Tech mining tools for technology roadmapping:
their usage in trends monitoring and bibliometric analysis

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Background and purpose of the study

Technology roadmapping may imply the usage of various methods: qualitative (f.e. literature review, expert surveys, horizon scanning) and quantitative ones (f.e. bibliometric and statistical analysis, trends monitoring, topic clustering) that preferably should complement each other. In recent decades automated and semi-automated techniques for extracting implicit information from textual sources are increasingly being developed in foresight studies. Such techniques as tech mining, a special form of "big data" analytics, help generate practical intelligence and validate expert assessments with empirical data obtained through specialized software (Vantage Point, VOSviewer, etc.). Therefore, active usage of tech mining in trends monitoring and bibliometric analysis may improve the technology roadmapping process.

This paper presents an approach to integration of trends monitoring and bibliometric analysis into technology roadmapping in the area of UAVs: it provides an overview of the trends influencing the development of UAVs (using STEEPV-categories); performs bibliometric analysis of the publications in 2005-2015 to identify the hot topics; and presents the ways how this information can be integrated in technology roadmapping process. The results obtained can be taken as a guide by researchers, business representatives or policy makers involved in foresight activity.

Methodology

The methodological approach implies usage of the following methods: qualitative (literature review, expert procedures) and quantitative (bibliometric analysis, technology mining).
It includes the following stages:
1. Semi-quantitative monitoring of STEEPV-trends (using different information sources: international reports, news, foresights, strategic documents, conference materials, etc.).
2. Quantitative analysis of Scopus publications in 2005-2015 (bibliometric analysis and technology mining with Vantage Point and VOSviewer).
3. Combination of the results of quantitative and qualitative procedures and their integration into a technology roadmap.
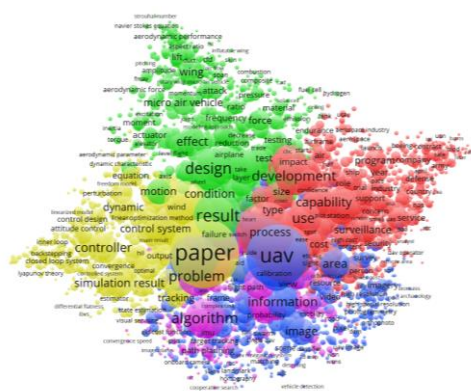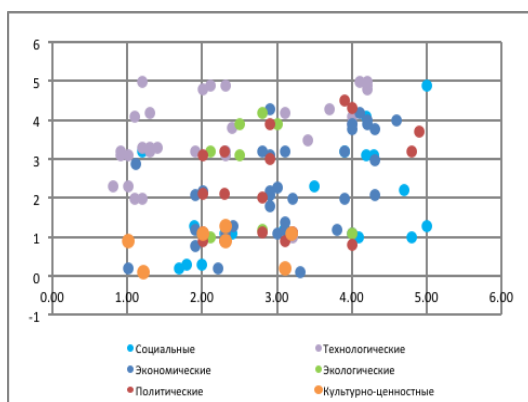
Figures 1-2: 1. Analysis of STEEPV-trends. 2. Main clusters of keywords.
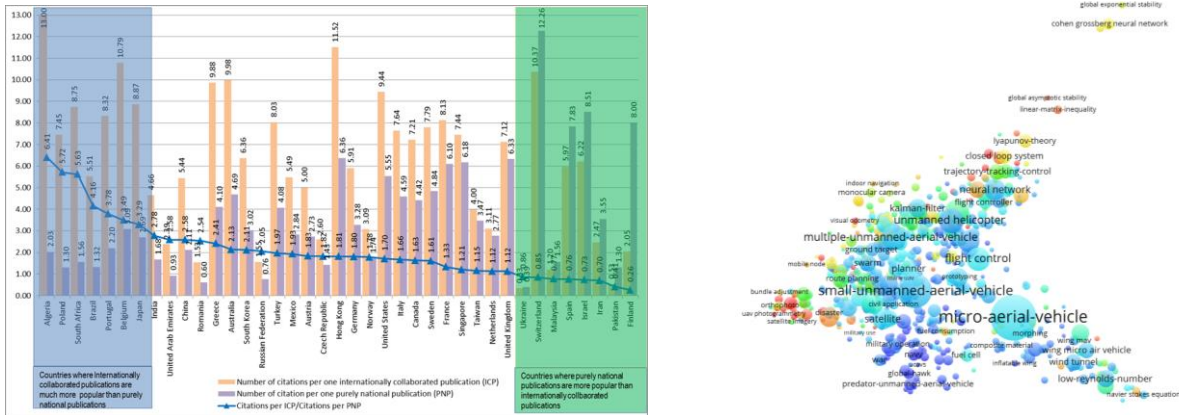
Figures 3-4: 3. Main countries involved in UAVs research. 4. The map of trends (VOSviewer).

Findings, discussion and conclusion

As a result of this study, the relative assessment of STEEPV-trends influencing the area of UAVs was conducted using quantitative data processing and expert procedures; the main research fronts and hot topics were detected (f.e. green UAVs, flying cars, sensor UAV technologies, drone swarms); and the possibilities for integration of trends monitoring and bibliometric analysis on different stages of technology roadmapping were explored and analyzed. Studying the ways for using these tools in developing, validating and updating technology roadmaps is an open room for further research.

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