

Looking for Opportunities: Challenges in Professional Procurement Search

Stuart Mackie
University of Strathclyde

David MacDonald
BiP Solutions

Leif Azzopardi
University of Strathclyde

Yashar Moshfeghi
University of Strathclyde

ABSTRACT

Procurement legislation stipulates that information about the goods, services, or works, that tax-funded authorities wish to purchase are made publicly available in a procurement contract notice. However, for businesses wishing to tender for such competitive opportunities, finding relevant procurement contract notices presents a challenging professional search task. In this talk, we will provide an overview of procurement search and then describe the challenges in addressing the related search and recommendation tasks.

1 INTRODUCTION

Public procurement is the process of tax-funded authorities purchasing goods, services, or works. Examples of tax-funded authorities include national and local government, health, education, police, and defence authorities. In 2016–17, the U.K. spent an estimated £255 billion on procurement¹. Annually, in the E.U. more than 250,000 tax-funded authorities spend approx. 14% of GDP on the public procurement of goods, services, or works². Public procurement represents a significant economic opportunity for businesses that supply goods, services, or works into the public sector.

Public procurement is a regulated activity³, with procurement legislation aiming to ensure transparent competition among businesses competing to fulfil procurement contracts, and achieving value for money for tax-payers. In recent years, to drive efficiency in public procurement, many countries have adopted e-procurement⁴. One aspect of e-procurement is the publishing of a procurement contract notice – a document that describes what goods, services, or works, a tax-funded authority wishes to procure on the open market. The tasks within the procurement search domain then relate to businesses searching for relevant procurement contracts.

2 PROCUREMENT SEARCH

Contract Notices and Awards. Within the domain of procurement search, the documents being sought fall into two main categories. First, and foremost, there are procurement contract notices

(specifying the required goods, services, or works). Businesses seeking to supply goods, services, or works into the public sector can submit bids (i.e. tender) for procurement contracts. However, before businesses can tender for procurement contracts, they must first find relevant contract opportunities. Second, there exist procurement award notices – disclosing which business successfully won a previously advertised public procurement contract.

Several country-specific procurement portals exist for the purpose of publishing procurement notices and awards. Examples include “Contracts Finder” (UK), “Tenders Electronic Daily” (EU), or “Federal Business Opportunities” (USA). Further, several institution-specific portals exist for the purposes of publishing procurement contracts, e.g. health boards, armed forces, or universities.

Each day such procurement portals publish new contract opportunities, so businesses searching for relevant opportunities need to visit multiple portals, and issue repeat queries on a regular basis. Since the opportunities only remain open for a certain period of time, i.e. tenders must be received within a certain number of days after publication, it is important that businesses find out about opportunities as they arise. And so, often an aggregated search service is employed that combines feeds from different country and authority specific portals, to reduce the burden of repeatedly searching multiple portals. At BiP Solutions⁵, we operate one of the market leading procurement contracts search engines, Tracker⁶, which indexes over 120,000 new contract notices and awards each month, aggregating information from over 1,500 different sources.

Push vs. Pull. Commercial search engine vendors operating within the procurement contracts vertical typically offer two key services. Users may enter queries manually, and in a manner similar to ad-hoc web search, interact with a search engine results page. Further, procurement search engines often store customer queries that are executed on a regular basis (e.g. daily), with search results being delivered via an email. This is known in the industry as a tender alerts service. We may then characterise procurement search as either pull (i.e. ad-hoc search) or push (i.e. tender alerts).

A Professional Search Task. In contrast to ad-hoc web search, we characterise procurement contract search as a professional search task [3]. This task involves business users searching for economic opportunities, with high economic value associated with the outcomes. Over the years there has been great interest in creating search systems to help professionals find relevant information to inform a decision, answer a question, or make a recommendation, e.g. patent, legal, medical, or recruitment search [1, 2].

Professional search differs from casual/leisure search in a number of ways, e.g. the searches are carried out for financial benefit, are within a particular domain, with a specified and typically complex brief, have a high value, and are performed under constraints

¹<https://researchbriefings.files.parliament.uk/documents/SN06029/SN06029.pdf>

²ec.europa.eu/growth/single-market/public-procurement_en

³ec.europa.eu/growth/single-market/public-procurement/rules-implementation_en

⁴ec.europa.eu/growth/single-market/public-procurement/e-procurement_en

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

SIGIR '19, July 21–25, 2019, Paris, France

© 2019 Copyright held by the owner/author(s). Publication rights licensed to ACM.

ACM ISBN 978-1-4503-6172-9/19/07...\$15.00

<https://doi.org/10.1145/3331184.3331428>

⁵bipsolutions.com

⁶trackerintelligence.com

```
( country:104 OR country:154 OR country:21 OR country:229 OR country:164 region:5090 OR region:5097 OR region:5088 OR region:5089 OR region:5093 OR
region:5096 OR region:5092 OR region:5098 OR region:5094 OR region:5087 OR region:5086 OR region:5085) AND ( (cpvCodes:[44161200 TO 44161299] cpv-
Codes:[45112340 TO 45112349] cpvCodes:[45214220 TO 45214229] cpvCodes:[45231300 TO 45231399] cpvCodes:[45232130 TO 45232139] cpvCodes:[45232150
TO 45232159] cpvCodes:[45232411 TO 45232411] cpvCodes:[45232430 TO 45232439] cpvCodes:[45232431 TO 45232431] cpvCodes:[45240000 TO 45249999] ... )
OR (L8* "project evaluation" civil* "risk management" "labour market" "community engagement" "air sampling" "engineering design" pollution* "capacity
building" contaminated* "stakeholder engagement" laboratory* "water supply" environment* "plant design" employment* planning* "regeneration funding"
roads* development* "urban design" architecture* technical* structural* "older people" potable* legionella* "Carbon Capture and Storage" archaeology* "waste
management" transport* "site investigation" borehole* sewer* framework* acoustic* "face fit" marine* "building survey" biodiversity* BREEAM* water* ... ))
```

Figure 1: An example complex Boolean query, for the domain of public procurement contract search, where Q = (filters) AND ((cpvcodes) OR (keywords)). The complex query is manually curated by business customers, with assistance from BiP Solutions.

(i.e. time and money). While there are some similarities to other professional search tasks, it is currently unclear if procurement contracts search is precision or recall oriented. However, it is certainly a value-oriented task, as the user is seeking opportunities that are relevant and valuable to their organisation. Unlike the other domains, the value of the contracts can be clearly expressed (i.e. in terms of profit) and so the potential costs/benefits are more salient.

3 CHALLENGES IN PROCUREMENT SEARCH

Query Specification. At BiP Solutions, procurement search queries are user-curated complex Boolean expressions, often many hundreds of terms in length. An example procurement search query is shown in Figure 1 (illustrated in Lucene query syntax). From Figure 1, we observe that such queries are defined as: Q = filters AND (cpvcodes OR keywords). The ‘filters’ component of the query is used to specify the contract delivery location(s) that are relevant to the business conducting the procurement contract search, such as country or region. The ‘cpvcodes’ component specifies entries from the Common Procurement Vocabulary⁷ (CPV), an EU-wide procurement classification system used to assign numerical codes to represent the goods, services, or works subject to procurement (contracts are tagged with CPV codes). The ‘keywords’ component contains natural language search terms (i.e. keywords), which are intended to identify relevant business opportunities.

Commercial & Temporal Relevance. Given the customer’s query, there is a further layer of business and commercial factors influencing relevance within the procurement search domain. For example, is a business able to supply goods or services into a specific geographical region, is the business likely to win public sector contracts (based on trading history), can the business manufacture the goods required or provide the specified services, and can the business ship the required number of units to fulfil the contract requirements. The most topically relevant contract may not be commercially relevant due to these query independent factors.

Further, within the procurement contracts search domain, there is an inherent temporal nature to the task. Contracts are published with bid submission deadlines, e.g. 30 days. A procurement contract that matches the user’s query, but has expired, is non-relevant. A procurement contract notice that is about to expire may be topically relevant to a user’s query, but is of limited commercial value at that point as submitting a bid requires extensive documentation to be prepared. Ideally, a business will be able to find or be recommended a procurement contract as soon as it is published.

Data and Test Collections. Within the domain of procurement contract search, there are a number of algorithmic challenges due to data sparsity. Typically we observe substantially lower click volumes than with commercial web search engines, and asking customers for explicit relevance feedback (e.g. relevance assessments) can be burdensome (especially for paying customers). This limits how much can be learned from customer interactions, how effectively the algorithms can be personalized, and can be an issue when training supervised learning-to-rank techniques.

Finally, a further issue is a lack of publicly available test collections within the procurement search domain, on which to test the effectiveness of different algorithms. In the future, we plan to develop and release a test collection (which is sufficiently anonymised) so that more researchers and practitioners in the IR community can investigate this important professional search task.

Bias and Regulations. A higher order challenge is the regulatory requirements to ensure that the systems are not biased – such that certain users are given preferential treatment over others – in the sense that they are recommended the more lucrative contracts while other users are not. This creates a tension between personalization and the fairness of the system – as the machine learning algorithms may encode biases due to interaction. As such a major challenge is to ensure that all opportunities are as accessible as possible, and that the system or the interface does not preclude users from accessing content, and the ‘personalization’ that is being applied is clearly explained, justified and controllable.

4 SUMMARY

In summary, procurement search is a professional search task that has not yet attracted much attention within the Information Retrieval community. During this talk, we will provide an overview of the task and the related challenges to bring attention to this area – which unlike other search tasks has clear financial and economic implications for businesses searching for new opportunities.

Acknowledgement: The collaboration between BiP and the University of Strathclyde is supported by Innovate UK (KTP 11464).

REFERENCES

- [1] Tony Russell-Rose, Jon Chamberlain, and Leif Azzopardi. 2018. Information Retrieval in the Workplace: A Comparison of Professional Search Practices. *Information Processing & Management* 54, 6 (2018).
- [2] John Tait. 2014. An Introduction to Professional Search. In *Professional Search in the Modern World*. LNCS, Vol. 8830. Springer.
- [3] Suzan Verberne, Jiyin He, Udo Kruschwitz, Gineke Wiggers, Birger Larsen, Tony Russell-Rose, and Arjen P. de Vries. 2018. First International Workshop on Professional Search. *SIGIR Forum* 52, 2 (2018).

⁷ simap.ted.europa.eu/web/simap/cpv