

GLOBAL RESEARCH EFFORTS AUTONOMOUS VESSEL

THE JOURNEY TOWARDS AUTONOMOUS SHIPS AND THE ROLE OF SEAFARERS IN THE FUTURE: A BIBLIOGRAPHICAL PERSPECTIVE

OBJECTIVES AND HIGHLIGHTS

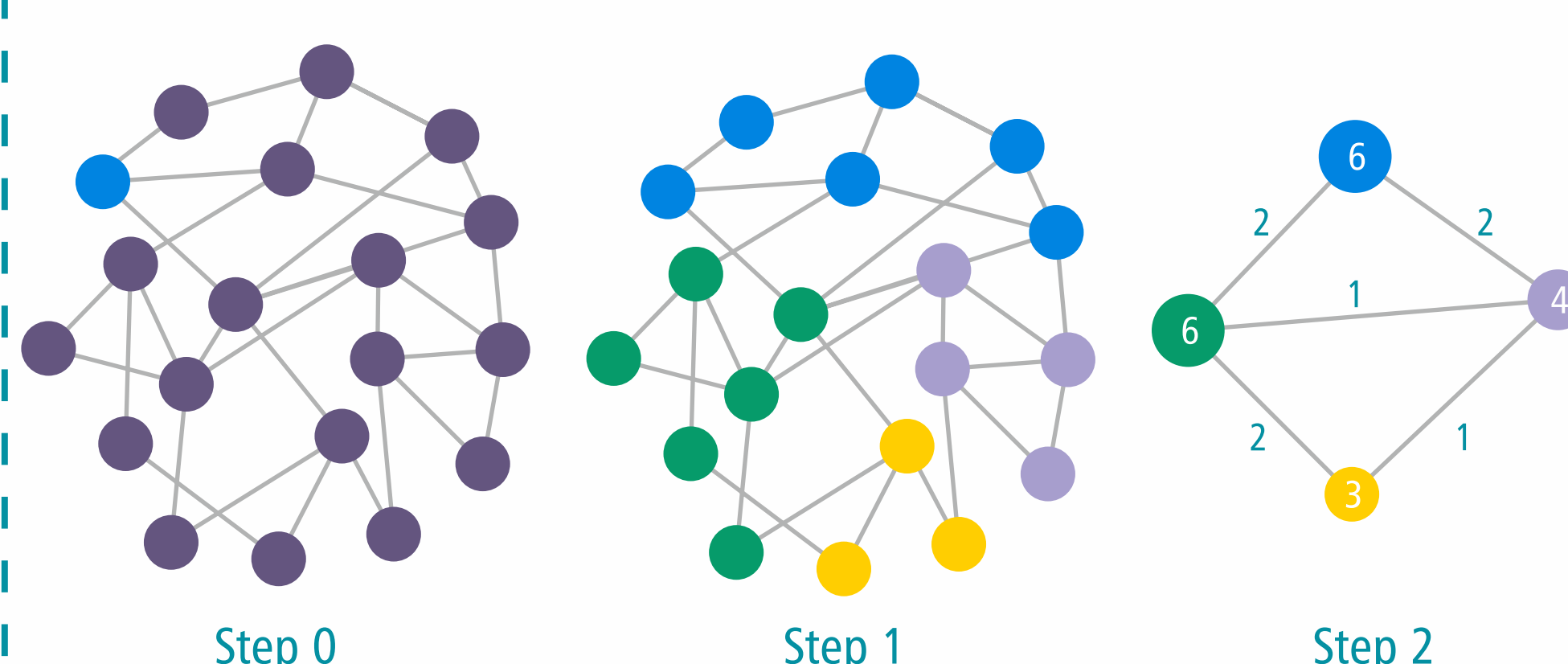
- Provide a map of the main areas and spot newly emerged topics.
- Quantify research efforts and conclude about future competences.
- Provide unbiased bibliometric overview of the literature related to autonomous vessels.
- 3978 articles were retrieved and screened from WoS Database.
- 2,250 articles were subjected to scientometric analysis and 985 articles were bibliographically classified into 7 main areas.
- Interactive web application available at:



maritime-research.gitlab.io/iamu

METHODS

- A broad search query to find related literature *TITLE ABS KEY (autonomous AND vessel* OR autonomous AND shipping OR autonomous AND ship* OR unmanned AND ship* OR unmanned AND vessel*)* supplemented by a semiautomatic pre-processing script and final evaluation by the authors.
- We used relative and absolute indicators to estimate the growth of an element in the corpus, e.g. average growth rate, average documents per year and percentage of documents in the last two years.
- Finally, the search for partitions in main and sub-clusters (bibliographic coupling) is carried out with the Louvain algorithm based on the Newman Girvan modularity function (Fig. 1).



RESULTS

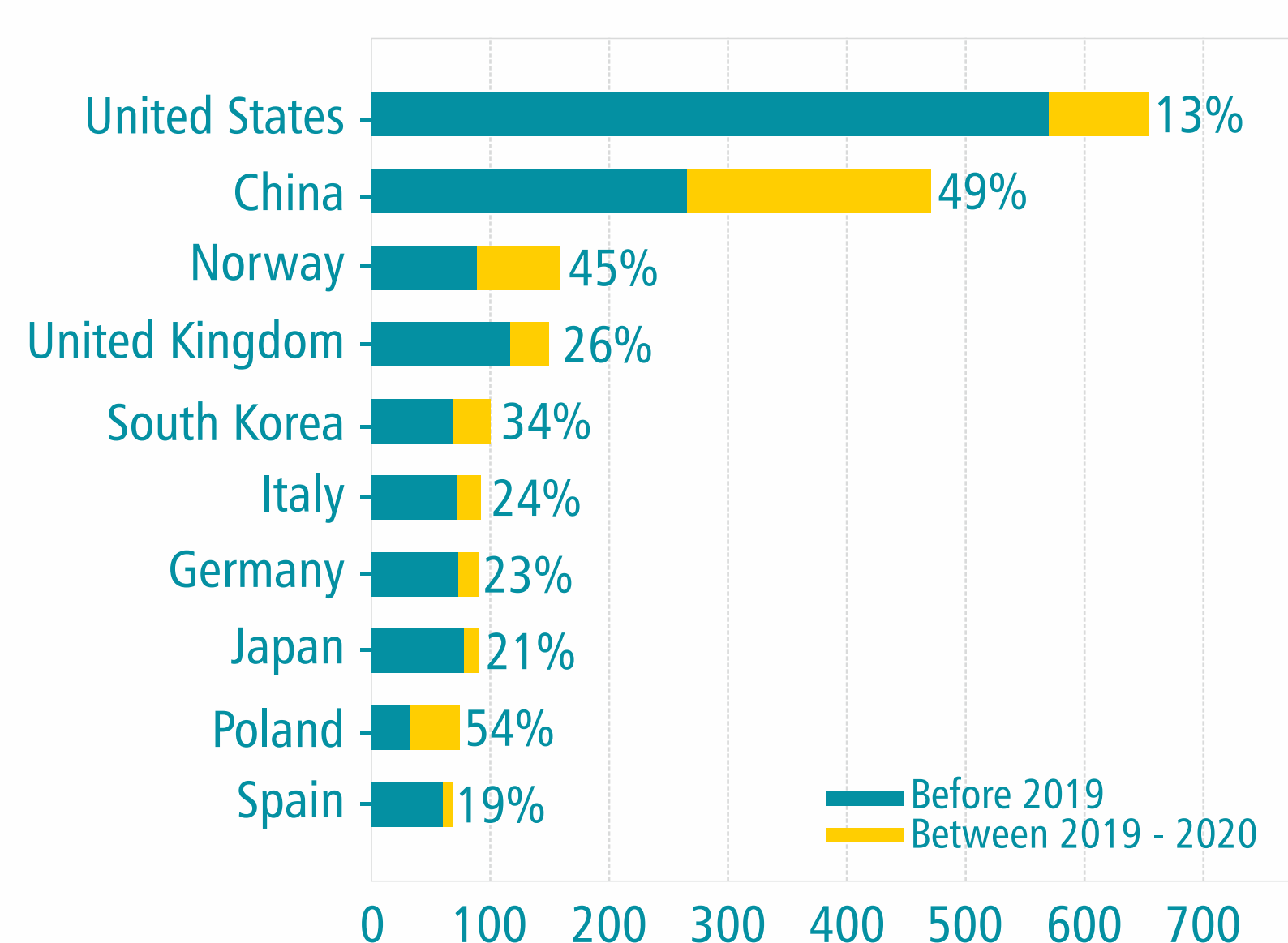


Figure 2: Top 10 contributing countries compared to the percentage publish article since 2019

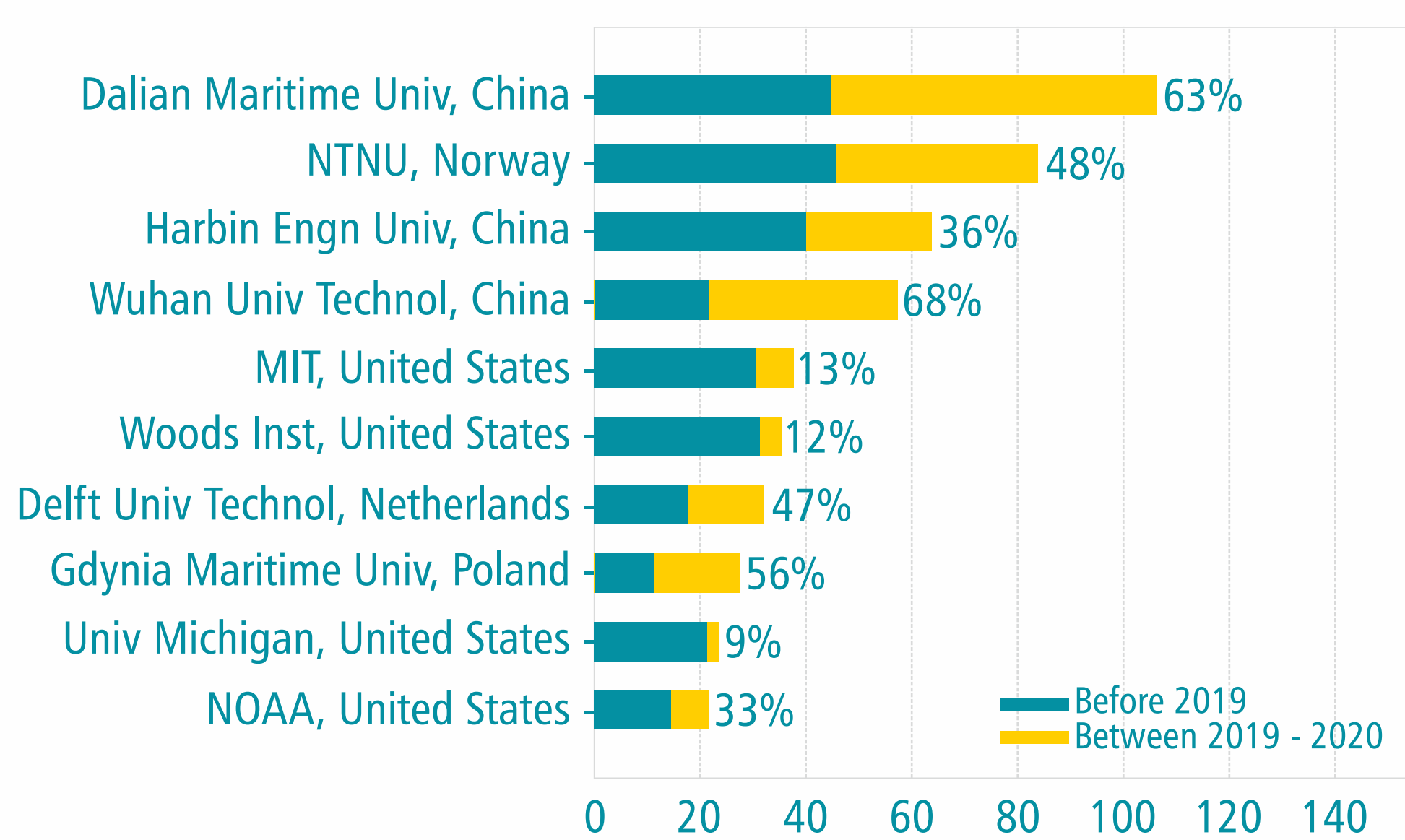


Figure 3: Top 10 contributing institutions in relation to the percentage of documents published since 2019

- The analysis shows that the ten most prominent countries are responsible for more than 85 % of the articles (Fig. 2).
- Research interest from Chinese, Norwegian, and Polish universities has increased significantly in recent years (Fig. 3).
- The new trends identified from the authors keyword are directed towards artificial intelligence and safety (Fig. 4).

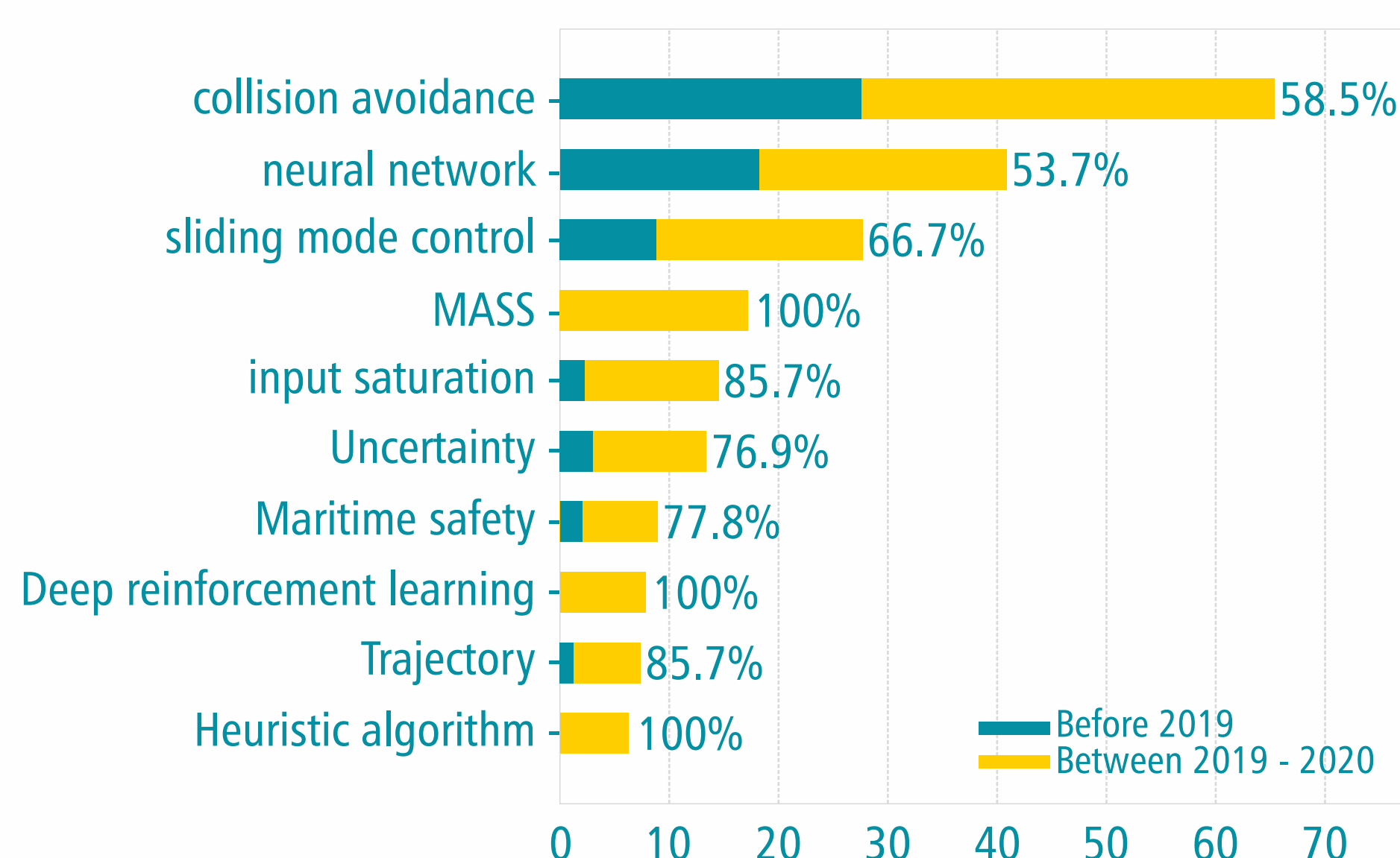
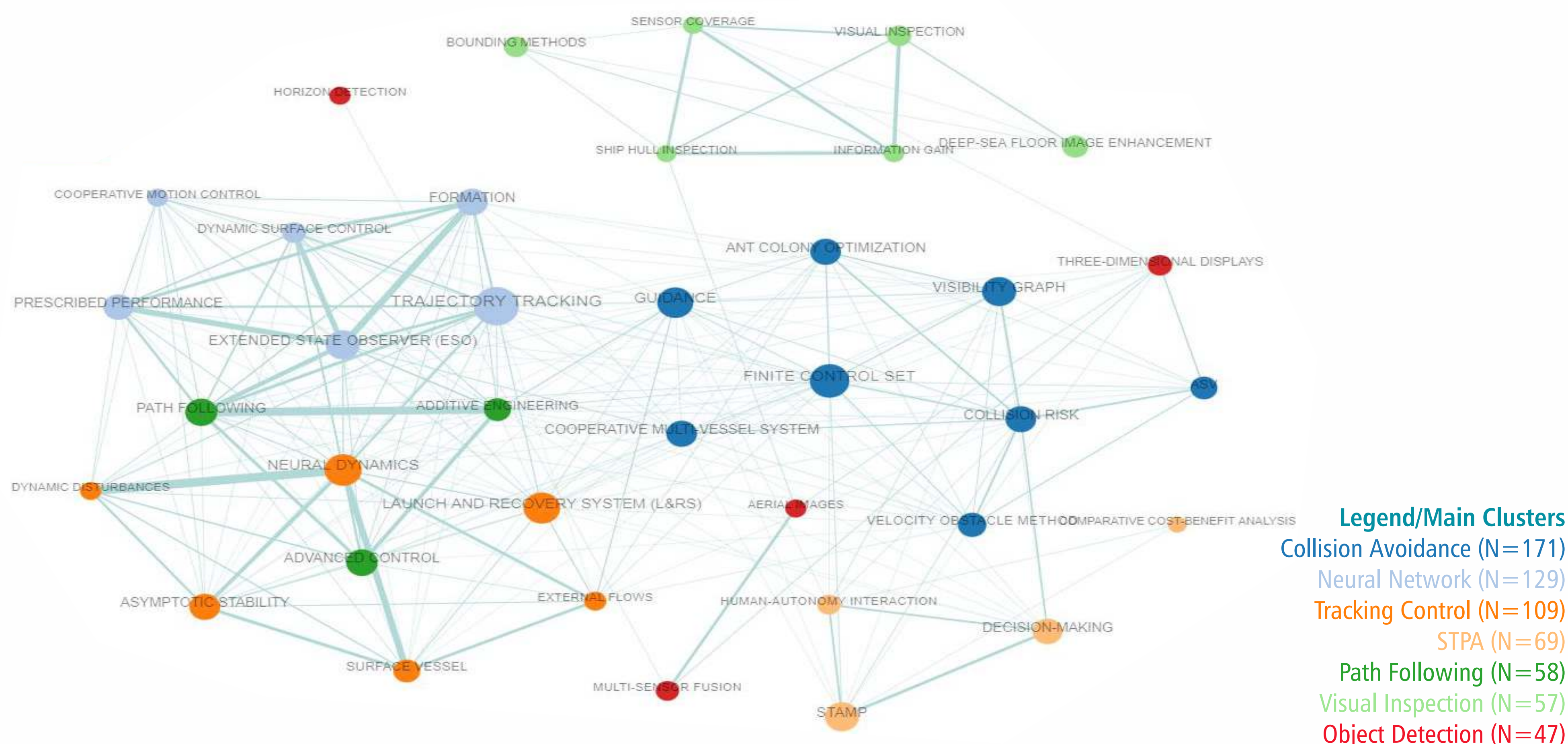


Figure 4: Trending topic according to the absolute and relative indicators

- Figure 5 shows the identified 7 main clusters with 37 sub-clusters in the WOS dataset. The central role in the corpus is taken by the "Collision Avoidance" cluster and its connection between all clusters.



CONCLUSIONS AND DISCUSSION

- The research focus is mainly on collision avoidance and object detection.
- The newly formed "STPA" cluster assessing the reliability and risks associated with the new technologies.
- Seafarers competences does not necessary cover immerging topics such as image processing, machine learning, data science, etc.
- Seafarers need to be able to question the decisions a machine makes, but this requires a better understanding of the underlying technologies.
- The traditional knowledge of seafarers is still important for the safety operation of the vessel, as many operational aspects such as medical care, emergency response, ISM (safety management practices) or maintenance are not yet considered.