

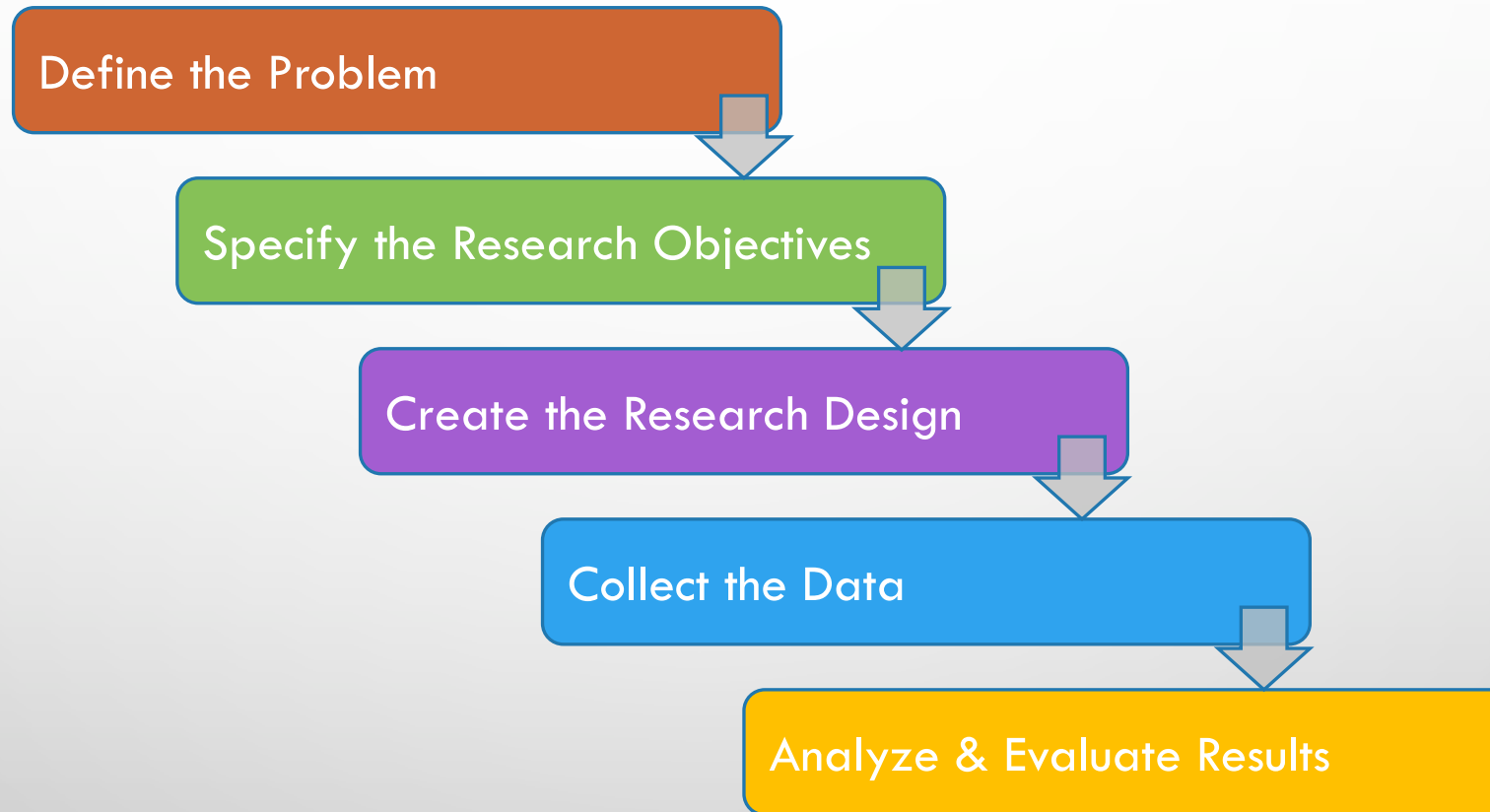


The use of ICTs in Research

Ruvan Weerasinghe

University of Colombo School of Computing

Steps in the Research Process



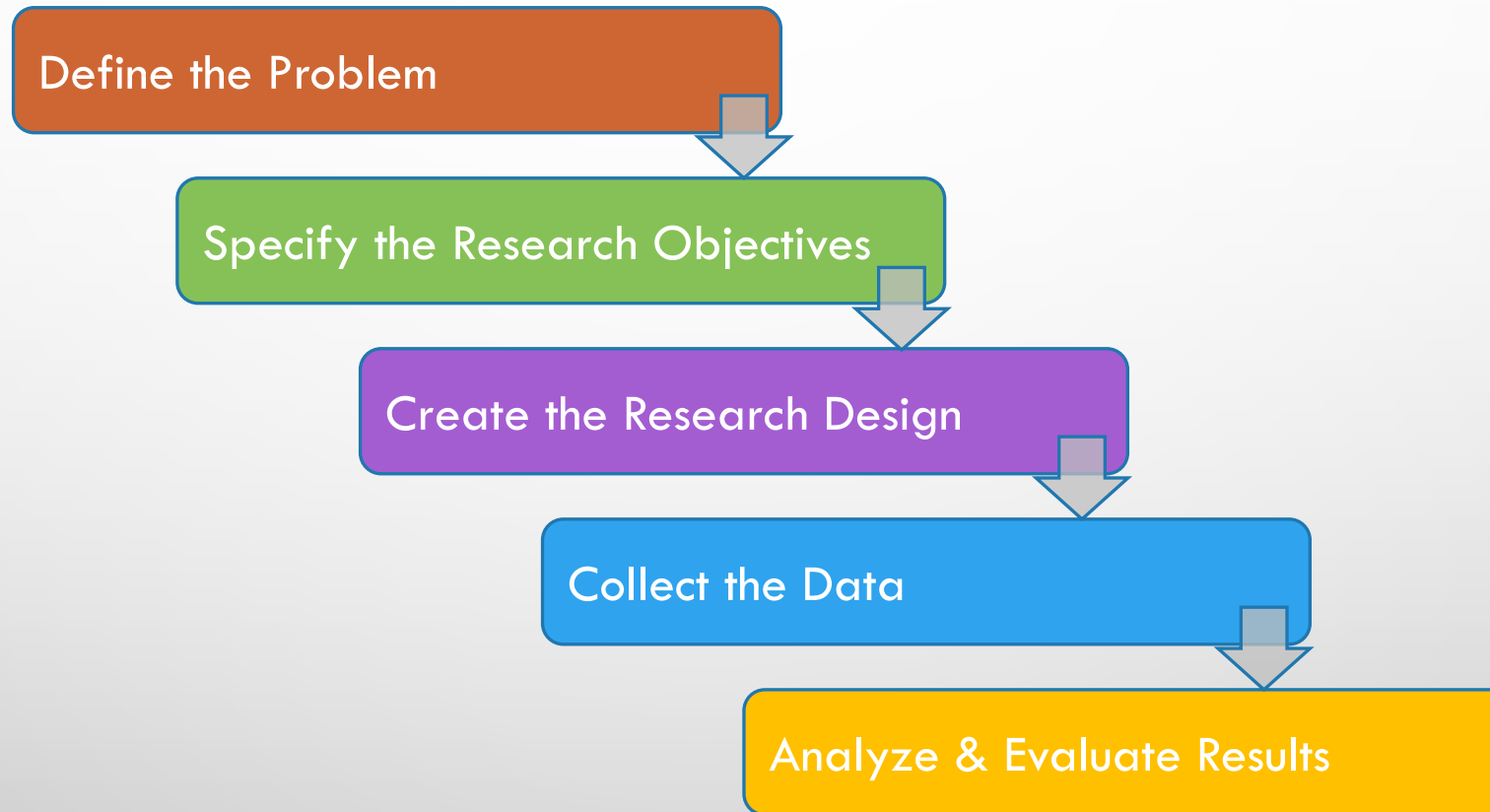


So where does ICT fit into the research process?

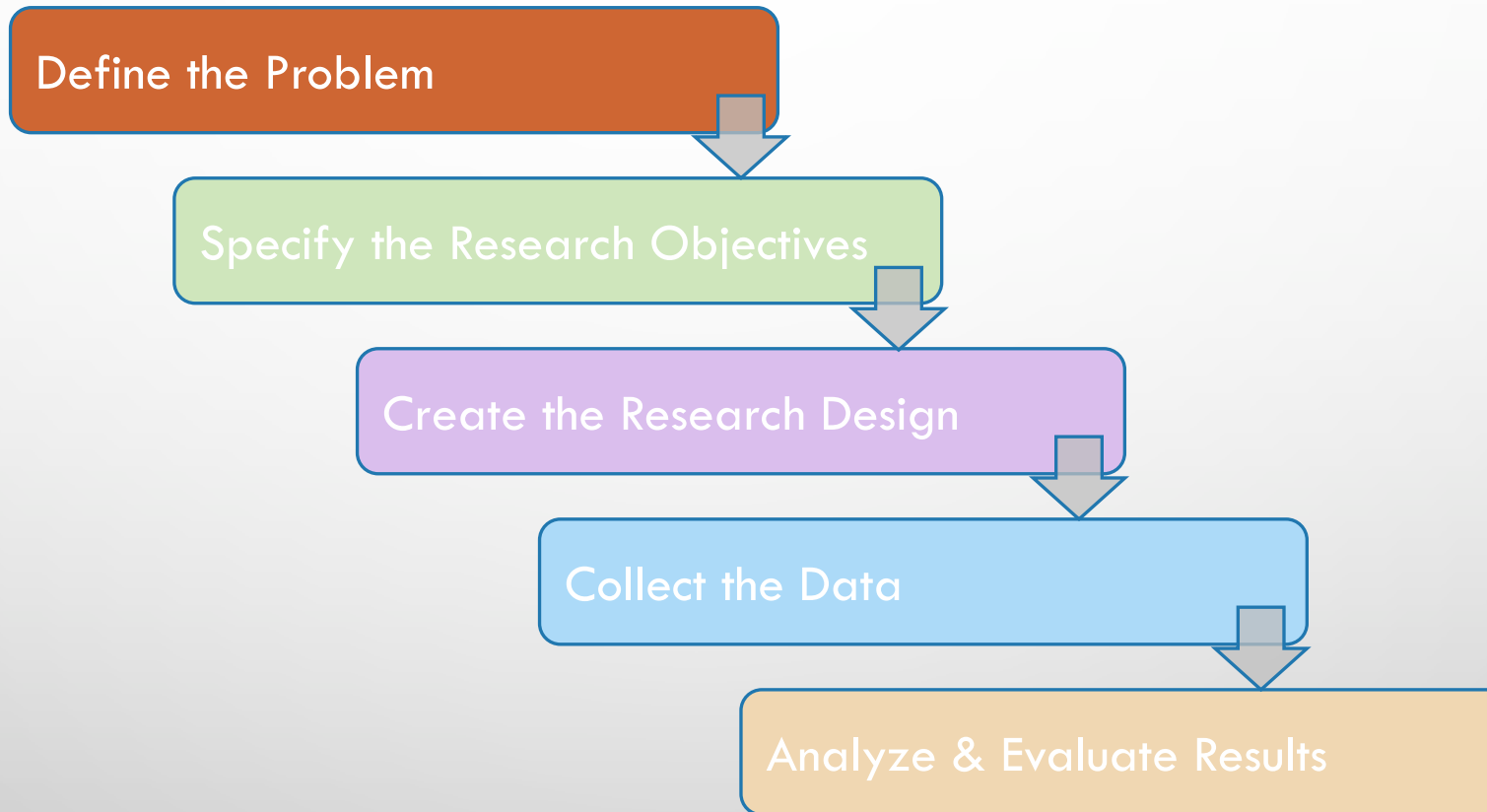
- Two possible answers
 - Nowhere
 - Everywhere



Steps in the Research Process



Steps in the Research Process



Problem Definition

- Get from supervisor – usually part of their ongoing research (gap pre-identified)
- Decide on an area of interest
 - Some burning issue in your head, in the society around you or in the discipline – *pain point*
 - Follow the [three most important steps of research](#) – to identify a *gap* in the current literature in that area
- In either of the above cases, a comprehensive literature survey is essential for this step
 - In the former, it will be very focused, in the latter firstly fairly broad and then focused (deep)



Three most important steps in research

Read

Read

Read!



ICTs in Problem Definition

- Where to look?
 - Electronic databases: PubMed, JSTOR, Scopus...
(https://en.wikipedia.org/wiki/List_of_academic_databases_and_search_engines)
 - Google Scholar – right-hand-side links!
([sci-hub site](#)/extension!)

ICTs in Problem Definition

Scholar

About 3,160,000 results (0.06 sec)

My Citations

http://scholar.google.com

Articles

The lasting effects of **social media trends** on advertising

[PDF] from cluteinstitute.com

E Wright, NM Khanfar, C Harrington... - Journal of Business & ..., 2010 - search.proquest.com

Case law

Abstract Americans are exposed to an astounding number of advertising messages every day. The result of this bombardment of advertising on society is that consumers have become increasingly resistant to traditional forms of advertising. After spending millions of ...
Cited by 58 Related articles All 7 versions Cite Save

My library

Any time

Trends in **social media**: Persistence and decay

[PDF] from arxiv.org

S Asur, BA Huberman, G Szabo... - Available at SSRN ..., 2011 - papers.ssrn.com

Since 2016

Abstract: **Social media** generates a prodigious wealth of real-time content at an incessant rate. From all the content that people create and share, only a few topics manage to attract enough attention to rise to the top and become temporal **trends** which are displayed to ...
Cited by 224 Related articles All 14 versions Cite Save

Since 2015

Since 2012

Custom range...

Sort by relevance

Six **Social Media Trends** for 2011

D Armano - Harvard Business Review, 2010 - tristarrjobs.com

Sort by date

It was a banner year for **social media** growth and adoption. We witnessed Facebook overtake Google in most weekly site traffic, while some surveys reported nearly 95% of companies using LinkedIn to help in recruiting efforts. In my outlook for last year, I cited ...
Cited by 28 Related articles Cite Save More

include patents

include citations

What **trends** in Chinese **social media**

[PDF] from arxiv.org

L Yu, S Asur, BA Huberman - arXiv preprint arXiv:1107.3522, 2011 - arxiv.org

Create alert

Abstract: There has been a tremendous rise in the growth of online **social** networks all over the world in recent times. While some networks like Twitter and Facebook have been well documented, the popular Chinese microblogging **social** network Sina Weibo has not been ...
Cited by 115 Related articles All 19 versions Cite Save

Social media? Get serious! Understanding the functional building blocks of **social media**

[PDF] from uwinnipeg.ca

JH Kietzmann, K Hermkens, IP McCarthy, BS Silvestre - Business horizons, 2011 - Elsevier

References: Armano, 2009; Armano, D. (2009, November 2). Six **social media trends** for 2010

ICTs in Problem Definition

- How to keep track?

- ZOTERO browser plug-in

zotero

- Mendeley Desktop

 **MENDELEY**

ICTs in Problem Definition

<https://www.mendeley.com>

The screenshot displays the Mendeley Desktop application window. The top menu bar includes 'File', 'Edit', 'View', 'Tools', and 'Help'. The status bar at the top right shows the date and time as 'Sat 30 Apr 06:19' and the user name 'Ruvan Weerasinghe'. The main interface is divided into several sections:

- Left Sidebar:** Contains 'MENDELEY Literature Search', 'MY LIBRARY' (with options like 'All Documents', 'Recently Added', 'Favorites', etc.), and 'GROUPS' (listing various folders like 'Computational Linguistics in Sri Lanka', 'AIR Lab at CNU', etc.).
- Central Panel:** Titled 'All Documents', it shows a table of document entries. The selected entry is 'Charniak, E. Statistical techniques for natural language parsing'.
- Right Panel:** Provides details for the selected document, including its type ('Journal Article'), title, author ('E. Charniak'), journal ('AI magazine'), year ('1997'), and a URL to the full text.

Authors	Title	Year	Published In	Added
Berger, A.L.; Pietra...	A maximum entropy approach to natural language processing	1996	Computational linguistics	29/11/11
Charniak, E	Statistical techniques for natural language parsing	1997	AI magazine	29/11/11
Cho, Kyunghyun; ...	Learning Phrase Representations using RNN Encoder-Decoder for Statistical Mac...	2014	Proceedings of the 2014 Con...	Apr 22
Church, Kenneth W...	Char_align : A Program for Aligning Parallel Texts at the Character Level		Agenda	29/11/11
Collins, M.	The EM Algorithm	1997	Papers	29/11/11
Collins, M.	Head-driven statistical models for natural language parsing	1999		29/11/11
Collins, M.	Parameter Estimation for Statistical Parsing Models: Theory and Practice of Distributio...	2005	New development...	29/11/11
Fernando, T N E; ...	A Morphological Parser for Sinhala Verbs			29/11/11
Foster, George	Evaluating a maximum entropy translation model			29/11/11
Gair, James W.; Ka...	The Sinhala writing system: A guide to transliteration			29/11/11
Gallege, Sajika	Analysis of Sinhala Using Natural Language Processing Techniques	2004		Apr 22
Henadeerage, Kum...	Anaphoric Binding in Colloquial Sinhala	1998	Nucleus	29/11/11
Jayalatharachchi, ...	Subasa - Sinhala Spellchecker	2010	Computing	29/11/11
Krenn, B.; Samuels...	The Linguist's guide to statistics	1997	Manuscript, University of ...	29/11/11
Lau, Raymond	Adaptive statistical language modelling	1994	Wall Street Journal	29/11/11
Liyanapathirana, J...	A Statistical Approach to English and		Language	29/11/11

Details | Notes | Contents | Enrichments

Type: Journal Article

Statistical techniques for natural language parsing

Authors: E. Charniak

View research catalog entry for this paper

Journal: *AI magazine*

Year: 1997

Volume:

Issue:

Pages:

Abstract:

Tags:

Author Keywords:

Date Accessed:
2011-11-29

URL:
<http://scholar.google.com/scholar?hl=en&btnG=Sea...>

ICTs in Problem Definition

- Whom to ask?
 - Research communities: ResearchGate (researchgate.net), Mendeley
 - Online courses: Coursera, Udacity, EdX
 - Individual researchers: Skype, Meet, WebEx, Zoom

ICTs in Problem Definition

<http://coursera.org>

coursera ☰ Catalog Institutions Log In Sign Up

You searched for: **research methods**. 348 matches

Availability

<input type="checkbox"/> This Month	140
<input type="checkbox"/> Pre-Enroll	35
<input type="checkbox"/> Self Paced	30

[Show More](#)


All Topics


<input type="checkbox"/> Business	91
<input type="checkbox"/> Social Sciences	72
<input type="checkbox"/> Data Science	66

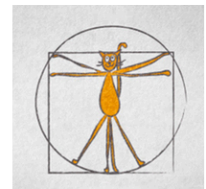
[Show More](#)

Course Languages

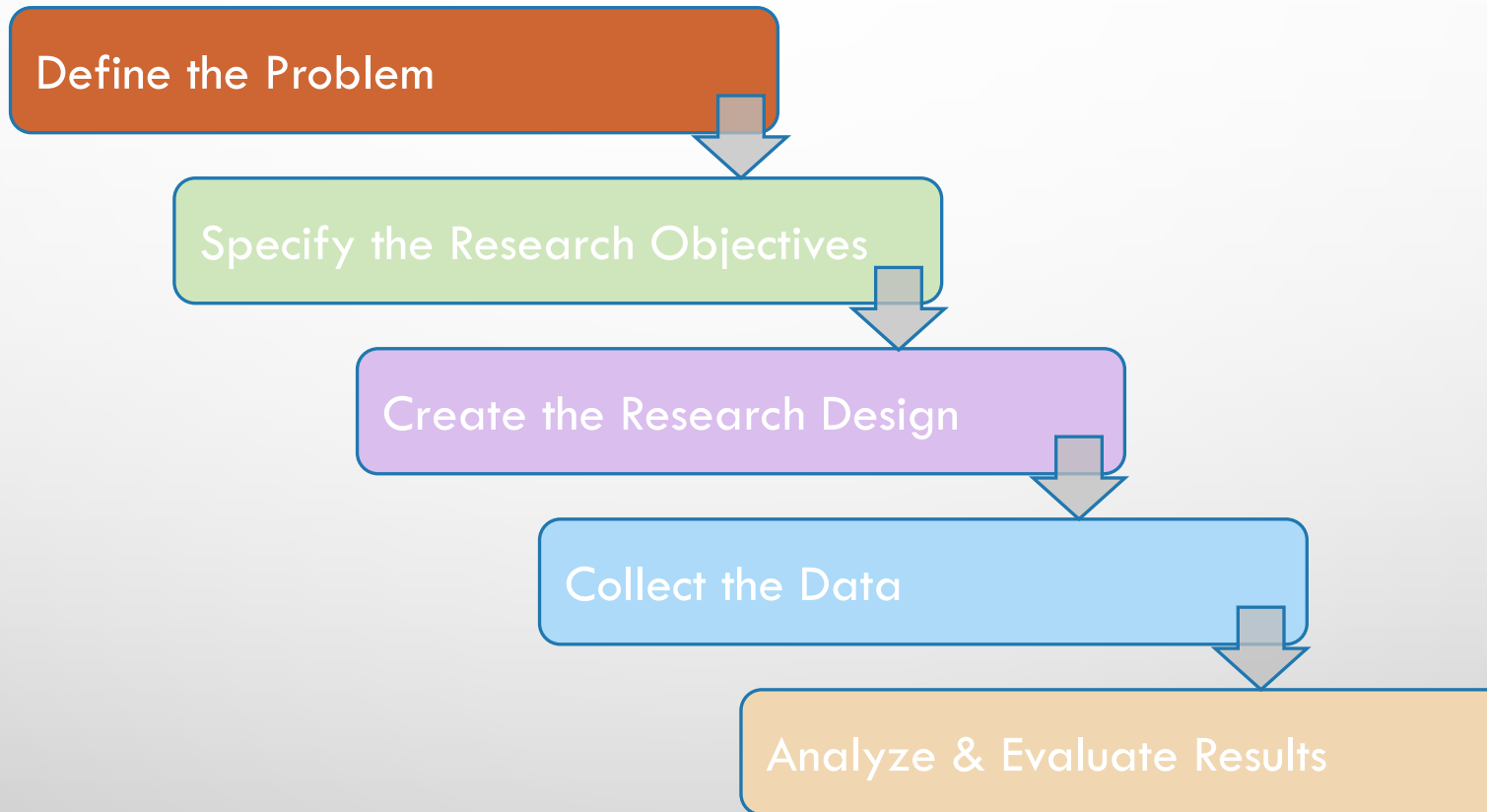
<input type="checkbox"/> English	341
<input type="checkbox"/> French	3
<input type="checkbox"/> Turkish	2

 **Qualitative Research Methods**
University of Amsterdam

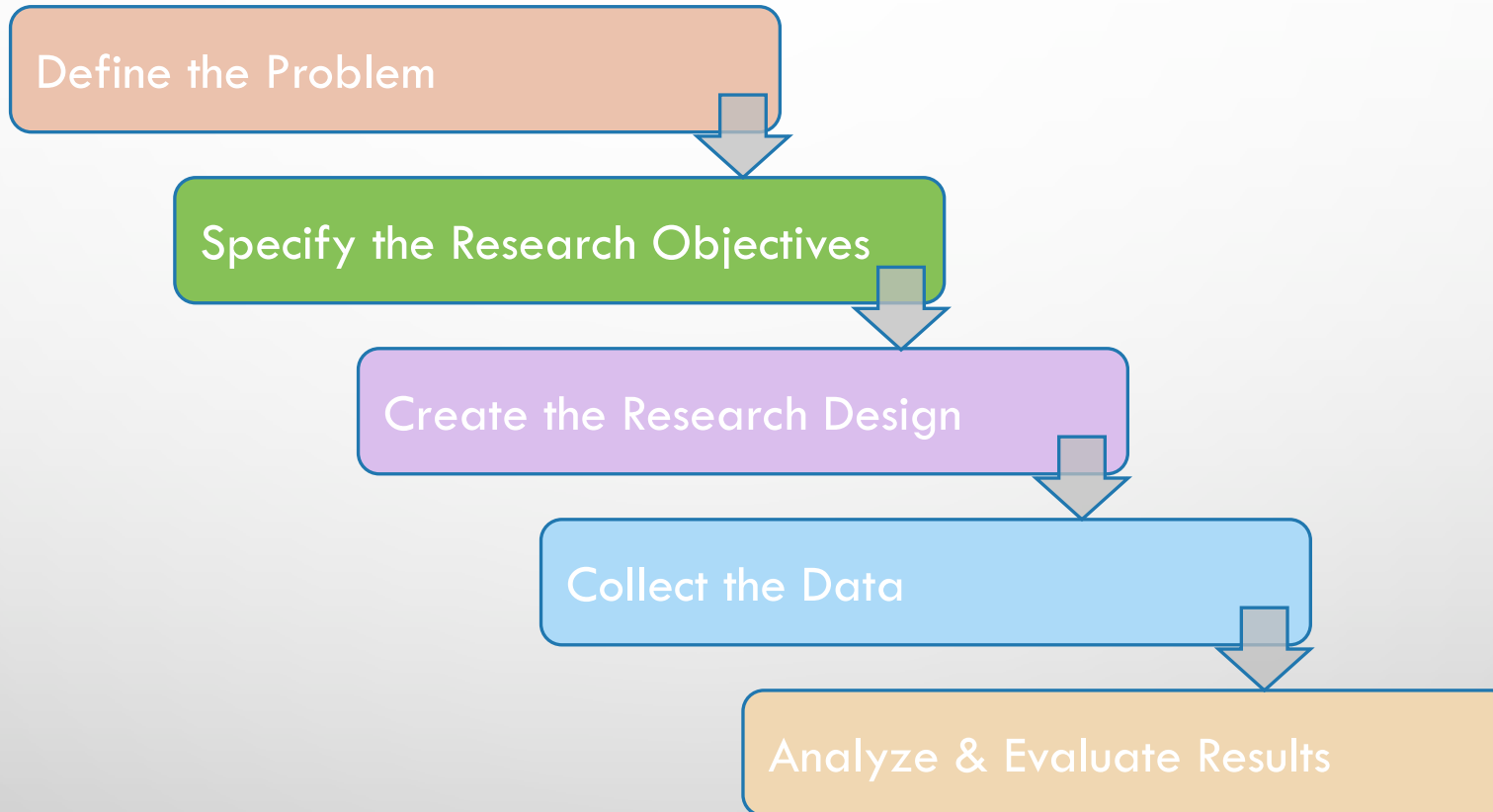
 **Understanding Research Methods**
University of London, SOAS University of London

 **Methods and Statistics in Social Sciences**
5-course Specialization · University of Amsterdam

Steps in the Research Process



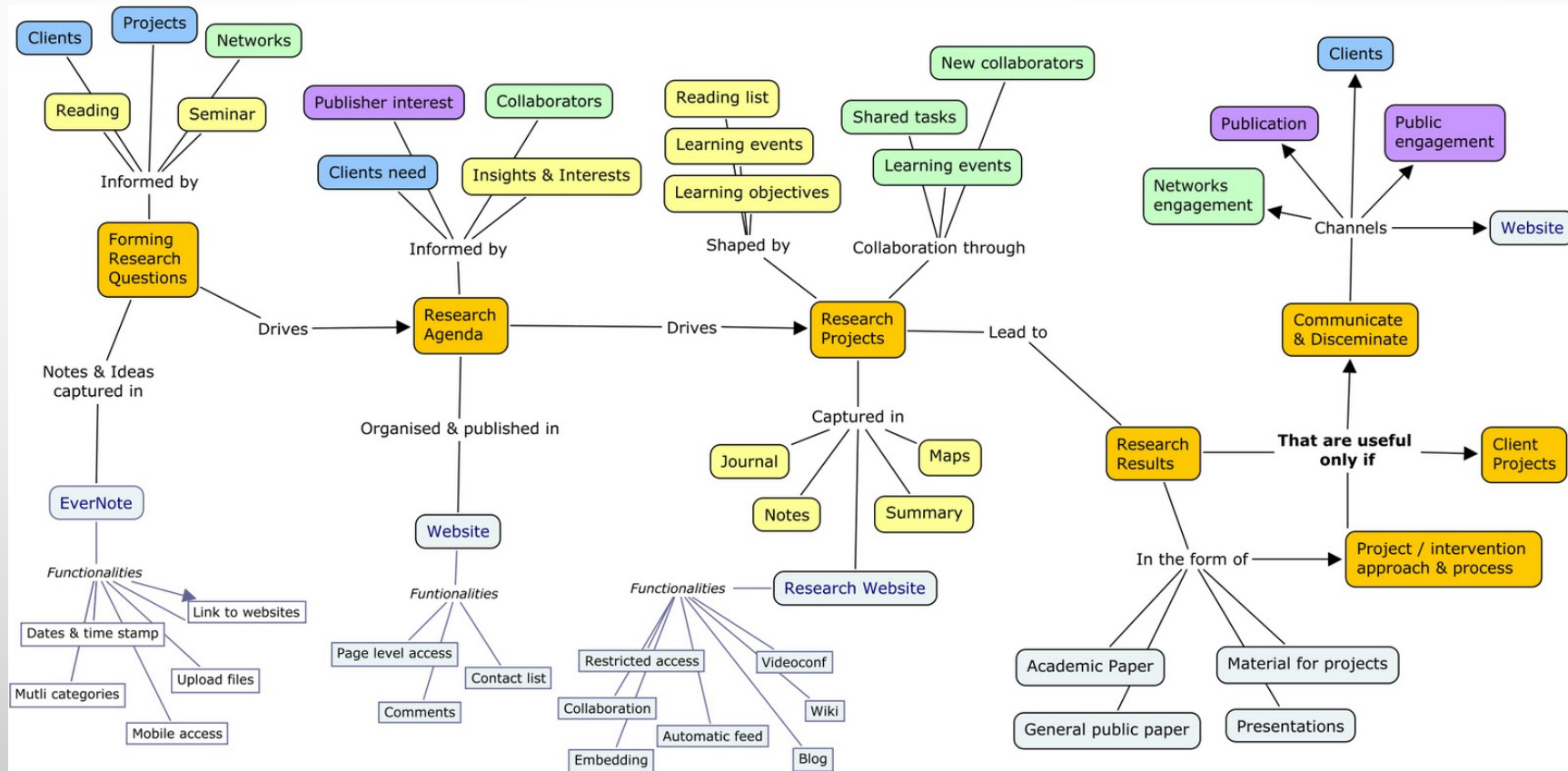
Steps in the Research Process



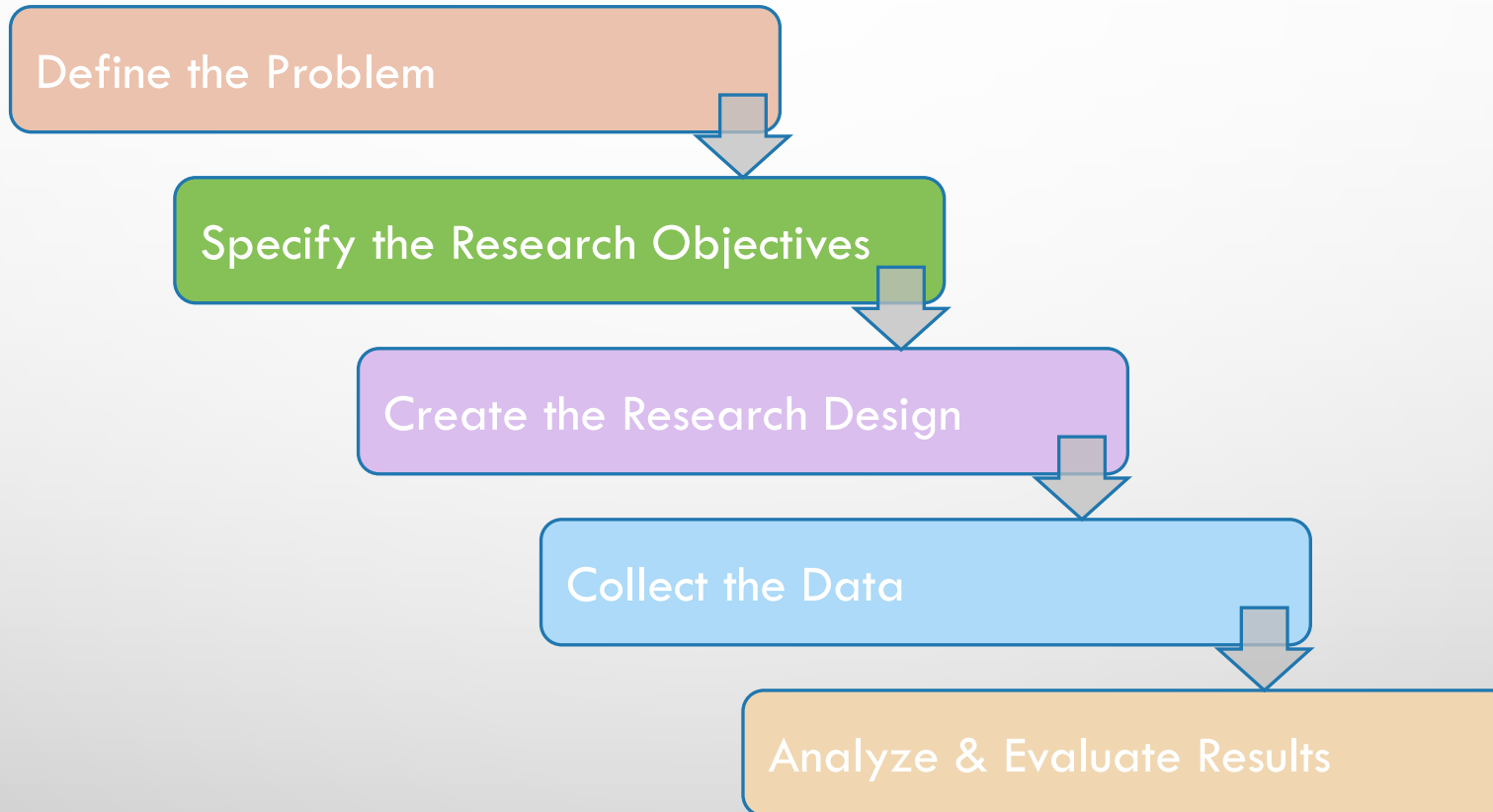
Specifying research objectives

- In order to do this, you need to organize the literature that you read
- The literature review is *not* a list of references
- But an organized body of knowledge of the domain concerned
 - The three most important steps in research... continued!
 - **Record, Collate, Organize (Categorize)**
- Mind maps and concept maps help us capture this organization
 - CMap Tools: cmap.ihmc.us

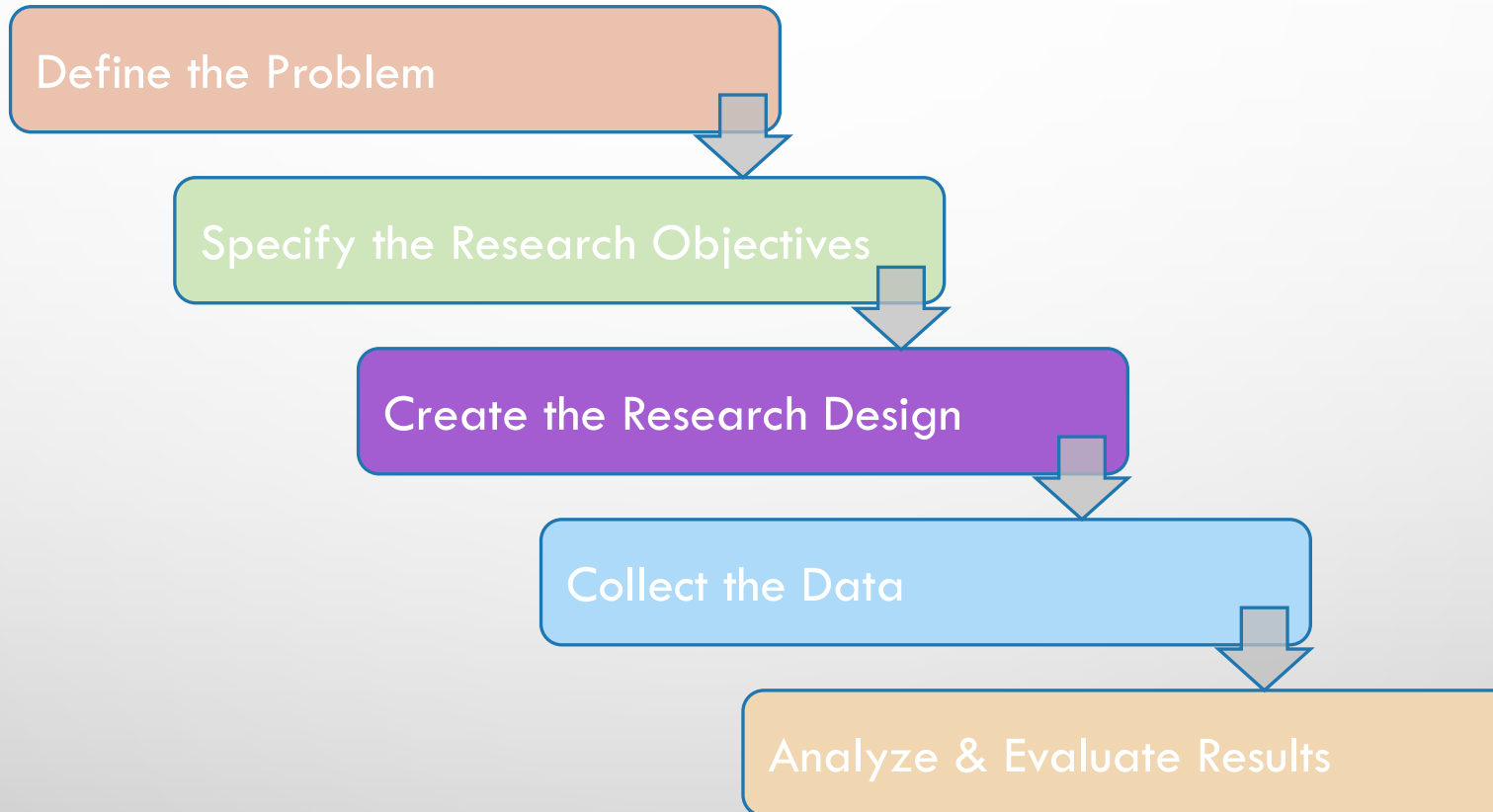
ICTs in specifying research objectives



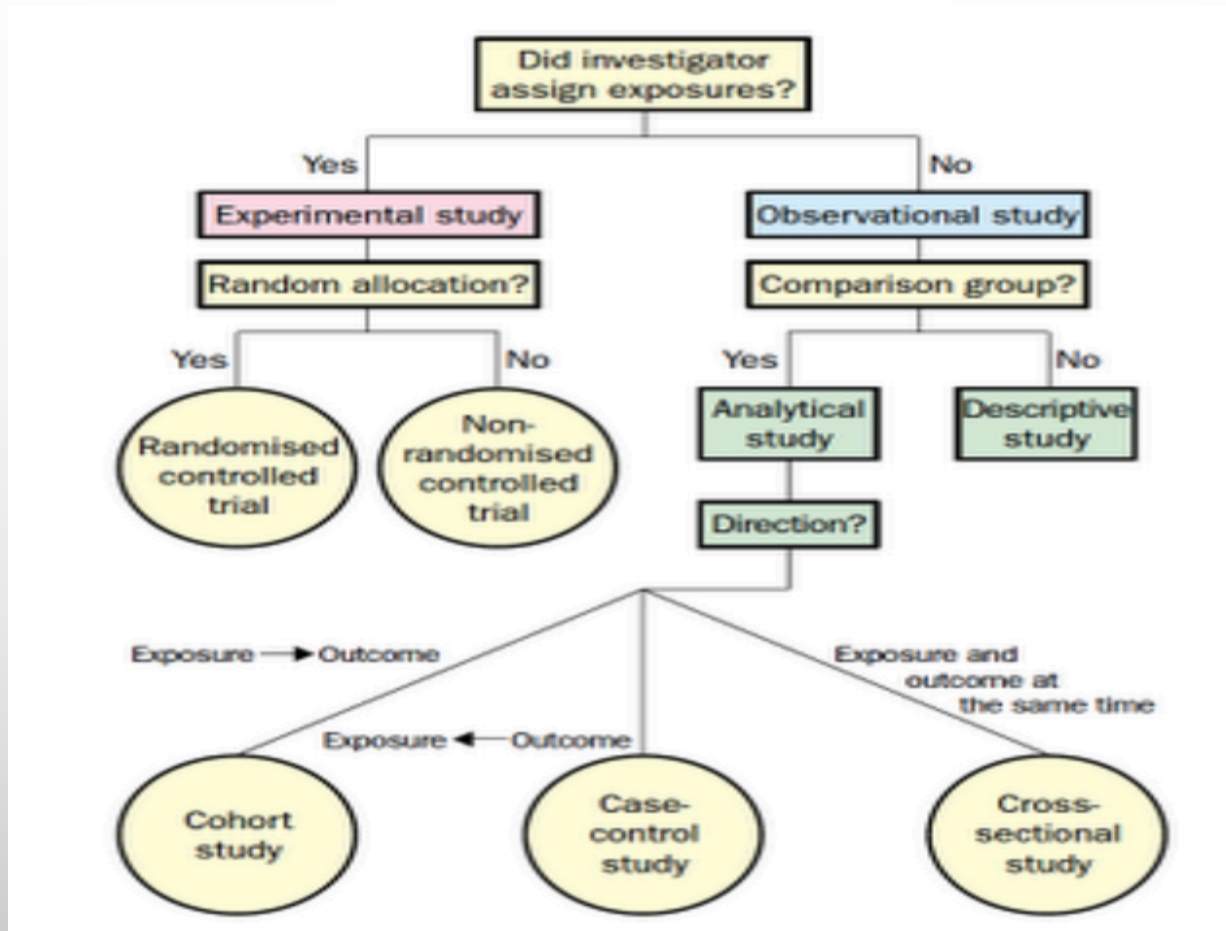
Steps in the Research Process



Steps in the Research Process



Creating the research design



Creating the research design

- Diagramming tools
 - Libre / OpenOffice Draw, MS Visio, Dia
 - Flowchart maker: www.draw.io
 - Creately – online, mobile

Creating the research design

The image shows a promotional banner for Creately. At the top left is the Creately logo, which consists of a lightbulb icon above the word "creately" in a blue, lowercase sans-serif font. To the right of the logo is a horizontal navigation menu with the following items: "Features", "Products" (with a dropdown arrow), "Examples", "Pricing", "Community", "Resources" (with a dropdown arrow), and "About" (with a dropdown arrow). The main body of the banner has a dark blue background. On the left side, the text "DIAGRAMMING & COLLABORATION" is written in large, white, uppercase letters. Below this, in smaller white text, it says "Beautiful, Easy and built for teams. Flowcharts, UML, UI Mockups and more." At the bottom left of this section is a yellow rectangular button with the text "Try Creately Now" in bold black font and "No registration required" in a smaller black font below it. On the right side of the banner, there are two overlapping browser window screenshots. The top window shows a flowchart with a central play button icon. The bottom window shows a UML class diagram. The background of the banner is decorated with various white icons in blue circles, including a cloud, a lightbulb, a pie chart, a network diagram, a document, a speech bubble, a person, a server, a bar chart, and a magnifying glass.

creately

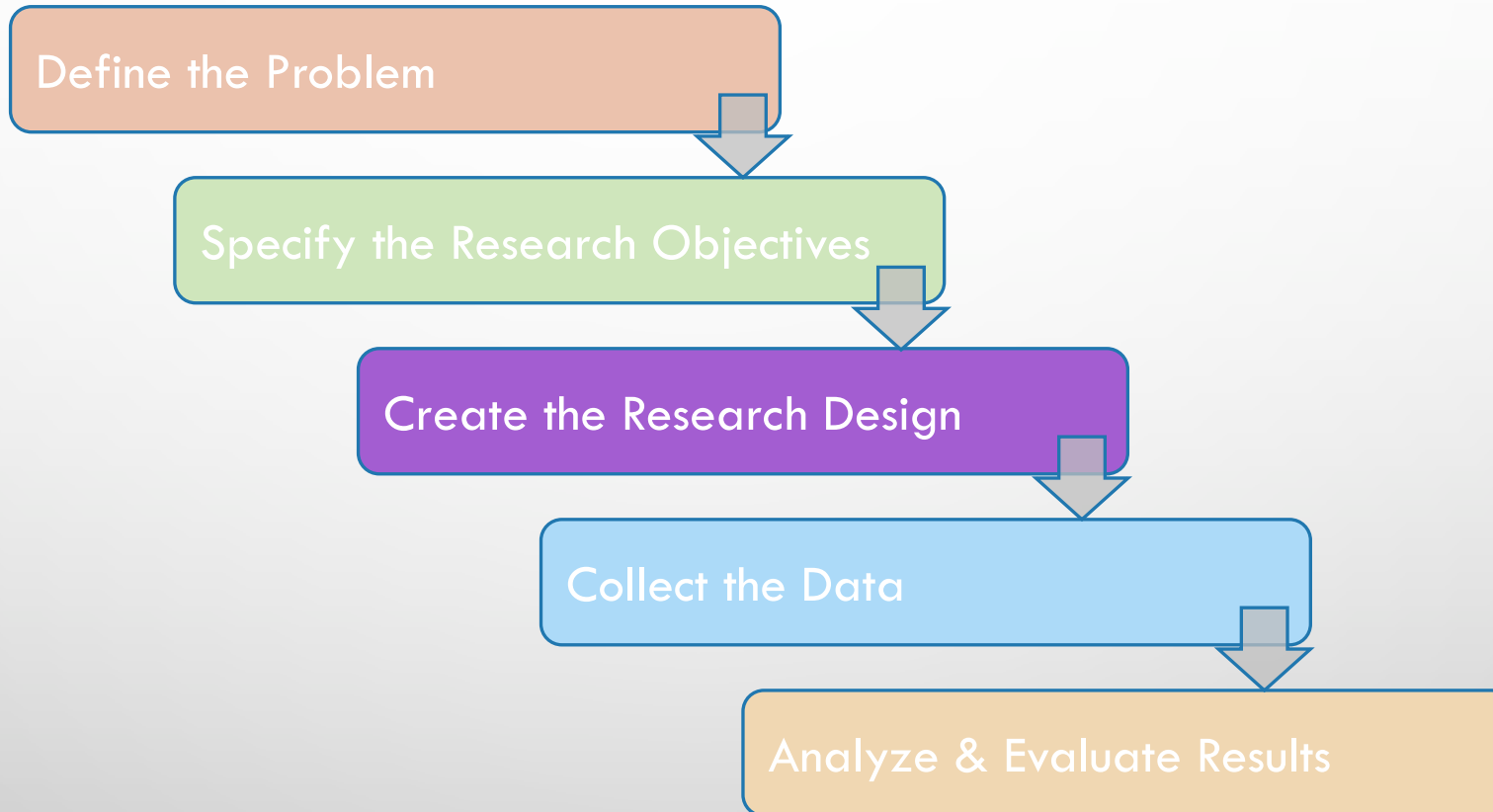
Features Products ▾ Examples Pricing Community Resources ▾ About ▾

DIAGRAMMING & COLLABORATION

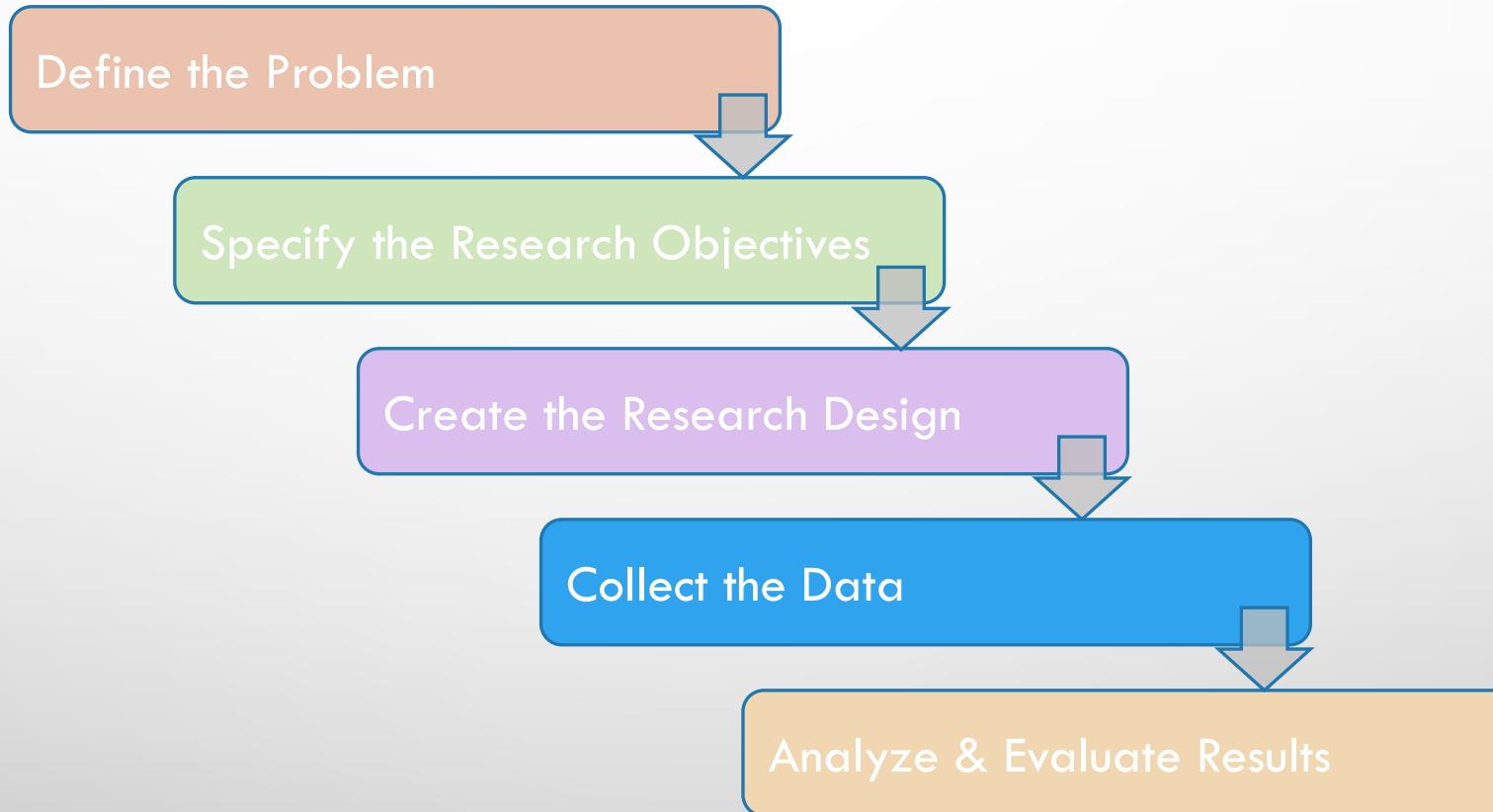
Beautiful, Easy and built for teams.
Flowcharts, UML, UI Mockups and more.

Try Creately Now
No registration required

Steps in the Research Process



Steps in the Research Process



Collecting the data

- Through survey
 - Use SurveyMonkey or google forms:
<https://www.google.com/forms/about/>
- Through observation recording
 - Your mobile device! e.g. Evernote
 - Use spreadsheet: Libre/OpenOffice Calc, MS Office Excel, Google Sheets

Collecting the data

- Secondary data sources
 - Open data archives: data.gov, opendatatoolkit.worldbank.org, Open Access Directory (http://oad.simmons.edu/oadwiki/Data_repositories)
 - Registry of research data repositories: www.re3data.org

Collecting the data

BROWSE TOPICS



Agriculture



Business



Climate



Consumer



Ecosystems



Education



Energy



Finance



Health



Local
Government



Manufacturing



Ocean

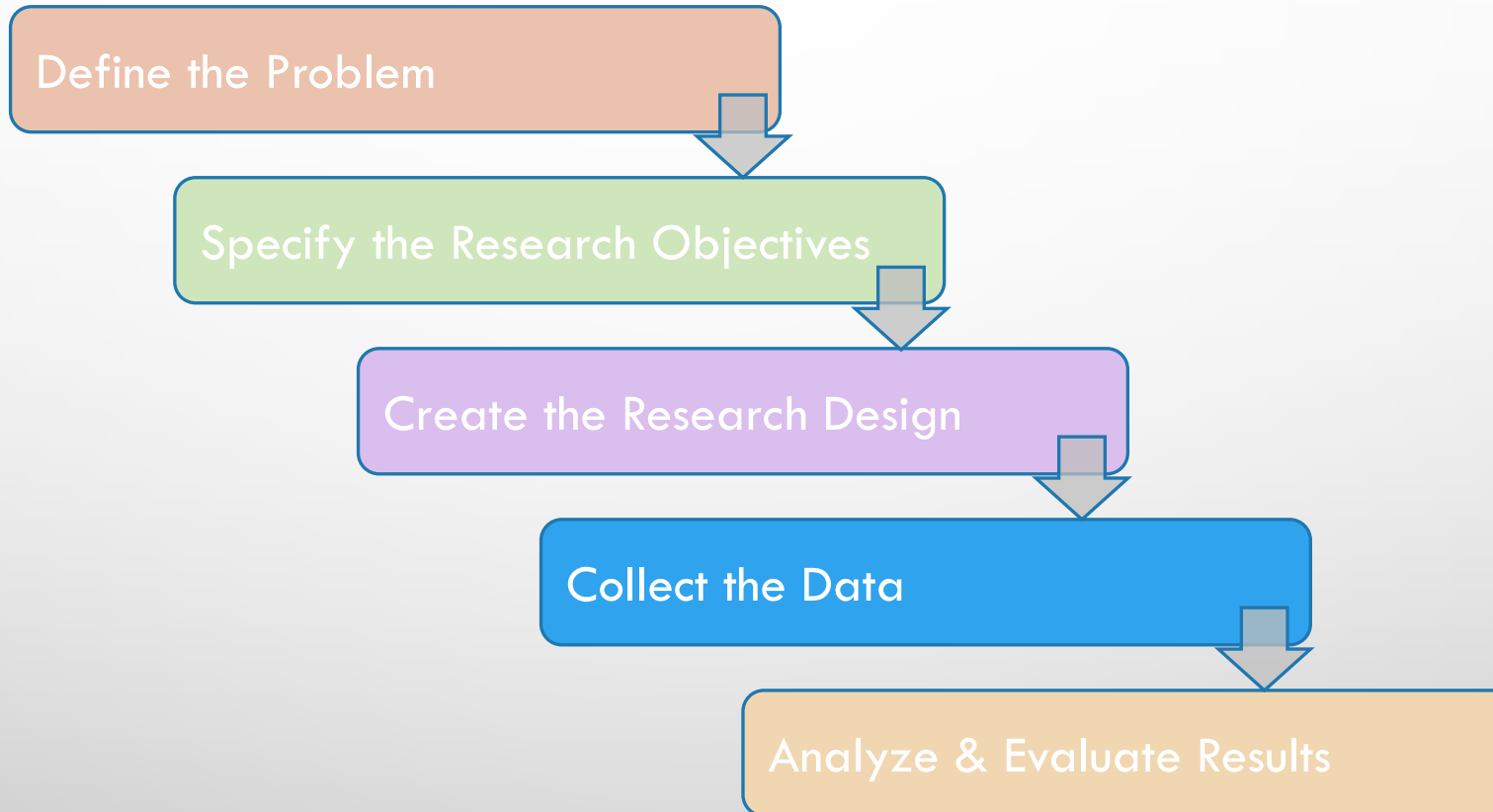


Public Safety

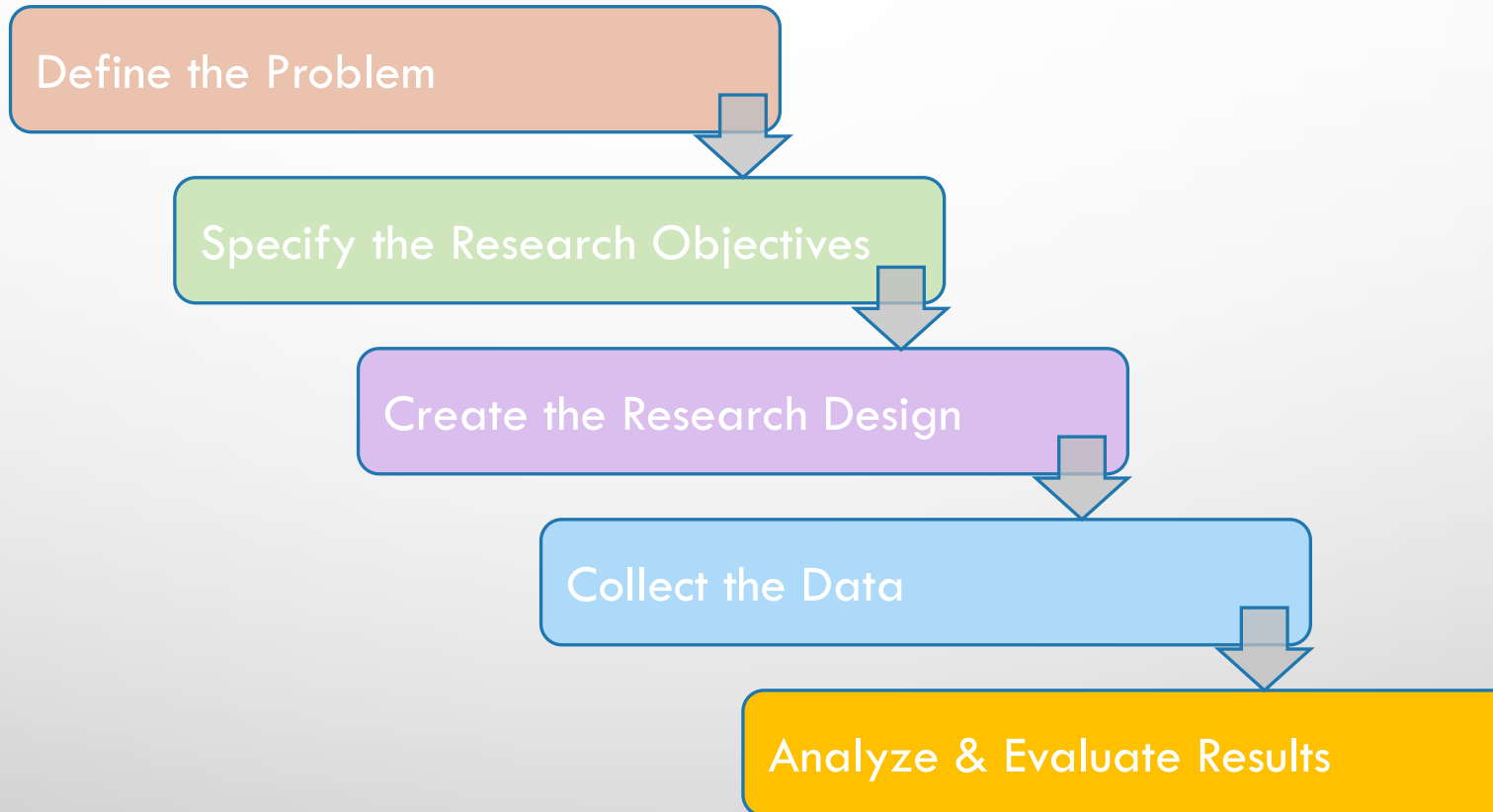


Science &
Research

Steps in the Research Process



Steps in the Research Process

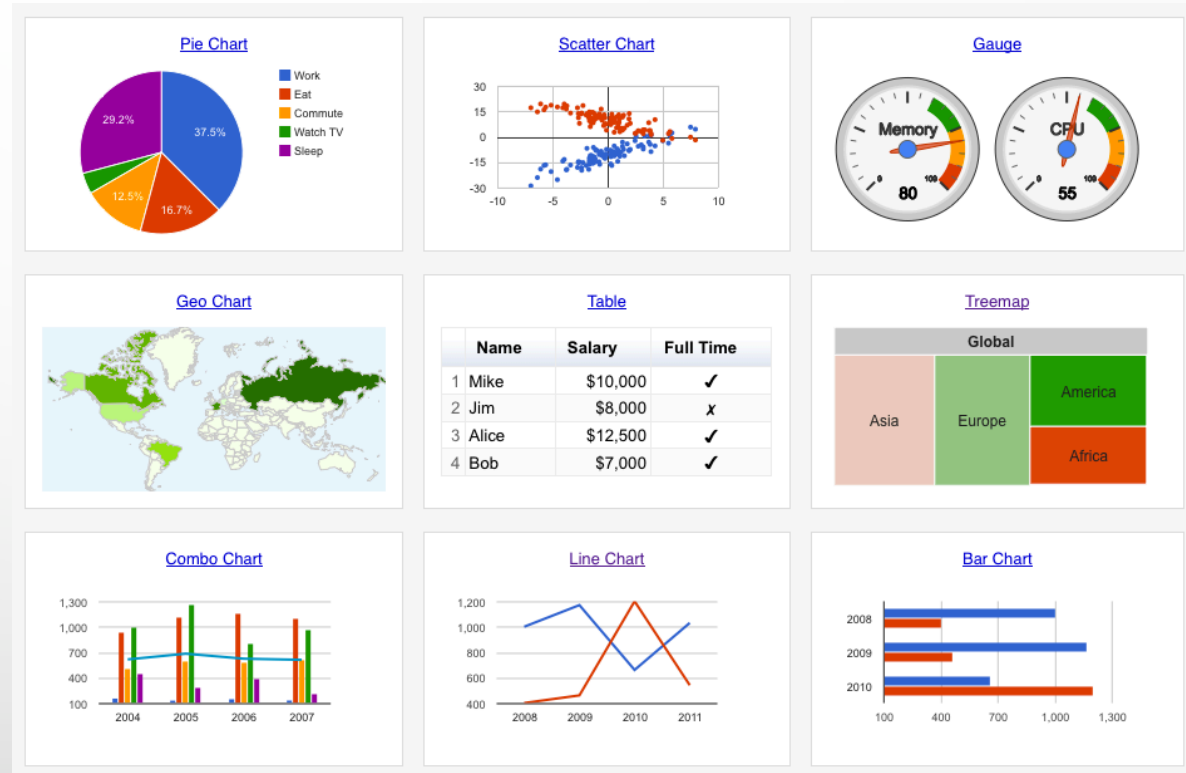


Analyze and evaluate results

- Analyzing the data collected
 - Libre / OpenOffice Calc, MS Excel, Google Sheets
 - Minitab, SPSS (PSPP), SAS (University Edition)
 - QDA Miner Lite, RQDA, NVivo, Dedoose.com (cloud)
 - Going further (R or Python programming)

Analyze and evaluate results

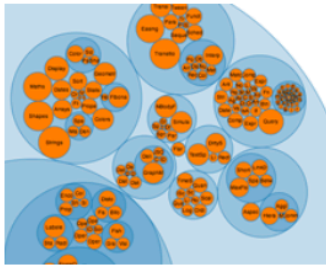
- Visualizing the data story
 - MS Excel
 - Tableau



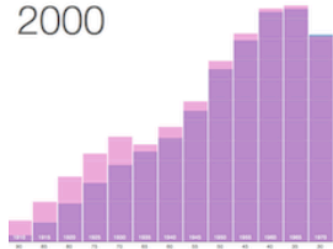
Analyze and evaluate results

<http://datavizproject.com>

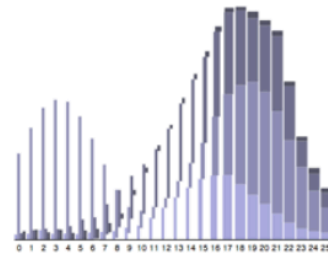
Circle Packing



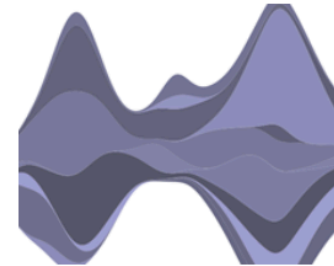
Population Pyramid 2000



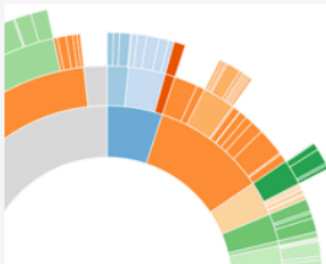
Stacked Bars



Streamgraph



Sunburst



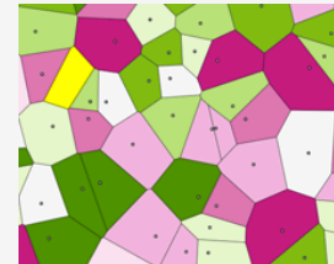
Node-Link Tree



Treemap



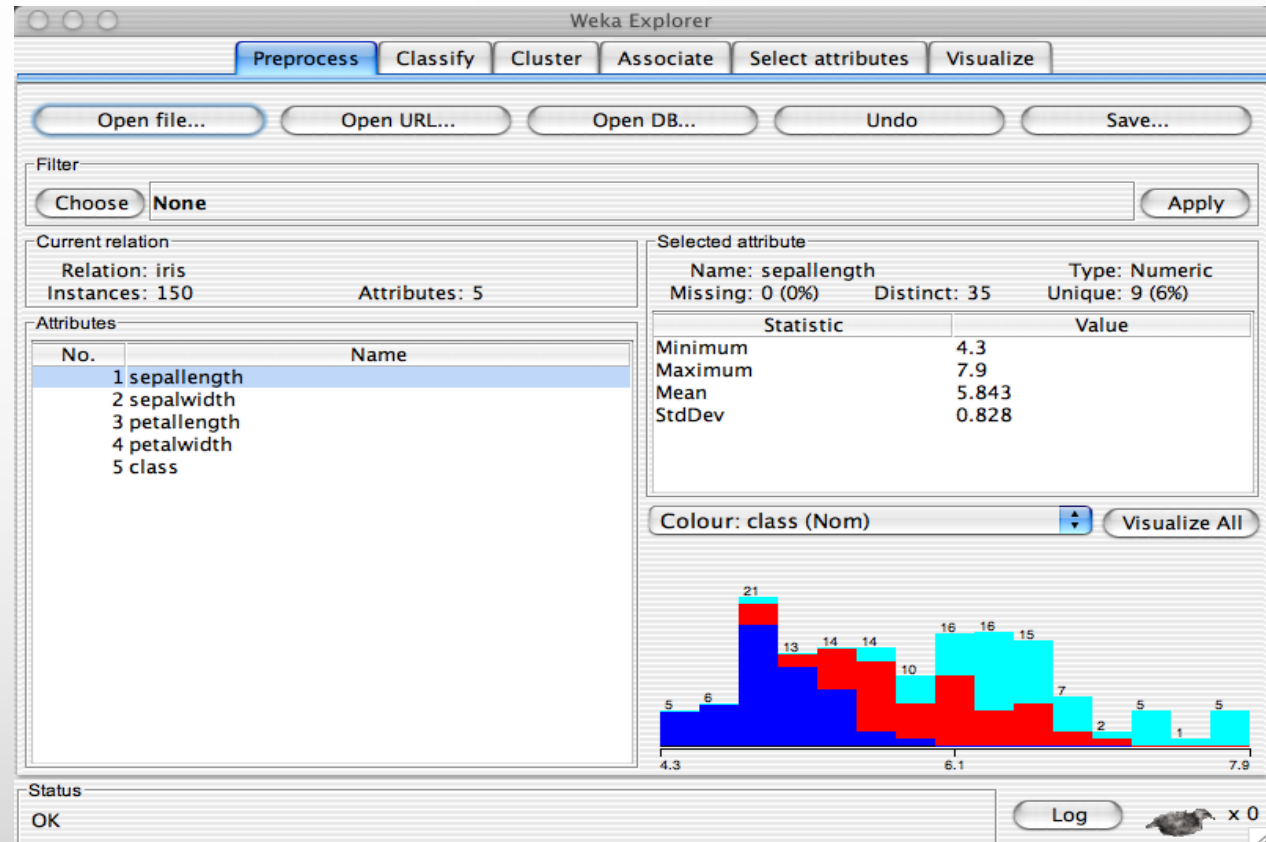
Voronoi Diagram



<http://datavizcatalogue.com>

Analyze and evaluate results

- Going further...
 - R (ggplot)
 - Python (plotly, matplotlib)
 - Chart.js, D3.js
 - Rapidminer, WEKA and Orange



Analyze and evaluate results

- Visualizing the 'data story'
 - [Hans Rosling](#) – when 2 dimensions are not enough!
 - Try it yourself: gapminder.org/world



Analyze and evaluate results

- So, the three most important steps in research...

Tell

Write

Present!



Analyze and evaluate results: telling

- Telling the story
 - Never too early
 - To yourself, friends, relatives, family, mother, pet...
 - The more iterations the better
 - I'm working on X in order to Y so that my audience will Z

Analyze and evaluate results: writing

- Presenting the story: in written form
 - The dissertation / thesis
 - Libre / OpenOffice Write, MS Word, Kingsoft Office
 - With Mendeley or Zotero plug-in
 - LaTeX: Texmaker on Desktop; Authorea / Sharelatex / Overleaf for online

Analyze and evaluate results: presenting

- Presenting the story: in person
 - Presentation software: Libre / OpenOffice Impress, MS Powerpoint

- Prezi



Analyze and evaluate results

<http://prezi.com>

The screenshot displays the Prezi web interface. On the left is a dark sidebar with navigation options: 'All synced prezis' (11 items), 'All local prezis' (6 items, currently selected), and 'Import a prezis'. At the bottom of the sidebar, it shows '0 days left Upgrade to Pro' and the user's name 'Ruvan Weerasinghe'. The main area is titled 'All local prezis' and contains a grid of presentation thumbnails. Each thumbnail shows a preview of the presentation's content and includes the title, author, and creation time.

Thumbnail Preview	Title	Author	Creation Time
Diagram with 'Renaissance' in the center, surrounded by 'Result', 'Cause', 'Science', and 'Arts'. A small box in the top right says 'Capture of Constantinople'.	Renaissance	by Ruvan Weera...	2 minutes ago
Diagram with 'LTRL' in the center, surrounded by 'Partners', 'Vision', 'Strategies', and 'Mission'. The background is yellow.	LTRL 2011 On	by Ruvan Weera...	on 21 July 2015
Blank white space.	Pan l10n past present	by Ruvan Weera...	on 21 July 2015
Blank white space.	English to sinhala machine	by Ruvan Weera...	on 21 July 2015
Diagram with 'preaching the anti-gospel' in the center, surrounded by various icons and arrows.	Preaching anti	by Ruvan Weera...	on 21 July 2015
Diagram with 'Renaissance' in the center, surrounded by 'Result', 'Cause', 'Science', and 'Arts'. A small box in the top right says 'Capture of Constantinople'.	Renaissance	by Ruvan Weera...	on 21 July 2015

Summary

- Which ICTs to use for research?
- For minimal installation (applications/software)
 - LibreOffice 5.1, OpenOffice 4.1, MS Office 2016, WPS Office 2016 (Kingsoft)
 - Google Docs/Sheets/Forms, Overleaf for cloud/online
- For enhanced features
 - Mendeley (for recording)
 - CMap Tools (for organizing)
- Essential online support: Google Scholar, ResearchGate, Skype