Disciplinary autonomy and concept relations in electronic knowledge bases.
A theoretical approach to KB-N – a knowledge base for economic-administrative domains

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1. Introduction

The title of this year's LSP conference (*Fagspråkkonferansen 2005)* at the Norwegian School of Economics and Business Administration (NHH) draws attention to intercultural issues and translation. My research interest is within the field of terminology, relating to business economic and administrative disciplines. The link between on the one hand intercultural aspects and translation and on the other terminology is thus an indirect one, in that I focus on terms as they are presented in LSP texts (i.e. specialist texts within the mentioned disciplines).

Terminology will in many instances be characterised by the culture in which it is used, for example as expressed in the Norwegian Accounting Act (1998). The recent adaptation of the act to cater for the requirements in the international accounting standards (IAS) and the international financial reporting standards (IFRS) will have influenced the terminology found in the act and also in the Norwegian accounting standards.

In this paper I will, however, not focus on these intercultural aspects, but rather on some theoretical and methodological assumptions that I have discussed in my doctoral thesis (Kristiansen 2004). I believe that these assumptions are important to consider in the building of terminology bases, such as the knowledge base that is presently being developed at the Department of Professional and Intercultural Communication at NHH. The project is titled Knowledge Bank Norway (KB-N). It is headed by Professor Magnar Brekke and is part of the KUNSTI programme,[1] a language technology programme funded by the Research Council of Norway. A description of the project is given on the project's website[2] (see also Innselset and Brekke 2004).

KB-N is a concept-oriented text- and term-based knowledge management system, including language technology applications for use primarily within translation, documentation and publishing. In addition, we intend to develop applications to implement the knowledge base in the e-learning system which is used at NHH by researchers, lecturers and students.

I will now first address the theoretical assumptions discussed in my doctoral thesis that I find quite relevant in the development of the knowledge base. The first aspect relates to what I have defined as **disciplinary autonomy** in my thesis. Secondly, I believe **concept relations** to be essential. Next, I will try to illustrate why these two aspects should be implemented in the base and through that improve its quality.

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[1] http://program.forskningsradet.no/kunsti/no/index.html?3568
[2] http://www.nhh.no/fsk/sff/kbn/

In connection with disciplinary autonomy and concept relations, two questions can be raised, namely,

1. How is it possible to distinguish between closely related disciplines?
2. How should we register identical terms found in different disciplines?

By answering these two questions, the complexity of the disciplines and their concepts may be dealt with in a way which will improve the usability of the knowledge base.

It has been argued that since so many areas are highly complex and indeterminate they cannot be delineated (Cabré 1998/1999). I believe that in today's society with an ever increasing specialisation of knowledge and constant emergence of new scholarly and scientific disciplines, the need to clarify the relationship that holds among related areas has never been greater.

The point of departure for discussing the need to consider disciplinary autonomy and concept relations when establishing knowledge bases, is expressed in this quotation from Malmeström 1964 where the thoughts of Linné are stated:

> De som i vår vetenskap inte förmå att hänföra varieteterna till deras egna arter, arterna till naturliga släkten, släktena till familjer och likväl giva sig ut för doktorer i denna vetenskap, äro bedragare och bedraga sig själva; ty alla som verkligen vilja utlägga denna vetenskap, äro skyldiga att kunna detta. (Linné in Malmeström 1964: 66)

Linné, often called the father of taxonomy, developed a system for naming, ranking, and classifying organisms which is still used today (although with many changes). The very important message in his statement is that we need to know how to relate concepts that belong together, something which requires that we also know what kind of domain we are dealing with. His ideas on classification have also influenced what can today be described as **terminology science**:

> an interdisciplinary science whose sphere of activities is, on the one hand, the investigation of the object, the concept and their representational forms and the relations between them, and on the other hand, the investigation of their systematic representation and their application within a wide range of fields of knowledge. (Picht 2000: 4)

This quotation stresses the importance of knowing what kind of content the terms we are dealing with, represent, when making term lists, collections of terminology, or when establishing term banks. To be able to group and relate concepts that belong together within a domain we need to know what kind of knowledge area or discipline we are dealing with. If not, the collections will have much less value, and the possibility of reusing the material by for instance other people will be little. This calls for solid methods to ensure a high quality of the end product, i.e. the knowledge base.

2. Disciplinary autonomy and concept relations

In my thesis I have discussed criteria for how to delineate domains as disciplines, and how to distinguish between interrelated disciplines and delineate them as autonomous disciplines. Obviously, many disciplines are multi-disciplinary by nature, and identical terms may be found across disciplinary borders. Whether the terms represent the same knowledge in the related disciplines, is, however, a totally different issue. In my thesis the focus has mainly

been on the discipline **organisational behaviour** (also called OB by subject specialists), a discipline closely related to **organisational psychology** which is perhaps more well-known, and a number of parent disciplines: **psychology**, **social psychology**, **sociology**, **anthropology** and **political science**. I have also discussed briefly OB's relations to other administrative disciplines, such as **marketing** and **organisation theory**.

In his well-known "The structure of scientific revolutions" (1970), Kuhn provides criteria for what should be considered the qualitative nature of normal science, including **sociological** and **epistemological characteristics** (Kristiansen 2004). In short, sociological characteristics include the existence of research groups and associations, common communication channels, and regular events where researchers meet such as conferences and meetings. In addition, internet sites and university level courses which teach the disciplines will add to the sociology of a discipline.

In my research I have mainly focused on the epistemological characteristics of a discipline since these characteristics are what describe the inherent nature of a discipline. Such characteristics include:

- a separable **research object**; i.e. its central researchers should agree upon which problems they want to solve and the nature of these problems
- separate **methods** for empirical investigations; research should be carried out in accordance with established forms for scientific activity
- an independent **theory development** or invention of new theory
- a common **conceptual apparatus**; i.e. a common use of language, such as terminology, which is accepted and used by its researchers in communication with others.

These criteria can be used to establish a framework for describing the degree of autonomy in the disciplines in question. Thus I have defined **disciplinary autonomy** as a relative independence from other related disciplines, including both 'sociological' characteristics, such as the existence of research groups and associations, and 'epistemological' characteristics, such as separate methods and theory development (Kristiansen 2004).

3. Exemplification

To illustrate the relevance of trying to delimit domains as autonomous disciplines we can look at two concepts, viz. 'equity' and 'group'.

The term *equity* will be found in a number of disciplines and the concepts the term represents will vary depending on which discipline we are dealing with:

(1)   *equity*
        Definition 1 = ordinære aksjer
        ownership interest in a corporation in the form of common stock
        (http://www.investorwords.com, accessed 07.02.05)

        Definition 2 = egenkapital
        total assets minus total liabilities; also called shareholder's equity or net worth
        (http://www.investorwords.com, accessed 07.02.05)

Definition 3 = billighet
a doctrine stating that the court should also take into consideration what is reasonable
and fair, not just follow the letter of the law (Lind 2000: 95)

As the example (1) shows, the term *equity* is used to denote at least three different concepts. These concepts will belong to three different conceptual structures, with their own separate set of related concepts. This should be reflected in the knowledge base. Based on textual evidence from corpus texts it is possible to decide which discipline (or domain) the terms belong to. The reason is that the investigation should focus on the concepts and not just the linguistic expression.

The term *group* can also refer to different meanings, something which indicates different knowledge units or concepts:

> **(2)**   ***group***
> In **chemistry**: two or more atoms bound together as a single unit and forming part of a molecule (www.cogsci.princeton.edu, accessed 07.02.05)
>
> In **computing**: A collection of network or database users with common permissions for particular objects, such as shared files or database tables. (www.pace.ch/cours/glossary.htm, accessed 07.02.05)
>
> In **sociology:** a collection consisting of a number of people who share certain aspects, interact with one another, accept rights and obligations as members of the group and share a common identity. (http://en.wikipedia.org, accessed 07.02.05)

The final concept I have included is 'group' as it is used in connection with business types:

> ***group (of companies)***
> A group of companies is usually not a firm or office in itself; rather it is set up to organize a group of firms belonging to one name. (http://www.emporis.com, accessed 07.02.05)

Whereas the Norwegian equivalent to *group* will be *gruppe* in most instances, this is, as the examples show not the case for the term *equity* which has a number of Norwegian equivalent terms depending on what the terms represent.

It may be argued that this seemingly polysemic use of one term to denote several concepts is not a problem because a terminology collection found in for instance a knowledge base will make such distinctions clear. There are already long traditions for entering one concept in one record, and including the domain, or discipline the concept belongs to in the record as well, together with synonyms, equivalents, definitions etc.

However, the distinction between concepts is not always as clear as in these examples. This is illustrated in the Venn diagram (p. 5) where the term *group* is shared by three disciplines: OB, sociology, and what I have named 'types of enterprise'. The reason for the third distinction is that the KB-N base will certainly include a comprehensive overview of various enterprise types, but it has not yet been decided to which discipline such concepts belong.

The problem does not arise when distinguishing between 'group of companies' as a type of enterprise and 'work group' in OB. Although both are frequently denoted *group* only, the two concepts are quite different when it comes to meaning, or what kind of characteristics they comprise. The problem is how to distinguish between the concept of 'interest group' found in OB and the seemingly identical concept in sociology.
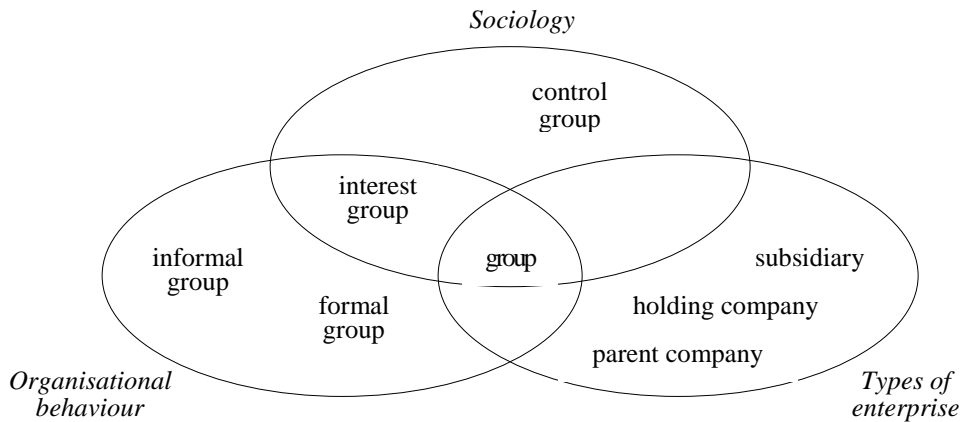
Figure 1. Concept relations – the concept of 'group'

One solution is that the term is entered in one entry/record in the knowledge base, that is only one concept is registered. This I believe is a poor solution. My analyses have shown that if we compare the way concepts within a discipline are related, with the concept relations found in what may be called sister disciplines, such as OB and sociology, the conceptual structure may be quite different as figure 1 illustrates. Thus important information, and in fact knowledge, may be lost. Among the KB-N domains there are a number of such closely related disciplines, or subdomains, e.g. OB, marketing and organisation theory.

Another example may be the concepts 'parent company' and 'holding company' which are also closely related. In the context of 'types of enterprise', 'parent company' will belong to a concept field comprising concepts such as 'subsidiary', 'sole trader', 'partnership', 'conglomerate' in addition to 'holding company'.

> **(3)** *parent company*
> company that owns or controls subsidiaries by buying up all or the majority of their shares. A company has a controlling interest in another when it has acquired over 50% of its issued shares which have voting rights. **Where a parent company does not operate in its own right, it is called a holding company**. (www.payontime.co.uk/ [accessed 07.02.05], emphasis added)

> **(4)** *holding company*
> A company that owns enough voting stock in another firm to control management and operations by influencing or electing its board of directors. **also called parent company.** (http://www.investorwords.com [accessed 07.02.05], emphasis added)

In texts on mergers and acquisitions, the term *holding company* is presented as a synonym to *parent company*, as illustrated in example no. 4, although it is perhaps more correct to call it a co-reference. Thus, in the context of mergers and acquisitions the concept of 'parent company' is closely related to that of 'holding company', and this information should be kept in the knowledge base. However, the true meaning of 'holding company' makes it difficult to think of it as a synonymous concept of what is understood by 'parent company' (cf. example no. 3) in the context of 'types of enterprise'. In this latter context, 'holding company' will be considered a type of 'parent company', something which calls for a different conceptual structure.

To keep this information in the knowledge base I believe it is necessary to develop two separate concept systems for the two knowledge areas to which the information belongs. Thus separate entries should be made for each domain or discipline to the extent it is possible to distinguish between the concepts, resulting in the fact that the same term will appear in several term records. This I believe can be achieved by implementing the criteria for assessing disciplinary autonomy which I have described in my thesis.

4. Conclusion

In this paper I have discussed the fact that a number of disciplines belonging to the economic-administrative domain are highly multi-disciplinary and closely related to each other. A set of criteria for how to delineate disciplines has therefore been presented. By applying these criteria in a terminological analysis, I have argued that it is possible to distinguish between closely related disciplines.

These interrelated disciplines also comprise many seemingly identical concepts which are designated the same term. To be able to describe this inherent characteristic of the concepts, I have argued that such terms should be registered in separate records to convey the relations that hold among the concepts of the various disciplines. That is, one term may have to be entered in several term records because several disciplines may all use the term to represent their concepts.

Consequently, to the extent it is possible, the development of a knowledge base comprising economic-administrative disciplines should take into consideration the way the disciplines define themselves as autonomous disciplines and the conceptual relations that hold among the concepts of the disciplines as presented in for instance textbooks. This will give a point of departure for distinguishing between various subdisciplines, and also for presenting seemingly identical concepts in the environment to which they belong.

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Web sites

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