Improve Interoperability by Formalizing the Natural Language Parts of Military Messages

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ABSTRACT

Due to the new military operations other than war, the extent of the natural language parts in formalized military messages increases. In order to guarantee further automatic interoperability between different C4ISR systems three problems must be solved. First, the natural language text must be automatically transformed into a formal structure, which represents the meaning of the text. Second, the formal structure must be exchanged between the different C4ISR systems. And third, the representation of the meaning must be automatically inserted into the C4ISR database. In this paper, we show that Information Extraction techniques can be used as a possible solution to the first sub problem. As the formal structure for representing the meaning we use typed feature structures.

1.0 INTRODUCTION

Relevant military information is available in different forms. On one side of the spectrum, there are highly formalized military messages (e.g. cf.. [2]). On the other side, we can find natural language texts with little structure (e.g. documents, e-mails, web pages). Due to the new military deployments (military operations other than war) the extent of the natural language parts in formalized military reports increases. This means, that more and more relevant information is only available in natural language texts.

Interoperability between different C4ISR systems can be realized by replication (cf. [3]) or by sending formatted messages. In both cases, the production and processing of the exchanged information should be completely automatically. But, if the extent of the natural language parts increases, then a processing of the texts by humans is necessary before the information can be entered into the databases of the C4ISR systems. This is an interruption of the automatic interoperability process.

If the above-described problem of interruption should be solved, three sub problems must be handled. First, the natural language text must be automatically transformed into a formal structure, which represents the meaning of the text. Second, the formal structure must be exchanged between the different C4ISR systems. And third, the representation of the meaning must be automatically processed and the result inserted into the C4ISR database.

In this paper, we propose to use Information Extraction (IE) techniques to solve the first mentioned sub problem. IE is an engineering approach based on results of computational linguistics to build systems that process huge amount of texts of a specific sort. Each IE system is tailored to a specific domain and task. The result of the IE process (the meaning of the text) is represented in feature-value structures. These feature-value structures together with an ontology are the fundamental mechanism for representing the natural language meaning. The second sub problem can be solved easily. Instead of sending the natural
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See also ADM202135, RTO-MP-IST-042. Coalition C4ISR Architectures and Information Exchange Capabilities (Les architectures C4ISR et les capacites d’echange d’information en coalition), The original document contains color images.

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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
language text, the feature structure will be send. The third sub problem demands for a mapping between feature-value structures and relational databases. In our SOKRATES project we have developed a component, which realizes this mapping into the LC2IEDM database (cf. [4]).

This paper is structured as follows. First, we will introduce an extended view of the interoperability problem due to free-form texts. Then, information extraction for producing the formal representation of meaning (cf. [1], [14]) is shortly introduced. In the main part of the paper, we show how the natural language part of a military message is represented. The presented example is from our SOKRATES project (cf. [4], [5], [6], [7], [8], [9], [10], [11], [12], [16], [17]) in which IE techniques and feature structures are used to represent German battlefield reports.

2.0 NATURAL LANGUAGE TEXT AND THE INTEROPERABILITY PROBLEM

The interoperability between different C4ISR systems assumes that the interchanged information is formatted according to a specific formal standard. In general, this standard is not designed to handle natural language text as part of military messages. Due to the new military operations other than war, the extent of the natural language parts in formatted military reports increases. Nevertheless, the automatic information exchange between the C4ISR systems should be still completely automatically. To realize
this, the natural language text must be transformed into a formal representation of the meaning of the text. This semantic representation than can become a part of the formal standard.

In Figure 1, the situation is shown in more detail. On the left side, the formal part and the natural language part of a military report are shown. The written text (“3 BRDM observed …”) must be transformed into a formal semantic representation. We propose to use Information Extraction (IE) technology. IE utilizes an ontology (a formal description of the domain concepts) to produce a formal description of the meaning (typed feature structure). Both parts of the report are now available in a formalized form and are combined. The whole formalized report is than used in the interoperability process.

In Figure 2 the processing of the whole formalized report is shown. This can be realized in two different ways. Reports can be interchanged directly by sending the produced formatted message. The other possibility is the replication of the database content. If the messages are send, in each C4ISR system the formal representation must be transformed into SQL statements. For those parts of the formal representation that origin from the natural language text, the processing must use the ontology from the IE process. This means, that the interoperability of the natural language parts of the messages create the new constraint that a common ontology must be used.

In the rest of this paper, one possibility of formalizing the meaning of military reports is presented. This approach was developed in the SOKRATES project. In this project, we applied IE to the analysis of German free-form battlefield reports. The SOKRATES prototype is able to process simple battlefield
Improve Interoperability by Formalizing the Natural Language Parts of Military Messages

reports about movements (cf. [9], [10], [11], [12]). The objective of the SOKRATES project was not to show the applicability of the IE to the above described interoperability problem. But we believe that results from our project are a good initial point to find solutions for the mentioned interoperability problem.

3.0 INFORMATION EXTRACTION

The information extraction (IE) identifies, collects and normalizes relevant information about the Who, What, When, etc. from natural language texts (cf. [1], [14]). The relevant information is described through patterns called templates. These domain and task specific templates represent the meaning of the relevant information. During the IE task the templates are filled with the extracted information. Therefore, IE can be seen as the process of normalizing free-form text into a defined semantic structure.

To realize an IE system, language resources (lexicon, grammar) and appropriated parsing software are necessary. This software must be language-specific. Thus, the IE tools for the English language are not appropriated for analyzing German texts (due to the free-order of the language).

In order to achieve robust and efficient IE systems, domain knowledge (ontology) must be integrated and shallow algorithms must be used. The domain knowledge is tightly integrated with the language knowledge, e.g., the name ‘Leopard’ in the lexicon has the categorical information ‘tank’. This association between words and semantic information is domain-specific and has to be change for other applications.

The IE process itself is divided into sub steps. After tokenizing the text, the sentence boundaries must be identified. Then, the morphological component identifies the word stems, the abbreviation, and detects the syntactic information (e.g., grammar case and gender). After this, the chunk parsing with transducers selects parts of the natural language text that are relevant for the specific information extraction task. The chunks are then used to instantiate the templates, which represent the result of the IE process.

{  
  (:TYPE . :MILITARY-ITEM)  
  (:LOCATION  
    {  
      (:COORDINATES . "32upd0290080100")  
      (:TYPE . :POINT)  
    }  
  )  
  (:QUALIFIER . :AT)  
}

Figure 3: Example of a feature structure

The instantiated templates are a formal description of the meaning of the texts. In our research project SOKRATES and in this paper we use typed feature structures as templates. For more details about information extraction from battlefield reports refer to [10] and [12].
4.0 FORMALIZING THE NATURAL LANGUAGE PARTS

In this section we describe in detail, how the meaning of the natural language part of the military reports can be formalized. The meaning is represented by typed feature structures. The general feature structure formalism is widely used in computational linguistics, e.g., in the HPSG approach (cf. [15]). Each feature structure consists of an unordered quantity of features and a type declaration. In Figure 3 the type declaration is given by (:TYPE :MILITARY-ITEM). All other bracketed terms within the highest pair of brackets represent the set of the features. Each feature consists of a name (e.g., QUALIFIER) and a value (e.g., AT). In the simplest case the value is a number, a character string or an atomic type. In addition, a feature value can recursively be a feature structure, e.g., the value of the feature LOCATION is a feature structure of the type POINT.

If the IE processes the natural language part of a military report, the feature structures result from two sources. They can be part of a lexicon entry or they are constructed during the IE process.

During the development of an IE system an important development step is the determination and definition of the used feature structures. Because these structures can be based on each other, they are arranged in a hierarchy. In Figure 4, a part of the feature structure hierarchy is shown that is used in the SOKRATES IE module (the whole hierarchy can be found in [12]). The topmost feature structure is of the type feature-structure. This structure has no features. A possible subtype of feature-structure is the feature type object ("A => B" means "A is a supertype of B."). This type has also various subtypes; one of them is the type equipment. equipment includes the features that are listed in square brackets under the type name. For each feature the name (e.g., hostility) and the feature type of the possible feature values (e.g., hostility-type) are given. The features are inherited down the hierarchy. So the types vehicle, weapon and also antitank have the same features as equipment. Some of the types are atomic and have no features, e.g., all subtypes of nationality-code. If features are defined for a subtype, these features extend the set of the inherited features. If the type of the feature value is enclosed by "<...>", the feature value consists of a set of feature structures of the indicated type. If the type is enclosed by "<...>", the value consists of an ordered list of feature structures.

```
feature-structure
  ➔ object
  ➔ equipment
    [ count number
      hostility hostility-type
      nationality nationality-code
      abbreviation string
      name string
      qualifiers {property-value} ]
    ➔ vehicle
    ➔ weapon
    ➔ antitank

Figure 4: Part of the feature structure hierarchy
```
The meaning of the natural language part of a military report is represented by a feature structure that is one of the subtypes of the type action. The action type move (see Figure 5) is used to describe movements on the battlefield. The basic structure of move was adopted from the FrameNet project (cf. [13]) and adapted to the military requirements. During a movement, objects are moved. These objects are represented as feature values of feature "theme". The objects are moving from a starting point (source military-item) to an end point (goal military-item) using a path (path <military-item>). The objects can also be in an area (area {military-item}).

```plaintext
move
[
  qualifiers {property}
  area {military-item}
  distance number
duration number
  goal military-item
  path <military-item>
  source military-item
  speed number
  start-time time
  theme theme
]
```

**Figure 5: Feature structure 'move'**

The feature "qualifiers" contains descriptions of adverbial phrases of the movement (e.g., "it moves fast"), if the descriptions are not contained in other features (e.g., in "goal <military-item>").
In some of the feature values of the type move, structures of the subtypes of object are used. In Figure 6 these subtypes are shown. Ordnance can be found under equipment. Other military objects and concepts (e.g., airfield, barrier) are subtypes of military-item.

In order to describe movements, concepts of locations and directions are necessary. Directions are formalized by the type direction (see Figure 7), locations by location (see Figure 8) and its subtypes.
In the following, we show how the meaning of the natural language part of a military battlefield report is represented with the introduced feature structures. The part is:

"2 BRDM 2 und 1 PT 76 durchfahren in rascher Fahrt auf Straße 14 – 1 die Ortschaft SULJIN HAN (CQ 5458) nach Westen."

("2 BRDM 2 and 1 PT 76 pass through the locality SULJIN HAN (CQ 5458) on the road 14 – 1 in fast travel to the west.")

In the tables of Figure 9, Figure 10, Figure 11 and Figure 12 the different feature structures are shown, which are produced by the IE from various parts of the text. In these tables is specified,

- which text part induces
- which syntactical phrase and
- the constructed feature structure (Feature structure A).

Also shown is:

- the syntactical function and
- the feature structure that will be part of the move-structure (Feature structure B).
The part "2 BRDM 2 und 1 PT 76" is a nominal phrase (NP), which is constructed from two smaller phrases and a conjunction. For each of these phrases a feature structure of the type :TANK is produced. The whole NP is the subject of the sentence. Both tank feature structures are stored as values of the objects feature in the move structure.
The verb "durchfahren" ("to pass through") forms the verbal phrase (VP). This VP is the predicate of the sentence. It is the feature type (:TYPE . :MOVE) of the VP, which is responsible for selecting the correct action subtype, in this example the move feature structure.

The prepositional phrase (PP) "in rascher Fahrt" ("in fast travel") produces a feature structure of the type :PROPERTY. This PP is an adverbial phrase, which specifies in more detail the VP (the movement is fast, not slow). The feature structure of this PP is stored in the qualifiers feature of the move structure.
The prepositional phrase "auf Straße 14 - 1" ("on the road 14 – 1") produces a feature structure of the type :WAY. It is also an adverbial phrase and it is stored in the area feature of the move structure.

The :TOWN-structure is also stored in the area feature. This structure results from the report part "die Ortschaft SULJIN HAN (CQ 5458)" ("the locality SULJIN HAN (CQ 5458)").
"nach Westen" ("to the west") produces a feature structure of the type :DIRECTION. This is stored in the goal feature.

The meaning of the whole natural language part of the report (all feature structures B) is represented as a value of type move of the :MESSAGE-feature (see Figure 13 and Figure 14). This is the result of the IE process, which is attached to the formatted part of the military report.

For more information concerning the feature structures and the information extraction refer to [12].
Figure 13: The feature structure of the example - I
5.0 CONCLUSION

Due to the new military operations other than war, the extent of the natural language parts in formalized military reports increases. To assure further on the automatic interoperability between different C4ISR systems three problems must be solved. First, the natural language text must be automatically transformed into a formal structure, which represents the meaning of the text. Second, the formal structure must be exchanged between the different C4ISR systems. And third, the representation of the meaning must be automatically inserted into the C4ISR database.

In this paper, we first explained the extended view on the interoperability problem. Then, we introduced the Information Extraction technology. In the main part of the paper, we showed that information extraction techniques could be used to solve the first of the aforementioned sub problems. For this, we introduced typed feature structures, explained parts of the feature structure hierarchy and, we gave an extensive example how to formalize the natural language parts of a report.
REFERENCES


Improve Interoperability by Formalizing the Natural Language Parts of Military Messages

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Content

1. Introduction
2. Natural Language Text and the Interoperability Problem
3. Information Extraction
4. Meaning Representation through Feature Structures
5. Conclusion
Introduction - I

Spectrum of relevant military information:
- highly formalized military messages, vs.
- natural language texts with little structure (e.g. documents, e-mails, web pages).

The extent of the natural language parts in formalized military reports increases due to the new military deployments.

The automatic interoperability process might be interrupted by the human-oriented processing of the texts.
This interruption is not acceptable.

To solve the problem these sub problems must be handled:

- The natural language text must be automatically transformed into a formal structure.
- The formal structure must be exchanged between the different C4ISR systems.
- The representation of the meaning must be automatically processed and the result inserted into the C4ISR database.

Claim: Information Extraction (IE) can be used to solve the first sub problem.
2 | Text and the Interoperability Problem - 1

Dr. M. Hecking

- Formatted part of military report
- "3 BRDM observed ..."
- Natural language part of military report
- Information Extraction
- Ontology
- Whole formalized military report
- Typed feature structure
- Natural language part of military report

<TRA 123> <MOV a1b > ...

<tank BRDM> ...

<tank BRDM> ...

<tank BRDM> ...

<TRA 123> <MOV a1b > ...
2| Text and the Interoperability Problem - II

Dr. M. Hecking

<TRA 123>
<MOV a1b >
...

report

formatted messages

Processing

DB

C4ISR-System

replication

C4ISR-System

DB

Processing
3 | Information Extraction: Definition

- Information extraction (IE) is the task of identifying, collecting and normalizing information from natural language text.
- Relevant information about the **Who, What, When, etc.** is looked for.
- The information of interest is described through domain-specific lexicon rules and patterns called *templates* (e.g. typed feature structures).
- During the IE task these templates are filled with the collected information.
- The templates are domain and task specific, i.e. for each new task and domain they must be newly created.
Partial analysis of a military free-form report:

- **when this report was given**: "09. September 10.45 Uhr von VN - Militärbeobachtern in BĲELJINA:"
- **where**: auf Straße 14 - 1
- **what**: die Ortschaft SULJIN:
- **who**: HAN (CQ 5458)
- **who reports**: VN - Militärbeobachtern
- **direction**: nach Westen
- **how**: durchfahren in rascher Fahrt
"... in BIJELJINA:
2 BRDM 2 und 1 PT 76
durchfahren
in rascher Fahrt
auf Straße 14 – 1
die Ortschaft SULJIN
HAN (CQ 5458) nach
Westen."
3 IE Example - III

**Formal representation**

- **report**
  - **move**
    - **location**
    - **area**
    - **vehicles**
    - **objects**...
  - **message**
    - **addressee**...

**Use it**

**LC2I EDM**

**Part of formatted message**
4| FS: Definition

- Representation of meaning by **typed feature structures** (FS)
- A FS consists of a set of features (name + value) and a type:

```
{ 
  (:TYPE . :MILITARY-ITEM) 
  (:LOCATION 
    { 
      (:COORDINATES . "32upd0290080100") 
      (:TYPE . :POINT) 
    } 
  ) 
  (:QUALIFIER . :AT) 
}
```
4 | FS: Hierarchy

feature structure

- template
  - report
- theme
  - objects object
  - move
  - theme theme
  - source military-item
  - path military-item
  - goal military-item
  - area {military-item}
  - distance number
  - start-time time
  - duration number
  - area {military-item}
  - attack ...
- action
  - withdraw

addressee partner
medium medium
message {action}
speaker partner
time time
credibility credibility

FGAN
Forschungsinstitut für Kommunikation, Informationsverarbeitung und Ergonomie
"09. September 10.45 Uhr von VN - Militärbeobachtern in Bijeljina: 2 BRDM 2 und 1 PT 76 durchfahren in rascher Fahrt auf Straße 14 - 1 die Ortschaft Suljin nach HAN (CQ 5458) nach Westen."
### 4| FS: Example - 11

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- syntactical phrase
- FS of the phrase
- syntactical function
- in FS move
4 | **FS: Example - III**

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<td>(:SPEAKER</td>
<td></td>
</tr>
<tr>
<td>feature structure B</td>
<td>(</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:TYPE . :UNIT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:NAME . &quot;VN-Militärbeobachter&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:ABBREVIATION . &quot;VN-MilBeob&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:LOCATED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:TYPE . :TOWN)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:NAME . &quot;bijeljina&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(:QUALIFIER . :EXACTLY-AT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>
### 4| FS: Example - IV

<table>
<thead>
<tr>
<th>part</th>
<th>2 BRDM 2</th>
<th>und</th>
<th>1 PT 76</th>
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<tbody>
<tr>
<td>phrase</td>
<td>NP-1</td>
<td>conj</td>
<td>NP-2</td>
</tr>
<tr>
<td>feature structure A</td>
<td>( (:TYPE . :TANK) (:ABBREVIATION. &quot;brdm-2&quot;) (:COUNT . 2) )</td>
<td>:SET</td>
<td>( (:TYPE . :TANK) (:ABBREVIATION . &quot;pt76&quot;) (:COUNT . 1) )</td>
</tr>
<tr>
<td>synt. funct.</td>
<td>subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feature structure B</td>
<td>(:OBJECTS (:SET ( ( (:TYPE . :TANK) (:ABBREVIATION . &quot;brdm-2&quot;) (:COUNT . 2) ) ) ( (:TYPE . :TANK) (:ABBREVIATION . &quot;pt76&quot;) (:COUNT . 1) ) ) ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 4| FS: Example - V

<table>
<thead>
<tr>
<th>part</th>
<th>durchfahren</th>
<th>in rascher Fahrt</th>
</tr>
</thead>
<tbody>
<tr>
<td>phrase</td>
<td>VP</td>
<td>PP</td>
</tr>
<tr>
<td>feature structure A</td>
<td>(:TYPE . :MOVE)</td>
<td>( (:VALUE . :FAST) (:TYPE . :PROPERTY) )</td>
</tr>
<tr>
<td>synt. funct.</td>
<td>predicate</td>
<td>adverbial</td>
</tr>
<tr>
<td>feature structure B</td>
<td>(:TYPE . :MOVE)</td>
<td>(:QUALIFIERS (:SET ( (:VALUE . :FAST) (:TYPE . :PROPERTY) ) ) )</td>
</tr>
<tr>
<td>part</td>
<td>auf Straße 14 - 1</td>
<td>die Ortschaft SULJIN HAN (CQ 5458)</td>
</tr>
<tr>
<td>------</td>
<td>------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>phrase</td>
<td>PP</td>
<td>NP</td>
</tr>
<tr>
<td>synt. funct.</td>
<td>adverbial</td>
<td>object</td>
</tr>
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### Feature Structures: Example - VII I

<table>
<thead>
<tr>
<th>part</th>
<th>nach Westen.</th>
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<tbody>
<tr>
<td>phrase</td>
<td>PP</td>
</tr>
<tr>
<td>feature structure A</td>
<td>(:GOAL</td>
</tr>
<tr>
<td></td>
<td>(:QUALIFIER . :TOWARDS)</td>
</tr>
<tr>
<td></td>
<td>(:DIRECTED-TO . :WEST)</td>
</tr>
<tr>
<td></td>
<td>(:TYPE . :DIRECTION)</td>
</tr>
<tr>
<td>synt. funct.</td>
<td>adverbial</td>
</tr>
<tr>
<td>feature structure B</td>
<td>(:GOAL</td>
</tr>
<tr>
<td></td>
<td>(:QUALIFIER . :TOWARDS)</td>
</tr>
<tr>
<td></td>
<td>(:DIRECTED-TO . :WEST)</td>
</tr>
<tr>
<td></td>
<td>(:TYPE . :DIRECTION)</td>
</tr>
<tr>
<td></td>
<td>)</td>
</tr>
</tbody>
</table>
Equipment:


```lisp
(
  (:TYPE . :TANK) (:COUNT . 2)
  (:NAME . "t80") (:ABBREVIATION . "t80")
  (:QUALIFIERS
    (:SET
      (:SET
        (:HOSTILE)
      )
    )
  )
)
4|FS: Units

Units:

- Examples: "Infanteriezug", "PzMrsKp (GE) in Wriedel (Zug bei Brockhoefe (32UND8610075100))", ...

```lisp
(:SPEAKER
  (:SECOND-PARTNER
    (:NAME "Zug") (:TYPE :UNIT) (:SIZE :PLT) (:ABBREVIATION "Zug")
    (:LOCATED
      (:TYPE :TOWN) (:NAME "brockhoefe") (:LOCATION ...) (:QUALIFIER :AT))))
  (:FIRST-PARTNER
    (:NATIONALITY :GE) (:ARM-CAT :ARMOUR) (:SIZE :COY)
    (:NAME "Panzer Mörser Kompanie") (:TYPE :UNIT)
    (:LOCATED
      (:TYPE :TOWN) (:NAME "wriedel") (:QUALIFIER :EXACTLY-AT))))

(:TYPE :MULTIPLE-PARTNER)
)```

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FGAN Forschungsinstitut für Kommunikation, Informationsverarbeitung und Ergonomie
Locations:

- Examples: "CQ 123456", "BANOVI CI (YK 1234)", "die Straßenkreuzung kr3", "kr5 (CQ 072368)", "kr3", "Stellung 1.3 (CQ 072368)", "Straßenkreuzung (CQ 072368) südlich MILESKIJ (CQ 0737)", ...

```
( (:QUALIFIERS
   (:SET
     ( (:TYPE . :TOWN) (:NAME . "mileskij") (:QUALIFIER . :SOUTH-OF)
       (:LOCATION ( (:COORDINATES . "cq737") (:TYPE . :POINT))))
   )
   (:LOCATION ( (:COORDINATES . "cq72368") (:TYPE . :POINT))
    (:TYPE . :CROSSING)
  )
```

Nominal phrases:

- Examples: "1 LKW", "neun Busse", "1 beschädigter Panzer", 1 serbisches Fahrzeug", "1 großer LKW", 1 eigener Leo", "1 zerstörter T80", "11 kroatische Fahrzeuge", "zwölf wiesel 1 tow", "Vier alte leopard 1a5", "2 AML - 90 und 1 BRDM 2" "2 feindliche T80", "1 funktionsuntüchtiger bm - 22 mehrfachraketenwerfer 220 mm", "2 AML - 90 und 1 BRDM 2", ...
Prepositional phrases:

- Examples: "bei Ebstedt (CQ 123456)", "bei kr7 (32UPD0290080100)", "nach Osten", "in Richtung Straßenkreuzung (CQ 072368)", "in Stellung 1.3 (CQ 123456)", "von Ebstedt (CQ 123456) über Banovici (YK 45678) nach Berlin (CQ 56789)", "auf Straße 14 – 1", "bis Ebstedt (CQ 123456)", "durch Ebstedt (CQ 123456)", ...
Other phrases:

Examples: "östlich der Straßenkreuzung (CQ 072368)", "in schneller Fahrt", "im Norden von MILES KIJ (CQ 0737)", ...

```
(
  (:TYPE . :TOWN)
  (:NAME . "mileskij")
  (:LOCATION
    ( :COORDINATES . "cq737")
    (:TYPE . :POINT)
  )
  (:QUALIFIER . :IN-THE-NORTH)
)
```
The extent of the natural language parts in formalized military reports increases.

To assure an automatic interoperability process, the natural language parts must be automatically transformed into a formal meaning representation.

Information Extraction and typed feature structures are one possibility to realize this automatic transformation.

In the main part of the talk, an example for the formalization of the natural language parts was given.