Stakeholder network analysis

Data on project participation of the stakeholders has also been used to analyse the stakeholder network behind the AS projects. For this, we have used social network graphs. These graphs are visual tools that enable us to explore proximity, relationships and their strengths between stakeholders, here the Alpine Space project partners. They have their foundation in social network analysis (see Hanneman and Riddle (2005) for an introduction) which is based on mathematical tools and graph theory. By definition, a social network is simply a set of actors (nodes), that may have relationships (edges) with one another. In our case, the network nodes are all identified stake holding institutions in the 30 AS projects along the 2007-2013 programming period. The list of stakeholders was created using the excel sheet from the JTS. However, this list might be subject to bias as different practices exist in declaring project partners, especially for large institutions such as regions, provinces, universities or research centres (head institution, sub-units). Therefore, and contrary to the main stakeholder analysis, we derived a second dataset by aggregating stakeholders according to their head institutions. In the aggregated dataset, the number of stakeholders dropped from 231 to 189, i.e. 40 institutions are in fact sub-units of head institutions. This generalization gives us insights on the real importance of these head institutions; information that is not available in the disaggregated data. We will see that this consideration has consequences for the graphs. The edges are based on the collaborations with other stakeholders that took place during the projects. We do not consider variations in collaboration intensity (e.g. different intensities of collaboration in general, timely variation) as we did not have available such qualitative data. Although data might not appear rich on first sight (lack of intensity), the resulting graphs provide us with valuable insights on the (partial, only 30 projects) network established in the framework of the AS programme.

We used freely available software tools: First, the R statistical software (R Development Core Team, 2008) is used to prepare data on edges and nodes. In a second step, we used gephi network analysis software (Bastian, Heymann, & Jacomy, 2009) to develop the graphs. Network graphs are typically drawn using layout algorithms, which calculate and draw the network based on the data on nodes and edges provided. Here, we used the Fruchterman and Reingold layout algorithm (Fruchterman & Reingold, 1991) that puts emphasis on complementarities between nodes. Once the network is drawn, it reflects centrality of stakeholders in the whole network (position), proximity between stakeholders (more distant stakeholders are less linked) and strength of relationships (number of collaborations, several possible, via thickness of edges). Furthermore, statistical tools and clustering algorithms can be used to explore the stakeholder landscape, e.g. regarding

- local connectivity of stakeholders (termed degree or weighted degree centrality),
- geographic centrality of stakeholders (termed closeness centrality),
- transit centrality of stakeholders (nodes where a lot of transit can happen, termed betweeness centrality),
- authority (termed eigenvector centrality, nodes connected to central nodes are central themselves),
- and clusters of stakeholders, i.e. detection of underlying sub-groups/communities of stakeholders (Levallois, 2014).

For the analysis, we used the following graphs: First, we compare two graphs based on the disaggregated (sub-units as institutions) and aggregated (head institutions) data. In these two graphs, we also highlight local connectivity of stakeholders. We then continue exploring in more detail the graph of head institutions, highlighting the distribution of projects, stakeholder role (lead partner, project partner) and countries across the network, and presenting a clustering approach.

Sources

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