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“Översätt den här sidan”

The advancement of Google Translate and how it performs in the online translation of compound and proper nouns from Swedish into English

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Abstract

Titel: "Översätt den här sidan": The advancement of Google Translate and how it performs in the online translation of compound and proper nouns from Swedish into English.

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Abstract: The English translation of the Swedish compound *fönsterbräda* into *windowsill*, or the proper noun *Danmark* into *Denmark* makes perfect sense. But how about the compound *fossilbränslefri* as simply *fossil fuel* or the name *Mälaren* as *Lake*? All four of these translations have been produced with the help of automatic machine translation. The aim of this paper is to present the expanding field of application of machine translation and some issues related to this type of translation. More specifically, the study has looked at Google Translate as one of the most commonly used machine translation systems online, and how it responds to the two linguistic categories that were selected for this small study: compound nouns and proper nouns. Besides analyzing these categories, two different text types were chosen: general information articles from a local authority website (Stockholm City) and patent texts, both of which belong to the expanding field of application of Google Translate. The results of the study show that in terms of compound nouns, neither of the text types proved to be significantly better suited for machine translation than the other and neither had an error rate below 20 %. Most of the errors related to words being erroneously omitted in the English output and words which were incorrectly translated in relation to context. As for proper nouns, the patent texts contained none and subsequently no error analysis could be made, whereas the general information articles included 76 proper nouns (out of a total word count of 810). The most prominent error related to the Swedish version not being maintained in the English output where it should have been, e.g. translating *Abrahamsberg* as *Abraham rock.* The errors in both of the linguistic categories had varying impact on the meaning of the texts, some of which distorted the meaning of the word completely, and some which were of minor importance. This factor, along with the fact that the reader of the text influences how the comprehension level of the text is perceived through their language and subject knowledge, makes it difficult to evaluate the full impact of the various errors. It can, however, be said that patent text could pose as a better option for machine translation than general information articles in relation to proper nouns, as this text type is likely to contain no or very few proper nouns.

Nyckelord: Machine translation, Google Translate, mistranslations, compound nouns, proper nouns, general information articles, patent texts.

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1. Introduction and aims

"We take no responsibility for the accuracy of the translation."
– Google Translate[1]

It is almost like magic—with a simple click on the "translate this page"-button, you are provided with an instant translation of any given combination of the 57 languages currently operated by the Google Translate system. As an aspiring translator, this online web tool caught my attention a while ago. Thinking perhaps I had chosen the wrong career path, I wondered if the future of translation would come down to artificial intelligence and the work of machine translation systems. Although the fear of a forced retirement scheme for translators might be far-fetched, it seems that the advancement of machine translation technology will inevitably transform the role of the translator, perhaps to that of an editor. At present however, it is evident to anyone who has used and experimented with Google Translate that it is far from perfect and can sometimes come up with highly entertaining and sometimes incomprehensible translations. But being based on statistics where the system works to find translation patterns and the most probable solution from the processing of huge amounts of documents, Google Translate is constantly improving. Millions of users, among them international organizations, authorities and private persons, have found their way to this rapidly advancing web tool, free of charge and readily available to anyone with an online access. Several Swedish authorities (among them Stockholm City), with the obligation to make their information accessible to non-native speakers as well as native speakers of Swedish, are now making use of Google Translate on their websites in an effort to respond to new linguistic demands in a time and cost efficient manner. Besides being added as a tool to translate entire websites to reach a wider target group, Google Translate is also being applied—and with greater success some might argue—to texts of a more technical nature in order to increase accessibility for professionals of various nationalities and language backgrounds within the technical field. Earlier this year, the European Patent Organization and Google Translate signed a contract allowing for translations of patents to be performed by Google (Alpman, 2011). The translation of patents is a major market as far as translation goes and the implementation of Google Translate will be a big cost reducer and time saver for European inventors and financiers. At this point in time however, it is only intended to serve informational purposes (i.e. the translations have no legal status) by providing an easier and wider access to patent texts, yet it is a big leap forward for machine translation (Rustici, 2011).

[1]Quote from "Google Translate" on the official website of Stockholm city. Available on: http://www.stockholm.se/. Accessed 2 May 2011.

The aim of this paper is to look at how Google Translate, as one of the fastest growing machine translation systems, operates and specifically, how well it performs in the translation process from Swedish into English when applied to two different text types: general information articles from a local authority website and patents. I will do so by looking at two linguistic categories: compound nouns and proper nouns.

In my analysis I will also be focusing on the following subquestions:

- What, if any, are the main types of mistranslations that occur when translating compound nouns and proper nouns? Are they attributable to differences in text type?
- Does one of the text types seem better suited to machine translation, i.e. contain fewer errors than the other and if so, what may be the reason for this?

In addition I will discuss how, in the light of my findings, Google Translate might affect the meaning of the texts and the implications that it could possibly have on the reader's comprehension of the texts.

2. Background

2.1 Machine translation—emergence and field of application

Machine translation (henceforth MT), also referred to as computer-aided translation, began to emerge at the end of the Second World War when the US, Britain, the Soviet Union and Japan began researching ways to improve the quality and efficiency of translation (Ingo 2007:353). Today, MT is an all-encompassing term which refers to tools that help facilitate the process of translation in various ways. These tools range from electronic dictionaries and terminology banks to complex software programs. With reference to the latter, there are several types of systems that these programs operate by. For a long time the most prominent system was founded on the rule-based approach, i.e. grammatical and lexical data (Hutchins 2006:380). However, languages are rarely as consistent as we would like them to be and there are numerous exceptions that need to be taken into account when it comes to translation. As a response, the 1990s offered a new or rather a revived approach based on statistics and large bilingual corpora (Hutchins 2006:380). This second type of system, which is also the one Google Translate operates by, recognizes language patterns from previous translations that have been added and processed by the system (Google Translate). This leads to the system making an "accurate guess" as to which translation is best suited (Helft 2011).

There are also so called example- or memory-based MT systems which, like those with a statistical approach, center around bilingual corpora, but instead of searching for the most common translation pattern, the system is trained to find previous examples and provide a more context sensitive approach (Hutchins 2006:380-381). Additionally, there are hybrid systems which operate by using both the rule-based approach and the processing of statistical data (Boretz 2009).

MT is in many respects an invaluable asset to most translators since it not only assists in finding suitable solutions, but also helps make translation more time and cost efficient, for both producer and consumer. Translators are, however, far from the only ones making use of this computerized technology. Automatic MT has been widely used for a long time to translate texts like weather forecasts and business documents, providing a rough version of the text (Ingo 2007:353). Large corporations, major organizations and institutions like the United Nations and the European Union, as well as the military, are other examples of where MT is frequently being used and also where a lot of its development and research has taken and is taking place (Herzog, Jones & Shen 2009:41).

One of the most recent developments within the field of MT is the collaboration between the European Patent Organization and Google which was settled in March 2011, allowing patents to be translated into and from 32 languages by the use of Google Translate (EPO 2011). The patents added to the system will serve to improve Google's translation abilities by providing access to an extensive translation corpus, in this case suited to the specific language of technical patent texts (EPO 2011). At present, Google translations are not accurate enough to replace the human made translations required in a patent application by law, but they do serve to spread information and provide access to texts which otherwise would be inaccessible to a non-speaker of the text's source language, thus greatly facilitating patent research (Rustici 2011).

It should also be mentioned that this is an ongoing project, scheduled to be finalized in 2014, and that at the moment translations on the EPO website can only be made in English, French and German, EPO's three official languages (EPO 2011). However, patents can already be translated with Google Translate just like any other text, by adding the text manually on translate.google.com. This is obviously more time-consuming and demands access to patents in Word format. Nevertheless, it produces the same results and hence can be used for this study.

Another expanding field of application when it comes to MT is general information articles on local authority websites. Since 2009, Swedish authorities have been required by law to make their information available to non-native speakers of Swedish, including languages which are not among

Sweden's five official minority languages (Språkrådet). This means that regardless of their mother tongue, all citizens are entitled to access information from the authorities, and one of the main channels to spread this information is the local authority websites. Though not applicable to all official authorities, the use of MT systems to perform the task of translating the information presented on a website into a given language (without the post-editing of a human translator) is becoming more and more common, replacing human translators who can produce translations with greater context sensitivity and higher equivalence level (Domeij 2011:45). The texts to be translated by MT are to follow the general guidelines for local authority language use, i.e. that "the language ought to be refined, clear and comprehensible"[2] (Språkrådet). This may be the case with the original texts, but just how well the MT versions of the texts comply with the guidelines is for the latter part of this paper to address.

Finally—although not the last thing to be said about MT—the Internet, which spreads vast amounts of information, has created a need for rapid and more accessible translation of various online texts. In combination with an equally rapid technical development, this has meant that the field of application for MT is expanding even further. MT is now operating in everything from online chat rooms where people from various language backgrounds communicate, to specific mobile apps which allow for instant translations without the need for online access. One of the latest developments relates to so called "augmented reality" where an app is downloaded which then translates words and texts via the camera of the mobile phone (Larsson 2010). This means that signs and menus for example, can be translated simply by aiming the camera at the text at hand. At the moment, translations can only be made between English and Spanish, but the technology is rapidly advancing and the aim of the app producers is of course to include as many languages as possible (Larsson 2010). Google Translate is among the leading designers of this new technology and it is to this cutting edge MT developer that we now turn.

2.2 Google Translate and statistical machine translation

Machine translation is one of the best examples that shows Google's strategic vision (...) *Google understands something about data that nobody else understands, and it is willing to make the investments necessary to tackle these kinds of complex problems ahead of the market.*

– Tim O'Reilley[3]

[2]The quote from Språkrådet is my own translation.

[3]Tim O'Reilly, founder and chief executive of the technology publisher O'Reilly Media, quoted in "Google's computing power refines translation tool", by Helft, Miguel for *The New York Times*, 8 March 2010.

Google Translate is the translation tool developed by the IT giant Google, which at present operates in 57 languages, as linguistically distant as Norwegian and Swahili (see Appendix 1). As mentioned in section 2.1, Google Translate is based on a statistical approach, but that is not how it started out. Previous to its current system, it was structured around the more conventional rule-based approach of lexical data and grammar, using a system called Babelfish (Domeij 2011:45). But as mentioned above, this was in many ways a flawed system, or rather it made it highly inflexible and not able to deal with more complicated grammar, e.g. the exceptions of grammatical rules (Google Translate). In order to tackle the challenges presented by the irregularities of language, Google Translate adopted the statistical approach and developed its own system instead, which came into use in 2006 (Domeij 2011:45). The statistics are based on millions of documents gathered from UN and EU transcripts, Google's own book scanning scheme and numerous websites that have already been translated by human translators (Helft 2010). After being processed by the system, the collected data make up a vast information bank of vocabulary, phrases, terminology etc. to be used in the instant online translation based on statistical calculations of common translation patterns (Helft 2010). In an article from 2010, the vice president of Google engineering, Vic Gundotra, stated that even though this type of system has been in operation since the mid-90s, none has come close to the capacity of Google's infrastructure (Helft 2010). So what is it that Google Translate can actually do? Google Translate is quite an extensive web tool. First, it is able to translate websites that appear in a Google search list into any of the languages supported by the system, simply by clicking on the 'Translate this page' option next to the search result. The user of Google Translate can also translate words, phrases and whole texts by clicking on 'Translate' on the Google.com home page and entering the data for translation. Here the user can also get access to an audio option where the translation is read out loud (this does not, however, apply to longer texts). Further, Google Translate can be added to a website by the owner of that website, who can then offer visitors a broad variety of language options and thus spread their website information more extensively. Besides this, Google Translate offers automatic e-mail translations to users of Gmail, Google's own e-mail service, as well as a tool kit for professional translators on how to make use of Google Translate in their work (Google Translate). Google Translate can also be applied to clips from YouTube (which is owned by Google) and can offer translation apps for mobile phones, responding to voice input (Zhu 2011).

The main issue that arises and which is at the core of this study is of course the level of accuracy and quality of the Google Translate translations. On Google Translate's own website (Google Translate), it is explained that the quality and level of correctness is directly related to the number of documents processed between different language pairs, i.e. a language with fewer translations

registered within the system has a lesser chance of being translated correctly. Computer linguist Richard Domeij (2011:45) explains in an article on MT that Google uses English as a transitional language between language pairs when there is not enough data to draw statistical conclusions. This can then cause mistranslations as in the following example of translation from Swedish into Norwegian, cited in the same article (Domeij, 2011:45):

Source text: Hur upplever läsaren texten?
Translation result: Hvad gjør leseren teksten?

What has happened here is that the Swedish text has been translated into English word by word and the word *upplever* has been mistaken for the English word *do*, producing the un-grammatical phrase *What do the reader the text?*. The English *do* has then been translated into the Norwegian *gjør*, which resulted in a confusing message for the reader (Domeij, 2011:45).

As for the translation from Swedish into English this might be less of a problem as no transitional language is needed. However, there are still other issues involving the Swedish-English language pair.

2.3 Issues with machine translation: Compound nouns and proper nouns

The challenges of translation are numerous and a complete elimination of mistranslations is more or less impossible, in particular when it comes to MT which lacks greatly in context sensitivity and style awareness. Presented below in greater detail are Swedish and English compound nouns and proper nouns and how they might pose their own set of challenges when it comes to MT from Swedish to English.

2.3.1 Compound nouns

Compound nouns are two or more words joined together to constitute a noun (Huddleston & Pullum 2002:1646). Compound nouns can be a combination of nouns, adjectives, adverbs, verbs, prepositions and numerals (Hasselgård 1999). In English, compound nouns are orthographically represented as follows (McArthur 1992: 244):

Solid compounds: news + paper = newspaper
Hyphenated compounds: passer + by = passer-by
Open compounds: national + park = national park

According to Hasselgård (1999) there are no set rules as to when an English compound noun should be solid, hyphenated or open. A general rule, however, is that compounds that are well-established are written as one, whereas more novel or less common compounds are written as separate words or with a hyphen (Hasselgård 1999).

Table 1. Examples of compositions of Swedish and English compound nouns (the Longman Contemporary Dictionary and Svenska Akademiens Ordlista).[4]

Swedish examples	**English examples**
gräs + hoppa = gräshoppa *n + n = n*	grass + hopper = grasshopper *n + n = n*
blå + bär = blåbär *adj + n = n*	blue + berry = blueberry *adj + n = n*
efter + skalv = efterskalv *prep + n = n*	after + shock = aftershock *prep + n = n*
fem + år (-ing) = femåring *num + n = n*	five + year + old = five-year-old *num + n +adj = n*
sjuk + försäkring + avgifter = sjukförsäkringsavgifter *n + n + n = n*	health + insurance + fees = health insurance fees *n + n + n = n*
stå + upp + komiker =ståuppkomiker *v + adv + n = n*	stand + up + comedian = stand-up comedian *v + adv + n = n*

In Swedish however, there are no open compound nouns. In Swedish, an open compound would not hold the same meaning as a solid or hyphenated compound since the words are then seen as separate units. Sometimes the result of splitting a compound into separate words can be highly misleading, as in the case with *sjuk sköterska* (*sick nurse* instead of *nurse*) and *kyckling lever* (*chicken is alive* instead of *chicken liver*). Without the use of open compounds, Swedish can produce very long closed compound nouns like *barnbidragstillägg* or *hjärttransplantationspatienter*, which differ from their English equivalents where an open compound is used: *child benefit supplement* and *heart transplant patients*. As the two examples demonstrate, some Swedish compounds may be joined together with an *s* or a vowel, but there are no definite rules as to when this is applied; thus it is advisable to consult a dictionary on this matters (Statsrådsberedningen 2009:18).

When it comes to hyphenated compound nouns, these are used sparingly in both Swedish and English. In English they can be used in order to clarify something to the reader, e.g *offshore-textile*

[4]I selected the examples by browsing the Longman Contemporary Dictionary and the Swedish Academy's Dictionary (Svenska Akademiens Ordlista) for suitable examples. The two dictionaries were also used to determine which word class the compound components belonged to, e.g. *blueberry* as a compound made up by an adjective + noun.

production rates, where the hyphen indicates that *offshore* refers to the textile production and not the rates (European Commission Directorate General for Translation [ECDGT] 2011:12). The same can be applied to Swedish compounds, e.g. when a clarification might be needed or when the compound consists of more than one word, as in *starta-eget-bidrag* (Statsrådsberedningen 2009:72). In both Swedish and English hyphens are always used in compounds where numerals are written with figures, e.g. *25-åring*/*25-year-old*. According to the general guidelines of the European Commission and the Swedish Cabinet Office (Statsrådsberedningen), hyphens should only be used when necessary and in certain contexts (ECDGT 2011: 12, Statsrådsberedningen 2009:72-73).

There are also compound nouns in Swedish which are not represented as compounds in English, e.g. *ingång*/*utgång* which translate as *entrance*/*exit*. This goes the other way as well, e.g. *horsewoman* which translates as *ryttarinna* in Swedish.

These differing structures of compound nouns in Swedish and English can cause problems when it comes to translation, both to human translators and machines. Previous tests have shown that compound nouns (along with other forms of compounding) are sometimes only recognized in parts by MT systems and as a result the compound is not translated in its entirety, e.g. *bostadsbidrag* being translated as *housing* rather than *housing allowance* (Domeij 2011:46). Thus, due to their sometimes flawed compound recognition, MT systems have the potential to mistranslate compound words and skew the meaning of a text.

2.3.2 Proper nouns

Proper nouns are names of people, places and whole range of other nouns starting with a capital letter (Estling Vannestål 2007:96). Proper nouns can consist of one or more words as long as they constitute the name of someone or something, e.g. *Mary* or *Mount Everest* (Teleman, Hellberg & Andersson, 1999:117). In general, proper nouns are not considered to be a separate word class, but rather a subcategory of nouns (Telemark et al., 1999:118). Nouns which do not belong to this category are so called *common nouns*, the main subcategory of nouns (Estling Vennerstål 2007:95). Note however, that the definition of a proper noun as starting with capital letter can be somewhat misleading. In *English Grammar: Theory and Use*, Hasselgård, Johnsson and Lysvåg (1998:94) explain that there are words which start with a capital letter, but which are not proper nouns as they can pluralize and take determiners, e.g. *Marxists* and the *Chinese*. According to the authors, these are no longer proper nouns. This process of nominalization can also be found in Swedish, where proper nouns are transformed into a countable noun onto which a determiner can

be applied without losing their capital letter is, e.g. *Helenorna*, a plural form of the proper noun *Helena* (Telemark et al., 1999:122). This means that all nouns with a capital letter cannot by definition be categorized as proper nouns. However, all proper nouns, both Swedish and English, start with a capital letter.

When comparing Swedish and English proper nouns it is also important to note that some proper nouns in English are not defined as such in Swedish. For example, weekdays, months and holidays are written without capital letters in Swedish and are not categorized as proper nouns (Telemark et al., 1999:121). The same goes with national words and political ideologies, along with a few other examples (Estling Vennerstål 2007:445).

There is also a difference in how the names of institutions, organizations and authorities are written in Swedish and English, beside the language difference. In English, words making up a proper noun all start with a capital, e.g. *United Nations*, whereas in Swedish it is only the first part that takes the capital letter, e.g. *Förenta nationerna* (Utrikesdepartementet, Språkrådet & Fritzes 2007:10 & ECDGT 2011:10).

There are also grey areas when it comes to the definition of Swedish proper nouns. Historical events, for example, can sometimes be considered as descriptive noun phrases rather than proper nouns and be written with a small rather than a capital letter (Telemark et al., 1999:120).

Table 2. Examples of historical events which can be written as descriptive noun phrases or proper nouns in Swedish (Telemark et al., 1999:120).

Descriptive noun phrase	**Proper noun**
andra världskriget	Andra världskriget
franska revolutionen	Franska revolutionen

Whether the noun is more of a descriptive noun phrase or a proper noun can usually be determined through the syntactic structure in which it appears, e.g. if a determiner like *den*/*det* is used the noun has less of a proper noun's characteristics (Telemark et al., 1999:120-21). However, there are no set rules for this when it comes to historical events. In English, however, historical events are defined as proper nouns and are always written with capitals (Estling Vennerstål 2007:445).

Keeping these differences in mind, the translation of Swedish proper nouns into English has great potential to cause problems. Besides what has already been mentioned, an MT system

might mistake a Swedish proper noun, e.g. the surname *Gran*, for a common noun and translate it as such, where in fact it should maintain its Swedish spelling. This could also be the case with names of products and companies etc. that are made up of, or contain, common nouns.

3. Methods and material

My aim with this paper is to look at Google Translate as one of the leading developers of MT systems and how it performs in the translation process from Swedish into English. A subsidiary aim is to determine whether some texts are better suited to this type of automatic translation. In order to narrow the scope of the study, the paper looks at two different text types where Google Translate is or will be frequently applied: general information articles on local authority websites and patents. More specifically, the paper analyzes the results of the translated compound nouns and proper nouns which appear in the selected texts. The text types and linguistic categories were chosen based on my own experience, both as a translator and a patent assistant. The latter role has provided me with insight into the growing importance of Google Translate within the world of patents and inspired me to look further into the application and development of this MT system. The use of Google Translate on local authority websites was something that I discovered when browsing for a suitable text type which differed from patent texts. In addition to this, the work as a translator has introduced me to the challenges that compound nouns and proper nouns can pose not only to MT systems, but to human translators as well. It is this combination of experiences which has been the determining factors in choosing the aim and material of this study.

3.1. Texts

For this study, a total of 8 texts were selected; 4 articles from the website of the city of Stockholm, with the following headings:

- Alfa– informerar och vägleder om sysselsättning, studier, praktik och arbete (Alfa —provides information and guidance regarding occupation, studies, internships and jobs)
- Stockholm – den klimatsmarta huvudstaden (Stockholm—the climate-smart capital)
- Friluftsliv (The outdoors)
- Nytt integrationsprojekt (New integration project)

and 4 patent texts (descriptions of the inventions):

- Behållare för rinnande material (Container for liquid material)
- Stödpelare för en vägg (Supporting pillar for a wall)
- Anordning och system för ventilation av tunnel vid brand (Device and system for ventilation of tunnel in case of a fire)
- Anordning för skydd av föremål (Device for protection of objects)

The first selection of texts represents online texts from a Swedish local authority (in this case the city of Stockholm), available on their website in order to inform and instruct citizens in various matters. The texts were selected based on their generic content in relation to other texts produced by local authorities in Sweden, i.e. they represent an across-the-board sample of the language style that is used to convey useful and comprehensible information to the public.

The second set of texts, patent descriptions, represents a text type of more technical and domain specific language than the first text type. These texts are more descriptive than those of the first type which are primarily informational and instructional.

3.2. Methods

The texts were all in Swedish in their original versions and then translated by Google Translate which produced an English output. Stockholm City's website offers the option to use Google Translate and with a simple click I was able to get the website all in English and print out the articles that I had selected. With the patents a different method had to be applied since Google Translate is not yet available on the EPO website (as explained in section 2.1). This meant that the patent texts had to be entered manually in the input box on the Google Translate website (simple copy and paste method) and then translated. By using this method I was restricted to texts available in Word format (most patents can be only be accessed as PDFs), but through my work as a patent assistant I was assisted in the search and found texts in the appropriate format[5]. Once the texts had been translated (both the general information articles and the patents texts), the output was analyzed with focus on the two linguistic categories selected for this study: compound nouns and proper nouns.

[5]The inventions described in the texts have already been published and are no longer protected by secrecy laws.

Compound nouns in the original texts were identified and listed manually based on the grammatical rules and guidelines of the Swedish Academy[6]. The listed compounds were then followed up in the English output and registered in a second list for analysis. In the evaluation process of the translated compound nouns, two bilingual dictionaries (*Nordstedts Svensk-engelsk fackordbok* and *Nordstedts Ord*) and two monolingual dictionaries (*Svenska Akademiens Ordlista* and *The Longman Dictionary of Contemporary English*) were used in order to determine whether a satisfactory translation had been made. A compound was listed as correctly translated if it was in line with these sources. Words which did not appear in any of the dictionaries were googled in order to see if and in what context they appeared and thus if the translation could be considered correct. The compound nouns were also analyzed into their separate components (e.g. *armaturorgan* as *armatur* and *organ*) to see if the translation was plausible. Note that omission of the definite article or genitive marker was not counted as a mistranslation of a compound, e.g. the translation of *bottenväggens* as *bottom wall*, without the genitive ending, was not listed as an incorrect translation as it does not distort the meaning of the compound itself. In instances where there were more than one equivalent of the word depending on the context in which the compound appeared, the option best suited to the specific context was selected as the correct translation. If the translated word was correct *per se*, but held the wrong meaning in the context in which it appeared, it was listed as incorrect.

The proper nouns, like the compound nouns, were identified manually in the Swedish texts and listed based on the rules and guidelines of the Swedish Academy. The proper nouns were then followed up in the translated version (simply by locating them in the correct place in the English output) and listed for analysis. Besides consulting the same monolingual and bilingual dictionaries as with the compound nouns, the nouns were evaluated according to the following criteria:

- All names of people should maintain their original spelling in the English translation.
- If there is an established and/or more suitable English spelling of the Swedish proper noun it should be used in the translation. If not, the Swedish spelling should be kept.
- If the proper noun contains more than one word, each word should take capitals in the English translation.
- Nouns which do not appear as proper nouns in Swedish, but are defined as such in English, should be written with a capital letter in the translation (e.g. names of weekdays, months and holidays).

[6]Book on Swedish grammar by the Swedish Academy that was used: Teleman Ulf, Staffan Hellberg & Erik Andersson. 1999. *Svenska Akademiens grammatik*. 2, Ord. Stockholm: Svenska Akademien.

Where proper nouns and compound nouns overlapped, as with *Arbetsförmedlingen* (jobcenter/employment office), they were treated as proper nouns. Note also, that when a noun appeared more than once in the same text, each occurrence was included in the calculations as the translation sometimes varied for the same word. This applied to both categories.

4. Analysis and results

4.1 General information articles

In total, the four articles in their original Swedish version contained 810 words. The articles dealt with topics like integration to energy saving strategies (see section 3.1 for all the headings).

4.1.1 Compound nouns

The articles contained 70 Swedish compound nouns, 8.5 %[7] of the total word count, none of which were hyphenated. The variety of compound constructions is presented in Table 3.

Table. 3 Variety of compounds.

Compound construction	**Number**	**Per cent**
n+n	57	81.5 %
adj+n	3	4.0 %
n+v	3	4.0 %
n+n+adj	2	0.15 %
n+n+n	1	0.15 %
adv+v	1	0.15 %
adj+n+n	1	0.15 %
v+n	1	0.15 %
num+n	1	0.15 %
Total	70	100 %

Out of the 70 compounds, 79 % were correctly translated and 21 % were mistranslated.
Listed in Table 4 are all the errors in the order that they appeared in the articles. Mistranslated words which appeared more than once with the *same* erroneous translation are in the English output column followed by the number of times this occurred (in brackets). Note also that words written in Swedish in the English output column are words that Google Translate left

[7] All the percentages referred to in this section are round figures.

untranslated.

Table 4. Survey of mistranslated compound nouns in the general information articles.

Swedish input	**English output**	**Acceptable translation/s**
stadsdel	town	district
förmedlingsrum	förmedlingsrum	intermediation room[8]
livsmiljö	living	living environment
fossilbränslefri	fossil fuel	fossil fuel free/free of fossil fuel
dygnslagring	Hour Storage	24-hour storage
fjärrkylnätet	fjärrkylnätet	(the) district cooling network
förskolors	förskolors	preschools'/preschools
energianvändning	energy	energy use
fjärrvärme	heat	district heating
energianvändning	energy-efficiency	energy use
strandbad	beach	bathing beach
pilotprojekt	pilot (2)	pilot project
lärarstudenter	student teachers	teacher students
distributionssystem	distribution	distribution systems

The most common error was the omission of the second part of the word, which occurred in more than half of the erroneously translated compounds. For example, the compound *pilotprojekt* was translated as *pilot* and the word *energianvändning* as *energy*. It was also noted that some compounds were mistranslated the first time they appeared in the text, but was correctly translated the second time they figured in the same text. One example was *förskolors*, which was erroneously translated as *förskolors* (i.e. not translated at all) the first time, but correctly as *preschools* later in the text. This was also the case with *lärarstudenter* which was both mistranslated and correctly translated. It cannot be generally said however, that mistranslated words which appeared more than once were translated correctly at least one of those times, as the words *pilotprojekt* and *energianvändning* appeared twice and were mistranslated both times. The final registered error was that three compounds had not been translated at all (*förskolors* included).

[8]This is a suggested translation made by me; no exact equivalence was found for ‘förmedlingsrum’.

4.1.2 Proper nouns

The total number of proper nouns was 76, out of which 73 were Swedish proper nouns and three were nouns which did not appear as proper nouns in Swedish, but were defined as such in English (e.g. names of weekdays, months and holidays). This meant that proper nouns made up 11.6 % of the total word count (including the additional English proper nouns).

67 % of the proper nouns were translated correctly, which included the three English proper nouns, and 33 % were mistranslated. Listed in Table 5 are the errors in total, appearing in the order that they did in the text. As with the list of compound nouns, words which appeared more than once with the same erroneous translation are in the English output column followed by the number of times this occurred.

Table 5. Survey of mistranslated proper nouns in the general information articles.

Swedish input	**English output**	**Acceptable translation/s**
Alfa	Alpha (7)	Alfa
Stockholms stad	the City	the City of Stockholm/Stockholm City
Försäkringskassan	Insurance	the (Swedish) Social Insurance Agency
Norrtullsgatan	Northgate street	Norrtullsgatan/Norrtull street
Abrahamsberg	Abraham Rock	Abrahamsberg
Företagens resor och transporter	Corporate travel and transport	Corporate Travel and Transport
Samhällsplanering	Urban	Urban Planning
Energieffektiva byggnader	Energy-efficient buildings	Energy-efficient Buildings
Mälaren	Lake	Mälaren
Saltsjön	Salt Lake	Saltsjön
Stockholms stad	Stockholm	the City of Stockholm/Stockholm City
Svenskacoacher	Swedish coaches (3)	Svenskacoacher/Swedish Coaches
KTH	KTH (2)	the Royal Institute of Technology
Mattecoacher	Matt coaches	Mattecoacher/Maths Coaches
Palatset	the Palace of Södermalm	Palatset/the Palace
Stockholms stad	Stockholm city	the City of Stockholm/Stockholm City

The most common error connected to proper nouns was that a Swedish spelling was not kept where it should have been, e.g. *Alfa* being spelt *Alpha*. The spelling of *Alfa* did, however, appear correctly twice in the same text. There was also an example of where the English spelling should have been used; the Swedish *KTH* (which stands for *Kungliga tekniska högskolan*) has an established English version which was also used in one out three times in the text—*the Royal Institute of Technology*. Omitted words and lack of capital letters, e.g. leaving out *Planning* in *Urban Planning* and the capital *C* in *Stockholm city*, were other common errors.

When compared to compound nouns, this category contained more errors in relation to the total number of words (words here referring to proper nouns, not the total word count of the articles). Roughly 33 % of the proper nouns were mistranslated, whereas only 21 % of the compounds contained errors in the English output. Proper nouns did, however, amount to slightly more words than the compounds; 76 in comparison to 70.

4.2 Patents

In total, the texts in their original Swedish version contained 849 words. The texts presented four different inventions.

4.2.1 Compound nouns

The patent texts were rich in compound nouns. In total there were 113 compound nouns, 13.5 % of the total word count, none of which were hyphenated.

Table 6. Variety of compounds in the patent texts.

Compound construction	**Number**	**Per cent**
n+n	102	90.0 %
adv+n	5	4.5 %
adj+n	3	7.0 %
n+n+n	2	2.0 %
n+adj	1	1.0 %
Total	113	100 %

Out of the 113 compounds, 76 % were correctly translated and 24 % were mistranslated. Listed in Table 7 are all the errors in the order that they appeared. As with the previous listings of errors, words which appeared more than once with the same erroneous translation are followed

by the number of times this occurred in the English output column. Remember also that errors were evaluated in relation to how well they fit in the context.

Table 7. Survey of mistranslated compound nouns in the patent texts.

Swedish input	**English output**	**Acceptable translation/s**
bränsletank	fuel	fuel tank
armaturorgan	luminaire body	fixture/fitting body
styrorgan	flight controls	control member/actuator
värmeslinga	heating element	heating coil
styroganen	governing bodies (2)	control member/actuator
nivåmätare	level sensor	level meter/gauge
väderpåverkan	weathering	weather effects[9]
väggelementens	väggelementens (2)	wall elements'/wall elements
väggelement	wall of elements	wall element
räddningstjänsten	civil protection	emergency service/s
brandförsvaret	fire department	fire service/control
ingång	input	entrance
utgång	output	exit
räddningstjänsten	rescue	emergency service/s
olycksplatsen	scene	scene of the accident
räddningsinsats	relief mission	rescue effort
spärrskikt	freezing layer	barrier/blocking layer
enhetsgods	goods knit	unit goods
tillverkningsindustrin	manufacturing	manufacturing industry
pallställningar	pallet positions	pallet stands
transportskydd	transport security	transportation cover
enhetsgods	general cargo	unit goods
pallställning	podium position	pallet stand
enhetsgods	goods unit	unit goods
enhetsgods	drive cargo	unit goods

The most common error related to context. One example of this was the word *styrorgan*, which was erroneously translated as *flight controls* and *governing bodies*. In another context, both

[9]This is a suggested translation made by me; no exact equivalence was found for ‘väderpåverkan’.

translations would have been correct. However, in the context of the invention the translation should have been *control member* or *actuator* (Gullberg 2000:1657). These types of errors which relate to context were not found in the general information articles. It was also common that the compound was translated with the wrong word, regardless of context. For example the word *ingång* was translated as *input* and the word *utgång* as *output*. This type of mistranslation did not figure in the general information articles. Compounds translated only in part, i.e. words where the second half was omitted, also appeared in the patent texts, but not as frequently as in the general information articles where it was the most common error. Two of the compounds had not been translated at all and remained in Swedish in the translation, which was somewhat less than in the general information articles in terms of percentage (1.5 % versus 4.5 %). Finally, there was one example of reverse word order, with the word *enhetsgods* being translated as *goods unit* instead of *unit goods*.

Although the type of errors relating to compound nouns and the frequency of those errors differed in comparison to the general information articles, the number of total errors in per cent did not differ significantly; 21 % of the compound nouns in the general information articles, versus 24 % in the patent texts.

4.2.2 Proper nouns

There were no proper nouns registered in any of the patent texts, not in terms of Swedish proper nouns or in terms of nouns appearing as proper nouns only in English. In the light of other patent texts, the use of proper nouns can be said to be more or less nonexistent in the description part of the text.

5. Discussion

When looking at the mistranslations of compound and proper nouns made by Google Translate in the general information articles and patent texts of the study, there is of course one primary question to reflect upon: how is the meaning of the text affected?

Starting with compound nouns, the number of mistranslations in both text types was low (21 % in the general information articles and 24 % in the patent texts) in relation to the number of correct translations. In both text types, 75 - 80 % of the compounds were correctly translated. However, that is not to say that it is a good overall result for Google Translate; a faulty translation can have a great impact on the text, even if it is only one mistranslated word out of a

hundred. The context in which the erroneously translated word figures is of great importance when analyzing the effects it may have on the comprehension level of the text. If for example the error occurs in the title of a text, it might completely mislead the reader, whereas an error in a footnote is of less importance. Also, words of central meaning, appearing for example in the definition of an invention in the patent text, will have a much bigger impact on the text than a word of less significance. Moreover, the meaning and understanding of the text is of course influenced not only by context, but by the reader of the text as well. This applies perhaps in particular to compound nouns which have been left untranslated in the target text, as the reader of the text is most likely not familiar with the source language (i.e. the original language of the text). The impact of omitted words is also dependent on the reader's understanding of the context and whether s/he is able to "fill in the blanks" by studying surrounding words or has previous knowledge about the subject of the text. Irregularities in the translation of compounds appearing more than once can also distort the meaning of the text. The same word might then be perceived by the reader as referring to separate things.

In the general information articles, the most common error was omitted words, which affected the texts to varying degrees. For example the omission of *free* in the word *fossil fuel free* (*fossilbränslefri*) distorts the meaning of the word completely. However, since the word appears in a context where Stockholm is presented as an environmentally friendly capital on its way to implement new green strategies, it is unlikely that the reader would be utterly misinformed, especially if s/he is aware that it is a machine translation and thus only a rough-and-ready version of the text. Omissions like *24* in *24-hour storage*, also has implications on the meaning of the text as it suggests one hour storage is rather than 24 hours, which is highly misleading information.

Words which were left untranslated also had an effect on the text, in particular when it came to words which could not be found in a bilingual dictionary, like *förmedlingsrum*. For readers who are not familiar with Swedish this would be problematic, if not impossible, to understand.

Thus, the general impact of mistranslated compound nouns in the two text types is difficult to evaluate as it depends on both context and the reader's own comprehension level. It is evident however, that Google Translate has an effect on the content of both text types to a greater or lesser degree when it comes to erroneous and irregular translations of compound nouns. The fact that it does make errors on a frequent basis (1 error in every 5 compounds in the general information articles, and 1 error in every 4 compounds in the patent texts) is in itself problematic

and demands that the reader is well aware of the lacking reliability of the translations produced by Google Translate.

As for errors in the translation of proper nouns, a significant difference was noted between the two text types. In the general information articles the number of mistranslations of proper nouns was greater than the number of errors related to compound nouns. However, in the patent text there were, as already reported, *no* proper nouns. This is most likely due to the nature of the texts; in the patent texts it is only the invention and the area of use which is being described, which does not demand references to places, people, institutions etc. In the general information articles however, which are filled with information regarding projects, places, organizations etc., there are plenty of proper nouns. Thus, on a general note it could be said that general information articles contain an element which can be subject to mistranslations and affect the meaning of the text, which patents do not. One needs to remember though, that compound and proper nouns are only two out of many linguistic categories which can be studied when looking at MT. The fact that patent texts contain no, or very few, proper nouns does not mean that they are better suited for this type of translation *per se*. There may be other aspects of the translation process where patent texts do not work as well, like correct word order. What can be concluded is that patent texts which are translated with the use of MT are unlikely to come across a lot of problems with proper nouns.

In terms of the proper nouns which did appear in the study (i.e. in the general information articles), there were a number of issues affecting the meaning of the texts. The most common error was, as already observed, that the Swedish name was not maintained in the English output where it should have been, but was substituted with an incorrect, English name. For example, the lake *Mälaren* was translated as *Lake*, which would be highly misleading for someone wanting to go there or look for further information about it. This type of error where the Swedish name should have been kept could be caused by the fact that Google Translate recognizes the word as a common noun rather than a proper noun or that it makes association to another, closely related word (e.g. *Mälaren* and *Lake*). Other examples of this error were of much less significance in terms of affecting the meaning, like *Alfa* being translated as *Alpha*. Proper nouns where a word had been omitted in the translation process also had an effect on the texts, e.g. referring to *Försäkringskassan* as *Insurance* instead of *the Social Insurance Agency*. This translation does not provide correct information to the reader since too much of the compounded proper noun has been omitted. But as with the previous error type, the impact of omitted words may vary in degree. The omission of *City*, in *Stockholms stad*, leaving only *Stockholm*, has a more or less

insignificant effect on the understanding of the text.

The lack of capital letters was the error which had the least impact on the meaning of the texts as it solely applied to proper nouns with more than one word where the first word was spelt with a capital letter. The capital letter indicates to the reader that it is a proper noun even though the second part of the word is written with lower-case/s

6. Summary and conclusion

The aim of this study has been to take a closer look at the development and field of application of MT and Google Translate in particular. Since more and more websites and organizations—among them local authorities in Sweden and the European Patent Office - are making use of this translation tool in order to cut costs, save time, reach a wider audience and comply with the new language demands of our multicultural society, it is also important to evaluate the quality of the translation it produces. This study has analyzed translations of two types of Swedish texts into English: informational articles from a local Swedish authority (Stockholm City) and patent texts. These two text types represent areas where the application of Google Translate is becoming more and more common. The study looked at the translation of compound nouns and proper nouns and found that Google Translate did not perform with great success in either of the two noun categories. When it came to compound nouns, approximately 21 % were mistranslated in the general information articles, and roughly 24 % in the patent texts; thus the translation of compound nouns did not significantly favor either of the text types in terms of error rate. It could be concluded that the most common error in the general information articles related to omitted words and that in the patent text, the issue of context was the greatest hurdle, i.e. a word may not have been incorrect *per se*, but in the specific context of the patent text it was categorized as erroneous. The way the mistranslations affected the meaning of the two text types differed in terms of context and type of error and must also be seen as subject to the reader's own understanding of the text. In any case, there were mistranslations which distorted the meaning in both texts.

Where the results differed was in the translation of proper nouns since the patent text did not contain a single one. The general information texts however, included 76 proper nouns out of which 33 % were mistranslated. It needs to be added, though, that the importance of the mistranslated proper nouns varied greatly, from the lack of a capital letter to a completely wrong substitution (e.g. turning *Mälaren* into *Lake*). The general information articles showed that proper nouns pose a challenge to MT systems as they are sometimes recognized and translated as common nouns or

translated only in parts or with great irregularity depending on the surrounding words. Thus, in the context of machine translated proper nouns, patent texts could be seen as better suited than general information texts since they are less likely to contain proper nouns.

To conclude, the quality of Google Translate's translations of compound nouns and proper nouns in general information articles and patent texts cannot be seen as high, even though the system does manage to provide correct translations in more than half of the cases. One must remember that when it comes to translation it is more to do with *which* word has been mistranslated, i.e. whether it is a word of central importance or if it is of peripheral meaning to the text. The higher the error rate, the greater the likelihood of distorting the meaning of the text of course, though even one error might be enough to mislead the reader. In the light of this, an error rate of over 20 % is significant. Subsequently, despite the limited scope of this study, the results suggest that Google Translate has a limited accuracy level when it comes to translating compounds and proper nouns in the selected texts. Thus, I would argue that as a translation tool, Google Translate is best suited to provide general overviews of texts rather than as a substitute for human translations. Hence, organizations and other public actors which make use if Google Translate to make their information available to readers who are not familiar with the source language of the site need to be clear in their information that the translation provided is only a rough version of the texts and not made by or even reviewed by a human translator. It should however, be kept in mind that the MT systems, including not only Google Translate, are constantly developing with the continuous input of new data and more refined techniques. It is therefore likely that the results of this study might look different in a few years. In the meantime, there are also great benefits with MT systems, like a more or less unlimited memory capacity, the ability to handle large amounts of texts and make information accessible to people who would otherwise have been excluded because they have limited knowledge of the source language. What is essential to remember and be aware of is MT systems' limited context sensitivity and their relatively high error rate; i.e. it is a matter of applying MT the right way and making use of its great abilities as well as acknowledging its flaws and not letting it become an easy and cheap solution to provide people with information at the expense of good quality translations. The translations of the texts in this study did show examples of MT systems' limited context sensitivity. However, a study of homonyms and /or polysemous words instead of compound and proper nouns would most likely result in an even higher error rate when looking at context.

For future analysis, it would be interesting to do a more extensive study of MT in general, with a larger data base as well as covering other, more complex areas of language, such as syntax and

polysemous words. It would also be of interest to examine how MT, and Google Translate in particular, could be used for educational purposes in second language learning, perhaps using it to study errors that are specific to different language pairs and the (humorous) mistranslations which may arise when translating polysemous words or idiomatic expressions and create awareness around those issues.

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Appendix 1

List of languages currently operated by Google Translate (Google Translate).

Afrikaans
Albanian
Arabic
Armenian
Azerbaijani
Basque
Belarusian
Bulgarian
Catalan
Chinese
Croatian
Czech
Danish
Dutch
English
Estonian
Filipino
Finnish
French
Galician
German
Greek
Haitian Creole
Hebrew
Hindi
Hungarian
Icelandic
Indonesian
Irish
Italian
Japanese
Korean
Latvian
Lithuanian
Macedonian
Malay
Maltese
Norwegian
Persian
Polish
Portuguese
Romanian
Russian
Serbian
Slovak
Slovenian
Spanish
Swahili
Swedish
Thai
Turkish
Ukrainian
Urdu
Vietnamese
Welsh
Yiddish

Appendix 2

General information articles with Google translations

Alfa - informerar och vägleder om sysselsättning, studier, praktik och arbete

Alfa ger information och vägledning om sysselsättning, studier, praktik och arbete till personer med psykisk funktionsnedsättning.

Vem får komma till Alfa?

Till Alfa är du välkommen om du:
har en psykisk funktionsnedsättning
är mellan 18 och 64 år
bor i Stockholms stad eller Huddinge kommun
har kontakt med kommunens socialpsykiatri eller har en pågående vårdkontakt inom specialistpsykiatrin

Det kostar ingenting att komma till Alfa och du är välkommen utan remiss eller biståndsbeslut.

Vad erbjuder Alfa?

På Alfa kan du:
få enskilda informationssamtal
delta i informationsmöten
få hjälp att komma i kontakt med olika myndigheter, till exempel din stadsdel eller kommun, Arbetsförmedlingen och Försäkringskassan
få hjälp att ta kontakt med olika verksamheter och göra studiebesök samt själv söka information

Vägar till

På sidorna "Vägar till..." som du hittar i menyn till vänster kan du själv hitta information till olika företag och organisationer som du kan kontakta. Du är alltid välkommen att besöka vårt förmedlingsrum om du behöver mer hjälp.

Nyhetsbrev och informationsfolder

I senaste nyhetsbrevet kan du bland annat läsa om öppet hus hos Alfa på Norrtullsgatan den 17 maj. Under maj skickar vi ut våra nya informationsfoldrar om Alfa som är skrivna på lättläst svenska.

Translation:
Alpha - informs and guides to employment, education, training and work

Alpha provides information and guidance on employment, study, practice and work to people with mental disabilities.

Who can come to Alpha?

For Alpha, you are welcome if you:
as a mental disability
between 18 and 64
living in the City or Municipality of Huddinge
have contact with the municipal social psychiatry or have a current health care contact within specialist psychiatric services

It costs nothing to get to the Alpha and you are welcome but referral or assistance decisions.

What Alpha offers?

On Alpha, you can:
obtain individual information, call
participate in information sessions

get help to get in touch with various agencies, such as your neighborhood or community, the employment Service and Insurance
get help to contact the various activities and make visits and yourself searching for information

Paths to

On the pages "Road to ..." as found in the left menu you can find information to various companies and organizations you can contact. You are always welcome to visit our förmedlingsrum if you need more help.

Newsletter and information leaflet

In the last newsletter you can among other things, read about an open house at Alfa in Northgate Street on May 17 In May, we send out our new information leaflets on Alpha that are written in easy Swedish.

Stockholm - den klimatsmarta huvudstaden
Stockholm har ett världsrykte för miljömedvetenhet och god livsmiljö. Nyligen blev Stockholm utsett till Europas första miljöhuvudstad. Stockholm har höga ambitioner för en minskad klimatpåverkan. Målet är att minska stadens utsläpp av växthusgaser med 25 procent till 2015. År 2050 ska staden vara fossilbränslefri. Det är ett tufft mål att nå och för att lyckas krävs att alla hjälper till.

Här är några av alla de klimatåtgärder som staden genomfört som tillsammans gett stora miljövinster:

Fjärrvärmeanslutning och utbyggnad i Abrahamsberg, Stora Essingen, Gamla Stan och skolor i Bromma.

Dygnslagring av kallt sjövatten i ett berglager på Kungsholmen för att öka kapaciteten i fjärrkylnätet i Stockholm som sedan fastigheter kan ansluta sig till.

Miljöanpassning av sex förskolors energianvändning genom konvertering till fjärrvärme i sex förskolor.
Klimatinformation och utbildning till 250 fastighetsägare i projektet Energieffektiva fastigheter för en effektivare energianvändning och en förbättrad egenkontroll.

Uppförande av två biogastankstationer i Stockholmsområdet samt förstärkt distributionssystem
Fler miljöbilar i Stockholm med sammanlagt 784 fordon som beviljats bidrag inom områdena taxi, hyr-bil, transport och service.

Stockholm Mobilitet - fyra parallella projekt som stödjer effektivisering av transportsystemet och ökad framkomlighet i Stockholm.: Företagens resor och transporter, Bilpool, Cykel, Samhällsplanering.

Translation:
Stockholm - the capital of climate-friendly

Stockholm has a worldwide reputation for environmental awareness and good living. Was recently appointed Stockholm as Europe's first green capital. Stockholm has high ambitions for a reduced carbon footprint. The goal is to reduce the city's greenhouse gas emissions by 25 percent by 2015. By 2050, the city is fossil fuel. It is a tough goal to achieve and to succeed requires that all helps.

Here are some of the climate action as the city implemented, which together provided major environmental benefits:

District heating connection and extension of Abraham Rock, Big Essingen, Old Town and schools in Bromma.

Hour Storage of cold seawater in a rock layer on Kungsholmen in order to increase the capacity of fjärrkylnätet in Stockholm that since real estate can join.

Greening of six förskolors energy being converted to heat in six preschools.

Climate information and education to 250 property owners in the project, Energy-efficient buildings for energy efficiency and an improved self-monitoring.

Construction of two biogas filling stations in the Stockholm area, and enhanced distribution
More clean vehicles in Stockholm, with a total of 784 vehicles that have benefited in the areas of taxis, rental car, transportation and service.

Stockholm Mobility - four parallel projects that support the efficiency of the transport system and increased accessibility in Stockholm.: Corporate travel and transport, Carpool, Bike, Urban.

Friluftsliv

I Stockholm är det aldrig långt till parker, grönområden eller vatten. Staden är omgärdad av Mälaren, Saltsjön och stora strövområden.

Drygt 40 procent av stadens mark består av park eller grönområden och det finns sju naturreservat, ett kulturreservat och världens första nationalstadspark inom kommunens gränser.

I Stockholms stad finns 29 officiella strandbad och du kan fiska både i och utanför city.

Translation:
Outdoors

In Stockholm is never far from the parks, green space or water. The city is surrounded by Lake, Salt Lake, and major recreation areas.

More than 40 percent of the city's land consists of parks or green spaces and there are seven nature reserves, a cultural reserve and world's first national urban park within the municipal boundaries.

In Stockholm there are 29 official beach and you can fish both inside and outside the city.

Nytt integrationsprojekt

Stockholms stad genomför pilotprojektet Svenskacoacher i syfte att främja integrationen av ensamkommande barn. Projektet handlar om en nätbaserad undervisning i svenska språket via ett chattprogram utvecklat av Microsoft. Coachar gör lärarstudenter från Stockholms universitet.

– För de barn som kommer ensamma till Sverige är det ovärderligt att få ett gott mottagande och bemötande. Svenskacoacher visar att staden genom samarbetet med näringslivet och universiteten kan erbjuda nya innovativa sätt att hjälpa barn att komma in i det svenska samhället. Vi är väldigt glada över det stöd som näringslivet och universiteten bidrar med för att hjälpa fler barn att lära sig svenska, säger socialborgarrådet Anna König Jerlmyr (M).

Stockholms stad har sedan 2010 drivit pilotprojekt Svenskacoacher i samarbete med KTH, Microsoft och Stockholms universitet. Svenskacoacher är en utveckling av det framgångsrika programmet Mattecoacher på nätet där blivande lärare på KTH och Stockholms universitet erbjuder läxhjälp i matematik på nätet.Projektet presenterades i dag på Palatset på Södermalm. Vid presentationen närvarade förutom socialborgarrådet och representanter från KTH, Stockholms universitet och Microsoft även migrationsminister Tobias Billström (M).

– Att bedriva undervisning via internet handlar inte bara om att öka tillgängligheten till lärare och att effektivisera inlärningsprocessen. Med teknikens hjälp ser Svenskacoacher till att de ensamkommande barnen verkligen integreras i det svenska samhället och, på längre sikt, att de kan komma in på den svenska arbetsmarknaden under lika villkor, säger Marie Ygge, försäljningsdirektör offentlig sektor på Microsoft.

Varje år kommer 150-180 ensamkommande barn och unga vuxna till Stockholm stad. Syftet med Svenskacoacher är att hjälpa till att motverka utanförskap och främja integrationen. De som coachar eleverna är studenter från Stockholms universitet som ska bli lärare i svenska och svenska som andraspråk.

– Lärarstudenterna som undervisar barnen och ungdomarna bygger på både sin digitala kompetens och sin lärarkompetens. De får en möjlighet att utveckla sitt eget sätt att ställa frågor så att de stöttar eleverna i deras lärande. Dessutom får de en merit när de så småningom ska söka jobb, säger professor Bengt Novén som är prefekt vid Institutionen för språkdidaktik, Stockholms universitet

Translation:

New integration project

Stockholm implement pilot Swedish coaches in order to promote the integration of unaccompanied children. The project is a web-based teaching in the Swedish language through a chat program developed by Microsoft. Coaches do student teachers from the University of Stockholm.

- For the children who come alone to Sweden, it is invaluable to get a good reception and treatment. Swedish coaches show that the city through collaboration with industry and universities to offer new innovative ways to help children get into the Swedish society. We are very excited about the support that industry and academia is contributing to help more children to learn Swedish, says social Mayor Anna König Jerlmyr (M).

City of Stockholm has since 2010 been running pilot Swedish Coaches in cooperation with KTH, Microsoft and Stockholm University. Swedish Coaches is a development of the successful program Matt Coaches on the web where future teachers at KTH and Stockholm University offers homework help in math on nätet.Projektet presented today at the Palace of Södermalm. At the presentation were present in addition to social Mayor and representatives from the Royal Institute of Technology, Stockholm University and Microsoft also Mr Billström (M).

- To engage in teaching via the Internet is not just about increasing access to teachers and to streamline the learning process. With the help of technology, see Swedish Coaches that unaccompanied children are truly integrated into Swedish society and, ultimately, that they can get into the Swedish labor market during the playing field, said Marie Ygge, Sales Director Public Sector at Microsoft.

Each year, 150-180 unaccompanied children and young adults to Stockholm city. The purpose of the Swedish coaches is to help to combat exclusion and promote integration. Those who coaches the students are students from Stockholm University to become a teacher of Swedish and Swedish as a second language.

- Teaching students to teach the children and adolescents is based on both their digital skills and their teaching competence. They get a chance to develop their own way of asking questions so that they support students in their learning. In addition they may be an advantage when they eventually look for work, says Professor Bengt Novén who is head of the Department of Language Education, Stockholm University.

Appendix 3

Patent texts with Google translations

Behållare för rinnande material

Föreliggande uppfinning avser en behållare för rinnande material, exempelvis bränsletank för motorfordon, innefattande en bottenvägg, en övre vägg, sidoväggar, som förbinder bottenväggen med den övre väggen, armaturorgan, som sträcker sig genom behållarens inre från ett område ovanför bottenväggen ned till bottenväggen och är förbundna med åtminstone en av bottenväggens väggar, en i bottenväggen upptagen dräneringsöppning och en bottenplugg, medelst vilken dräneringsöppningen är tillslutbar.

I exempelvis bränsletankar i motorfordon förekommer praktiskt taget alltid armaturorgan i form av vätskenivågivare, som ger signal till en i fordonskupén anordnad bränslemätare. En typ av nivågivare innefattar av en stång, som sträcker sig mellan tankens övre vägg och botten och på vilken en flottör är glidbart lagrad. Stången är vanligen upphängd i den övre väggen. Den nedre änden är oftast åtminstone delvis styrd i sidled av i tankens botten fixerad styrorgan. Andra typer av armaturorgan i tankar för rinnande material är elektriska värmeslingor, s.k. doppvärmare, som exempelvis används i ureatankar för upptining när innehållet frusit. Även här gäller att den elektriska uppvärmningsarmaturen bör fixeras relativt tankbottnen, så att en viss rörlighet i sidled medges.

När det gäller svetsade tankar är styrorganen vanligen fastsvetsade i tankens bottenplåt. I gjutna plasttankar består styrorganen vanligen av i ett stycke med tankens botten gjutna profiler. När dylika tankar utsätts för skakningar vid körning av fordonet, tillåts en viss begränsad relativrörelse mellan nivåmätarens nedre del och tankbottnen. Rörelsen ska vara så begränsad att den övre infästningen inte brister. Om den nedre änden av nivåmätaren infästs stelt i bottnen finns det nämligen risk för att infästningen vibrerar sönder och då kan armaturens pendlingsrörelser vid körning på gropigt underlag bli så stora att den övre infästningen kan brista.

Translation:
Containers for running materials

The present invention relates to a container for flowing materials, such as fuel for motor vehicles, including a bottom wall, an upper wall, side walls, connecting the bottom wall of the upper wall, fixture body, which extends through the container's interior from an area above the bottom wall to the bottom wall and is associated with at least one of the bottom wall of walls, a bottom wall busy drain opening and a drain plug, by means of which the drain opening is tillslutbar.

For example, motor vehicle fuel tanks is virtually always luminaire body in the form of liquid level sensor, that sends a signal to the vehicle passenger compartment arranged fuel gauge. One type of level sensor includes a rod, which extends between the tank top wall and bottom, and on which a float is sliding lower. The pole is usually suspended from the upper wall. The lower end is usually at least partially driven sideways by the bottom of the tank fixed flight controls. Other types of fittings bodies in tanks of flowing materials are electric heating elements, so-called immersion heaters, such as used in the urea tanks to thaw when the contents are frozen. Again, the electrical heating fixture should be fixed relatively tank bottom, so that a certain movement laterally allowed.

In the case of welded tanks are governing bodies are usually welded to the tank bottom plate. The molded plastic tanks consists governing bodies usually in one piece with the tank bottom cast profiles. When such thoughts are subjected to vibration while driving the vehicle, allowed some limited relative movement between the level sensor, bottom and tank bottom. The movement should be restricted to the upper attachment does not break. If the bottom end of the level meter fastened rigidly to the bottom, there is a risk that the attachment vibrate apart and then the armature oscillation movements when driving on rough surface can be so large that the upper attachment to rupture.

Stödpelare för en vägg

TEKNIKOMRÅDE

Uppfinningen avser en stödpelare för en vägg sammansatt av flera horisontella, på varandra placerade stavformiga väggelement.

KÄND TEKNIK

När på detta sätt sammansatta väggar utsätts för väderpåverkan i form av temperatur- och fuktvariationer varierar även väggelementens dimensioner i motsvarande grad. Om därvid väggelementen tillåts röra sig i vertikal riktning när de expanderar, finns risk för att de ej intar sina ursprungliga lägen och former när de krymper, resulterande t.ex. i kvarblivande glipor i väggen.

Det är känt att hindra sådana rörelser hos knuttimrade byggnder medelst dragstänger som sträcker sig genom vertikalt borrade hål i väggelementen. Hos sådana byggnader är dock fuktvariationerna och därav orsakade rörelser relativt små, så att takets tyngd ofta är tillräcklig för att nöjaktligt sammanhålla väggelementen.

REDOGÖRELSE FÖR UPPFINNINGEN

Ett ändamål med uppfinningen är att tillhandahålla en stödpelare av inledningsvis angivet slag som förutom att bilda ett stöd för väggen även förmår sammanhålla väggelementen mot varandra.

Detta uppnås genom de särdrag som anges i efterföljande patentkrav.

Enligt en betraktelse av uppfinningen har stödpelaren en fjädrande dragspännanordning som är förskjutbart styrd längs pelaren och uppvisar en undre ände som ingriper med stödpelaren och en övre ände som ingriper med ett övre väggelement.

Translation:
Support Column for a wall

TECHNOLOGY AREA

The invention relates to a support pillar of a wall composed of several horizontal, located on each rod-shaped wall elements.

SOURCE TECHNOLOGY

In this way compound walls are exposed to weathering in the form of temperature and moisture variations will also vary väggelementens dimensions accordingly. If taking the wall element is allowed to move in vertical direction as they expand, there is a risk that they do not occupy their original positions and shapes when they shrink, resulting eg in the remaining gaps in the wall.

It is known to prevent such movement of the joint log building connects by means of tie rods that extend vertically through holes drilled in the wall elements. In such buildings, however, moisture variation and hence caused the movement of relatively small, so that the roof's weight is often sufficient to adequately hold the wall elements.

STATEMENT OF INVENTION

One purpose of the invention is to provide a support pillar of the initially mentioned kind which, in addition to form a supporting wall is also able to keep the same wall of elements against each other.

This is achieved through the characteristics specified in the subsequent patent claims.

According to a contemplation of the invention, the support pillar features a resilient tensioning device that is removable guided along the pillar and exhibits a lower end that can interfere with the support pillar and an upper end of intervening with an upper wall elements.

Anordning och system för ventilation av tunnel vid brand

TEKNISKT OMRÅDE

Uppfinningen rör anordningar, metoder och system för ventilation av tunnlar vid brand.

TEKNISK STÅNDPUNKT

Erfarenheten från stora brandolyckor i tunnlar visar att räddningsinsatser vid bränder i tunnlar innebär problem för räddningstjänsten. Exempel på alternativa benämningar på räddningstjänsten är brandkåren, brandförsvaret eller

civilförsvaret. Ett av problemen är beroende av att den stora majoriteten av tunnlar normalt går under marknivå, vilket gör att det är begränsat med utgångar/ingångar. Ett annat problem är att röken vid en brand vanligen inte kan ventileras bort vertikalt, utan tunneln kommer att fyllas med rök. Flertalet av de moderna vägtunnlarna som finns i bruk i dag ventileras med hjälp av en fast monterad längsgående ventilation i tunnelröret, medan det vid de flesta former av spårtunnlar och tekniska försörjningstunnlar saknas möjligheter att kunna ventilera bort brandröken. Detta gör att räddningstjänsten i många fall kommer att få mycket stora problem med att genomföra en räddningsinsats. Räddningstjänsten kommer inte ha någon överblick över olycksplatsen. Det är i denna rökfyllda, okända tunnel som människor skall utrymma och räddningstjänsten skall genomföra sin räddningsinsats.

Translation:
Device and system for ventilation of the tunnel fire

TECHNICAL FIELD

The invention related to devices, methods and systems for ventilation of the tunnels in case of fire.

TECHNICAL POSITION

The experience of major fire accidents in tunnels show that the emergency services at fires in tunnels is a problem for emergency services. Examples of alternative names for civil protection is the fire department, fire department or civil defense. One of the problems is dependent on the vast majority of tunnels normally go below ground level, which means that it is limited to outputs / inputs. Another problem is that the smoke of a fire is usually not to vent vertically, but the tunnel will be filled with smoke. Most of the modern road tunnels that are in use today is ventilated by means of a fixed longitudinal ventilation in the tunnel tube, whereas in most forms of track tunnels and technical supply tunnels missing opportunities to divert the smoke. This allows the emergency services in many cases will have very big problems with the implementation of a rescue operation. Rescue will not have an overview of scene. It is in this smoke-filled, unknown tunnel that people should evacuate and rescue services should carry out their relief mission.

Anordning för skydd av föremål

TEKNIKENS OMRÅDE

Föreliggande uppfinning avser en anordning för skydd av föremål som riskerar att smutsas ned av ovanifrån kommande partiklar, omfattande ett spärrskikt samt en ovanför nämnda föremål placerade bärare för spärrskiktet.

BAKGRUND
Vid tillverkningen av produkter styrs material som enhetsgods fram till en arbetsplats där montering sker. Inom tillverkningsindustrin förekommer pallställningar av balkar med flera våningsplan för lastpallar, vilka används som transportskydd och lagerutrymme för kompenter som monteras vid närbelägen arbetsyta. Gaffeltruckarna används för hantering av enhetsgods, t.ex. vid förflyttning från lastterminal till pallställning i en monteringshall.

Vid transport av sådant enhetsgods, t.ex. från en underleverantör till en fabrik för slutmontering av en produkt, kan det förekomma att enhetsgodset/lastpallen kontaminerats med smutspartiklar. När denna lastpall sedan placeras ovanför en annan lastpall kan grus, sand och andra främmande partiklar lossna och falla ned i den underliggande lastpallen som kan vara öppen och ha oskyddade komponenter som skall monteras ihop till en större komplett enhet. Inom många bransher som tillverkar maskiner och motorer har smuts, och speciellt då hårda partiklar, en dramatsikt inverkan på tillförlitlighet och livslängd.

Translation:
Device for protection of objects

TECHNICAL FIELD

The present invention relates to a device for protection of objects that might be contaminated by particles coming from above, that comprises a barrier layer and the one above mentioned items placed media for freezing layer.

BACKGROUND
In the production of products controlled material transport unit to a workplace where assembly takes place. In manufacturing, there are pallet positions of beams with multiple floors for pallets, which are used as transport security and storage space for comp center that is fitted to the nearby workspace. Fork lift trucks used for handling general cargo, such as in moving from the cargo terminal to the podium position in an assembly hall.

In the carriage of such goods unit, eg from a subcontractor to a factory for final assembly of a product, there may be to

drive cargo / pallet contaminated with dirt particles. When the pallet is then placed above another pallet can be gravel, sand and other foreign particles loose and fall down into the underlying pallet can be open and have unprotected components to be assembled to form a more complete unit. In many this business that manufactures machines and engines are dirt, and especially when the hard particles, a drama-term impact on the reliability and longevity.