Solving Definition and Relation Problems in English Navigation Terminology

Ayşe Yurdakul, Eckehard Schnieder

Abstract—Because of the increasing multidisciplinarity and multilinguality, communication problems in different technical fields grow more and more. Therefore, each technical field has its own specific language, terminology which is characterized by the different definition of terms. In addition to definition problems, there are also relation problems between terms. Among these problems of relation, there are the synonymy, antonymy, hypernymy/hyponymy, ambiguity, risk of confusion and translation problems etc.

Thus, the terminology management system *iglos* of the Institute for Traffic Safety and Automation Engineering of the Technische Universität Braunschweig has the target to solve these problems by a methodological standardisation of term definitions with the aid of the *iglos* sign model and *iglos* relation types. The focus of this paper should be on solving definition and relation problems between terms in English navigation terminology.

Keywords—*Iglos*, *iglos* sign model, methodological resolutions, navigation terminology, common language, technical language, positioning, definition problems, relation problems.

I. INTRODUCTION

WITH the increasing technical progress, multidisciplinarity becomes very important. But there are also linguistic communication problems between different technical fields in the last decades. The communication problems are especially based on terminological kind. In each technical field, terms are differently defined and related with each other. First of all, "terminology" is the vocabulary of a special linguistic variety (technical language) according to the general linguistic usage [5]. The DIN standards define terminology as the entirety of terms and their designations in a special field [4]. Finally, terms are described as the smallest meaningful linguistic units of a technical language system which are used within the communication of a particular field of human activity [9]. In our opinion, terminology is the lexicology of a technical language of a specialised field.

The main target of our paper is to present the *iglos* terminology management system which models terminology of several fields and has the main goal to avoid multilingual and multidisciplinary problems in special fields. In our contemplation, we focus on solving definition and relation problems between navigation terms in the English common

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language and traffic engineering terminology with a methodological approach. This methodological approach [2] contains the terminology modeling with *iglos* in four steps. There is the common language which describes the form of appearance as a reliable pattern to all people using the language in the whole language area [6] on the one hand and the technical language which defines the language area which is orientated towards an unambiguous and consistent communication in a specific field by a specified terminology on the other hand [4].

Before presenting the modeling process, there will be a short description in relation to the *iglos* terminology management system including the goals and the sign model with its relation types. After all, the navigation terminology includes the terms "position", "positioning", "location", "localisation" and "navigation".

II. THE *IGLOS* TERMINOLOGY MANAGEMENT SYSTEM

A. Goals

Firstly, the idea for *iglos* resulted from a cooperation of the Institute for Traffic Safety and Automation Engineering and the Department for German Linguistics of the Technische Universität Braunschweig. The project is predominantly interdisciplinary and also includes the dialogue of different fields such as terminologists, linguists, computer scientists, engineers, translators and users. In addition to these fields, there is also a dialogue of different languages such as German, English, French, Spanish, Chinese, Slovak, Turkish etc. In general, the main target of *iglos* is to develop a software platform on a linguistic basis. "For optimising the scientific and commercial communication, it is intended to accelerate and facilitate a consistent, multilingual and unambiguous development of technical terminology. Finally, the foundation of the *iglos* system consists in a further development of the variety-based trilateral sign model." [1]

B. The iglos Sign Model with Relation Types

The *iglos* sign model is trilateral and variety-based. It describes lexemes as abstract morphological units which are concretised by their grammatical word forms. On the whole, a lexeme consists of three constituent sides, namely the lemma (denomination), the definition which describes the content of a lexeme and the variety (technical language) as the context of the lexeme. In our contemplation, technical terms are special lexemes. For relating lexemes with each other, there is a relational lexeme (relation type) which is placed between two lexemes (see Fig. 1). In this context, we want to mention some selected relation types with their predicates such as:

- **risk of confusion** (*isMixesUpWith*)
- **translation** (*hasTranslation*)
- **output** (*hasOutput, isOutputOf*)
- **input** (*hasInput, isInputOf*)
- **holonymy** (*hasPart, isPartOf*)
- **meronymy** (*isPartOf, hasPart*)
- **antonymy** (*hasAntonym*)
- **synonymy** (*isSynonymOf*)
- **polysemy** (*isPolysemOf*)
- **homonymy** (*hasHomonym*)
- **hypernymy** (*hasHypernym, isHypernymOf*)
- **hyponymy** (*hasHyponym, isHyponymOf*)
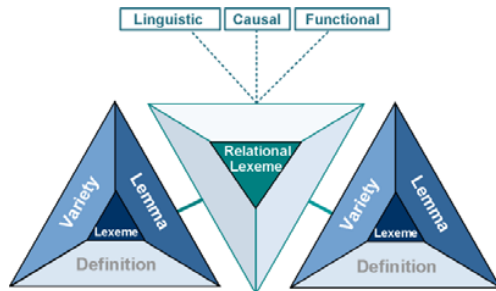
Fig. 1 The *iglos* Sign Model

By avoiding terminological haziness and creating and visualising concrete unobstructedly typable relations between terms in a systematic variety, the *iglos* sign model facilitates the specification of terminologies.

Additionally, the *iglos* sign model achieves to avoid synonymy and ambiguity (disambiguation) of terms within the communication between different fields (multidisciplinarity) and different national languages (multilingualism).

III. TERMINOLOGY MODELING FOR SOLVING DEFINITION AND RELATION PROBLEMS BETWEEN ENGLISH NAVIGATION TERMS

In this section, we describe a methodological approach for solving terminological problems in English navigation terminology of common language and traffic engineering. This approach refers to terminology modeling in four steps. The first step is the denomination of navigation terms in general linguistic usage and in traffic engineering, whereas the second includes the definition and the third the relation of these terms in general linguistic usage and in traffic engineering. Finally, the relations between the navigation terms can be presented in a graphic view (*visualisation*, *iglos* graph) in the fourth step.

A. Denomination of Terms

TABLE I
DENOMINATION OF NAVIGATION TERMS IN COMMON LANGUAGE AND IN TRAFFIC ENGINEERING

General Linguistic Usage	Traffic Engineering
position	position
location	location
positioning	positioning
localisation	localisation
navigation	navigation

According to the schedule, there are equivalences for all the navigation terms to be contemplated. As one can see in the schedule, the navigation terms are denominated identically in English common language and traffic engineering terminology.

B. Definition of Terms

The second step is the definition of navigation terms in both technical fields by determination of their sources. According to this, the definitions of the navigation terms are extracted from defining dictionaries for describing them in common language and standards and glossaries for describing them in the terminology of traffic engineering.

TABLE II
DEFINITION OF ENGLISH NAVIGATION TERMS IN COMMON LANGUAGE

Term	Definition in Common Language	Source of Definition (Example)
position	1.) a place where someone or something is located or has been put 2.) a particular way in which someone or something is placed or arranged 3.) a person's point of view or attitude towards something 4.) a situation, especially as it affects one's power to act	[8]
location	a particular place or position	[8]
positioning	1.) to put in place or position. 2.) to determine the position of; locate	[10]
localisation	1.) to make local: decentralise and localize political authority. 2.) to confine or restrict to a particular locality: localized the infection. 3.) to attribute to a particular locality: sought to localise the origin of the rumor	[10]
navigation	1.) the process or activity of accurately ascertaining one's position and planning and following a route 2.) the passage of ships	[8]

TABLE III
DEFINITION OF ENGLISH NAVIGATION TERMS IN TRAFFIC ENGINEERING TERMINOLOGY

Term	Definition in Traffic Engineering Terminology	Source of Definition (Example)
position	given by a set of coordinates related to a well-defined coordinate reference frame	[3]
location	a position in terms of topological relations	[3]
positioning	process of obtaining a position	[3]
localisation	process of obtaining a location	[3]
navigation	Combination of routing, route traversal and tracking	[7]

C. Relation of Terms

Furthermore, the third step deals with the relating of navigation terms in general linguistic usage and in traffic engineering on the basis of the *iglos* sign model and *iglos* relation types. In common language and in the terminology of traffic engineering, there are the following relations between the navigation terms:

1. Causal/functional relation between "position" and "positioning" and "location" and "localisation" in both

lexicologies.

→ "Position" *isOutputOf* "positioning"!
→ "Positioning" *hasOutput* "position"!
→ "Location" is *OutputOf* "localisation"!
→ "Localisation" *has Output* "location"!
→ "Position" *isInputOf* "localisation"!
→ "Localisation" *hasInput* "position"!
→ "Location" is *InputOf* "positioning"!
→ "Positioning" *has Input* "location"!

2. Risk of confusion between "position" and "location" and "positioning" and "localisation" in both lexicologies.

→ "Position" *isMixesUpWith* "location"!
→ "Positioning" *isMixesUpWith* "localisation"!

3. "Positioning" and "localisation" are parts of "navigation" in common language.

→ "Positioning" *isPartOf* "navigation"!
→ "Navigation" *hasPart* "positioning"!

→ "Localisation" *isPartOf* "navigation"!
→ "Navigation" *hasPart* "localisation"!

4. "Positioning" and "localisation" are hyponyms of "navigation" in traffic engineering terminology.

→ "Positioning" *isHyponymOf* "navigation"!
→ "Positioning" *hasHypernym* "navigation"!
→ "Localisation" *isHyponymOf* "navigation"!
→ "Localisation" *hasHypernym* "navigation"!
→ "Navigation" *isHypernymOf* "positioning"!
→ "Navigation" *hasHyponym* "positioning"!
→ "Navigation" *isHypernymOf* "localisation"!
→ "Navigation" *hasHyponym* "localisation"!

D. Visualisation of Terms

In the last subsection, we will visualise the relations between English navigation terms in both contemplated fields/languages.

After creating relations between terms, the relations in both varieties are presented in the *iglos* graph (see Figs. 2, 3).
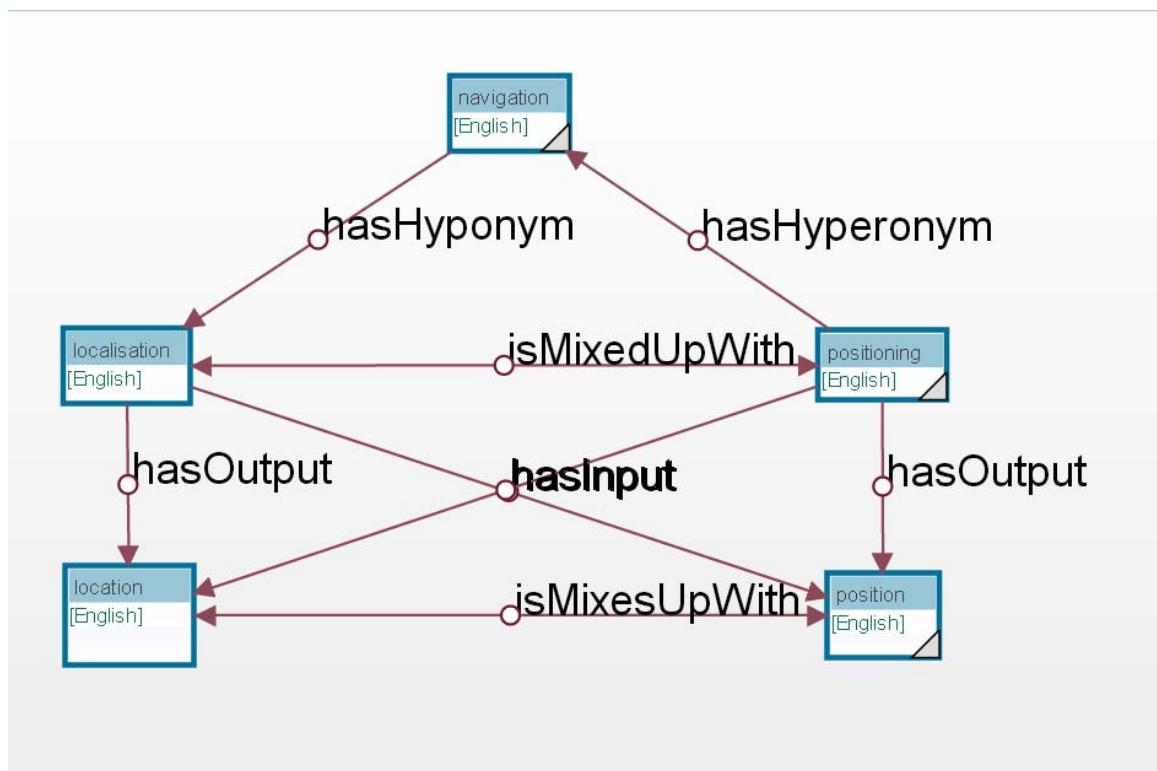

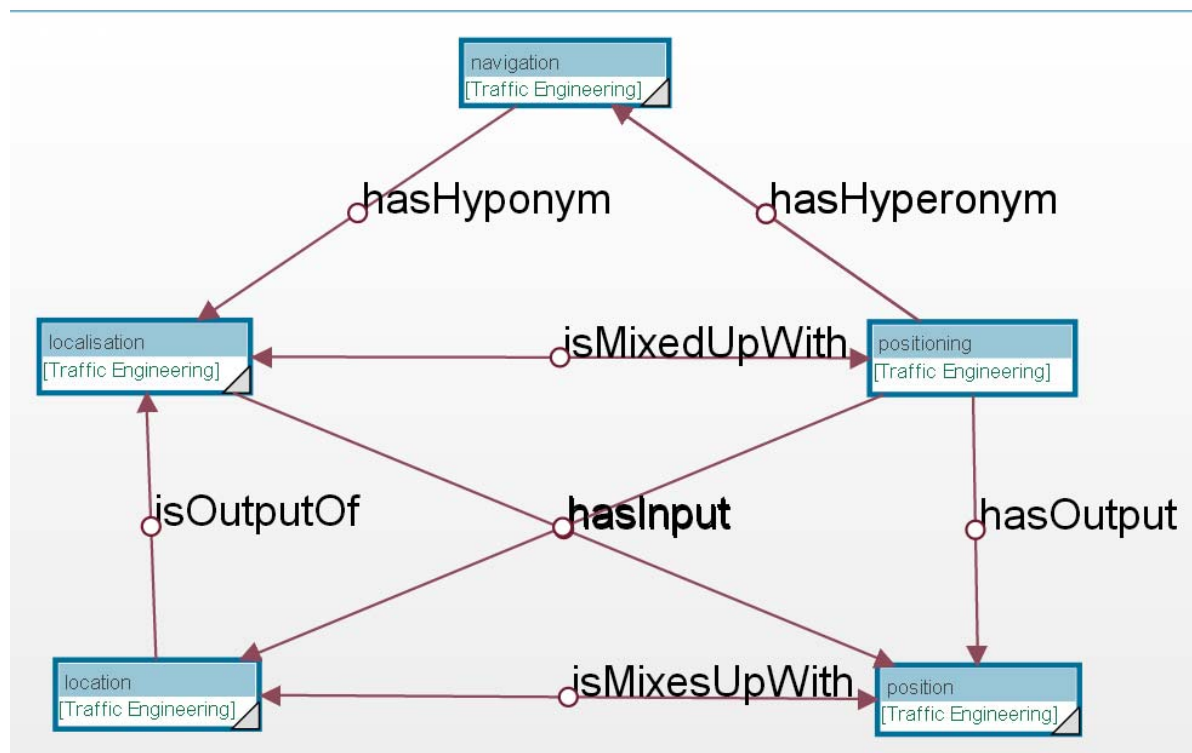Fig. 2 Visualisation of English Navigation Terms in Common Language

Fig. 3 Visualisation of English Navigation Terms in Traffic Engineering Language

IV. CONCLUSION

With the aid of the methodological approach of terminology modelling, we could find out that there are differences in relation to defining and relating terms (in this case "navigation terms"). For avoiding linguistic problems between the common language and the technical language, we have defined and related terms separately for each field/language. Whereas the common language describes "navigation" as a whole of "localisation" and "positioning", the traffic engineering defines it as a hypernym of them. Apart from that, there are no differences between relations of the contemplated navigation terms. In summary, the definition of a term is connected with its variety or context and its relation with the definition.

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