



ICAR-CIFE
Mumbai-India



Skill Development Programme on
“SciCom for Smart Scholars”

5-18 May : 12-25 May : 19th May - 1st June : 26 May - 8 June



Online Short Course on
“SciCom for Smart Scholars”
5-18 May : 12-25 May : 19th May - 1st June : 26 May - 8 June

Compiled By

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(वि. अ. आ. अधिनियम धारा-3 के अंतर्गत विश्वविद्यालय)
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कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार, Ministry of Agriculture and Farmers Welfare, Govt. of India

डा. गोपाल कृष्णा

निदेशक एवं कुलपति

Dr. Gopal Krishna


Director & Vice Chancellor



Foreword

Research information management is one of the major challenges faced by researchers today. Data visualization and infographics are some of the recent tools that have come handy in organising, exploring and understanding the big and complex data. Scientists, research scholars and students need to equip themselves with these latest tools to effectively and impressively share their results. Even a student turned entrepreneur can use these tools to display the idea or market the product.

The manual on "SciCom for Smart Scholars", brought out as part of the NAHEP-CAAST sponsored skill development program (SDP) specially designed for the scientists, provides resource material on reference and citation management tools, raster vs vector graphics, communicating scientific writing, preparing posters, brochures, popular articles and extension exhibits, info-graphics and data visualization tools like PowerBI and ethics in scientific practice and publications. It will serve as a handy guide that one can refer to whenever needed. The manual provides shortcut keys which will be very useful to researchers and students to communicate science in an effective manner.


(Gopal Krishna) 9/10/2020

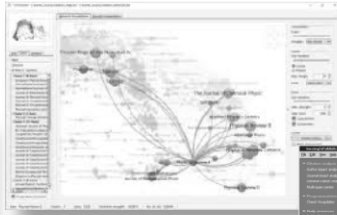
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Healthy Soils for a Healthy Life



Contents



Year	Author	Title	Journal	Volume	Issue	Page
2012
2011
2010

Google AdWords Search
Search criteria and filters.

The quick brown fox jumps over a lazy dog.
The quick brown fox jumps over a lazy dog.



Author	Title	Published	Abstract
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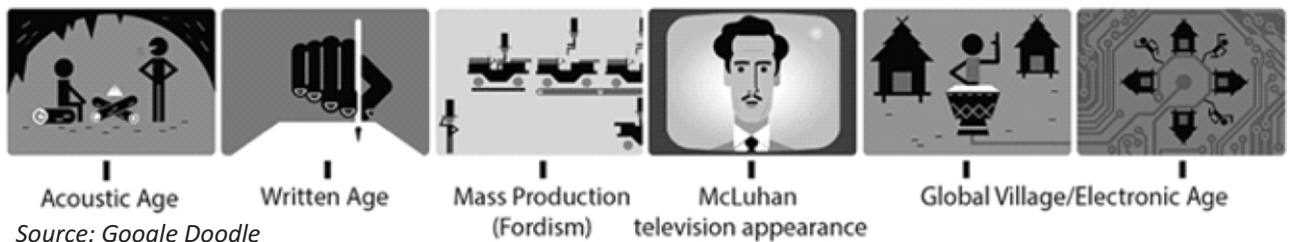
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Create Beautiful Infographics
A better way to tell your story.



The Changing Landscape of Science & Scientific Practice: Science Communication in the Digital Era

There is a paradigm change in the way science is conceived, practiced, published and communicated. In the globalised era, the omnipresent internet is impacting the landscape of science in ways that were unimaginable in the past. For once, the practice of science has become simple as well as complex at the same time. Vast trove of scientific literature, ever expanding database, fast flow of information, networking and collaborative workspaces,



Source: Google Doodle

and innovative ways of organising, visualising and communicating knowledge are the hallmarks of present day scientific practice.

Scientists and research scholars have no option but to become aware of and familiar with the changing landscape of science in order to artfully navigate through it and take advantage of emerging trends and tools.

SciCom for Smart Scientists is a tailor-made short course designed primarily for practicing scientists/faculty and research scholars to enable them become smart practitioners and communicators of science.

Course Objectives

- To familiarise the scholars to state of art online & offline tools that makes them smart scientists
- To enable the scholars with new age skills to practice, collaborate, visualise and communicate science better and smarter

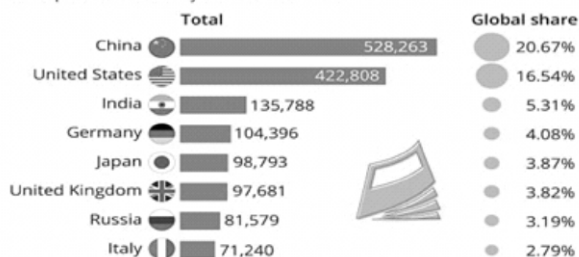
Course Content

- Changing landscape of science and scientific practice
- Reference/citation management tools: *Zotero* and *Mendeley/EndNote*
- Online academic networks: *ResearchGate*, *Academia*, *Google scholar*
- Scientometrics: *Web of Science* and *Publish or Perish*
- Myth & reality about citation / impact of scientific publications
- Data visualization, Infographics and Dashboards: *PowerBI* & more

- Collaborative workspace: *Google Suite - Drive, Office & Classroom*
- Raster vs Vector graphics: *Photoshop* and *Coreldraw*
- Communicating science effectively: *oral and visual* presentation skills
- Writing science: *research paper, popular article, poster & extension material*
- Ethics and plagiarism in scientific practice

The Countries Leading The World In Scientific Publications

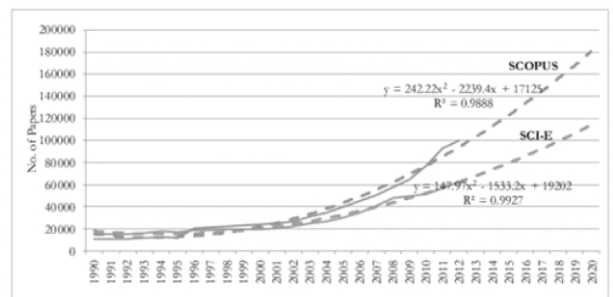
Number of science & engineering articles published in peer-reviewed journals in 2018



Source: National Science Foundation



statista



ACADEMIC SOCIAL NETWORKING SITES

Harnessing ACADEMIC SOCIAL NETWORKING SITES (ASNS) for Research Productivity

Similar to the personal Social Networking sites such as Facebook, Twitter, WhatsApp, etc. the online academic ASNs are designed to cater to the needs of the academic community. ASNS offer research scholars and scientists to connect to other research scholars and scientists across the world, join discussion forums, read practical case studies, update about research methodologies adopted by various researchers, contact with supervisor and peers, as publishing platform, comments to improve and bibliographical control.

ASNS offer opportunities to connect, communicate and collaborate with peers and colleagues, scientists and researchers seek out new information and disseminate new ideas to the broader public. They provide a low-cost way to create a personal brand or identity (Dutta, 2010) and develop a professional online presence (Donelan, 2015). ASNS are economical due to their anytime approach, boundless space and help in research and learning, finding popular topic, collation of resources, collaborative and peer-to-peer learning, etc. They also provide an online repository to which users can upload and share research papers.

Five main features of ASNS

- Management of an online persona - professional experience, ideas, and capabilities, number of citations and downloads of his or her articles, thereby cultivating an online identity and promoting his or her professional reputation (Barbour & Marshall, 2012).
- Diffusion of studies - account holders can upload articles to the cybersphere.

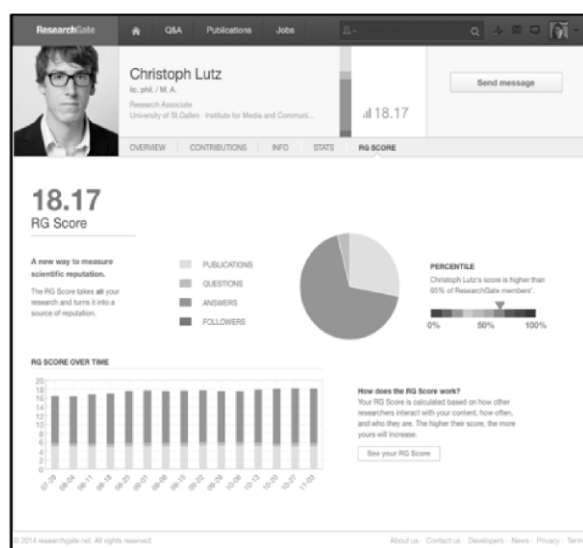
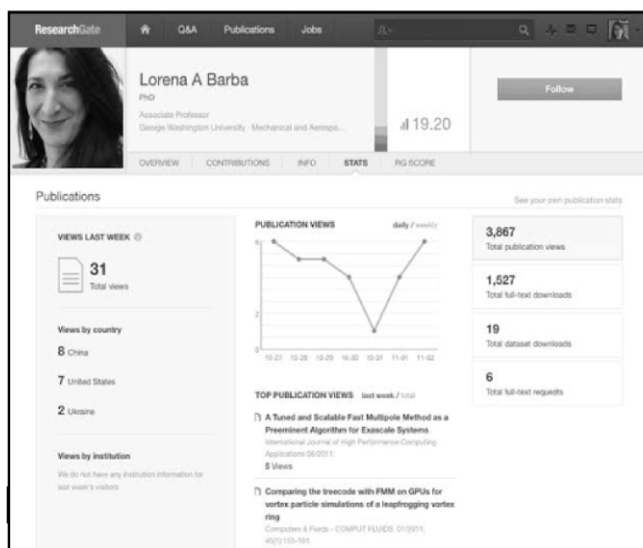
- Collaboration - bridges distances, encourages cross-disciplinary and cross-border collaborations
- Information management- serve as a source for the collection and organization of personal academic information including ideas, drafts, and anything else that a researcher on the network gleans from articles, references, and citations
- Measurement of impact - in terms of the number of citations of an article and the quality of the journals in which the article appears

Popular ASNS

There are several online ASNS but the ResearchGate, Google scholar and Academia.edu are among the most widely used SNS by researchers.

ResearchGate (RG)

It was started by Ijad Madisch, a Harvard educated Berlin virologist in 2008. RG Offers same services as that of other social networking sites like Facebook, Twitter and so on like upload journal articles, conference papers, posters, data and code to an online repository. It is useful for locating conference materials such as posters and slide decks that are not archived in other online databases. Users also receive analytics on their publications including the number of times their papers have been read and cited by other users. It offers a convenient interface with other diffused social networks



such as Facebook, Twitter and FriendFeed of LinkedIn, to connect through yet existing profiles (ResearchGate, 2020).

RG has several interesting features. One can ask questions within the academic community regarding measures, constructs or topics and respond to questions posed by other users; opt to follow other researchers and receive notifications when they upload new work; contact other users through the Research Gate direct

messaging system; request authors upload full versions of their papers using the “request full text button”; directly contact readers of their publications to request feedback; allows researchers to create project logs that can be used to update peers on current projects, attract potential co-authors or request submissions for journal special issues; RG lists articles in almost all the domains such as Social sciences, Sciences, Engineering, Medicine, Management, Life sciences though it has relatively less focus on arts and humanities domain.

Use Capabilities	Strengths	Limitations
<ul style="list-style-type: none"> ▪ Share your publications, access millions more and publish your data. ▪ Get stats about views, downloads & citations of your research ▪ Find the right job using our research-focused job board ▪ Connect & collaborate with colleagues, peers, co-authors & specialists in your field ▪ Ask questions, get answers & find solutions to research problems. 	<ul style="list-style-type: none"> ▪ More than 6 million members ▪ Conveniently organized – see description of live feed & home page. ▪ <i>Live Feed</i> allows you to upload and access articles/publications; to access, request, and bookmark others’ work; and to ask / answer a question in a particular discipline, research area, or theory. ▪ The <i>home page</i> will also show your network activity (who is connecting with whom) & jobs you may be interested in 	<ul style="list-style-type: none"> ▪ Science heavy/Not prominent is the humanities and arts; Adoption in the social sciences is mixed and moderate ▪ Efforts not recognized for Tenure & Promotion, though accessing citations, etc. is easier than Academia.edu ▪ Many researchers & students are currently not using it as a search tool ▪ Confusion over copyright laws, especially after the Elsevier takedown. ▪ Big push-back from major publishing companies – may throw their weight around in the future


Google Scholar (GS)

First launched in 2004, Google Scholar was created by former University of California, Santa Barbara Professor Anurag Acharya and engineer Alex Verstak. It provides a simple way to broadly search for scholarly literature; provides a search engine that can be used to identify hyperlinks to articles that are publically available or may be obtained through institutional libraries; Users who choose to create a personal Google Scholar profile can access their citations per year metrics; Articles uploaded on ResearchGate, Academia.edu or other databases can also be linked to your Google Scholar profile so that

readers can find hyperlinks to all of your work; Google Scholar also has a “Scholar Button” that users can install on Chrome, Firefox or Safari web browsers to quickly search for articles without typing in a web address.

Google Scholar also compiles a list of top publications in each discipline based on journal impact (users can access data by clicking the "Metrics" button on their Google Scholar homepage). Google Scholar has become an important tool for finding and keeping up with the latest research, promoting one's own work, and tracking scholarly impact. It helps to find relevant work across the world of scholarly research.

Use Capabilities	Strengths	Limitations
<ul style="list-style-type: none"> ▪ Search all scholarly literature from one convenient place ▪ Explore related works, citations, authors, and publications ▪ Locate the complete document through your library or on the web ▪ Keep up with recent developments in any area of research ▪ Check who's citing your publications, create a public author profile ▪ Can create a profile ▪ Able to keep track of citations to your articles & see who is publishing your work. ▪ Also able to graph citations over time & compute citation metrics. 	<ul style="list-style-type: none"> ▪ Ranks the documents by "weighing" the full text, where it was originally published, who it was written by & how often & recently it's been cited. ▪ Decent search tool ▪ Citation tracking & Metric calculator is valuable for tenure & promotion 	<ul style="list-style-type: none"> ▪ Ability to keep track of citations to your articles & to see who is publishing your work. ▪ Also able to graph citations over time & compute citation metrics. ▪ Profiles are minimal, with name and Institutional affiliation – does not allow for presentation of extensive bios ▪ Results for google scholar searches are not always relevant ▪ The frequency of site updating is unclear – i.e. the most recent publications are not always available ▪ The counts of citations are not always accurate



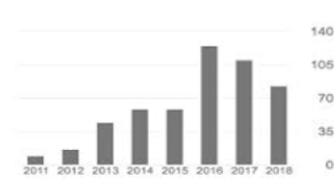
Kyle Harper
University of Oklahoma
Verified email at ou.edu - Homepage
Roman history economic history social history demography epidemiology

FOLLOW

TITLE	CITED BY	YEAR
Slavery in the late Roman world, AD 275–425 K Harper Cambridge University Press	152	2011
Climate change during and after the Roman Empire: reconstructing the past from scientific and historical evidence M McCormick, U Büntgen, MA Cane, ER Cook, K Harper, P Huybers, T Litt, ... Journal of Interdisciplinary History 43 (2), 169-220	151	2012
From shame to sin K Harper Harvard University Press	76	2013
From Shame to Sin: The Christian Transformation of Sexual Morality in Late Antiquity K Harper Harvard University Press	76	2013
From Shame to Sin: The Christian Transformation of Sexual Morality in Late Antiquity	76 *	

Cited by

	All	Since 2013
Citations	524	481
h-index	9	9
i10-index	9	8



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Google Classroom

Google Classroom is a free web service, developed by Google for schools, that aims to simplify creating, distributing, and grading assignments in a paperless way. The primary purpose of Google Classroom is to streamline the process of sharing files between teachers and students.

Google Classroom **combines Google Drive** for assignment creation and distribution, **Google Docs, Sheets and Slides** for writing, **Gmail** for communication, and **Google Calendar** for scheduling. Students can be invited to join a class through a private code, or automatically imported from a school domain. Each class creates a separate folder in the respective user's Drive, where the student can submit work to be graded by a teacher. Mobile apps, available for iOS and Android devices, let users **take photos and attach to assignments, share files from other apps, and access information offline**. Teachers can **monitor the progress** for each student, and after being graded, teachers can return work along with comments.

Features

Google Classroom **ties Google Drive, Google Docs, Sheets and Slides, and Gmail together to help educational institutions go to a paperless system. Google Calendar was later integrated** to help with assignment due dates, field trips, and class speakers. Students can be invited to classrooms through the institution's database, through a private code that can then be added in the student's user interface or automatically imported from a school domain. Each class created with Google Classroom creates a separate folder in the respective user's Google Drive, where the student can submit work to be graded by a teacher.

Assignments

Assignments are stored and graded on Google's suite of productivity applications that allow collaboration between the teacher and the student or student to student. Instead of sharing documents that reside on the student's Google Drive with the teacher, files are hosted on the student's Drive and then submitted for grading. Teachers may choose a file that can then be treated as a template so that every student can edit their own copy and then turn back in for a grade instead of allowing all students to view, copy, or edit the same document. Students can also choose to attach additional documents from their Drive to the assignment.

Grading

Google Classroom supports many different grading schemes. Teachers have the option to attach files to the assignment which students can view, edit, or get an individual copy. Students can create files and then attach them to the assignment if a copy of a file wasn't created by the teacher. Teachers have the option to monitor the progress of each student on the assignment where they can make comments and edit. Turned in assignments can be graded by the teacher and returned with comments to allow the student to revise the assignment and turn back in. Once graded, assignments can only be edited by the teacher unless the teacher turns the assignment back in.

Communication

Announcements can be posted by teachers to the class stream which can be commented on by students allowing for two-way communication between the teacher and students. Students can also post to the class stream but won't be as high of a priority as an announcement by a teacher and can be moderated. Multiple types of media from Google products such as YouTube videos and Google Drive files can be attached to announcements and posts to share content. Gmail also provides email options for teachers to send emails to one or more students in the Google Classroom interface. Classroom can be accessed on the web or via the Android and iOS Classroom mobile apps.

Archive course

Classroom allows instructors to archive courses at the end of a term or year. When a course is archived, it is removed from the homepage and placed in the Archived Classes area to help teachers keep their current classes organized. When a course is archived, teachers and students can view it, but won't be able to make any changes to it until it is restored.

Mobile applications

Google Classroom mobile apps, introduced in January 2015, are available for iOS and Android devices. The apps let users take photos and attach them to their assignments, share files from other apps, and support offline access.

Privacy

In contrast to Google's consumer services, Google Classroom, as part of G Suite for Education, does not show any advertisements in its interface for students, faculty, and teachers, and user data is not scanned or used for advertising purposes.

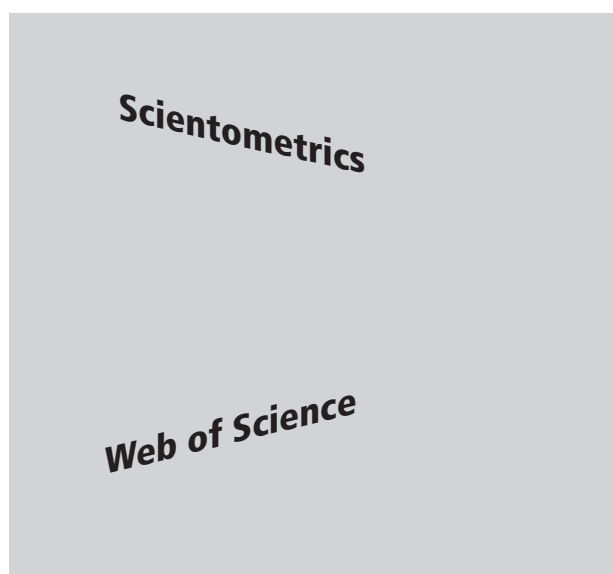
Reception

eLearning Industry tested and made a review of Google Classroom, in which they highlighted many positive and negative aspects. Among Classroom's strengths, the review highlighted ease of use, universal device accessibility, use of Google Drive as an effective way for

teachers to quickly share assignments with students, the paperless process meaning the end of printing, handing out, and potentially losing work, and the fast feedback system between students and teachers. Among Classroom's disadvantages, the review highlighted the service's heavy integration of Google apps and services with limited or no support for external files or services, lack of automated quizzes and tests, and a lack of live chats that can aid in feedback efforts.

https://en.wikipedia.org/wiki/Google_Classroom

<https://www.youtube.com/watch?v=M6L-nZGIUTE>



Scientometrics

While the term scientography has not been widely adopted, it is a very apt label for the mapping of science. Science maps serve as tools for navigating the research literature by depicting the spatial relations between research fronts, which are areas of significant activity. Such maps can also simply be used as a convenient means of depicting the way research areas are distributed and conveying added meaning to their relationships.

Web of Science

By meticulously indexing the most important literature in the world, Web of Science has become the gold standard for research discovery and analytics.

Web of Science is the world's most trusted publisher-independent global citation database. Guided by the legacy of Dr Eugene Garfield, inventor of the world's first citation index, Web of Science is the most powerful research engine, delivering your library with best-in-class publication and citation data for confident discovery, access and assessment

Web of Science Core Collection content is uniquely selective and our indexing is uniquely consistent. Our independent and thorough editorial process ensures journal quality, while more than 50 years of consistent, accurate and complete indexing has created an unparalleled data structure.

Every article and all cited references from every journal have been indexed, creating the most comprehensive and complete citation network to power both confident discovery and trusted assessment. Only the Web of Science Core Collection indexes every piece of content cover-to-cover, creating a complete and certain view of over 115 years of the highest-quality research.

The Web of Science Core Collection consists of six online databases:

- Science Citation Index Expanded covers more than 8,500 notable journals encompassing 150 disciplines. Coverage is from the year 1900 to the present day.
- Social Sciences Citation Index covers more than 3,000 journals in social science disciplines. Range of coverage is from the year 1900 to the present day.
- Arts & Humanities Citation Index covers more than 1,700 arts and humanities journals starting from 1975. In addition, 250 major scientific and social sciences journals are also covered.
- Emerging Sources Citation Index covers over 5,000 journals in the sciences, social science, and humanities.
- Book Citation Index covers more than 60,000 editorially selected books starting from 2005.
- Conference Proceedings Citation Index covers more than 160,000 conference titles in the Sciences starting from 1990 to the present day

Web of Science Journal Evaluation Process and Selection Criteria

- The curation process for Web of Science Core Collection is unique: our editorial decisions are conducted by our expert in-house editors who have no affiliations to publishing houses or research institutes thus removing any potential bias or conflict of interest.
- Each editor is focused on specific subject categories enabling them to gain a deep, nuanced knowledge of the journals in that field. This level of in-house editorial curation contrasts sharply with methods used to create other databases that rely on predominantly algorithmic approaches and/or delegate aspects of editorial decision making to the research community.
- The basic principles of our selection process remain the same: objectivity, selectivity and collection dynamics. We use a single set of 28 criteria to evaluate journals; these are divided into 24 quality

criteria designed to select for editorial rigour and best practice at the journal level, and four impact criteria designed to select the most influential journals in their respective fields using citation activity as the primary indicator of impact.

- Journals that meet the quality criteria enter Emerging Sources Citation Index (ESCI). Journals that meet the additional impact criteria enter Science Citation Index Expanded (SCIE), Social Sciences Citation Index (SSCI) or Arts & Humanities Citation Index (AHCI) depending on their subject area.
- These are dynamic collections subject to continuous curation to ensure journals are in the appropriate collection. ESCI journals that gain impact move to SCIE, SSCI or AHCI. SCIE, SSCI and AHCI journals that decrease in impact move to ESCI. Any journal that decreases in quality will be removed from the Web of Science Core Collection.
- With the creation of the Book Citation Index, Web of Science expanded the scope of its citation coverage to include this essential scholarly format.
- As with the journal and proceedings literature, books are selected according to a well-defined set of criteria. By careful evaluation of the content and format of each publication, Clarivate Analytics assures not only that all citation indexes in Web of Science contain the most relevant and timely research, but also that rigorous bibliographic control will ensure that this research is discoverable.
- But comprehensive does not necessarily mean all-inclusive. With books, as with journals and conference proceedings, there is a need to select those publications that will most likely contain significant scholarship. Web of Science has demonstrated that, by applying rigorous selection criteria to the literature it covers, researchers are able to discover the scholarly content that best serves their needs quickly and efficiently. The aggregation of important book content in the Book Citation Index enables researchers publishing in books to reach a far wider audience and to measure citation impact across various publishing formats.

VOSviewer

VOSviewer is a software tool for constructing and visualizing bibliometric networks. These networks may for instance include journals, researchers, or individual publications, and they can be constructed based on citation, bibliographic coupling, co-citation, or co-authorship relations. VOSviewer also offers text mining functionality that can be used to construct and visualize co-occurrence networks of important terms extracted from a body of scientific literature.

Highlights

Some highlights of VOSviewer are summarized below.

Data

- Web of Science, Scopus, Dimensions, and PubMed. Co-authorship networks, citation-based networks, and co-occurrence networks can be created based on data downloaded from Web of Science, Scopus, and Dimensions. Co-authorship networks and co-occurrence networks can also be created based on PubMed data.
- Crossref, Europe PMC, and Microsoft Academic. Networks can also be created based on data retrieved through the APIs of Crossref, Europe PMC, and Microsoft Academic. These APIs can be queried interactively in VOSviewer.
- Semantic Scholar, OpenCitations, and WikiData. For a given set of DOIs, networks can also be created based on data retrieved through the APIs of Semantic Scholar, OpenCitations, and WikiData.

Visualization

- Zooming and scrolling. Visualizations of bibliometric networks can be explored in full detail using zoom and scroll functionality similar to for instance Google Maps. A smart labeling algorithm prevents labels from overlapping each other.
- Density and overlay visualizations. Density visualizations provide a quick overview of the main areas in a bibliometric network. Overlay visualizations can for instance be used to show developments over time.
- Screenshots. Screenshots of bibliometric network visualizations can be created at a high resolution and can be saved in many popular graphical file formats, both bitmap and vector formats.

Techniques

- Advanced layout and clustering techniques. State-of-the-art techniques for network layout and network clustering are provided. Layout and clustering results can be fine-tuned using various parameters.
- Natural language processing techniques. Natural language processing techniques are available for creating term co-occurrence networks based on English-language textual data. Relevant and non-relevant terms can be distinguished algorithmically.
- Creating bibliometric networks. A number of advanced features are available for creating bibliometric networks (e.g., co-authorship, bibliographic coupling, and co-citation networks). For instance, the influence of publications with many authors, many citations, or many references can be reduced using a fractional counting approach. Data cleaning can be performed using thesaurus files.

Publish or Perish

"Publish or perish" is an aphorism describing the pressure to publish academic work in order to succeed in an academic career.

Successful publications bring attention to scholars and their sponsoring institutions, which can help continued funding and their careers. In popular academic perception, scholars who publish infrequently, or who focus on activities that do not result in publications, such as instructing undergraduates, may lose ground in competition for available tenure-track positions. The pressure to publish has been cited as a cause of poor work being submitted to academic journals. The value of published work is often determined by the prestige of the academic journal it is published in. Journals can be measured by their impact factor (IF), which is the average number of citations to articles published in a particular journal.

Publish or Perish is a software program that retrieves and analyzes academic citations. It uses Google Scholar and (since release 4.1) Microsoft Academic Search to obtain the raw citations, then analyzes these and presents the statistic and scholarly metrics including the H Index and others.

The development of the Publish or Perish software is a volunteering effort that has been ongoing since 2006.



Publish or Perish is provided courtesy of Harzing.com. It is free for personal non-profit use

In addition to an author search, Publish or Perish also provides the option to do a journal search. For more demanding users, the general search function opens up a host of additional search options. The multi-query center stores all of your queries and allows for sophisticated query management.

Amongst many other things, you will learn about a multitude of metrics, how to manage, import and export your queries, how to use PoP to make your case for tenure or promotion, how to decide which journals to submit to, how to prepare for a job interview, how to do a literature review, and even how to do bibliometric research.

Although Google Scholar typically provides better coverage than Scopus or the Web of Science, it is not a bibliometric database. Instead it relies on parsing scholarly literature on the Web. Therefore, this tutorial also covers the main limitations of Google Scholar, including lack of discipline filtering, truncation of author and journal names, and the occasional wrong parsing of years, master records, author names.

Infographics -Piktochart

According to the Oxford English Dictionary, an infographic (or information graphic) is “a visual representation of information or data”. But the meaning of an infographic is something much more specific

An infographic is a collection of imagery, charts, and minimal text that gives an easy-to-understand overview of a topic.

Infographics use striking, engaging visuals to communicate information quickly and clearly.

The most visually unique, creative infographics are often the most effective, because they grab our attention and don't let go.

But it's crucial to remember that the visuals in an infographic must do more than excite and engage. They must help us understand and remember the content of the infographic, as seen in this infographic about palm reading from Jing Zhang:

Infographics are great for making complex information easy to digest. They can be helpful anytime you want to:

- Provide a quick overview of a topic

- Explain a complex process
- Display research findings or survey data
- Summarize a long blog post or report
- Compare and contrast multiple options
- Raise awareness about an issue or cause

When you need to give someone a really quick rundown on something that can be hard to explain in words alone, an infographic is a good way to go.

This means that infographics can be useful in pretty much any industry.

Marketers use infographics to build brand awareness and boost engagement:

Piktochart

Piktochart is a web-based infographic application which allows users without intensive experience as graphic designers to easily create infographics and visuals using themed templates.

First, begin by logging in to create.piktochart.com. You will first see the Piktochart dashboard. This is where you can choose from three different visual formats – infographics, presentations and printables.

Browse for an infographic template layout that stands out to you. You can narrow down the categories by using the search tool.

You can add shapes, lines, icons or photos to your content.

Once you find an icon, drag and drop it onto the chosen canvas block. Use the tools on the toolbar to configure your icon size and color. you can insert data visualization tools.

To add data, you can: manually input data on the spreadsheet, import data from a locally saved spreadsheet, or insert complex data via a Google Spreadsheet link. You can insert videos too. Once you have published your infographic, you can set it to public, password-protected, or private. To directly share your infographic with friends or on social circles, either copy the listed URL or click on the social media share icons. You can also share via direct email, an export to other apps, or embed via HTML. You can even present your infographic as slides via Presentation Mode

Effective writing

'It should be remembered that good writers not born, but are self-made through continuous practice'

Effective writing is writing that delivers.

- Purpose: Inform? Explain? Persuade?
- Outcome: What would you like the reader to do on reading the document?
- Useful: relevant and pitched at right level
- Clear: who does what to whom
- Vivid: paints pictures in the mind's eye
- Specific: free of vague generalities
- Confident: free of hedging and ifs and buts
- Organized: follows a clear sequence
- Friendly: uses personal pronouns

Here are a few tips

- Stop waiting for "inspiration."
- Revise. Nobody gets it perfect on the first try.
- Complex ideas don't require complex language.
- Scientific writing should be easy and even enjoyable to read
- Cut unnecessary words and phrases; learn to part with your words!
- Use the active voice (subject + verb + object)
- Write with verbs: use strong verbs, avoid turning verbs into nouns, and don't bury the main verb!
- Cut the clutter
- The secret of good writing is to strip every sentence to its cleanest components. Every word that serves no function, every long word that could be a short word, every adverb that carries the same meaning that's already in the verb, every passive construction that leaves the reader unsure of who is doing what—these are the thousand and one adulterants that weaken the strength of a sentence. *William Zinsser in On Writing Well, 1976*
- Cut unnecessary words

Avoid Common clutter

Dead weight words and phrases

- As it is well known
- As it has been shown
- It can be regarded that
- It should be emphasized that
- As a matter of fact (instead of in fact), utmost importance (instead of importance), etc.
- Failure to restrict use of modifiers- *very* significant, *really* useful, *definitely* possible, and so on.

"Some words and phrases are blobs."

-William Zinsser in *On Writing Well*, 1976

Long words and phrases that could be short...

Wordy version

A majority of
A number of
Are of the same opinion
Less frequently occurring
All three of the
Give rise to
Due to the fact that
Have an effect on

Crisp version

Most
Many
Agree
rare
The three
Cause
Because
Affect

Eliminate

- Eliminate negatives
- Eliminate superfluous uses of "there are/there is"
- Omit needless prepositions

She was not often right. She was usually wrong.

She did not want to perform the experiment incorrectly. She wanted to perform the experiment correctly.

They did not believe the drug was harmful. They believed the drug was safe.

- | | |
|----------------------------|-------------|
| • Not honest | dishonest |
| • Not harmful | safe |
| • Not important | unimportant |
| • Does not have | lacks |
| • Did not remember | forgot |
| • Did not pay attention to | ignored |
| • Did not succeed | failed |

Editors, reviewers, and readers may look first (and maybe only) at titles, abstracts, and tables and figures!

- Do the numbers in your abstract match the numbers in your tables/figures/text?
- Do the numbers in the text match those in the tables/figures?
- Do the numbers in each table/figure match those in other tables/figures?

- Tables and Figures are the foundation of your story!
- Figures and tables should stand alone and tell a complete story. The reader should not need to refer back to the main text
- Use the fewest figures and tables needed to tell the story.
- Do not present the same data in both a figure and a table

Get outside feedback. Ask someone outside your department to read your manuscript. Without any technical background, they should easily grasp: -the main findings

- take-home messages
- significance of your work

Ask them to point out particularly hard-to-read sentences and paragraphs!

A few style tips

Academic degrees

Lowercase both the degree and the subject of the degree. *She earned a bachelor's degree in pharmacy.* However, when the subject of the degree is a proper noun, it should be uppercase: *He earned a bachelor's degree in English.*

When abbreviating degrees, do not use punctuation: BS, EdM, MBA, PhD.

Capitalization

Avoid unnecessary capitalization. Common nouns such as university and president should be capitalized only when used as part of a full name for a person, place or thing: *The University at Buffalo is a research institution. The university is among the nation's top research institutions.*

Cellphone

Not cell phone. Similarly, smartphone.

Composition and publication titles

Use roman type and double quotation marks for the titles of books, films, musical compositions, paintings, dissertations, video games, etc. See AP Stylebook for exceptions. Render titles as they appear in the original composition, even if they deviate from your headline style.

The names of newspapers, magazines and periodicals should be cited in copy as they appear on their own banners. *The article appeared in The New York Times.* But: *The article appeared in the Los Angeles Times.*

Courtesy titles

In general, do not use courtesy titles (e.g., Dr.) except in direct quotes.

Days, weeks, months

Always use Arabic figures, without st, nd, rd or th. For example: June 1, not June 1st.

Do not abbreviate days of the week, except when needed in a tabular format.

When a month is included as part of a specific date, use Jan., Feb., March, April, May, June, July, Aug., Sept., Oct., Nov., Dec. *María Garcia's birthday is Sept. 12, 1985.* Do not abbreviate the names of any months when only a month and year are given: *The research project began in January 2000 and ended in November 2003.*

Email

Do not hyphenate. However, a hyphen should be used with e-book, e-business and e-commerce.

Em dashes

No spaces around em dashes in body copy.

Internet

Lowercase. *He surfed the internet.*

Names

Use first and last name on first reference and last name only on second reference.

Numbers

When referring to common objects, spell out one through nine and use figures for 10 and above: *James Nowak has two computers, 10 notebooks and 11 pens on his desk.* However, use figures when referring to percentages, dimensions and children's ages. (See AP Stylebook for additional exceptions.)

Numbers at the start of a sentence should always be spelled out: *Sixty-four students signed up for the class.*

Units are symbols, not abbreviations.

No plural form: 1 kg, 2 kg (not 2 kgs)

Not followed by a full stop (1 km, not 1 km.).

Symbols named after people take uppercase: 2 kPa, 230

Use the symbols only with numbers; if not, use unit names

(the weight was measured in kilograms; the concentration was expressed in grams per litre)

About versus Approximately

Use *about* with multiples of 5 or 10 to indicate that values have been rounded off.

Use *approximately* to indicate more precise measurements.

You will require about 160 kg of sand.

You will need approximately 157 kg of sand.

Make 3-digit groups separated with space

12 345

123 456 not 1,23,456

1 234 567 not 12,34,567

Two common errors in titles and row/column heads

- Breakdown, not break-up
Breakdown of costs: travel, accommodation, food, honorarium, etc.
- By', not 'Wise'
Power generation, by source: coal, nuclear, natural gas, hydroelectric, etc.

Align columns logically

- Whole numbers only; all the rows share a common unit:
right alignment
- Decimal numbers; all the rows share a common unit:
decimal alignment
- Whole numbers or decimals; rows do not share a common unit: left alignment
- Individual cells without data: centre only those cells.

School and department titles

Uppercase the formal name of UB's schools, colleges and departments: *She attends the School of Engineering and Applied Sciences*. Lowercase when used informally: *She attends the engineering school*. However, when a proper noun is used, it should be capitalized in all uses: *The English department has productive scholars*.

Serial commas

Do not put a comma before the conjunction in a simple series: *UB's researchers are hardworking, innovative and creative*. Use a comma before the conjunction in a complex series: *In considering Aisha Kumar for the job of research assistant, they wondered if Kumar had enough research experience to complete required duties, if she was able to work for more than one semester, and if she was enthusiastic about the project itself*.

Telephone numbers

Use figures with hyphens, without parentheses: 716-555-2000.

Times

With the exception of noon and midnight, use figures and lowercase a.m. and p.m. *The class began at noon and ended at 1 p.m. Haruto Sato skipped the class because he worked from 11 a.m. to 5:30 p.m.*

Titles

Only formal titles that precede a name are capitalized, and prepositions should be lowercase in all instances: *Vice President of Student Affairs Jane Olatunji wears glasses*. But: *Jane Olatunji, vice president of student affairs, wears glasses*.

URLs

Don't include <https://www> unless it is essential for calling up the website. Usually the simple web address will suffice, for example, buffalo.edu.

website

One word, not capitalized. Also webcam, webcast, webmaster, webpage, webfeed, the web.

Source: apstylebook.com/buffalo



PowerPoint Tips, Tricks, and Hacks from 20 Experts

PowerPoint Presentation Approach Tips

1. Use the Tell 'n Show method: a headline with a single point and media to support it

To get your audience to understand and remember what you say, use the Tell 'n Show(SM) method.

Use the slide title to tell your point—what you want them to remember. For example, write “3rd quarter sales rose 5% over last year” instead of just “3rd quarter sales.”

Then use the rest of the slide to show your point with an image, animation, graph, or diagram.

Research has shown the students who see slides done like this do better on tests and similarly, your audience will “get” your point more quickly and easily. They'll be more engaged, too.

2. Don't open PPT until you have a clear message

Don't launch PowerPoint until you have a clear message. Many people launch PowerPoint, think what they want to present, add slides, then think again, and add slides again.

3. Start with the end-scenario in mind

As a designer, I recommend you think more about the end scenario than the beginning.

Practical considerations – is this a printout, email attachment, onscreen presentation, interactive discussion tool or combination of those? Where will it be seen – in a stadium, boardroom, café, at their desk?

Then consider the conceptual considerations – who is your audience and what do they currently think about your topic? What would you like to change in that thinking? Based on what you know about them, how can you change that thinking?

Write those things down, then build your presentation with that at the forefront.

4. Tease the audience by revealing info in parts

Do you struggle to hold your participant's attention

– especially when your training topic is dull and boring?

There's a secret technique I use that works like a charm every time. It is...

“Tease your audience by revealing your information in parts”

Let me give you an example...

Want to present a Framework?

Present just the skeletal structure first. Explain the context. Then reveal the first step. Explain.

Then reveal the next step and so on.

Your audience can't take their eyes off, till you finish your explanation.

Why does this work so well?

Studies have shown that as humans – we experience 'tension' when we leave things incomplete.

We feel subconsciously compelled to pay attention to the task till we see it finished. It's called the 'Zeigarnik effect'.

Try it in your next presentation. All you need is to apply a simple custom animation to your visuals – to reveal information in stages.

5. Don't open PowerPoint first. Instead, sketch on a notepad

The first step on PowerPoint is...don't open PowerPoint.

Sketch out your presentation on a notepad (regular or digital) and plan out the whole thing.

Then rewrite, numbering and ordering your thoughts. That's your slide order.

PowerPoint Design Tips

6. Use transparent overlays on images for text contrast

The best trick to do in PowerPoint is to create transparent overlays over slides, videos, photographs in PowerPoint!

First, you create a rectangle to cover up the slide > Then you set it to a solid color or a gradient > You right click, set the transparency of each color to around 20% or any value you like depending on the project > and there you have it!

You can dim photos, create duo-tone overlays, darken, brighten, add exposure, add a vignette or do pretty much anything regarding colors with this type of object!

Best part is – you can freely copy it between slides or even separate PowerPoints!

7. Go big with visuals. Bleed photos and videos to the edge

Go big with your visuals.

My top tip to presentation designers of all levels is a simple, elegant, and often overlooked technique: bleed your inserted photographs and videos all the way to the edges.

Insert your image. Scale (don't stretch!) and crop appropriately. If next is necessary, set it in a semi-transparent shape with sufficient contrast against the text color.

8. Create quick native PPT icons using your subtract and combine tools

Create quick native PPT icons using your subtract and combine tools.

9. Structure clean layouts by using a grid system on slide masters

Keep your layouts clean and well-structured by implementing a grid system with guides on the pasteboard of your master slide.

10. Find a beautiful, fresh font pair. One for headers and one for body

Think about techniques that would be really simple to implement and yet would have the biggest positive impact. So if you have 2 minutes to transform your presentation from good to awesome, I would suggest looking at your fonts.

Find a beautiful, fresh looking font pair (one font for the headers and one for the body) and you can instantly change how your presentation feels and looks like.

11. Create an arrow with broken SmartArt

You know the arrow type that looks like a Nike Swoosh logo? The ones that start at a point then become thicker as they softly curve up or down?

Do this instead: 1) Insert > SmartArt > Process > Upward Arrow (or Descending Process) | 2) Ungroup | 3) Ungroup again | 4) Delete all extra shapes and text boxes, leaving only the arrow.

You're left with an adjustable arrow that allows you to use the yellow handles to change the swoosh width and arrow head size. Rotate, Flip Vertical, Flip Horizontal, or resize to further customize.

PowerPoint Shortcuts, Tricks, and Hacks

12. Power-crop photos with SmartArt

The favorite hack is Power Cropping a bunch of photos in seconds.

(1) In PowerPoint select a bunch of odd sized (or shaped) photos

(2) Navigate to the Picture Tools Format Tab

(3) Open up the Picture Layout drop down

(4) Select a SmartArt layout (Bending Picture Semi-Transparent Text is my favorite)

(5) CTRL+SHIFT+G to ungroup the graphic twice.

It's a great little PowerPoint hack that not a lot of people know about.

13. Use Ctrl + arrow keys to nudge objects on the screen

Want to move something just a smidge using the arrow keys? You may notice that it's hard to get to juuuuust the right spot using the arrow keys.

Try holding down the [Control] key with the arrow keys and watch as your slide objects move by just a pixel at a time.

14. Use SmartArt to break bullet points into text boxes

Use SmartArt as a tool to eliminate bullet points and "chunk" your information out visually.

Select your text box of bullet points and either right-click or choose from the Home tab "Convert to SmartArt." Select a SmartArt graphic that contains horizontal boxes. Select the newly created SmartArt containing your text, right-click and ungroup it twice, giving you text in rectangles.

Now, delete any extraneous SmartArt items (i.e. arrows) and format the boxes however you like. Voila, you have magically turned a page of bullet points into visual chunks—much easier to read!

15. Create "smoky letters" with PPT's new Morph transition

Let's say, for instance, that you want the word TEXT to come out as smoke from a chimney (or fireplace, tailpipe, cigar, teapot, magic lamp, etc.). You first put a picture of the chimney on your slide. Next, you create smoke "seeds" by inserting a rectangle and editing one of the points (Format – Shape – Edit Points) – then making 4 copies of this rectangle (one for each letter in TEXT). Make these "seeds" tiny and transparent, then place on top of the chimney (where you want the smoke to come out).

Next, duplicate the slide and on this new slide, delete the "seeds" on the chimney. Then, vectorize the word TEXT (by writing it in a text box, putting it on top of a colored rectangle, selecting both objects and going to Merge Shapes – Fragment and deleting the stuff around TEXT).

Finally, add a Morph transition to the second slide,



and you're done!

16. Convert text to an image if the custom font might not be installed.

If the slide would benefit from a gorgeous script as an accent element, I will turn that piece of text into an image.

I do this by selecting the font as an object, copying it and then pasting it as a picture (either right click to paste or use the paste button in the Home menu).

Now I know the "text" will display as designed on any computer.

PowerPoint Presentation Delivery Tips

17. Use the notes panel for detailed printed notes

Many students want detailed lecture notes, but get bored quickly reading mountains of text on a slide.

So use the "Notes Pages" panel for detail while keeping the slides simple –urge students to read the notes which may contain more information than given in a lecture.

If printing out the slides, it is essential to use "Notes Pages" print layout option.

18. Leverage "Presenter View" and "sections" when there are multiple presenters

Increase the power of Presenter View with PowerPoint Sections.

Sections are used to organize slides within a presentation by grouping slides and giving each group a name.

In addition, Presenter View leverages these Sections that can be seen in Presenter View's Grid Layout.

When running a presentation with multiple presenters, or an awards show with multiple award categories, I add lots of PowerPoint sections. The ability to minimize live-show stress and find the correct section to jump to is amazing!

19. Use "triggers" to create interactive presentations

Create interactive presentations with triggers to start animations through hot spots on a slide.

You can reveal specific parts of a diagram, make something change color by clicking it, or give people multiple choice questions and have the correct answer pop-up.

It takes seconds to do and works brilliantly, particularly with visual slides.

Right click on any animation, choose Timing, then

Triggers in the pop-up window, and choose which object you click to start (trigger) the animation. You can have multiple triggers on one slide and multiple animations triggered by the same object. It makes really compelling and effective presentations.

20. Use a formatted "Notes" page for presentation handouts.

I open the most eyes when I discuss how to use the Notes page to create handouts that are contained within the same PPTX file as the slides.

Most people have never spent even a second in the Notes master so they never knew you could globally reformat the Notes pages to allow them to better accommodate the creation of handout pages.

Designing conference posters

A one-sentence overview of the poster concept. A large eformat poster is a big piece of paper or image on a wall mounted monitor featuring a short title, an introduction to your burning question, an overview of your novel experimental approach, your amazing results in graphical form, some insightful discussion of aforementioned results, a listing of previously published articles that are important to your research, and some brief acknowledgement of the tremendous assistant and financial support conned from others if all text is kept to a minimum (less than a 1000 words). a person could fully read your poster in 540 minutes.

Why give a poster instead of a talk

Although you could communicate research via a 15-minute talk at the same meeting, presenting a poster allows you to more personally interact with the people who are interested in your topic, and lets you reach people who might not be in your esoteric but no doubt fascinating sub-field. And, it turns out, posters sessions are not all about you: research has demonstrated that people who are standing are more engaged learners than people sitting in chairs (at talks). Posters are also handy because they can still be viewed even when you're not present. And after the conference ends, you can hang the poster in the hallway of your department for people to admire. Finally, presenting a poster is especially recommended if you are bad at public speaking or can't comfortably speak a particular language (the reason poster sessions were invented).

1. Motivational advice

The best general advice I can give a first-time poster constructor is to describe the circumstances in which a poster will eventually be viewed: a hot, loud, congested room with really bad lighting. And meeting organizers will invariably situate your poster between two posters that are infinitely more entertaining, such as "Teaching house cats to perform cold fusion" and "Huff-quacking in extraordinarily cute red pandas." In these circumstances, your poster needs to be interesting and visually slick if you hope to attract viewers.

2. Horizontal template with big central column

If you prefer a more traditional layout (just columns) but still like the big central area for results use gm; (Powerpoint). Note that any content near the bottom pan of the Materials and methods and Results sections will be harder for tall people to read (because they will need to bend their necks). If you don't like tall people, choose this template.

3. Horizontal template with four columns

The third option is the four-column approach (the most traditional).

4. Portrait template with demoted sections

If you need a portrait-style poster template, you can give this a try. Template has little dots near the bottom to indicate that Literature cited and Acknowledgements should be read last. You can delete those dots if they offend your sensibilities. I've also indicated with the "logos" graphic that logos can/should go at the bottom.

5. Portrait template with demoted sections

If you need a portrait-style poster template, you can give this a try. Template has little dots near the bottom to indicate that Literature cited and Acknowledgements should be read last. You can delete those dots if they offend your sensibilities. I've also indicated with the "logos" graphic that logos can/should go at the bottom.

6. Portrait template with results arena

If you prefer a portrait-style template with a big results area, use @ (Powerpoint) template. As with other templates, put the logos at the bottom of the poster. Or don't include them at all.

Your poster doesn't need to look like any of the templates above. Unlike a manuscript, a poster can adopt a variety of layouts depending on the form of charts and photographs. Indeed, you probably don't want your poster to look like every other poster in the room (that would be boring). There are also thousands of other templates on the internet, but I dislike most of them because they are too busy and don't have white space.

Software recommendations

Although the vast majority conference posters on the planet are produced with Microsoft Powerpoint, you'll end up with a better-looking poster if you use Coreldraw. These programs allow control of text wrapping around images, automatic text flow among associated text blocks, and much more. You can also make posters with graphics software such as Illustrator. Ideally, print a draft poster at least a month before the meeting and get people to critique your poster when you are not present, i.e., hang it in a hallway with a huge sign that pleads and begs for honest feedback about layout, word count, spelling, font, color,

content. etc. Tell them to leave comments on Post-It notes (so provide these in container, with pens). And, again, don't be present for this. if you are lurking like a proud parent, people will say, "Looks beautiful!" out of politeness and a desire to get away fast.

What to put in each section

Below are some rough guidelines on what to include in each section of a scientific poster and how to pitch that content. The word-count guesses are for a poster that is approximately 3 x 4'. so adjust accordingly if your poster is a different size. Names of the section headings are somewhat flexible. too. especially if you're not crafting a science poster.

Title

Should briefly convey the interesting issue, the general experimental approach, and the system (e.g., organism): needs to be catchy in order to reel in passersby who are trying to avoid boring interactions, a real danger at conferences just like in the real world. [approximately 1-2 lines]

Abstract

Do not include an abstract on a poster (a poster is an abstract of your research. so having two summaries is a waste of valuable poster space). Some meetings require an abstract, of course. and if that's the case be as brief as possible. But if you can get away with it. just omit the section.

Introduction

Write this section to target an intelligent person who is not in your field. Assume they don't know your study organism at all and assume they are predisposed to find your topic unimportant. E.g., if you're an astronomer. imagine a visitor who has a degree in biology or mathematics. Quickly (first sentence or two) get your viewer interested in the issue or question that drove you to take up the project in the first place. Use the absolute minimum of background information. definitions. and acronyms (all of which are boring). Place your issue in the context of published, primary literature. Pitch an interesting, novel hypothesis. then describe (briefly) the experimental approach that can test your hypothesis. Please note that "X has never been studied before" or "my mentor gave me this project" are lame reasons for doing something. even if true. Also note: unlike a manuscript for a journal. the introduction of a poster is a wonderful place to display a photograph or illustration that visually communicates some aspect of your research question. A nice image can draw people in even if you look boring or have a boring poster title. Keep length to approximately 200 words.

Materials and methods

Briefly describe experimental equipment and procedure. but not with the detail used for a manuscript. Use figures and flow charts to illustrate experimental design if possible. Include a photograph or labeled drawing of organism or setup. Mention statistical analyses that were used and how they allowed you to address hypothesis. Keep length to approximately 200 words

Results

First, mention whether your experiment procedure actually worked (e.g., "90% of the birds survived the brainectomy"). In same paragraph, briefly describe qualitative and descriptive results (e.g., "surviving birds appeared to be lethargic and had difficulty locating seeds") to give a more personal tone to your poster. in second paragraph, begin presentation of data analysis that more specifically addresses your hypothesis. Refer to supporting charts or images. Provide engaging figure legends that could stand on their own (i.e., could convey some point to reader if viewer skipped all other sections. which they will do). Opt for figures over tables whenever possible. This is always the largest section (except if you have no data). Keep length to approximately 200 words (not counting figure legends).

Conclusions

Remind the reader. without sounding like you are reminding the reader, of the major result and quickly state whether your hypothesis was supported. Try to convince the visitor why the outcome is interesting (assume they have skipped the Introduction). State the relevance of your findings to other published work. Add relevance to real organisms in the real world. Add sentence on future directions of research. Keep length to approximately 200 words.

Literature cited

Follow format described by your main society exactly. Grammar and typography police at conferences will find even minor infractions.

Acknowledgments

Thank individuals for specific contributions (equipment donation. statistical advice. Laboratory assistance, comments on earlier versions of the poster). Mention who has provided funding. Do not list people's titles (e.g., write Colin Purrington not Dr Purrington). Also include in this section disclosures for any conflicts of interest and conflicts of commitment (more info). If you have a lot of conflicts. put them all in a Conflicts section. Keep length to approximately 40 words.

DOs and DON'T s

1. The number one mistake is to make a poster too wordy. Aim for 1000 words or less. That might mean 700 words in paragraph form (body text), plus 300 words in the legends of all your figures and tables. Below is an example poster that has almost 2000 words. 1000 too many.
2. The second-most common mistake is related to the first: a failure to maintain a pleasing amount of white space around text boxes and figures. A cramped poster is hard to read, and the brain simply cannot effectively process the information provided, regardless of how amazing it is.
3. Avoid titles with colons if you can: they are overused. If you absolutely must have a coloned title, just be sure it doesn't force you to spill onto a third line.
4. Format the title in sentence case so that trade names, Latin binomials, gene names, allele names, and such can be immediately recognized as such (because they are capitalized or italicized). Using title case or all caps obscures that information. NB: Older People Really Like Title Case So Many Disagree with Above Advice. SOME EVEN LOVE ALL CAPS!!!!
 1. Effect of ken and barbie knockouts on sexual preference in *Drosophila melanogaster*
 2. Effect of Ken and Barbie Knockouts on Sexual Preference in *Drosophila Melanogaster*
 3. EFFECT OF KEN AND BARBIE KNOCKOUTS ON SEXUAL PREFERENCE IN *DROSOPHILA MELANOGASTER*
5. Use a non-serif font (e.g., Helvetica) for title and headings and a serif font (e.g., Palatino) for body text. Serif-style fonts are much easier to read at smaller font sizes (that's why novels are rarely set with Helvetica and the like).
6. Do not add bullets to section headings. The use of a bolded, larger font is sufficient for demarcating sections.
7. The width of text boxes should be approximately 45–65 characters. Lines that are shorter or longer are harder to read quickly.
8. Don't vary the width of text boxes (it's visually distracting).
9. Whenever possible, use lists of sentences rather than blocks of text.
10. Use italics instead of underlining. Underlining draws too much attention to a word.
11. When using acronyms and numbers (e.g., ATP, 42) within the body of text, scale down the font size by a couple of points so that their sizes don't overpower the lowercase text. Use of "small caps" will sometimes do the trick, but this effect varies with different fonts and with different software.
12. Set line spacing manually to make sure spacing is uniform. Doing this is critical if you have used super- or sub-scripted text. If you don't, only some lines will have extra space, and that would be visually distracting.
13. Do not trust the tab button to insert the correct amount of space when you are indenting a paragraph (the default is usually too big). Set the tab amount manually, with the ruler feature. And never, ever use spaces to create a tab-like space (it just doesn't work).
14. When you have quotations, make sure your software hasn't used the "double prime" glyph, instead of quotation marks. Double primes are the things used for inches (e.g., 5"/11"), and mathematical formulas/formulae.
15. Correct any errors in spacing within and between words, especially before and after italicized text. (See how annoying that is?!) Note that you can use a single space between sentences (the double-space convention was needed for typewriters, and we are slow to lose the habit). Use the Search/Replace feature to globally replace all double spaces with single spaces, and to locate locations where too many spaces occur between words.
16. Avoid dark backgrounds for text boxes. Dark text on white is the easiest for most people to read. Also, dark backgrounds make designing graphics much harder. It's better to just use a white background. And you save on ink, too.
17. Avoid color combinations that create problems for those with color-deficient alleles. Approximately 8% of males and 0.5% of females have some degree of color-vision deficiency (example). To test whether you've made a terrible mistake in color choice, you can run a JPG of your poster through colours, or use the built-in simulator in Photoshop. In general, avoid using red and green together, and opt to use symbols and line patterns (e.g., dashed vs solid) instead of colors for graph elements.
18. Similarly, if you have a color sensitivity mutation and don't know it, you might inadvertently design posters that are difficult for wild types (the biology terms for those with typical alleles) to interpret. You can test your by the way.
19. Complete the entire poster on a single platform. Switching from PC to Mac or Mac to PC invites disaster, sometimes in the form of lost image files or garbled graph axes. Even if you are lucky enough to transfer content across platforms, switching in

- this way often creates printing problems in the future.
20. Give your graphs titles or informative phrases. You wouldn't do this in a manuscript for a journal, but for posters you want to guide the visitor as much as possible.
 21. If you can add miniature illustrations to any of your graphs, do it. Visual additions help attract and inform viewers much more effectively than text alone. Tables benefit from this trick as well.
 22. Choose the right graph. Please see "Watch your figures" for help choosing among bar graph, line graph, etc.
 23. Most graphing applications automatically give your graph an extremely annoying key that you should immediately delete. Just directly label the different graph elements with the text tool.
 24. Acronyms and other shorthands for genotypes, strains, and the like are terrible for communicating with people outside of your laboratory. Use general, descriptive terms. even if they require more space. which they do.
 25. Y-axis labels aligned horizontally are much, much easier to read. and should be used whenever space allows.
 26. Format axis labels in sentence case (Not in Title Case and NOT IN ALL CAPS). People process sentence-case text faster.
 27. Never give your graphs colored backgrounds, grid lines, or boxes. If your graphing program gives them to you automatically, get rid of them. (if you are friends with any of the programmers who make software that has such settings as defaults, please plead with them to revisit that decision.)
 28. Never display two-dimensional data in 3-D. Three-dimensional graphs look adorable but obscure true difference among bar heights.
 29. Make sure that details on graphs and photographs can be comfortably viewed from 6 feet away. A common mistake is to assume that axes labels, figure legends, and numbers on axes are somehow exempt from font-size guidelines. The truth is that the majority of viewers want to read only your figures.
 30. If you include photographs, add a thin gray or black border to make them stand out against background color (even if it's white).
 31. Provide the source of any image that is not yours. And only use an image (illustration, photograph, etc.) that is fully in the public domain. when in doubt, ask the author/photographer/illustrator for permission. Or buy it.
 32. Use web graphics with caution. You need something with high-enough resolution so that it doesn't look pixelated (fuzzy) when printed. FYI, photographs imported from TIFFs often look better than JPEGs because the latter are often compressed too much (or too many times). Gruesome details if you're interested.
 33. If you can't find the perfect illustration or photograph for your poster, get one made. A good image can be used in multiple posters, future talks, and even in manuscripts.
 34. Don't clutter the top of your poster with logos. If you are required by your mentor to include logos on your poster, put them on the bottom of the poster and make them small. Here is an example image of a poster with logos at the top if you'd like see why it's a graphical fail.
 35. Unlike boring institutional logos, adding a research-related image to the top of a poster can draw in visitors.
 36. Format your Literature cited contents carefully. References that are only haphazardly formatted mark a poster, and thus you, as unprofessional and incapable of grasping the importance of details. When asking somebody to proof your poster, specifically ask them to be critical of your citation style. Ask several people, too: no one person is going to catch all your errors. Keep your font size the same as the size of the normal body text — shrinking the font looks bad.
 37. Write "data are," not "data is." "Data" is an officially plural noun ("datum" is the singular). Many people roll their eyes at this advice and say that "data is" is totally acceptable because that's what folks often say. Although it's true that some scientists (and most non-scientists) say "data is" when speaking, you should protect yourself from the scorn of grammar prudes at conferences.
 38. If you don't know the difference between "effect" and "affect," it's probably best not to use those words.
 39. if you use "woman" as an attributive noun ("woman participant"), be consistent and use "man" in the same way ("man participant"). If either sounds awkward, revert to using adjectives (female, male). But (full disclosure) I'm a male biologist, so if you'd like to hear that same advice from a woman.
 40. This is probably obvious but don't plagiarize. If this is not obvious, please see my page on the topic.

Photography

Images are a powerful visual asset for helping us tell the rich and complete story. To focus the selection process, the images are reorganized into the seven categories below.

Location

Location-based imagery helps establish our setting for audiences who are new and reinforces it for those who are familiar. Campus imagery needs to convey an appropriate level of energy and movement, and should be authentic to the on-campus experience. Images of location should frame the university as an integral and central part of the city, and give an appropriate impression of it.

The people

The people. Everyone who makes it happen. Students. Faculty. Staff. Alumni. Community.

Images of people should feel candid, natural and in the moment, never posed or generic. The subject should not typically be looking directly at the camera. Representing people in their natural, everyday environments is important.

Depictions of students in a classroom or working environment should feel intimate and authentic. Natural light should be used whenever possible. Single students should never seem lonely, and groups should always seem collaborative. Capturing a sense of curiosity, interest or discovery is a great way to accomplish this.

Outside the classroom, it's important to show people in an energized setting, whether that's on campus, in the city, in nature or abroad.

How

Hands-on. Collaborative. Intense. Engaged. Smart. Enthusiastic.

Capturing our process is integral to building an authentic image library and attracting new and talented students, faculty and staff. Ideally, "how" images are a combination of who and what, meaning that a person and an object are always present. The framing can be tighter and more detailed than usual. Action should be implied if not obvious, and any additional context like the environment or other objects for conveying scale are helpful. As always, lighting should be natural.

What

The subjects. What we're innovating. What we're studying. What we're improving. Everything we use to move the world forward. Object-based imagery should play a large role in our communications, serving as a window into our areas of study and the tools of our trades.

Interesting and unexpected perspectives should be implemented to make the images dynamic. Keeping the camera parallel with or perpendicular to the ground from a variety of vantage points will help maintain some consistency throughout your collection.

Framing can vary from macro to wide-angle and everything in between-whatever helps to showcase the object in the best way.

Cultural Hallmarks

Things from the past and present that make unique. Our quirks. Our traditions. Our most treasured characteristics.

The Cultural Hallmarks category comprises both historical and modern image assets.

While we have a wonderful and expansive archive of historical photos and footage, they're not appropriate for heavy use in most communications..

Environmental Portraits.

The profiles. The difference-makers. Featured in a more editorial scenario.

Portraiture is, in many cases, a necessity in telling compelling stories and recounting personal journeys. When these images are shot in a certain manner, they can also showcase the importance of our collaborative process.

The setting for a portrait should be appropriate for the subject's major, program or area of interest. If open windows are available, shoot near those. Contextual elements such as tools, machinery or accessories that relate to the topic are helpful in building a realistic

image, even if they are in the background or out of focus.

Clothing should be casual and appropriate for the setting. The subject's normal day-to-day wear should be fine. Most importantly, subjects should feel comfortable.

Patterns and Details.

Images that showcase the beauty in the details.

Abstract images serve an important role within our communications. They're a great tool for establishing a mood and allowing room to breathe. They're also incredibly useful when an image that matches specifically to copy isn't available.

Architecture, nature, landmarks and objects are all suitable subjects for these close-up shots. Sometimes, even people can be used to create a pattern (though they should not be the predominant focus of this category).

The key is to get as close as possible without entirely losing the context of the subject. Always try to crop an image to leave a hint of what the object actually is.



The A to Z of CorelDRAW

CorelDRAW Graphics Suite's toolbox and dockers are jam-packed with useful tools, options, and settings that may be new to you or as familiar as the back of your hand. This A to Z list breaks down most of the program's tools, dockers, and functions with links to relevant tutorials showing you what fantastic things CorelDRAW can do. You can check out CorelDRAW X7 for a free 30 day trial to get you started with the program.

A

Align and Distribute: This docker allows you to organize, align, and evenly distribute two or more selected objects along a defined line within a document. Align or distribute objects by their edges, centers, or a mix of the two. Additionally, there are options to align objects according to specific criteria.

Angular Dimension Tool: A tool that allows you to draw angular dimension lines with three points of execution. Such markers inform you of the dimensions of objects within your document by giving accurate measurements between them.

Arrow Shapes: A variety of perfect arrow shapes ready for use within your document and easily modified with the Shape and Pick tools and assorted dockers.

Artistic Media: This docker is your central hub for all things Artistic Media tool related. Organize, create, and play with the variety of tool types courtesy of the Artistic Media tool. You can make custom brushes and sprayers within it too.

Artistic Media Tool: This tool mimics the look of a variety of brushes and brush types. Create paintbrushes, vector brushes, sprayer brushes, and more. Use in conjunction with the Artistic Media docker for greater control and organization.

Attract Tool: One of the Shape Edit tools, the Attract tool manipulates the edges of the object by pulling nodes to the center of the cursor so long as they're within the tool's nib diameter.

Attributes Eyedropper: This tool samples not only the color, but other attributes (fill, outline, and more) of an object, allowing you to transfer these properties onto other objects within your document.

B

B-Spline: This curve tool allows you to draw lines and curves by setting the boundaries around the curve itself rather than the nodes.

Banner Shapes: An assortment of Perfect Banner Shapes ready for use within a document, with special nodes that manipulate various parts of each banner object.

Basic Shapes: The basic set of perfect shapes containing a variety of geometric shapes ready for manipulation with the Pick and Shape tools, as well as special nodes that change a variety of features unique to each object.

Bevel: This docker allows you to fully control the Bevel effect on a selected text object. Chose the style, offset, shadow color, and various lighting controls for a quick and easy effect.

Bezier Tool: This curve tool allows you to draw one segment of a curve or line at a time. Similar to the Pen tool, users place the nodes of a line or curve manually. This tool, however, does not allow users to preview curves before placing them, unlike some of the other curve tools.

Blend: This docker offers additional control to the user when creating blends with the Blend tool. Control the number of steps, acceleration, and style of color blend.

Blend Tool: This tool is an interactive one that creates a progression of objects shape, size, and colors between the two objects selected with the tool. Users can control the angle and acceleration of the blend, as well as how many steps will be created from point A to point B.

C

Callout Shapes: This is an assortment of Perfect Shapes ready for use within a document as preset objects that can be modified with the Shape and Pick tools, as well as their individual special nodes that change specific components of each Perfect Shape.

Color Docker: This docker allows you to choose fill and outline colors from a color picker, color sliders, and color palettes. Found with dockers and in the Toolbox.

Color Eyedropper: This tool samples an object's color and allows you to apply it to another.

Color Styles: Use this docker to create and save color styles as well as create and save color harmonies, helping you define your document's color palette.

Complex Star Tool: This shape tool creates a star from a series of triangles. Users can define both points and sharpness of the shapes created with this tool by way of the Property Bar.

Connect: A content browser within CorelDRAW that syncs the user's machine, local network, and internet, so long as the files are readable by those in CorelDRAW Graphics Suite X7 applications.

Contour: This docker gives you greater control over the Contour effect, defining the contour's steps and offset, color blend, and additional options.

Contour Tool: This interactive tool allows you to create a series of concentric shapes within or around a selected object according to the settings defined either in the Contour docker or the Property Bar.

Crop Tool: This tool allows you to select an area of the working document and instantly delete everything outside that selection, effectively cutting it out of the document.

D

Distort Tool: This tool transforms objects by giving you the option to apply effects such as push and pull, zipper, or twister distortions through settings found in the Property Bar.

Docker: The variety of windows and palettes that organize, modify, and aid designs within a user's document. You'll find they contain additional options for nearly every tool and function and are a critical part of workflow.

Document Palette: This color palette contains all of the colors used throughout a document's history. It collects both fill and outline colors in a convenient docker that you can place anywhere within the application window.

Drop Shadow Tool: This interactive tool allows you to create, place, modify, and copy a drop shadow effect on objects within your documents. Define settings manually or drag the shadow out from the object itself with the tool to create drop shadows quickly and easily. You can save and load preset drop shadows as well, speeding up your productivity within the program.

E

Edit Anchor Tool: This tool allows you to modify nodes within an object or line.

Ellipse Tool (F7): This tool creates ellipses and circles within a document. It also gives you the ability to create

closed shapes, pie shapes, and arc shapes as well in the Property Bar.

Envelope (Control F7): This docker gives you additional control when applying the Envelope effect to an object within a working document.

Envelope Tool: This tool allows you to change the shape of an object by manipulating nodes surrounding the object in an envelope or bounding box instead of the object's nodes themselves.

Eraser Tool (X): This tool allows you to delete (erase) components of selected objects within a document.

Extrude: This docker gives you additional control when using the Extrude tool or applying an Extrude effect.

Extrude Tool: This tool allows you to convert a flat object into a 3D object with a number of options found within either the Property Bar or the Extrude docker.

F

Fillet/Scallop/Chamfer: This docker controls the corner options to create rounded, scalloped, or straight-edged corners in both objects and curves.

Flowchart Shapes: These perfect shapes are fantastic for use within flowcharts and, as objects, have special nodes that you can manipulate with the Shape tool in order to edit the shape in a unique way.

Font Playground: This docker allows users to preview sample text by comparing font and size choices before settling on a font to be used within a document.

Free Transform: This tool allows you to rotate, skew, scale, and reflect objects by choosing the method of manipulation in the Property Bar.

Freehand Pick: This tool lets you select an area around or near objects in order to select multiple things within your document at once, so long as they fall within the selection shape you draw.

Freehand Tool (F5): This curve tool allows you to draw lines, curves, and shapes freely without thinking about where to place nodes or the angles of curves. You can draw segments of lines and objects, connect to open nodes, and close objects quickly and easily with this tool as well.

G

Graph Paper Tool (D): This tool creates grids of complete and closed shapes according to the settings implemented in the Property Bar.

Guidelines: This docker controls the application and look of guidelines placed within a document. Users can create, edit, or delete any guidelines found within their document by way of this docker.

H



Horizontal or Vertical Dimension Tool: This tool draws either vertical or horizontal lines, allowing users to measure spaces within their document.

I

Interactive Fill Tool (G): This tool allows full control over fill attributes, especially fountain fills, giving users the ability to define a fill's angle and placement dynamically versus defining it based on numerical inputs. Additional options are controllable through the Property Bar and Object Properties docker.

Insert Character: This docker allows you to look through and add glyphs within a text object. You can run through all of the glyphs within an installed font as well as replace characters within text with something new or more fitting from your font.

J

Join Curves: This docker allows you to select and join the open nodes of curves, effectively creating closed objects within your document through its automated process so long as open curves are within the defined Gap tolerance.

K

Knife Tool: This tool allows you to split an object into two separate objects. Additional options for the tool are found in the Property Bar while the tool is in use.

Knife Tool (Premium): This tool is found within the toolbox if you are a Premium subscriber. It furthers the options of the Knife tool by allowing you to split objects directly, with a gap, or an overlap.

L

Lens (Alt-F3): This docker applies a variety of effects to objects overlapping each other within a document, including Brighten, Fish Eye, Heat Map, Magnify, and more. The view within the overlapping object can also be frozen so that the object can be moved whilst retaining the effect within.

M

Mesh Fill Tool (M): This tool allows users to convert an object into a rendered mesh object by placing nodes and cross sections of nodes whereupon blended colors will be applied to a mesh grid.

N

Nodes: These are the points that make up lines and objects within a document. Every object has them, especially those which have been converted to curves, and many tools and dockers aid in manipulating them in some way. The more nodes a document has, the larger the file size. The fewer node objects within a document, the smaller a file will ultimately be. The

Shape tool is used to manipulate the nodes.

O

Object Coordinates: This docker allows users to create and place a variety of objects according to the dimensions defined within the docker itself. When users set the options to 0 copies, the docker manipulates the selected object. When 1 or more copies are defined, the docker creates a succession of objects according to their defined settings.

Object Manager: This docker organizes all objects and curves within a document into Layers and Pages, giving you full control over everything within your working document.

Object Properties: This docker allows you to control object attributes such as Outline, Fill, and Transparency, and their unique options.

Object Styles: This docker controls all of the styles and style sets you can apply to an object. Set up assorted styles and attributes, including paragraph options, fill options, outline options and more. Save and load style sets from document to document, or edit and delete styles to alter a working document, all within the comfort of the docker.

Outline Color Tool: This tool allows you to add or edit an outline color of an object through models, mixers, or palettes.

Outline Pen Tool: This tool allows you to add or edit an outline's weight, style, corner options, and more, all from the comfort of the Toolbox.

P

Pan Tool (H): This hand-shaped tool allows you to grab and pan across and around a working document. It's especially helpful when working on elements off the page or when moving around a document without zooming out to see more of it.

Parallel Dimension Tool: This dimension tool draws slanted dimension lines, allowing you to measure various areas within your document.

Pattern Fill: This feature allows you to create and edit custom patterns, or patterns downloaded through Corel Connect, that can be used as fills in closed objects within a working document.

Pen Tool: This curve tool allows you to place nodes to draw straight lines and curves. Unlike the Bezier tool, it lets you preview curves and lines as they're being placed and drawn, giving you greater control when creating lines and objects.

Pick Tool: This tool lets you select, move, and transform objects within your document so long as they're on the working page and unlocked.



Polygon Tool (Y): This tool creates an assortment of polygonal shapes thanks to the ability to define the number of sides in the Property Bar.

Polyline Tool: This drawing tool allows you to draw curves, arcs, and straight lines in one connected go, only ending once an object has been closed.

PowerClip: This powerful action clips a group to the boundaries of an overlapping object, masking off components of the group outside the overlapping object's boundaries. Users can create PowerClips, edit them, add components, and delete components within the Object Manager docker, as well as within the document itself.

Property Bar: This all-important docker gives users additional options and points of control for every tool. It's not only a useful docker but often quite important in contributing to the productivity of working within the program.

R

Rectangle Tool (F6): This tool creates rectangles and squares within a document. It also gives users the ability to alter the corners in the Property Bar.

Repel Tool: One of the Shape Edit tools, this tool is the opposite of the Attract tool. The Repel tool manipulates the edges of the object by pushing nodes away from the center of the cursor so long as they're within the tool's nib diameter.

Right-Angle Connector Tool: This connector tool connects two objects with a right angle created by the user drawing the line itself. Users can also define the path's ends, width, color, radius, and style within the Property Bar or Object Properties docker.

Roughen Tool: This distortion tool creates a series of angles and points along an object's edge according to the settings the user defines in the Property Bar.

Rounded Right-Angle Connector Tool: This connector tool connects two objects with a rounded right angle created by the user drawing the line itself. Users can also define the path's ends, width, color, radius, and style within the Property Bar or Object Properties docker.

S

Segment Dimension Tool: This tool displays the distance between nodes of a single object or multiple objects.

Shape Tool (F10): This tool allows users to edit objects, curves, and text by manipulating their nodes.

Shaping: This docker allows users to manipulate overlapping objects through functions such as Weld, Simplify, Intersect, and more.

Smart Drawing Tool (Shift-S): This curve tool converts paths drawn into either smoothed out paths or basic shapes. Ellipses, polygons, and rectangles can all be created with this predictive, smart drawing tool. This tool works especially well with pressure-enabled graphic tablets.

Smart Fill Tool: This tool creates objects from intersecting areas within other objects, effectively "filling" them in with the chosen fill color.

Smear Tool: This distortion tool allows the user to drag the edge of an object out into a tapered shape. Users can adjust the tool's options and how the smear affects the object in the Property Bar.

Smooth Tool: This tool smoothes an object's path when you drag it across an object's outline. When possible, the tool reduces and simplifies the shape and number of nodes found in the path in order to smooth it out.

Smudge Tool: This tool changes the shape of an object, not just its edges, when you drag the tool across it. You can adjust the tool's settings in the Property Bar.

Spiral Tool (A): This shape tool allows you to draw symmetrical and logarithmic spiral objects within your document.

Star Tool: This shape tool allows you to draw star objects within your documents. Settings in the Property Bar give you the option of adjusting the number of points and sharpness of the shape similar to the settings found in the Complex Star Tool's objects.

Step and Repeat: This docker allows you to create and position multiple copies of an object at a time. You can also control how the copies are positioned from the original object within the docker itself.

Straight-Line Connector Tool: This connector tool connects two objects with a straight line created by the user drawing the line itself. Users can also define the path's ends, width, color, and style within the Property Bar or Object Properties docker.

Symbol Manager: This docker gives you access to symbols and associated functionality so long as symbols have been saved onto your machine. Drag objects, curves, or object groups into the docker to add new symbols to work with, and edit, save, or delete symbols for use in other documents.

T

Table Tool: This tool creates grids of open lines according to the settings implemented in the Property Bar.



Text Properties: This docker controls all things related to text. Users can modify character, paragraph, and frame settings in a number of ways in one convenient location.

Text Tool (F8): This tool allows users to create and modify artistic and paragraph text. Best paired with the Text Properties docker.

Toolbox: This Toolbar contains all of the tools within the program. It's customizable too, allowing users to toggle tools or tool groups on or off at their discretion.

Transformations: This docker allows users to manipulate and move objects or object copies in their document. Position, rotate, mirror, scale, and skew objects or create a succession of copies based on the data input into the docker's **options**.

Transparency Tool: This tool allows users to interactively create or modify an object or curve's transparency properties either on the object itself or in the Property Bar.

Tray: This docker integrates with Corel CONNECT, CorelDRAW and Corel PHOTO-PAINT, allowing users to collect content from multiple folders into one easily referenced place within the program for the working document.

Twirl Tool: This tool swirls an object's edges toward the center of the cursor as you drag it around the object. You can alter the twirl direction and rate in the Property Bar.

V

View Manager: Allows users to zoom in or out of a document in different ways and save those views in the docker for quick reference.

Z

Zoom Tool (Z): This tool changes the level of magnification within a document as well as allowing users to change how the document is magnified (through selection, a simple plus or minus, into all objects, etc.).

#

2-Point Line Tool: This tool allows you to draw straight lines between two points by dragging from one point to another. Lines can be drawn either straight, perpendicular, or at a tangent to other objects depending on which option is chosen in the Property bar.

3-Point Ellipse Tool: A shape tool that creates ellipses and circles by defining the diameter of the shape and

building the ellipse outward from that line. It starts in a way that's similar to the 2-Point Line, but once the line is drawn you create an ellipse or circle.

3-Point Curve Tool: A drawing tool that allows you to create a curved line by first defining the length of the line and then defining the curve of that line. The third point is the center point of the curve, which you can manipulate and preview while drawing the line.

3-Point Rectangle Tool: A shape tool that creates rectangles and squares by defining the width of the shape and building the ellipse outward from that line. It starts in a way that's similar to the 2-Point Line, but once the line is drawn you create a rectangle or square.

3-Point Callout Tool: This tool lets you draw an angled two-segment line that serves as a callout shape.

Power BI

What is Power BI?

Power BI is a collection of software services, apps, and connectors that work together to turn your unrelated sources of data into coherent, visually immersive, and interactive insights. Your data may be an Excel spreadsheet, or a collection of cloud-based and on-premises hybrid data warehouses. Power BI lets you easily connect to your data sources, visualize and discover what's important, and share that with anyone or everyone you want.

Power BI consists of:

A Windows desktop application called Power BI Desktop.

An online SaaS (Software as a Service) service called the Power BI service.

Power BI mobile apps for Windows, iOS, and Android devices.

These three elements—Power BI Desktop, the service, and the mobile apps—are designed to let you create, share, and consume business insights in the way that serves you and your role most effectively.

A fourth element, Power BI Report Server, allows you to publish Power BI reports to an on-premises report server, after creating them in Power BI Desktop. Read more about Power BI Report Server.

How Power BI matches your role

How you use Power BI may depend on your role in a project or on a team. Other people, in other roles, might use Power BI differently.

For example, you might primarily use the Power BI service to view reports and dashboards. Your number-

crunching, business-report-creating coworker might make extensive use of Power BI Desktop to create reports, then publish those reports to the Power BI service, where you view them. Another coworker, in sales, might mainly use their Power BI phone app to monitor progress on sales quotas, and to drill into new sales lead details.

If you're a developer, you might use Power BI APIs to push data into datasets or to embed dashboards and reports into your own custom applications. Have an idea for a new visual? Build it yourself and share it with others.

You also might use each element of Power BI at different times, depending on what you're trying to achieve or your role for a given project.

How you use Power BI can be based on which feature or service of Power BI is the best tool for your situation. For example, you can use Power BI Desktop to create reports for your own team about customer engagement statistics and you can view inventory and manufacturing progress in a real-time dashboard in the



Power BI service. Each part of Power BI is available to you, which is why it's so flexible and compelling.

Explore documents that pertain to your role:

Power BI Desktop for designers

Power BI for consumers

Power BI for developers

Power BI for administrators

A common flow of work in Power BI begins by connecting to data sources and building a report in Power BI Desktop. You then publish that report from Power BI Desktop to the Power BI service, and share it so end users in the Power BI service and mobile devices can view and interact with the report. This workflow is common, and shows how the three main Power BI elements complement one another.

Here's a detailed comparison of Power BI Desktop and the Power BI service.

On-premises reporting with Power BI Report Server

But what if you're not ready to move to the cloud, and need to keep your reports behind a corporate firewall? Read on.

You can create, deploy, and manage Power BI mobile and paginated reports on premises with the range of ready-to-use tools and services that Power BI Report Server provides.

Power BI Report Server is a solution that you deploy behind your firewall and then deliver your reports to the right users in different ways, whether that's viewing them in a web browser, on a mobile device, or as an email. And because Power BI Report Server is compatible with Power BI in the cloud, you can move to the cloud when you're ready.

What is Power BI Desktop?

Power BI Desktop is a free application you install on your local computer that lets you connect to, transform, and visualize your data. With Power BI Desktop, you can connect to multiple different sources of data, and combine them (often called modeling) into a data model. This data model lets you build visuals, and collections of visuals you can share as reports, with other people inside your organization. Most users who work on business intelligence projects use Power BI Desktop to create reports, and then use the Power BI service to share their reports with others.

The most common uses for Power BI Desktop are as follows:

- Connect to data
- Transform and clean that data, to create a data model
- Create visuals, such as charts or graphs, that provide visual representations of the data

- Create reports that are collections of visuals, on one or more report pages
- Share reports with others by using the Power BI service

People most often responsible for such tasks are often considered data analysts (sometimes referred to as analysts) or business intelligence professionals (often referred to as report creators). However, many people who don't consider themselves an analyst or a report creator use Power BI Desktop to create compelling reports, or to pull data from various sources and build data models, which they can share with their coworkers and organizations.

There are three views available in Power BI Desktop, which you select on the left side of the canvas. The views, shown in the order they appear, are as follows:

- **Report:** In this view, you create reports and visuals, where most of your creation time is spent.
- **Data:** In this view, you see the tables, measures, and other data used in the data model associated with your report, and transform the data for best use in the report's model.
- **Model:** In this view, you see and manage the relationships among tables in your data model.

Connect to data

To get started with Power BI Desktop, the first step is to connect to data. There are many different data sources you can connect to from Power BI Desktop.

To connect to data:

1. From the Home ribbon, select Get Data > More. The Get Data window appears, showing the many categories to which Power BI Desktop can connect.
2. When you select a data type, you're prompted for information, such as the URL and credentials, necessary for Power BI Desktop to connect to the data source on your behalf.
3. After you connect to one or more data sources, you may want to transform the data so it's useful for you.

Transform and clean data, create a model

In Power BI Desktop, you can clean and transform data using the built-in Power Query Editor. With Power Query Editor, you make changes to your data, such as changing a data type, removing columns, or combining data from multiple sources. It's like sculpting: you start with a large block of clay (or data), then shave off pieces or add others as needed, until the shape of the data is how you want it.

To start Power Query Editor:

- Select Edit Queries > Edit Queries from the Home ribbon.



The Power Query Editor window appears.

Each step you take in transforming data (such as renaming a table, transforming a data type, or deleting a column) is recorded by Power Query Editor. Every time this query connects to the data source, those steps are carried out so that the data is always shaped the way you specify.

The following image shows the Power Query Editor window for a query that has been shaped, and turned into a model.

Once your data is how you want it, you can create visuals.

Create visuals

After you have a data model, you can drag fields onto the report canvas to create visuals. A visual is a graphic representation of the data in your model. There are many different types of visuals to choose from in Power BI Desktop. The following visual shows a simple column chart.

To create or change a visual:

- From the Visualizations pane, select the visual icon.

If you already have a visual selected on the report canvas, the selected visual changes to the type you selected.

If no visual is selected on the canvas, a new visual is created based on your selection.

Create reports

More often, you'll want to create a collection of visuals that show various aspects of the data you've used to create your model in Power BI Desktop. A collection of visuals, in one Power BI Desktop file, is called a report. A report can have one or more pages, just like an Excel file can have one or more worksheets.

With Power BI Desktop you can create complex and visually rich reports, using data from multiple sources, all in one report that you can share with others in your organization.

Share reports

After a report is ready to share with others, you can publish the report to the Power BI service, and make it available to anyone in your organization who has a Power BI license.

To publish a Power BI Desktop report:

1. Select Publish from the Home ribbon.

Power BI Desktop connects you to the Power BI service with your Power BI account.

2. Power BI prompts you to select where in the Power BI service you'd like to share the report, such as your workspace, a team workspace, or some other location in the Power BI service.

You must have a Power BI license to share reports to the Power BI service.

