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Application of semantic knowledge management system in selected areas of Polish public administration

1. Introduction

Knowledge management systems (KMS) play an important role with respect to the advancement of information management, collaboration and information sharing[1]. Ontologies and also all the aspects of semantic technologies (e.g. SWRL rules, reasoners), which are applied in KMS, allow to represent static knowledge about given part of the world. Ontologies are used for sharing knowledge and common understanding of a particular domain of interest, which makes communication between various beings possible and unambiguous. The various actors may be human users with different levels of expertise or computer programs (agents).

[1] *Handbook on Ontologies*, eds S. Staab, R. Studer, Springer-Verlag, 2009.

Ontology refers to a description of a given part of the world using a specific vocabulary and a set of explicit assumptions concerning intended meaning of words from the vocabulary. It incorporates common vision about knowledge that is (to be) represented[2]. Generally, the semantic technologies allow for easy adaptation to changes in legislation and procedures without the need for intervention in the system architecture and its internal structure. In this case, we need to exchange only the knowledge of the system described using ontologies and defined rules. Additionally to whole spectrum of semantic technologies, interfaces using controlled natural language (CNL) can improve human-computer interaction easiness and efficiency.

In this paper we present an architecture and some ideas associated with KMS, e.g. application of ontologies and interfaces using CNL. We show that the tools have a potential to improve effectiveness and efficiency of work coordination in specific fields of Polish public administration. The areas of administration are crisis management and EU policy coordination processes. At first (in section 2 and 3) we introduce the domains and we analyse their actors, processes, existing solutions, current problems etc. In the following sections the principal contributions of this document are: a general view of an architecture of KMS applied to coordination processes in the chosen areas (section 4), a simple use case dedicated to crises management showing the usefulness of ontologies, automated reasoning and CNL interfaces in this field (section 5). In the last section we conclude our work and give an overview of future works.

2. Crisis management processes

Crisis management (CM) is an activity of public administration which is a part of national security management. Crisis management is focused on four distinct but intertwining phases: mitigation, preparation, response and recovery. It is an interdisciplinary field dealing with the strategic organizational management processes (an integrated rescue and emergency system) used to prevent critical situations (hazard analysis, risk assessment), prepare to assume control of crises by way of planned activities, to respond in case of emergencies,

[2] A. Sheth, C. Ramakrishnan, *Semantic (Web) Technology In Action: Ontology Driven Information Systems for Search, Integration and Analysis*, "Bulletin of the Technical Committee on Data Engineering" 2003, vol. 26, no. 4, pp. 40–48.

removing their effects and restoring the resources and critical infrastructure[3]. In Poland, the crisis management corresponds more to the definition of crisis management activity rather than only crisis management. It is not restricted only to respond to the identified risks, but it is a holistic process that deals with the prevention of crises, preparing to take control of them as a result of planned actions, responses, and then the reconstruction of the destroyed infrastructure. The reconstruction also includes prevention, because it forces that making infrastructure decisions and drawing conclusions about the improvement of the situation so as to minimize the effects of subsequent events[4].

The crisis management system (CMS) formed bodies that are interrelated. In Poland, the CMS comprises: disaster management authorities, advisory--consulting bodies (crisis management teams) and crisis management centers. At all administrative levels are created appropriate organizational units. The legal basis for the functioning of the Polish crisis management system is the Act on Crisis Management 26, April 2007, defining composition rules functioning and powers of the institutions at every level of administrative division[5]. CMS in Poland can be divided into 4 levels: national, voivodeship (provinces), powiats (counties) and gminas (communes or municipalities). However, the possible influence of the gminas level is limited by the lack of compatibility and lack of standardization. The position of central coordination (voivodeship) is mainly functional, while at the level of gminas, powiats and regional real actions are taken[6]. Crisis management is focused primarily on acquiring, processing and distribution of information. The information is the basis for further action, issue decisions, and it enables communication between services/actors of the

[3] Ustawa z dnia 26 kwietnia 2007 r. o zarządzaniu kryzysowym (Dz.U. 2007 r. Nr 89, poz. 590).

[4] W. Skomra, *Zarządzanie kryzysowe – praktyczny przewodnik po nowelizacji ustawy*, Presscom, Wrocław 2010.

[5] Other legal acts: Zarządzenie Nr 86 Prezesa Rady Ministrów z dnia 14 sierpnia 2008 r. w sprawie organizacji i trybu pracy Rządowego Zespołu Zarządzania Kryzysowego (M.P. z 2008 r. Nr 61, poz. 538); Rozporządzenie Prezesa Rady Ministrów z dnia 10 lipca 2008 r. w sprawie organizacji i trybu działania Rządowego Centrum Bezpieczeństwa (Dz.U. z 2008 r. Nr 128, poz. 821); Rozporządzenie Rady Ministrów z dnia 15 grudnia 2009 r. w sprawie określenia organów administracji rządowej, które utworzą centra zarządzania kryzysowego, oraz sposobu ich funkcjonowania (Dz.U. z 2009 r. Nr 226, poz. 1810).

[6] If a threat covers one gmina (municipality/commune), to fully function properly managing the prefect (wójt), the mayor, president of the city, sometimes with help/advisory of starost (powiat level). When a threat is present in more than one municipality, a starost takes over the management. Similarly, the situation is an emergency in several counties – a governor (voivode) takes over the management.

system. Rapid circulation of information is very important in this process, and therefore are created twenty-four hour crisis management centers. They provide the service of the tasks on national level. On the highest central level is formed Governmental Crisis Management Team, chaired by the Prime Minister. The tasks of the team are advisory and opinion-making activities, its value increases in time of crisis. The super ministerial structure responsible inter alia for civil emergency planning, ongoing monitoring of risks, and to ensure a continuous flow of information across the country is the Government Centre for Security (RCB)[7]. Nevertheless, it is not known who is the supervisor over the voivodeship, because RCB is subjected to Prime Minister and there exists Department of Rescue Services and Citizen Protection in Ministry of the Interior. On provinces level are appointed Voivodeship Crisis Management Centres and on district level Powiat Crisis Management Centres[8]. At the gminas level, such a center could be set up. However, in most cases, risk monitoring is carried out by people working in independent positions on crisis management in collaboration with prefect. The key element of emergency preparedness here is municipal emergency program planning, which includes identifying and asserting the risks the community faces. Crisis management plans are also formed at the powiat, voivodeship and national level, and usually there are copied by the lowest levels. The goal of making plan on different levels is to develop systematic procedures that provide an effective response to a probable emergency.

Crisis always results in disruption of the existing order. It is usually unpredictable and entails qualitative changes in the functioning system, organization, or country. It includes often a catastrophic phenomenon, due to natural causes or uncontrolled humans activities, causing a threat to themselves and the environment in which they live. The factors that make up a crisis are: time pressure, state of emergency, and a surprise. An important factor is characterized by crisis management operation under pressure, especially at the stage of response. In general, you can divide crises because of the environment from which they come to: natural disasters, technical specifications, acts of terrorism and other threats[9]. That the situation could be considered a crisis there must occur: the

[7] Government Centre for Security (Rządowe Centrum Bezpieczeństwa), http://www.rcb.gov.pl.

[8] A. Najgebauer, *Modele zagrożeń aglomeracji miejskiej wraz z systemem zarządzania kryzysowego na przykładzie miasta stołecznego Warszawy*, Wojskowa Akademia Techniczna, Warszawa 2009, p. 25.

[9] Crisis Management Center (Centrum Zarządzania Kryzysowego) http:/czk.pl; A. Kurkiewicz, *Zarządzanie sytuacjami kryzysowymi w polskim systemie prawnym*, in: *Zarządzanie*

circumstances of a given situation conditioning the negative impact on the level of security of citizens and at the same time the inadequacy of the forces and resources available and applicable to the event by public authorities. The crisis we face when security is breached. It begins the process variable, which affects external and internal factors. It is also a state of instability, violation of social ties, characterized by the possibility of losing control of the situation[10].

The universal principles of crisis management can be reduced to five rules:

- The dominance of the territorial structure over departmental,
- Single command (leadership and responsibility),
- Responding on the lowest level of administration,
- The principle of subsidiarity,
- Combination of forces and means at every possible level of government.

The main challenges that are associated with these rules should therefore be: monitoring and current assessment of the situation; ensuring exchange of information with the relevant authorities (including the emergency services, security and social benefit institutions); warning and alerting the personnel of military units; preparation the necessary forces and resources to use (equipment suppliers) to join the anti-crisis in conjunction with other forces (such as co-district municipality); the coordination of the various emergency services; if necessary armed force branches in emergency operations; response to build up an emergency and direct the action and inform the public; preserve the continuity of opinion, that there are adequate levels of readiness for military units.

The complexity of the tasks and duties are determined with three criteria: time, space and aggregation (information presentation). The information used in crisis management refers to these dimensions at each stage (e.g. the spread of the epidemic in the region, the threat of flooding). In a crisis situation, the information may generally vary with time. The ability to calculate the time for the implementation of a specific task and the reality of the project in relation to time, we have the disposal affects the effectiveness and feasibility of response plans. The criterion of time in emergency response planning is a prerequisite for effective action. The data must be delivered to the intervention units aggregated and properly presented, such as a specific map or map layer (it includes working with geo-information). Analysis of the information is to take the form of decision analysis. The decision here is choosing the objectives, methods and tools of action.

kryzysowe w Polsce, eds M. Jabłonowski, L. Smolak, Akademia Humanistyczna imienia Aleksandra Gieysztora, Pułtusk 2007, pp. 151–152.

[10] W. Kitler, *Istota zarządzania kryzysowego*, in: *System reagowania kryzysowego*, eds J. Gryz, W. Kitler, Wydawnictwo Adam Marszałek, Toruń 2007, pp. 20–23.

Information and decision-making process, occurring in emergency management, is a systematic processing of information in the operating instructions[11].

The creation of a knowledge management system based on human-computer interaction in natural language would be a real support for the actors and performers of CMS. Process would improve the flow of information and shorten the time of decision. The latest scientific projects in Europe that are applied to the area of crisis management and which partially inspired our approach are: ORCHESTRA[12], OASIS[13], Dynamic Geovisualization in Crisis Management[14], ISyCri[15].

3. EU policy coordination processes

EU policy coordination (EUPC) processes on national level are processes of elaboration of instructions for representatives of national public administrations on how to vote (and what position to represent) in the Council. The subject of coordination is a proposal of a legal act of the EU (usually a directive). Governments which are well coordinated are considered to be more efficient, experience fewer conflicts as well as useless and more rationally public resources in pursuit for achievement of their political goals[16].

Coordination of European policies is an extremely important issue for Polish public administration, since its purpose is efficient realization of national interests on European level and proper implementation of European policies into national policies[17]. In order to achieve the above mentioned purposes, it is necessary to properly use administrative resources (e.g. human, financial), administrative capacities (e.g. know-how, best practices), and efficient systems supporting the coordination process (document exchange, communication,

[11] R. Grocki, *Kryterium czasu w planach reagowania kryzysowego*, in: *Zarządzanie kryzysowe w Polsce…*, op.cit, pp. 219–227.

[12] Open Architecture and Spatial Data Infrastructure for Risk Management, an European project, 2005–2008, www.eu-orchestra.org.

[13] Open Advanced System for Improved Crisis Management, an European project, 2004–2008, www.oasis-fp6.org

[14] Project in Czech Republic, 2005–2011, http://www.muni.cz/research/projects/2134.

[15] Information Systems Interoperability in Crisis Situations, project in France, 2007–2010, http://www.irit.fr/isycri/eng.

[16] H. Kassim, B.G. Peters, V. Wright, *The National Co-ordination of EU Policy*, vol. 2, *The Domestic Level*, Oxford 2001, pp.1–21.

[17] Ibidem, pp. 2–12.

division of responsibilities). European integration process, since it bases to a certain extent on path-dependence model, requires efforts to maintain acceptable level of participation in decision and policy-making processes on the level of European institutions. Therefore it is essential to build efficient system of coordination of European matters in order not to be a European laggard. As for now Poland is one of these Member States which least efficiently coordinate European policies (regarding mainly implementation of the EU law)[18]. This fact underlines the need (actually indispensability) for improvement of the EU policies coordination system.

In Poland, the system of coordination of EU policies is led by the Polish Prime Minister and Minister of Foreign Affairs (MFA). In the MFA there is a special Committee for European Affairs, which is responsible for overall coordination of the EU issues in Poland[19]. All the coordination actors have a dedicated hierarchical structure and they include mainly ministries, parliament, Permanent Representation of Poland in the EU, central agencies and social partners. They are involved in the process of gathering information necessary for elaboration of Polish position in European institutions, processing documents related to the position, managing communication with other institutions involved, sticking to strict time frame etc.[20]

Summing up, important aspects in EU policies coordination are **communication channels and tools** (for communication) among the actors and subjects of coordination (**documents**, usually proposals of the EU legal acts). All the taken actions and decisions are based on and derived from **legal acts** (underlying a system of relations as well as division of competences and responsibilities in coordination). At the end of one coordination process there are **outcomes of coordination**: usually instructions and positions.

The knowledge which needs to be managed in the coordination system regards: (i) legal bases which needs to be applied (procedures) – mainly laws, regulations

[18] R. Zubek, K. Staronova, *Ministerial Transposition of EU Directives: Can Oversight Improve Performance?*, Institute for European Integration Research, Working Paper No. 09/2010, December 2010, http://www.eif.oeaw.ac.at/downloads/workingpapers/wp2010–09.pdf [accessed 04.09.2012].

[19] Ustawa z dnia 27 sierpnia 2009 r. o Komitecie do Spraw Europejskich (Dz.U. z 2009 r. Nr 161, poz. 1277); Ustawa z dnia 8 sierpnia 1996 r. o Radzie Ministrów (Dz.U. z 2003 r. Nr 24, poz. 199 z późń. zm.).

[20] R. Mieńkowska-Norkiene, *Koordynacja polityk unijnych w Polsce*, ASPRA-JR, Warszawa 2009, pp. 6–11; also N.K. Tabaszewski, *Struktury koordynacji polityki europejskiej w Polsce*, „Annales Universitatis Mariae Curie-Skłodowska", sectio K (politologia), vol. 18, Lublin 2011, pp. 51–66.

of ministers and others; (ii) actions undertaken within the process (preparation of instructions, detailed analysis of the documents' merit, consultations with social partners etc.); (iii) actors involved in certain actions (actors' hierarchy, division of responsibilities); (iv) documents to be dealt with at certain stages of the process (instructions, positions, adopted legal acts to be implemented).

There are a few systems supporting document flow (e.g. EWD-P of Rodan Systems SA[21]) and communication in Polish public administration (intranet; skuteczni.gov.pl). They are, nevertheless, usually hardly efficient, applying them requires a lot of effort on the side of officials. They require constant monitoring of changes and updating. They have been implemented only in some institutions of the whole system. There have been diagnosed numerous problems pointing out not only a necessity but also indispensability of building a complex and "tailor-made" system supporting coordination of European policies on national level in Poland.

Some of the most important problems arising from EUPC processes and currently implemented systems: (i) a number of contradictions, discrepancies, various procedures among different divisions involved in a coordination process, not unified categories of legal acts and regulations; (ii) lack of tools supporting prioritization of goals and objectives of coordination on the basis on legal acts, (iii) poor distribution of tasks and not effective communication among competent authorities and / or officials; (iv) only transposition of directives or only document flow without any focus on the merit. All these issues lead to inability to properly diagnose problems in coordination process (without a uniform system they are hard to be detected), and find ways to solve them.

There is a need of substantive knowledge base, streamlining preparation of instructions and Polish positions in European institutions. The knowledge management system (KMS) may not only fill in the gap in technological support for coordination institutions but also solve numerous problems arising from dysfunctions of the already existing systems (e.g. poor user experience, lack of appropriate training for end users, incoherent information infrastructure). The system can lead to efficient use of tools and instruments enabling high coordination performance. Such knowledge management system can: (i) gather and systematize info about sources of expertise and experts themselves, (ii) merge various procedures, (iii) unify categories of legal acts and regulations. We assume that the system contains a full set of procedures in certain area and thus it enables avoidance of contradictory procedures, it can finds duplications. This

[21] http://www.rodan.pl/web/guest/przykladowe/wdrozenia/ewdp.

results in putting in proper order legal acts and procedures (according to rules of *lex posterior derogat legi priori* and *lex specialis derogat legi generali*).

Furthermore, the system may provide the end users access to as large as necessary knowledge base which may be used by them without specific knowledge of description logic. A big advantage of the KMS based on use of controlled natural language interface is that it can be effectively used even by users without domain knowledge. In the Polish coordination system it is important since it involves both actors involved in proceeding information without analyzing it (e.g. European departments in ministries) as well as actors dealing with domain knowledge (departments in ministries responsible for the merit of Polish positions in the EU institutions in specific fields).

4. Knowledge management systems in public administration

In response to the above mentioned problems in the selected areas of Polish public administration, we propose a specially designed semantic knowledge management system Ontorion Knowledge Server[22]. The system collects knowledge and information from different sources (e.g. web services, institution databases, other information entered by dedicated users with the specialized interfaces). The knowledge in the system is designed as ontologies and SWRL rules to define the common understanding of the domain. The advantage of this design is that the knowledge can be easily changed while all the actual knowledge is instantly available to all system actors and the system automatically adjusts its behavior to this knowledge (through the rules/executors). Secondly end-users will require less effort to learn how to interact with the system, since its user interfaces are built upon well-known schema (i.e. natural language). Last but not least maintenance costs of this system are highly reduced, since this approach leads to eliminate or reduces several phases of maintenance of the classical IT system (e.g. system analysis, detailed design, implementation of data-base and system codes, validation in test-environment and final acceptance tests).

Knowledge in coordination of the analyzed public administration fields can be divided into at least 2 layers: general knowledge describing the common understanding (e.g. crisis types and characteristics, types of rescue actors and their resources, coordination actors, types of EU documents, types of legal acts),

[22] http://www.cognitum.eu/semantics/Ontorion/.

specific concrete instances and their parameters (e.g. particular crisis event that occurs at given date and time, one EUPC process). The first layer in ontology terminology is called Terminology Box. They are concepts, relations and axioms. The second layer is called Assertion Box and it contains instances. In this article we use term "meta-ontology" for the general knowledge with additional rules (e.g. SWRL rules). The meta-ontology can gather the 2 layers, e.g. general actors named as police, fire brigade (not particular teams and divisions).

In CM there are also additional facts associated with geo-information which can be considered as another layer of knowledge. The concrete actors such as individual fire brigade departments and their locations and particular resources can be considered as belonging to the grained ontologies (not the general meta-ontology). In EUPC the grained ontologies can gather information about particular departments and persons involved in coordination institutions.

Our proposed system has dedicated interfaces that can be used by experts in a specific domain, coordination users and other public (e.g. rescue teams in CM, all the citizens). We assume that experts define the general knowledge in the system (the interface is shown in Figure 1 at the right bottom corner). Coordination users can specify instances (e.g. describe concrete documents and processes in EUPC). An example of coordination user interface is shown in Figure 1 on the right side. Other public can read selected information (e.g. to be informed about a progress of a crisis and procedures to execute in that case).

The user interfaces utilize components allowing defining the knowledge in controlled natural language (CNL)[23], that is a subset of natural language with restricted grammar and vocabulary in order to reduce its ambiguity and complexity. In the last years, CNL has established itself in various application fields as powerful knowledge representation language that is readable by humans and processable by computers. We use CNL with formal semantic (e.g. description logic, OWL standards, SWRL rules) that will allow us to provide a domain ontology with rules. Then we apply automatic reasoning services and we generate explanations (written in CNL) of the automatically provided implications.

Summing up, new instances can be entered into a core storage (shown in the central circle in Figure 1) in two ways: the new instances are grabbed automatically from different sources (e.g. from structured data written in databases, from private or public clouds, from GIS web services), the new instances can be entered into the system by coordination user as it was said before. The

[23] P. Kapłański, *Controlled English interface for knowledge bases*, "Studia Informatica" 2011, vol. 32, no. 2A (96), pp. 486–494.

core storage can be distributed or central, implemented inNoSQL technology (e.g. Cassandra[24], Azure Tables[25]) or other RDF data store (e.g. AllegroGraph[26], Virtuoso[27]).

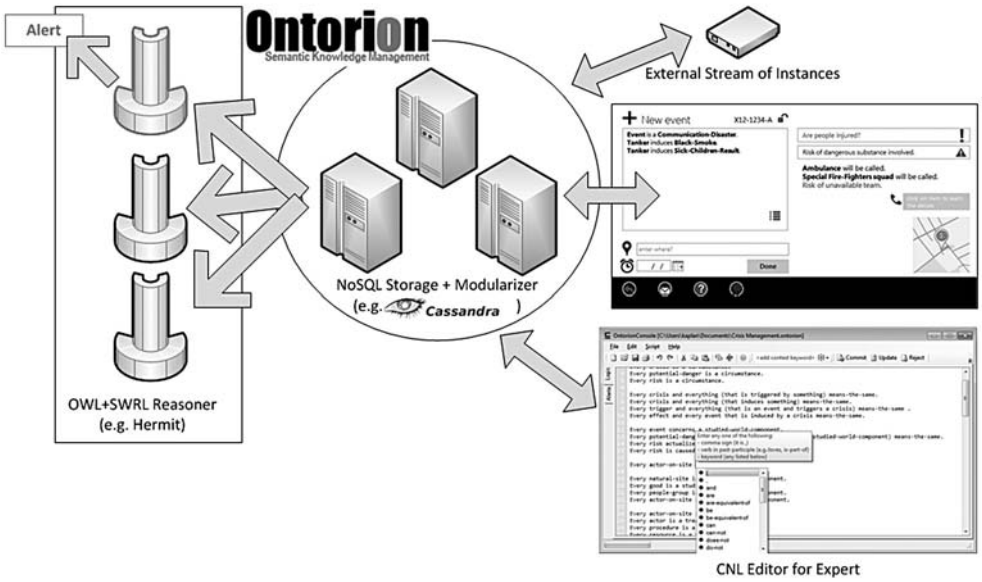


Figure 1. General architecture of Ontorion Knowledge Server system. The system interfaces dedicated for an expert to define domain knowledge in CNL and dedicated for a coordination user e.g. to specify a concrete crisis event

Source: own development.

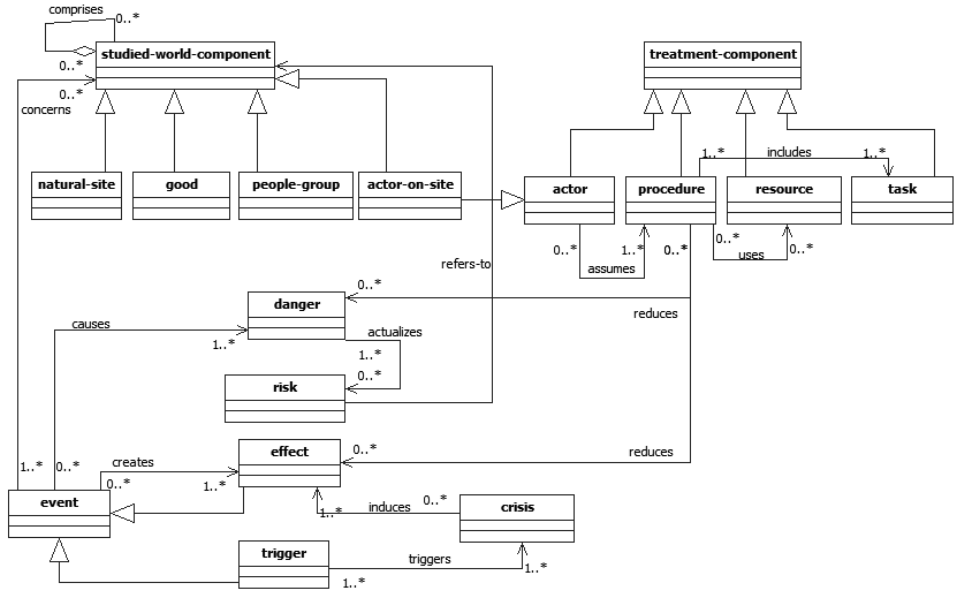
When a new instance is entered into the core storage, a specially designed algorithm *Modularizer* is launched. The Modularizer[28] extracts the whole knowledge associated with the newly arrived instance (all the concepts, relations in the ontology, associated SWRL rules etc.) and then it copies the ontology module. The module is exported to one reasoning service (on the left side of Figure 1). When the service reasons any new knowledge associated with the new appearing instance, then an alert is produced. The alert is sent to the external services dedicated to operate on the chosen special types of alerts. For example: when

[24] http://cassandra.apache.org/.
[25] http://www.windowsazure.com/en-us/develop/net/how-to-guides/table-services/.
[26] http://www.franz.com/agraph/allegrograph/.
[27] http://virtuoso.openlinksw.com/rdf-quad-store/.
[28] P. Kapłański, *Syntactic Modular Decomposition of Large Ontologies with Relational Database*, "New Challenges in Computational Collective Intelligence" 2009, vol. 244, pp. 65–72.

we derive the new knowledge that police is needed at the site of particular event, the dedicated service can call the proper emergency teams.

5. Use case dedicated to crisis management

In this use case we consider and construct only the meta-ontology of crisis management. The ontology can characterize crises (crisis events, effects, risks and dangers), the studied world (crisis environment: people, natural sites, goods) and treatment system (communication and coordination actors, procedures and tasks and the treatment infrastructure, e.g. resources). The ontology and some dedicated SWRL rules are shown in Figure 2.




```
SWRL rules
Actor(?xa) ∧ Crisis(?xc) ∧ Danger(?xr) ∧ Effect(?xe) ∧ Procedure(?xp) ∧ assumes(?xa, ?xp) ∧
causes(?xe, ?xr) ∧ induces(?xc, ?xe) ∧ reduces(?xp, ?xr) -> needs(?xc, ?xa)
Actor(?xa) ∧ Crisis(?xc) ∧ Crisis_Type(?xct) ∧ has-type(?xc, ?xct) ∧ reacts-to-type(?xa,
?xct) -> needs(?xc, ?xa)
```

Figure 2. A fragment of the developed ontology (boxes are concepts and arrows are object properties) and SWRL rules modeling meta-knowledge of crisis management

Source: own development.

Our use case concerns a tanker accident and its effects. A tanker truck (containing unknown toxic substance) had an accident. Several children of the near kindergarten (outside when the accident happened) feel sick. We use the ontology and reasoning engine to find answers to questions: what the dangers can occur and what emergency services are needed. A fragment of the ontology, SWRL rules and instances modeling the use case and written in CNL is shown in Figure 3. The developed system infrastructure can deduce that in our use case we need such rescue teams as police, fire brigade and emergency medical services.

FRAGMENT OF GENERAL KNOWLEDGE

```
Communication-Disaster is atechnical-disaster.
Toxic-Accident is a technical-disaster.
Fire is a technical-disaster.

Fire-Brigade is an actor.
Police is an actor.
Emergency-Medical-Service is an actor.

Fire-Brigade reacts-to-type Toxic-Accident.
Fire-Brigade reacts-to-type Fire.
Police reacts-to-type Communication-Disaster.

Securing-Suspicious-Substances reduces Contamination.
Fire-Brigade assumes Securing-Suspicious-Substances.

Leakage-Of-Toxins is an effect.
Leakage-Of-Toxins causes Contamination.
Contamination is a risk.
Sick-Children-Result is an effect.
Sick-Children-Result concerns Sick-Children.
Sick-Children are a people-group.
```

SWRL RULES

```
If Z is an actor and if a crisis has-type a crisis-type and if Z reacts-to-type the crisis-
type then the crisis needs-actor Z.

If Z is an actor and if an effect causes a danger and if a crisis induces the effect and if
Z assumes a procedure and if the procedure reduces the danger thenthe crisis needs-actor Z.

If Z is an actor and if an effect concerns a people-group and if a crisis induces the effect
and if it is true that the people-group has-victims and if Z is Emergency-Medical-Service
then the crisis needs-actor Z.
```

ACCIDENT DESCRIPTION

```
Tanker-Accident-X has-type Toxic-Accident.
Tanker-Accident-X has-type Communication-Disaster.
Tanker-Accident-X induces Sick-Children-Result.
Tanker-Accident-X induces Leakage-Of-Toxins.
```

REASONED RESULTS

```
Tanker-Accident-X must need-actor Police.
Tanker-Accident-X must need-actor Fire-Brigade.
Tanker-Accident-X must need-actor Emergency-Medical-Service.
```

Figure 3. A fragment of the developed ontology and SWRL rules and instances dedicated to taker accident use case. The knowledge is written in developed CNL interface

Source: own development.

6. Conclusions and perspectives

In this paper we have investigated a problem of application of semantic technologies and distributed system architecture in selected areas of Polish public administration. The chosen areas are crisis management and EU policy coordination processes. We have sketched architecture of semantic knowledge management system Ontorion. We have described user interfaces and mechanisms of dedicated controlled natural language. We have given a lot of examples showing how to model domains of crisis management and EU policy coordination. In the future we plan to elaborate CNL mechanisms for Polish language, integrate geo-information and the presented meta-knowledge, collect crisis management and UE policy coordination procedures to be coded in CNL and extend the system to other disciplines, e.g. oncology medical guidelines.

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Zastosowanie semantycznego systemu zarządzania wiedzą w wybranych obszarach polskiej administracji publicznej

Streszczenie

Artykuł opisuje zastosowanie technologii semantycznych i systemów zarządzania wiedzą w wybranych obszarach polskiej administracji publicznej. Przedstawiono w nim krótką analizę dziedzin zarządzania kryzysowego i koordynacji polityki UE. Zaproponowano architekturę systemu zarządzania wiedzą z interfejsami stosującymi komunikację za pomocą kontrolowanego języka naturalnego. Podano przykłady pokazujące przydatność semantycznego zarządzania wiedzą i automatycznego wnioskowania w analizowanych dziedzinach administracji.

Słowa kluczowe: zarządzanie kryzysowe, koordynacja polityki UE, systemy zarządzania wiedzą, technologie semantyczne, ontologie, kontrolowany język naturalny, analiza systemowa