A mixed quantitative-qualitative FTA approach for analysing emerging technologies

Emerging Arctic Technologies?

An increasing interest towards the Arctic region is an example of domain where FTA can provide remarkable advantage. However, the actual "Arctic aspect" of emerging technologies is not easy to define. This is the background for our research questions:

1) What is the "Arctic aspect" in the context of emerging technologies?
2) How the complexity of the "Arctic" can be structured in a FTA-process?

We introduce a mixed quantitative-qualitative FTA approach to identify emerging technologies in a complex systemic settings, such as the “Arctic”.

Process

The “Arctic aspect" of emerging technologies is not to be understood as a function of one or two defining keywords, but it is an outcome of a network of functional conceptualisations across technologies. The proposed approach has two steps combining qualitative and quantitative methods:

1) Constructing a conceptual thematic network through expert workshops

2) Patent analysis: The outcome of the first step is used as inputs to the patent analysis.

Results

For the patent analysis, we wrote a Python script which deconstructs the concept map to queries. The script analysed each abstract from PATSTAT database and identified, if the patent related to a theme in the concept map (Figure 1). The resulting dataset was analysed descriptively according to patent volume, technology themes and key organizations (Figure 2).

The exemplary figures show that Arctic technology is not a coherent entity, but the recognized technology themes are separate. In the example, the motor vehicle companies dominate the actor network and it is otherwise scattered.

Conclusions

Our approach was a mixed qualitative-quantitative FTA-process for the analysis of complex technology domains. The approach enables the structuring of a technology domain for quantitative analysis. Qualitative workshops produce boundaries for the quantitative search. The approach is suitable for future oriented technology analysis where the technology domain is not established. Although still explorative, our method has potential applicability also beyond the Arctic issues: it can be utilised, for example, to analyse grand challenges with unclear boundaries, such as “security” or “health.”

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