

Evaluation and optimization of the catalog search process of e-procurement platforms

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Abstract

With the emerging of e-catalog standards the product search can be used in a very different and improved matter. Beyond the usual keyword search this opens the arena for attribute-based search engines, including parametric search and preference search. We analyze the impact of different search techniques for such e-catalogs on the overall search process costs. It turns out that preference search has a high potential to significantly reduce the process costs. A large-scale use case with the MAN2B e-procurement platform supports our claim. We identify improvements achievable by using preference search, in particular less navigation steps during the product search and better search results due to the BMO query model. Expensive cases, where frustrated users accept bad search results or phone up the company's purchasing department, should decrease significantly. This in turn will enable the purchasing department to focus more on strategic issues like supplier relationship management than on operative issues as it still happens widely today.
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1. Introduction

Today, procurement of goods in enterprises is often still a manual process. But it is recognized that there is an enormous potential to reduce the costs of this process [1]. In particular, unstructured procurement – the search and requisition of a product initiated by an end-user, e.g., for office goods [2] – should benefit from a well designed e-procurement platform [2] and thus providing a reduction of the process costs.

Huge enterprises often run internal online market places. After a verification process regarding formal correctness, suitable prices and surrounding conditions, suppliers are allowed to spool their electronic product catalog onto this market platform. The purchasing department

only once has to intervene in this process. The buyer, e.g., an engine fitter or office worker in a mechanical engineering enterprise, only has to buy via internal web shop and does not have to care about the price. Ideally, he nevermore has to contact the purchasing department by lengthy phone calls, e-mails, etc., being extremely costly events. But especially this last point is wishful thinking for the time being, because reality is different.

Users like the engine fitter or the clerk must be able to handle this internal e-procurement shop effectively. The product descriptions in the normally XML-based e-catalogs are mostly provided in full-text format. There are several standardization approaches for product feature descriptions in e-catalogs, but in current practice most of the suppliers are not able or willing to prepare the catalog with high quality feature specifications.

As we will demonstrate later on, for a clerk, e.g., it is not easy to successfully search for a seemingly simple item like a file folder with a width of 5 cm. The result is that the clerk will often not find the most suitable file folder using a keyword search. Thus he has to accept a sub-optimal result or

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to manually contact the purchasing department, both incurring high process costs.

Because of this misery some employees even use another very inefficient strategy: They organize a print version of the suppliers catalog being familiar from the old days, look up the article number and enter this number in the keyword search. These failed attempts do not reduce the process costs as intended.

Using typed and structured e-catalogs would probably improve the process. Keyword search techniques can be replaced by attribute-based search engines. But in case that there is no perfect match, severe problems occur if the search engine implements an exact-match query paradigm. Because search technologies for typed information did not provide a general solution for the mentioned problems, there seemed to be no reason for suppliers to support a high quality e-catalog regarding typed feature descriptions. On the other hand, there has been no demand for an enterprise to support improved search technologies for these problems, if there is no high quality e-catalog. By means of a large-scale practical use case we show in this paper *how to break this vicious circle* by generating a win-win-situation both for catalog providers and shop users.

The search engine is the crucial link between user and the e-procurement platform. Nevertheless, little research has been conducted in the past to compare the quality and usability of different search technologies for B2C or B2B e-commerce [3].

The rest of this paper is now organized as follows: In Section 2 feature standards for e-catalogs will be shortly introduced, followed by a discussion of different search technologies. This includes a preference based approach, which is able to cope with the mentioned problems. In Section 3 we describe a large-scale practical use case. After an analysis of the e-procurement system and the general process of purchasing goods via this internal market place we will show how we can improve this process substantially. In Section 4.2 the search times of the original search and preference search are evaluated and compared. Thereafter, the costs of a search process are examined in detail. We report how we can reduce both the total time for the search process and the quality of the search results, yielding an enormous potential for reducing the overall process costs. We finish with a short summary and outlook regarding future challenges.

2. Search technologies for e-catalogs

2.1. Standardized e-catalogs for C-articles

In [3] it has been recognized that standard taxonomies for products are a promising attempt, but were insufficiently developed to that date. Such standardization is helpful to classify heterogeneous articles and make them more comparable. Meanwhile, the standardization attempts for product features have improved and are in use in industrial e-procurement applications. Especially

for so-called *C-articles* or *MROs* (maintenance, repair, and operations) they are well-designed and these standards are still being extended. Popular in Europe and USA are product feature standards such as:

- *proficl@ss* (www.proficlass.org) for the building industry,
- *ETIM* (www.etim.de) for the electric branch,
- *UNSPSC* (www.unspsc.org) and *eCl@ss* (www.eclass.com) for diverse articles.

These product feature standards can be integrated with more general, XML-based e-catalog standards for electronic data interchange like for instance *BMEcat* (www.bmecat.com) or *cXML* (www.cxml.org).

Both standards support a few common attributes like price, article id, delivery time, supplier id, and article details (e.g., containing short and/or long description).

The eCl@ss standard describes products in a 4-tier classification, e.g., a leaflet folder is listed:

communication technology, office →
office supplies →
filing, archiving →
letter file, leaflet folder, ring folder.

ECl@ss then specifies lots of features for such a folder as shown in Fig. 1. There is a feature name, a feature value, and if necessary a feature unit; e.g., the width of a leaflet folder could be 5 cm or 50 mm.

If an e-catalog is equipped with a product feature standard description, then it comes with many more structured and typed data. Thus instead of performing plain full-text

Description	
Letter file, leaflet folder, ring folder	
AAA216001	Approval
AAA215001	Certificate
AAA485001	Color back
AAA391001	Color casing
AAA889001	EAN/UCCCode
AAA041001	Height
AAA039001	Length
AAA001001	Manufacturer
AAA252001	Manufacturer article number
AAA484001	Material
AAA486001	Number of sub-divisions
AAA003001	Product name
AAA002001	Product type
AAA483001	Spine width
AAA482001	Type
AAA488001	Type of subdivision
AAA042001	Weight
AAA040001	Width

Fig. 1. eCl@ss features of a leaflet folder.

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