Development of a Benchmark System for Social Enterprise Software

Benchmark System and Visualisation for Analysing Personal Knowledge Behaviour

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Abstract

Network knowledge management in companies does not work without proactive motivation of their users. This paper describes the development of different benchmarks to assess users' performance and shows a novel approach to stimulate their willingness to actively share their knowledge in their collaborative work by the use of visualisations.

Keywords: network knowledge management; incentive system; motivation; measurement; benchmark system; data visualisation

1 Introduction

Well-established and popular social enterprise software like Atlassian Confluence, Microsoft Yammer and many open source projects show the high standard of computer-based support of knowledge communities and work groups. Growing competition makes knowledge an increasingly important success factor for enterprises. The resource-based view of creation, organisation, and use of intellectual capital is rated as an essential competitive issue.

In: M. Gäde/V. Trkulja/V. Petras (Eds.): Everything Changes, Everything Stays the Same? Understanding Information Spaces. Proceedings of the 15th International Symposium of Information Science (ISI 2017), Berlin, 13th–15th March 2017. Glückstadt: Verlag Werner Hülsbusch, pp. 158–163.

Since knowledge is often exclusively attached to interpersonal exchange, the cooperative and communicative aspect becomes highly important when it comes to knowledge management. In accordance with the paradigm of cooperative and communicative knowledge management, it is necessary to get over the dominating approach of knowledge warehouses and recognize the value added functions of electronic communication and interaction platforms for knowledge generation. The assumed supremacy of collaborative knowledge management is based on the productive exchange and sharing of knowledge among virtually connected groups, which balances knowledge asymmetry. It has been shown that the participants in such electronic systems need to be proactively motivated and supported (Schanz, 1999). We want to introduce such a system.

2 Developing a benchmark system for social enterprise software

A key method to support and encourage employee motivation is to allow them to understand how they and their colleagues deal with knowledge. To create this understanding, it is necessary to define appropriate benchmarks. The significance of individual benchmarks is limited without knowing the context, so there is the risk of an inadequate interpretation of the individual benchmarks. To avoid this, it is necessary to present the benchmarks by means of suitable visualisations. The lack of meaningfulness of individual benchmarks is countered by the combination of a selected set of benchmarks. It makes sense to link several factually related benchmarks to a benchmark system that describes the relationships and mutual effects of the individual benchmark. To develop benchmarks for knowledge management, the well-known basic systems of bibliometry, as presented by Havemann (2009), can be used, adapted and extended. To serve as an intrinsic incentive system such a benchmarking system must also provide the participants with appropriate feedback.

Starting at the basic functions in knowledge management tools, the following three basic variables for the development of benchmarks can be presented:

1. "Entity": An entity is a user, or any form of an entry, a "like", or other elements.
2. "Activity": An "entity" is created by a certain activity by another entity. This can be coded as subject-predicate-object triple.
   Examples:
   User (entity) → opened (activity) → a blog (entity);
   User → comments → blog entry
   Blog entry → was commented → by a user
   Space → has been opened → by a user
3. "Time": Each "activity" occurs at a time

With the aid of these triples (entity → activity → entity) it is now possible to display various benchmarks. The activities can be differentiated by number (quantity) and by content (quality) and allows the development of different benchmarks.

To show the individual performance of users, automatically generated benchmarks are used. In order to set up the incentive/motivational benchmarking component, it is not helpful to use a hierarchic method, since not all benchmarks are mathematically related. The more useful approach is to have the measures in an order defined by subject and content criteria (Hummel, 2003: 555). Grob (2004: 50) suggests a benchmark system for LMSs (learning management systems) from which we borrow the benchmarks: coverage, relation, and time range that are registered on different levels: system level, group level, and individual level. Coverage is generated from measures like number of participants and entries and is given as absolute numbers (and sums). The combination of absolute numbers generates relation figures. They are shown as percentage or index numbers (Schwickert & Wendt, 2000: 8). Time range figures are derived from monitoring long-time user performance. By analysing timelines, changes in benchmarks can be identified. To create qualitative benchmarks, text analytical methods must be used. The quality of a contribution can also be inferred by the sensible combination of quantitative parameters. For example, the number of likes or comments to a post may be indicators of the quality of contributions. Additional metadata and tags set by the author or other users can be used to determine which author writes on which topic. By combining certain benchmarks, then it is possible to identify if a user is an expert on a specific topic.

3 Visualisation of benchmarks for social enterprise software

A visual aid in the form of a graphical representation can considerably simplify the interpretation of the benchmarks by the user. For the visual representation of communication relations, so-called knowledge maps are particularly suitable. Knowledge maps are virtual and represent immaterial data objects, which are not related spatially to one another. The knowledge maps are divided into the two categories "concept maps" and "associative maps". The concept maps represent the subject areas in a specific arrangement and size. Concept maps are used in collaborative knowledge management, particularly to present the contributions of an individual actor, as well as to present the discussion context, and thus the knowledge distribution. The fact that concept maps are not particularly suitable for the visualisation of a hypertext-like system such as collaborative knowledge management lies in the fact that the edges are not explicitly represented. This problem is solved by associative knowledge maps (Däßler, 2002: 13–18). The associative maps visualise only objects and their object relationships. In associative maps, two types of associative structures can be distinguished, the "tree structures" and the "network-like structures". The former only allow relationships between certain objects, while network structures in principle allow each object to be related to any other object. With this type of visualisation, it would be possible to represent the discussion structure of whole groups. The analysis and visualisation of the relationships in social networks is its own research field. The complexity of such networks is determined by the analysed characteristics, such as centrality in networks, grouping, distribution of roles, different relationships of the same set of actors, or the comparison of different networks. The fundamental measures to characterize the centrality of an actor in a community and the measures to characterize the importance of an actor provide an excellent basis for analysing the activities in a collaborative knowledge management tool (Dehmer, Emmert-Streib & Pickl, 2015; Cross & Parker, 2004).

The Atlassian Confluence tool is used as basic software. At present, 150 employees of a research and development department, which are distributed over six locations worldwide, share their knowledge through this tool. The goal is to analyse the communication and the written texts (in the form of wikis) in order to determine which person has what knowledge and how this

knowledge is exchanged between the employees. In doing so, the employees should be given a transparent feedback on their actions through visualisations and thus be motivated to pick up the knowledge of colleagues, but also to hand over their knowledge voluntarily.

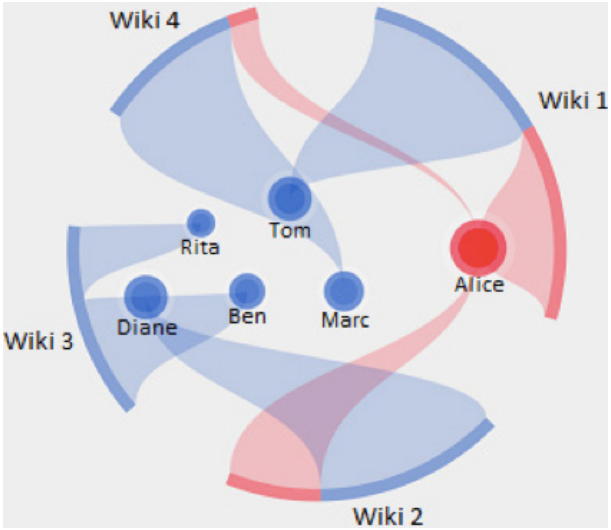

Fig. 1 Example of a wiki collaboration map for network knowledge management

Figure 1 shows the individual and the overall contributions for selected wikis. A node represents an author and an arc along the circumference the overall contributions to a specific wiki. Each section of the arc and corresponding chord that connects to an author's node displays their contributions to a given wiki. The larger the node, the more contributions that author has contributed. The red node represents the author who has contributed the most.

4 Future development

The comparison of the individual scores and making it visible to every member is also a strongly motivational momentum. It is also a proof of discourse control. It has to be kept in mind however that these benchmarks work on a quantity basis and do not reflect quality issues. To rate the quality of dis-

course objects, it is necessary to analyse content (intellectually and/or automatically). The first evaluation of the benchmark system showed that the benchmarks have to be refined and that advanced visualisations will be helpful. For the future, it is planned implement automatic text analysis in order to be able to better identify experts and thematic clusters. Furthermore, it should then be possible to analyse questions from users and forward them automatically to the relevant experts. In addition, the visualisation system will be extended by extensive interactive presentations. With the aim of motivating the participants to exchange their knowledge with their colleagues more and more, methods of gamification will be used.

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