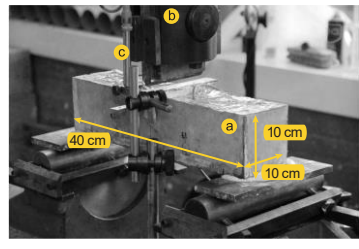## Highlight information in the graph

Tell your story in the graph

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Combine graphs and illustrations
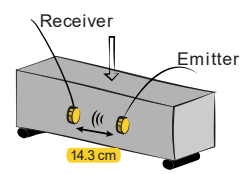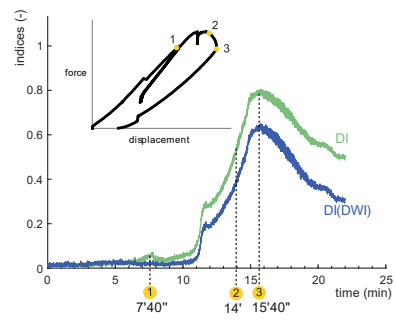

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Combine graphs and illustrations

a Non-Reinforced Beam
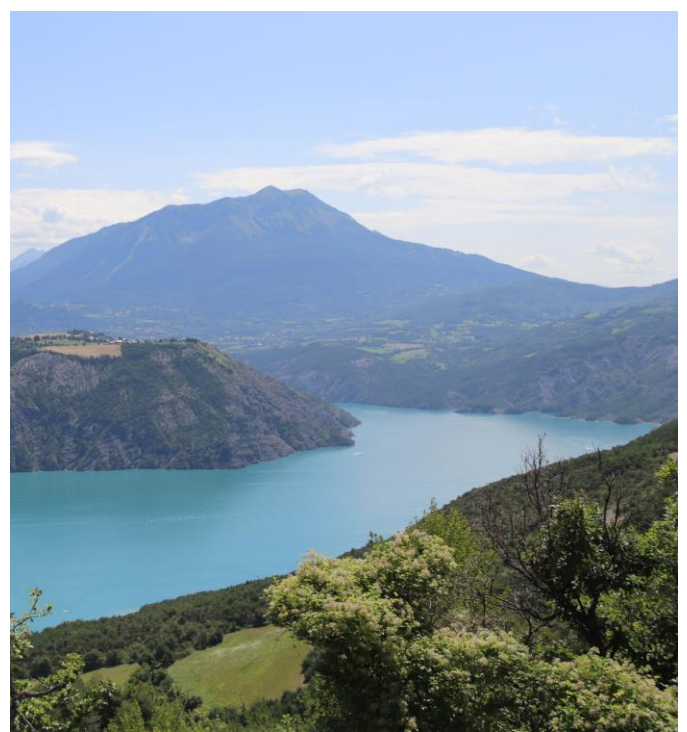b 200 kN Hydraulic Jack
c LVDT

Is all the important information present to explain the graph ?

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Pictures

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Basics of picture handeling

Cropping

Adjusting brightness and levels (saturation)

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More advanced features

Getting rid of the background

Recomposing

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Background

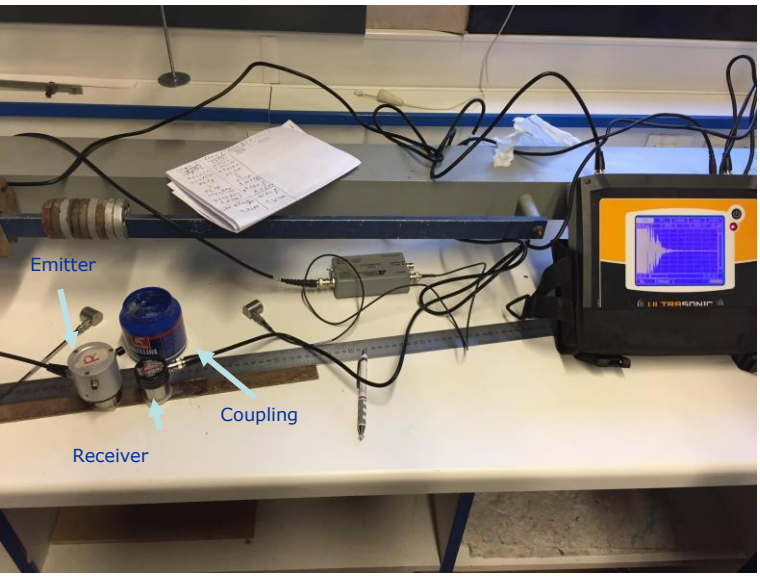When possible pay attention to the background

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Background

Or improve it ....
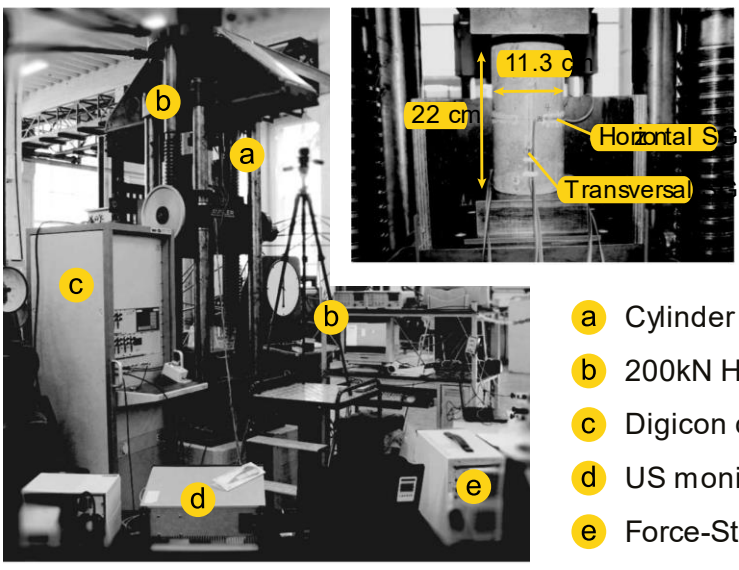
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Add information on your pictures

And clean up before taking the picture !

[from student presentations]

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Add information on your pictures

a Cylinder
b 200kN Hydraulic Jack
c Digicon controller
d US monitoring system
e Force-Strain DAQ

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Pictures and illustrations from the internet

- Cite at least the main site

[https://www.polycliniquedeloreille.com/]

- Except for content which has specific licences (pexels.com)

Rarely technical content

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Summary

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Summary

Importance to convey emotions

First Axial Mode (1-3 Composites)

$|UZ|$ (μm/V)   x 10^{-3}

1-3 PU Matrix (● 35, ● 55%)

1-3 Epoxy Matrix (● 35, ● 55%)

Bulk Element

1-3 Cement Matrix (● 35, ● 55%)

First Axial Mode (Bulk Element)

Frequency (kHz)
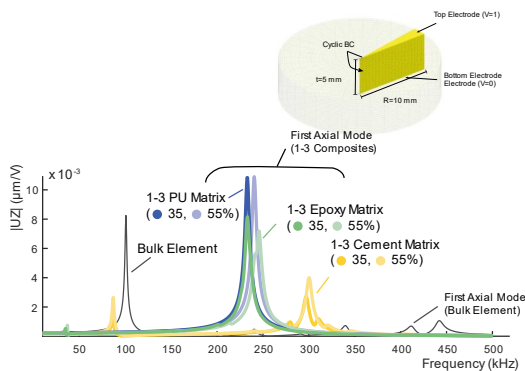
A good story is told with a proper graph and a self-made illustration/picture

Use the right tools !

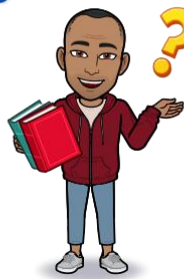This is the skeleton of your scientific communication

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Any Questions?

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Basics of graphs

Choosing the right graph

Jean-luc Doumont

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