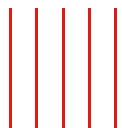


Designing Scientific Posters

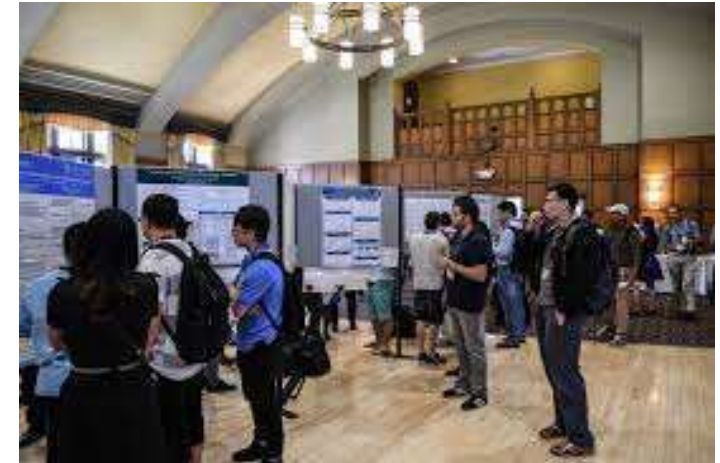
English Course
INSA - Toulouse



What is a scientific poster?

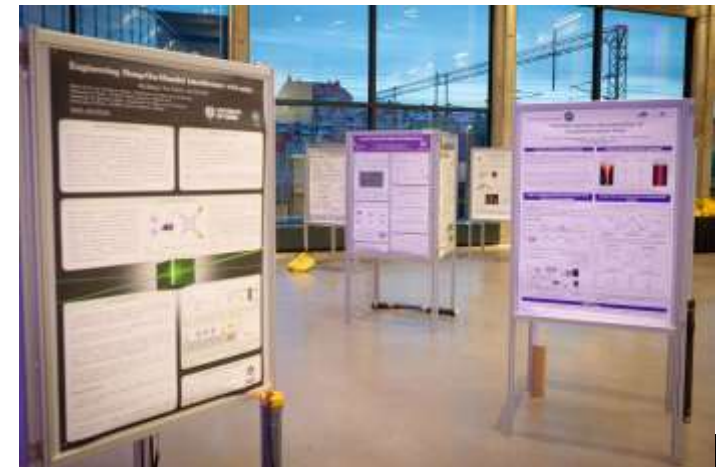
While you are standing next to your poster

– a visual tool to help communication and start a conversation about your work

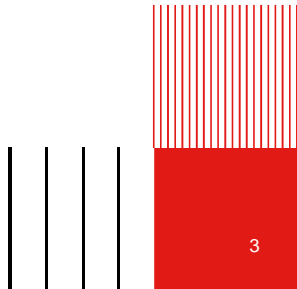


When you are absent

– a standalone document to concisely communicate your work through effective figures, titles and text.



**A good poster can't make up
for bad research, but a bad
poster can make good
research hard to recognize!**





Two questions before you start

Who is your audience?

Your audience determines the tone of your poster.

Specialists? Wide-ranging disciplines? The general public? All three?

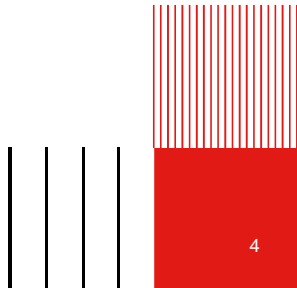
What is your message?

What is the purpose of your poster?

What story do you want to communicate to your audience?

This message should be reflected in the content of your poster

The key points of your poster should be read in 3-5 mins, full text in 10 mins



An effective poster...

Attracts an audience

Prominent title

Attractive figures + limited number of words

Clean, open layout with effective use of colour

Is readable

No grammatical or spelling errors

Simple English

Correct scientific vocabulary

Concise and clear text

Is legible

Avoids small, fancy fonts

Can be easily read from a distance

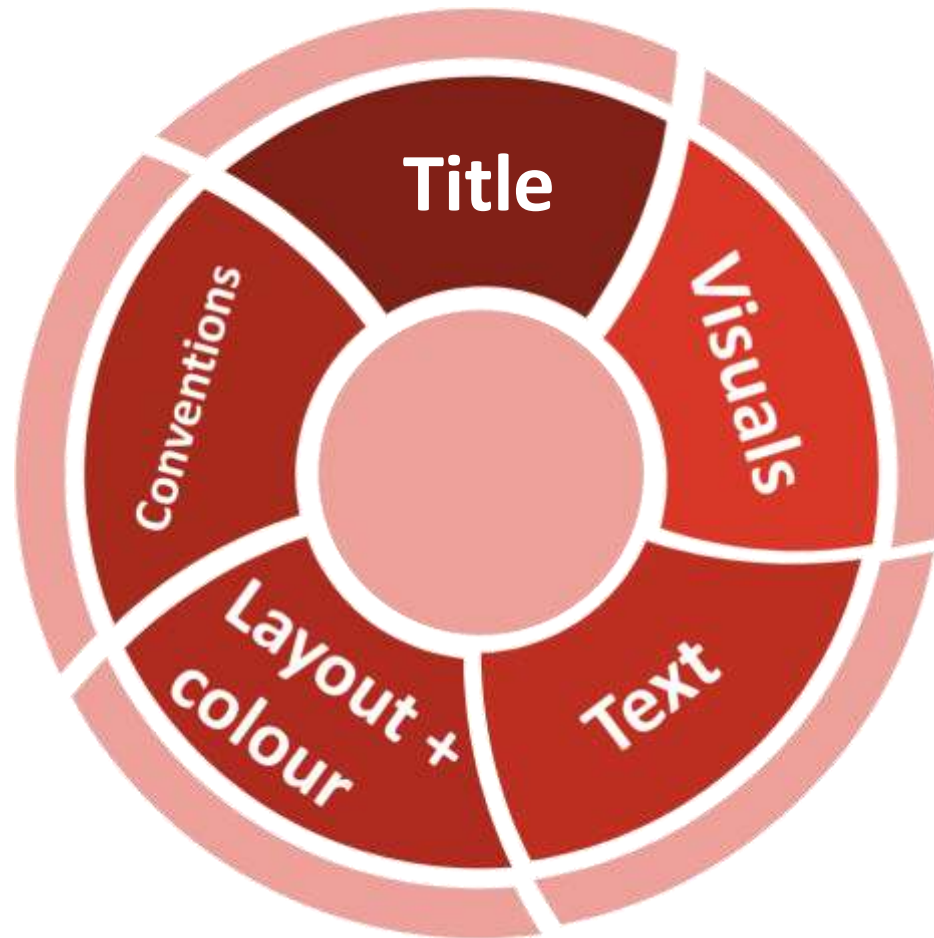
Is easy to navigate

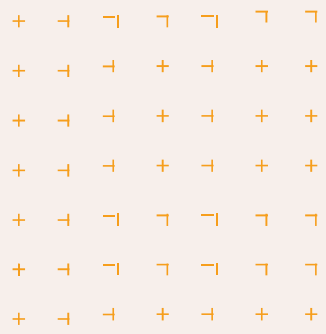
Orientates the reader to key points

Logically arranged sections and elements within sections

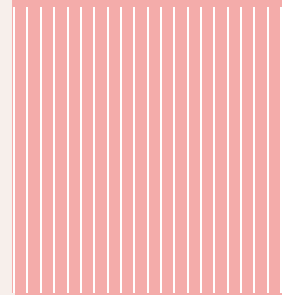
Tells a story

What is your message? Who is your audience? What do you want for/from your audience? Does the audience understand the message?





Prominent and captivating title





A title should...

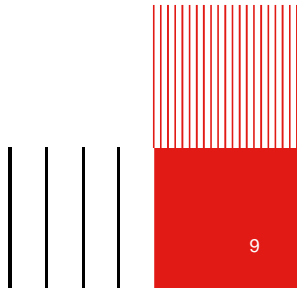
Summarize the main idea you want to get across

Be clear and captivating: it is the first thing the audience will read

Contain key nouns and verbs relevant to your work, linked together with as few words as possible

Be legible: don't use ALL CAPS, don't use shadowing , use **high contrast colors**

Use a non-serif font (e.g. Ariel, Calibri, Tahoma)



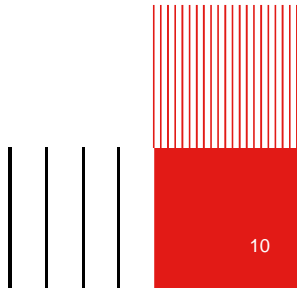
A title should avoid...

Misleading information

Amusing or informal words

Obvious or non-specific openings: e.g., “Report on”, “A Study of”, “Results of” etc.
(these don’t contribute meaning!)

Non-standard abbreviations and unnecessary acronymns





There are three types of title...

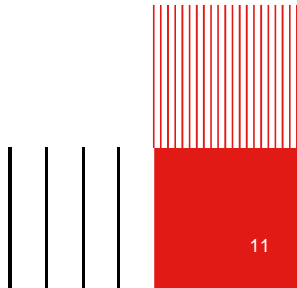
(1) Descriptive

Forecasting residential electric power consumption using regression models

Using BP neural network to predict critical meteorological conditions of pavement icing

Includes the essential elements of the project

Does not include the results or conclusion





(2) Results

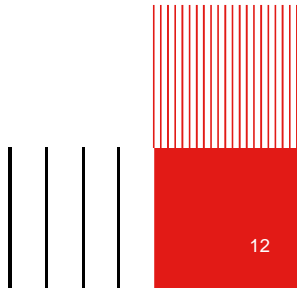
(1) Functionally graded plates behave like homogeneous plates

(2) Improved K-mean algorithm by phased assignment optimization: application in air passenger grouping

States the main result of the study

Be careful not to be biased: (1) implies that the issue is settled once and for all!

Prefer to use the simple past for your results (2)



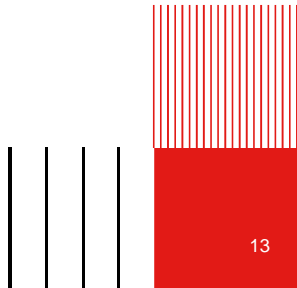


(3) Question

Deep machine learning – a new frontier in artificial intelligence?

Artificial intelligence in meta-optics: where are we now?

Be careful: can sensationalize the topic





Check list

1. Your title has >3 words? Noun strings? Use prepositions.

Biomass measuring inventory vs **An inventory for measuring biomass**

2. Articles are needed before a countable noun, but not uncountable nouns

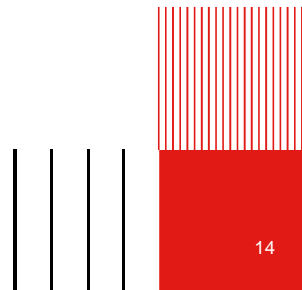
A survey of the importance of X / Vibration analysis for electronic equipment

3. Use –ing form of verbs rather than nouns

Silican mechanical strength measurement for surface damage quantification.

Quantifying surface damage by measuring the mechanical strength of silican.

4. Avoid the terms *novel* and *innovative* – all research is unique in some way!

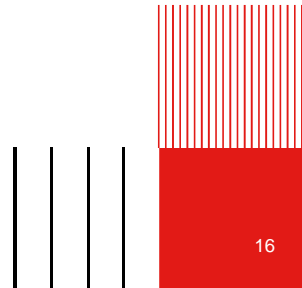




**Create a visual poster with attractive,
standalone figures**



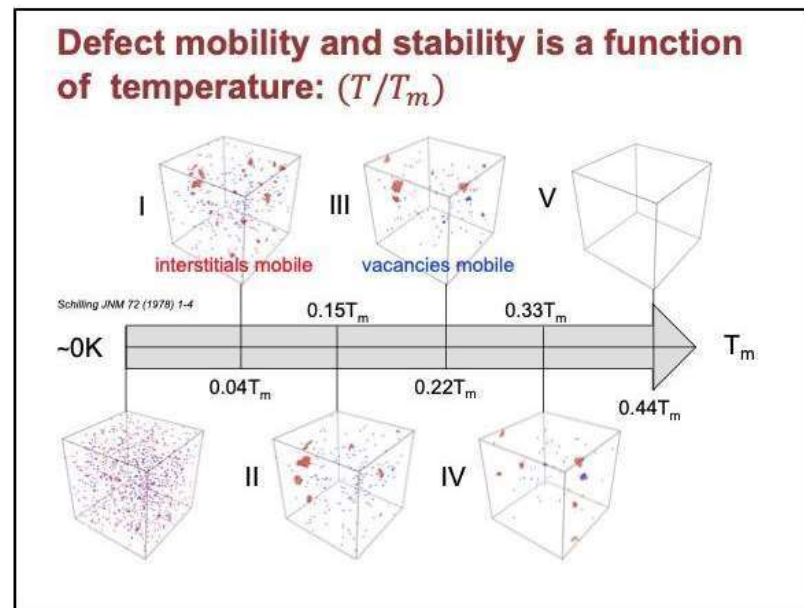
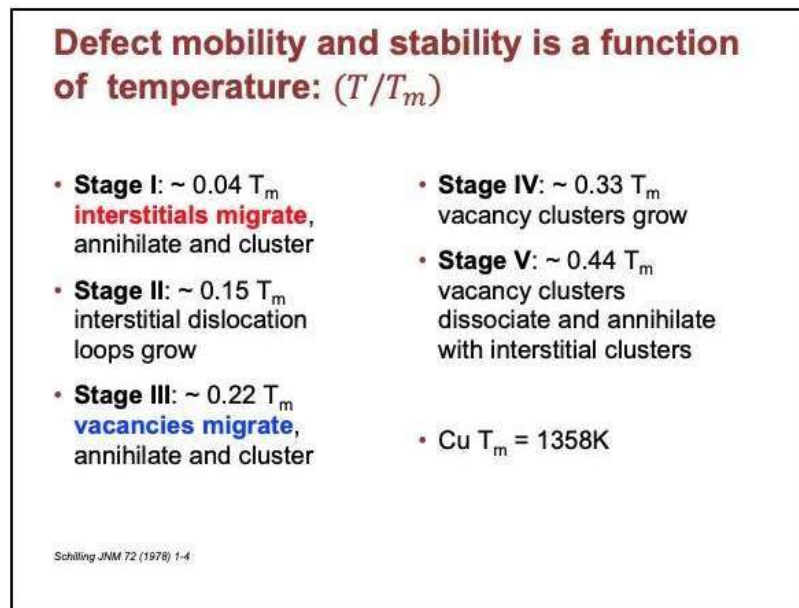
- Use a 1/3 to 2/3 text to figure ratio
- Figures can be images, diagrams, photographs, graphs, charts and maps
- All figures should have a purpose and be standalone
- Include no more than 8 figures
- Tables communicate large amounts of data in a concise and effective manner
- All figures and tables should be large and high quality
- Avoid decorative clip art



Replace text with figures

Graphical content is the most efficient and memorable way to convey information to your audience

The challenge is to turn words into figures!

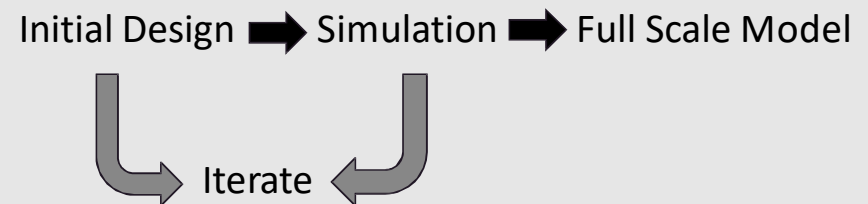


Eliminate all but keywords and phrases

Project Schedule

- Initial design with low-fidelity iterative flow simulation
- High fidelity numerical simulation
 - CFD, FEA
- Iterate
- Full scale model

Project Schedule

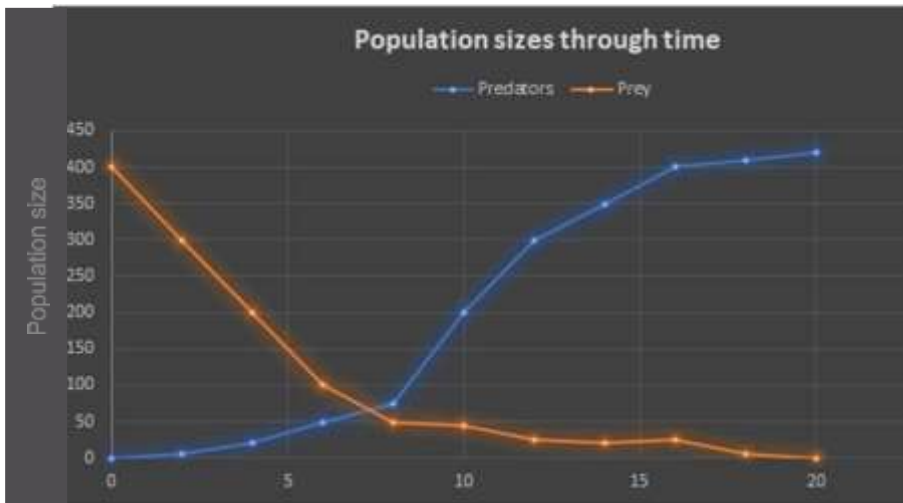


The audience cannot understand the link between the points

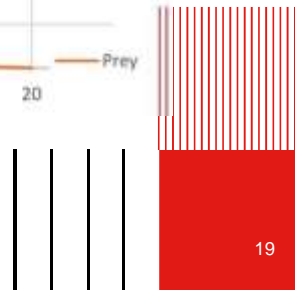
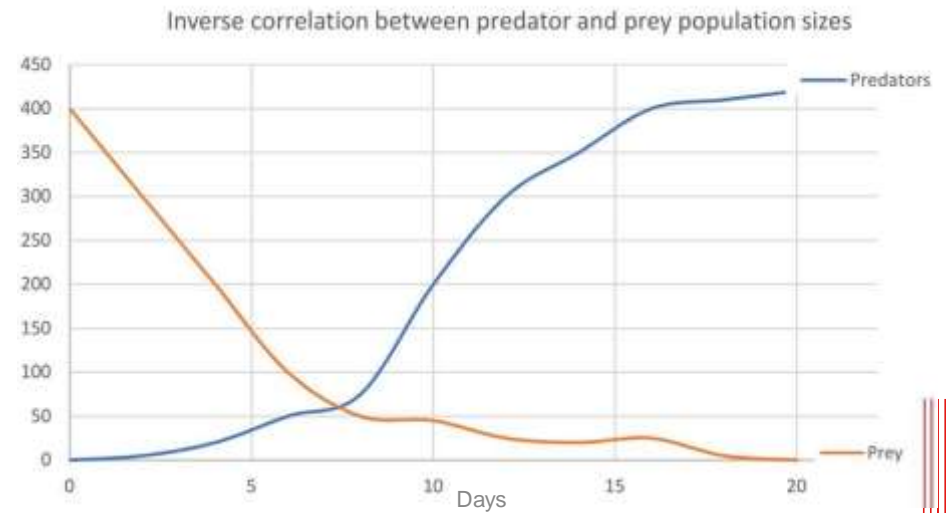
Visual representation, only keywords

Simplify your figures: 1

- Delete grid lines if appropriate
- Delete keys – label lines
- Minimise tick marks on axes
- Avoid coloured backgrounds



Population size



Simplify your figures: 2

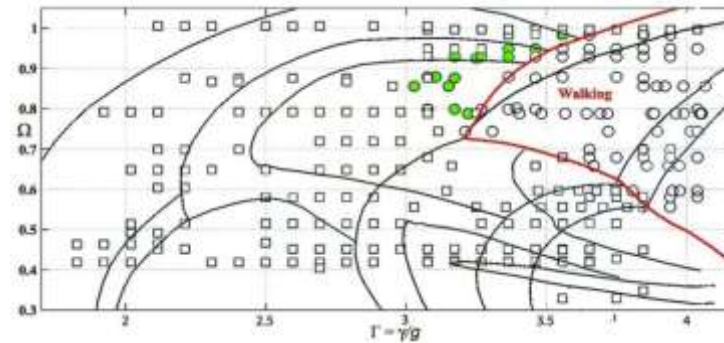
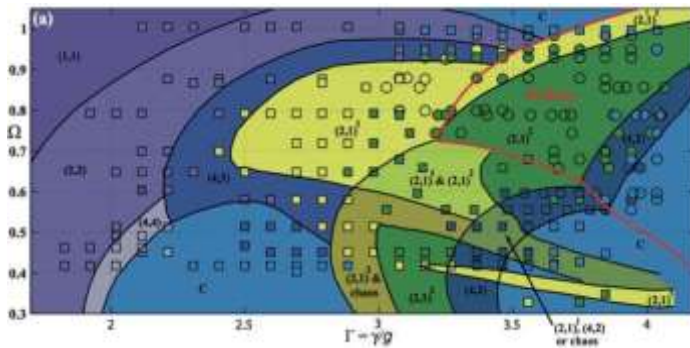
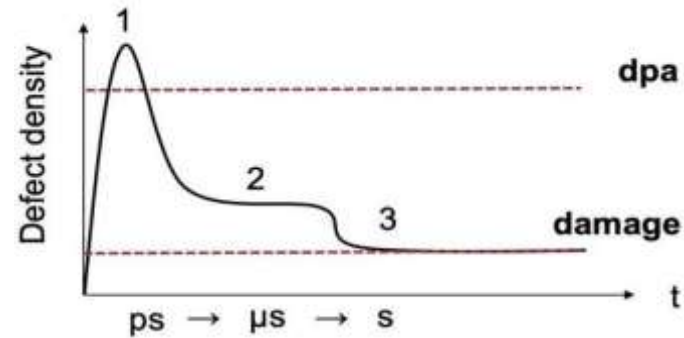
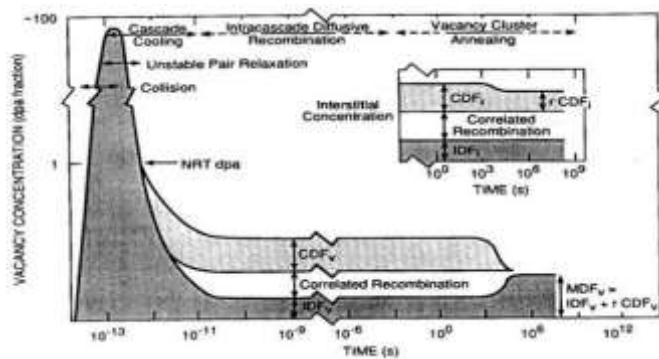
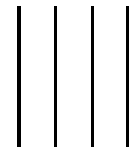


Figure suitable for article:
complete model or data

Figure adapted for poster :
key parts highlighted + labelling



Highlight key parts of figures

Use colours, arrows, shading or labels

- ✓ Shows the reader what to focus on
- ✓ Increases readability
- ✓ Minimises supplementary text

dpa is not a measure of damage

- dpa is *calculated* from irradiation parameters, it isn't *measurable*:

$$\text{dpa} = \int_0^\tau \int_0^{\hat{E}} \Phi(E, t) \int_{\hat{T}} \sigma_D(E, T) \nu(T) dT dE_i dt$$

Was, Fundamentals of Radiation Materials Science, Springer (2016)

dpa is not a measure of damage

- dpa is *calculated* from irradiation parameters, it isn't *measurable*:

Flux of particles with energy E Number of displacements per primary knock-on atom

$$\text{dpa} = \int_0^\tau \int_0^{\hat{E}} \Phi(E, t) \sigma_D(E, T) \nu(T) dT dE_i dt$$

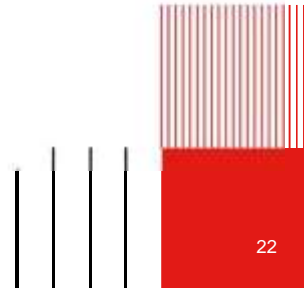
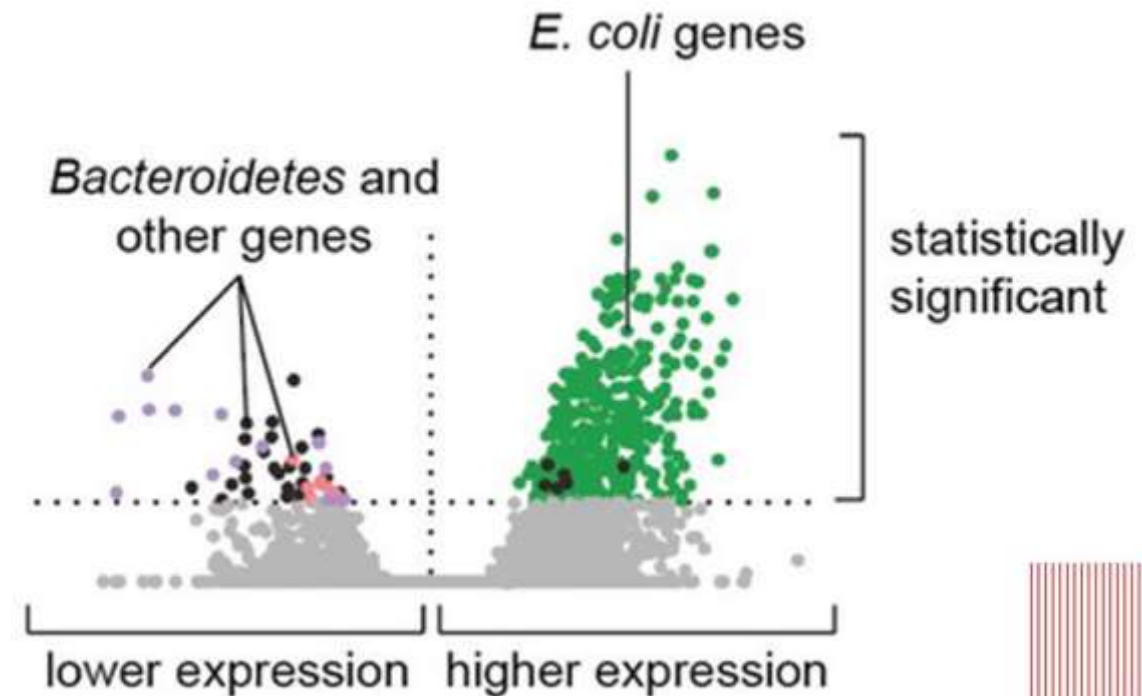
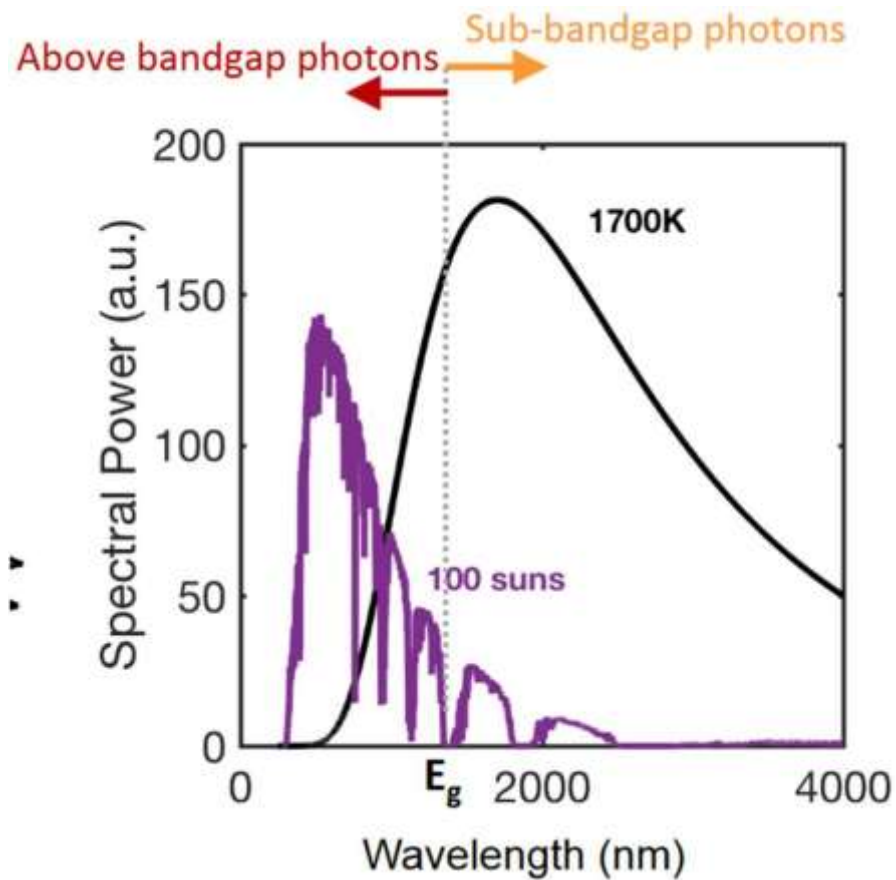
Probability an atom is displaced gaining recoil energy T

Was, Fundamentals of Radiation Materials Science, Springer (2016)



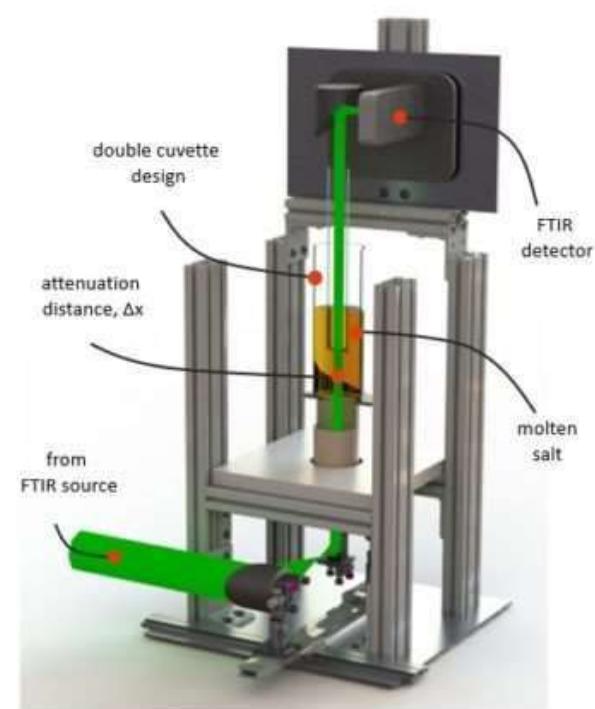
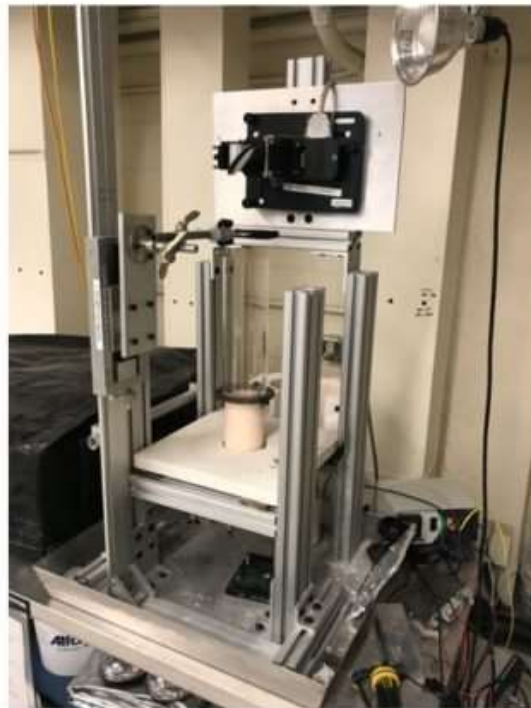


Highlight key parts of figures: other examples



Replace photos with diagrams

Photographs contain many details that interfere with the technical description of your setup



Consider creating a diagram to accompany/replace your photo

Use realistic but contrasting colours to help the components stand out

Label even if your audience knows the structure well

Add a scale bar

Scientific conventions for graphs

- All figures/tables need to be numbered and have a clear caption
- Captions go above figures and below tables
- Refer to the figure/table in the text if this helps the reader navigate your poster
- Cite the source for each figure/table if not your own work

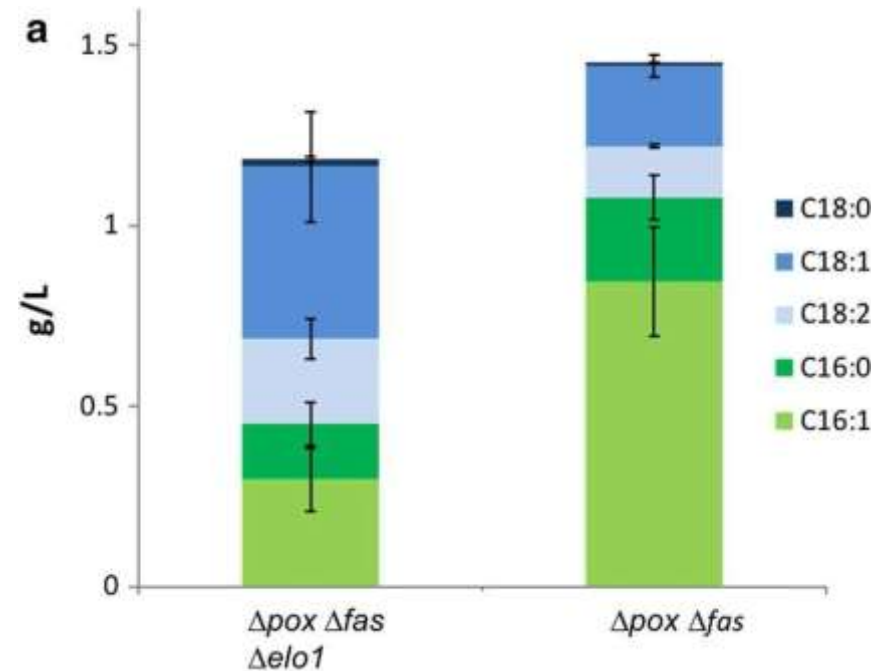
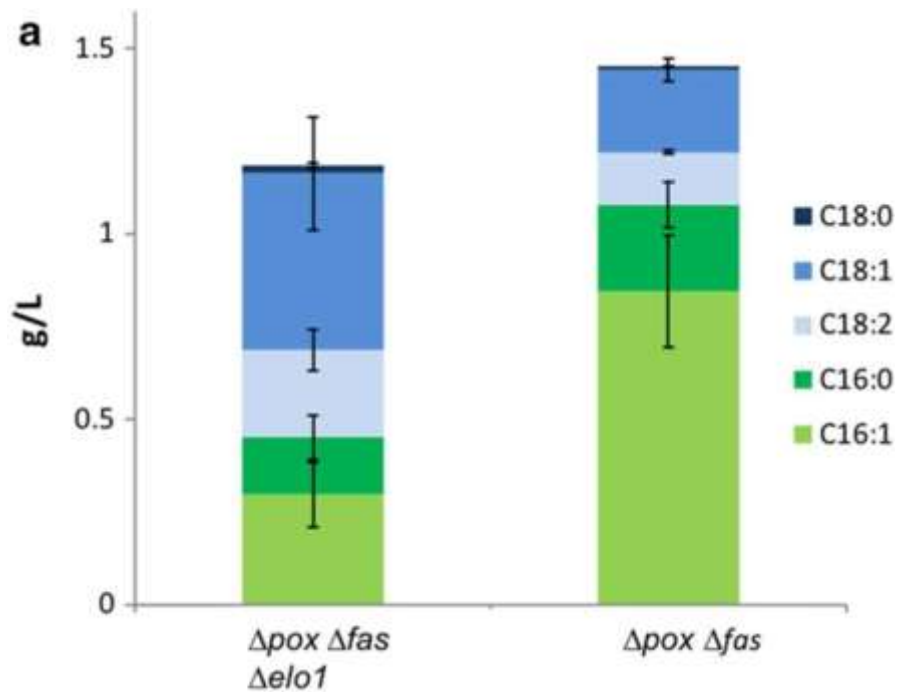


Fig. 3: Lipid profiles of the strains $\Delta pox \Delta fas$ and $\Delta pox \Delta fas \Delta elo1$. (Source: Rigouin et al., (2018))

Cite the sources of visuals that are not yours



Write 'Adapted from' if you have modified the visual

Use Numerical (1) or Author/date citations

All citations need to be listed in the 'References' section at the bottom of the poster

Fig. 3. Lipid profiles of the strains $\Delta pox \Delta fas$ and $\Delta pox \Delta fas \Delta elo1$ grown in rich medium completed with mC16:0 at 72h. From Riguoin et al. (2018)

References



- [1] R. E. Ziemer and W. H. Tranter, *Principles of Communications*, 7th ed. Hoboken, NJ: Wiley, 2015. [Online]. Available: <https://ebookcentral.proquest.com/lib/vu/reader.cation?docID=5106516&ppg=1>
- [2] J. D. Bellamy et al., *Computer Telephony Integration*. New York: Wiley, 2010.
- [3] C. Jacks, *High Rupturing Capacity (HRC) Fuses*. New York: Penguin Random House, 2013, pp. 175–225.
- [4] N. B. Vargafik, J. A. Wiebelt, and J. F. Malloy, "Radiative transfer," in *Convective Heat*. Melbourne: Engineering Education Australia, 2011, ch. 9, pp. 379–398.
- [5] H. C. Hottel and R. Siegel, "Film condensation," in *Handbook of Heat Transfer*, 2nd ed. W. C. McAdams, Ed. New York: McGraw-Hill, 2011, ch. 9, pp. 78–99.
- [6] W. M. Rohsenow, "Heat transmission," in *Thermal Radiation Properties*, vol. 3, M. W. Catton and J. P. Hartnett, Eds. New York: Macmillan, 2012, ch. 9, pp. 37–62.
- [7] H. Schmidt-Walter and R. Kories, *Electrical Engineering. A Pocket Reference*. Boston: Artech House, 2007. Accessed: Oct. 16, 2016. [Online]. Available: <http://ebruary.com>

Barnet, S., Bellanca, P., & Stubbs, M. (2013). *A short guide to college writing*. Pearson Education.

Caron, T. (2008). Teaching writing as a con-artist: When is a writing problem not? *College Teaching*, 56(3), 137-139. <https://doi.org/10.3200/CTCH.56.3.137-139>

Cismas, S. C. (2010). Educating academic writing skills in engineering. In P. Dondon & O. Martin (Eds.), *Latest trends on engineering education* (pp. 225-247). WSEAS Press.

Drew, S., & Bingham, R. (2010). *The guide to learning and study skills: For higher education and at work*. Gower.

Löfström, E. (2011). "Does plagiarism mean anything? LOL." Students' conceptions of writing and citing. *Journal of Academic Ethics*, 9(4), 257-275. <https://doi.org/10.1007/s10805-011-9145-0>

Oshima, A., & Hogue, A. (2007). *Introduction to academic writing*. Pearson/Longman.

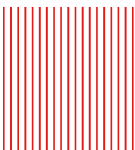
Rose, J. (2007). *The mature student's guide to writing*. Palgrave Macmillan.

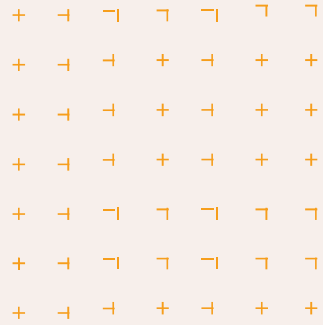
Soles, D., & Soles, D. (2005). *The academic essay: How to plan, draft, revise, and write essays*. Studymates.

Turner, K., Krenus, B., Ireland, L., & Pinton, L. (2011). *Essential academic skills*. Oxford University Press.

In numerical order (if you used numerical citations on your poster)

In alphabetical order (if you used author/date citations on your poster)



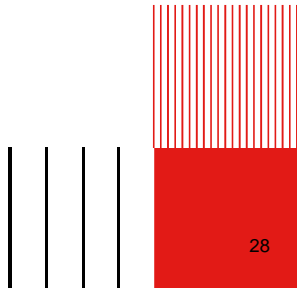


**Limited text: concise + clear to convey
your message**



Content + view

- Remember the 1/3 to 2/3 text to figure ratio
- 400-700 words is a good target, but depends on field/purpose (check with your tutor)
- Distill your message: eliminate all but the vital elements of your work
- The poster should have a clear take-home message
- Avoid big blocks of text: use bullet points or spaced-out, short paragraphs





Text size + fonts

Think legibility! Text and figures should be legible from 1-1.5 m away

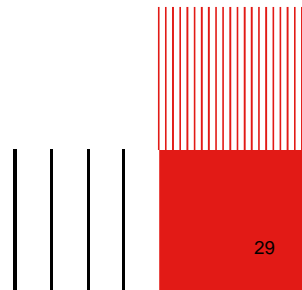
Use sans serif fonts = more legible than serif fonts at a distance

Avoid having many font sizes and styles – go for a consistent look

Use **bold** and *italics* sparingly, and avoid underlined text

Recommended font sizes for an A0 poster

Title Body Text ◀ 24 pt Authors
Sub-headings ▲ 50 pt
▲ 85 pt 36 pt ▲ 18 pt ► Captions





Bullet points

Posters shouldn't have too much text.

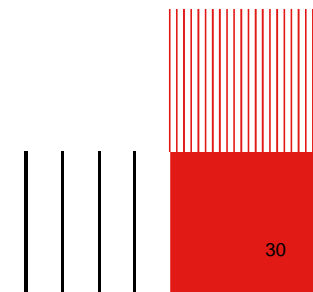
But good posters don't just convert text into bullet points.

- ♦ Current approaches:
 - ♦ MILP based encoding (Sherlock), satisfiability modulo solvers (Reluplex)
- ♦ Challenges:
 - ♦ Scalability with respect to the network size
 - ♦ MILP/SMT solving is expensive, and size of the constraints is proportional to the size of the network




You have to be more judicious

- Prioritize bullets for lists
- Don't use bullets for titles/subheading
- Be creative and display your text visually
- Space out sentences and short paragraphs





Incorrect grammar (different grammatical forms)	Incorrect grammar (all nouns)
A Java infrastructure for: <ul style="list-style-type: none">• MPEG-7 features processing• XML database managing• Algorithms ontology exploiting• Functions integrating	A Java infrastructure for: <ul style="list-style-type: none">• MPEG-7 features processing• XML database management• Algorithms ontology exploitation• Functions integration
Good example (all verbs in gerund –ing form)	<div>If you do use bullets make sure the first word of each bullet is grammatically the same</div>
A Java infrastructure for: <ul style="list-style-type: none">• Processing MPEG-7 features• Managing XML databases• Exploiting algorithm ontology• Integrating functions 	





Create word tables for ideas and concepts

APOPTOSIS

- Genetically Programmed cell death Deletion of individual cells by fragmentation into membrane-bound particles, which are phagocytized.
- apoptosis elicits no inflammatory response in adjacent cells and tissues.
- Besides being genetically programmed, apoptosis can be:
 - Induced by injury to cellular DNA, as by irradiation and cytotoxic agents
 - Suppressed by naturally occurring factors (e.g., Prot. Kinase AKT) and by some drugs (e.g., prostaglandin E2).

- 13 -

What is Apoptosis & how does it happen?

Definition

Death of individual cells by fragmentation into membrane-bound particles, which are phagocytized.

Note: apoptosis elicits no inflammatory response in adjacent cells, tissues.

How it happens

- Typically genetically programmed
 - Induced by injury to cellular DNA – e.g., by irradiation and cytotoxic agents
- Note:* Can be suppressed by naturally occurring factors (e.g., Prot. Kinase AKT) and by some drugs (e.g., prostaglandin E2).

- 15 -

Create a table with rows + columns
Define categories





Create message titles not topic titles

The assertion-evidence model of slide design (1) can be applied to posters

Build talk on messages ➡ **Support message with visual evidence** ➡ **Explain your evidence**

Section in poster	Weak topic title	Strong message title	Why?
Introduction section	Introduction	Hydrogen-based energy supplies	It tells the audience where you are and what concept your are illuminating
Conclusions section	Conclusions	Remote sites can become energy self-sufficient in the future	You say ‘in conclusion’ with your words, tone and body language during your pitch.

Source (2)

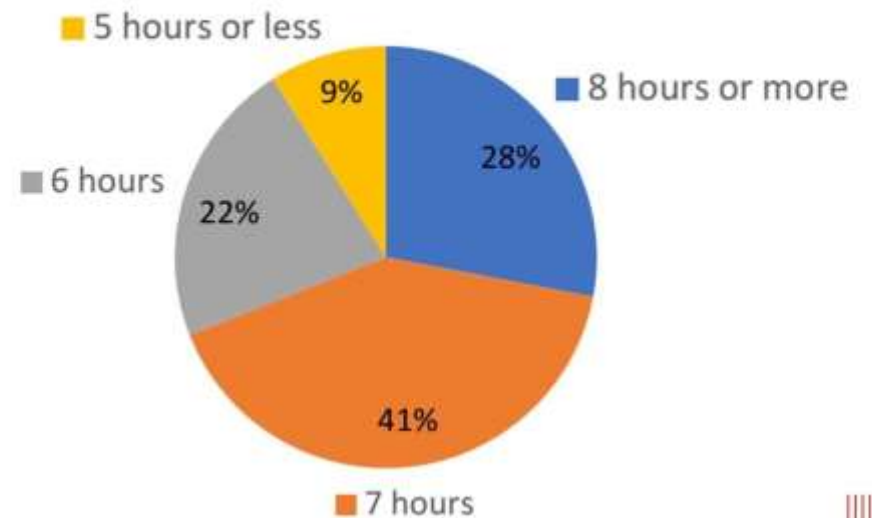
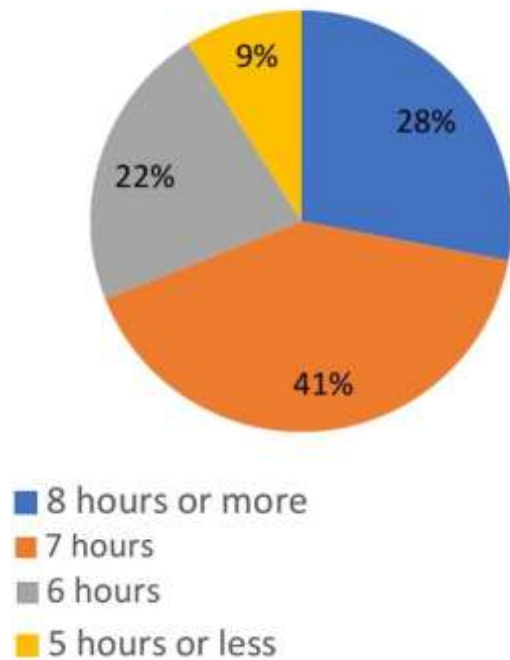


Message titles for result sections

Message titles usually have a verb (past simple tense)

Distribution of the number of sleep hours for adults

Only 28% of adults slept the recommended 8 hours





English language

All text must be in English, including graphs

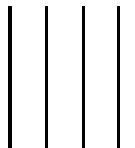
Correct spelling and grammar

Correct scientific vocabulary

Think readability!

Scientific style + other considerations

- Use simple words – avoid needlessly complex words
- Be concise – avoid redundancy, repetition, long sentences and use verbs, not nouns!
- Keep basic word order (subject, verb, object) with elements close together
- Use active verbs (avoid *do* and *make*)
- Check for false friends (*important, realise, control, thanks to, actually, evolution* etc.)
- Avoid noun strings





- Use active voice (personal or impersonal style)

~~X~~ The voltage was displayed by the oscilloscope (passive voice)

✓ The oscilloscope displayed the voltage (active voice - impersonal style)

- Numbers must be in English style

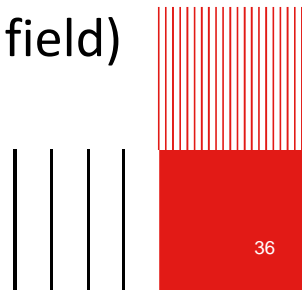
✓ 1,253,934.289 or 1 253 934.289 ~~X~~ 1.253.934,289

✓ 0.72 ~~X~~ 0,72

- Correct notation of scientific units: (*✓ 85 K ~~X~~ 85K, ✓ 103 Hz ~~X~~ 103 HZ*)

- Avoid abbreviations

- Write out acronyms in full the first time they appear (unless well known in your field)





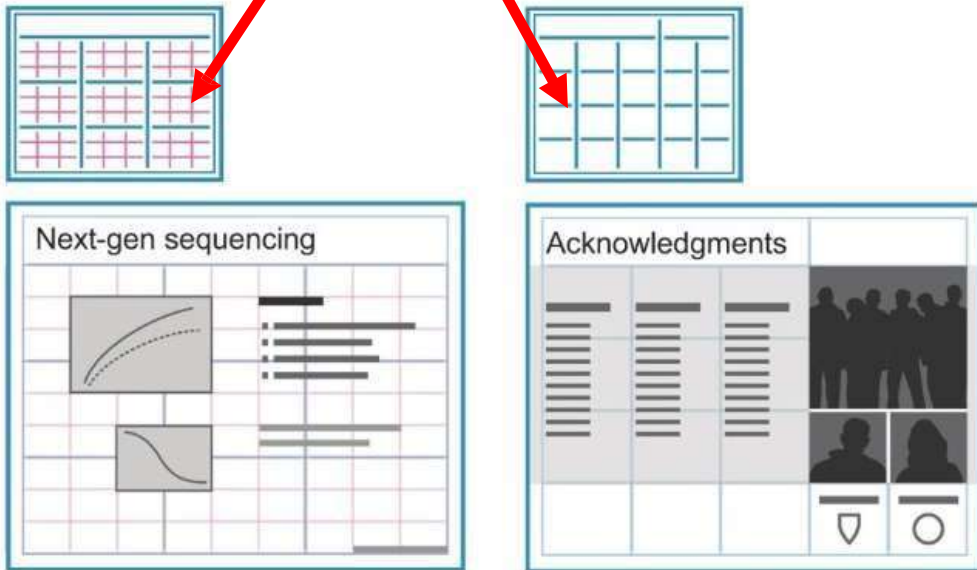
Layout: aligned, easy to navigate and open

Layout the sections in an aligned + logical order

Make sure there is a coherent 'flow' between the sections in your poster.

You are telling a story, so make sure the reader knows where to start and end

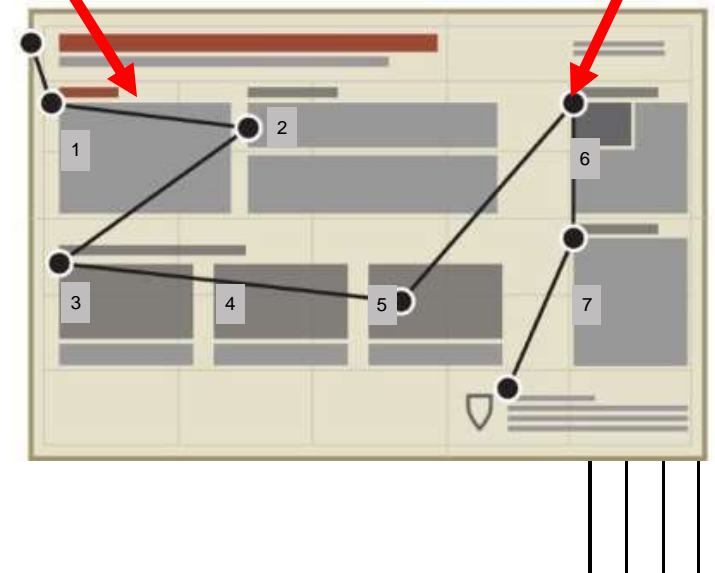
Use a grid system to align sections and elements within sections so poster is visually appealing + easy navigation



Source (7, 8, 9)

Guides (arrows and numbering systems) can help but may add visual noise

Natural tendency = to read from left to right, top to bottom



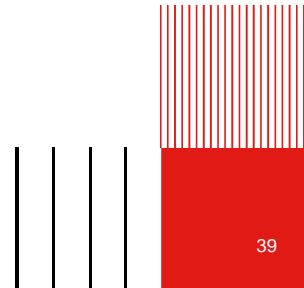


Make sure there is enough white space

White space = the lungs of good design = improves the visual appeal, readability and effectiveness of your poster

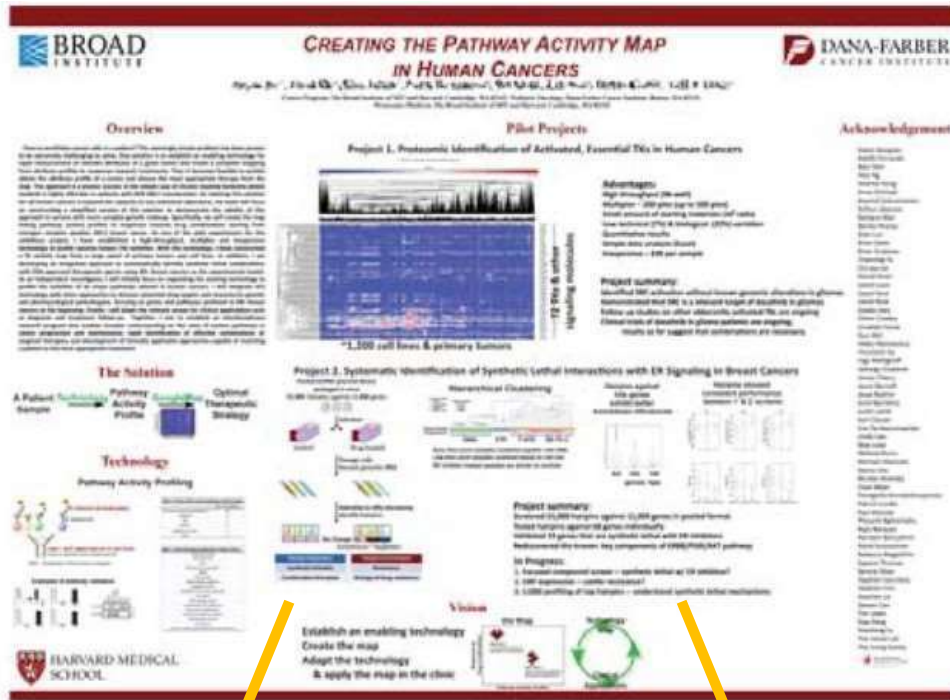
Provide a wide gap between each element/section

Avoid dark, bold outlines to demarcate – use space and colour, light lines



Source (7, 8, 9)

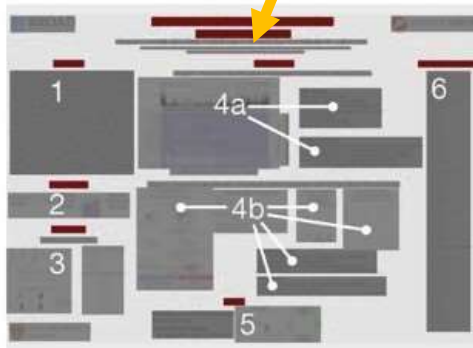
a



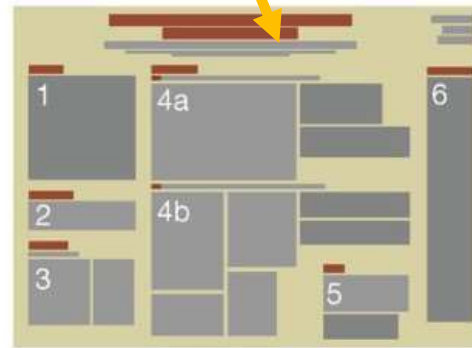
Unify whitespaces into regularly shaped blocks
= easy navigation

- larger gaps to differentiate sections
- thinner gaps to separate items within a section

b



c



Source (7, 8, 9)

X

✓

Portrait or landscape?



**Date of poster
presentation**

+

Context

06/09/2022
Conference of
Automation Science and
Engineering, London

Title

Author(s) and affiliation(s)

First name + surname + position + full address of school/company

John Doe, 4th year student, Department of Electrical and Computer Engineering, INSA – Toulouse, France
Electrical Apprentice Engineer, Cyber Security Department, Hensoldt Nexeya, Toulouse, France
Tutor: Jane Doe, Position, Company address, Country

Sections to include in a scientific poster

References

Include citations in the main text using a standard referencing style (APA, AMA, IEEE etc.) when you:

- Refer to other researcher's work
- Use figures/tables/images that aren't yours

e.g. Previous studies have focused on optimising flow rate
(Kennedy 1999, White, 2020) OR (1, 2, 3) OR ^{1, 2, 3}

Write out the full references in this section in alphabetical or numerical order (according to the referencing style used, i.e. standardised format).

Acknowledgements



- Thank individuals for specific contributions (e.g. X for technical advice, statistical advice, discussion, comments on poster etc.)
- Mention who has provided funding.
- Include any conflicts of interest.

**School + company
logos**




THALES

Where to put the logos?

Put logos at the top of your poster to ruin poster aesthetics, reduce legibility of title, and undermine the ability of your graphs to visually compete for viewers' attention

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Introduction

Your reader was mildly intrigued by the title, but you have exactly two sentences to hook them into reading more. So describe exactly what your interesting question is and why it needs to be addressed. Unintentional background information will cause them to walk away.

Typography research has shown that text is easier to read if you use a serif font such as Times. But use a sans-serif font for titles, headings, etc., to satisfy legibility as a default. Research has also shown that fully justified text (like this paragraph) is harder to read, so don't do this, even if it seems cool and professional looking.

Materials and methods

For people really want to know the granular details of what you've been up to, so be brief. And be visual. Use a photograph, drawing, or flow chart if possible, supplemented with only a brief overview of your procedures. If you can combine sketch an object, an iPad, etc., that can involve viewers in active way, do so. Refer to the computer website (not from right column) for more detail if you are seriously challenged.




Figure 2. Hand-drawn illustrations are preferable to computer-generated ones. Just make it fit with an effort to get them to help you out. A photograph of you actually doing something might be nice.

Literature cited

Breschi, D.L., R.M. Boyce, and R.M. Boyce. 1996. Latent condition influence on the (C)risis of the (C)risis. *American Medical Association* 176:417.

Breschi, L.D. 1996. The evolution of communication rates. Pages 97-108 in *The Evolution of Sex*, edited by R.E. Malsin and R.E. Levin. Boston, Sunderland, MA.

Book, E.C. 2005. *Evolution of Communication in the Introduction*.

Results

The overall layout of this poster should be visually compelling, well-organized, and have a reader should see it through the components. You might want a large map with some graphs. Or have questions on left and answers with supporting graphs on right. Or have separate figures from other figures by general use of white space. When figures are too crowded, viewers get confused about which figures to read first and which legend goes with which figure. Changed content just looks bad, too. The big thing to remember is that a flexible section on a poster does not need to look like a flexible section on a manuscript, so feel free to be creative.

If you can add small drawings or icons to your figures, do so — these visual cues can be helpful aids in answering viewers. And use colored arrows or callouts to focus attention on important parts of graphs. You can even put text annotations next to arrows to tell reader what's going on that's interesting in relation to the hypothesis too. E.g., "This outlier was most likely caused by contamination when I entered into tube." Also, don't be afraid of using colored connector lines to show how one part of a figure relates to another figure.

Figures are prepared that tables are sometimes more readable, but don't. If you must include one, go to great efforts to make it look professional (the table, that is). Look in a respectable journal and emulate the layout, line types, font choices, font alignment, etc., exactly. A table looks best when it is first composed within Microsoft Word, then inserted as an object. Use colored text to convey to draw attention to important parts of the table.

Photograph format is fine, but so is better than of results.

- 9 out of 12 treatments were not survived
- Most common error was low
- Control rate completed rates (data, not average, than rate without factor)

This sample results section is long too easily, in case you were wondering.

Acknowledgments

We thank L. Glor for laboratory assistance. Many thanks for seeds, and Herb for the greenhouse care. Funding for this project was provided by the Department of Biology. If you want to share your poster with someone, please, share them down so that they can do inside that area to share something that is much. Now that people's talks are online — please use TML.

Conclusions

Conclusions should not be mere restatements of your results — this would be boring. You want to guide the reader through what you have concluded from the results, and you need to make the first several sentences understandable on their own and interesting. Because many conclusions statements will start reading this section first. If you don't hook them, they'll walk. These first several sentences should refer back, explicitly, to the findings you presented in the introduction. If you didn't mention a heading back in the introduction, go back and fix that.

A good conclusion will also explain how your conclusions fit into the literature on the topic. E.g., from exactly does your research add to what is already published on the topic? It's important to be honest and generous in this section, so assume that authors of previous literature may be at the conclusion, and further assume they are really and honestly. You can also draw upon any formal types of context such as presentations you have had with expert and important people (and, personal communication).

Finally, you want to tell readers who have found this being what needs to be done next, and who should do it. E.g., are you taking the next logical step, or should another discipline follow up on your amazing result? It's OK to put a lot of personality into this writing because "viewers expect" points to be personal, and if you're not actually standing there to convey your enthusiasm, your poster should be doing that for you.

If you have a graphical way to express the next iteration of your hypothesis, by all means include it. For example, you might make a graph of hypothetical data that shows an expected trend in a future experiment. That's something you wouldn't do in a traditional manuscript, but it's useful for a poster.

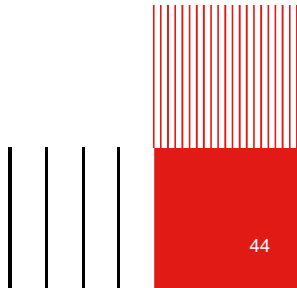
Further information

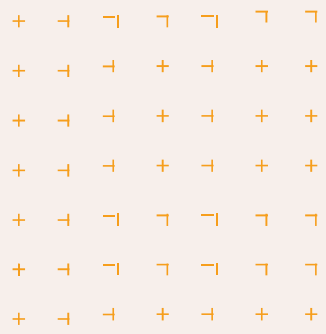
More tips than you'd ever want can be found on "Designing conference posters" at <http://designposters.com/papers/posters/posters.htm>. Please the URL should be included in your poster. Encouraging your poster printing a poster, you can do that by right-clicking, then "insert hyperlink." This file and contents copyright Colin Purrington. Free to people to link to and use, but not for plagiarizing, adapting, or having elsewhere (thanks!).



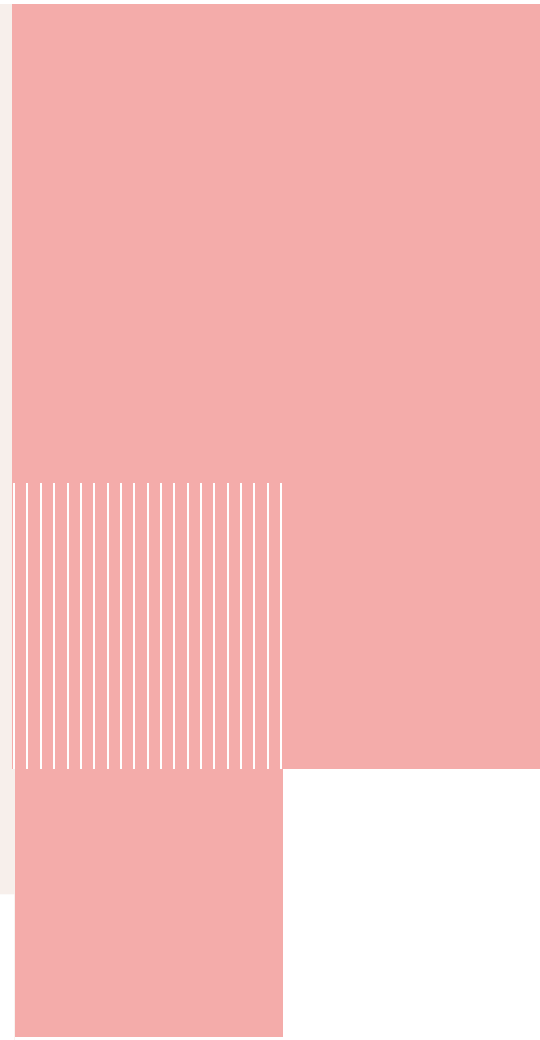
Organise the content in the individual sections

- Each section is like a slide in a presentation, with a title, figures and text.
- Choose appropriate titles – no conventions to follow except if tutors ask for AIMRAD.
- Don't add bullets for section titles – use a bolded, larger font
- Use italics instead of underlining. Underlining draws too much attention to a word.
- Text should be in bullets/short sentences with white space rather than paragraphs.





Colour

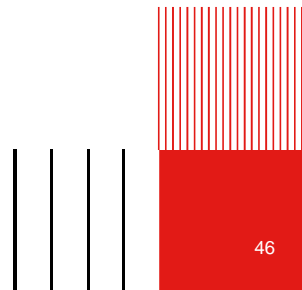


Use colour to define the relationships between the different areas of the poster

Use dark letters on a white / light-coloured background

Avoid overly bright colours: they attract attention, but are tiring!

Don't overuse colour. Stick to a colour theme. 2-3 colours. No more!





References and Bibliography

- (1) <https://www.assertion-evidence.com/templates.html>
- (2) <https://mitcommlab.mit.edu/meche/commkit/technical-presentation/>
- (3) <https://mitcommlab.mit.edu/nse/commkit/figure-design>
- (4) <https://mitcommlab.mit.edu/be/commkit/slideshow/>
- (5) Wallwork, A. 2016. English for Presentations at International Conferences. Basel: Springer
- (6) Designing PowerPoint Slides for a Scientific Presentation, CLIMB program (2020).
<https://www.northwestern.edu/climb/resources/oral-communication-skills/designing-PowerPoint-slides.html>
- (7) Wong, B. 2011. Negative Space. Nature Methods. Vol. 8. No. 10. p783.
- (8) Wong, B. 2011. Negative Space. Nature Methods. Vol. 8. No. 1. p1. <https://www.nature.com/articles/nmeth0111-5.pdf>
- (9) Bang Wong (2011). Layout. Nature Methods 8, 783.
- (10) Colin Purrington (2019) Designing conference posters. <https://colinpurrington.com/tips/poster-design/>

Adapted from:

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University of Guelph, Integrative Biology Department (2011). Creating an effective scientific poster.
<https://www.uoguelph.ca/ib/sites/uoguelph.ca.ib/files/public/Creating%20an%20Effective%20Scientific%20Poster.pdf>

Marilee Ogren (2009). Making a great poster. MIT presentation.

