

Cognitive Production Systems: A Mapping Study

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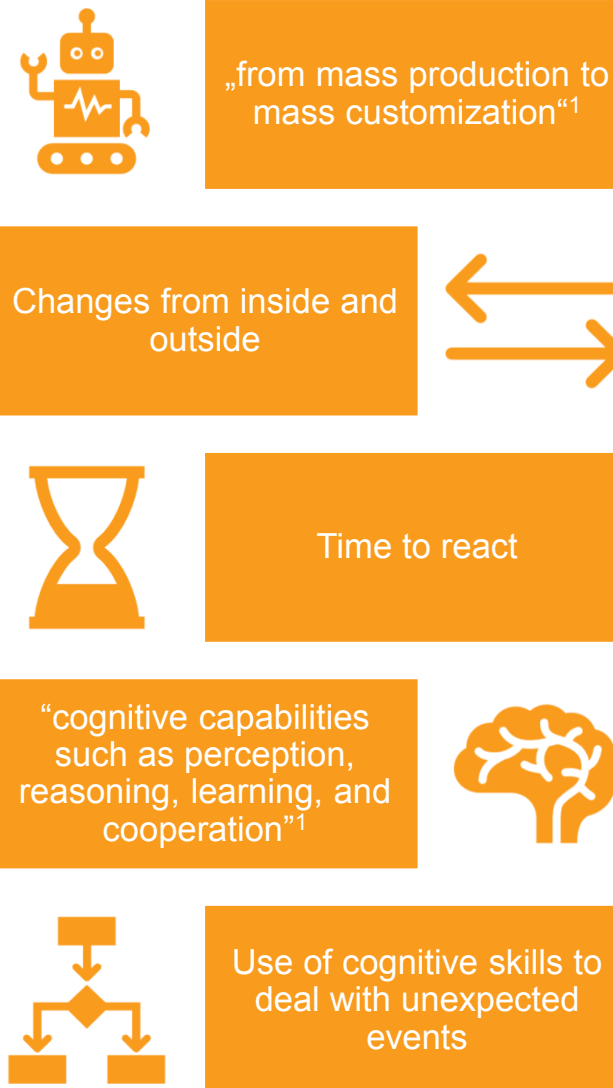
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Abstract—In order to guarantee the quality and the productivity of a production system in a competitive marketplace, it is important to be able anticipate the changes in specifications of products and systems. The time limits in running productions, the complexity of manufacturing systems, and the diversification of components, are the challenges that human experts cannot handle



- ▶ Introduction
- ▶ Aims and research questions
- ▶ Execution
- ▶ Analysis
- ▶ Conclusion and outlook
- ▶ Literature sources

► Introduction



¹Tran, Park, Nguyen & Hoang, 2019

- ▶ Provide an overview of the research area
- ▶ Represent the quantity and type of publications
- ▶ Identify gaps in research

► Objectives and Research Questions

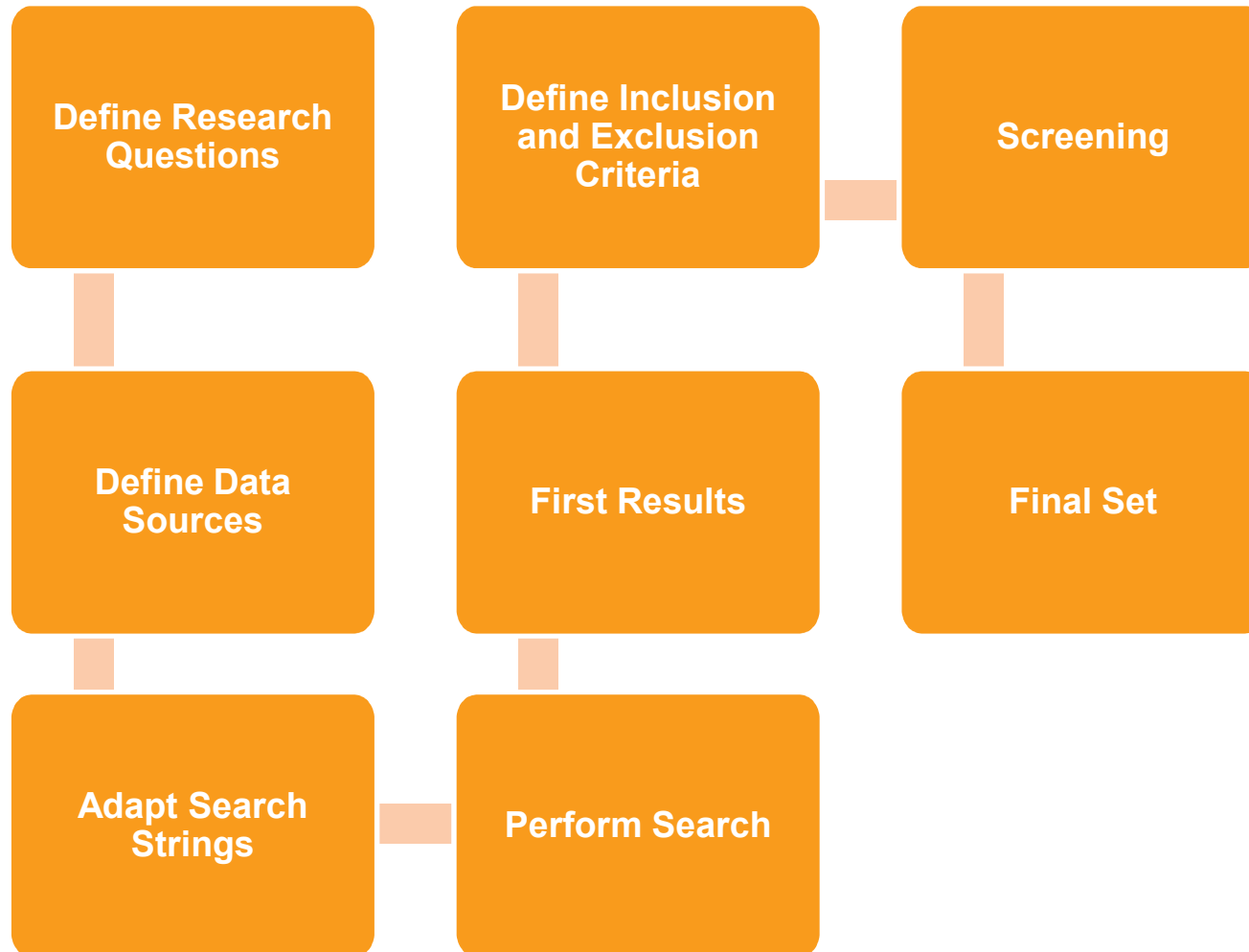
RQ1: What types of concepts exist for Cognitive Production Systems(CPS)?

RQ2: Which types of existing concepts for CPS are used in practice?

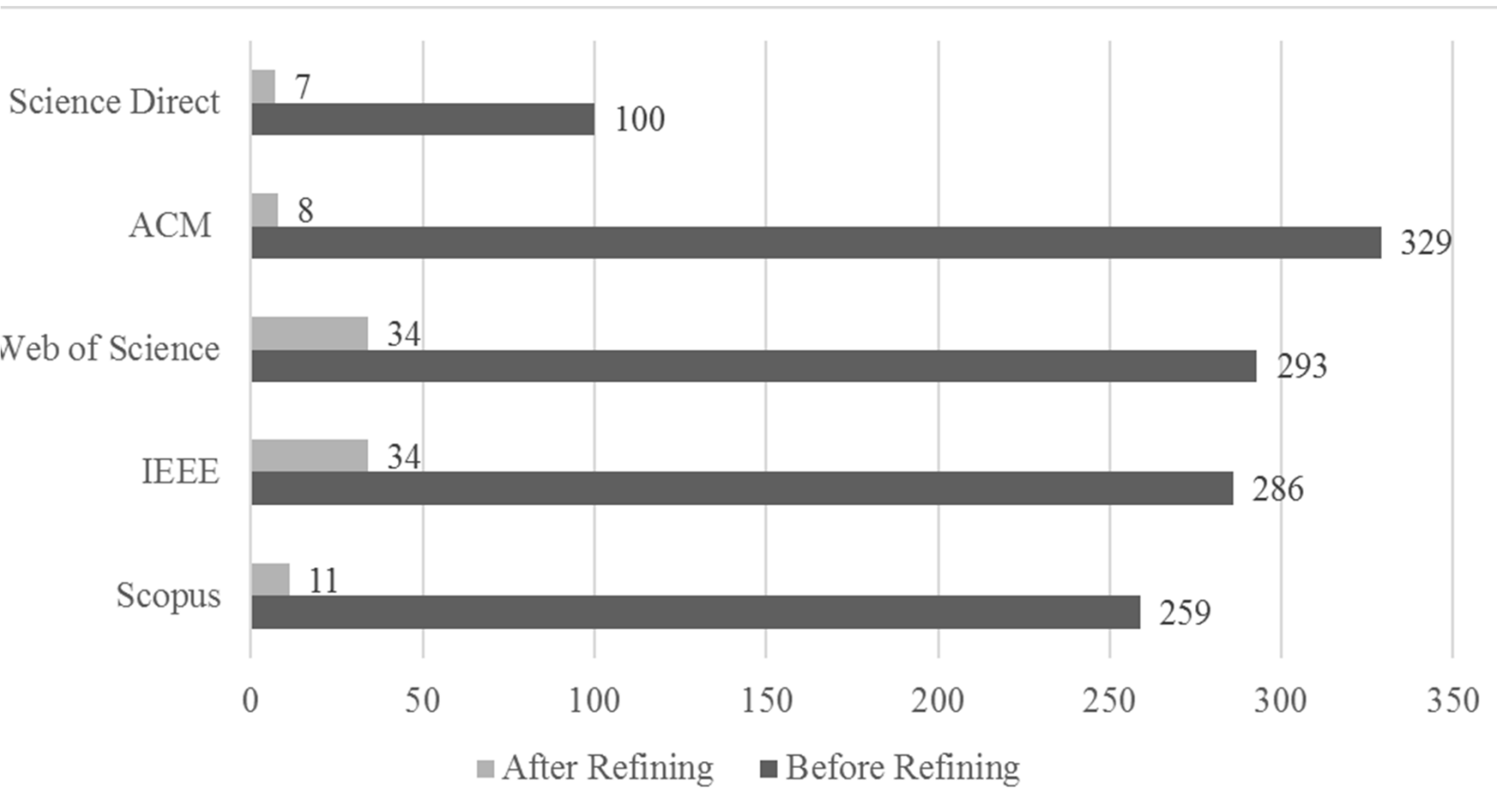
RQ3: Which advantages do they (CPS) have in production and which problems of traditional automated production do they really solve?

What are the most relevant problems and barriers for CPS-prototypes?

► Research Methodology



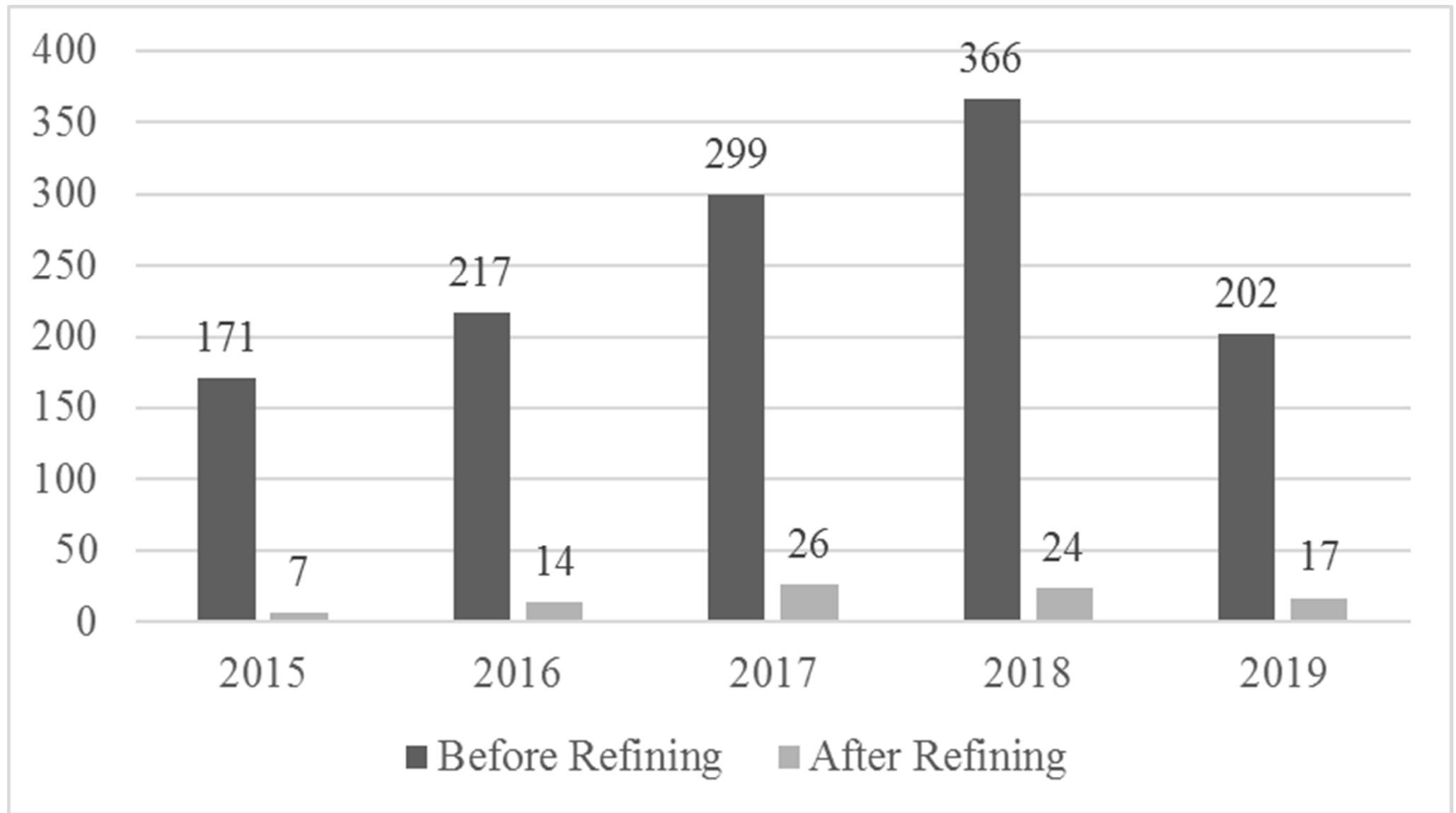
Findings with Regards to Dataset



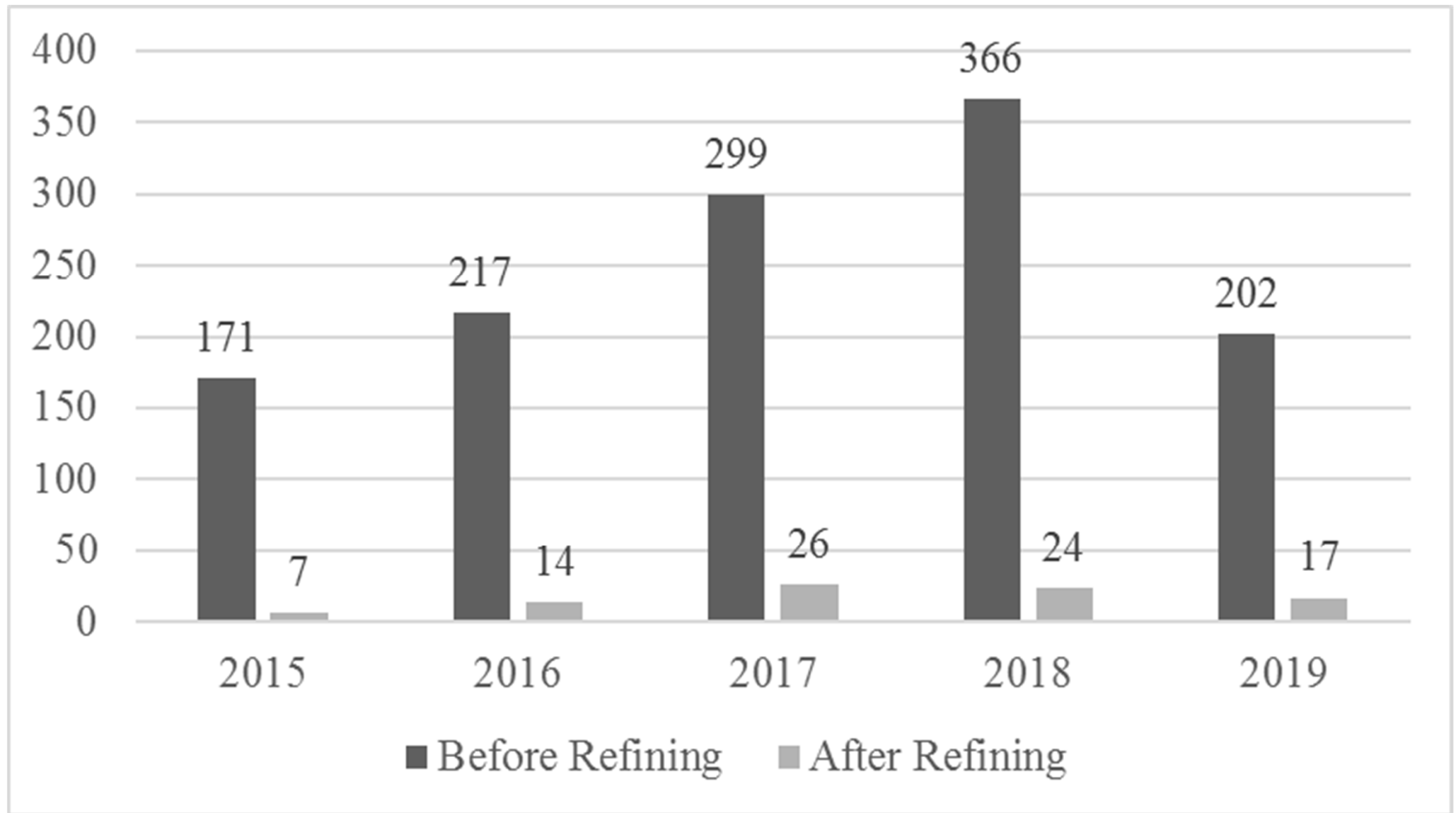
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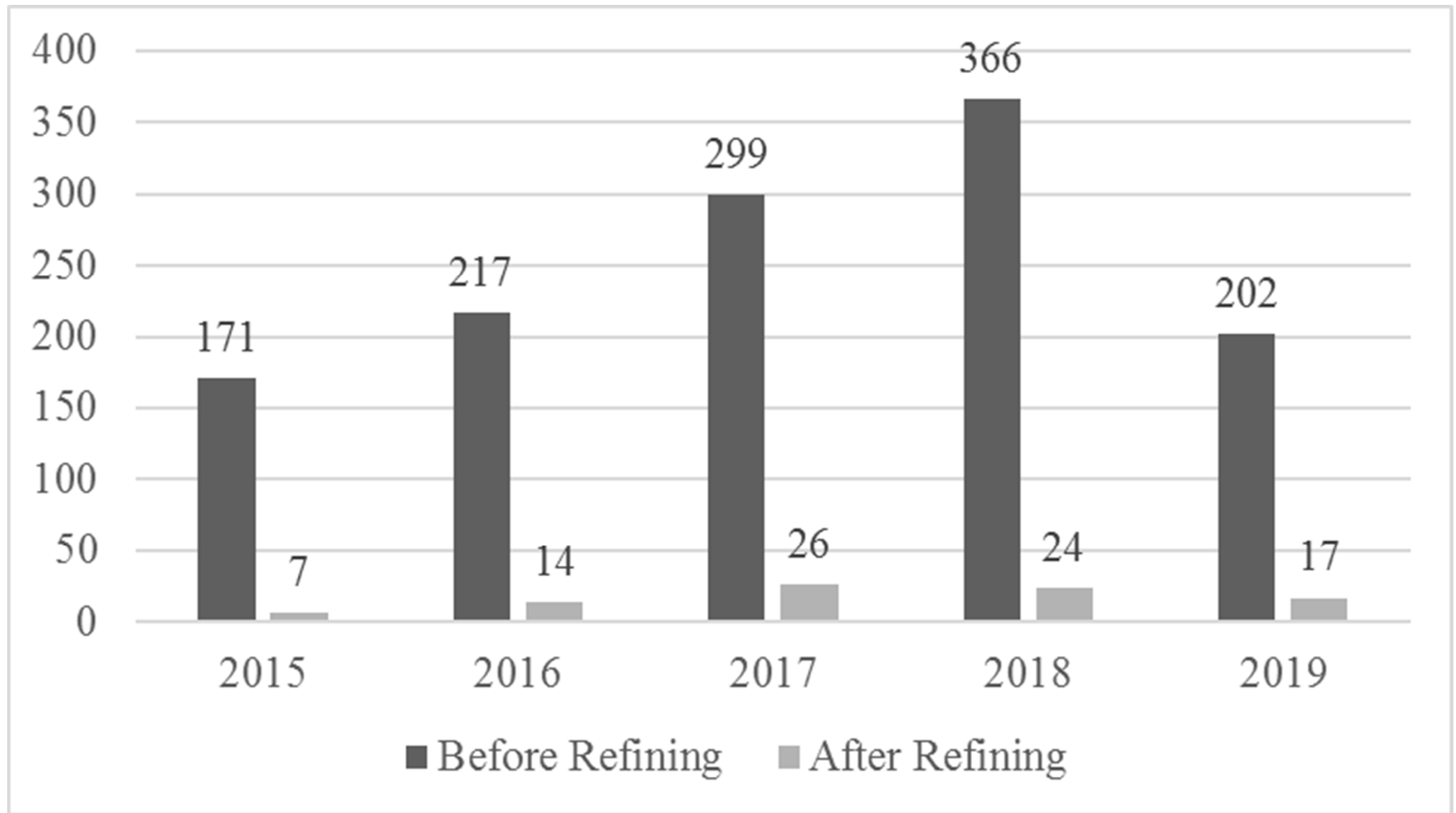
Papers with Regards to Year of Publication



Papers with Regards to Country of Publication

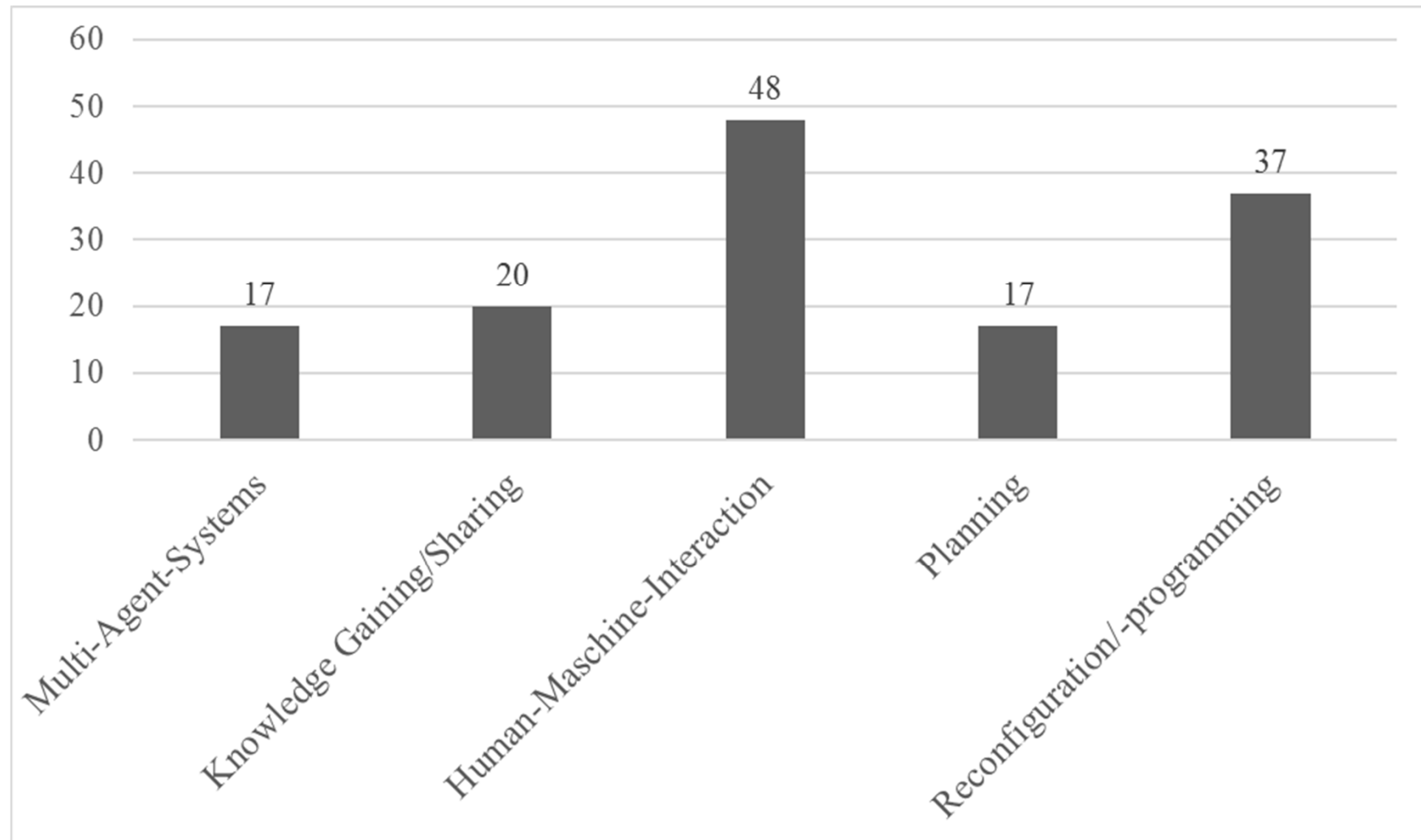


Papers with Regards to Country of Publication

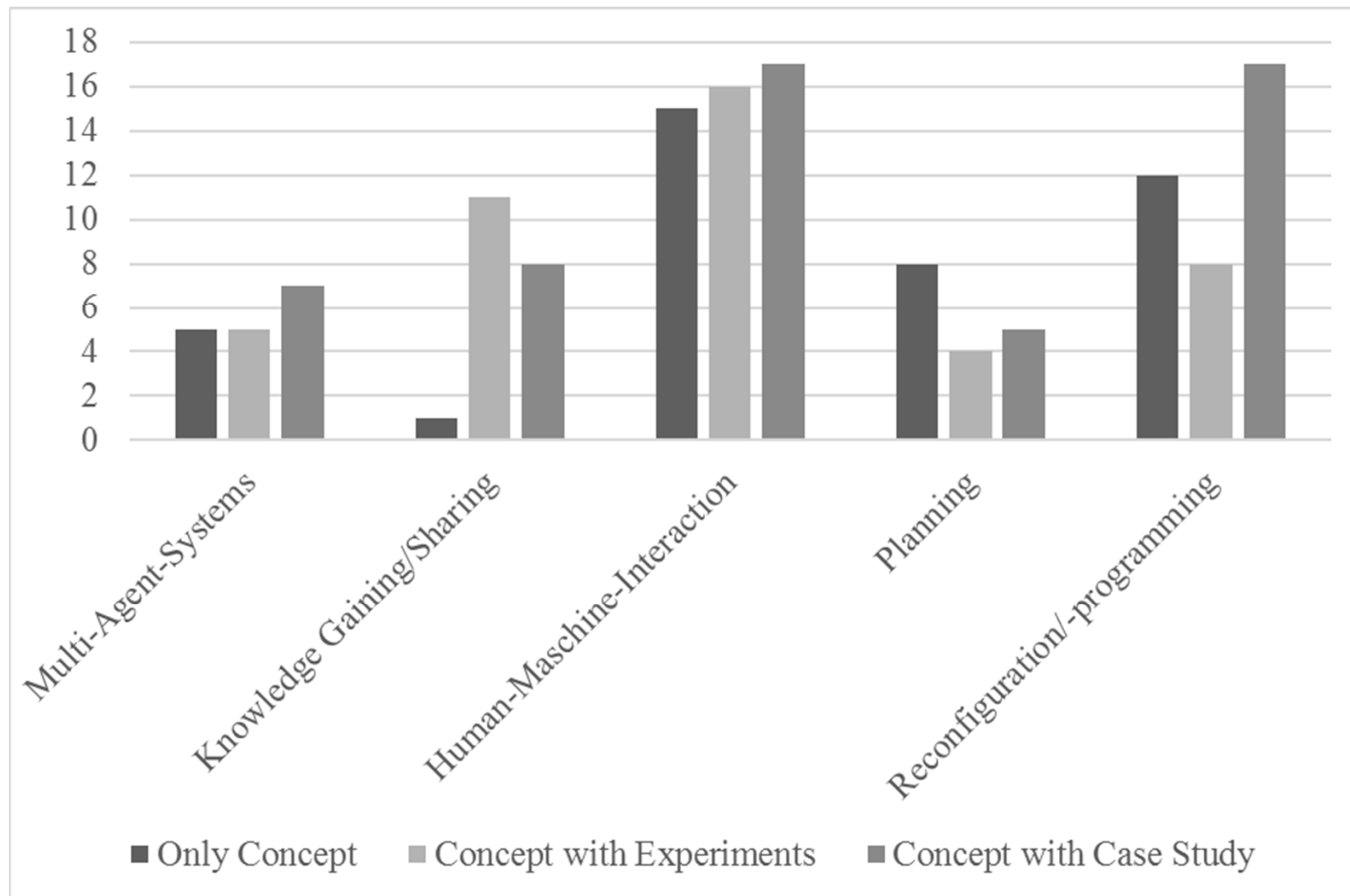


► Results

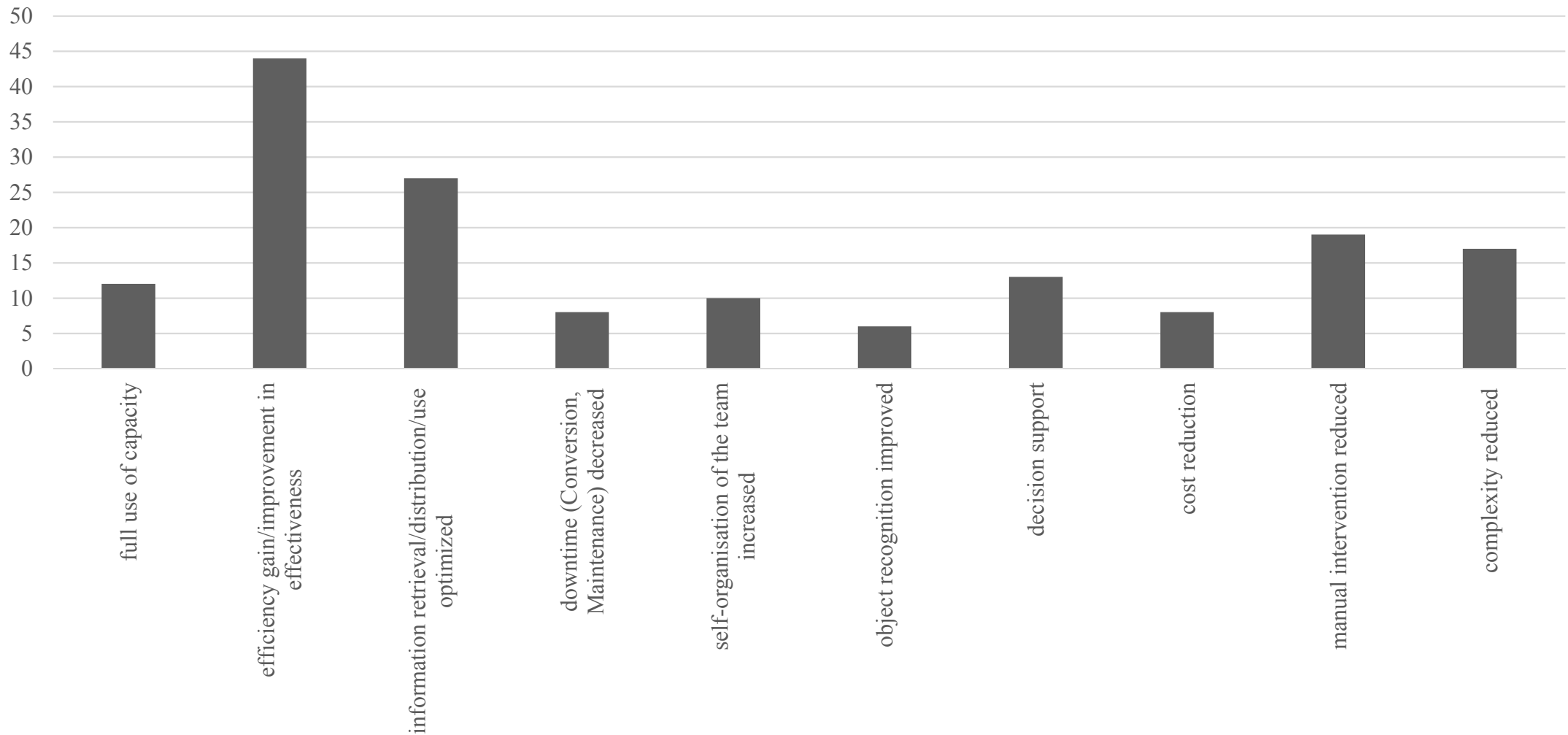
RQ1: What types of concepts exist for cognitive production systems?



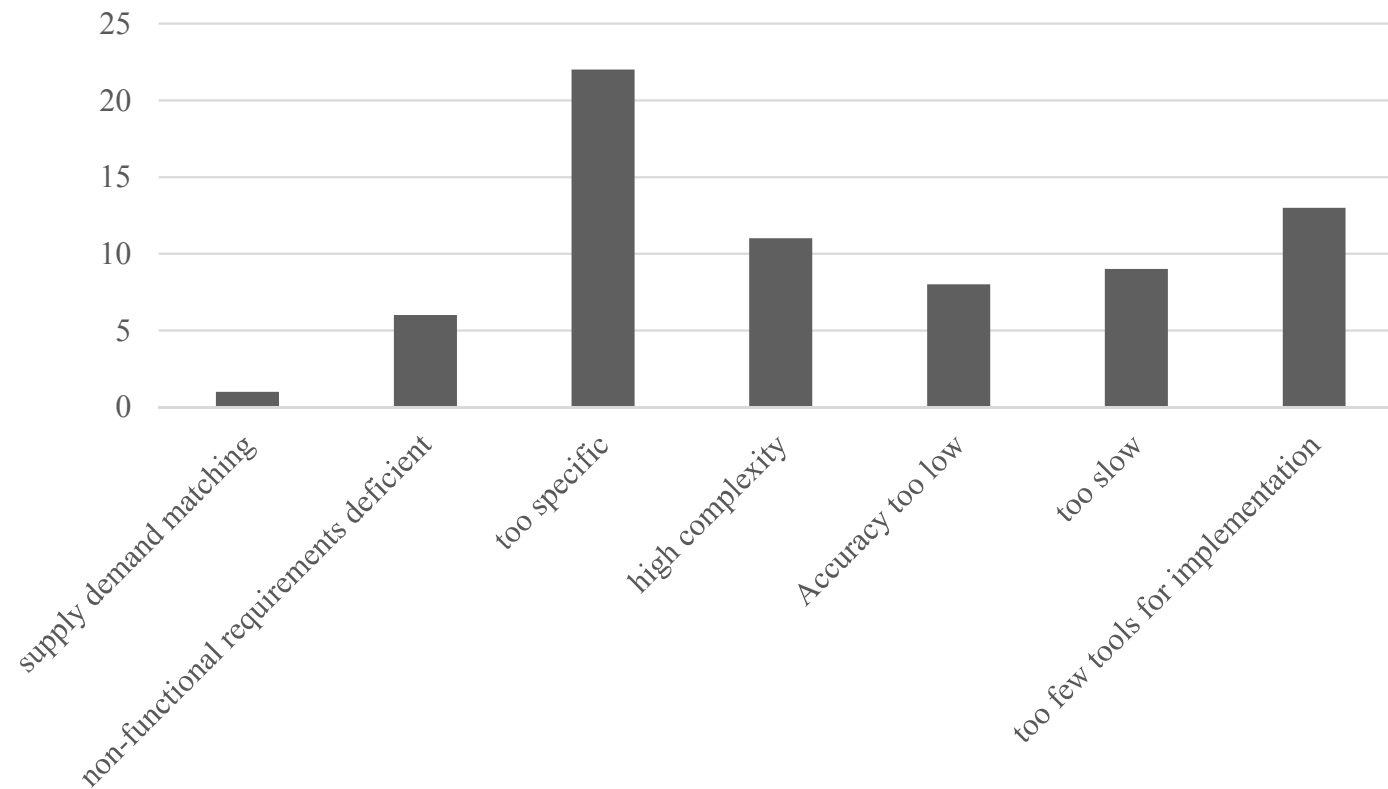
RQ2: which types of existing concepts for CPS are used in practice?



RQ3: Which advantages do they (CPS) have in production and which problems of traditional automated production do they really solve?



RQ4: What are problems and barriers for CPS prototypes?



► Discussion

Some Questions to be Answered

Questions in the
context of cognitive
production systems:

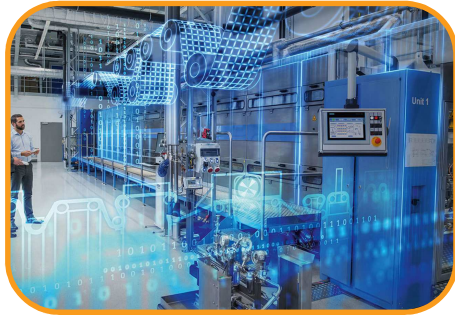
Although people should be involved, the question is how?

Can human involvement withstand the need for efficiency in the long term?

Reconfiguration: Which approaches are successful?

Would be standard AI solutions possible? or do the different approaches remain?

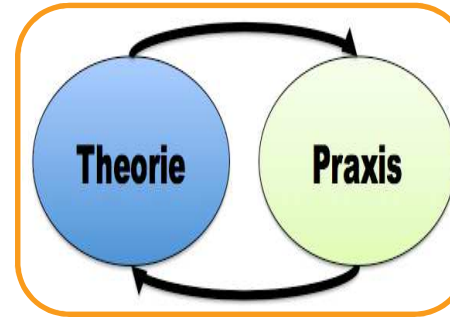
Is the use of ontologies a method or just the help to implement other methods?



Digital Twins



Learning Factory:
Ambiguity



too specially developed
algorithms without
reference to production



Concrete functioning of
individual subject
complexes



Hype started since 2015



Human involvement is the focus
of research



Research also with many
practical results



Generalization of approaches is
the most common problem



Optimized efficiency through
cognitive production systems

- List of papers and their contribution in research questions
 - <https://doi.org/10.6084/m9.figshare.12582632.v1>



- **Link to the Slides**

- Link to Smart Production Systems at HTW Dresden
 - <https://www.htw-dresden.de/industrie40>



Papers with Regards to Publication Category

