Methods of concept analysis
– Towards systematic concept analysis

Part 2 of 3

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Abstract

This article is the second one in a series of three articles which focus on comparison and development of concept analysis methods as an academic research method. In the first article, terminological analysis methods – originally developed for practical terminology work – were contrasted with selected concept analysis methods developed in business studies and nursing science. Based on the comparison, the second article discusses a further development of terminological methods towards what is here called 'systematic concept analysis', and outlines steps that can be taken when analysing concepts for various purposes. The systematic concept analysis method is based on terminological methods and thus lays emphasis on clarifying the relations between concepts and locating concepts in concept systems – also in the case where a single concept is taken as a research object. The third article will describe concept analysis tools in more detail.

1 Introduction

In the first part of this series of articles (Nuopponen 2010), a comparison of selected methods for analysing concepts from terminology science (Picht & Draskau 1985; Nuopponen 1994, 1996; Skuce & Meyer 1990; Suonuuti 1999), business studies (Näsi 1980; Takala & Lämsä 2001) and nursing science (Walker & Avant 1994). Concept analysis was defined as an activity where concepts belonging to a whole, their characteristics and the relations that they hold within systems of concepts are clarified and described.

In all types of studies, it is necessary to sort out and clarify concepts and terms, and there is a need for more accurate tools for doing it than than those offered by the general research method literature. In this article, results of the comparison are discussed while outlining a method for systematic concept analysis, which could be applied as a research method in its own right or as part of any other type of study let it be qualitative or quantitative.

The terminological literature accounts for detailed procedures and methods to break down concepts into their characteristics, to structure concept systems, and to write well formed definitions. The theory of terminology seems to have the most accomplished set of theoretical

tools for analysing special field concepts[1]. Whereas terminological methods are geared towards practical terminology work, descriptions of concept analysis in the other disciplines contribute with some aspects of scholarly research. This article makes an effort to integrate these approaches into the analysis of concepts and to describe more or less concrete steps for concept analysis.

2 Systematic concept analysis

Systematic concept analysis as it is presented here is a further modification of the terminological analysis method presented by Heribert Picht in his various writings (e.g. in Arntz & Picht 1982; Picht & Draskau 1985), which has had a major influence in the Nordic terminology research and terminology work. Here, elements from other, more research oriented, concept analysis methods are combined with elements of terminological analysis. The main modification made here is that only the core concept analysis is taken into account, and the orientation towards terminology work is treated as one of the purposes for which systematic concept analysis may be used.

When systematic concept analysis takes the major role as the sole research method in a study, it covers the phases 1–6 in Figure 1. Alternatively, it may form a part of a wider overall research process, and that is why Figure 1 also includes references to an eventual overall research framework and its various phases preceding the actual concept analysis, and references to further possible research steps where the results of the concept analysis are utilized.
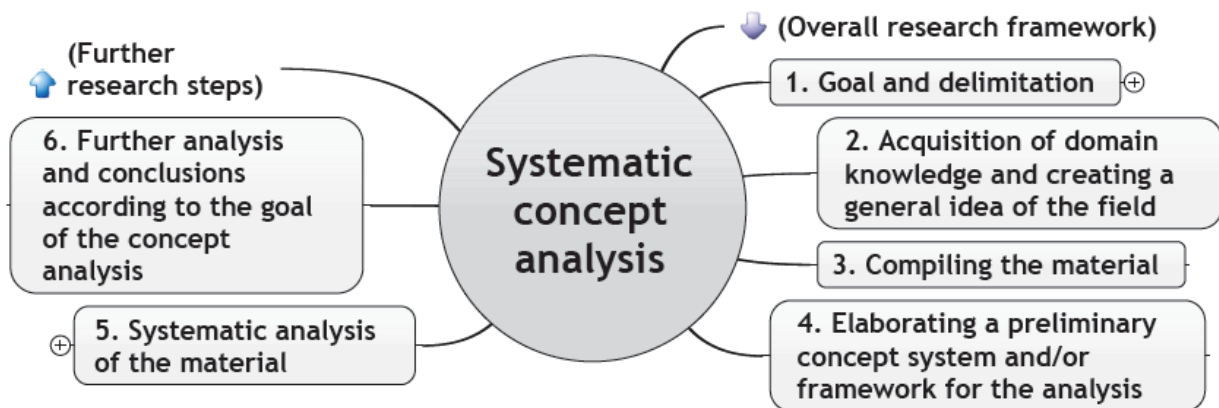

Figure 1. An outline for systematic concept analysis

The steps listed in Figure 1 are not always following each other in a linear way – after all, a research process "is not a clear-cut sequence of procedures following a neat pattern but a messy interaction between the conceptual and the empirical world, deduction and induction occurring at the same time" as Bechhofer (1974: 73) expresses it. In practice, the steps are overlapping and interwoven with each other as also Näsi and Takala & Lämsä emphasize. In the following, the steps are discussed and exemplified with the analysis of the concept of

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[1] These theoretical tools will be described in more detail in the third part of the article series.

concept analysis itself, which was performed for Nuopponen 2010 in order to be able to compare the methods and further develop them.

2.1 Purpose and delimitation of concept analysis

The first step is to define a purpose for the analysis and delimit its scope, i.e. the domain and the number of concepts to be dealt with. The purpose of the whole study may be to clarify concepts and concept systems in a domain, in which case concept analysis plays a major role in the whole research process. For instance, concepts in a new field of knowledge may still be in a quite chaotic or undeveloped state, and need clarification. Concept analysis may be integrated in the framework of a wider investigation in order to find an answer to one or more research questions, e.g. to establish a clarified conceptual foundation for further research.
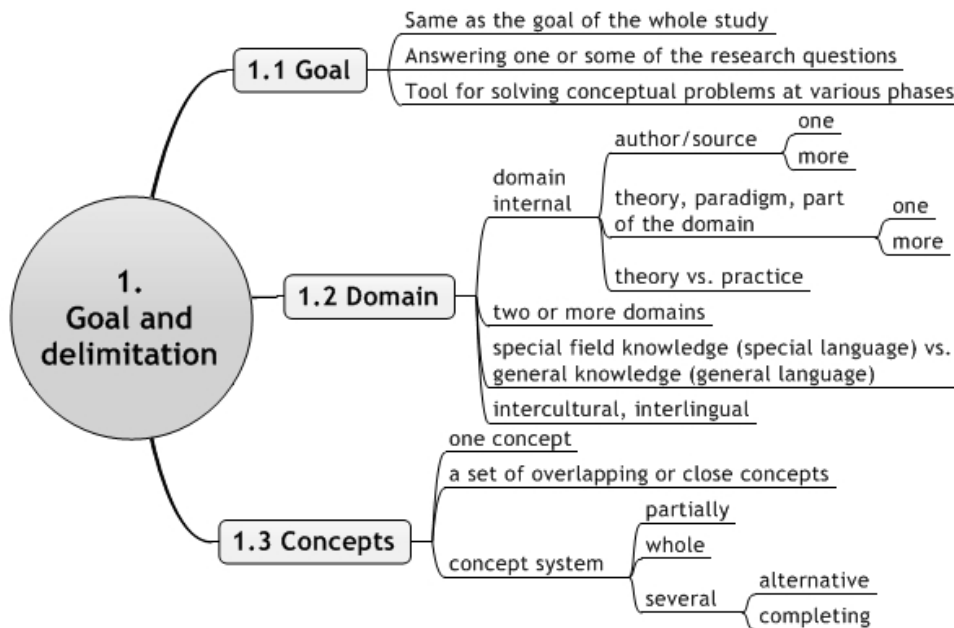

Figure 2. Purposes and delimitations of concept analysis

Furthermore, throughout the whole research process, concepts have to be sorted out, ordered, and defined, e.g. when doing a literature survey or looking for information on the object of the study. Concept analysis is often performed "in the background", and not all concept analysis activities are necessarily described as such nor discussed in the research report. Only the findings may be discussed and summarized. Concept analysis may thus work as an auxiliary tool to create conceptual clarity at various stages of the research work.

A study may have as a purpose to clarify one or more concepts inside a certain domain or compare concepts over domain borders. The comparison inside a domain may restrict to one author or one theory, or cover more authors or theories. E.g. in Nuopponen 2010, similar concepts from three different domains were compared with each other.

In terminological analysis, the special field under scrutiny is taken as a delimiting factor and material is selected only from that field. In practical terminology work, there is only a limited amount of resources and time available and hence a strict delimitation is well motivated. This

should apply to many academic studies, too. However, Walker and Avant's method (1994: 40-–41) explicitly sends the analyst to explore all the usages of the term for the concept under scrutiny in all fields and in both LSP and general language. As seems to be usual in nursing science studies, concept and its linguistic representation are somehow mixed with each other. They treat both scientific and ordinary uses of the linguistic expression as equally relevant. These are all to be collected even though they would be used for totally unrelated concepts (cf. ibid.; Nuopponen 2010). This kind of "semantic inventory" is something that could be done prior to the concept analysis when trying to narrow down to those terms and concepts, which are relevant for the study. For instance, when looking for information on the concept, library systems and online searches require search terms. Polysems and homonyms are revealed in this phase. As soon as the research object is delimited, there is, however, hardly any need to follow up on polysemic or homonymic naming functions of the linguistic expression, provided this is not motivated by the overall purpose of the study. Terminological concept analysis takes into account that there may be alternative terms (synonyms) for the same concept, which is not so apparent in Walker and Avant's method. For terminology work or terminological research, a wider analysis of term elements becomes relevant when evaluating the opacity of terms as linguistic expressions and their motivation various other naming tasks of the same linguistic form.

Terminological studies normally concentrate on larger conceptual fields and whole concept systems or their components at a time. Therefore, a challenge is posed by the fact that in scholarly research, e.g. in nursing science, a certain concept may be selected as the study object. The same goes for a set of concepts that rather than form a concept system, overlap each other and could be illustrated with overlapping circles instead of a clear-cut boxes or tree diagrams. They may not even have any common immediate superordinate concept. In multidisciplinary research, this kind of problems arise, when different but rather similar concepts which belong to various concept systems come together and have to be discussed and somehow agreed upon. This is the case in this series of articles comparing various concept analysis models. In Nuopponen 2010, similar concepts from the selected disciplines were contrasted, but concept analysis methods as well as meanings of the term 'concept analysis' in other disciplines and special fields were left out of the study. The purpose of the overall study, however, will include concept analysis methods from more disciplines. In order to develop the method, existing concept analysis methods needed to be explored at first. The findings are utilized to further develop the method.

2.2 Acquisition of domain knowledge and creating a general idea of the field
If the researcher is not familiar with the domain(s) or special field(s), where the concept(s) to be analyzed belong to, it is necessary to acquire a general idea of the field in order locate where the concept(s) belong(s). Together with the next phase this could be called 'creating a knowledge foundation'. It is done simultaneously with compilation of material (cf. 2.3) for the analysis and while going through it.

This phase may reveal that some sources are using different terms for the concept to be analyzed. For instance, in this study, the quest was to search for disciplines that are interested in concept analysis methods and have developed these. The term 'concept analysis' and its Finnish equivalent gave as search results texts on terminological research and terminology work, studies from business, nursing science and educational studies as well as formal concept analysis (cf. Figure 3).
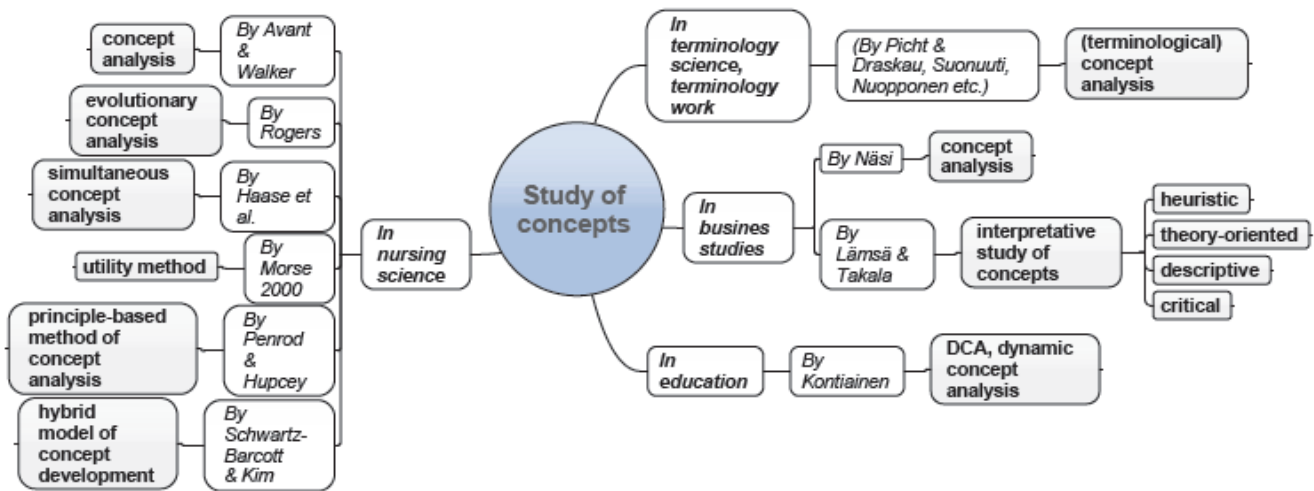
Figure 3. Various types of concept analysis methods

When reading the sources, also methods that were close to concept analysis methods even though they were not called 'concept analysis' were taken into account. Thus, various types of methods used to analyse concepts were included in the study – unlike Walker and Avant, who look for the "true meaning of the word" (cf. Figure 3; Nuopponen 2010).

2.3 Compiling the material

Compilation of sources and material is started already in the previous phases, or even prior to them. When looking for information and sources, an overall picture starts to appear and it will become easier to single out relevant texts, definitions, classifications etc. In the case with the concept *concept analysis*, key researchers and their key articles and works were found quite early on, cf. Figure 3 above.

The overall research design has an influence on the material selection criteria and a more serious compilation can be done only when the purposes and delimitations have been decided upon. The material may be various types of information on one or more concepts according to the purpose and delimitation. Furthermore, it may be collected from one or more special fields, theories, authors, languages, countries, etc. (cf. Figure 2).

If the purpose is to cover all the concepts of the selected domain, i.e. the analysis is "domain-restricted", a final and a more accurate material compilation is best done after the following phase (cf. 2.4), i.e. after a preliminary creation of a concept system or another type of framework for the study. The analysis may also be "source restricted", i.e. the purpose is to analyse one or more concepts as seen in a certain predefined source or certain sources (e.g. Nuopponen 2010; Figure 3 above). In the domain-restricted analysis, the number of sources is not limited in the same way as in the second case.

In terminology work, information on concepts and terms is recorded on electronic forms or in a data base for further analysis while a researcher often tries to manage various concept information details from different sources in his/her memory, especially when writing a literature review and comparing concepts described by different authors. A more systematic

approach and an appropriate software to record concept related data to be analysed would give more accurate and reliable results in the concept analysis.

2.4 Elaborating a preliminary concept system and/or framework for the analysis
Elaborating a concept system starts actually at the very beginning of the research process. The observations at various phases lead to establishing a preliminary concept system or another type of framework for the analysis. A general outline of the concept system(s) of the domain is needed before analysing the material systematically (Picht & Draskau 1985: 171). Näsi's model also includes preliminary ordering of different views. Walker & Avant's model (1994) does not have anything that could be compared with this step. An overview of various attributes or characteristics of the concept in focus is acquired after analysing various concepts with the same linguistic designation from different fields. (Ibid; see also the discussion in Nuopponen 2010).

When working with several languages, theories, disciplines, or sources with different views on the subject matter, it is necessary to establish a preliminary ordering of the concepts for each of them separately. In this way, a proper understanding of the differences and similarities is secured. Terminologists have also learned a lesson from the practical terminology work, namely that even if certain special fields appear to have a common international concept system, the reality is not always that idealistic. Picht and Draskau (1985: 171) warn, "One should cherish no illusions, however, nor should one take the international character of system of concepts for granted". However, in order to facilitate a later comparison of the concept systems, they recommend establishing general classifying criteria for the concept systems (Picht & Draskau 1985: 171). With classifying criteria they refer to those characteristics of concepts that may "determine the configuration of the system of concepts" in generative concept systems, or to other, empirically based criteria for ontological concept systems (e.g. partitive concept systems) (ibid. p. 63).

At this point, the question raised above about the analysis of only a single concept or a set of overlapping concepts becomes of importance. Picht and Draskau (1985: 62) emphasize that "the concept may not be viewed as an isolated unit in terminology" and it should always be evaluated and elaborated "with the conceptual context, which is in turn closely related to a special subject field or a discipline". They regard construction of a concept system "as the representation of the conceptual structure inherent to the special field". Thus, systematic analysis is needed because concepts do not exist and cannot be defined in isolation. Even if a single concept is taken as the object of the analysis, there are always other concepts involved: one or more superordinate concepts, subordinate concepts and coordinate concepts.

In addition to generic concept system, concepts may have their location e.g. in partitive or causal concept systems. Thus, also other types of concepts may also be involved in clarifying and delimiting the content of the concept, e.g. those referring to a cause or a result. In Walker & Avant's model (1994: 45) causal relations are analysed even though they do not discuss these as concept relations but e.g. as "antecedents and consequences of the concept". This shows that even though one concept would be initially taken as the research object, other concepts will be involved and eventually need to be analysed, too. As to overlapping concepts, each of them needs its own analysis as to which concept systems they belong. Establishing the intension and extension of a concept depends on this. Generic concept systems and other types of concept systems or models that may provide a basis for systematic analysis will be discussed in the next part of this article (see also Nuopponen 1994; 2005).

When analysing various concepts of *concept analysis*, at first the compiled texts were read, especially focusing on information on the analysis methods, their definitions, and classifications. Based on this raw material, preliminary satellite models (i.e. mindmap-like presentations) were outlined for each discipline separately. In this analysis, generic concept systems (super/sub- and coordinated concepts) could be found as well as temporal concept systems (e.g. overall process, part-process, co-ordinate process, overlapping process concepts). This inventory gave also as a result that the information on concepts could be compared with the help of a concept system model of activity (see e.g. Nuopponen 1994; 2006), which involves questions like: *Who analyses? Which material is used? Why is the analysis done? How is the analysis performed? With which material? What is the end product?* In order to clarify further the question *"How concept analysis is performed"*, the research methods were analyzed with the help of a temporal concept system model, where sequential, parallel, merging, alternative and optional phases in a process can be distinguished.

2.5 Systematic analysis of the material
Analogously with Picht's and Draskau's model, the next step is to go through the accumulated data according to the preliminary concept system or other conceptual framework. This is done again separately language by language, field by field etc. in order to avoid domination by one of them. For instance, when analysing *concept analysis*, the concept analysis methods were first analysed in their own context before comparing them with other related methods.

The phases in Figure 4 are by no means successive. They are rather various types of activities that are performed when the material is processed systematically. The systematic analysis of the material includes further elaboration of one or more concept systems based on the preliminary one (5.1). Various types of relations between concepts are sorted out (5.2). Larger concept systems are analysed part by part. If the preliminary concept system presentation includes various types of concept relations (e.g. generic, partitive, or temporal relations), its component systems are analysed individually concept by concept. Refining the concept systems runs through the whole analysis side by side with the contents analysis of the concepts (5.3), determining synonymy etc (5.4). The concept system or systems become more and more exact during the analysis (5.5).
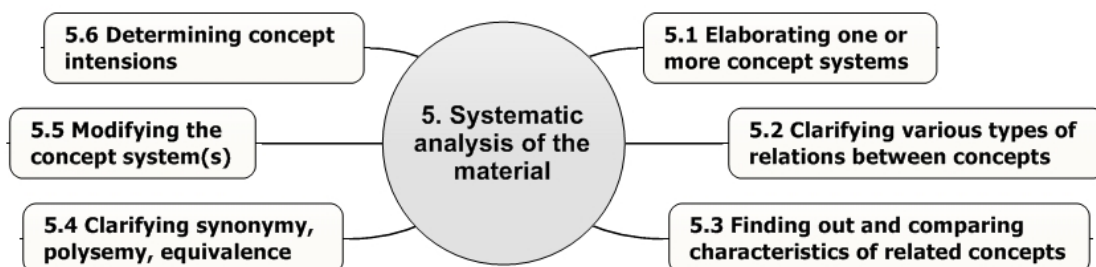

Figure 4. Systematic analysis of the material (cf. item 5 on Figure 1)

Another activity that runs through the whole analysis is clarifying the contents of the concepts, i.e. their characteristics. Based on the steps 1-4, the analyzer already has a certain notion of

the concepts, but now this notion is being refined (5.3). Characteristics of related concepts have to be clarified and compared especially when it concerns generic concept systems (5.5). This leads to more clearly delimited concepts and makes it easier to confirm existing synonymy, polysemy and equivalence (5.4). After the concept systems have been finalized, the contents of the concepts should be more or less clear cut - depending on the depth of the analysis and selected material (5.6). This phase is the core element in any concept analysis undertaking and will therefore be discussed in a separate article.

3 Further analysis and conclusions according to the purpose

The last step of the concept analysis proper is the summarization of the activities implied by the purpose of the concept analysis. In the previous phases (1–5 in Figure 1), concepts and their intension, concept systems, etc. from different domains, languages, countries, sources etc. were analysed separately. In this phase, the results of these analyses are brought together and compared. Similarities and differences between concepts, concept systems are commented as well as synonymy, polysemy, and equivalence of terms etc. In the case of *concept analysis*, during this phase, the individual analyses were compiled in tables in order to make the comparison of the characteristics easier. Various types of concept system diagrams can also be utilized in order to show the similarities, differences and overlappings.

4 Overall research framework and further research steps

If the concept analysis is part of a wider study, the researcher continues according to the research design to the next phase (cf. the box to the right in Figure 5). In all the method descriptions that were discussed in Nuopponen 2010, two elements could be observed more or less explicitly: concept analysis proper and application of its results to certain purposes. In this paper, the overall purpose of a research is distinguished from the purposes of the systematic concept analysis as described in section 4. At least the following types of purposes could be found for an overall research framework and thus for the further research, where the results of the concept analysis can be used: descriptive, interpretative, descriptive, contrastive, constructive, and normative.
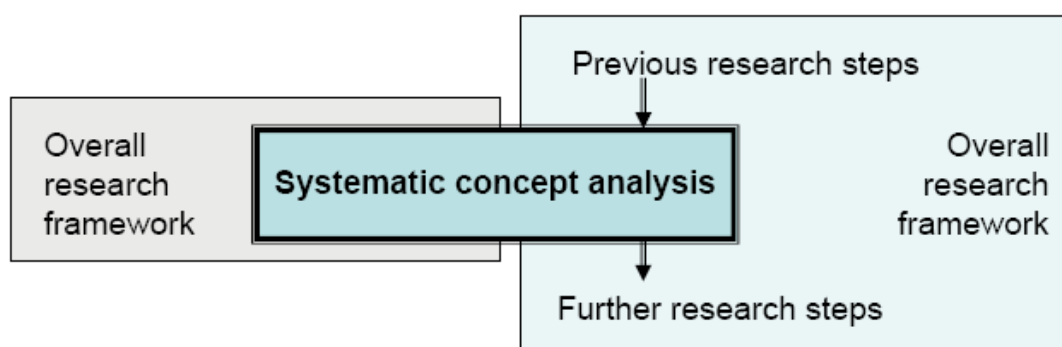

Figure 5. The location of systematic concept analysis in the research process

A descriptive analysis describes the state of the concepts and their use as such. The basic purpose of a concept analysis can be seen as descriptive and in this case, the overall research framework may overlap the concept analysis (cf. the box to the left in Figure 5). However, a descriptive concept analysis may be included in a wider research framework, too, e.g. a study of the special language of a certain field. **Contrastive** analysis explores and clarifies similarities and differences of similar concepts in different fields, theories, paradigms,

languages, and cultures. Also this could be a purpose of the concept analysis (see section 4), but e.g. in translation studies, finding out similarities and differences between concepts may just be a start of a wider study discussing translation equivalents. **Interpretative** analysis describes the concepts and their use, but also tries to find out the reasoning behind the conceptual structures of the field. Takala's and Lämsä's (2001) interpretative research aims to enhance and to understand a concept. Their method focus on interpreting definitions that are given in different sources and relating the concepts to each other. The result, they say, could be a fruitful interpretation from a new unexplored angle. An interpretative analysis goes deeper into the concepts than a descriptive analysis.

A constructive analysis aims at developing concepts and concept systems for the field. As stated in Nuopponen 2010, business studies and nursing science authors utilize concept analysis as part of developing their own discipline. For Näsi (1980), the aim of the concept analysis is to create new concepts or even whole new concept systems. Also in nursing science, concept analysis is discussed as a concept development method and seen as a part of the discipline development producing operational definitions as the end product. The nursing scientists Walker and Avant (1994: 38) regard concept analysis as "an excellent way to begin examining information in preparation for research or theory construction".

The methods of these disciplines seem also to have **normative** purposes similar to terminology work and standardization when aiming at harmonized or unified concepts and concept systems. In terminology work, concept analysis is a part of the whole process and its results create a foundation for writing unambiguous definitions for concepts, evaluating and agreeing upon terms for to be recommended and equivalence between concepts and terms in different languages etc. A researcher faces also this kind of tasks when establishing unambiguous concept systems and terminology for his/her study. As for the analysis of *concept analysis*, it could be characterized as descriptive, contrastive and interpretative, while the overall purpose of the research is constructive: constructing and modifying an analysis method.

5 Conclusions

In this article, a theoretical model for systematic concept analysis was outlined based on the previous phase of the study, the results of which were discussed in Nuopponen 2010. The purpose of this model is to serve many fields and disciplines where concept analysis is needed. In this article, terminological concept analysis served as the point of departure, while the challenges brought by scholarly research were in special focus.

In a scholarly research process, there is a need for analysing and clarifying concepts in all phases. Some of these analyses are very restricted and are performed in the background, while others cover larger areas and may get a decisive role in the whole research process. In the beginning, the key concepts of the study are researched while identifying and developing the topic, choosing and focusing on it. When searching, finding and evaluating information and planning research design and creating a theoretical framework, it is necessary to discuss and decide upon concepts and concept systems that the study will be based on. Various types of classifications, concept systems and conceptual models are devised for material and data collection and especially for analysing the collected data and synthesizing the results and drawing conclusions. Also when writing a research report and preparing the presentation of the research, concept analysis tools and visualisation is needed, e.g. tables of characteristics,

concept system diagrams, glossaries, discussions of appropriate term selection, and methods for compiling definitions etc.

The model for systematic concept analysis will be discussed in more detail in forthcoming articles. The third part of the paper will concentrate on the theoretical tools of concept analysis, especially various types of concept system models. A separate paper will take a look more specifically at the phase, during which collected material is analysed systematically.

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