The Concept of Research

Dr. Muhammad Said Hasibuan

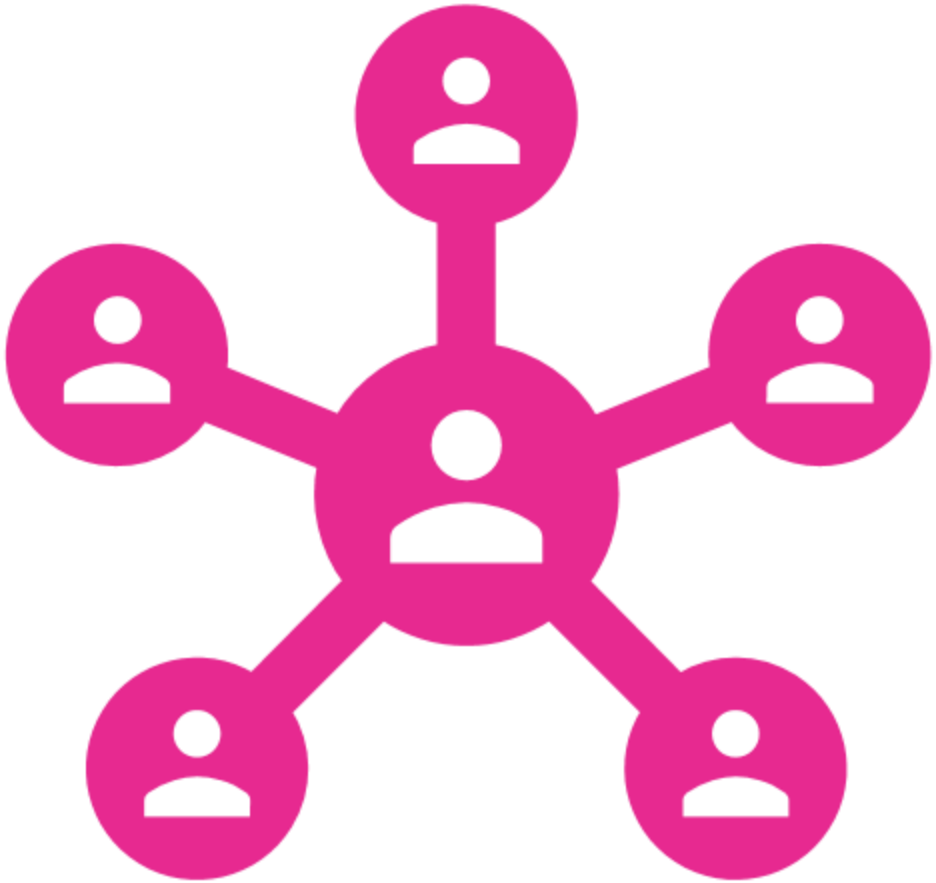
Definition

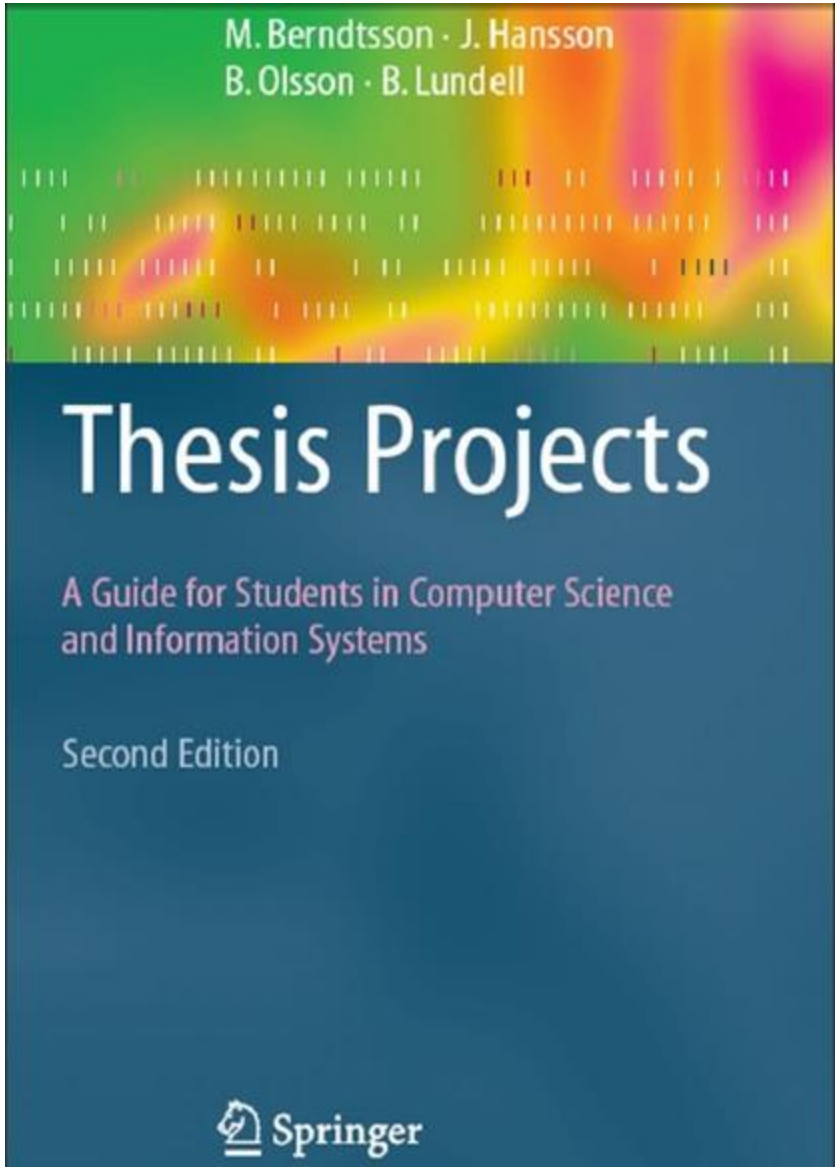
Research:

The good researcher is not 'one who knows the right answers' but 'one who is struggling to find out what the right questions might be!'

State of the art:

the current stage of development of a practical or technological subject





Mengapa Melakukan Penelitian?

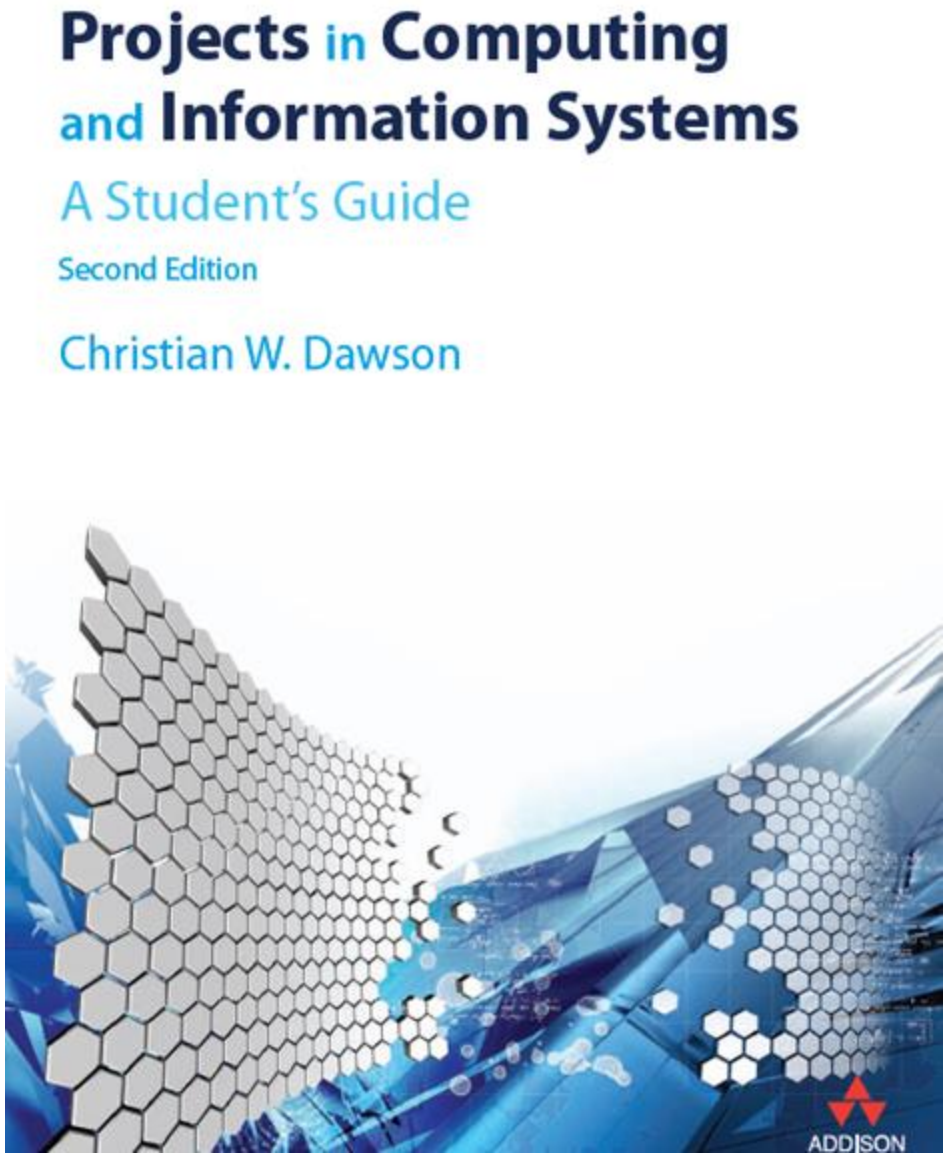
Berangkat dari adanya masalah penelitian

- yang mungkin sudah diketahui metode pemecahannya
- tapi belum diketahui metode pemecahan yang lebih baik

Research (Inggris) dan recherche (Prancis)

- re (kembali)
- to search (mencari)

The process of exploring the unknown, studying and learning new things, building new knowledge about things that no one has understood before
(Berndtsson et al., 2008)



Apa Yang Dikejar di Penelitian?

Research is a considered activity, which aims to make an original contribution to knowledge

(contribution to the body of knowledge, in the research field of interest)

(Dawson, 2009)

Bentuk Kontribusi ke Pengetahuan

Kegiatan penyelidikan dan investigasi terhadap suatu masalah yang dilakukan secara berulang-ulang dan sistematis, dengan tujuan untuk menemukan atau merevisi teori, metode, fakta, dan aplikasi

(Berndtsson et al., 2008)

Kontribusi ke Pengetahuan vs Kontribusi ke Masyarakat

Kontribusi ke masyarakat tidak secara langsung bisa diukur, karena itu tidak dimasukkan ke tujuan penelitian, tapi ke manfaat penelitian

Apa itu Penelitian?

Penelitian dilakukan karena ada masalah penelitian, dimana masalah penelitian sendiri muncul karena adanya latar belakang masalah, yang terlahir dari masalah kehidupan

Penelitian dilakukan secara terencana, sistematis, berulang-ulang dan terukur

Penelitian harus memiliki orisinalitas (*originality*) dan kebaruan (*novelty*), serta menghasilkan kontribusi yang orisinil pada pengetahuan dalam bentuk menemukan atau merevisi teori, metode, fakta, dan aplikasi

Pengembangan Software vs Penelitian

Membangun software bukanlah tujuan utama penelitian, hanya *testbed* untuk mempermudah kita dalam mengukur hasil penelitian

- Tidak ada listing code, UML atau screenshot software di paper-paper journal (SCOPUS/WoS), kecuali penelitian tentang perbaikan paradigma pemrograman, analisis design, dsb

Ketika pada penelitian kita mengusulkan perbaikan suatu algoritma (*proposed method*)

- Bidang image processing, topik penelitian face recognition, memikirkan perbaikan metode/algoritma untuk pengenalan wajah dengan akurat/efisien
- Bidang data mining, topik decision tree, memikirkan perbaikan algoritma decision tree sehingga bisa memprediksi (klasifikasi) dengan lebih akurat
- Untuk mempermudah eksperimen dan evaluasi, kita menulis kode program (software) untuk menguji dan mengevaluasi performance dari algoritma yang kita usulkan

Karakter Peneliti

Peneliti itu boleh salah

- salah hipotesis
- salah analisis
- salah pengujian hipotesis
- dsb

Tapi peneliti tidak boleh bohong atau menipu

- mempermainkan data
- manipulasi hasil pengolahan statistik
- dsb

Klasifikasi Penelitian

Klasifikasi Penelitian

1. Pendekatan

1.Pendekatan Kualitatif

2.Pendekatan Kuantitatif

2. Metode

1.Metode Penelitian Tindakan

2.Metode Eksperimen

3.Metode Studi Kasus

4.Metode Survei

3. Jenis

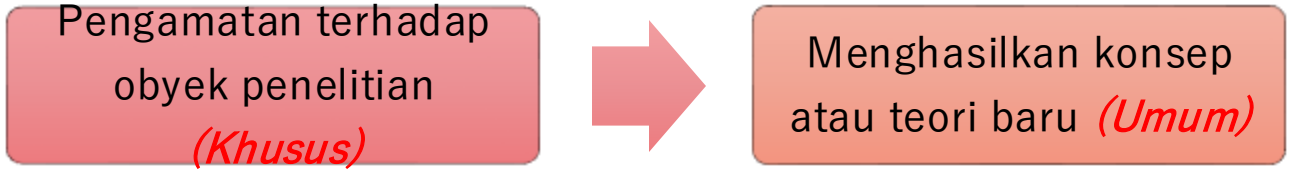
1.Dasar vs Terapan

2.Eksplanatori vs Konfirmatori

3.Deskripsi vs Eksperimen vs Korelasi

1. Pendekatan

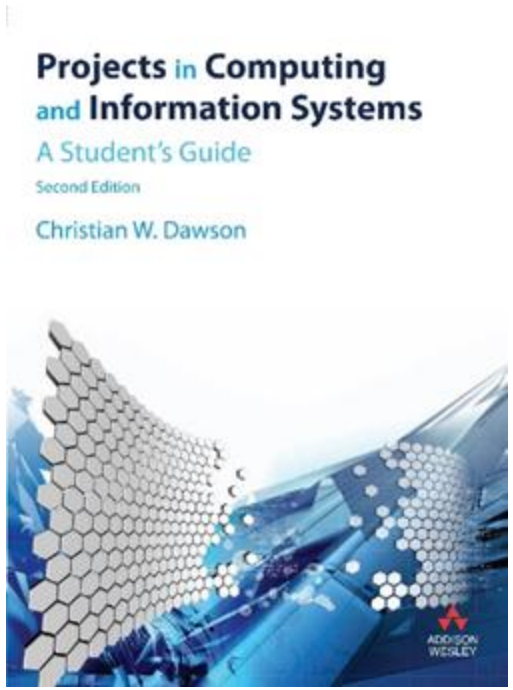
1. Pendekatan Kualitatif:
   - Dari ilmu sosial, konsepnya peningkatan pemahaman terhadap sesuatu, dan bukan membangun penjelasan dari sesuatu *(Berndtsson et al., 2008)*
   - Sifatnya subyektif, berorientasi ke observasi tanpa dikontrol, dan secara umum tidak ada generalisasi *(Blaxter, Hughes, & Tight, 2006)*
   - Dilakukan bidang sistem informasi, dengan metode penelitian seperti "studi kasus" dan "survei", berbasis pola alur induktif



2. Pendekatan Kuantitatif:
   - Dari ilmu alam, konsepnya bagaimana sesuatu dibangun dan bekerja, dan membangun penjelasan dari sesuatu
   - Sifatnya obyektif, berorientasi ke verifikasi, observasi yang dikontrol, dan secara umum ada generalisasi *(Blaxter et al., 2006)*
   - Menggunakan skala numerik, berbasis pola alur deduktif-induktif

dtsso 8)

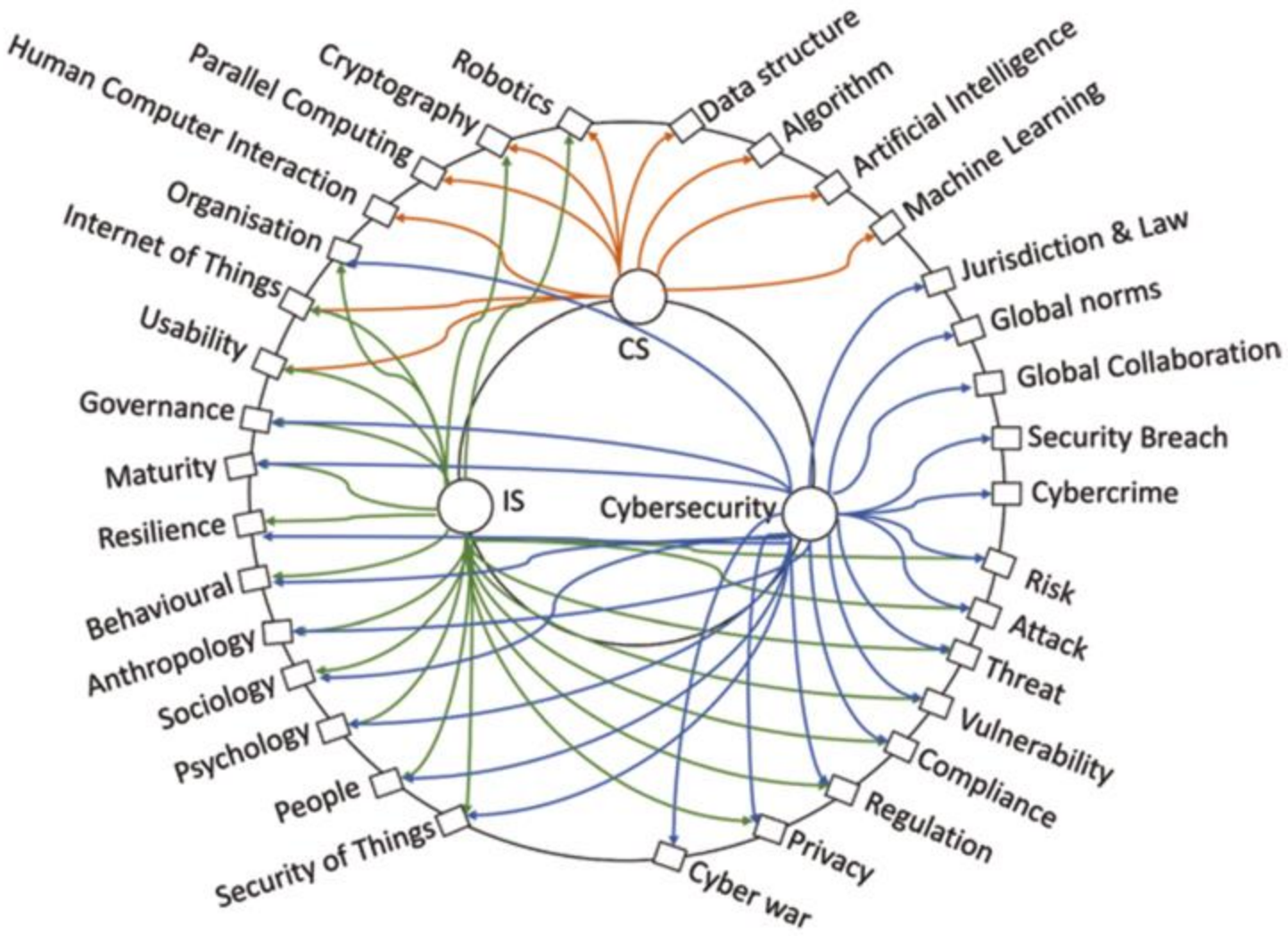
2. Metode



1. Penelitian Tindakan
   - Studi berupa monitoring dan pencatatan penerapan sesuatu oleh peneliti secara hati-hati, yang tujuannya untuk memecahkan masalah dan mengubah situasi *(Herbert, 1990)*
   - Penelitian Tindakan Kelas (PTK) di bidang Pendidikan
2. Eksperimen
   - Investigasi hubungan sebab akibat dengan menggunakan ujicoba yang dikontrol oleh peneliti
   - Melibatkan pengembangan dan evaluasi
   - Penelitian bidang Science dan Teknik
3. Studi Kasus
   - Eksplorasi satu situasi secara mendalam dan hati hati *(Cornford and Smithson, 2006)*
   - Penelitian bidang Sosial, Ekonomi, Politik
4. Survei
   - Pengumpulan data dari populasi yang bisa diukur, dengan cara yang ekonomis *(Saunders et al., 2007)*
   - Melibatkan penggunaan kuesioner dan interview

(Dawson, 2009)

Computer Science (CS), Information Systems (IS) and Cybersecurity (CY) Research



Metode Pengukuran User Experience

- Questioner For User Interaction Satisfaction (QUIS)
- Standardized User Experience Percentile Rank (SUPR-Q)
- System Usability Scale (SUS)
- Software Usability Measurement Inventory (SUMI)
- User Experience Questionnaire (USQ)

UEQ

User Experience Questionnaire

A fast and reliable questionnaire to measure the User Experience of interactive products.

Available in more than 30 languages. Easy to use due to rich supplementary material.

What does it measure?

The scales of the questionnaire cover a comprehensive impression of user experience. Both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (originality, stimulation) are measured.

Attractiveness

Overall impression of the product. Do users like or dislike it?

Perspicuity

Is it easy to get familiar with the product and to learn how to use it?

Efficiency

Can users solve their tasks without unnecessary effort? Does it react fast?

Author: Henning Brau

Author: Henning Brau

Authors: Peter Strauch, Eva Pankova, Jozef Hanč

Korean

Authors: Apolline Mallet, Sumi Ledain

Download

This section list all materials required to work with the UEQ. Everything is completely free of charge.

Handbook

Describes the most important facts concerning the usage of the UEQ.

Download

Questionnaire (PDF)

The User Experience Questionnaire in all language versions as PDF.

Download

Data Analysis Tools

Two Excel-Sheets that make the analysis of your results easy.

Download

Short version UEQ-S

A short version of the UEQ with just 8 items is available for some special application scenarios.

Questionnaire

Data Analysis Tool (UEQ-S)

Saat ini silakan evaluasi produk dengan memilih satu lingkaran tiap baris item.

	1	2	3	4	5	6	7		
menyusahkan	O	O	O	O	O	O	O	menyenangkan	1
tak dapat dipahami	O	O	O	O	O	O	O	dapat dipahami	2
kreatif	O	O	O	O	O	O	O	monoton	3
mudah dipelajari	O	O	O	O	O	O	O	sulit dipelajari	4
bermanfaat	O	O	O	O	O	O	O	kurang bermanfaat	5
membosankan	O	O	O	O	O	O	O	mengasyikkan	6
tidak menarik	O	O	O	O	O	O	O	menarik	7
tak dapat diprediksi	O	O	O	O	O	O	O	dapat diprediksi	8
cepat	O	O	O	O	O	O	O	lambat	9
berdaya cipta	O	O	O	O	O	O	O	konvensional	10
menghalangi	O	O	O	O	O	O	O	mendukung	11
baik	O	O	O	O	O	O	O	buruk	12
rumit	O	O	O	O	O	O	O	sederhana	13
tidak disukai	O	O	O	O	O	O	O	menggembirakan	14
lazim	O	O	O	O	O	O	O	terdepan	15
tidak nyaman	O	O	O	O	O	O	O	nyaman	16
aman	O	O	O	O	O	O	O	tidak aman	17
memotivasi	O	O	O	O	O	O	O	tidak memotivasi	18
memenuhi ekspektasi	O	O	O	O	O	O	O	tidak memenuhi ekspektasi	19
tidak efisien	O	O	O	O	O	O	O	efisien	20
jelas	O	O	O	O	O	O	O	membingungkan	21
tidak praktis	O	O	O	O	O	O	O	praktis	22
terorganisasi	O	O	O	O	O	O	O	berantakan	23
atraktif	O	O	O	O	O	O	O	tidak atraktif	24
ramah pengguna	O	O	O	O	O	O	O	tidak ramah pengguna	25
konservatif	O	O	O	O	O	O	O	inovatif	26

Indonesian version

menghalangi	o o o o o o o	mendukung
rumit	o o o o o o o	sederhana
tidak efisien	o o o o o o o	efisien
membingungkan	o o o o o o o	jelas
membosankan	o o o o o o o	mengasyikkan
tidak menarik	o o o o o o o	menarik
konvensional	o o o o o o o	berdaya cipta
lazim	o o o o o o o	terdepan

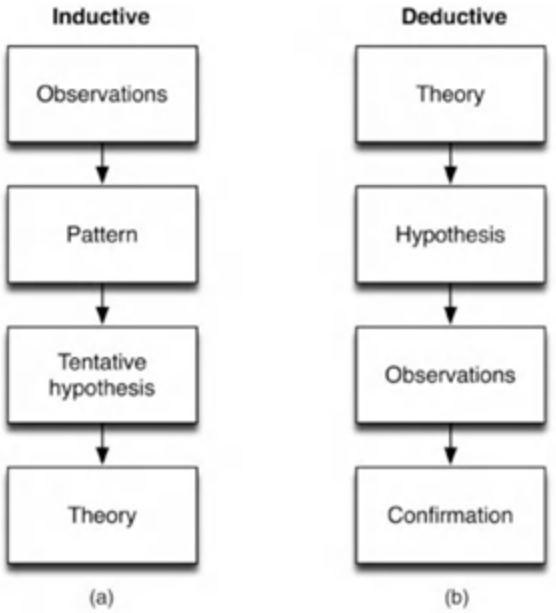
kuesioner

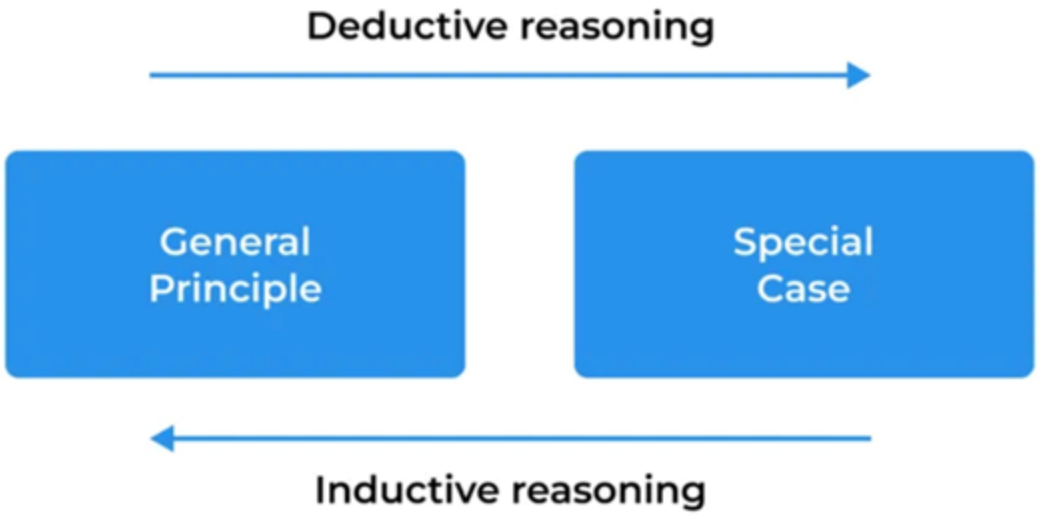
Terima Kasih

Research Methodology

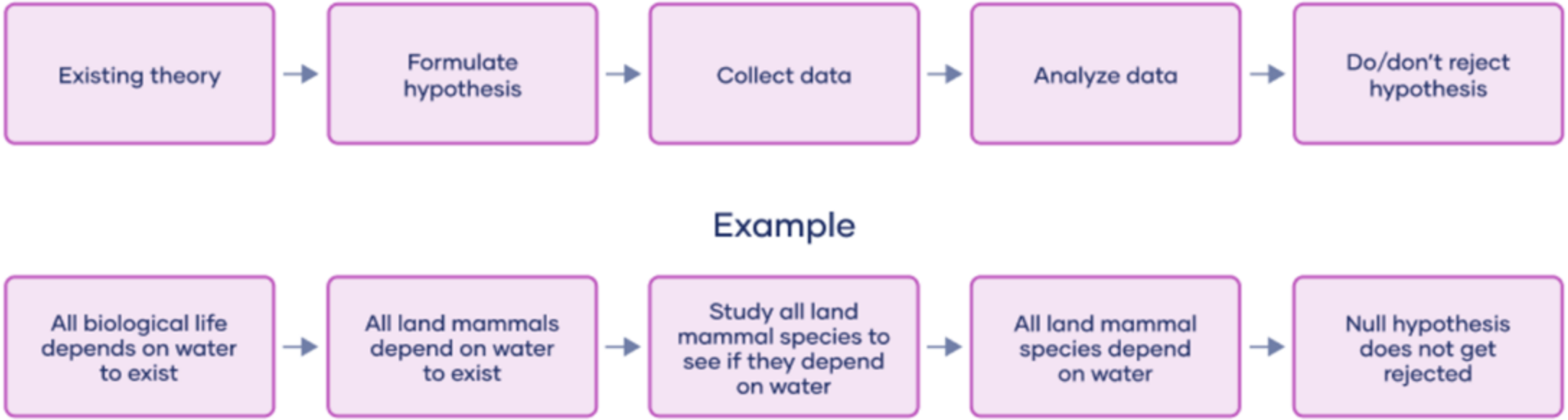
- **What** data to collect (and what data to ignore)
- **Who** to collect it from (in research, this is called "sampling design")
- How to **collect** it (this is called "data collection methods")
- How to **analyse** it (this is called "data analysis methods")

Intellectual discovery

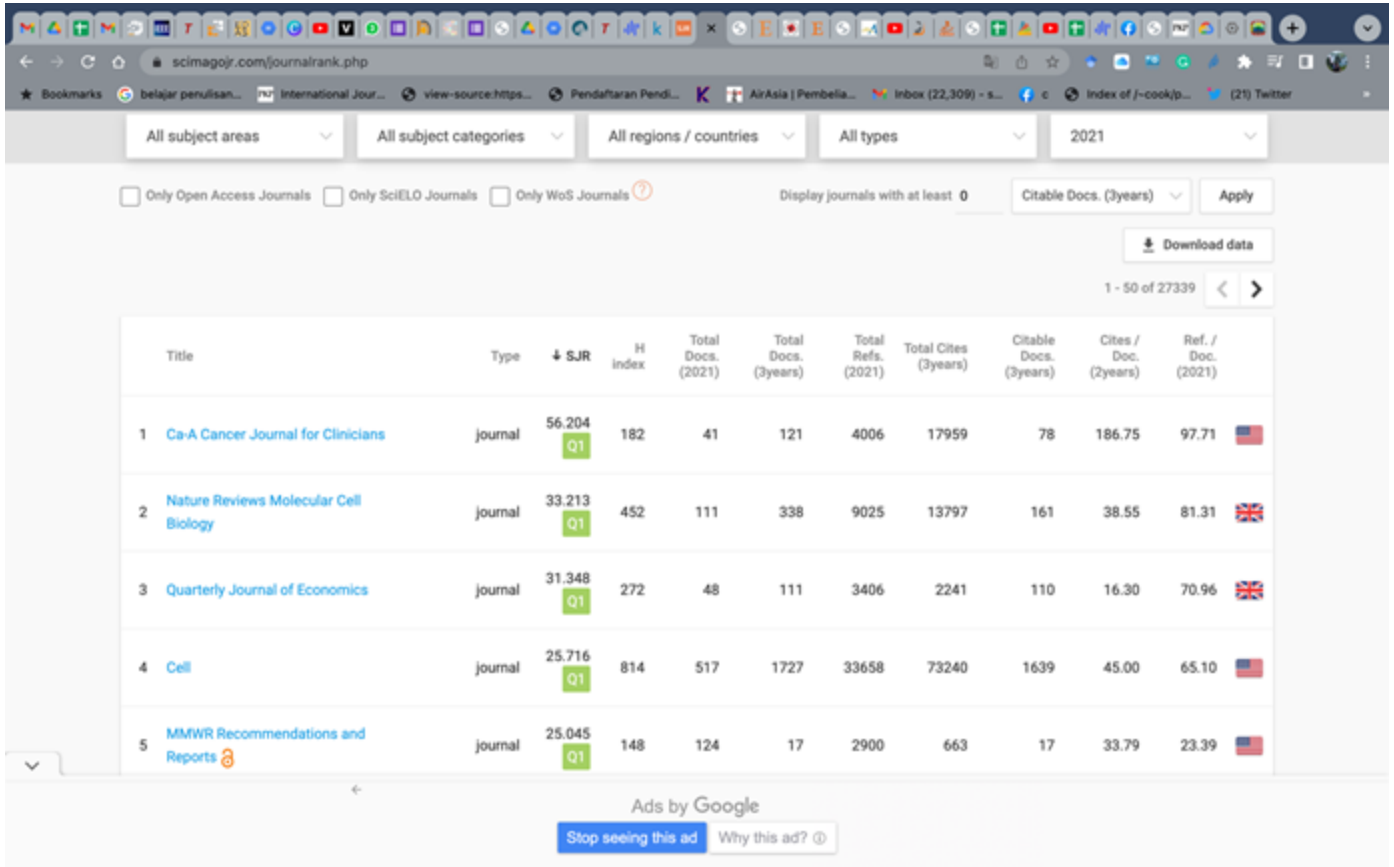




Intellectual discovery



resource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All subject categories
All regions / countries
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2021
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Only SciELO Journals
Only WoS Journals
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Citable Docs. (3years)
Cites / Doc. (2years)
Ref. / Doc. (2021)
1 Ca-A Cancer Journal for Clinicians journal 56.204 Q1 182 41 121 4006 17959 78 186.75 97.71
2 Nature Reviews Molecular Cell Biology journal 33.213 Q1 452 111 338 9025 13797 161 38.55 81.31
3 Quarterly Journal of Economics journal 31.348 Q1 272 48 111 3406 2241 110 16.30 70.96
4 Cell journal 25.716 Q1 814 517 1727 33658 73240 1639 45.00 65.10
5 MMWR Recommendations and Reports journal 25.045 Q1 148 124 17 2900 663 17 33.79 23.39
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Q2

Journal of Technology and Science Education

The Journal of Technology and Science Education (JOTSE) has been created as a contribution to the development and improvement of scientific and technological education by constituting a common space to share experiences to all those who, somehow, are involved in the teaching and learning processes of engineering studies, in all modalities.

This journal aims at publishing two issues a year besides special editions. This scholarly periodical will serve as a meeting space for teaching innovation of the academic community wishing to analyse or observe methodological and pedagogical factors that may influence and enhance the learning experience of engineers.

Focus and scope

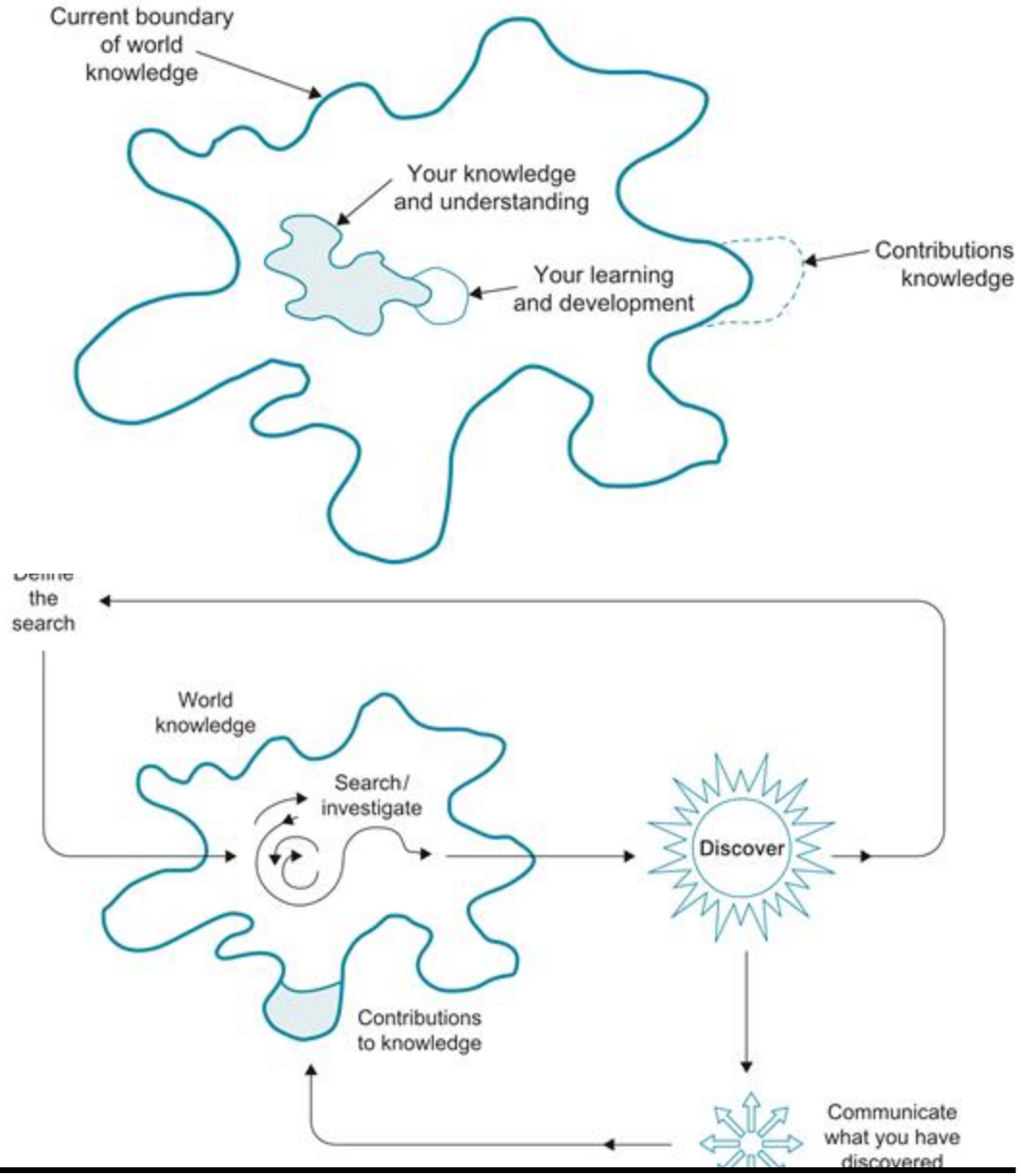
Announcements

Call for papers special issue: Towards a sustainable school culture

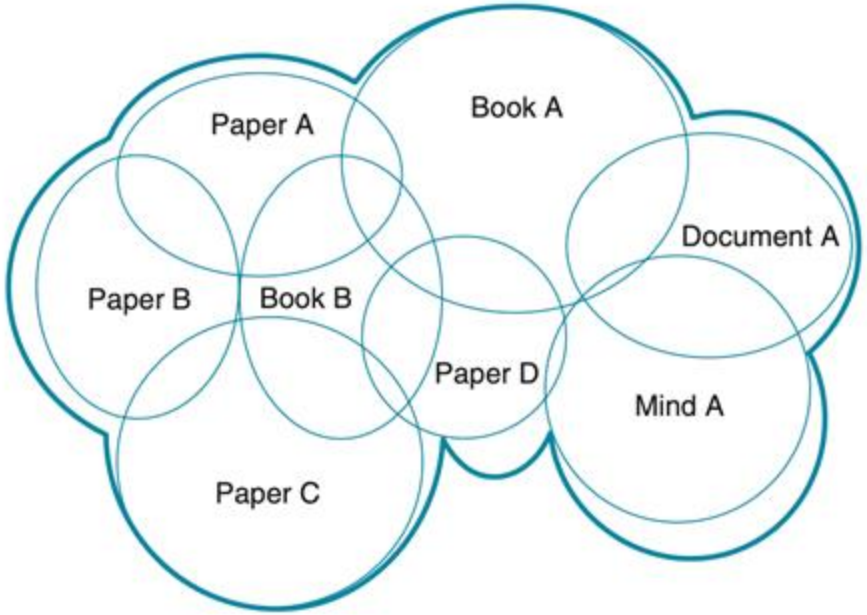
Deadline for submission of articles: 30th December 2023.

Section: Sustainable School

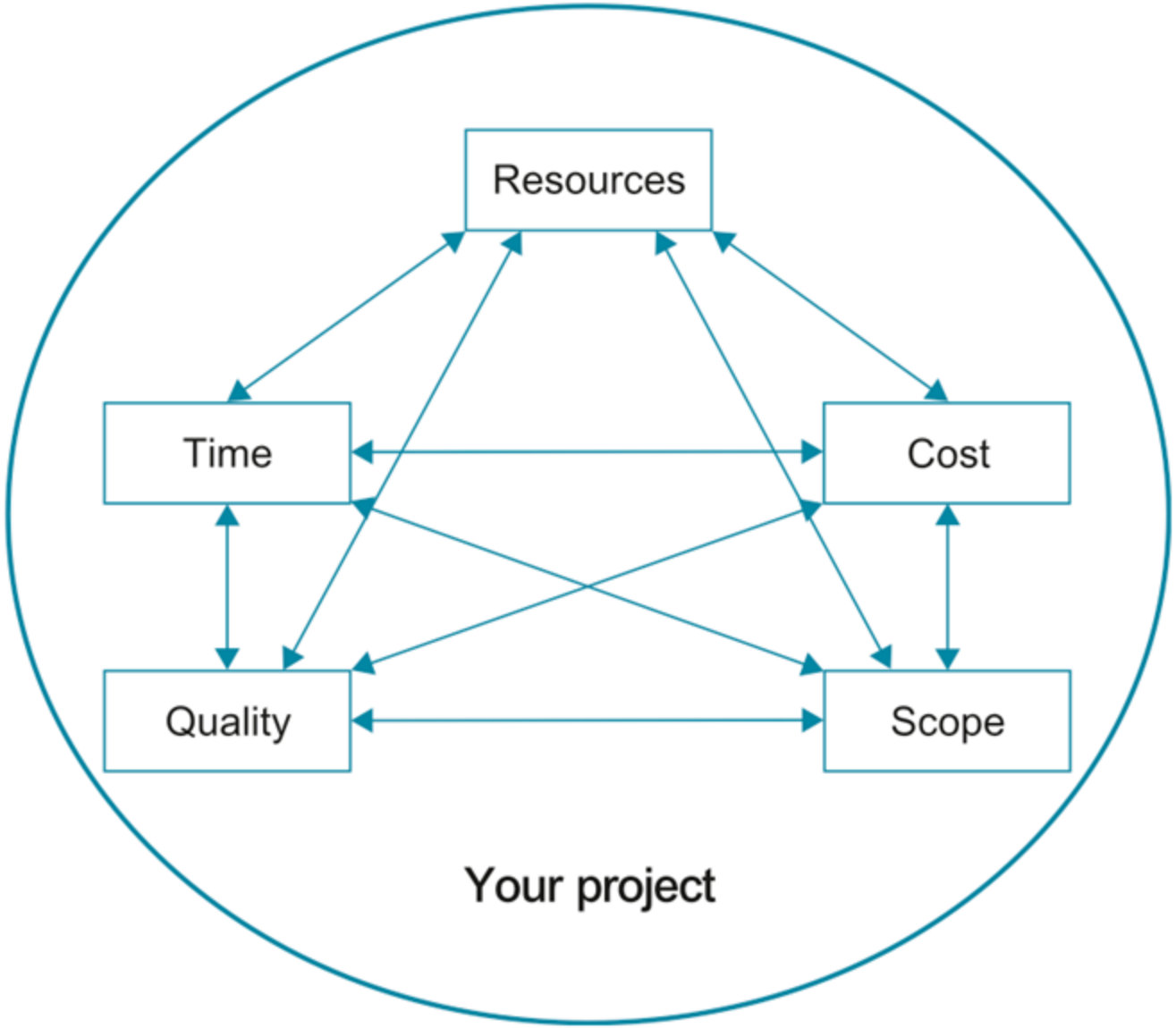
Contributions to knowledge



A research field made up of a number of articles, books, documents, etc.



Balancing five project elements against one another



identify this search definition as an attempt to answer the following questions:

- ‘What am I looking for?’
- ‘Why am I looking for it?’
- ‘How shall I set about it?’
- ‘Where shall I start looking?’

What is good research

Open minds. You should work with an ‘open system of thought’. Be open minded to the questions posed. ‘Conventional wisdom and accepted doctrine . . . may turn out to be inadequate’. Do not allow yourself to be limited by pre-existing thinking.

- **Critical analysis.** Examine data critically. Are these figures correct? Have they been affected in some way? What do these data *really* mean? Are alternative data available? Are these data appropriate for the study we are undertaking? Are there weaknesses in the data? Can these data be interpreted differently?

- **Generalisations.** Researchers generalise and specify limits on the generalisations they identify. Generalisation allows research to be interpreted and applied to a wide variety of situations.

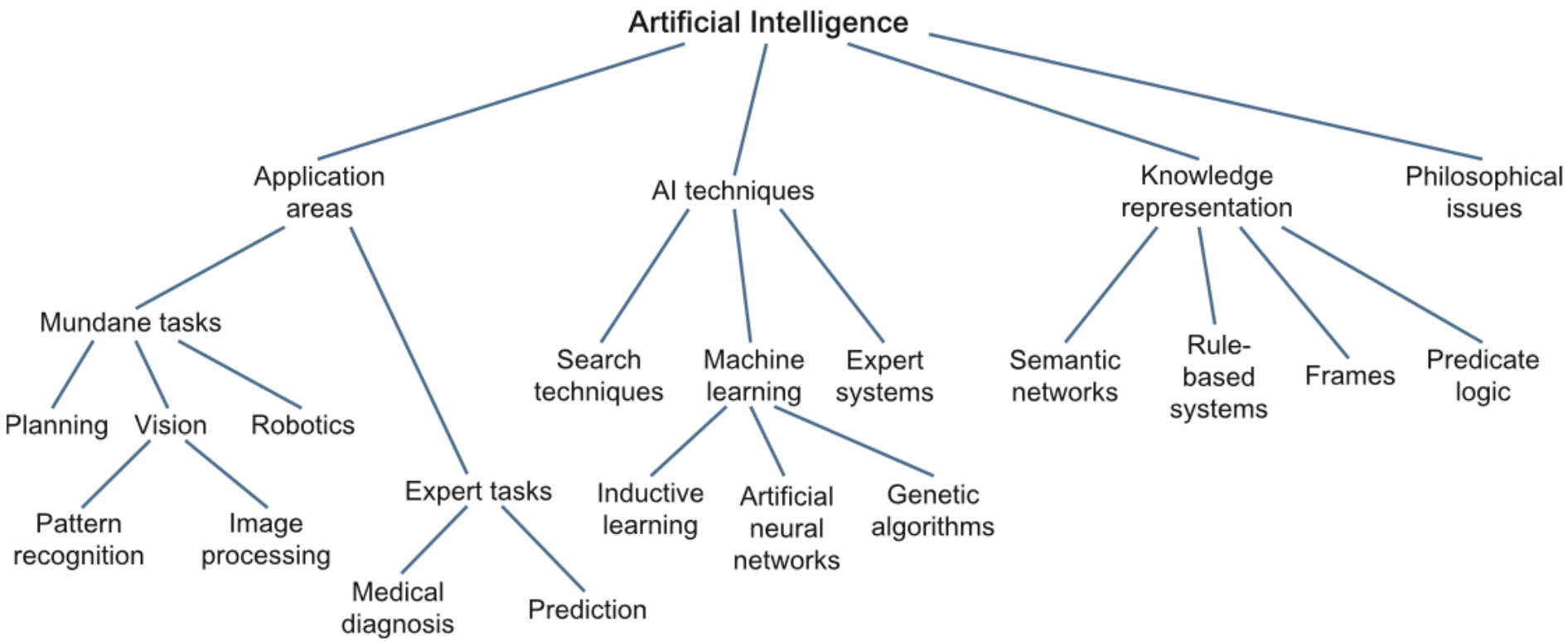


Figure 3.2 An example relevance tree for the field of *artificial intelligence*

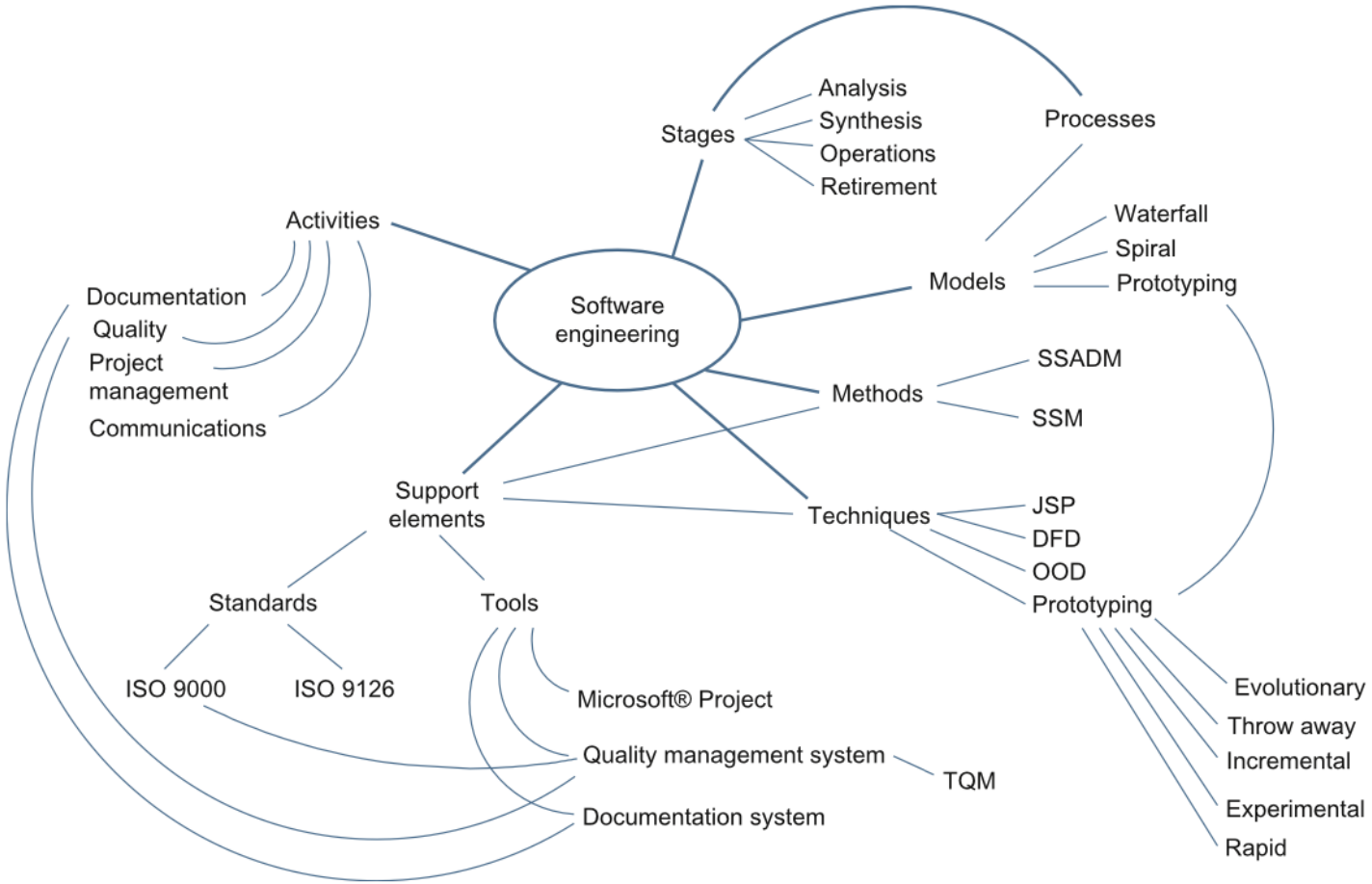
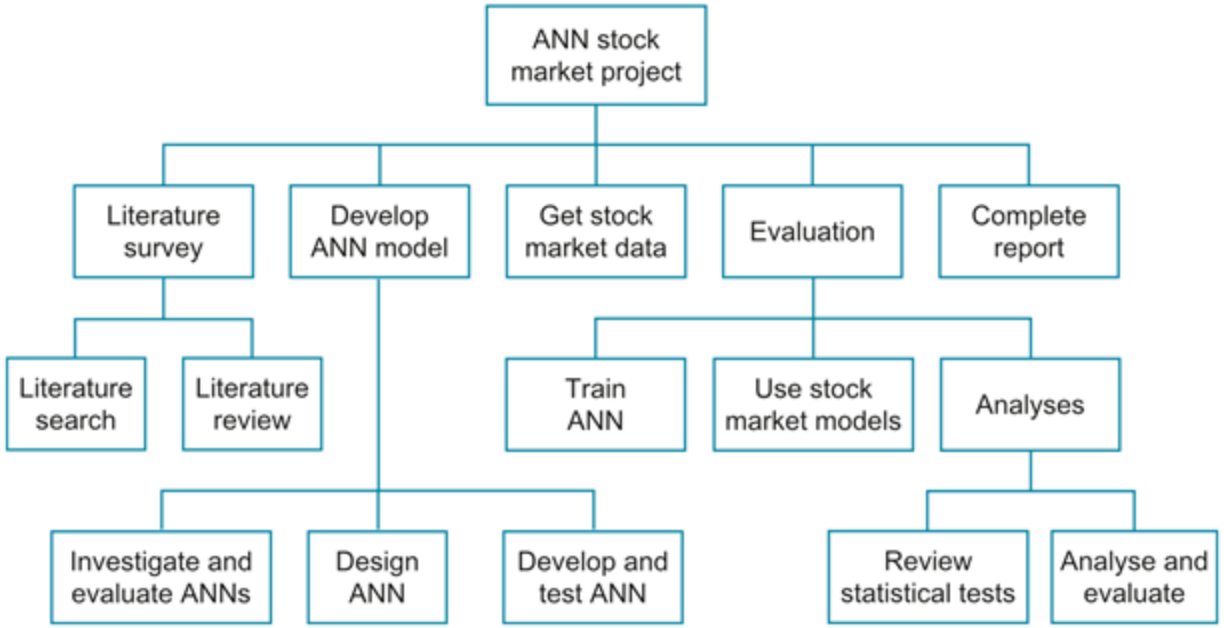
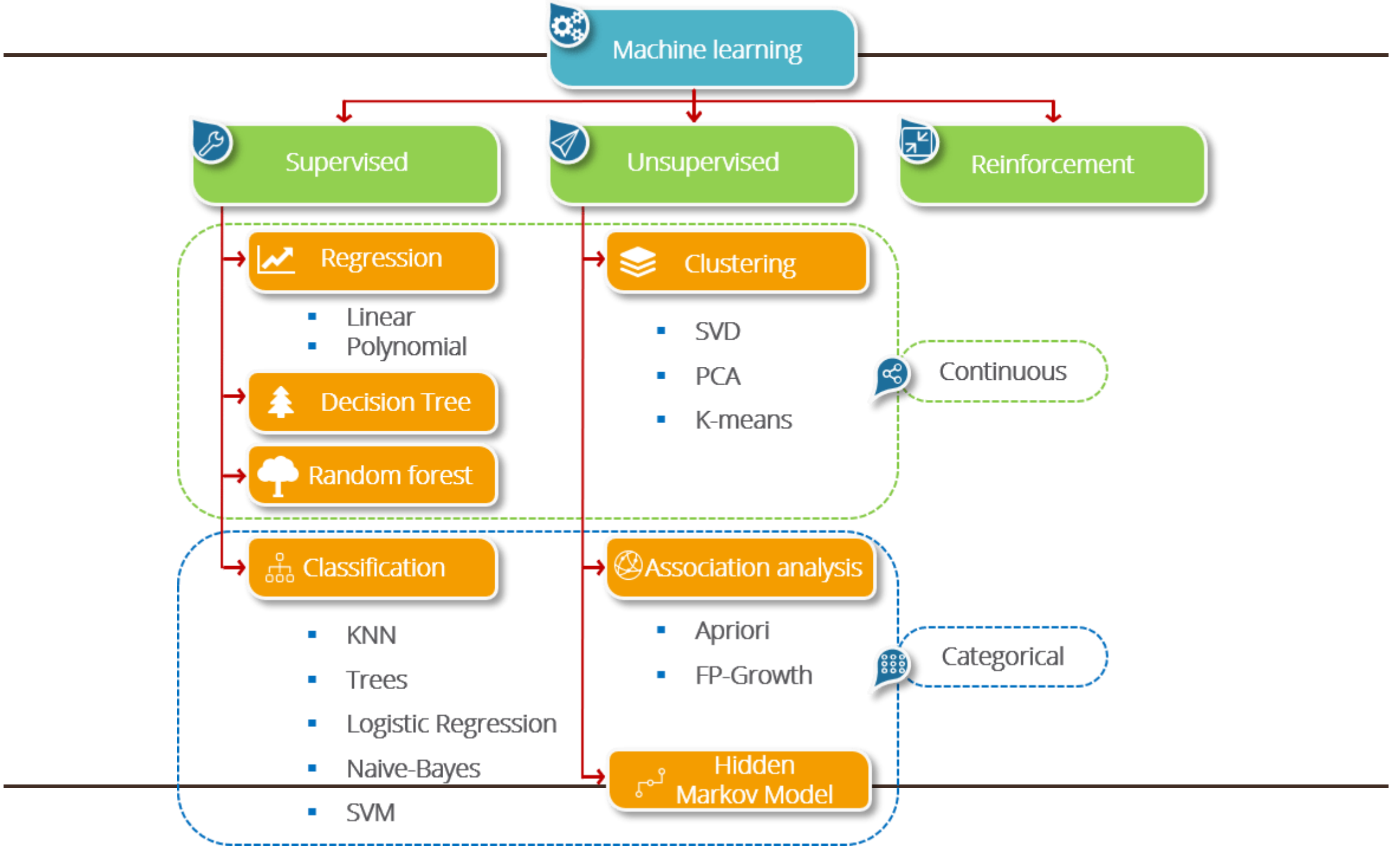


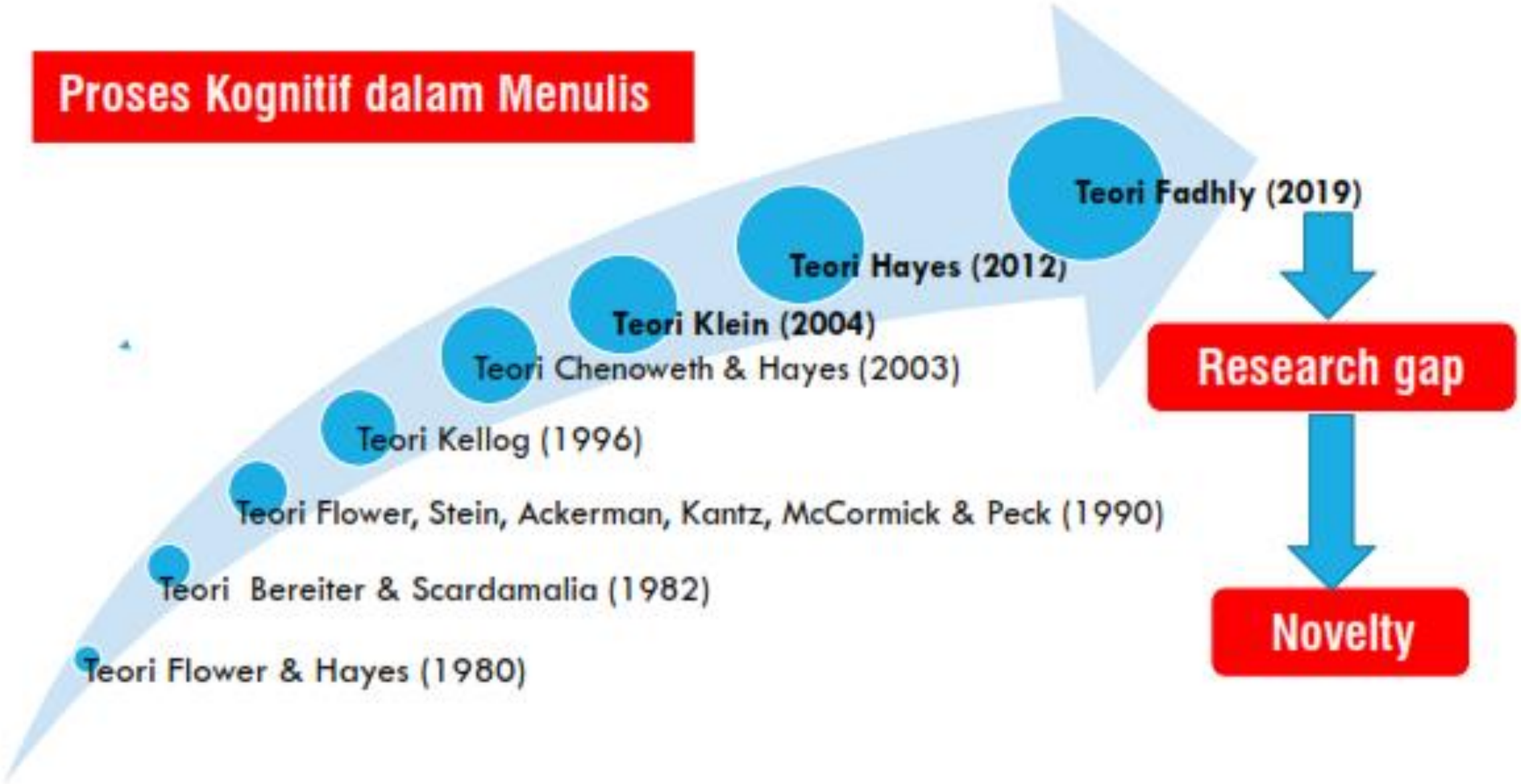
Figure 3.3 An example spider diagram for the field of *software engineering*

An example of a work breakdown structure



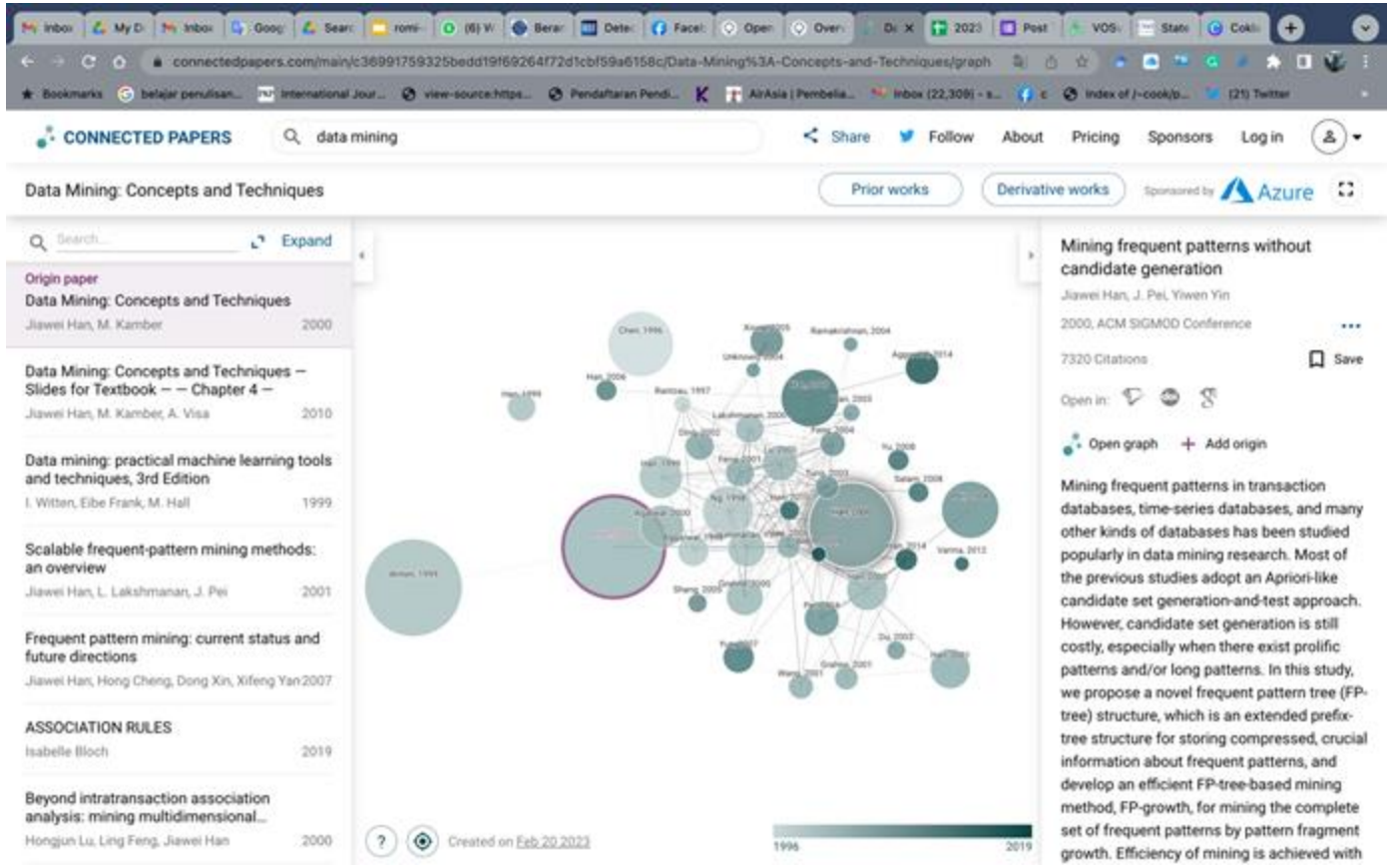

Machine learning
Supervised
Unsupervised
Reinforcement
Regression
Linear
Polynomial
Decision Tree
Random forest
Clustering
SVD
PCA
K-means
Continuous
Classification
KNN
Trees
Logistic Regression
Naive-Bayes
SVM
Association analysis
Apriori
FP-Growth
Categorical
Hidden Markov Model

State of The Art, Research Gap & Novelty

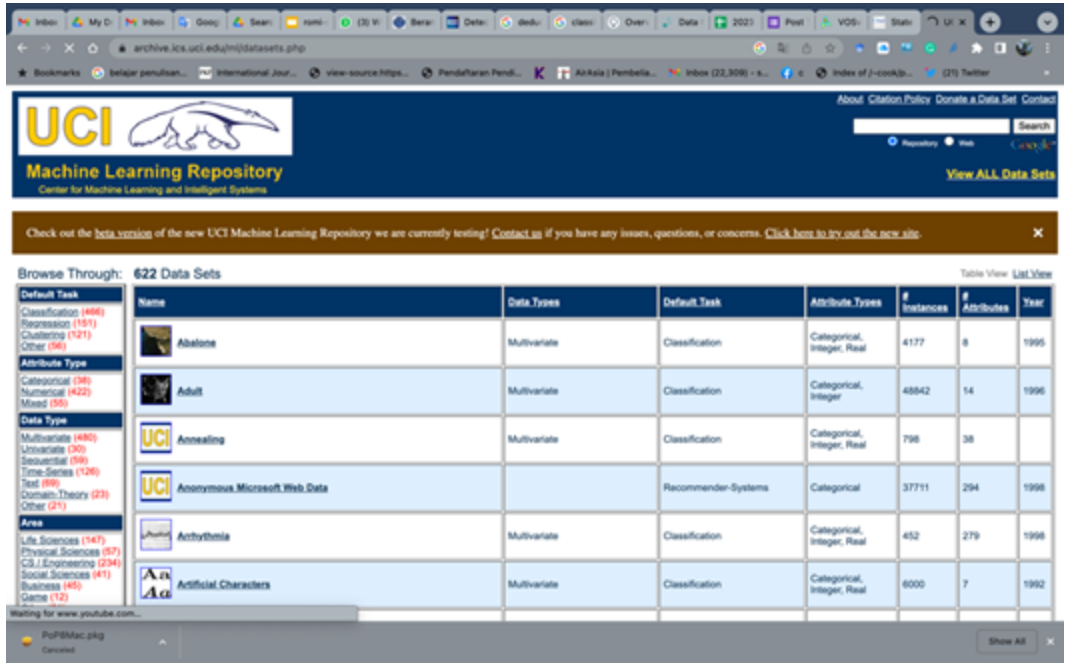


Tools

https://www.connectedpapers.com/



Dataset
https://archive.ics.uci.edu/ml/datasets.php



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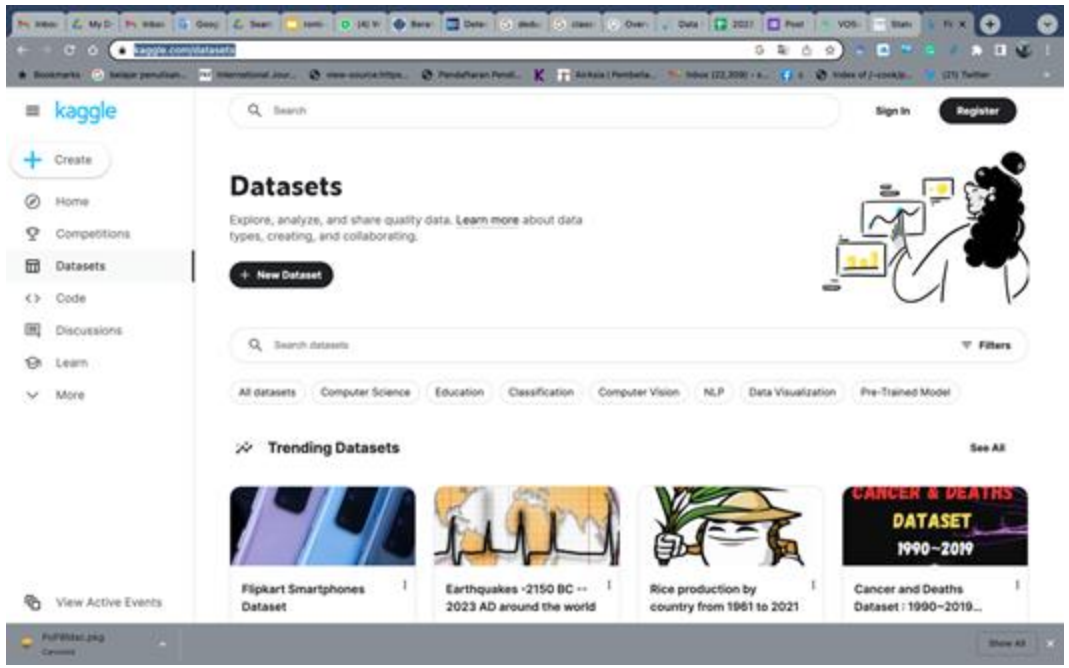
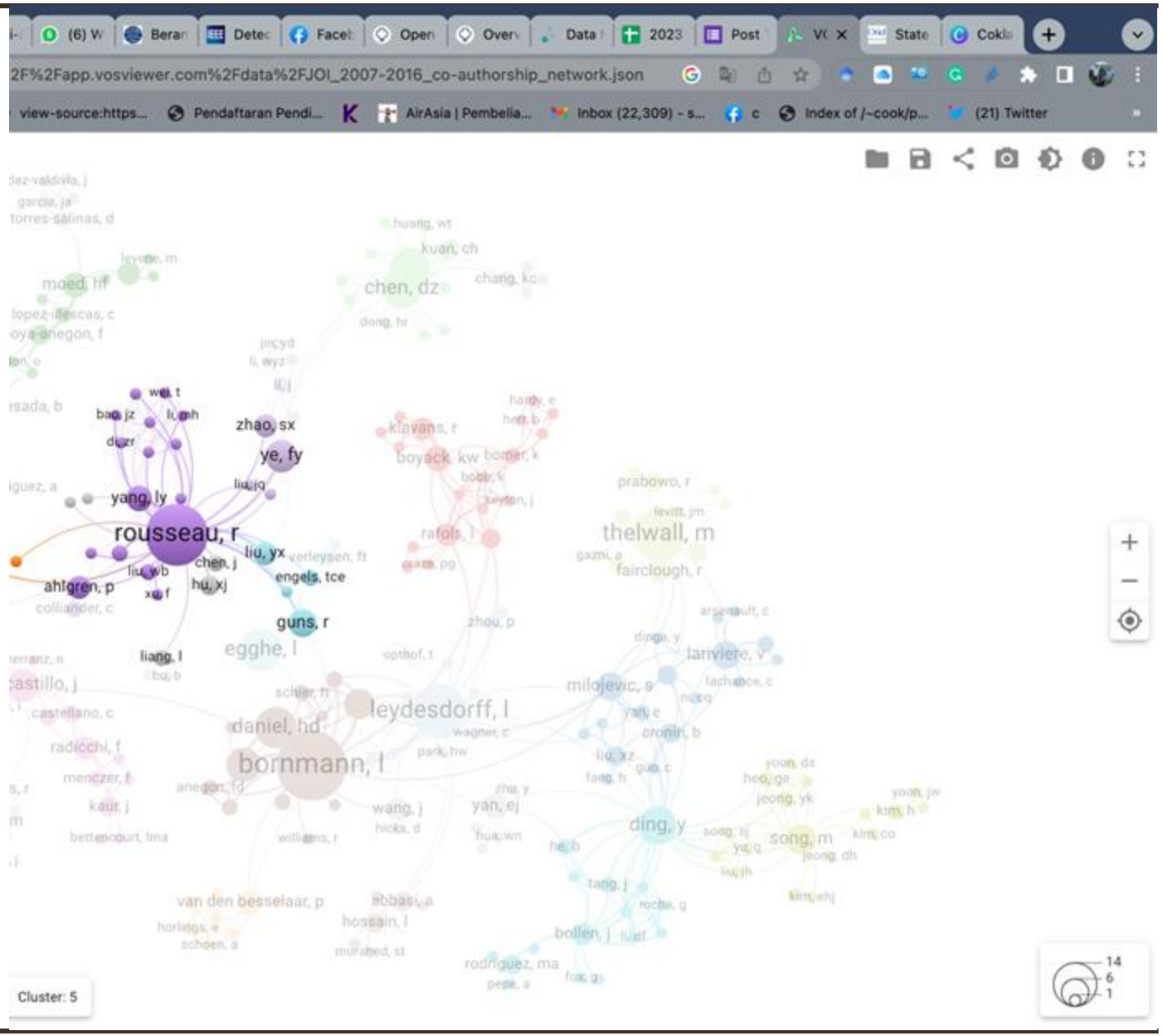


Tools
Vosviewer



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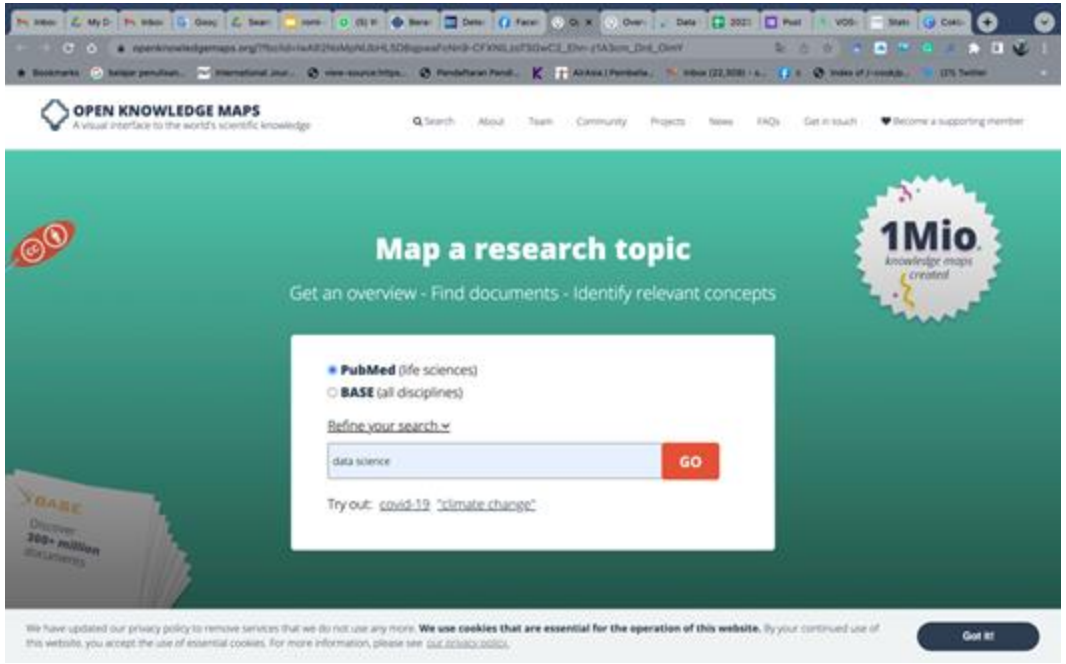
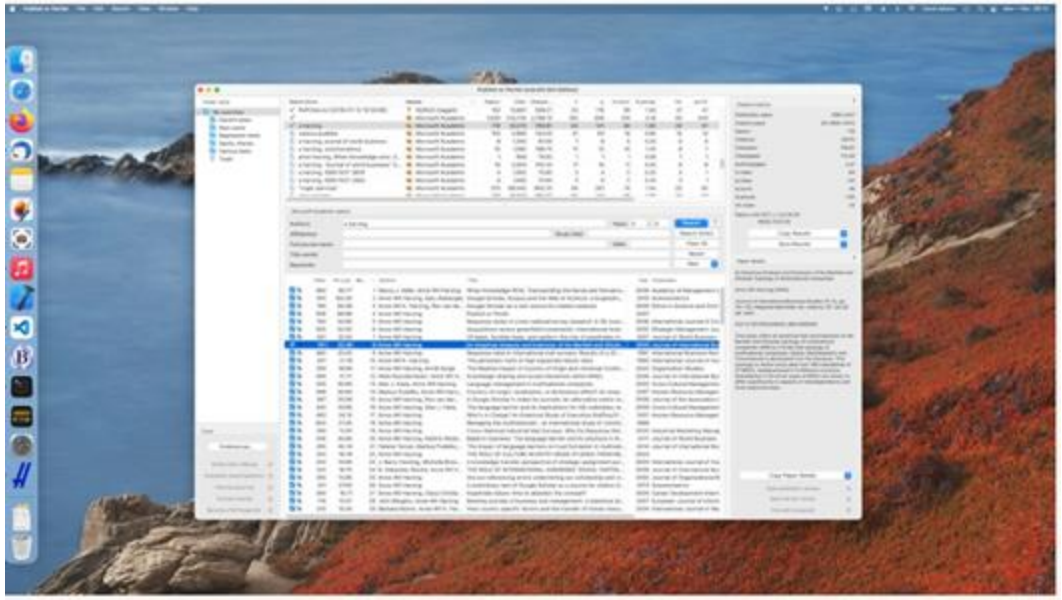


Publish or perish



Classification data

First degree. These are direct methods, where the researcher is in direct contact with the interviewees and collect data in real time. This is the case with, for example, interviews [162, pp. 277–282], focus groups [162, pp. 284–289], Delphi surveys [38], and observations with "think aloud" and protocol analysis [133].

Second degree. These are indirect methods where the researcher directly collects raw data without actually interacting with the interviewees during the data collection. This approach is, for example, taken in Software Project Telemetry [78] where the usage of software engineering tools is automatically monitored, and observed through video recording.

Third degree. These are methods where the researcher independently analyses work artifacts that are already available. This approach is used when, for example, requirements specifications and failure reports are analyzed, or when data from organizational databases such as time accounting is analyzed.

Project Scheduling

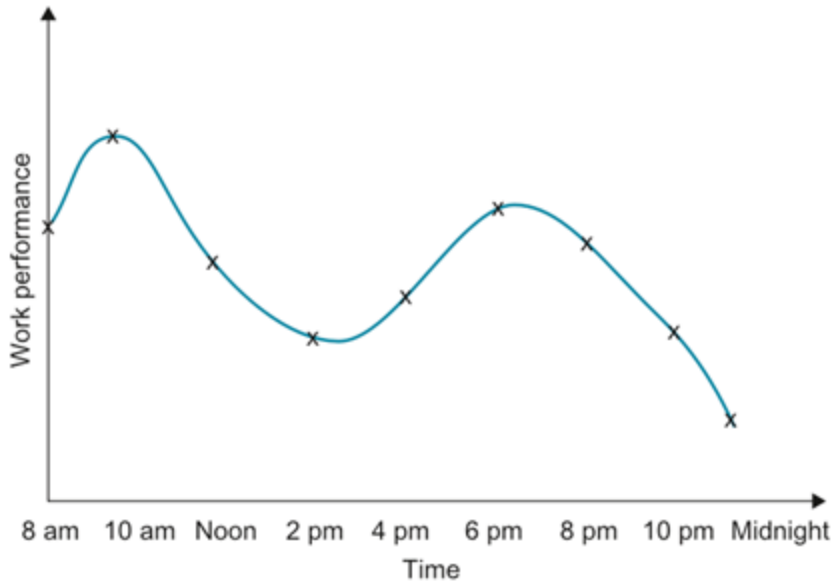
ID	Task	Duration	Start	End
1	Preparing Problem Statement	?	?	?
2	Understanding general requirements	?	?	?
3	Meeting with my supervisor	?	?	?
4	Literature Review	?	?	?
5	Implementation	?	?	?
6	Testing	?	?	?
7	Writing Project Report	?	?	?
8	Preparing Presentation	3 days	01/17/13	01/21/13

Time estimates for example stock market ANN project

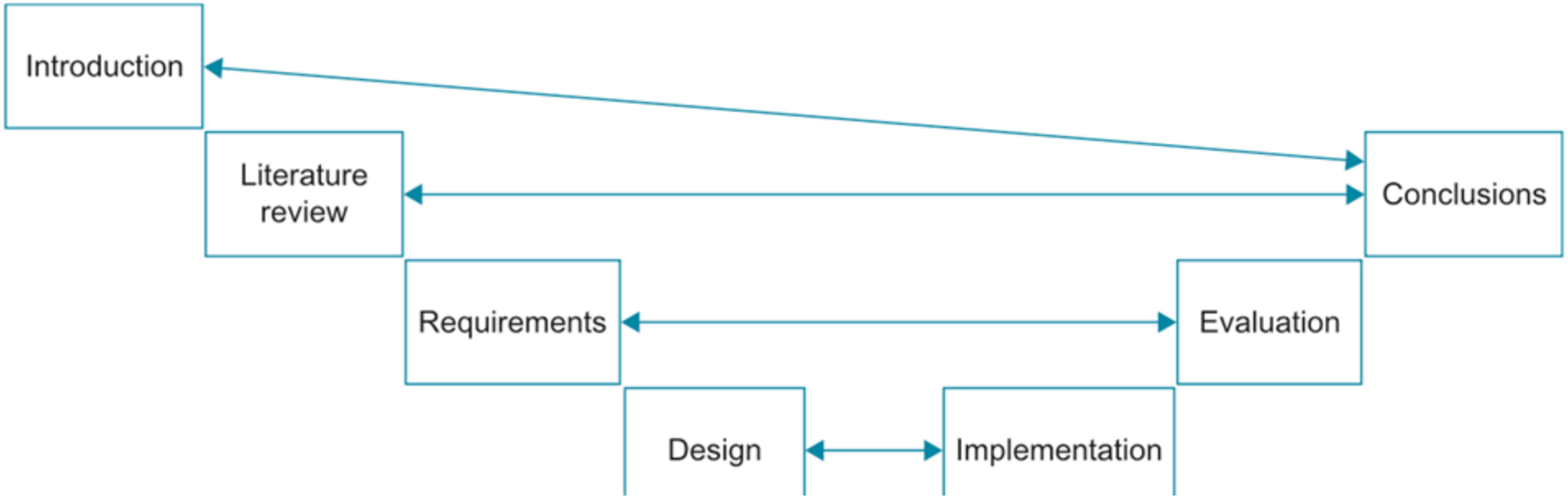
Activity	Estimated duration
Literature search	8 weeks
Literature review	4 weeks
Investigate and evaluate ANNs	4 weeks
Design ANN	4 weeks
Develop and test ANN	2 weeks
Get stock market data	1 week
Train ANN	1 week
Use stock market models	2 weeks
Review statistical tests	2 weeks
Analyse and evaluate	4 weeks
Complete report	8 weeks
Total effort	40 weeks (approximately 10 months)

Log activity student (dataset)

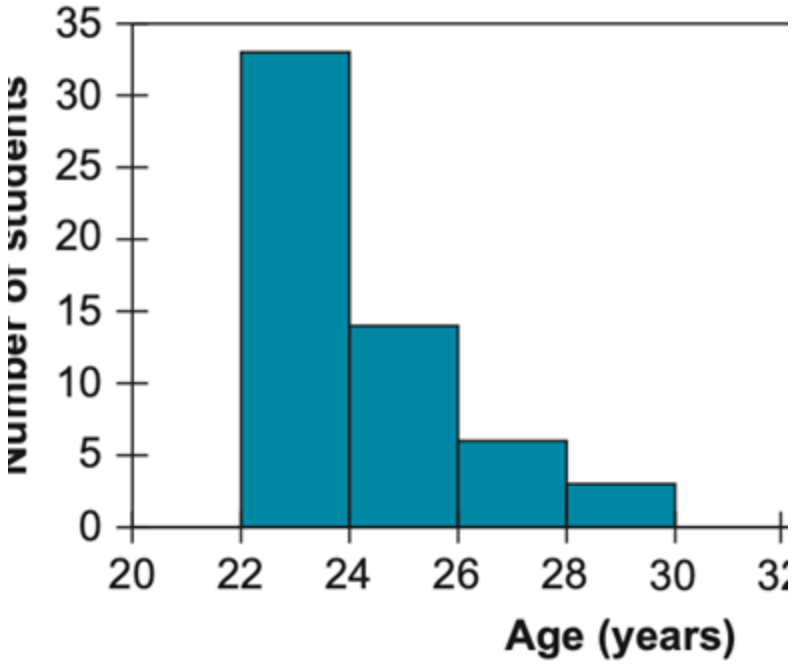
Time	Activity	Effectiveness	Comments/ Improvements
7.00–8.00	Get ready for university	50%	Could probably do this in 30 minutes but I'm always tired
8.00–8.30	Walk to campus	60%	Could get the bus but I need the exercise
8.30–9.00	Meet friends in canteen	10%	Need to socialise
9.00–10.00	Lecture	70%	Quite good today!
10.00–10.15	Coffee break	10%	I need a break
10.15–12.00	Tutorial/seminar	50%	Could have done this in half the time
12.00–1.30	Lunch – students' union	20%	Far too long but I need to eat
1.30–2.00	Library hunting for books	40%	Couldn't use the computer
2.00–2.30	Meeting with project supervisor	80%	Useful
2.30–3.00	Coffee with friends	20%	I need to socialise
3.00–4.00	Library hunting for books	20%	Not finding what I wanted and getting distracted
4.00–4.30	30 minutes on assignment	30%	Wasted time getting started – should spend longer on this
4.30–5.00	Walk home	60%	As before
5.00–5.30	Have a coffee	0%	No comment
5.30–6.00	Watch TV	0%	No comment
6.00–7.00	Get tea	50%	I need to eat
7.00–8.00	Work on assignment	90%	Get a lot done
8.00–11.00	Go to pub	40%	I need to socialise but should have done more work first
11.00–1.00	Work on project then go to bed	60%	Too tired to achieve much – must tackle this kind of thing earlier in the day

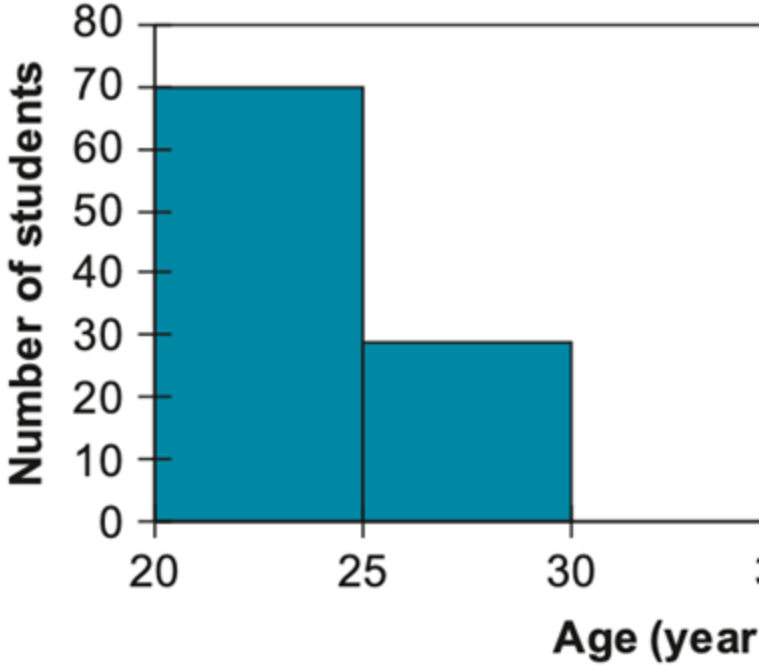


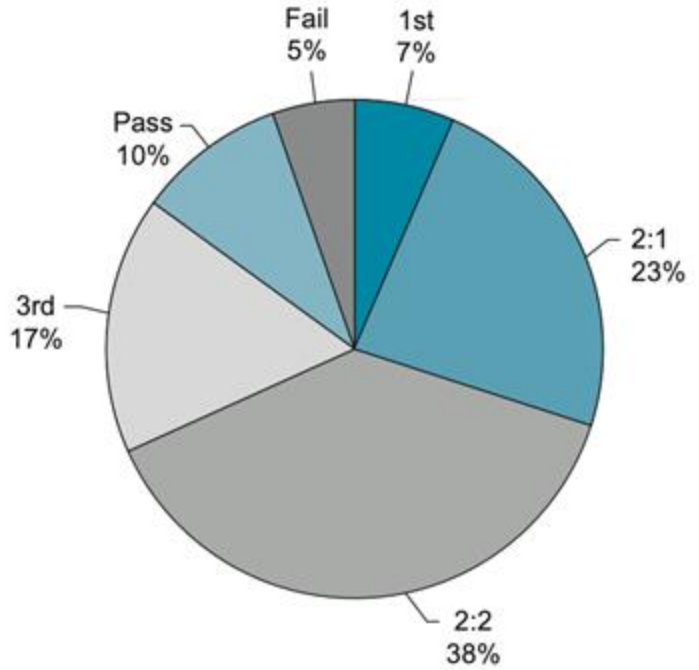
The relationship between chapters

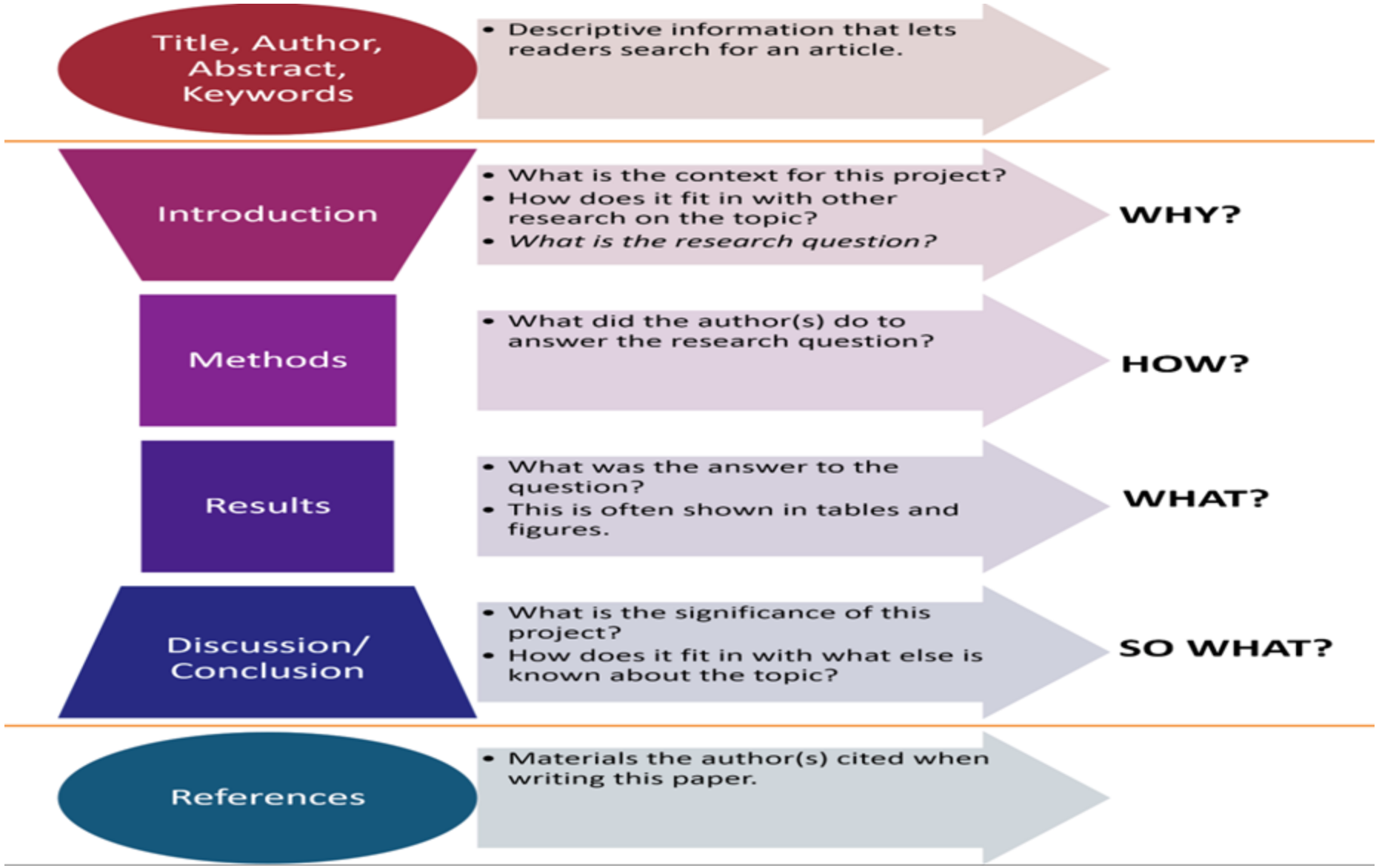


Data Presentation








Title, Author, Abstract, Keywords
• Descriptive information that lets readers search for an article.
Introduction
• What is the context for this project?
• How does it fit in with other research on the topic?
• *What is the research question?*
WHY?
Methods
• What did the author(s) do to answer the research question?
HOW?
Results
• What was the answer to the question?
• This is often shown in tables and figures.
WHAT?
Discussion/ Conclusion
• What is the significance of this project?
• How does it fit in with what else is known about the topic?
SO WHAT?
References
• Materials the author(s) cited when writing this paper.

Terima kasih