

# Innovation Networks

## –Seminar–

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*Week 9: 25 March 2022*

## Learning Outcomes

Learning outcome	Assessment mode
1 Explain the concept of network and list the main network indicators	ESS
2 Describe and apply the major techniques for the collection of network data and their statistical analysis	ESS, GPN + GWS
3 Identify the main characteristics of networks by means of network measures	ESS, GPN + GWS
4 Employ network analysis techniques to produce network data-based infographics	GPN + GWS

Note: ESS: Essay; GPN: Group Presentation; GWS: Group Written Submission

# Overview

- 1 Innovation network [recap]
- 2 Introduction to VOSviewer

# Innovation network [recap]

# Innovation network [recap]

## Mapping

Network analysis has been extensively used in **bibliometrics/scientometrics** to map science and technology

- **Mapping of collaboration**

- ▶ Co-authorship data (publications)
- ▶ Co-invention data (patents)

- **Mapping of cognitive connections**

- ▶ Citation analysis
  - ★ Direct citation analysis
  - ★ Co-citation analysis
  - ★ Bibliographic coupling
- ▶ Co-word analysis
- ▶ Overlay mapping

# Introduction to VOSviewer

# Introduction to VOSviewer



<http://www.VOSviewer.com/>

- Developed by van Eck and Waltman (CWTS, University of Leiden)
- Runs on [Windows](#), [Linux](#), [Mac OSX](#)
- Relatively [user-friendly](#)
- Can analyse [scientometric data](#)
- Can import [raw data](#) from Web of Science, Scopus, PubMed
- Capable of analysing [relatively large networks](#)
- Operation cannot be easily [automated](#)

# Introduction to VOSviewer

## Interfaces

- **Top** tab

- ▶ Network visualisation
- ▶ Overlay visualisation
- ▶ Density visualisation

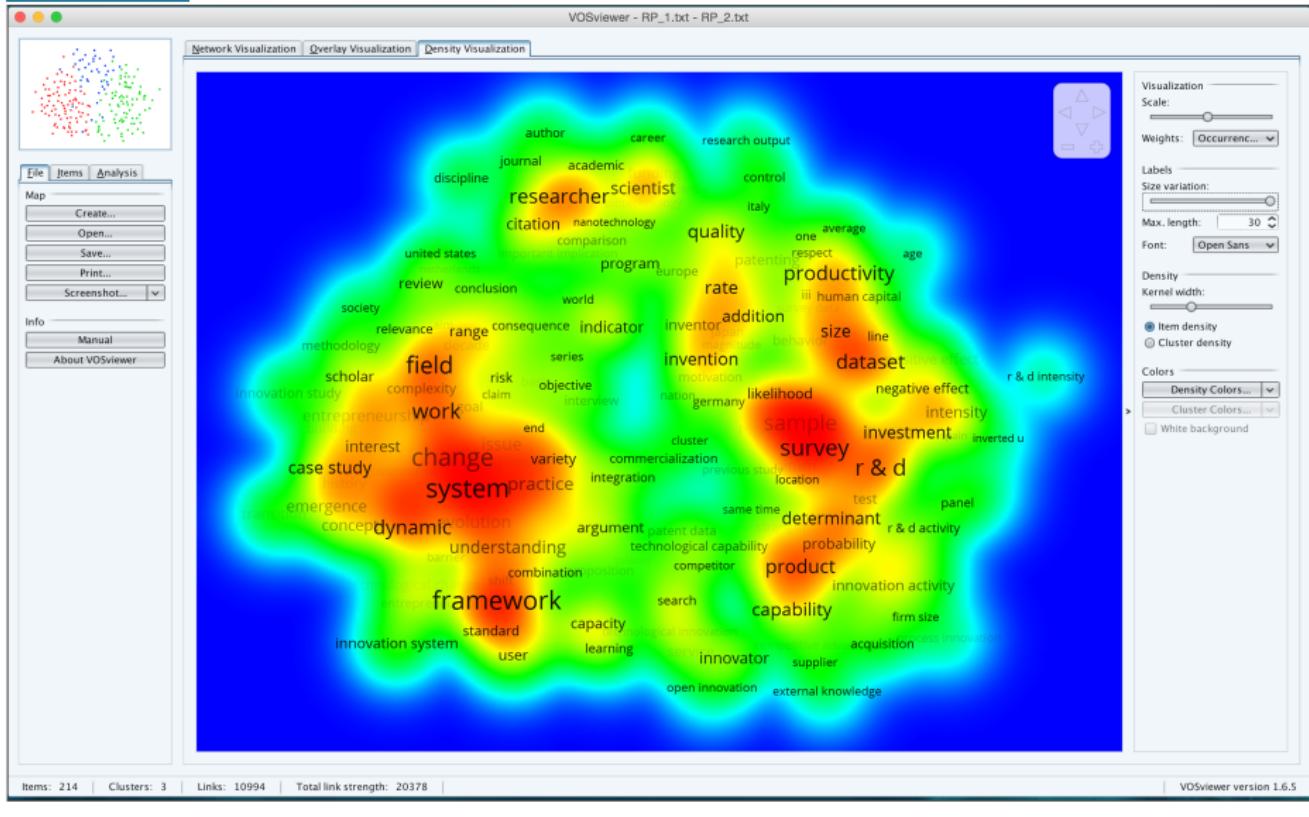
- **Left-hand side** tab

- ▶ load/sace data and maps
- ▶ analyse data
- ▶ explore clusters

- **Right-hand side** tab

- ▶ Visualisation
- ▶ Labels
- ▶ Lines
- ▶ Colors

# Introduction to VOSviewer



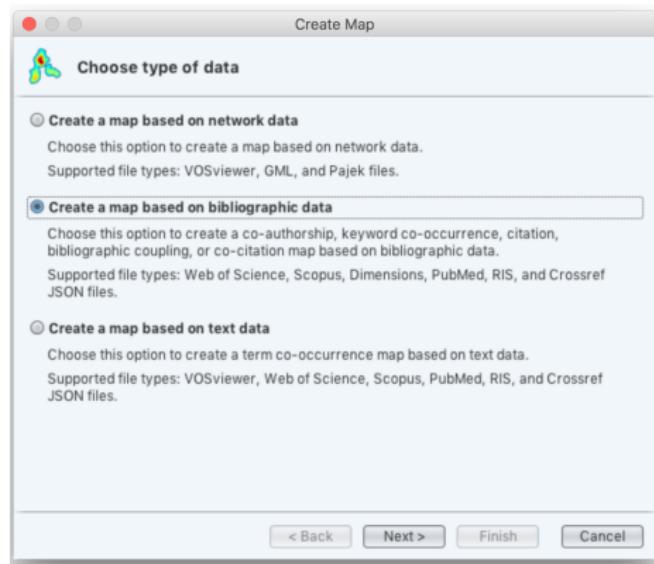
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## Example

- Let's examine the **Research Policy's publications** over the years 2008-2018
- We can search these publications in **Web of Science** with the following search string:

SO="Research Policy" AND PY=(2018 OR 2017  
OR 2016 OR 2015 OR 2014 OR 2008)

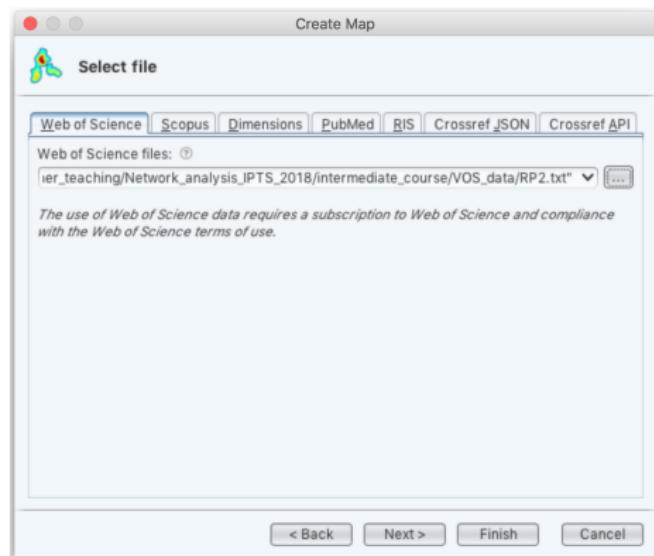
- This search returns **1545 publications**
- We downloaded the **full records**
- We can upload these files in **VOSviewer**
  - Create
  - Create a map using bibliographic data
  - Select the type of map



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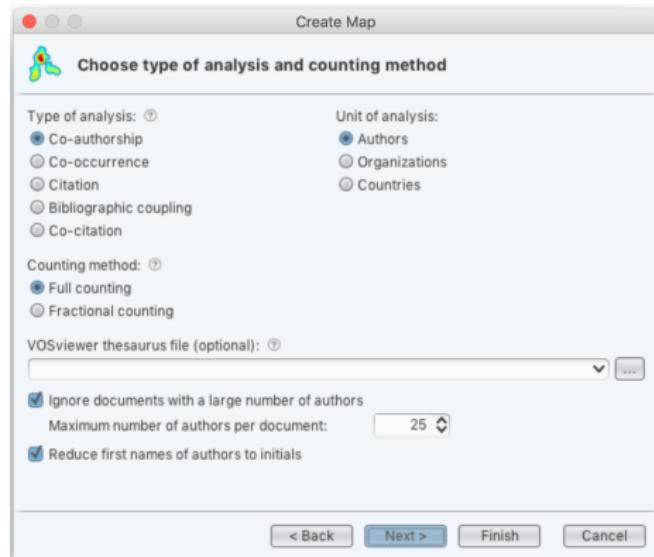
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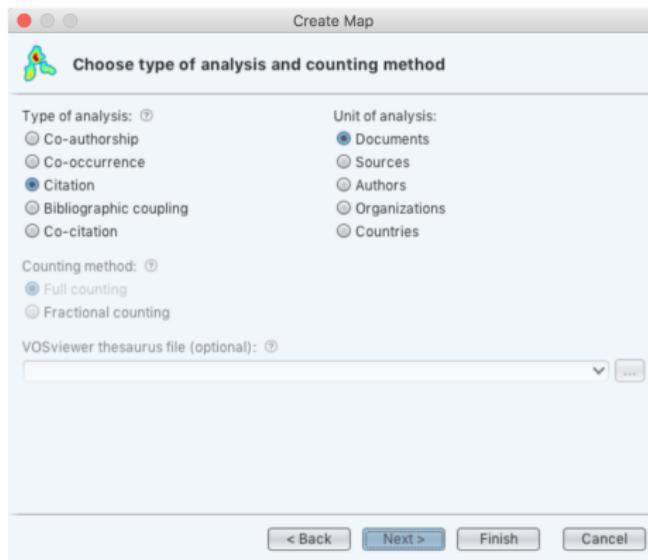
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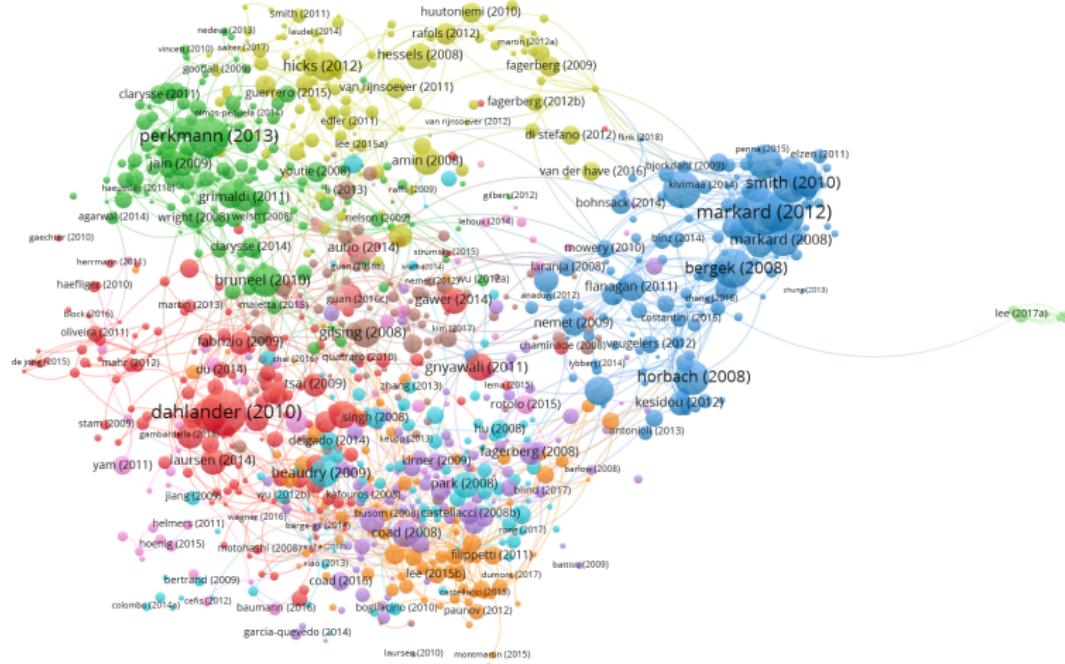
# Introduction to VOSviewer

## Example: Co-citation analysis



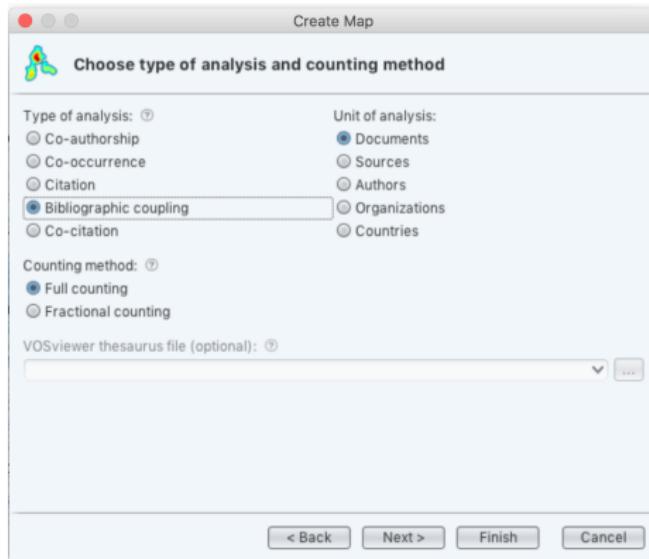
# Introduction to VOSviewer

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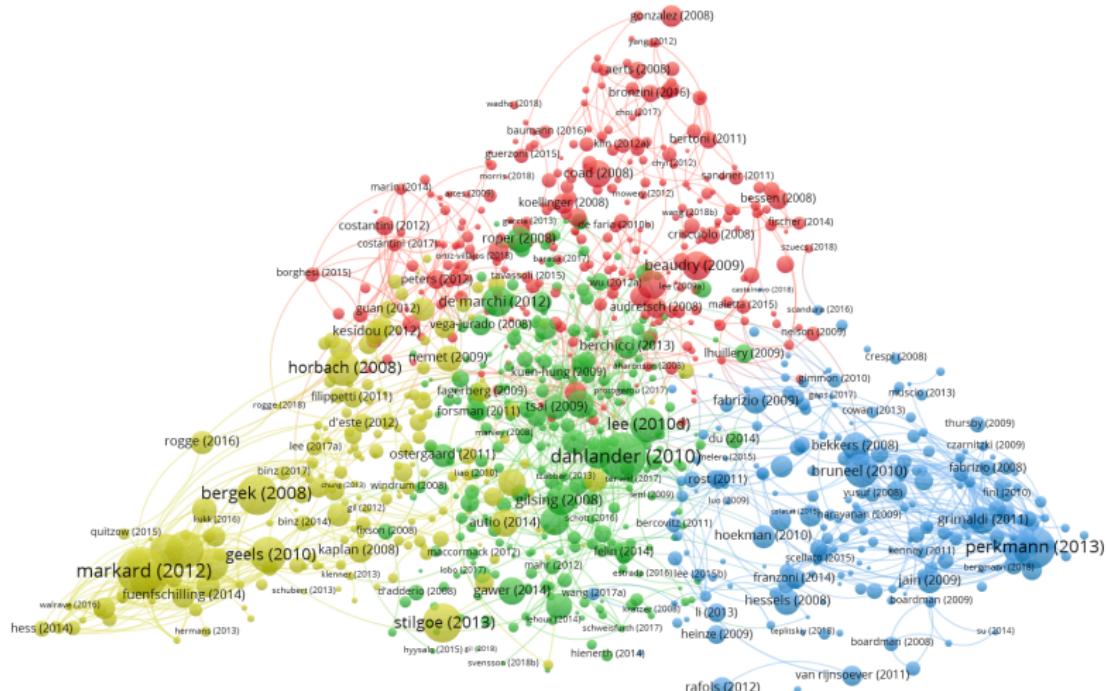
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## Example: Bibliographic coupling



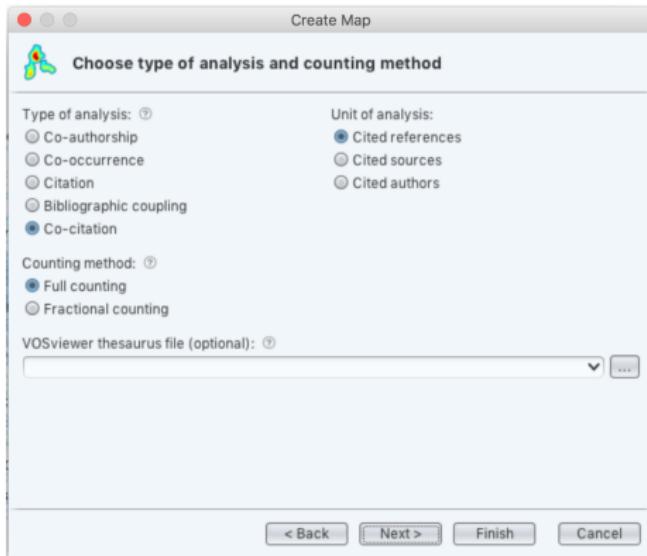
## Introduction to VOSviewer

### Example: Bibliographic coupling



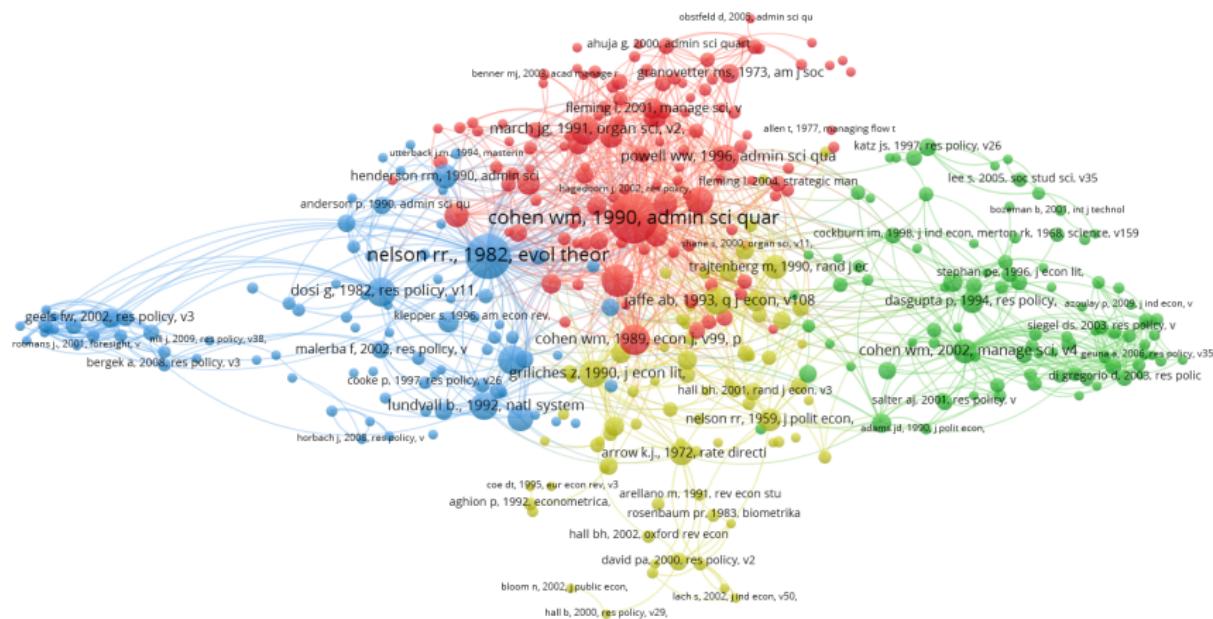
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Example: How RP papers' references are jointly cited?



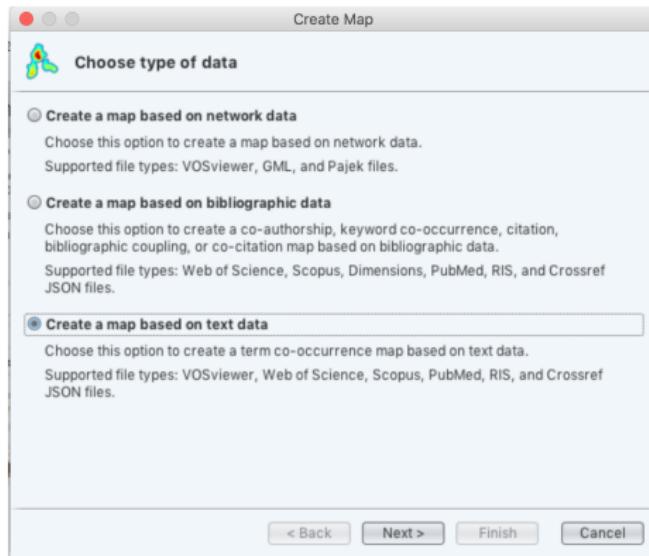
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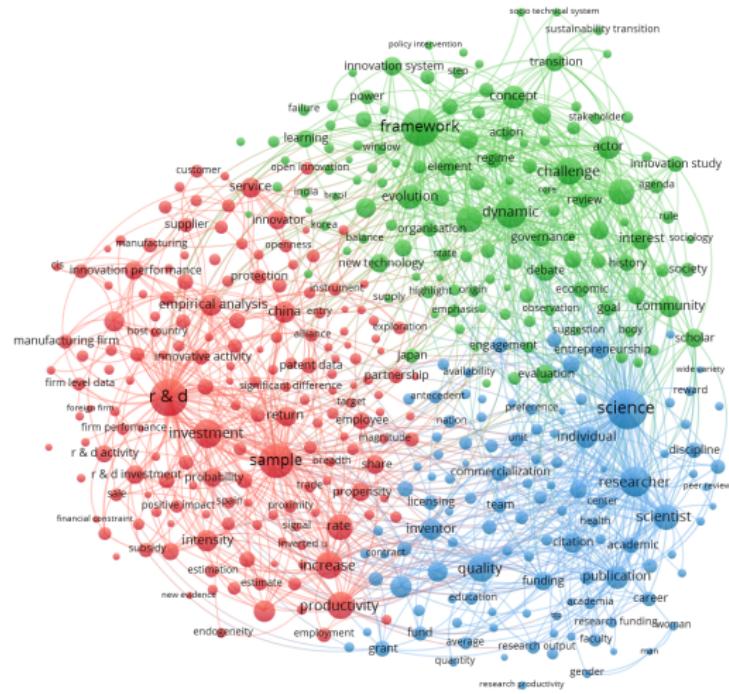
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## Example: Co-word analysis



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## Example: Co-word analysis



# Introduction to VOSviewer

## Exercise

### Scientometric analysis in VOSviewer

- ① Download a [sample of publications](#) that are of your interests from Web of Science
- ② For example, these can include
  - ▶ publications of a specific journal
  - ▶ publications related to a topic
  - ▶ publications of a specific author
  - ▶ publications of a country/region
  - ▶ ...
- ③ Create and export the corresponding
  - ▶ [co-citation map](#)
  - ▶ [bibliographic coupling map](#)
  - ▶ [co-word coupling map](#)

# Introduction to VOSviewer

Downloading bibliographic data from Web of Science

## How to download a sample of publications from Web of Science:

- ① Go to <https://apps.webofknowledge.com/>
- ② Search by keywords, authors, journals...
- ③ Once you have obtained the search results, refine your search by year, discipline...
- ④ In the document type window, choose only "Articles"
- ⑤ Export file using other formats: choose .txt (plain text format) - You can export only 500 results per download!
- ⑥ Export the full record and cited references
- ⑦ The data will look extremely messy if opened, but it's ready to be read in VOSviewer

# Questions

Next time ...

Next time ...

- **Lecture: Social network theories**

- ▶ Social capital
- ▶ Strength of weak ties
- ▶ Structural holes