

Manual for using Pajek to initially draw the network pictures

(last updated August 2017)

1. Introduction

This is a way around manually drawing the bibliometric research trail. There is a macro embedded in the Bibliographic coupling spreadsheet that produces the input for the network analysis package Pajek. Pajek can generate network pictures, which can be imported in visio. Pajek has also routines for finding clusters in the network. Since all this is done in seconds, we can experiment with different thresholds.

2. Pajek

Pajek is a free network analysis and visualisation package that *runs under Windows* (only). It can be downloaded from

<http://pajek.imfm.si/doku.php?id=download>

There is also a manual that can be downloaded but this is not really helpful because the manual just explains the menus and functions without any ‘how to’ – advice. We have worked with the book *Exploratory Network Analysis with Pajek* by Wouter de Nooy, Andrej Mrvar and Vladimir Batagelj, Cambridge University Press 2009.

Pajek must be downloaded and installed on the computer.

3. Drawing the network picture with Pajek

3.1 Preparing the input files

- **Open Makros_BibCoupling with Pajek interface.xls**
- Create the xls file for the researcher you are investigating by **running the Macro “ProcessSavedrecs”** (for details see Manual Research Trail).
- With the researcher spreadsheet open and visible, go to Tools->Macro->Macros. You will find the macro **‘Makros_BibCoupling with Pajek interface.xls’!CreatePajekfileNetwork.**
- **Run this macro.** The macro asks you: “Cutoff for Salton’s cosine strength:” Here you should ideally find a value when most publications are connected and different clusters become visible. Start with a small value like 0.01 (and then experiment with other values). **Please note** that some MS-Office-versions may need a comma for the value, like 0,01.

This macro produces 2 input files for Pajek. The file **[researchername].net** contains information about

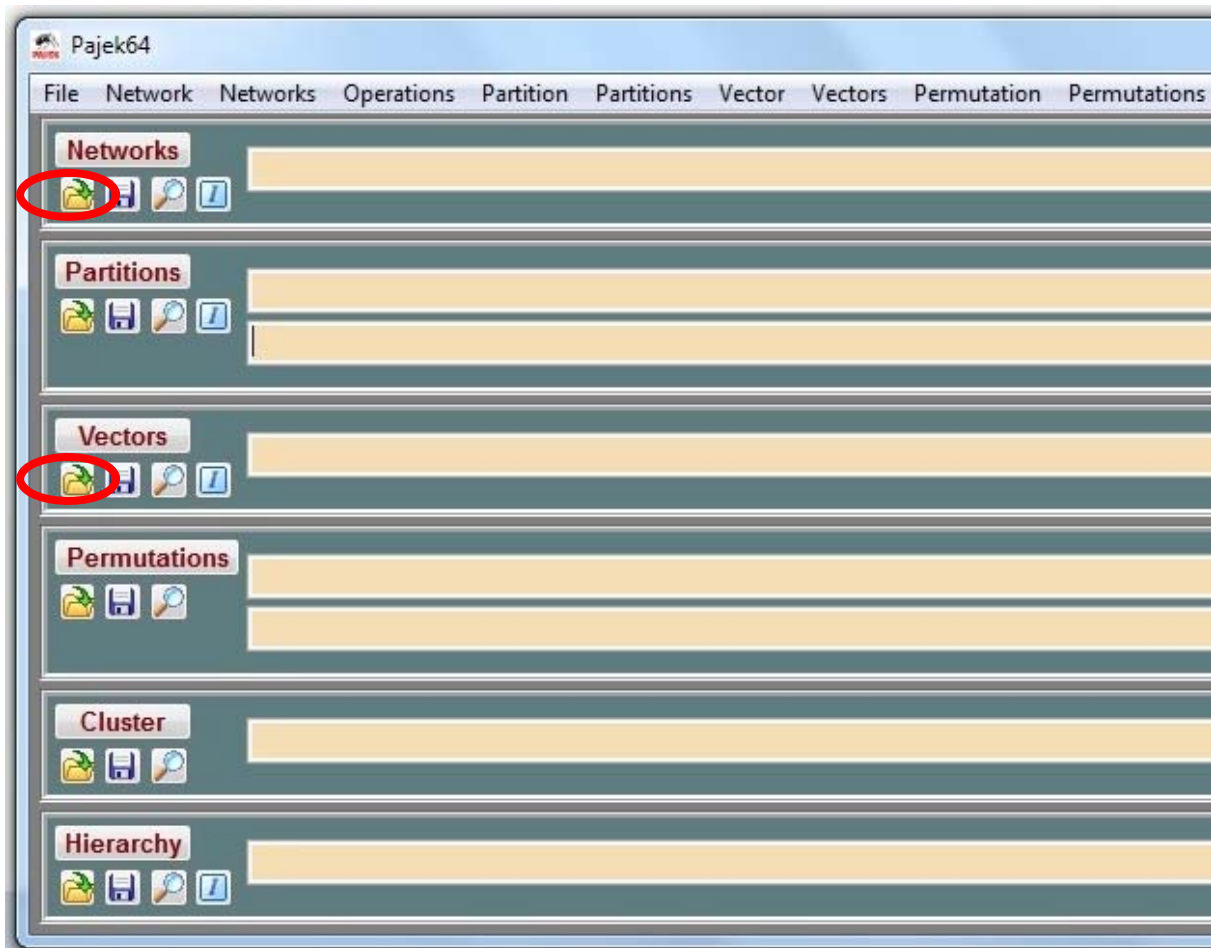
- the number of vertices (=number of publications),
- the label assigned to each vertex (= the number of the publication)
- the initial coordinates of each vertex in three-dimensional space (These coordinates are defined in a way that gives all publications from one year the same x-coordinate and spreads them out with maximal distances along the y-coordinate. The x-coordinates represent the years.),
- the edges between vertices (with data in the form first vertex second vertex strength of line (according to Salton’s cosine)).

The file **[researchername].vec** contains information about the size of the vertices (normalised number of citations).

Both files are stored in the same directory as the xls file for the researcher you are investigating.

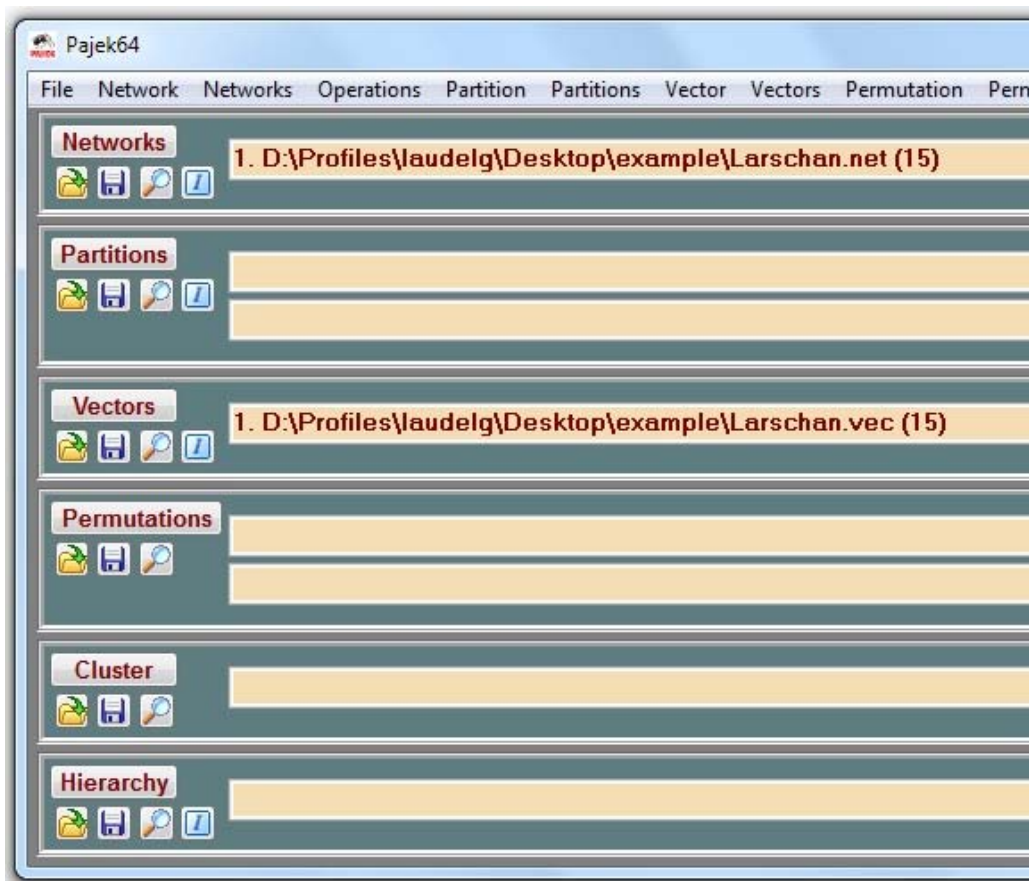
3.2 Drawing the picture¹

- Start Pajek
- On the screen, click on the open folder under “Networks”.
- Navigate to the folder in which your input files are stored.
- Open the file **[researchername].net**.
- Click on the open folder under “Vectors”.
- Navigate to the folder in which your input files are stored.
- Open the file **[researchername].vec**.

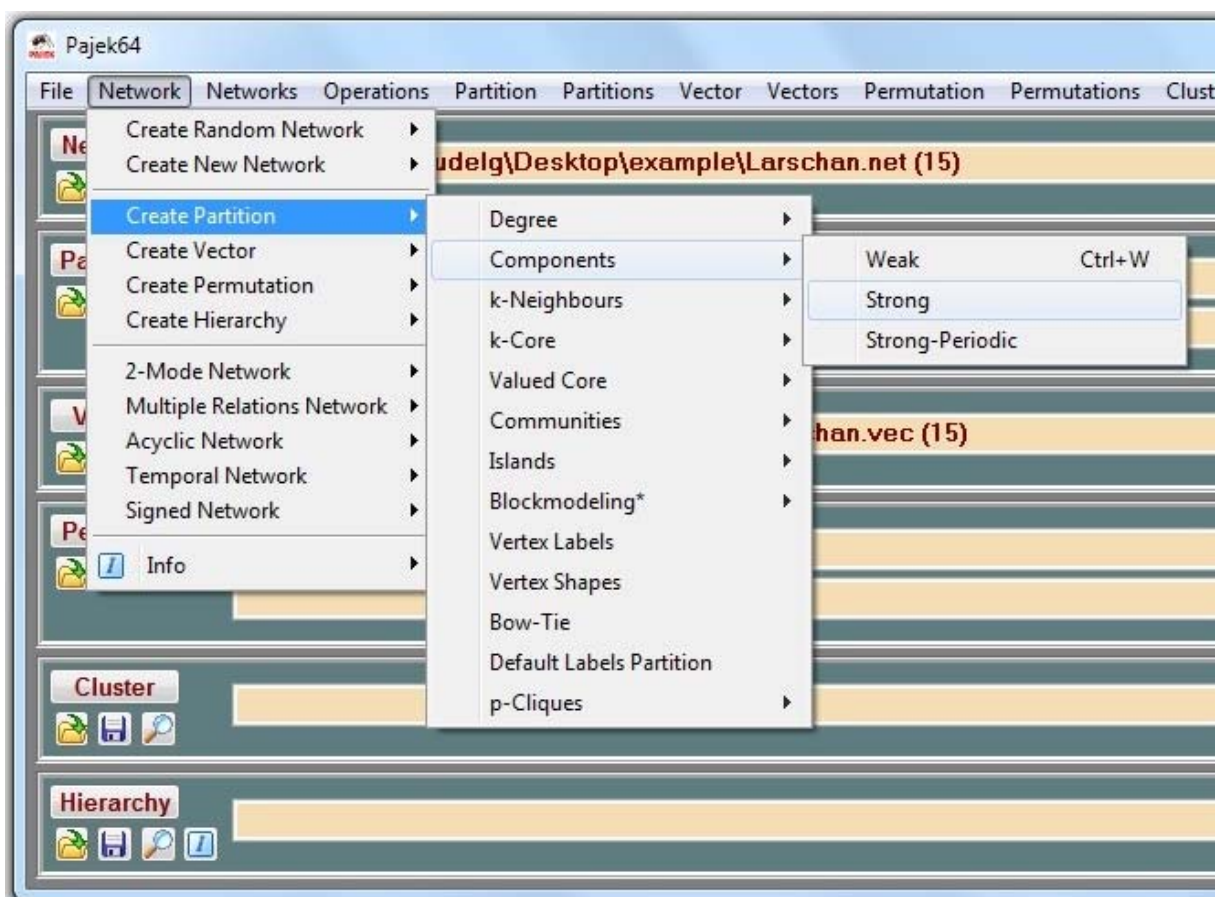


The “Networks” and “Vectors” fields should now show the input files.

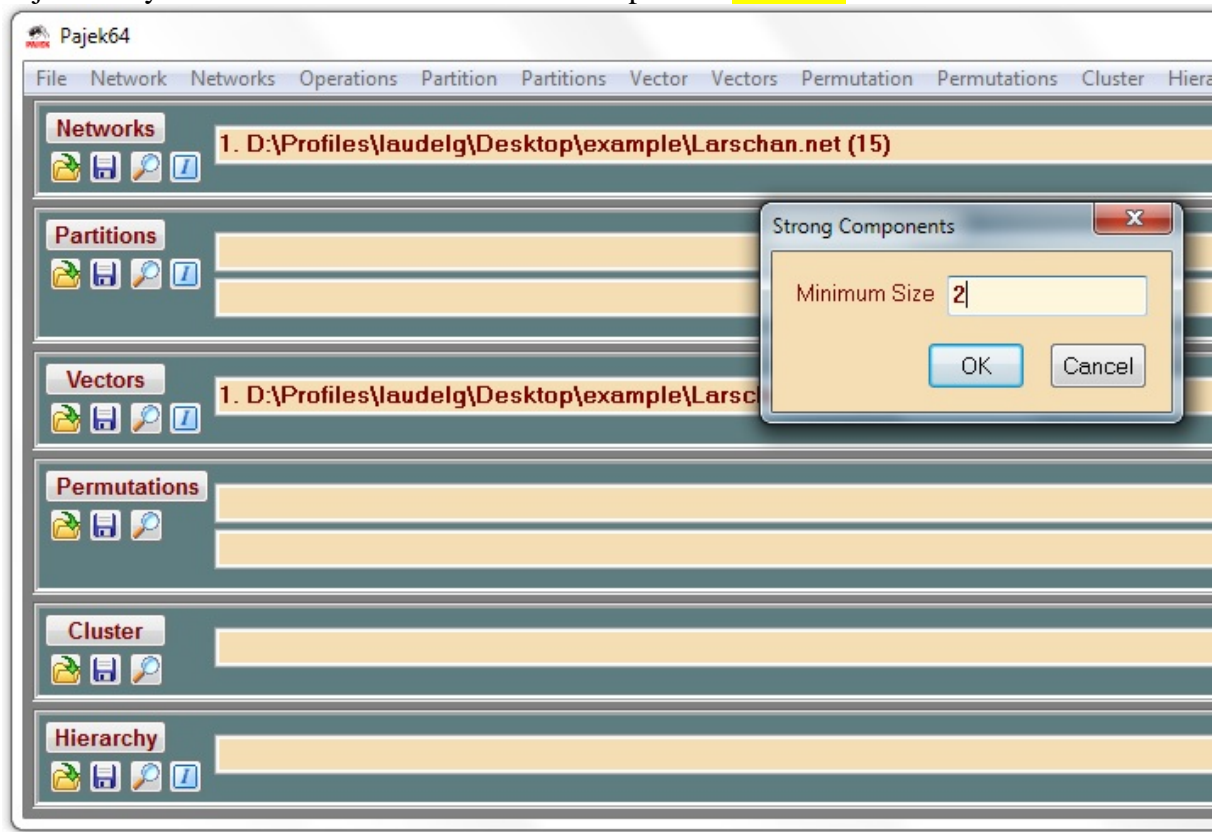
¹ Screenshots are taken with Pajek Version 64 3.11



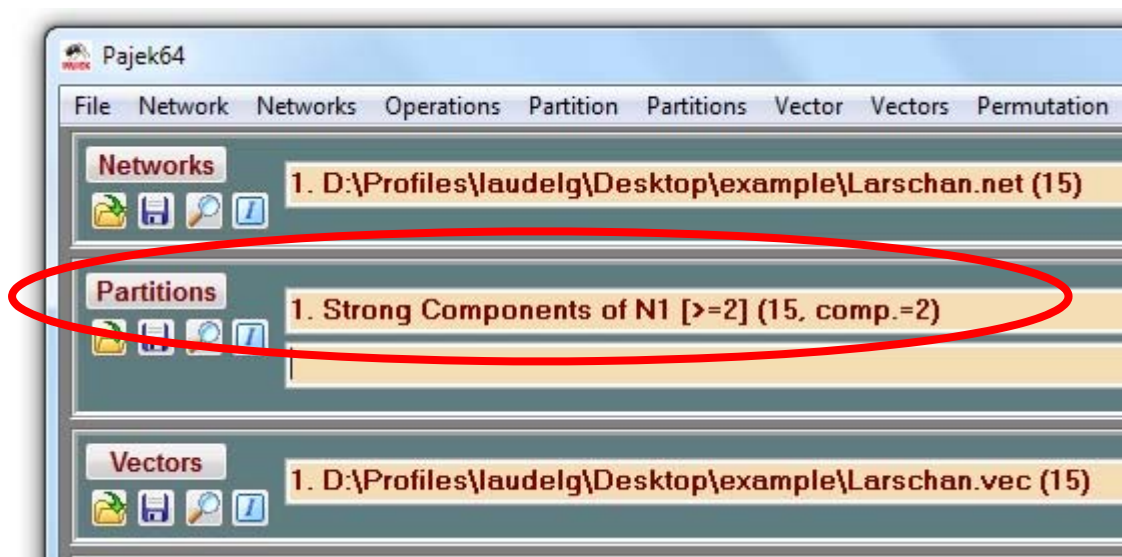
- Select Network → Create Partition → Components → Strong.



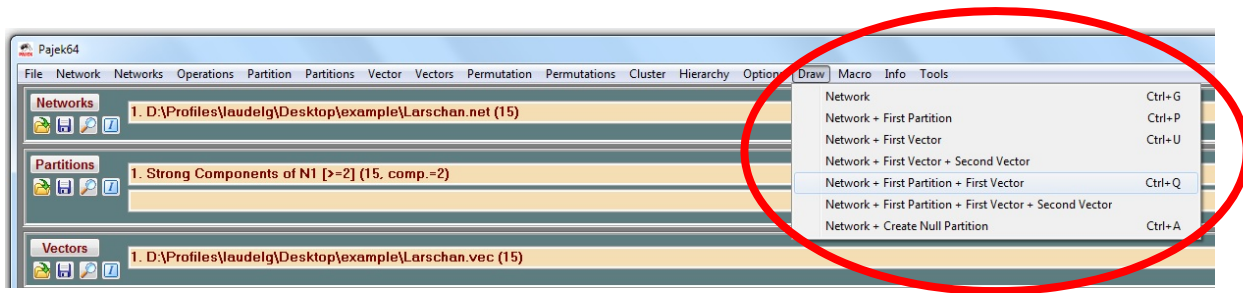
Pajek asks you about the minimum size of a component. Put in “2”.



Pajek analyses your network and writes the clusters it found in a partition file, which now appears under “Partitions”.

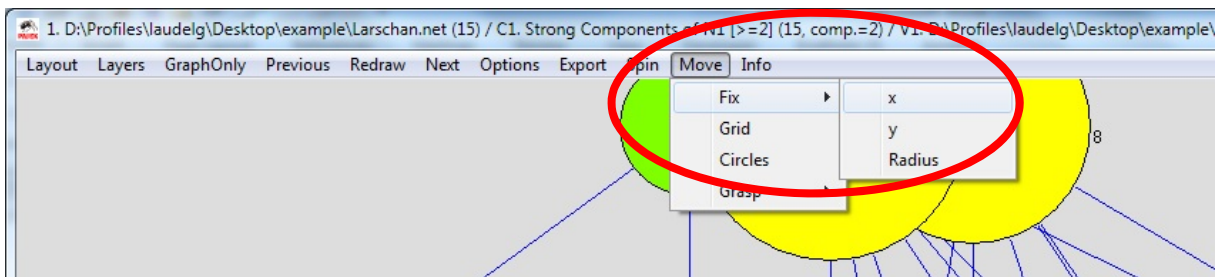


Now go to Draw → Network + First Partition + First Vector.

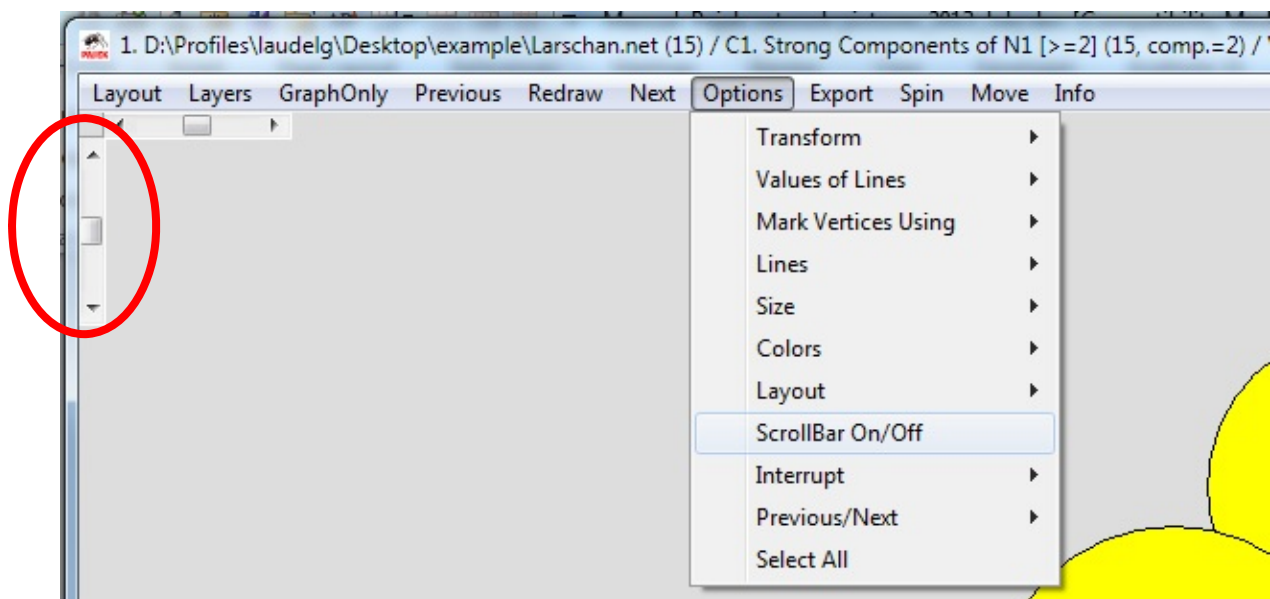


Pajek will now draw a picture in which the publications belonging to different clusters have different colours. The picture appears in a separate window.

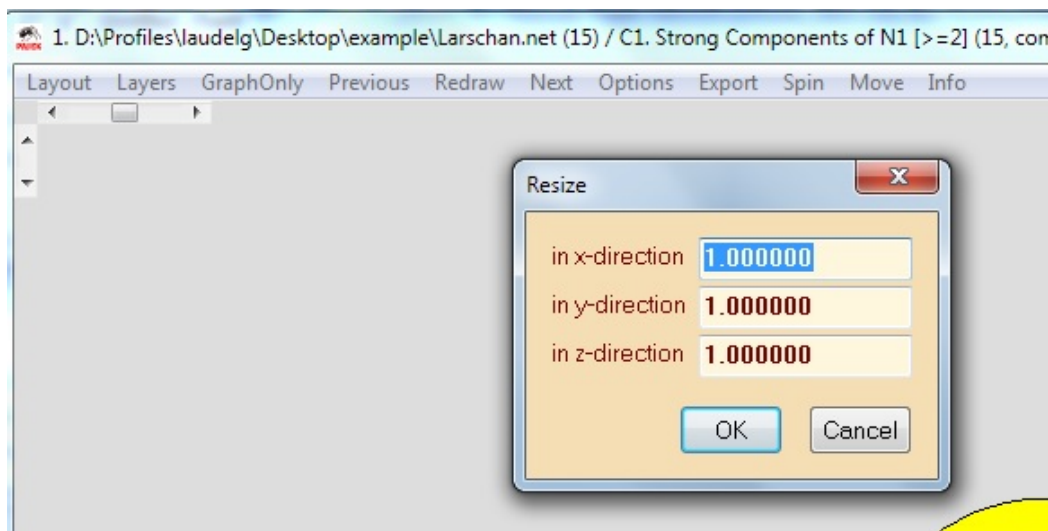
- **Important!** From the Drawing menu bar, select Move->Fix->x. This holds the publications in the position assigned to their year and restricts movements to the y-direction. This is important because Pajek has no time axis and no grids, and it is very easy to accidentally move a publication to a different year. If you feel safe later, you can 'free' the x-direction (by again selecting Move->Fix->x). and slightly vary the x-coordinate in order to see all connections of a vertex (publication).



Move the circles around (preferably only along the x-axis) in order to produce the nicest picture. By clicking on a line of a cluster, you can move the whole cluster around. If you think you need to enlarge the picture beyond the size of the Pajek screen, you can use the scrollbars for reducing the picture in Pajek as much as possible, in order to expand it later in Visio (in Visio you will need to keep the x/y ratio constant for the circles to remain circles. In Pajek, only distances between circles are changed when you use the scrollbars. Circles remain unchanged. Best is to squeeze the picture along the Y-axis using the left-hand scrollbar only.

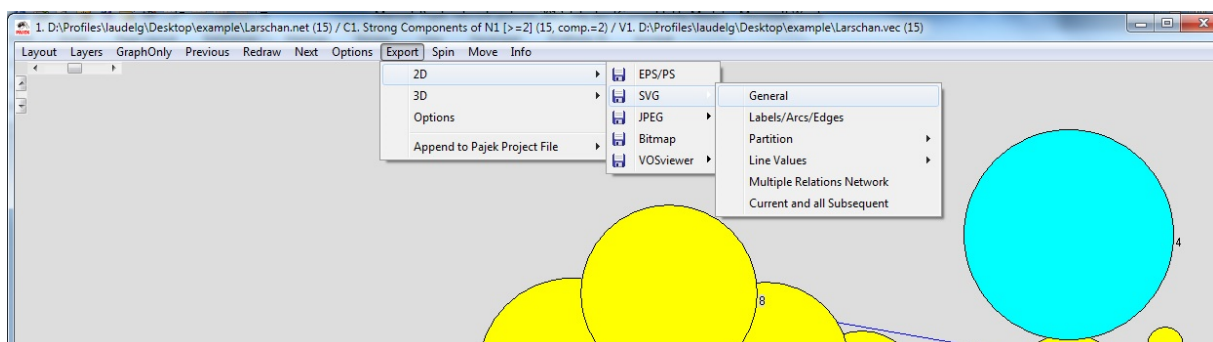


Furthermore you can change the proportions of the picture by changing by **resizing in X or Y-direction**. For example, for long research trails (older researchers) you might need to have a lower value for the y-direction. Simply put a new value in, e.g. “0.75”

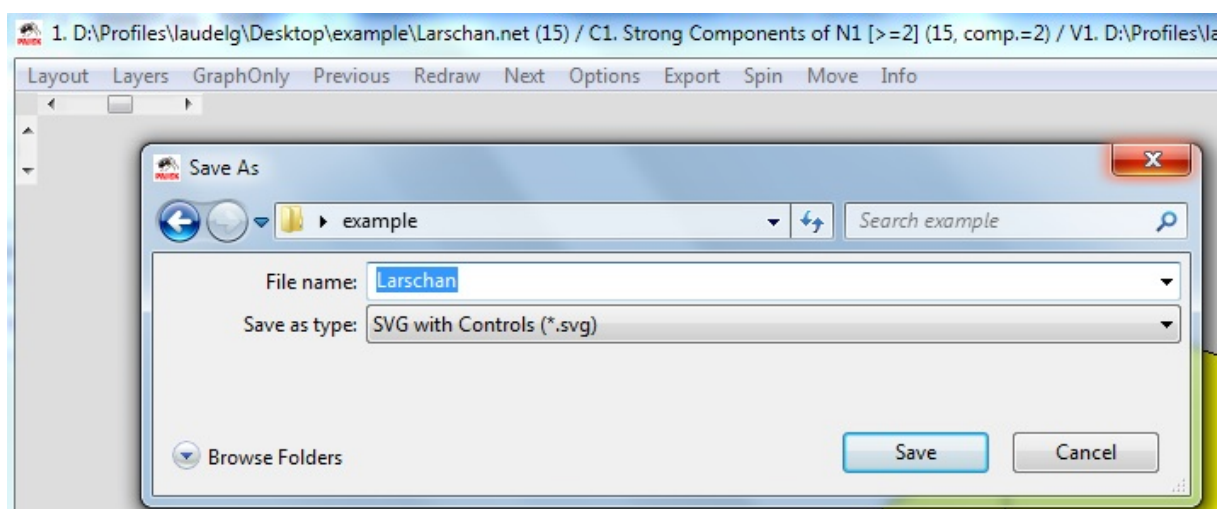


3.3 Export Pajek picture to Visio

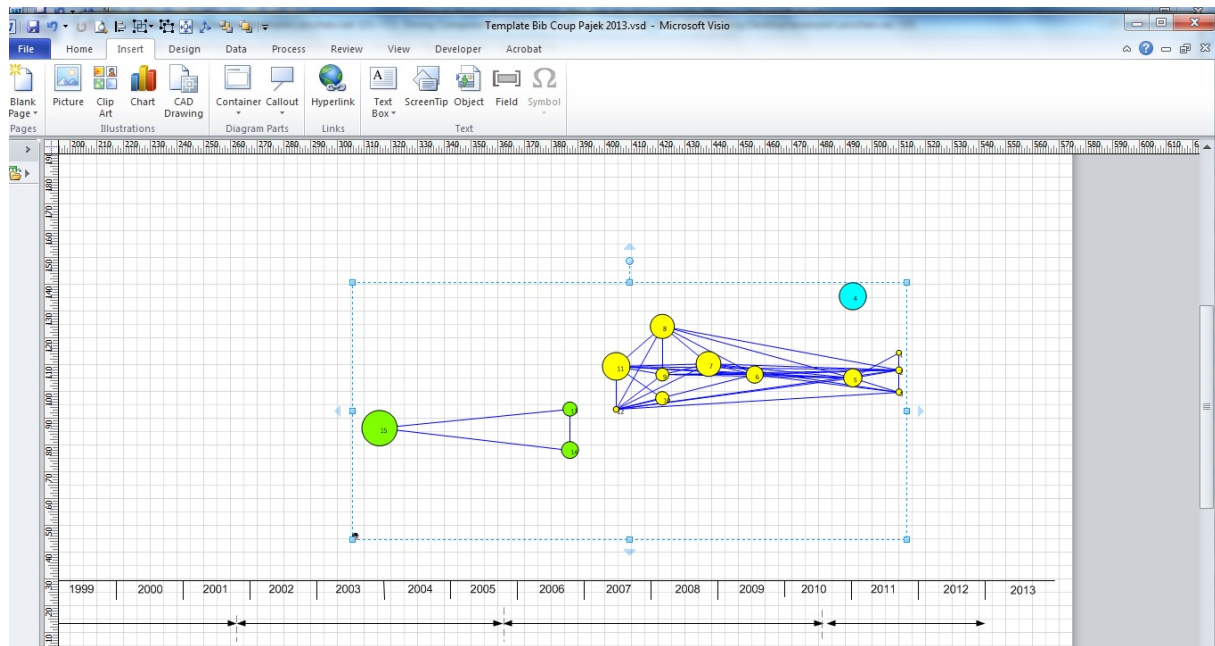
There are several way of doing this. The best way apparently is to export the Pajek picture as a 2D svg file. Thus, go to **Export → 2D → SVG → General**. You will be asked for a filename.



Its easiest to use the researcher name again.



Then **open Visio and go to Insert → Picture → From File**. Locate your svg file and insert it.



You can now expand or shrink this picture. If you ungroup the Visio image, you can also access individual vertices and edges. However, when you move the circles, the edges will not follow! They are not firmly connected in to the circles in the traditional Visio way.