Terms, definitions and conceptual modelling

Andersson, Gunnar; Tomuzia, Katharina; Löfström, Charlotta; Karlsson, Oskar; Knutsson, Rickard

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

AniBioThreat

CLASSIFICATION LEVEL: UNCLASSIFIED

TASK 1.1

TERMS, DEFINITIONS AND CONCEPTUAL MODELLING

With the financial support from the Prevention of and
Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

WP1

TASK 1.1
TERMS, DEFINITIONS AND CONCEPTUAL MODELLING

TASK LEADER
Gunnar Andersson (SVA)

TASK PARTNERS
ANSES, BfR, CVI, DTU, IFR, ISS, RPS, SJV, SKL, SLU, SVA, ULUND

AUTHORS OF THIS REPORT
Gunnar Andersson (SVA), Katharina Tomuzia (BfR),
Charlotta Löfström (DTU) and Oskar Karlsson (SLU)
Co-author Rickard Knutsson (SVA)

HOW TO REFER TO THIS DOCUMENT
Andersson, G., Tomuzia, K., Löfström, C., Karlsson, O. (2013),
Definitions and conceptual modelling, ISBN number 978-91-87147-02-9

ISBN number 978-91-87147-02-9 **Layout** To Be Frank **Printed by** Davidsons Tryckeri 2013

The AniBioThreat project was in 2010 awarded a grant by Directorate General Home Affairs under the programme "Prevention of and Fight Against Crime". One issue stated in the call text in 2009 under this programme was animal bioterrorism threats. The focus of AniBioThreat is therefore based on threats to living animals, animal feed and food of animal origin. As part of this, it is foreseen that the project will enhance international cooperation and promote networking for bridging security with animal and public health.

The objectives are furthermore based upon some of the identified actions in the EU Chemical, Biological, Radiological and Nuclear (CBRN) Action Plan (2009), the recommendations of the CBRN Task Force Report (2009) and especially the work that took place in the Biosubgroup threats to animal, and food and feed for animals (2008), and the Biosubgroup detection and diagnosis (2008, June).

The project is divided into the following six work packages (WPs); WP1 the establishment of a network between law enforcement, forensic institutes, first responders, intelligence, veterinary institutes, public health agencies and universities, WP2 threat assessment, WP3 early warning/ detection, WP4 European Laboratory Response Network for animal bio-terrorism threats, WP5 detection and diagnostics and WP6 dissemination.

SPECIFIC OBJECTIVES OF THE WPS ARE AS FOLLOWS:

- To facilitate effective international cooperation, improve training and establish a network between law enforcement, forensic institutes, first responders, intelligence agencies, veterinary institutes, public health agencies and universities (WP1).
- To improve monitoring and threat assessments (WP2).
- To investigate early warning and rapid alert for animal disease outbreaks caused by criminal acts (WP3).
- To establish a European Laboratory Response Network approach to counter animal bioterrorism threats (WP4).
- To enhance research and development of detection methods of animal diseases, such as anthrax, botulism and viral diseases caused by criminal acts (WP5).
- To disseminate the outcome of the project to relevant stakeholders through exercises, workshops, publications, and academic courses and to strengthen research through existing EU projects (WP6).

The overall objective of AniBioThreat is to improve the EU's capacity to counter biological animal bioterrorism threats in terms of awareness, prevention and contingency.

CAPACITY AND CAPABILITY

The overall goal of the EU CBRN Action Plan is an all-hazards approach to reduce the threat of damage from CBRN incidents of accidental, natural or intentional origin, including acts of terrorism.

This deliverable has improved EU's capacity and capability to counter biological animal bioterrorism threats in terms of awareness, prevention and contingency in following areas:

- [x] **Education and training capacity and capability**
- [ ] Research capability
- [ ] Risk assessment capability
- [x] **Cooperation/interoperability capability**
- [ ] Surveillance and rapid alert capability
- [ ] Diagnostic and laboratory response network capacity and capability
- [ ] Forensic awareness capability
- [ ] Contingency planning capability
- [x] **Joint exercise capacity**
- [ ] Readiness assessment and medical countermeasure capacity
- [x] **Communication and information sharing capability**
- [ ] Strategic, tactical and operational decision making capability

ABSTRACT

The exchange of knowledge between experts from different organizations and disciplines is essential for strategic planning and decision making. The activities in task 1.1 had an integrative role in this project. The main objective was to exhange knowledge and facilitate coordination of activities in different tasks. In addition the multidisciplinary network of task 1.1 has been essential for the construction of scenarios for workshops and exercises.The work was divided in two main parts: (i) collection and analysis of terms and definitions and (ii) construction of scenarios and contribution to planning and conduction of workshops and exercises.

In the first part, terms were collected, and analyzedwith the help from the Swedish Centre of Terminology (TNC). The CBRN area has roots in multiple disciplines and the analysis of terms showed that the project partners use various international standards and that many terms occur in several documents without being properly defined anywhere. Furthermore the analysis showed that the pragmatics of the terms, that is how they are used in different contexts, are as important as the definitions. In particular it is important to recognize when the usage of a term is implicitly referring to a protocol or legal framework and references to updated source documents would be an important component of a term database.

In the second part, a set of scenarios was constructed that was used as working examples in lectures and workshops, exercises and scientific studies. The joint work on scenario construction was found to be an efficient way of building networks between partners and disciplines and involved several other persons than those which

were finally trained. Thus we conclude that scenario activities at an EU level should not focus on construction of prefabricated scenarios but rather on supporting local scenario construction for example by promoting exchange of personnel. The construction of scenarios should be appreciated as an important networking activity to exercises. To facilitate this concept for scenario construction and a toolbox including checklists and scenario skeletons could be valuable. A set of scenarios were used to assess the applicability of forensic statistics to biocrime investigations and Bayesian belief networks (BBN) were found to be a useful tool for combining evidence from different types of investigations, such as forensic entomology, witness statements and type matching of DNA fingerprints. Although some scenario were too complex to be fully represented as a BBN the model building appears to be a useful way of structuring data and uncertainties and to identify relevant reference population and critical parameters and to promote informed decision making during the investigation.

DELIVERABLE ACCORDING TO GRANT AGREEMENT

A report on definitions and conceptual models.

DESCRIPTION OF DELIVERABLE

This deliverable consists of a report describing the work and results that has been undertaken in task 1.1 during the course of the AniBioThreat project. Since task 1.1 is a horizontal task many of the activities have been performed in collaboration with other tasks in AniBioThreat or occasionally with external projects. The main document contains a summary of activities and results whereas more extensive reports from different activites are provided as appendices.

CONTENTS

BRIDGING STATEMENT

In order to reach the goals of AniBioThreat it is necessary to bring together expertise from a wide range of disciplines. Knowledge and information from all actors must be collected and summarized in order to support other activities in the project, such as scenario development, workshops and exercises, as well as threat assessment, diagnostics and the creation of response plans. A major obstacle is that the terminology used varies between disciplines and professions. Thus in order to create joint situation awareness it is necessary to acknowledge the various definitions.

Definitions of terms and concepts is not sufficient to achieve efficient communication between disciplines since the terms point at implicit knowledge about processes, organizational structures, legal frameworks etc that is essential for understanding. Visualization of knowledge and the construction of illustrative scenarios are important tools for bridging the knowledge gaps.

LINK TO EU CBRN ACTION PLAN

The exchange of knowledge between experts from different organizations and disciplines is essential for strategic planning and decision making. Mechanisms and tools for exchanging knowledge and creation of a joint situation awareness including joint definitions, conceptual modelling and visualization are necessary for several Biological and Horizontal Actions of the EU CBRN Action Plan (1) including:

B.11 Member States together with the Commission should set minimum requirements for sampling, detection, identification and monitoring of pathogens and toxins within a civilian security context at the EU level and make these requirements available to the private sector, if appropriate, subject to applicable requirements on confidentiality. This action is linked with recommendation 148 of the report from the CBRN task force (2).

H.1 The Member States together with the Commission should establish and regularly update EU lists of:
– high-risk chemical agents;
– high risk biological agents and toxins;
– high-risk radioactive sources;
of special security concern. The lists should be developed through a joint effort involving various actors, with scientific and security expertise from the Member States, the Commission Europol, Eurojust, and relevant international organisations. These lists should be based on a risk assessment analysis and should take account of existing relevant lists, including those developed by other international organisations. The work should include an agreement on the criteria and method to be used for establishing and applying such lists, including quantitative thresholds where appropriate. This action is linked with recommendation 1 of the report from the CBRN task force (2).

H.17 The Member States together with the Commission should encourage public authorities to provide, as appropriate, adequate security information to the entire supply chain of high-risk CBRN materials, first responders (police, fire-departments, medical services, other special units as needed) and educational establishments to focus attention on issues of concern. This action is linked with recommendation 14 of the report from the CBRN task force (2).

OTHER RELEVANT ACTIONS

B.9 The Member States together with the Commission should define;
- sets of relevant simulants of biological agents for field tests, practical exercises and field technology trialling at national level and EU level, where appropriate;
- criteria for method validation across detection of human, animal and crop threats.

H.22 The Member States together with the Commission should develop a mechanism for information exchange among Member States on methodologies of scenario development related to sampling and detection. The Commission should prepare an overview of Member State activities in this area. The Commission will support, as far as required, the exchange of further information by those Member States wishing to do so, taking appropriate confidentiality requirements into account.

CONTRIBUTION TOWARDS OVERALL OBJECTIVE OF ANIBIOTHREAT

The activities in this task had an integrative role in the project. The main objective was to create joint situation awareness between project partners and to facilitate coordination of activities in different tasks and between partners of different fields of expertise.

The multidisciplinary network of Task 1.1 has been essential for the construction of scenarios used in activities in other tasks including workshops, exercises and evaluation of evidence in relation to detection and identification.

TASK LEADER

Gunnar Andersson (SVA)

TASK PARTNERS

ANSES, BfR, CVI, DTU, IFR, ISS, RPS, SJV, SKL, SLU, SVA, ULUND.

AUTHORS OF THIS REPORT

- Gunnar Andersson (SVA)
- Katharina Tomuzia (BfR)
- Charlotta Löfström (DTU)
- Oskar Karlsson (SLU)

AIM

The aims of task 1.1. were:
- To generate consensus of definitions and conceptual modeling that could be used for other tasks and activities in the project.
- To collect the information needed for making strategic decisions in the project.
- To generate joint situation awareness about aims of the project and the models/documents/guidelines that should be delivered in different tasks.

BACKGROUND

In order to reach the goals of AniBioThreat, it is necessary to bring together expertise from a wide range of disciplines. Knowledge and information from all actors had to be collected and summarized in order to support other activities in the project such as scenario development, threat assessment, modelling and training. In order to accomplish this work the task was divided in two main parts: (i) collection and analysis of terms and definitions and (ii) construction of scenarios and contribution to planning and conduction of workshops and exercises (*Figure 1*).

In order to reduce the threat from bioterrorism and to coordinate the response to an attack communication, including risk-, incident- and crisis-communication between disciplines is critical. Employees at organizations from various sectors are educated and trained in different disciplines, such as agricultural science, bio-

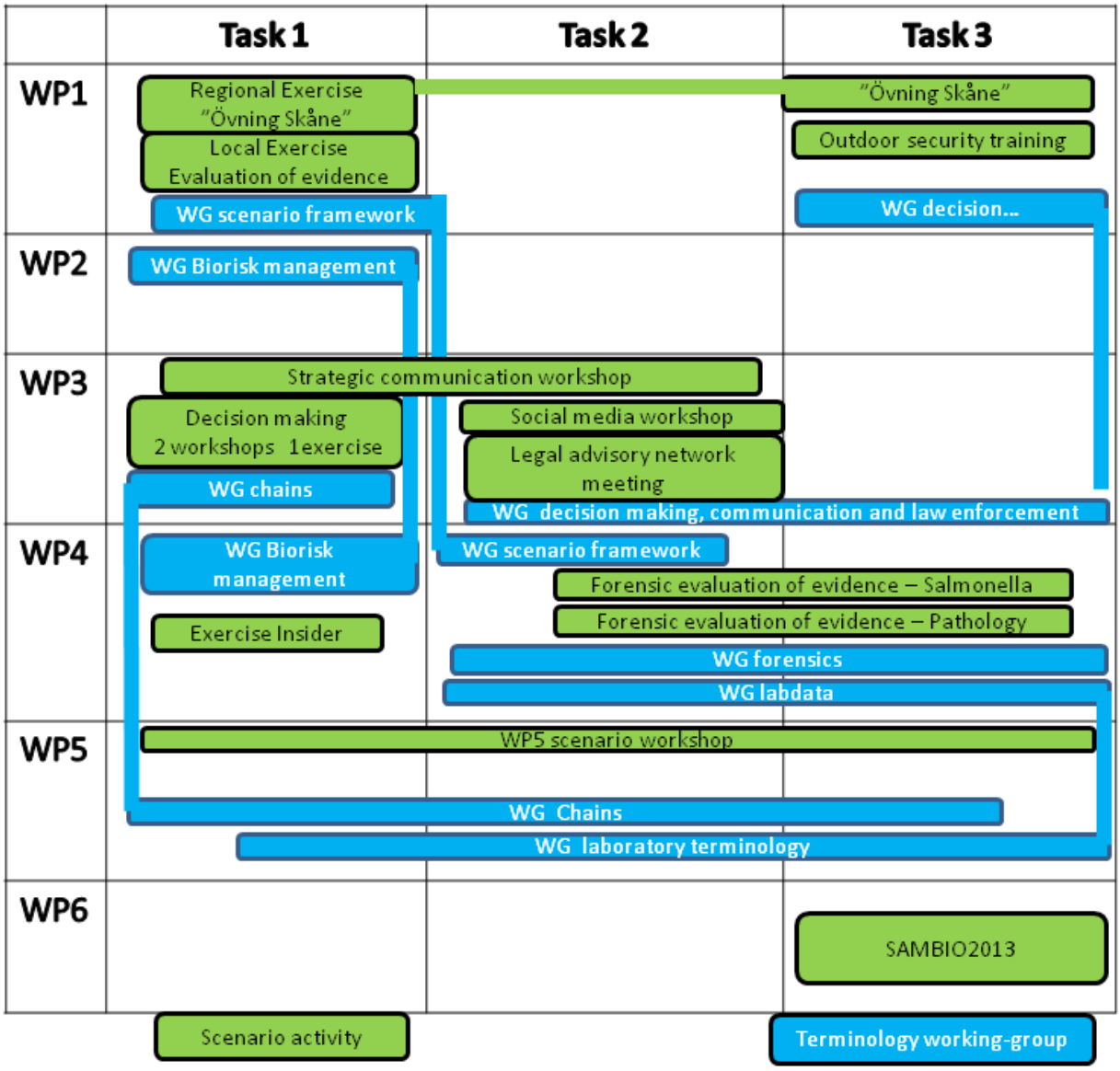


Figure 1. Horizontal activities in AniBioThreat. Activities includes workinggroups for terms and definitions and construction of scenarios for workshops and exercises.

chemistry, criminology, food science, forensic science, juridical science, mathematics, medicine, microbiology, and veterinary medicine. From education and experience the professionals have adopted the professional terminology and jargon of their discipline as well as social codes and conventions of their professional culture. When communicating across disciplinary boundaries the differences in understanding and interpretation of terms and concepts may result in misunderstandings. The use of conflicting terminology may also be problematic for decision makers and communicators who may lack the expert knowledge to detect that experts from different disciplines use the same term or word to talk about different things. This may result in

miscommunication and can impair the ability to prevent or handle an incident. Misunderstandings due to differences in terminology may be particularly detrimental in emergency situations to support communication in the fight against bioterrorism which requires cooperation between organizations from science, biosafety and law enforcement. It will thus be necessary to find mechanisms to cope with conflicting terminologies and to adopt joint definitions of key concepts.

The structured collection, representation and visualization of knowledge about for example threats, vulnerabilities and capabilities will be essential for the risk assessment based establishment of lists of high-risk agents (Action H1) and for the establishment of criteria for such lists as well as for the communication of security information.

Understanding of concepts and processes is essential for communication within a project as well as in a crisis situation. Joint definitions of terms is only a small step towards better communication since terms do not only represent a defined concept but also point at other implicit knowledge underlying the information in the message (3). For example an epidemiologist, a laboratory technician or a police officer being asked to perform a risk or threat assessment would not only rely on an implicit definition of the term but also on implicit knowledge on the protocol to use and the delimitations of the mandate. In order to correctly understand a message and to create awareness of a situation it is necessary to process a large quantity of background information including organizational structures, legal frameworks, causal relations and process flows. In this situation bridging exercises and seminars as well as comprehensive visual representation of knowledge and good illustrative examples becomes invaluable.

Scenarios are an important tool for contingency planning in general and for reaching the goals of the AniBioThreat project. They are needed for the planning of exercises, developing and challenging response plans, assessing vulnerabilities and setting work priorities. Thus, the network of task 1.1 was used to support the development of a set of contamination scenarios for use in different tasks. Additionally the collective construction of realistic and relevant scenarios is an activity that involves expertise from all organizations and disciplines represented in the project and the scenarios were expected to be a powerful tool to establish networks and to increase the understanding or the work in other organizations and fields of expertise.

METHODOLOGY

Collection and Analysis of Terms & Definitions

Terms were collected, from a varied set of subject experts. Each new record was decomposed into several fields that included the term and its definition, source reference etc. The lists were imported into a MySQL 5.1.41 database (Oracle Corporation CA, www.mysql.com) and made accessible online using php tools (phpMyAdmin 3.3.2. www.phpmyadmin.net). A description of the database including a tutorial and login information was prepared in the form of a slide show *(Appendix 1)*. The term relationships were included in separate fields for generic relations (IS A), partitive relations (Part OF) and associative relations (IS RELATED TO) (*Figure 2*). Terms were analyzed with assistance from the Swedish Centre for Terminology in Solna, Sweden (TNC) (www.tnc.se/the-swedish-centre-for-terminology.html) and the result from their work was presented in a separate report (*Appendix 2*). The report from TNA was followed up in a workshop where participants from different organizations (SVA, CVI, SMI, SJV, SLU and DTU) sought to agree on joint definitions of concepts related to risk/threat/hazard and analysis/management. (*Appendix 3*).

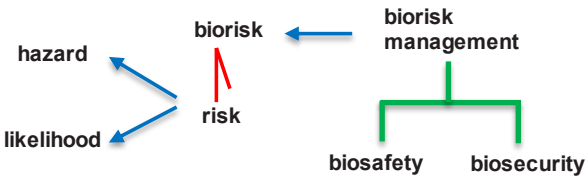


Figure 2. Example of concept diagram with generic (angle), partitive (tree) and associative (arrow) relations. The concepts biosafety and biosecurity are part of biorisk management which is associated with biorisk. The concept biorisk is a risk which in turn is associated with the concepts hazard and likelihood.

The following terminology was used in the analysis:

object – anything perceivable or conceivable

concept – unit of knowledge created by a unique combination of characteristics

term – verbal designation of a general concept in a specific subject field

definition – representation of a concept by a descriptive statement which serves to differentiate it from related concepts

operational definition – defines something (e.g. a variable, term, or object) in terms of the specific process or set of validation tests used to determine its presence and quantity (from Wikipedia. The term was introduced in the discussion about definitions for risk and biorisk)

characteristic – abstraction of a property of an object or of a set of objects. Characteristics are used for describing concepts.

Terms are not always single words but may be simple (e.g. risk), compound (e.g. biorisk) or multiword (e.g. risk assessment) terms.

Identifying scenario needs

The needs for scenarios in the project were investigated through a series of workshops and seminars. The work was initiated with a table top exercise at the AniBioThreat Kick Off meeting (*Appendix 4*) which was followed up by a session at the first WP1 meeting and the first annual meeting. In addition, a survey was sent to project members to identify the need for scenarios in different tasks. Based on this work a conceptual framework for scenarios was developed together with templates/check-lists for scenario development. (*Appendix 5*).

Construction of scenarios for exercises and workshops

An important distinction in the scenario construction was between *core scenearios* and *user scenarios*. In the project a *core scenario* was defined as a set of preconditions (epidemiological potential of agent etc) that sets the «rules» for the development of the scenario. In addition the core scenario contains a description of the series of events taking place. The core scenario constructed in the project are summarized in *Appendix 6*. In contrast a *user scenario* is constructed with particular aims and goals which is typically to train or study one or several capabilities. While being based on a core scenario it contains extra information which is specific for the planned activity. The user scenarios constructed in the project are summarized in *Appendix 7*.

The scenario construction was lead by a core team consisting of modeller and one or a few experts such as police men, epidemiologists and pathologists with experience of handling related incidents. The initial step was to define the aims and goals of the work using the "user scenario template" in the AniBioThreat conceptual framework for scenario building (*Appendix 5*). The first parameters to decide upon was the capabilities/skills that the scenario should challenge. After the aims were set appropriate core scenarios were created or selected from an excisting set.

The scenarios were updated in an iterative process including interviews with experts on the agent, epidemiological work and police work,

biosafety etc., until it fulfilled the specification and was plausable and credible enought to stimulate a good discussion. The construction also included studying of case reports and scientific papers on the agent in question. In this process many of the attributes of the core scenario, including biological agents, target species, and route of dissemination were changed until the scenario fullfilled the criteria with respect to challenges, realism and availability of data. The scenarios were represented as a slide show including background information, fact cards with data from sampling and typing, observations and results from investigations and finally the key to what happened.

During 2012 a set of forensic scenarios were developed with the aim of evaluating Bayesian Belief Networks and forensic statistics as a concept for expressing causal relationships and uncertainty in expert reports. The scenarios were used as working examples in lectures and workshops (*Appendix 7*) as well as for research (4, 5).

Exercises and workshops

During table top exercises (*Appendix 8*) and workshops (*Appendices 9, 10*) the participants were introduced to the aims and goals of scenario work. Subsequently, they were presented in a slide show containing background information to the scenario and the initial events. Additional slides representing injects were presented during the course of the exercise. As the scenario proceeded the participants were asked frequently about several issues such as:

- *What might have caused the scenario?*
- *How would the people (depending on their power of decision) react to the situation?*
- *How would the organization the participants are working in react and cope with the scenario (further steps, procedural instructions etc.)?*

Analyzing forensic scenarios

Forensic scenarios based on real incidents were constructed in a collaborative process involving experts from several disciplines including epidemiology, veterinary pathology, feed safety and forensic science. Two workshops were held at SVA, Uppsala in January and September 2012 (*Appendices 9, 10*). The scenarios were presented in the format of a slideshow. The workshop participants, representing the various scientific disciplines were asked to list possible hypotheses and the sources of information that would be used to test them. Afterwards, the information was structured as a Bayesian Belief Network in a collective process using the software GeNie 2.0 (Decisions Systems Laboratory, Univ. Pittsburgh). When constructing the network guesstimates of the parameters of the different modelswere provided by the groups of participating experts.

The draft network that resulted from the workshop was further elaborated in an iterative process where the statistician modified the network based on input from domain experts and the parameter guesstimates were updated based on scientific data.

RESULTS AND DISCUSSION

Terms and definitions

– construction of a term database

The collection of terms resulted in a database of in total 683 distinct terms (Effective: Oct 23 2012) proposed by one or several parties. For 401 of these terms at least one English definition was found. Storage of terms and definitions in an SQL database was found to be superior to text files of spread sheets for managing the term collection. The format supports the use of SQL to perform customized queries that include associated terms and synonyms or restrict the query to a particular source or context.

The example SQL query below returns the term name, author, relations, synonyms and

definition of all entries which are either named *animal bioterrorism* or listed as related to *animal bioterrorism*.

```
SELECT `TERM` , `AUTHOR` , `IS A` , `IS PART OF` ,
`IS ASSOCIATED WITH` , `ENGLISH SYNONYM
ABBREVIATION` , `DEF ENGLISH`

FROM `term database`

WHERE `TERM` like '%animal%bio%terrorism%'

OR `IS A` like '%animal%bio%terrorism%'

OR `IS PART OF` like '%animal%bio%terrorism%'

OR `IS ASSOCIATED WITH` like
'%animal%bio%terrorism%'

OR `ENGLISH SYNONYM ABBREVIATION` like
'%animal%bio%terrorism%'

ORDER BY 'AUTHOR'
```

The query in this example will in addition to *animal bioterrorism* return information for *agro-terrorism*, *bioterrorism* and *animal-bioterrorism* threat. A screenshot illustrating searching and editing of terms is shown in *Figure 3* whereas a more detailed description of the database is given in *Appendix 1*.

SQL was found to be a useful means for retrieving and sorting terms based on not only name but also features like related terms, synonyms and acronyms. In a terminology or glossary project it may be accessed directly for example via a web interface but it could also be used as an external resource for term banks or web based glossaries and reference management tools.

However, the construction of such a database through copying from source documents was laborious and introduces errors due to human-mistakes and the presence of invisible special characters. It also became evident that the database would rapidly be out of date unless the organizations behind the source documents continuously submit and update their own term posts in a repository similar to e.g. genebank (http://www.ncbi.nlm.nih.gov/genbank/). Curation of the database will be another important issue. In practice it will most likely require too much time and resources to be performed by the database owner. Thus it will probably be necessary that each term post has an owner responsible for the curation and that maintainance is secured by linking ownership of each post to a permanent organisation of function rather than individuals or projects.

Terms and definitions – analyzing the definitions

The analysis of collected terms and their sources showed that the project partners use various international standards in their area of expertise (*Appendices 3, 4*). The same term often represented different concepts in the diverse standards from different sectors or alternatively distinct terms were used to represent the same or a very similar concept. According to general terminology, theory definitions apply to concepts and a word becomes a term only when the concept behind the term is clearly delimited (3). Among the terms analyzed in the project, this approach to terminology seemed to work mainly for terms representing physical objects (substances, organisms, samples etc.) and their measurements (concentrations, detection limits). In contrast, the terms referring to objectives, procedures or activities (e.g. biosecurity, threat assessment and risk management) could often be defined in this way only as part of a specific protocol or method.

Furthermore TNC observed that many of the terms in the list cover concepts that occur in a large number of documents but which are not properly defined anywhere. Therefore, the selection of the best definition can require a very thorough analysis of the concept in question and not in isolation but with regard to other related concepts and preferably together with a group of experts in the field (*Appendix 3*).

Figure 3. Screenshot from AniBioThreat term database. The example shows the first part of the list of terms retrieved when searching for “risk assessment” in the field “term” as well as in fields representing the generic, partitive and associative relations. One entry for “hazard characterization” is marked for editing.

The workshop held in December 2011 focused on definitions of terms related to hazard, risk and threat and the management thereof. The difficulties of defining terms in the bioterror area are illustrated in the following examples.

Hazard: Was found to be relatively easy to define, for example as "an accidental or naturally occurring phenomenon with the potential to cause physical or psychological harm to humans including loss of life, damage or losses of property, and/or disruption to the environment or to structures (economic social, political) upon which a community's way of life depends". Alternative phrasings were discussed, most of which were considered acceptable. The definitions were generally not "operational", that is hazard was not defined by how it is measured. Thus, a hazard was viewed as a phenomenon, which might have consequences. In this view it is the severity of the consequences which may be measured, not the hazard itself.

Risk: Most of the definitions found were *operational definitions* in the form of a mathematical expression. In different contexts the term risk was defined as "the likelihood/probability of a harmful event" (6), "a combination of probability and severity" (7) or sometimes a "combination of threat, consequences and vulnerability". However, it was noted that the term risk can be used in a qualitative sense as in "Which are the risks?" as well as quantitative sense as in "How big is the risk?". It was discussed whether or not there is a conceptual difference between risk as a "phenomenon" and risk in an operational sense.

Threat: The definition according to the US Department of Homeland Security (DHS) risk lexicon (8) is "natural or man-made occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment and/or property". However, the concept analysis revealed that threat with this definition may actually refer to several concepts including 1) indicated threats, 2) intentional threats and 3) natural threats. The workshop identified a difference between authorities from different disciplines regarding which of these concepts are referred to when threats are discussed.

Biorisk: An analysis of the concept biorisk indicated a problem with defining the term. The only definitions so far for biorisk is in the WHO biorisk management standard (9) where it is defined as: "The probability or chance that a particular adverse event (in the context of this document: accidental infection or unauthorized access, loss, theft, misuse, diversion or intentional release), possibly leading to harm, will occur" and in the CEN workshop agreement on Laboratory Biorisk Management Standard (CWA15793, Feb 2008) "combination of the probability of occurrence of harm and the severity of that harm where the source of harm is a biological agent or toxin".

In the workshop it was discussed whether the *"operational" definitions* (probability or probability x consequence) would be useful for defining the concept biorisk since the term biorisk is primarily used to discuss risks in a qualitative manner as in "identify the biorisk(s)" or control the biorisk. It was observed that in practice the term biorisk (if at all a term) is used in a wide sense where the narrow operational definition may not be applicable. This is also reflected by an alternative definition of biorisk from the homepage of De Norske Veritas (DNV) where it is stated that: "Biorisk can be defined as the application of risk management in areas where the principal hazard is a biological agent"(10). However, in the sense biorisk is used by DNV it appears to be used as a short form for *biorisk management*.

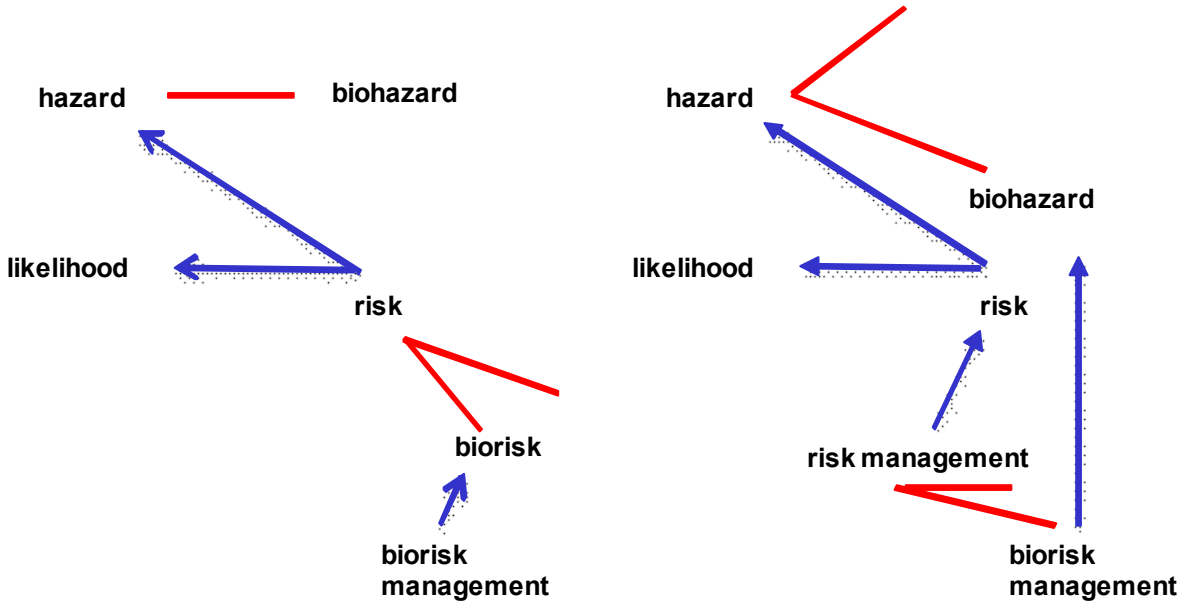


Figure 4: Example of outcome from the Terminology workshop. Two alternative concept systems for biorisk management were proposed. *Left:* In this system biorisk is considered a term representing a well-defined concept. *Right:* In this system biorisk is not considered a well-defined term. Instead biorisk management is defined as risk management associated with biohazards.

One group suggested discarding biorisk as a term whereas the other group wished to keep it resulting in two different concept systems (*Figure 4*). The concepts system in *Figure 4*, right, where biorisk management is associated with risk management and biohazard would result in a definition similar to the before mentioned definition of biorisk of DNV.

During the workshop terms and concepts related to risk assessment and risk management were discussed in two groups consisting of persons with different professional background. In one group the terms were discussed in the context of the Laboratory Biorisk Management Standard. The resulting concept diagram, with definitions, is indicated in *Figure 5*. In the second group dominated by persons working with food safety and animal health there was a consensus to follow the terminology of the Codex Alimentarius Commission (CAC) (11) resulting in the concept diagram of *Figure 6*. Similar definitions are used by the World Organisation for Animal Health (OIE) (12) although in that terminology hazard identification is considered a separate stage preceding risk assessment (not shown). A comparison between *Figures 5 and 6* reveals that *risk management* as defined by CAC is a very narrow definition which may be applicable to the specific context of the procedures for scientific risk analysis. *Risk management* as used in this context refers to setting the appropriate level of protection based on political, economic and other considerations. *Risk management* in this sense in this sense is only a small part of *risk management* in general. However it could perhaps be seen as the part of *risk management* which is included in the analysis of risk. Similar the term *risk analysis* according to the Laboratory Biorisk Management Standard is extremely narrow compared with *risk analysis* according to CAC and the terms refers to different concepts.

These examples illustrate the problems associated with definitions lists and glossaries in the CBRN field. A fixed glossary might be agreed upon within one domain. However, in a multi disciplinary context the same term will in many cases have been defined differently in other domains and may sometimes refer to different

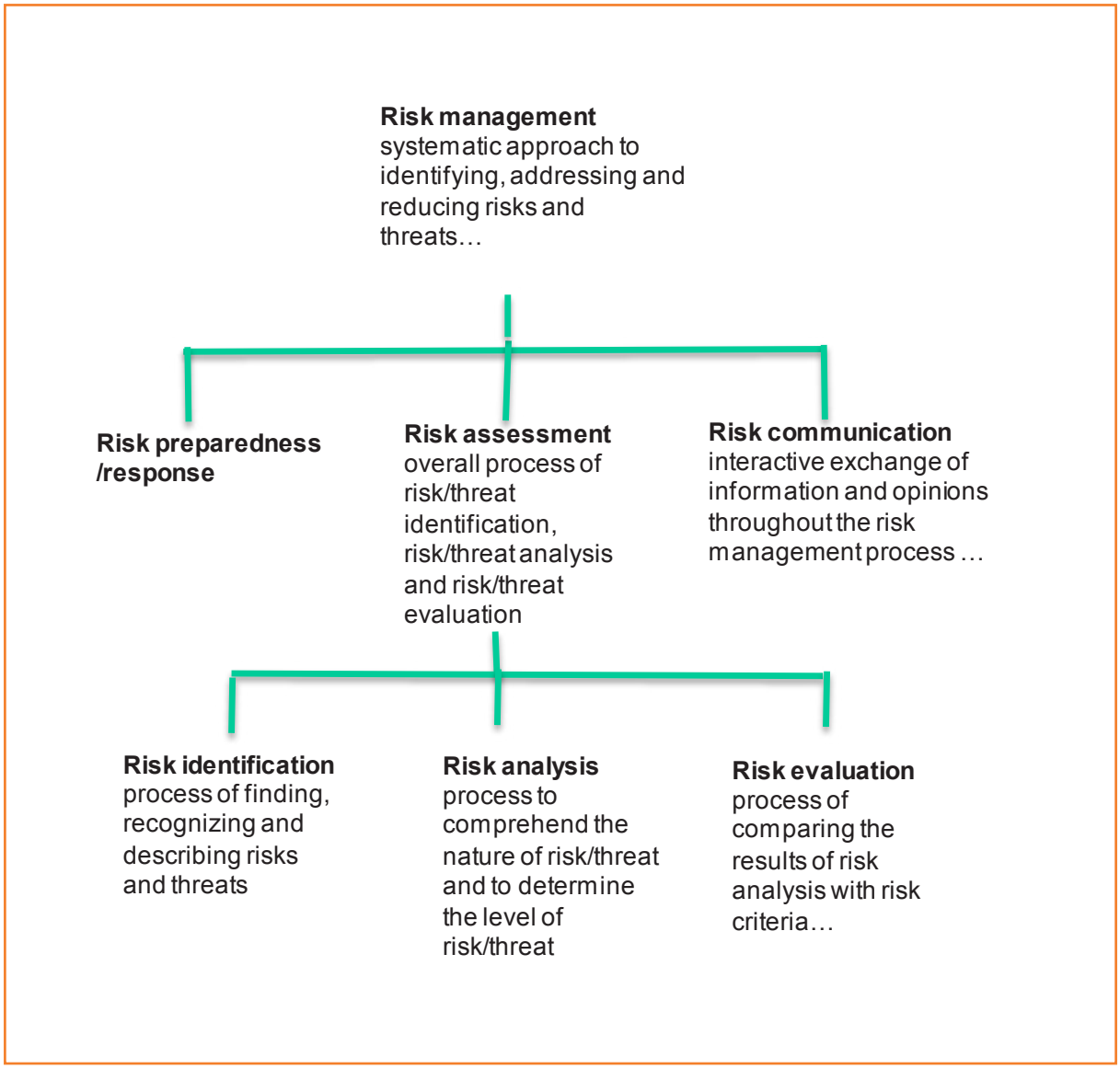


Figure 5. Diagram of concepts related to management and analysis of risks in the in the context of the Biorisk Management Standard.

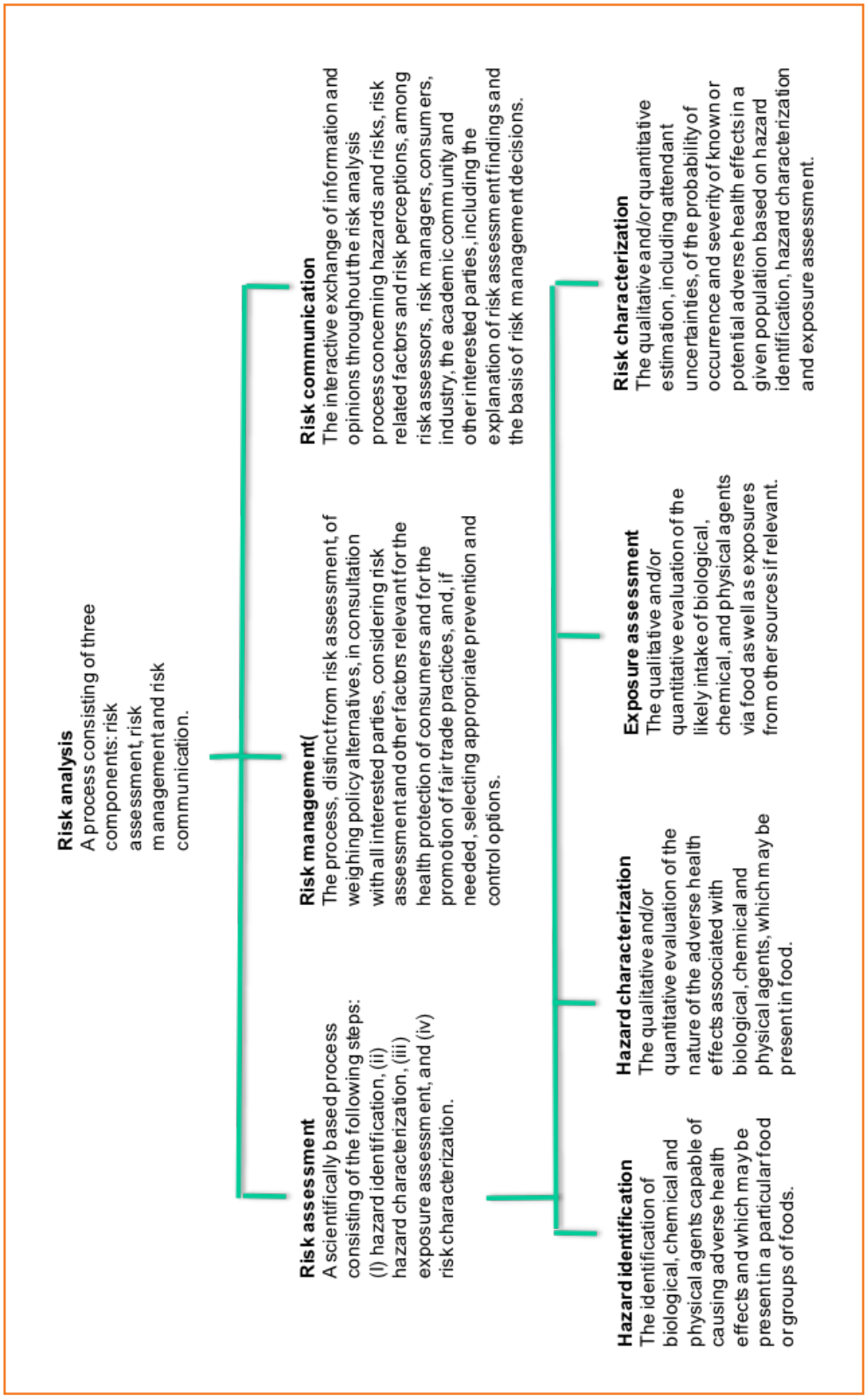


Figure 6. Diagram of concepts related to management and analysis of risks according to the Codex Alimentarius Commission working principles.

concepts. The definitions lists from different domains typically originate from influential sources such as the Codex Alimentarius of the WHO or the US Department of Homeland Security. When attempting to provide a joint definition there is a risk of ending up with a very broad definition that does not clarify in what sense the term is used in a specific document.

Since the CBRN area has roots in multiple disciplines, with evolving terminology it may not be realistic to achieve unequivocal communication through a standardized vocabulary and joint definitions for words from common language. Thus a communication strategy should include awareness of alternative definitions and the ability to talk and write without relying on the implicit knowledge. Cross disciplinary communication skills should be part of the training of personnel in the CBRN field. In addition, a searchable repository of terms and definition from relevant organizations and authorities would be a valuable addition to existing glossaries.

The outcome of the work on terms and definitions has been compiled in a manuscript (13) and submitted to the AniBioThreat supplement in the journal Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science.

A framework for scenarios

A conceptual framework for structured description of scenarios was developed in collaboration with task 4.2 creating templates for specifying core scenarios and user scenarios. The result was described in a previous report (*Appendix 5*). An important step forward was to explicitly distinguish between the description of the events that defines the scenario (core scenario) and the description of the requirements of the scenario in relation to a planned activity e.g. an exercise (user scenario).

Construction of scenarios

During the first year of the project several core scenarios of various complexity were constructed (*Appendix 6*). The scenarios were selected to cover the most important agents studied in WP5 (*Bacillus anthracis, Clostridium botulinum* and viruses including highly pathogenic avian influenza (HPAI), as well as challenging different capabilities including biosafety, biosecurity, forensics, early warning and first responders. The core scenarios were intended to be used as starting points for the development of different user scenarios with specific demands to serve activities in other tasks (*Appendix 7*).

Scenario based activities

Scenarios were used in various activities in the project including workshops, exercises and research activities. For each activity the work started with the definition of a user scenario determining the desired properties of the scenario after which the core scenario was either selected from the set of existing scenarios or constructed from scratch. A summary of the activities together with references to original reports are summarized in *Appendix 7*.

Scenarios for forensics

The work on forensic evaluation of evidence was initiated by a workshop in January 2012 focusing on a scenario involving the tracing of Salmonella in a suspected feed-borne outbreak (*Appendix 9*). The work was further elaborated through the analysis of an authentic case. The resulting network model was presented at the International Symposium Salmonella and Salmonellosis (I3S) in Saint-Malo (France) in May 2013 (5) and is planned to be included in a prospective publication.

A second workshop in September 2012 focused on the evaluation of evidence in pathology cases involving suspected poisoning of animals (*Appendix 10*). As part of the outcome a Bayesian Belief

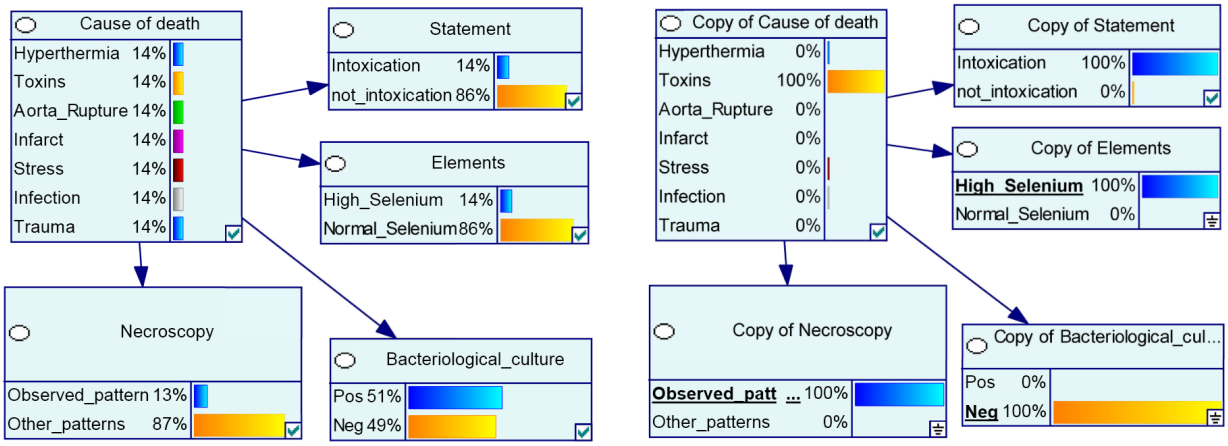


Figure 7. Simplified representation of the BBN constructed during the workshop in evaluation of evidence in cases involving veterinary pathology and chemistry (*Appendix 10*).
Left: Network with prior probabilities before adding evidence. *Right:* Network after adding evidence.

Network (BBN) was constructed that illustrates how results from different investigations can be used to infer the cause of death (*Figure 7*). However the participants concluded that in this scenario neither the sets of hypotheses nor the different observed results could be considered independent and may be difficult to represent correctly as a BBN. It was noticed that the process of a veterinary pathology investigation had similarities with that of e.g. an investigation of a fire where new hypotheses and pieces of evidence are added stepwise. A scenario focusing on the interpretation of negative results in the investigation of an intentional release of anthrax was used in a tabletop exercise with staff working in a BSL-3 laboratory (*Appendix 8*).

The joint work on scenario construction was found to be an efficient way of building networks between partners and disciplines and may involve other persons than those which should be trained. The scenario workshop format was also useful for introducing new concepts including statistical analysis of sampling results. Since the involvement of different actors in the scenario building process was found to be crucial for reaching the goals it may be questioned if a database of ready-to-use scenarios would be beneficial for the preparedness at EU level. However, the skeleton of the scenarios may be used as a starting-point for developing customized scenarios that are representative for the local agricultural practices, infrastructure and organization of companies and authorities. In this context, the essence of a scenario is the type of decision that should be made, the type of information that should be interpreted and the challenges faced. Relevance and realism of the scenario are important for the motivation of participants and the agent and target should be selected with regard to these facts. A concept for scenario construction and a toolbox including checklists and scenario skeletons could be valuable for improving the preparedness against bioterrorism.

Presenting scientific evidence to a court or decision maker is different from writing scientific publications and most scientists have never participated in a forensic investigation. At the same time, forensic components in exercises have been lacking (14). Both the development of good

forensic scenarios and conduction/evaluation of exercises take time and resources and are not activities typically funded by research projects. Consequently there is a need for funding and encouragement for researchers and students to learn and train evaluation of evidence. The experience from the AniBioThreat project indicates that the forensic approach to presenting scientific evidence and the associated uncertainties would be valuable also when presenting results to decision makers and risk managers in other contexts. Thus, adopting a common approach for the presentation of evidence/results in forensic reports and normal expert statements could potentially result in better decision support to risk managers as well as a better preparedness to conduct forensic investigation of bio-crimes. Building statistical models and generating scientific data is only one step towards improved capacity in microbial forensics. Equally important is to train scientists and decision makers in forensic work. In addition, several important knowledge gaps relate to the communication process itself. Examples of this are how the evaluation process works in practice under different scenarios and how the reports and statements are perceived by the client. In order to build a capacity in forensic microbiology it will thus be necessary to apply an iterative approach including education, exercises and research (*Figure 8*).

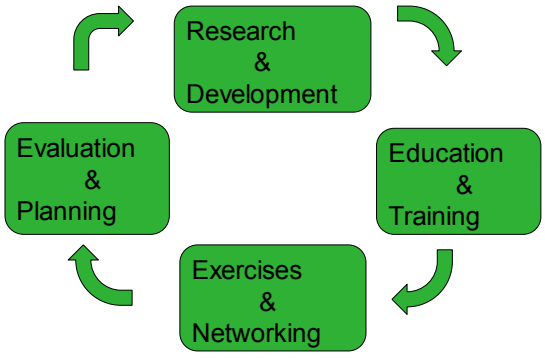


Figure 8. Building up a capacity in forensic microbiology

The ability to combine circumstantial evidence from very different types of investigations, such as forensic entomology, witness statements and matching of DNA fingerprints makes the BBN a promising tool for creating joint situation awareness during the investion of CBRN incidents. However, as noticed in the analysis of the pathology case some scenarios may be difficult to be represented as a Bayesian Network. Nevertheless the model building appears to be a useful way of structuring data and uncertainties, to identify relevant reference population and critical parameters and to promote informed decision making during the investigation.

CONCLUSIONS

The activities in Task 1.1 had an integrative role within this project. The main objective was to create joint situation awareness between partners in the project and to facilitate coordination of activities in different tasks. Therefore, it is not focused on a single action in the EU CBRN Action Plan. However, the results from the work have contributed to the fulfilment of several actions:

B11 The cross disciplinary work in tasks 1.1, 4.2 and 4.3 has introduced a logical framework for evaluation of evidence in microbial forensics and veterinary microbiology. The framework was introduced to laboratory staff and decision makers through scenario workshops (*Appendices 9 and 10*) and a pilot exercise (*Appendix 8*). Analysis of additional forensic microbiology scenarios will offer means to evaluate how well a detection method performs in terms of value of evidence and thus contribute to the setting of minimum requirements for sampling, detection, identification and monitoring of pathogens and toxins.

H1 The collection and representation of knowledge on e.g. threats, vulnerabilities and capabilities is essential for the risk-assessment based establishment of lists of high risk agents and for the establishment of criteria for such lists. This includes for example conceptual understanding of risks threats vulnerabilities and a contribution to vulnerability assessment conducted within AniBioThreat task 2.1. Exercises such as "Insider" conducted in task 4.1 (*Task 4.1 Appendix 1*) which involves decision makers will be an important tool for understanding how the criteria would be interpreted and applied. It is recommended that decision making relating to high risk lists should be studied in tabletop exercises focusing on for example theft of contagious material and threat assessment and involving decision makers from different organizations and member states. The setting of definitions for terms used in a criteria set for the risk assessment of biological agents supports the interdisciplinary work. Since only short phrases are used to describe the single criteria and measures, it is crucial that everybody filling in data into the system should use the same interpretation of the respective criteria.

H17 A structured representation and visualization of domain knowledge is essential for the communication of security information to stakeholders such as first responders and decision makers. The process of collaborative scenario building involving experts from different disciplines including scientists, police officers and veterinarians was found to be useful for identifying what kind of decisions are made by different actors and thus contribute to identify what kind of security information is adequate to provide to whom.

The work done in Task 1.1 is also relevant for the following actions of the EU CBRN Action Plan:

B9 The work on scenario analysis together with tasks 4.2 and 4.3 and the exercise with BSL-3 laboratory staff (*Appendix 7*) has contributed to a better understanding of the role of simulants as positive controls in microbial forensic investigation including associated caveats. An important aspect is that the simulants may have different properties in comparison to the target organisms in certain aspects. For example *Bacillus cereus* appears to be more competitive than *Bacillus anthracis* in the broth used for pre-enrichment and controls performed with *B. cereus* as a simulant may overestimate the detection probability (Andersson, Unpublished results). The work on evaluation of evidence from microbiological analyses will also contribute to the establishment of criteria for validation of such methods.

H22 The generic scenario methodology used in the project was found to be useful also for scenarios in sampling and detection. The experience from the sampling and detection scenarios used in the table top exercise with laboratory staff and the scenario workshop at the WP5 meeting in December 2011 (*Appendix 11*) showed that even a very simple scenario gave rise to interesting discussions where participants should discuss what statements could be made about the contamination levels in a material from which samples are taken. The work on evaluation of evidence indicated that the Bayesian approach for evaluation of evidence is a useful approach for constructing scenarios in microbial forensics. Modelling tools for evaluating microbiological evidence have been developed within epidemiology (15),

forensic sciences (16) and risk assessment (17). However, most microbiologists seem to be aware of neither the statistical aspects of the result evaluation nor of the tools to deal with them. An important use of detection scenarios is to involve microbiologists in forensic exercises in order to raise their awareness of the interpretation problems and to initiate a discussion on how results from microbiological analyses should be presented to be useful in forensic and epidemiological investigations.

Extra outcomes

The work on scenarios was the most efficient way to exchange knowledge between organizations and disciplines and served to strengthen the network of experts from safety, security and research. Although the workshops and exercises served well to disseminate knowledge and information to the participants the most important outcome was that the process of constructing the scenario as well as the interaction with the participants increased the cross disciplinary skills of the organizing team. Thus the joint construction of scenarios and exercises will not only be an important step towards useful and relevant definitions and explanations for terms but also contribute to an increased capability of handling bioterror incidents.

In retrospect the work on the database of terms and definitions may be seen as a pilot work that is useful for setting the specification for a full-scale database. It was noted that the understanding of a term depends largely on an understanding of its context, which may be a procedural manual or a legal document. Thus when constructing a term database for supporting communication in the CBRN field it is important that this information is included together with references to the source documents. In order for such a database to be maintained and updated it is essential to have a strategy for how the different organisations could be involved in keeping their own terms updated. This may for example be accomplished by creating a term-repository, analogous to Genebank where terms, and definitions could be deposited together with relevant metadata.

FUTURE OUTLOOK AND RECOMMENDATIONS

Based on the work in this task we would like to propose some recommendations for future work within this area. References to relevant sections, publications or appendices are provided where applicable.

Recommendation in relation to terminology (13)

(Appendices 1-3)

- Focus on awareness of alternative definitions and ontologies rather than providing definitions for words from common language.
- Cross disciplinary communication should be part of the training of persons working in the interdisciplinary CBRN field including for example first responders, diagnostics personnel and decision makers.
- A searchable repository for terms and definition from competent bodies and authorities would be a valuable addition to existing term banks and glossaries.
- A domain based collection of text sources would support broader mechanistic text analytics.

Recommendation in relation to scenario work

(Section "Extra Outcomes")

- Scenarios for exercises and training should be constructed locally and the collective construction of scenarios should be appreciated as an important networking activity.
- An EU level scenario activity should focus on supporting local scenario construction.

Recommendation in relation to microbial forensics

(5), *(Section "Scenarios for forensics", Appendices 8-10)*

- Use the same generic concepts for routine source tracking and forensic investigations to maintain the competence and to promote cross-fertilization between methodology used in microbial forensic investigations and normal epidemiological investigations (5).
- Involve scientists such as bioinformaticians, statisticians and epidemiologists in forensic-exercises and scenario building (*Appendix 8*).
- Highlight research and training needs.
- Apply the forensic approach for evaluation of evidence to assess the value of planned reference data generation.

PUBLICATIONS FROM TASK 1.1

Peer reviewed publications

- Andersson MG, Tomuzia K, Löfström C, Appel B, Bano L, Haralampos K, et al. Separated by a common language - Awareness of term usage differences between languages & disciplines applied in biopreparedness. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. 2013; in press.
- Andersson MG, Sundström A, Lindström A. Bayesian networks for evaluation of evidence from forensic entomology. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. 2013; in press.

Conference proceedings

- Andersson G, Aspán A, Hultén C, Ågren E, Barker GC, editors. Application of forensic evaluation of evidence to the tracing of Salmonella. Symposium Salmonella and Salmonellosis I3S; 2013; Saint-Malo FRANCE.

ACKNOWLEDGEMENTS

The framework of the EU-project AniBioThreat (Grant agreement: HOME2009/ISEC/AG/191) with support from the Prevention of and Fight against Crime Programme of the European Union European Commission – Directorate-General Home Affairs. This publication reflects the views only of the authors, and the European Commission cannot be held responsible for any use which may be made of the information contained therein.

REFERENCES

1. Council of the European Union. EU CBRN Action Plan2009: Available from: http://register.consilium.europa.eu/pdf/en/09/st15/st15505-re01.en09.pdf.
2. EU CBRN Task Force. Report of the CBRN Task Force2009: Available from: http://www.ebsaweb.eu/GGTSPU-argusgate02.bfr.bund.de-25391-3642556-NGrXC2DO2OxJ1pJL-DAT/ebsa_media/Downloads/EBSAActivities/Biosecurity+and+Bio_preparedness-p-877/CBRNupdate02_02_2009-p-1180/CBRN+TF+Report_20_01_2009.doc.
3. Faber Benítez P. The cognitive shift in terminology and specialized translation. MonTI Monografías de Traducción e Interpretación, Universidad de Alicante Alicante, España. 2009;1:107-34.
4. Andersson MG, Sundström A, Lindström A. Bayesian networks for evaluation of evidence from forensic entomology. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. 2013;in press.
5. Andersson G, Aspán A, Hultén C, Ågren E, Barker GC, editors. Application of forensic evaluation of evidence to the tracing of Salmonella. Symposium Salmonella and Salmonellosis I3S; 2013; Saint-Malo FRANCE.
6. EFSA, editor. When food is cooking up a storm. Proven recipes for risk communications. Parma (Italy)2012.
7. CAC. Codex Alimentarius Commission procedural manual Twentieth edition. Rome: Joint FAO/WHO Food Standards Programme; 2011.
8. DHS. THS Risk Lexicon: US Department of Homeland Security; 2010.
9. WHO. WHO/CDS/EPR/2006.6 Biorisk management Laboratory biosecurity guidance: World Health Organisation2006.
10. DNV. Biorisk. 2013 [cited 2013 May]; Available from: http://www.dnv.com/services/consulting/biorisk/.
11. CAC. CAC/GL 63-2007 Principle and guidelines for the conduct of Microbiologica risk managment (MRM) Codex Alimentarius. 2007.
12. OIE. OIE – Terrestrial Animal Health Code: World OOrganization for Animal Health; 2011.
13. Andersson MG, Tomuzia K, Löfström C, Appel B, Bano L, Haralampos K, et al. Separated by a common language - Awareness of term usage differences between languages & disciplines applied in bio-preparedness. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. 2013;in press.
14. Reutter D, Schutzer SE, Craft CM, Fletcher J, Fricke FL, Holowachuk SA, et al. Planning for exercises of chemical, biological, radiological, and nuclear (CBRN) forensic capabilities. Biosecur Bioterror. 2010 Dec;8(4):343-55.
15. Martin PA, Cameron AR, Greiner M. Demonstrating freedom from disease using multiple complex data sources 1: a new methodology based on scenario trees. Preventive Veterinary Medicine. 2007 May 16;79 (2-4):71-97.
16. Jarman KH, Kreuzer-Martin HW, Wunschel DS, Valentine NB, Cliff JB, Petersen CE, et al. Bayesian-integrated microbial forensics. Applied and Environmental Microbiology. [Research Support, U.S. Gov't, Non-P.H.S.]. 2008 Jun;74(11):3573-82.
17. van Schothorst M, Zwietering MH, Ross T, Buchanan RL, Cole MB, (ICMSF) ICoMSfF. Relating microbiological criteria to food safety objectives and performance objectives. food control. 2009;20(11):967-79

APPENDIX

Appendix 1:
Tutorial terms and definitions database

Appendix 2:
Report from terminology workshop
December 14, 2011

Appendix 3:
Delivery report from TNC including
main document and annex 1 & 4

Appendix 4:
Report from scenario workshop at AniBioThreat kickoff meeting in Uppsala October 2010

Results are reported as restricted (Annex X). The annex has been classified in accordance with the Swedish law “Offentlighets- och sekretesslagen (SFS 2009:400)”: Chapter 15, § 1, Chapter 15, § 2, and Chapter 18, § 13.

Appendix 5:
Conceptual framework for scenario building

Appendix 6:
Summary table of core scenarios
from AniBioThreat

Appendix 7:
Summary table of User scenarios
from activities in AniBioThreat

Appendix 8:
Report from tabletop exercise
– evaluation of results

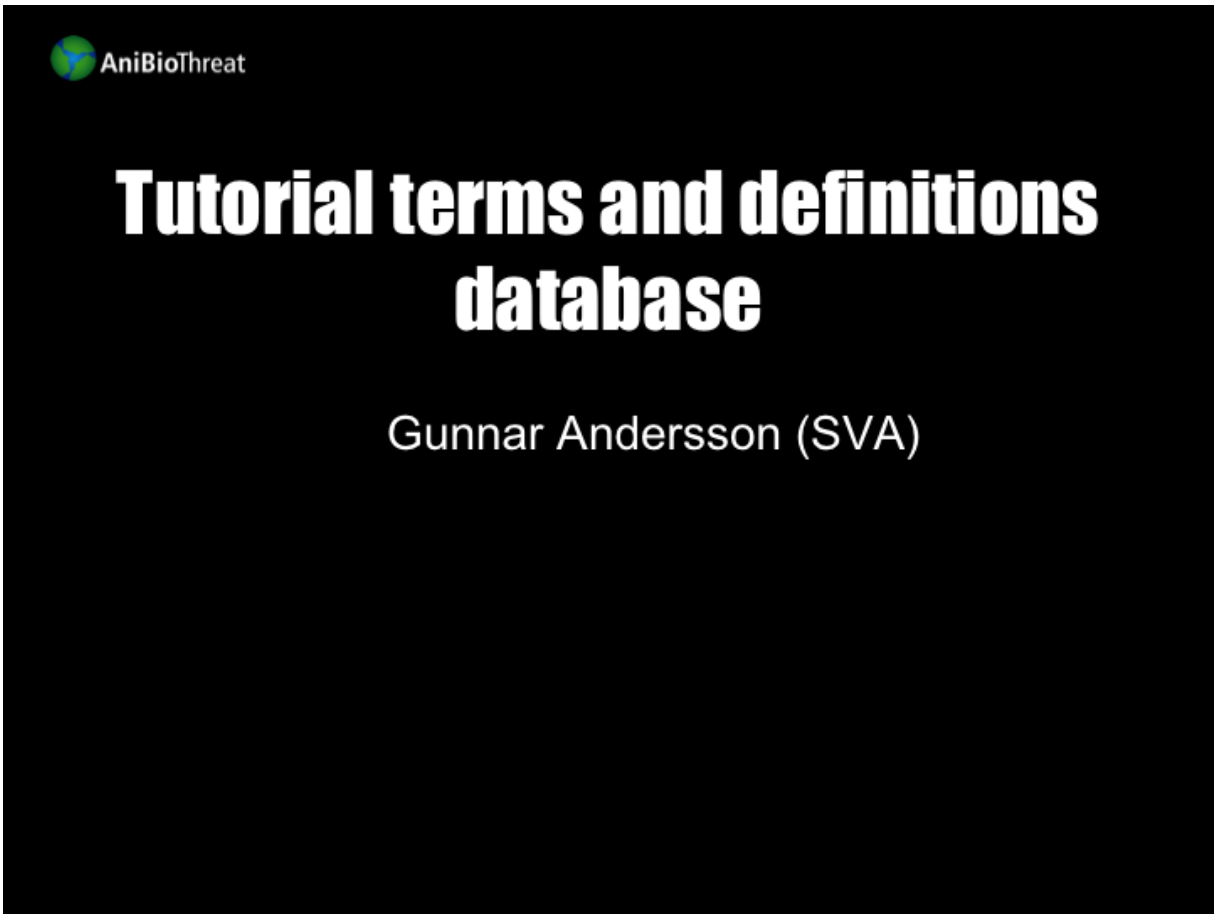
Results are reported as restricted (Annex X). The annex has been classified in accordance with the Swedish law “Offentlighets- och sekretesslagen (SFS 2009:400)”: Chapter 15, § 1, Chapter 15, § 2, and Chapter 18, § 13.

Appendix 9:
Report from workshop in evaluation of evidence, Jan 26 2012

Appendix 10:
Report from workshop in evaluation of evidence in cases involving veterinary pathology and chemistry

Appendix 11:
Report from Scenario workshop at
WP5 meeting in Paris


AniBio Threat
BRIDGING SECURITY, SAFETY AND RESEARCH


AniBioThreat
Tutorial terms and definitions database
Gunnar Andersson (SVA)

AniBioThreat

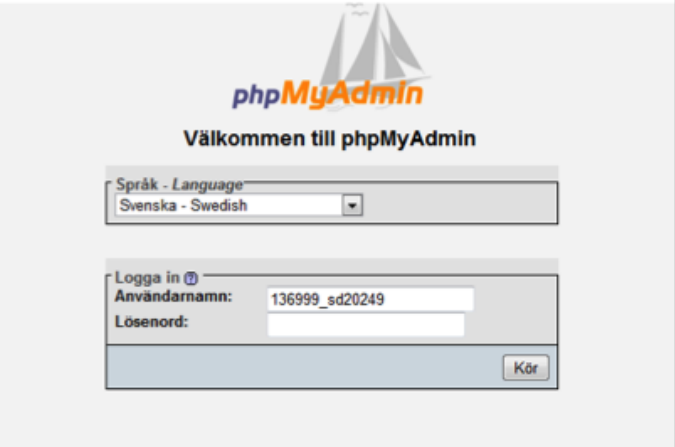
Database of terms and definitions

- ~950 entries
- Alternative definitions from different sources and contexts
- Many definitions related to ”risk/biorisk” and ”detection”
- Translations, synonyms and associated terms
- Available as MySQL database!
  - ONLINE at http://termdatabase-136999.phpmyadmin.mysql.binero.se
  - Advanced search and sorting using ”Standard Query Language” (SQL)
  - Export custom lists
  - Add and edit online using phpMyAdmin

AniBioThreat

Log in to web hotel

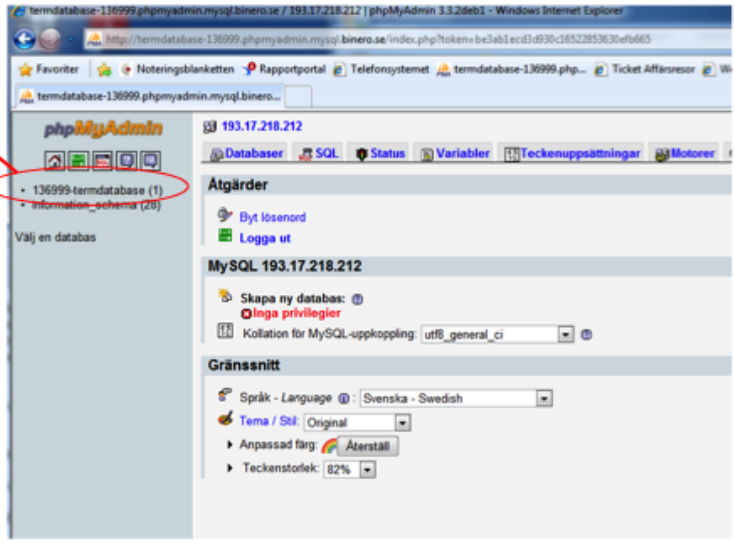
- http://termdatabase-136999.phpmyadmin.mysql.binero.se
- Select your language
- Enter username and password
- For read only user:
  - User:: 136999_sb71011
  - pw: AniBioTerms!1



AniBioThreat

Find the right table in database

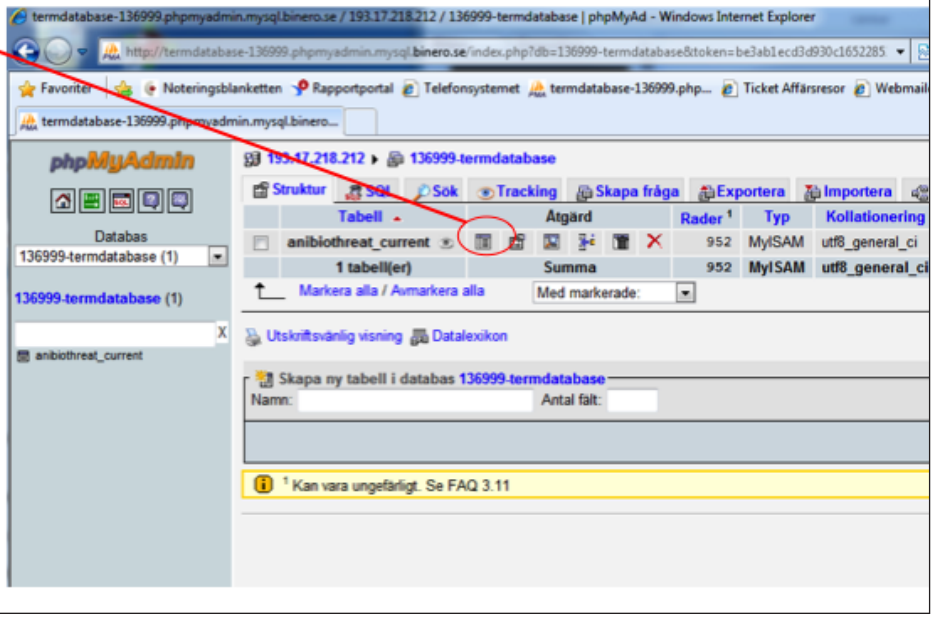
- Select ”termdatabase”



AniBioThreat

Select the table

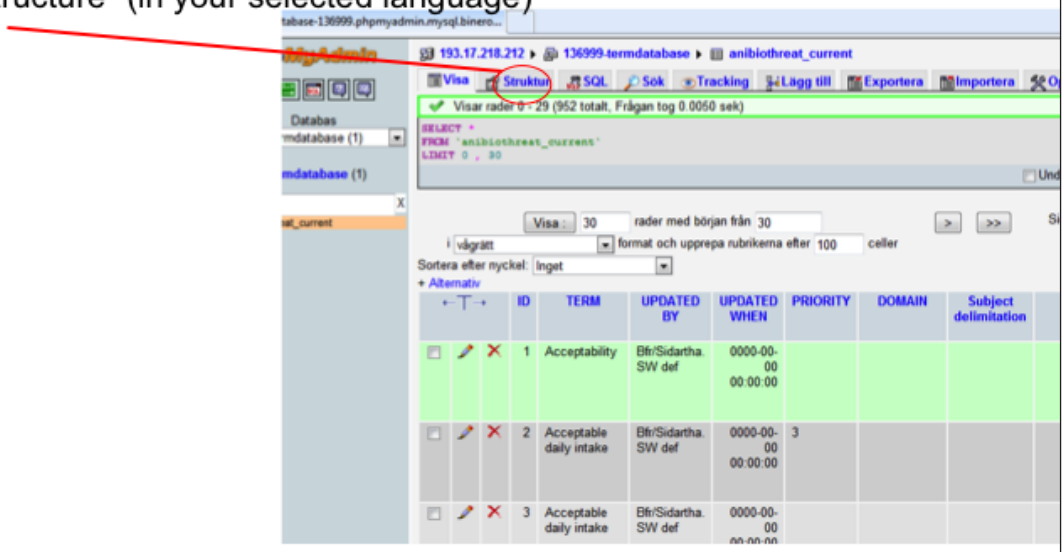
- ”AniBioThreat current” is a table in the database ”termdatabase”
- Click here to view the full table



AniBioThreat

Overview of database

- To get an overview of database structure press "structure" (in your selected language)



AniBioThreat

Structure

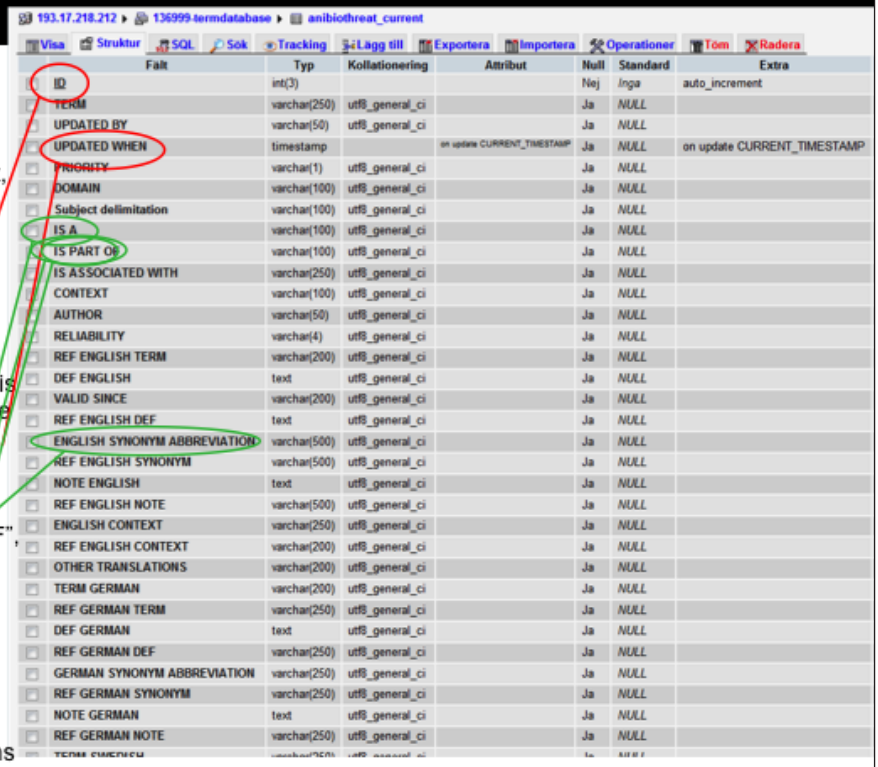
The fields are essentially the same as in the spreadsheet, following the recommendation by TNC

New fields is "ID", a unique number generated when a new entry is created and ""UPDATED WHEN" which is the exact timepoint when the entry was last modified.

Related terms are listed in column "IS A", "IS PART OF", "IS ASSOCUIATED WITH" and "ENGLISH SYNONYM ABBREVIATION"

Click on column name to see details.

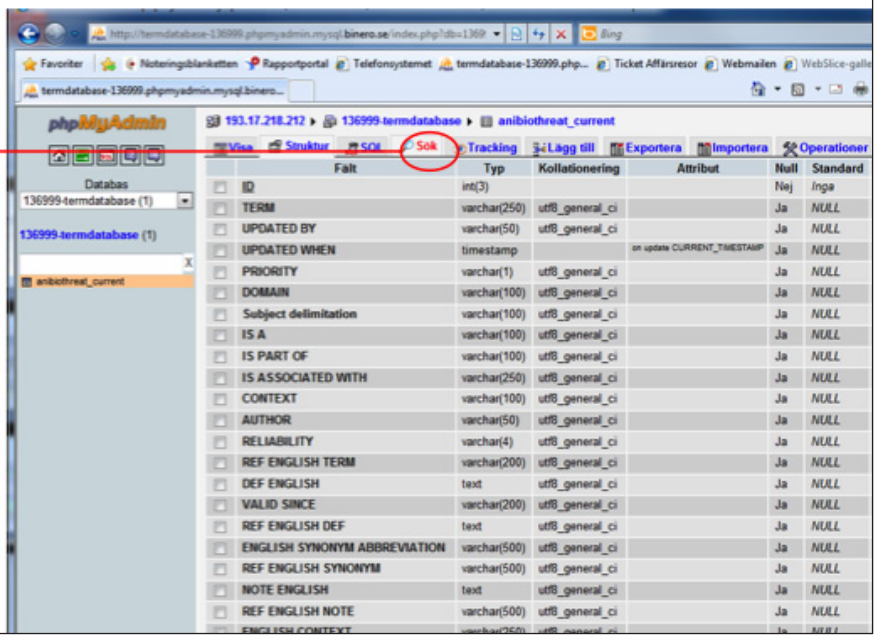
Detailed description of columns is in appendix.



AniBioThreat

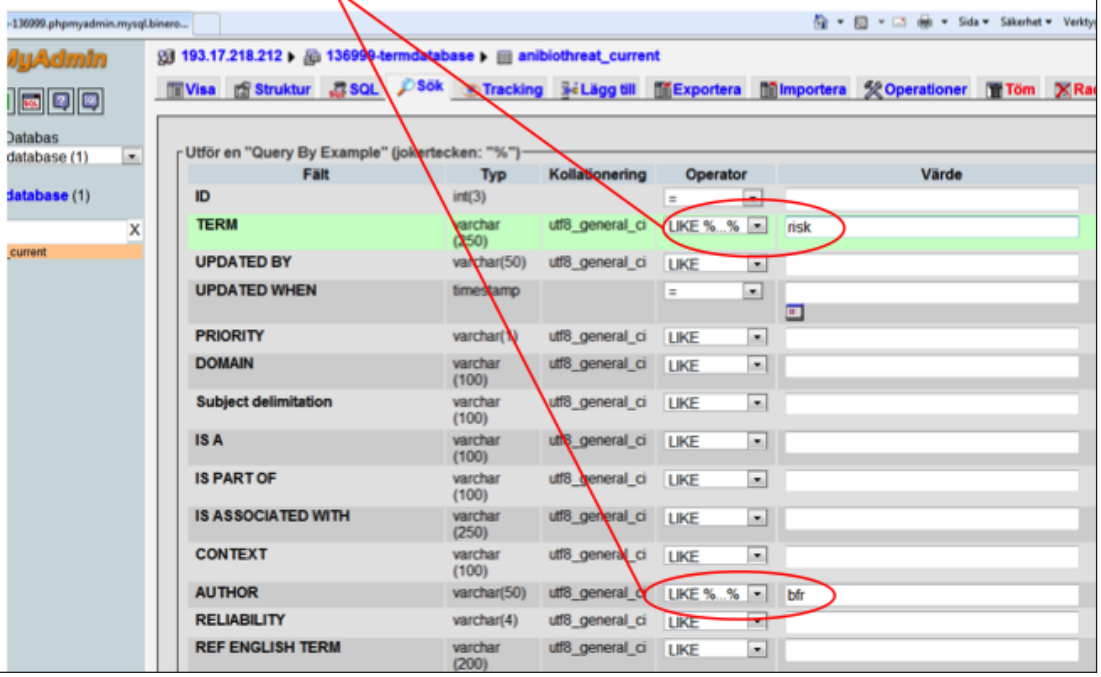
Get customized view

To select columns and perform simple search use the ”search/sök” function



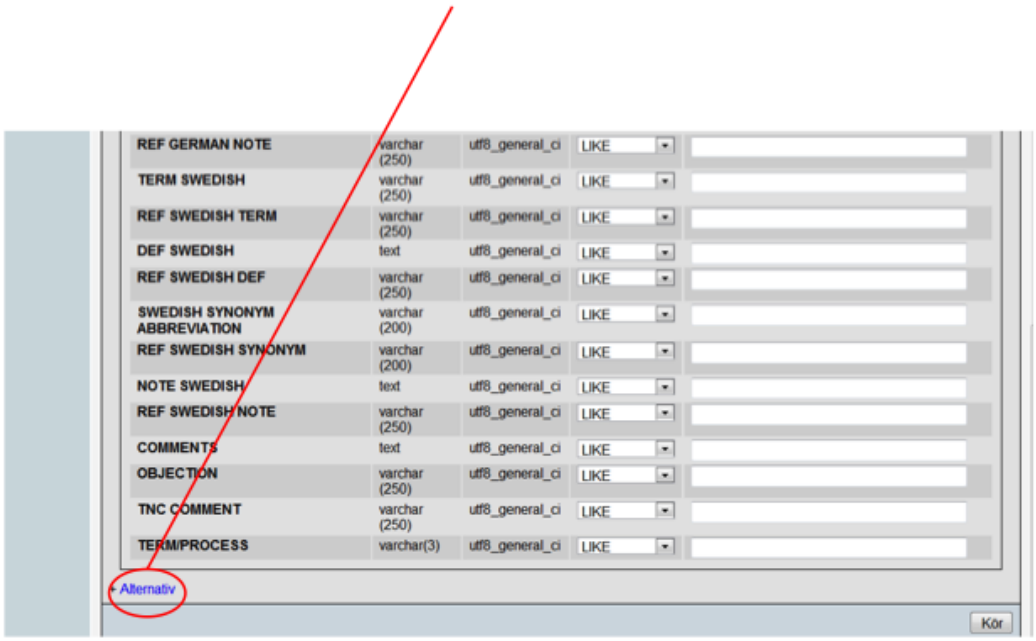
AniBioThreat

Enter search terms in one or several fields. "%" works as wildcard. The example below returns entries where the columns TERM and AUTHOR contains the words "risk" and "bfr" respectively. If you want to return all terms leave all fields blank



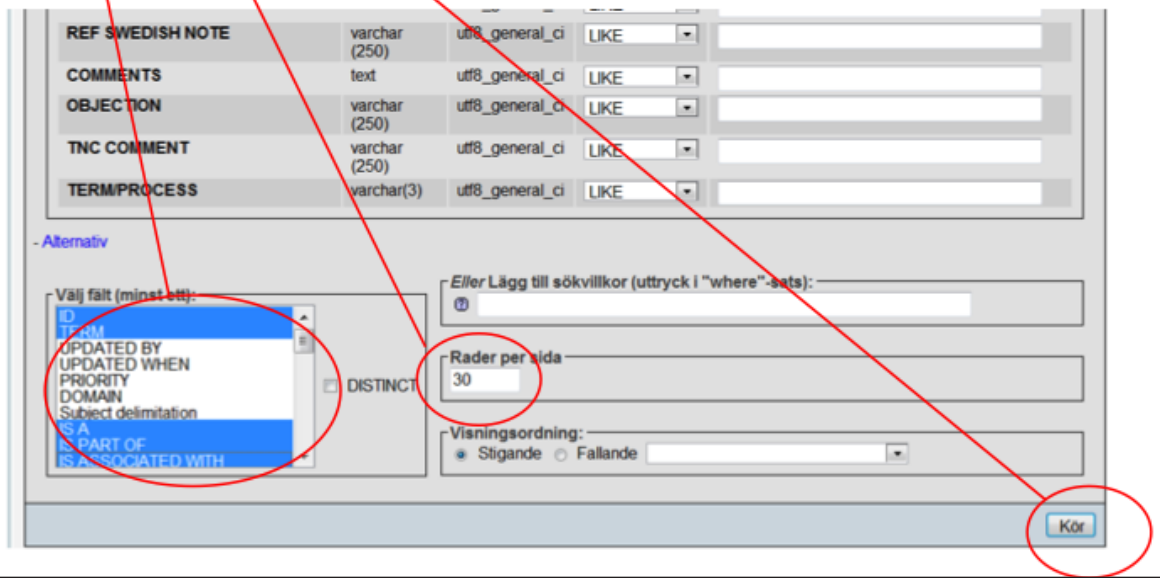
AniBioThreat

To select the columns you want to see, press "alternative" (or equivalent in your own language)



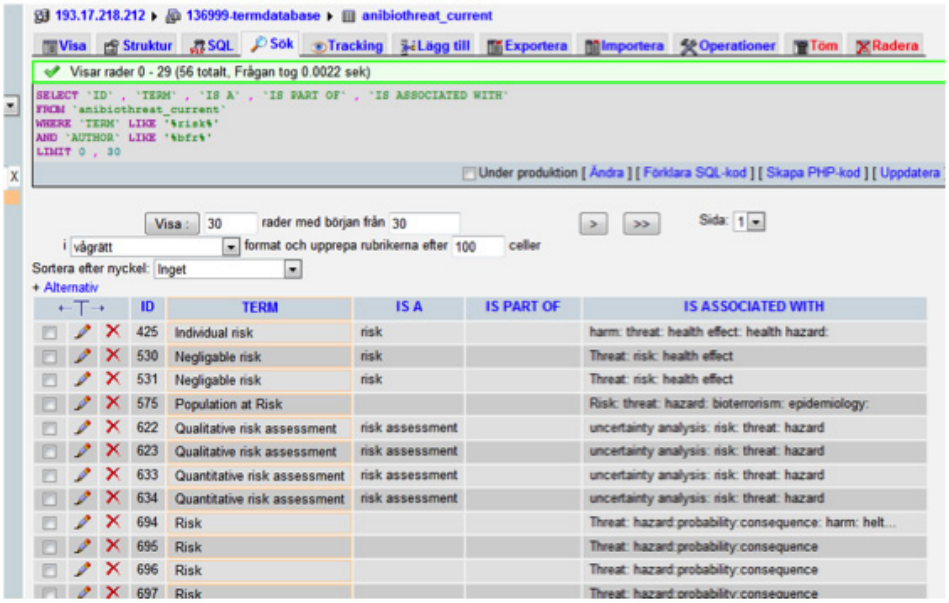
AniBioThreat

- Select the columns you want to see, (hold down 'control' to select multiple)
- You may also select the number of entries per page.
- Then press "run" (or equivalent)



AniBioThreat

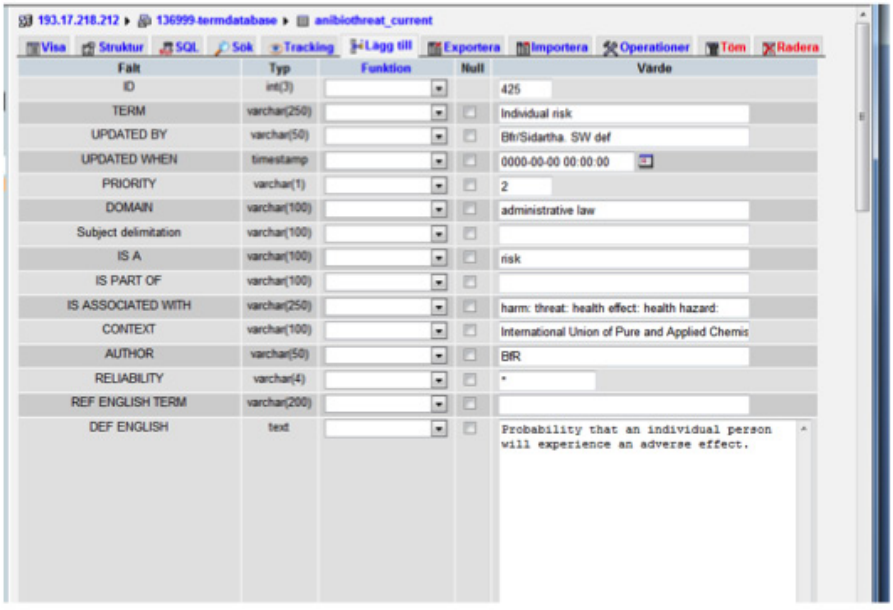
- Then you will get this view
- To modify an entry click on the pencil



ID	TERM	IS A	IS PART OF	IS ASSOCIATED WITH
425	Individual risk	risk		harm: threat: health effect: health hazard:
530	Negligable risk	risk		Threat: risk: health effect
531	Negligable risk	risk		Threat: risk: health effect
575	Population at Risk			Risk: threat: hazard: bioterrorism: epidemiology:
622	Qualitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard
623	Qualitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard
633	Quantitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard
634	Quantitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard
694	Risk			Threat: hazard:probability:consequence: harm: helt...
695	Risk			Threat: hazard:probability:consequence
696	Risk			Threat: hazard:probability:consequence
697	Risk			Threat: hazard:probability:consequence

AniBioThreat

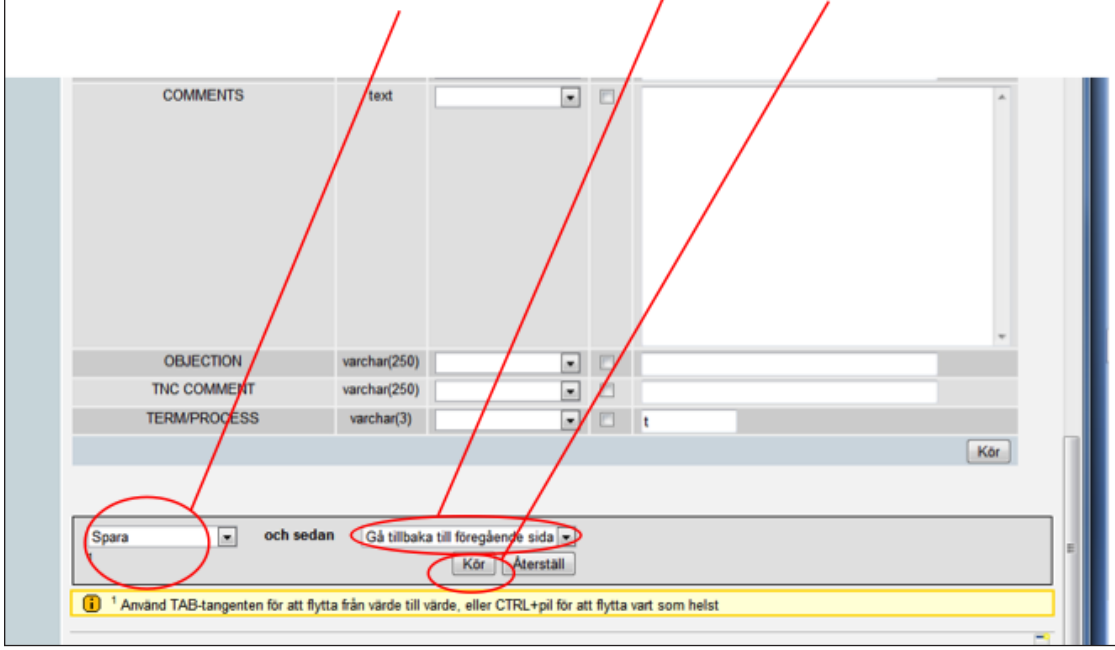
In this view you may edit the text of any field (column). UPDATED WHEN is automatically changed if you save updates.



Fält	Typ	Funktion	Null	Värde
ID	int(3)			425
TERM	varchar(250)			Individual risk
UPDATED BY	varchar(50)			Bfr/Sidartha. SW def
UPDATED WHEN	timestamp			0000-00-00 00:00:00
PRIORITY	varchar(1)			2
DOMAIN	varchar(100)			administrative law
Subject delimitation	varchar(100)			
IS A	varchar(100)			risk
IS PART OF	varchar(100)			
IS ASSOCIATED WITH	varchar(250)			harm: threat: health effect: health hazard:
CONTEXT	varchar(100)			International Union of Pure and Applied Chemis
AUTHOR	varchar(50)			BfR
RELIABILITY	varchar(4)			*
REF ENGLISH TERM	varchar(200)			
DEF ENGLISH	text			Probability that an individual person will experience an adverse effect.

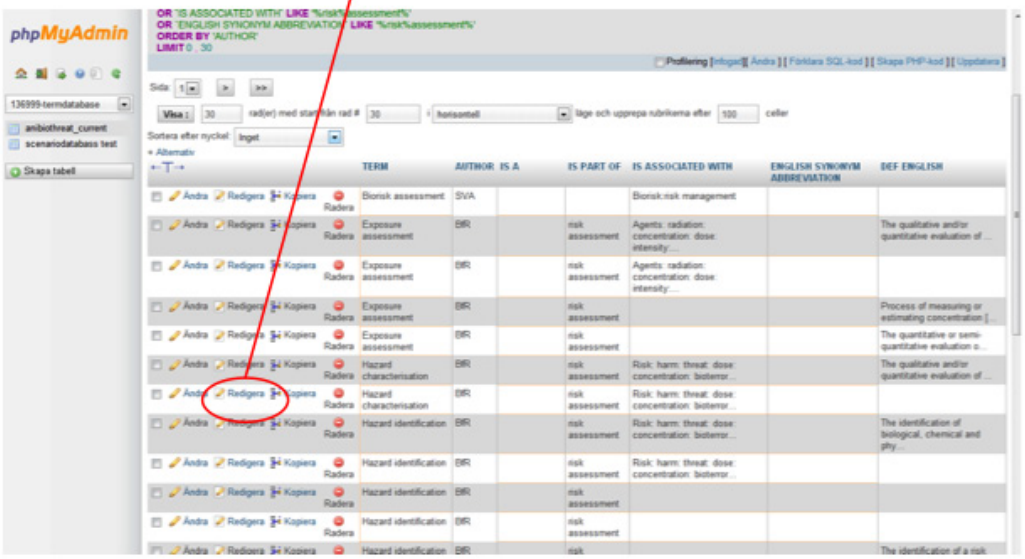
AniBioThreat

- When you are done, select "save and go back to previous page" then "run"



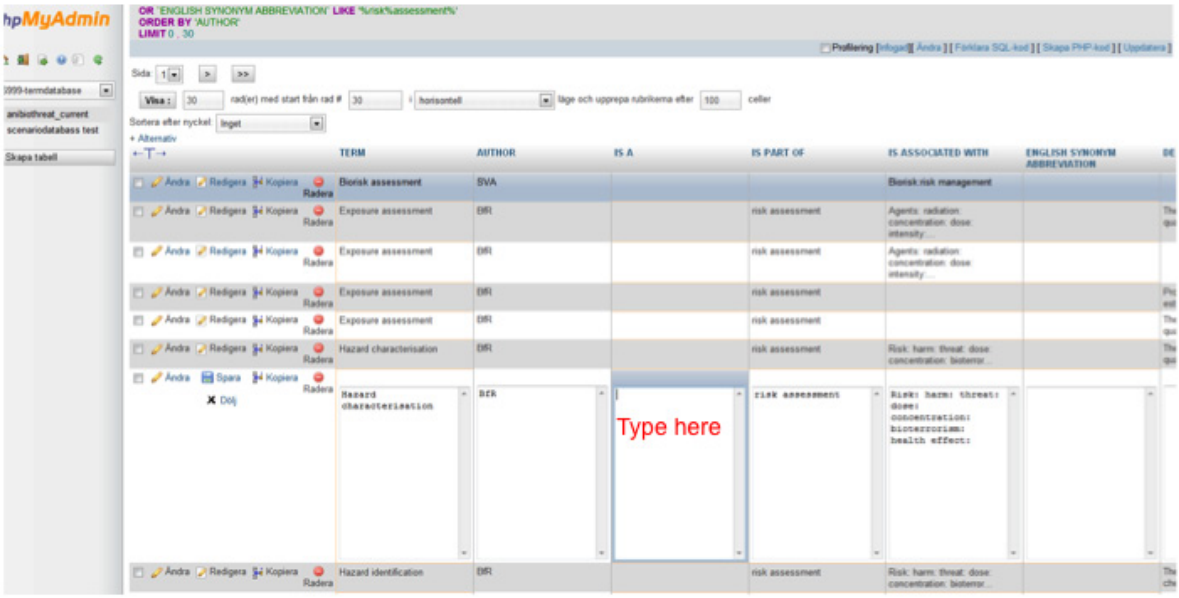
AniBioThreat

In the updadet version of PhPMyAdmin it is also possible to edit entries directly in the list. Expand the line by clicking "edit" or equivalent in our language.



AniBioThreat

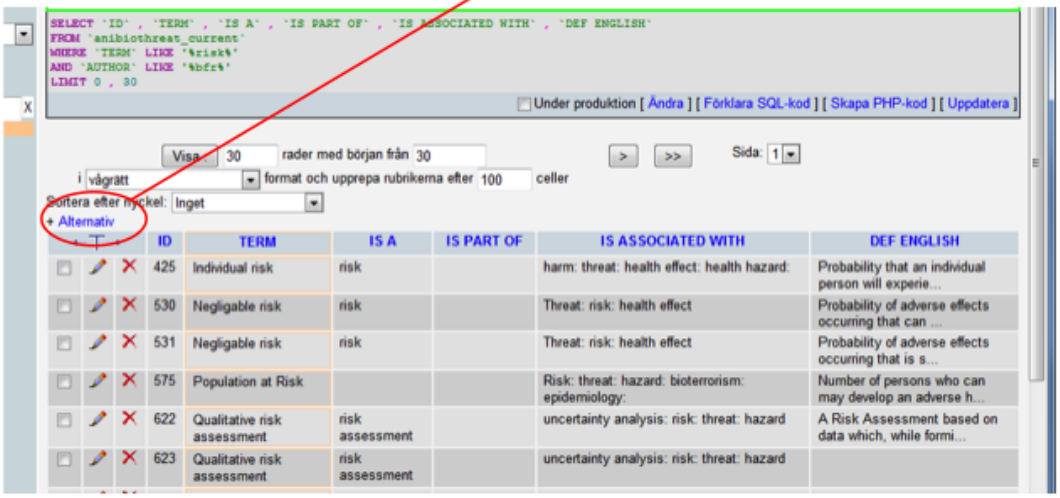
Text can now be entered or edited directly in the fields. This works for columns of type "varchar".



AniBioThreat

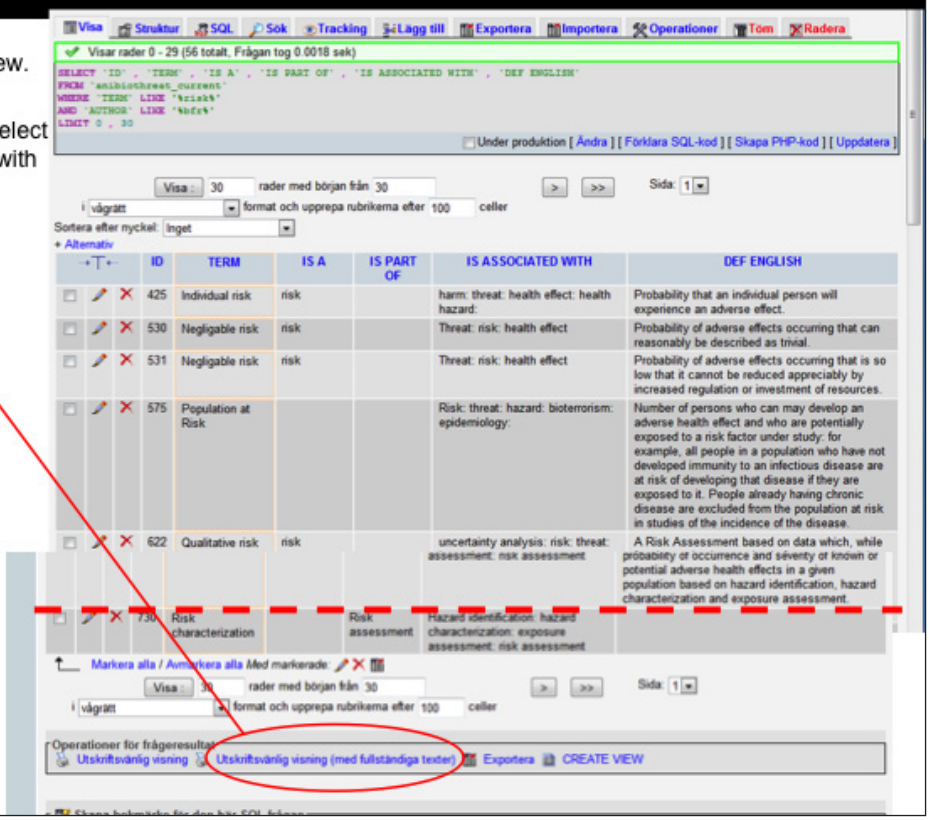
If you selected a column with long texts you can click at "alternative"

and then select "view full text" (or equivalent) and press "run"



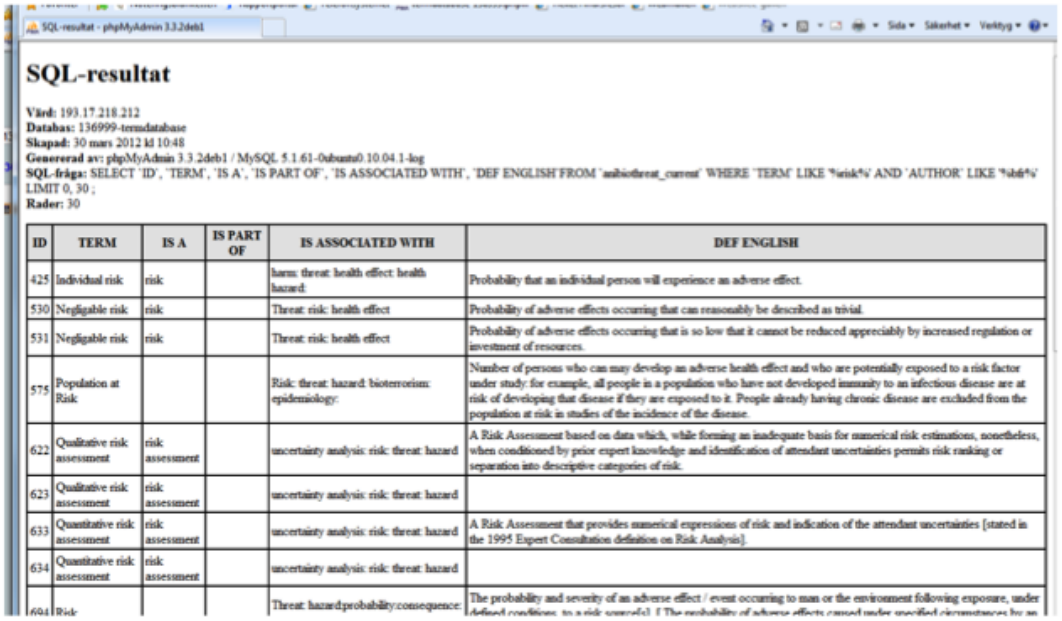
AniBioThreat

- That gives you this view.
- If you wish you may select "printer friendly view [with full text]"



AniBioThreat

To get this result. This page may be printed, but you may also copy it and paste into e.g. word or excel.



SQL-resultat - phpMyAdmin 3.3.2deb1

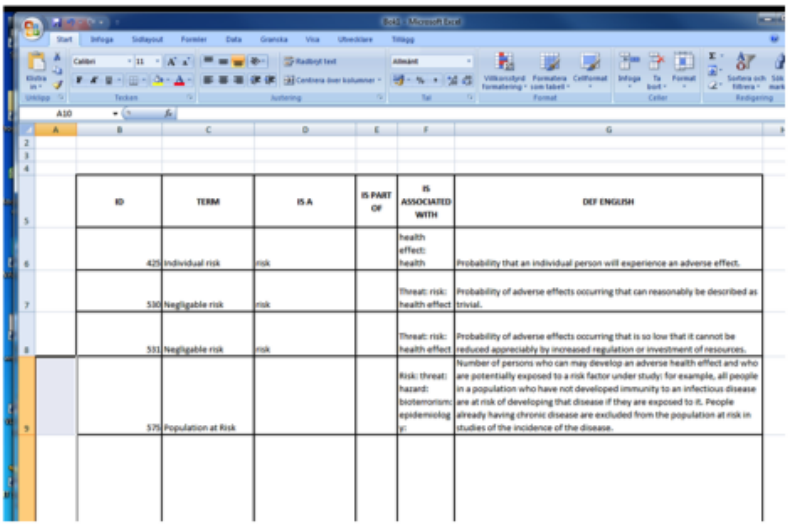
SQL-resultat

Värd: 193.17.218.212
Databas: 136999-termdatabase
Skapad: 30 mars 2012 kl 10:48
Genererad av: phpMyAdmin 3.3.2deb1 / MySQL 5.1.61-0ubuntu0.10.04.1-log
SQL-fråga: SELECT `ID`, `TERM`, `IS A`, `IS PART OF`, `IS ASSOCIATED WITH`, `DEF ENGLISH` FROM `anibiothreat_current` WHERE `TERM` LIKE '%risk%' AND `AUTHOR` LIKE '%bf6%' LIMIT 0, 30 ;
Rader: 30

ID	TERM	IS A	IS PART OF	IS ASSOCIATED WITH	DEF ENGLISH
425	Individual risk	risk		harm: threat: health effect: health hazard:	Probability that an individual person will experience an adverse effect.
530	Negligable risk	risk		Threat: risk: health effect	Probability of adverse effects occurring that can reasonably be described as trivial.
531	Negligable risk	risk		Threat: risk: health effect	Probability of adverse effects occurring that is so low that it cannot be reduced appreciably by increased regulation or investment of resources.
575	Population at Risk			Risk: threat: hazard: bioterrorism: epidemiology:	Number of persons who can may develop an adverse health effect and who are potentially exposed to a risk factor under study: for example, all people in a population who have not developed immunity to an infectious disease are at risk of developing that disease if they are exposed to it. People already having chronic disease are excluded from the population at risk in studies of the incidence of the disease.
622	Qualitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard	A Risk Assessment based on data which, while forming an inadequate basis for numerical risk estimations, nonetheless, when conditioned by prior expert knowledge and identification of attendant uncertainties permits risk ranking or separation into descriptive categories of risk.
623	Qualitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard	
633	Quantitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard	A Risk Assessment that provides numerical expressions of risk and indication of the attendant uncertainties [stated in the 1995 Expert Consultation definition on Risk Analysis].
634	Quantitative risk assessment	risk assessment		uncertainty analysis: risk: threat: hazard	
604	Risk			Threat: hazard:probability:consequence:	The probability and severity of an adverse effect / event occurring to man or the environment following exposure, under defined conditions, to a risk source(s). [The probability of adverse effects caused under specified circumstances by an

AniBioThreat

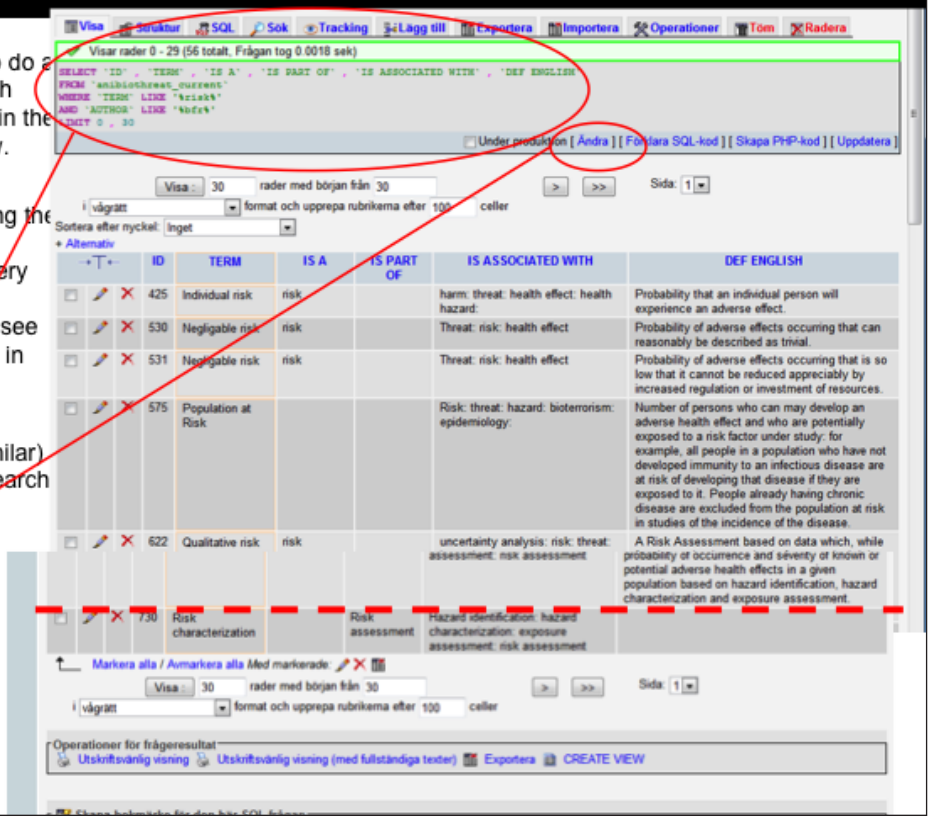
- When pasted in excel (or word) you get a perfectly editable table..



ID	TERM	IS A	IS PART OF	IS ASSOCIATED WITH	DEF ENGLISH
425	Individual risk	risk		health effect: health	Probability that an individual person will experience an adverse effect.
530	Negligable risk	risk		Threat: risk: health effect	Probability of adverse effects occurring that can reasonably be described as trivial.
531	Negligable risk	risk		Threat: risk: health effect	Probability of adverse effects occurring that is so low that it cannot be reduced appreciably by increased regulation or investment of resources.
575	Population at Risk			Risk: threat: hazard: bioterrorism: epidemiology:	Number of persons who can may develop an adverse health effect and who are potentially exposed to a risk factor under study: for example, all people in a population who have not developed immunity to an infectious disease are at risk of developing that disease if they are exposed to it. People already having chronic disease are excluded from the population at risk in studies of the incidence of the disease.

AniBioThreat

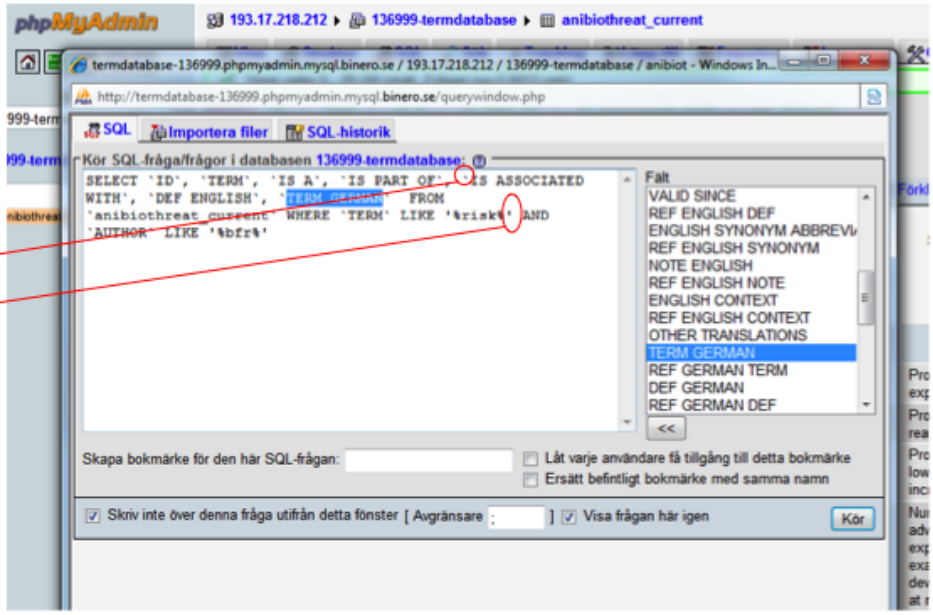
- Inow you may want to do a more advanced search than what is possible in the simple search window.
- This can be done using the "Standard Query Language" (SQL). Every time you search in phpMyAdmin you will see your query expressed in SQL code.
- Press "modify" (or similar) to edit or copy your search statement



AniBioThreat

- In this window you may edit the SQL query, for example by adding more fields. By clicking on a field in the colmn to the right you can enter it to the list ("*" means "all fields"). Remember to insert comma between terms. The text you enter after "WHERE determines the entries (lines) wou retrieve.

Note that different separators are used around names of fields and around search strings.



AniBioThreat

Search using "Standard Queary Language" (SQL)

Once you have a SQL text you may modify it to retriece exactly what you want. In this example we have separated several "WHERE" statements by "OR" in order to retrieve any term which contains the search string or where an associated term or synionym contains the string.
By insering a wildcard (%) in the string we will find alternative forms including "animalbioterrorism" , "animal bioterrorism" or "animal bio-terrorism"
You may also decide which column should be used for sorting and the number of rows per page.

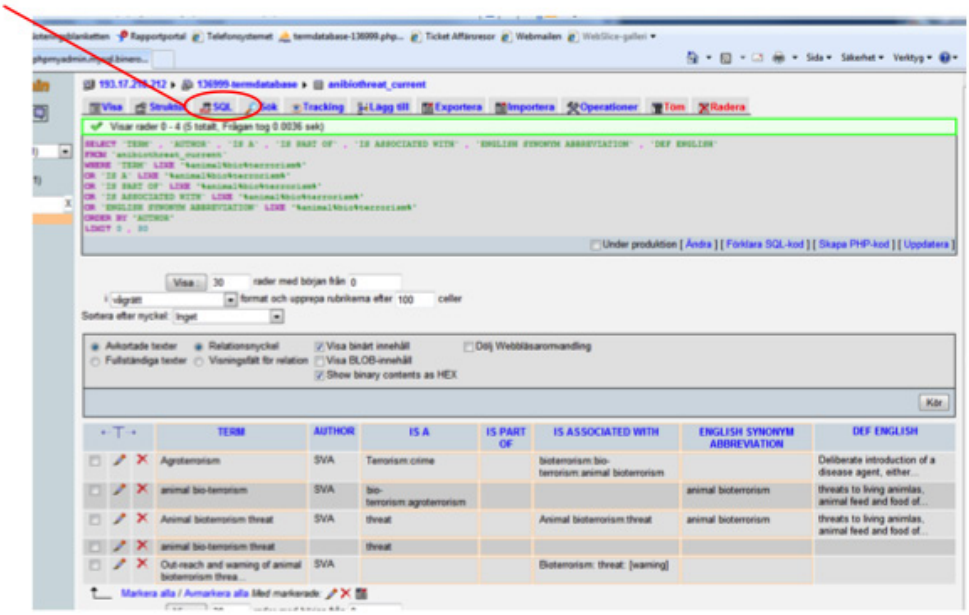
```
SELECT `TERM` , `AUTHOR` , `IS A` , `IS PART OF` ,
 `IS ASSOCIATED WITH` , `ENGLISH SYNONYM ABBREVIATION` , `DEF
   ENGLISH`
FROM `anibiothreat_current`
WHERE `TERM` like '%animal%bio%terrorism%'
OR   `IS A` like '%animal%bio%terrorism%'
OR   `IS PART OF` like '%animal%bio%terrorism%'
OR   `IS ASSOCIATED WITH` like '%animal%bio%terrorism%'
OR   `ENGLISH SYNONYM ABBREVIATION` like '%animal%bio%terrorism%'
ORDER BY 'AUTHOR'
LIMIT 0 , 30
```

Copy this text in the query editor to see all entries related to animal bio-terrorism

AniBioThreat

This is the result you get…

If you press "SQL" you will see a search window where this example is bookmarked…



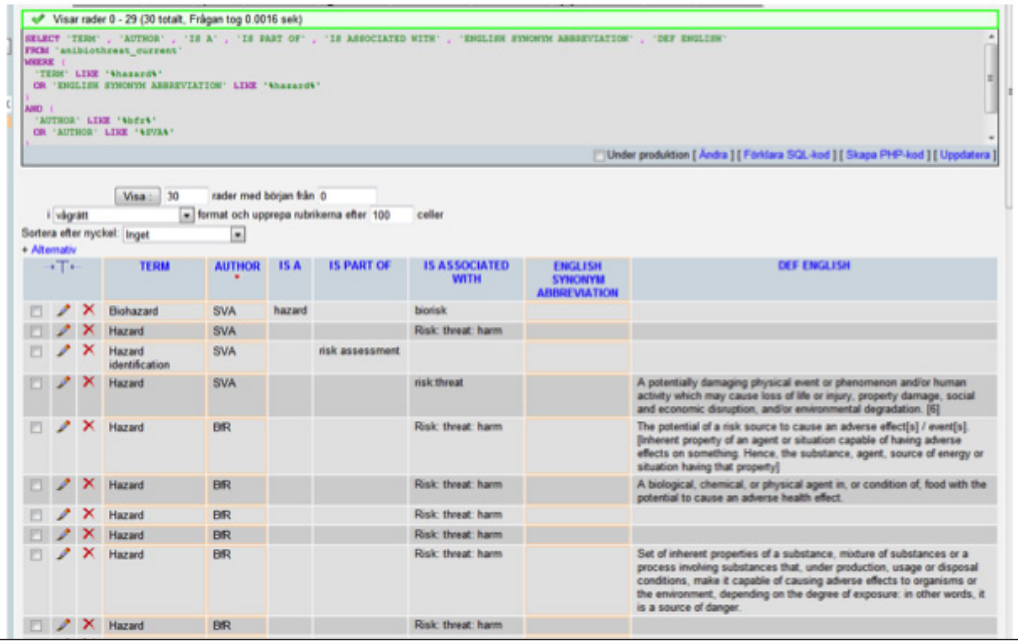
AniBioThreat

- By using brackets you may further refine your where statements. In the example below the SQL first looks for entries with "hazard" in term or synonym then looks for entries with "bfr" or "SVA" in AUTHOR.
- Then the AND combines the results from the first and second bracket…

```
SELECT `TERM` , `AUTHOR` , `IS A` , `IS PART OF` ,
 `IS ASSOCIATED WITH` , `ENGLISH SYNONYM ABBREVIATION` , `DEF
   ENGLISH`
FROM `anibiothreat_current`
WHERE
 ( `TERM` like '%hazard%'
OR   `ENGLISH SYNONYM ABBREVIATION` like '%hazard%' )
AND
(`AUTHOR` like '%bfr%'
OR   `AUTHOR` like '%SVA%' )
ORDER BY `AUTHOR` DESC
LIMIT 0 , 30
```

AniBioThreat

Then you get this.. (efter showing full texts). The terms from SVA comes first as the AUTHOR is sorted alphabetically in decending order (DESC after ORDER BY)



Visar rader 0 - 29 (30 totalt, Frågan tog 0.0016 sek)

```
SELECT `TERM` , `AUTHOR` , `IS A` , `IS PART OF` , `IS ASSOCIATED WITH` , `ENGLISH SYNONYM ABBREVIATION` , `DEF ENGLISH`
FROM `anibiothreat_current`
WHERE (
  `TERM` LIKE '%hazard%'
  OR `ENGLISH SYNONYM ABBREVIATION` LIKE '%hazard%'
)
AND (
  `AUTHOR` LIKE '%bfr%'
  OR `AUTHOR` LIKE '%SVA%'
)
```

Under produktion [Ändra] [Förklara SQL-kod] [Skapa PHP-kod] [Uppdatera]

Visa : 30 rader med början från 0

vågrätt format och upprepa rubrikerna efter 100 celler

Sortera efter nyckel: Inget

+ Alternativ

TERM	AUTHOR	IS A	IS PART OF	IS ASSOCIATED WITH	ENGLISH SYNONYM ABBREVIATION	DEF ENGLISH
Biohazard	SVA	hazard		biorisk		
Hazard	SVA			Risk: threat: harm		
Hazard identification	SVA		risk assessment			
Hazard	SVA			risk:threat		A potentially damaging physical event or phenomenon and/or human activity which may cause loss of life or injury, property damage, social and economic disruption, and/or environmental degradation. [6]
Hazard	BfR			Risk: threat: harm		The potential of a risk source to cause an adverse effect[s] / event[s]. [Inherent property of an agent or situation capable of having adverse effects on something. Hence, the substance, agent, source of energy or situation having that property]
Hazard	BfR			Risk: threat: harm		A biological, chemical, or physical agent in, or condition of, food with the potential to cause an adverse health effect.
Hazard	BfR			Risk: threat: harm		
Hazard	BfR			Risk: threat: harm		
Hazard	BfR			Risk: threat: harm		Set of inherent properties of a substance, mixture of substances or a process involving substances that, under production, usage or disposal conditions, make it capable of causing adverse effects to organisms or the environment, depending on the degree of exposure: in other words, it is a source of danger.
Hazard	BfR			Risk: threat: harm		

AniBioThreat

GOOD LUCK

Please send feedback on database or tutorial to gunnar.andersson@sva.se.

P.s. try searching terms WHERE

`TERM GERMAN` NOT LIKE ''
Or
`TERM SWEDISH` NOT LIKE ''

To see only terms with translation….
ds

AniBioThreat

Questions?

AniBioThreat

With the financial support from the Prevention of and
Fight against Crime Programme of the European Union

European Commission – Directorate – General Home Affairs

AniBioThreat

Partner: SVA

Type: Meeting report
Reg. no.: ABT2011-WP1-12
Project: HOME/2009/ISEC/AG/191
Date: 7/12 2011

Levels of classification:
☐ EU Restricted
☐ Internal use
☒ Open/Unclassified
Choose classification level:

TERMINOLOGY WORKSHOP
DECEMBER 14, 2011 UPPSALA SWEDEN

Participants

Henk Wisselink	CVI
Rickard Knutsson	SVA
Susanna Westerberg	SVA
Haralampos Keremidis	SJV
Gunnar Andersson	SVA
Claudia Dobrina	TNC
Erik Nordkvist	SVA
Jeffrey Skiby	DTU
Bo Sundqvist	SVA
Ulrika Allard Bengtsson	SVA
Henrik Nilsson	TNC
Elisabeth Sjöberg	SVA
Johan Olsson	SMI

Abstract (for newsletter)
The AniBioThreat partners CVI, DTU, SJV, SLU and SVA participated in a terminology workshop in Uppsala, Sweden on the 14th of December, in association with the WP2 meeting. Claudia Dobrina and Henrik Nilsson from the Swedish centre for terminology (TNC) gave a presentation on the distinctions between words, terms and concepts and on the analysis of concept systems and how to write proper definitions. They also presented the results of their analysis of prioritized terms from AniBioThreat. During group discussion the workshop participants constructed concept systems for concepts connected to risk/threat/hazard, biorisk and biorisk management.
Alternative solutions for managing a terms and definitions database were discussed. Henrik Nilsson (TNC) presented available software tool and requirements for data structure.
Alternatives to storing the present collection of AniBioThreat definitions in an Excel sheet were discussed with staff from the IT-department of SVA.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Meeting report

This report contains a short summary of the activities during the workshop. A more elaborate discussion on the topic which also considers results from discussions with other partners during the WP2 meeting and later reflections by the participants (edited by GA) is presented in appendix 1 “Discussion paper on terminology in AniBioThreat”. The meeting agenda is included as appendix 2.

TNC presentations

Claudia Dobrina presented the background to TNC and their work, the term bank and other assignments.
She explained terminology and terminology work, the determinations and designations.
Why – to ensure a clear communication between professionals and to deliver specialized knowledge in a concentrated form.
She also explained the role of terminology and terminology science – and the definitions.

The terminological tetrahedron includes term-concept-object and definition and showed some examples how formation of concepts is formed, difference between concept and objects. Objects have properties, concept has characteristics. Definition includes delimited characteristics.

One important message is that all terms are words but not all words are terms. A word becomes a term when:

- it is widely used in a subject field
- the concept behind the term is clearly delimited

A consequence of this is that not all words in the glossary may be terms and that is is neither possible nor necessary to define them. The words may still need an explanation or a note/comment.

Then she told about how a terminology project should be carried out, different phases, and how she has planned and carried out her work. The priority list that has been taken out so far was up for discussion. She explained the generic concept relations in terminology work and in AniBioThreat. Finally definition of definitions, content and form requirements.

Some discussion took place after the presentation, thereafter planning of the day, since the group was quite small, it was enough with one group. Before the work started Claudia showed diagrams she has prepared for some words on the priority list like biorisk management.

Group discussions

After coffee break discussion took place in one group about concepts and definitions related to threat/risk/hazard

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Hazard was found to be relatively easy to define, for example as "*an accidental or naturally occurring phenomenon with the potential to cause physical or psychological harm to humans including loss of life, damage or losses of property, and/or disruption to the environment or to structures (economic social, political) upon which a community's way of life depends*"(annex 2). Alternative phrasings were discussed, most of which were considered acceptable. The definitions were generally not "operational", that is hazard was not defined by how it is measured.

A long discussion took place regarding the definition of threat. Different views were expressed ranging from the view that threat refers to a "threat statement" and the view that threat , from the AniBioThreat perspective should refer to real threats. The discussion was not settled during the workshop….
An attempt to structure the idea, after the workshop is presented in appendix 1.

Alternative definitions of risk were discussed including both qualitative ones (risk defined as a phenomina) or operational definitions (How risk is calculated). Rickard Knutsson showed examples of alternative operational definitions from different countries (e.g. risk = probability * severity; risk= probability*severity*vulnerability). Also alternative definitions of threat were presented.

After lunch the discussion continued in in two groups.
We discussed different terms, risk, threat hazard, differences between them and whether some words should be excluded from a definitions list. Different approach were followed in the twogroups.

It was discussed whether the *operational" definition* (probability * consequence) would be reasonal for the concept biorisk since the term biorisk is primarily used to discuss risks in a qualitative manner as in "identify the Biorisk(s)" or control the Biorisk. It was suggested that in contexts where the term biorisk is used for "biological risks" the simple term *risk* would be used in any situation where the "operational" definitions makes sense. However, the two groups presented different views and the issue was not solved. ….
An attempt to structure the idea, after the workshop is presented in appendix 1.

During the workshop terms and concepts related to (bio)risk management were discussed in the context of the Biorisk Management Standard. It was discussed whether it made sense to use the concept biorisk in the discussion since biorisk is not well defined. An alternative definition of "biorisk management" was proposed using only the concepts risk and biohazard. However, not all participants agreed with this definition. It was also pointed out that the definition if risk management from the biorisk standard is much wider than de definition used by codex and OIE.
An attempt to structure the idea, after the workshop is presented in appendix 1.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Planning of further work

Gunnar will work further with the definition list. He will modify, make some changes and send them for review

Concrete, structure, important to create a way to work. It was suggested that WP leader should send their lists to Gunnar. Gunnar pointed out that there are already workinggroups defined in the task 1.1 DOW responsible for certain sets of terms. A summary of these groups and their relation to tasks and WP's is shown in figure 5. These groups does not exactly follow the WP structures reflecting the fact that some tasks from different WP5 may share important terminolgy (e.g. task 4.1 and 2.1) Gunnar proposed to activate these groups instead of creating a new system.

Under all circumstances it is important that the WP and task leaders are committed to support the work and dedicate time. It is also important to agree on level of ambition and aims. It may be necessary to bring the question to the Steering committee. In any case we must take a decision soon recognizing that there is a pressure from other partners, especially BfR, to see results and get feedback on the work invested.

As pointed out by Oskar, active leadership in WP5 is needed. Gunnar will activate the working group or each task leader and try to manage the work. The workshop at the WP5 meeting in Paris was a kickoff for this. We need to be able to identify, technical terms within labwork is very varying.

For the other workinggroups it is essential that the someone takes the lead to make sure that goals are set and time is allocated.

Some suggestions and recommendations from TNC – don't do double work, much is already done, look at the termbank first, thereafter work on definitions. Exemple: energy, bluelight, etc, within the same field of work. Cooperation is important! Networkning is important!

It may be useful to try to bring up work on terms and definitions to SOFÄ
(Swedish CBRNE network – what is the correct translation??)

Vocabulary management issues

Henrik Nilson (TNC) gave a presentation of a possible management of a termbank, TMG – terminology maintenance group.

In any case a system is needed, so that the lists are correctly delivered. A problem with the current excel file is that it is sometimes filled in wrongly which creates disorder. Another problem is that the many columns are difficult to read on the screen and that text for definitions is hard to read in small boxes.
Gunnar will discuss the solution with Henrik B and Erik H and try to cone up with a a system. Temporary solutions that can be demonstrated while we wait for final solution. Several

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

commercial software for management of terminology project excists. The alternative would be to build a SQL database or similar. The important thing is to have the correct datastructure.

It was proposed to make a difference between generic and wp-specific terms, those in common and those that differ and to build the terms WP-wise, and connect thereafter. Divide an extra column for WPs, to be able to organize, to WP or tasks

(This may be applied to workinggroups instead, G's comment).

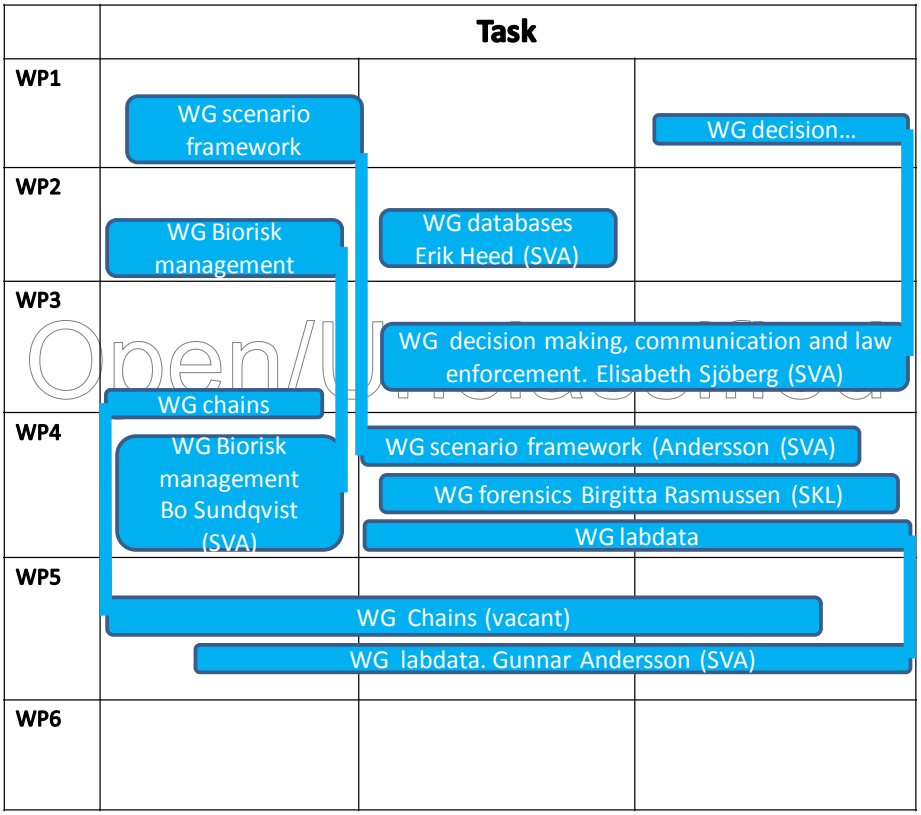


Figure 5. Schematic representation of workinggroups for terms and definitions, and responsible person according to DOW.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Appendix 2: Agenda

Time	Activity	Speakers	Topic
8:30	**Opening of the meeting**	**Organizers**	
8:30-9:30	**Terminology work – why, what and how**	**Claudia Dobrina & Henrik Nilsson, TNC**	Introduction into terminology work: - terms, concepts, definitions - steps of a terminology project
9:30-10:00	**Planning session**	**Claudia Dobrina TNC** **Project leader**	Presentation of AniBioThreat Vocabulary and diagrams Selection of concept clusters for further discussion and division into groups, e.g. 1) threat and risk mangagement, 2) biopreparedness and bioterrorism
10:00-10:20	Coffee Break		
10:20-11:45	**Group discussions**		
11:45-12:15	**Report of the groups**		
12:15-13	**Planning of further work**		How should we proceed? How should we manage the definitions list on the IWA. Need for position paper on Animal Bioterrorism including terms/definitions (and translation between languages/disciplines)
13:00-13:45	Lunch		
13:45-14:45	**Vocabulary management issues**	**Henrik Nilsson /Gunnar Andersson**	Addition of new entries, updating, presentation (database solution/TMS, etc.)
14:45-15:30	**Summary of results**	**Project leader**	Collecting and sorting notes Edit files Prepare report from the day

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

2011-12-05

Delivery Report from TNC

Contents

Background

According to SVA's document of 2011-09-19 TNC has received the following assignment from SVA:

- Titta på bruttolistan och bygga upp begrepps hierarkier för valda delar. Prioritering på termer och begrepp från Call-text i kommissionens papper (se bilaga) och viktiga ord och begrepp från projektets- och olika WPns titlar
- Beskriva begreppshierarkin i användbart format
- Förslag på hur termer och begrepp kan integreras med andra termer och definitioner projekt (CBRN) (skall finnas med i rapporten)
- Rekommendationer hur arbetet kan gå vidare och var det saknas användbara termer och definitioner (skall finnas med i rapporten)
- Rekommendationer hur AniBioThreat – CBRN – Rikstermbanken kan vara kompatibla (skall finnas med i rapporten)
- Hur hanterar databasmässigt termer där en översatt term står för delvis annat begrepp (t ex vidare, smalare)….
- Rekommendationer om hur jobba vidare med förvaltningen (skall finnas med i rapporten.
- Svenska termer, svenska definitioner ur befintliga källor läggs in.
- Eventuella kommentarer på de engelska definitionerna tillförs.)

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

The scope and results of the investigation

According to the objectives specified in the SVA's assignment of 2011-09-19 TNC has carried out a preliminary terminological analysis of central concepts for the AniBioThreat project[1]. The analysis is labeled preliminary because a proper terminological analysis requires that all major decisions concerning analysis and presentation of terminological information should be taken in cooperation between subject field experts and terminologists (which is in accordance with the methodology of terminology work described in international standards[2]). A joint effort of the project team and terminologists is thus required to finalize TNC's proposal.

The analysis carried out by TNC included the following steps:

1. Collection of relevant documentation: document texts, vocabularies, etc.
2. Extraction of terminological support information from the collected material including:
   - contexts (mostly English), i.e. text excerpts which illustrate the usage of terms in the *Priority list* (Annex 4) in the respective domains,
   - concept descriptions (English and Swedish) , namely definitions, explanations, supplementary information (encyclopedic, etc.) as the basis for identification and delimitation of the concepts to be analyzed,
   - information for selection of relevant Swedish equivalents of the original English terms.
3. Elaboration of concept systems and preparation (selection, adjustment and in some cases formulation) of definitions to achieve a better compliance between the drafted concept systems and the definitions.
4. Identification of preferred terms (terms which are to be used in the first place for a certain concept) and admitted terms (terms which refer to the same concept as preferred terms but for various reasons considered not quite appropriate, in other words, synonyms).
5. Presentation of the results of the analysis in an appropriate form.

Comments on steps 1-5

1. The sources included the material supplied by SVA as well as the documents found through extensive Google searches.
2. Different documents were used as sources of different types of support information:
   - *CBRN Action Plan* and *Bridging Security and Safety Research* (AniBioThreat Kick Off Meeting Report), *Green Paper* and *Laboratory Biosafety Guidance* were used for forming an idea of the current term usage in the project domain. A selection of contexts collected is presented in Annex 3 *Relevant contexts*.
   - *CBRN Glossary*, *CWA 15793,* ISO guides and ISO and CEN standards, WHO, Interpol and other international organization documents, special and general language

[1] The list of concepts to be analyzed is given in Annex 4 *Priority list*

[2] For example, ISO 704:2009 *Terminology work – principles and methods,* ISO 15188:2001 *Project management guidelines for terminology standardization*

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

dictionaries as well as a vast number of web sources were used for extraction of relevant concept descriptions.

- *CBRN glossary.sv* and a number of web sources were used for identifying credible Swedish equivalents.

3. A concept analysis of the collected concept descriptions has been carried out in order to identify relations between the concepts analyzed and to elaborate concept systems. It showed that many of the concepts in the *Priority list* are defined in a different manner in different authoritative sources. This may be due to a number of reasons, e.g. that the domain is not homogeneous and that it includes a number of subdomains where the same term may denote either quite different concepts or slightly differing concepts or that the definitions in question were formulated for different user groups. As an example the definitions of the concept *threat* can be considered. One of the definitions comes from a general language dictionary and reflects a very general view of the concept; another found in a relevant document ("likelihood for an adverse event to occur, as an expression of intention to inflict evil, injury, disruption or damage") contains important characteristics "likelihood", "intention" (these help to see the differences between the concepts *threat* and *risk*) and "damage"; a third definition ("substance, condition or event, which by its presence has the potential to rapidly harm an exposed population, sufficiently lead to a major crisis") belongs to the domain of public health and describes a concept which differs radically from the other too. The 2nd definition was chosen as most representative and was included in the concept system (see Annex 1 *Concept diagrams*). All other cases of multiple definitions were treated likewise.

   The analysis of the concepts in the *Priority list* showed that they can be viewed as belonging to several concept clusters, i.e. thematically related groups of concepts. The following concept clusters were identified:

   - Threat/risk/hazard
   - Bioterrorism and biopreparedness
   - Biorisk management
   - Transaction analysis
   - Forensics.

The first three clusters have been presented in the form of concept diagrams reflecting the underlying concept systems. There is also a concept diagram with all three clusters presented together. Transaction analysis and forensics include too few concepts for a concept diagram to be reasonable. The concept diagrams include all three types of concept relations traditionally used in terminology work:

- generic relations (X is a type of Y), e.g. *biohazard* is a type of *hazard*,
- partitive relations (X constitutes part of Y), e.g. *risk identification* and *risk communication* are viewed as parts of *risk management*
- associative relations (X has something to do with Y), e.g. *early warning* has to do with *prevention.* The exact content of the relation (which can be rather difficult to verbalize) is not shown in the diagrams but can usually be seen in the definitions of the respective concepts.

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

In terminological practice the elaboration of concept systems usually goes hand in hand with definition work: collected concept descriptions are analyzed and concept systems are drafted and checked against the definitions. In this project, however, there was no question of formulating new definitions, that is why this practice has not been followed and as a result there might be a certain discrepancy between the definition of the concept and its place in the concept hierarchy, e.g. *biorisk* which is a type of *risk* is not defined as "risk which…".

4. The most difficult problem TNC met with when elaborating concept systems for AniBioThreat concepts was to distinguish between the concepts *risk*, *threat* and *hazard.* They may have dissimilar definitions but they are often used interchangeably in a number of authoritative documents. The situation becomes even more complicated when these terms are part of multiword terms, e.g. *risk assessment*, *threat assessment.* We have therefore chosen to present them in the following manner:

   As *risk* and *threat* are often used together, e.g. "awareness of CBRN risks and threats" "risk and threat assessments" [EU CBRN Action plan] the concepts of *risk management*, *risk assessment*, etc. can be regarded as dealing with both threats and risks. The definitions of *risk management* and several other related concepts have been modified to include *threat*: "systematic approach to identifying, addressing and reducing risks and threats of all kinds associated with hazards and human activities" (*risk management*). Consequently, the concept *biorisk management* which is a type of *risk management* can be regarded as including such parts as *risk assessment*, *risk evaluation*, etc. See the concept diagram*, Biorisk management* in Annex 1. Threat terms, such as *threat assessment* and *threat communication* are listed as synonyms for *risk assessment*, *risk communication*, etc.in *List of concepts* (Annex 2). This is of course to be regarded as just a suggestion on TNC's part which is intended to be used as the basis for discussion at the coming project team meeting.

5. The results of the investigation are presented in the following way:

   - Concept systems for a number of the most central concepts in the *Priority list* (mainly from the domains of WP 2-4) are presented in the form of terminological concept diagrams. (Annex 1 *Concept diagrams*).
   - The term and concept information concerning the concepts in the *Priority list* is presented in a terminological vocabulary to be found in the Excel file *List of concepts* (Annex 2). *List of concepts* includes three tabs:

     1. *Definitions list* which contains the original material from SVA.
     2. *TNC* which is a kind of a terminological vocabulary containing terminological entries (collection of information on a specific concept) for the concepts included in the *Priority list*. The entries contain information on English and Swedish terms and synonyms, English and Swedish definitions and notes, English and Swedish contexts, sources of terms, definitions, notes and contexts and TNC's comment (not all entries contain all types of information). The definitions extracted from various documents have been left as they were or somewhat modified according to the established terminological practice, e.g. *biorisk management*. Some of the definitions have been formulated by TNC. If several definitions have been collected they are listed in separate rows numbered 1 to 4). Some of multiple definitions refer to the same concept, e.g. *bioterrorism* 1 and 2, while others describe differing concepts, e.g. *threat* 1 and 2.

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

3. *Sources* which lists the occurrence of priority list concepts in several central documents (to be considered as working material)

- The support material which illustrates the term usage in authoritative documents is presented in Annex 3 *Relevant contexts.*
- The final *Priority list* is in Annex 4.

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

Annex 1 Concept diagrams

Notation used:

generic relation, e.g. **biorisk** is a type of **risk**

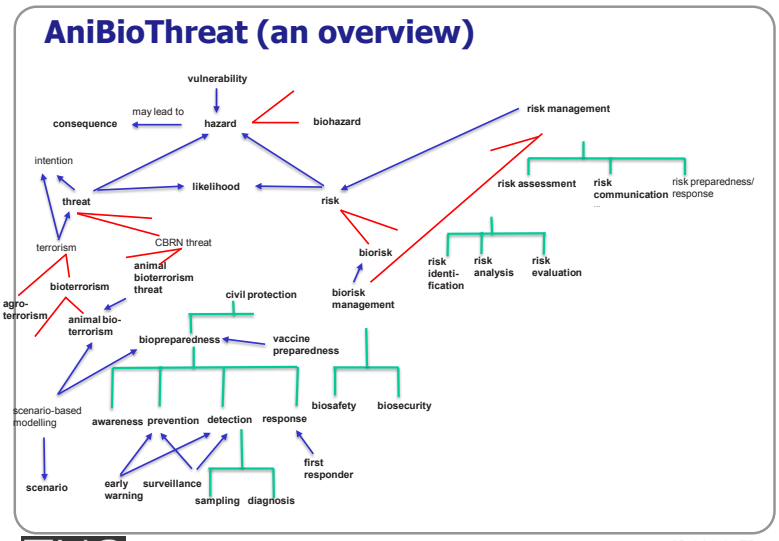
partitive relation, e.g. **risk identification**, **risk analysis** and **risk evaluation** are parts of **risk assessment**)

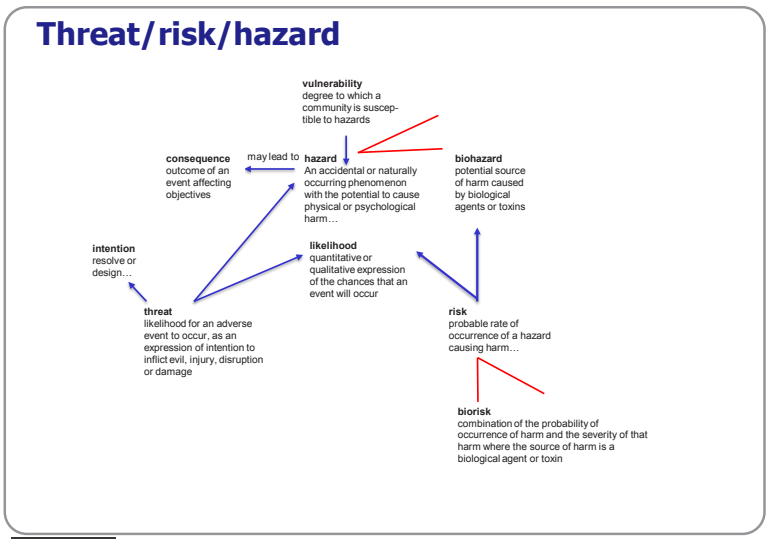
associative relation, e.g. **risk management** has to do with **risk**. The content of the relation is usually revealed in the respective definitions. It can also be specified directly in the diagram, e.g. **hazard** may lead to **consequence.** Arrows are usually directed from that concept in the definition of which the other concept is used or could be assumed to be used (the definition of **threat** includes **likelihood**)

Concepts not in bold style are not listed in *List of concepts*.

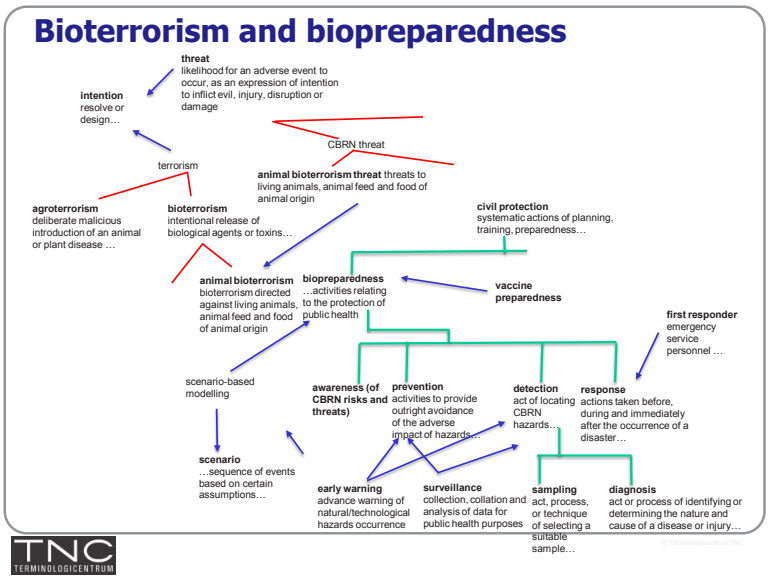
TNC
TERMINOLOGICENTRUM

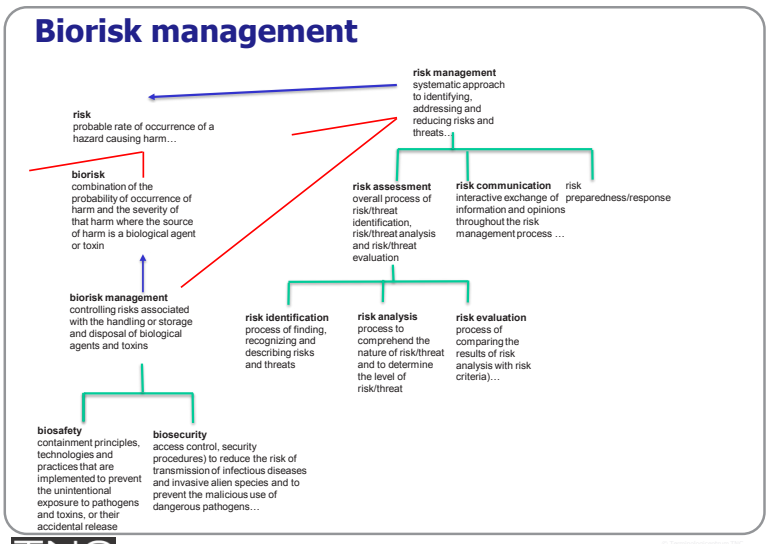
Delivery report from TNC, 2011-12-05, including Annex 1 & 4.





Delivery report from TNC, 2011-12-05, including Annex 1 & 4.





Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

Annex 4

Priority list

1. Agroterrorism
2. Animal bioterrorism
3. Animal bioterrorism threat
4. Awareness
5. Biohazard
6. Biopreparedness
7. Biorisk
8. Biorisk management
9. Biosafety
10. Biosecurity
11. Bioterrorism
12. Consequence
13. Contingency
14. Detection
15. Detection field
16. Diagnosis
17. Diagnostics
18. Dissemination
19. Early warning
20. First responder
21. Forensic analysis
22. Forensic Response Plan
23. Forensic sampling
24. Hazard
25. Impact
26. Incident communication
27. Intention
28. Likelihood
29. Prevention
30. Response
31. Risk

Delivery report from TNC, 2011-12-05, including Annex 1 & 4.

32. Risk analysis
33. Risk assessment
34. Risk communication
35. Risk identification
36. Risk management
37. Sampling
38. Scenario
39. Surveillance
40. Suspicious transactions
41. Threat
42. Threat assessment
43. Threat communication
44. Threat identification
45. Threat recognition
46. Transaction analysis
47. Vaccine preparedness
48. Vulnerability

Appendix 4:
Report from scenario workshop at AniBioThreat kickoff meeting in Uppsala October 2010

Results are reported as restricted (Annex X). The annex has been classified in accordance with the Swedish law "Offentlighets- och sekretesslagen (SFS 2009:400)": Chapter 15, § 1, Chapter 15, § 2, and Chapter 18, § 13.

AniBioThreat

Partner:	SVA	**Levels of classification**:
		☐ EU Restricted
Type:	PM Task 1.1/4.2 Scenario Framework (SF)	☐ Internal use
Reg. no.:	ABT2011-WP4-5	☒ Open/Unclassified
Project:	HOME/2009/ISEC/AG/191	Choose classification level:
Date:	2012-04-16	

Gunnar Andersson/Patrik Lorentzon (SVA)

Conceptual framework for scenario building (1.4)

Background

« Scenarios are an important tool for the project. They are needed for the planning of exercises, developing and challenging response plans, assessing vulnerabilities and setting work priorities. The construction of useful scenarios requires collaboration between experts in various disciplines. » (Task 1.1 DOW.)

Several activities in AbiBioThreat are connected to recommendations connected to scenarios. During the start-up phase it has been obvious that experience in working with scenarios differs in both in extent and context. As a consequence there have been different ideas about what a scenario is which has clearly impaired communication and also made it difficult to agree on directions and goals. The work so far has identified various needs for different tasks and cannot be described in one format.

Constructing a realistic and relevant « background story » takes a lot of research and must involve experts is several disciplines. It would be time saving if the same « background story » could be used to construct several user scenarios for different purposes. When constructing a scenario for a specific purpose the goals and objectives of the specific task should come first, and the choice of « background story » should come later. The work in task 1.1 at present aims at specifying the needs of the scenarios in the different tasks and based on this see if one or several of the existing « background stories » are fit for the purpose

Scenario template for WP1 meeting.

Before the WP1 meeting in Rome, Jan 2011 a template for describing a scenario was sent out to the participants. This template can be used to describe in a structured way be basic information about as scenario as well as an outline of the series of events.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

The « headings » for the template are largely taken from exercise scenarios but supplemented with specific « headings » needed for a describing a scenario involving intentional release of b-agents targeting animals.
A handful of scenarios have been sketched in this template (Appendix tableApp1). The template proved useful to capture basic information whereas the format for describing the series of events was seen as too limiting. What is also missing in this template is a good format for describing the intended use.
An example of a scenario (Anthrax in feed, covert) is presented in appendix 1,

Scenario wish list.

In order to structure the work a « wish list » was sent out before the general meeting in April 2011 where each partner was asked to specify their needs for scenarios in the different tasks in AniBioThreat. The results are summarized in Appendix table App2.

Scenario workshop SVA May 23 2011

On May 23 a scenario workshop was held at SVA with the aim of generating a list of « user scenarios » that should be constructed in AniBioThreat, (Spec tasks 4.1 and 3.2 and 3.2) and specify the use of and requirements on these scenarios.

A second aim was to identify needs for education, tools and expert support.
A preliminary list of information that should be specified for each « user scenario » is given in Table 1. One example was given by Gunnar specifying the need for a scenario for « working group detection » dealing with the design of sampling plans for hazardous microorganisms.
In the workshop two additional scenarios were specified. One scenario « contingency plan » with the aim of testing the functionality of a contingency plan immediately after detect of an epizootic agent and the second scenario « communication » aiming at testing the communication plan.
It was agreed that both scenario could well fit to the core scenario « anthrax in feed –covert ».

Both scenarios would also focus on approximately the same « time window » but involve different actors. A user scenario » communication » should also be coupled to a core scenario involving theft of biological agents thus generating two user scenarios. As an example the specifications for user scenario « Contingency plan » are given in table 2.

Table 1 : Information that should be specified for each user scenario

Usage	The intended use of the scenario, e.g. exercise, modelling, scenario analysis.
Capability tested	The capabilities that the scenario tests
Threat /challenge	The threat that the scenario deals with. Agent-antagonist /the immediate threat/challenge to the society or organisation. (e.g. work overload)
Actors	In this case the persons and agencies etc that are players in the scenario.
Tools/resources	The tools and resources available to the players.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

« Core scenario »	The core scenario that the user scenario should be connected to.
Timeframe/delimitations	The timeframe that the « user scenario » deals with as well as delimitations in time, space as well as in the aspects considered.

Table 2: User Scenario"Contingency plan"

Title "Contingency plan"

Part "usage and goals"

Purpose:
- Evaluating functionality of SVAs general contingency plan.

Actors:
- SVAs board, and units * *trained
- SVA Biosafety committee *
- SVA safety committee *
- SLU
- Health care (disease control)
- Board of agriculture
- Regional agencies

Threat/challenge:
- Agent as in core scenario (Anthrax)
- The organization may not handle the task/mission in a situation with criminal release of zoonotic agent.

Capacities/capabilities challenged:
- Situation awareness
- Detection and alarm
- Communication and cooperation
- Decide and lead
- Rescue and protect
- Documentation

Tools:
- Contingency plan
- Contingency organization
- (Participants, figurants "co-players")
- Checklists
- Internal experts
- External experts/Networks
-

Part « sub scenario »

Core scenario
- Anthrax i feed – covert (Kickoff scenario)

Time frame:
- Act 1:
- T0 = Outbreak detected at pathology department
- T1 = Situation is managed, "case opened, Code yellow"
- Act 2:
- T0=Report about incident presented to decision maker

T1= Case closed

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

A conceptual framework for scenario work.

Based on the discussion on terminology that resulted from our attempts to specify our scenario needs we have attempted to sort out the terminology related to scenario construction.

Or first concept is the « *core scenario* » (in Swedish "ramscenario" = "frame scenario"). The question was raised whether there is a difference between « core-« and « frame-« scenarios. For the time being they are considered equivalent. However, one may argue that there is a subtle difference, e.g. with respect to delimitations in time and space or with respect to alternative series of events.

The most important purpose of the core scenario is to provide realism and relevance. Experience from exercises has shown that unrealistic or irrelevant scenarios will annoy the participants so that they lose motivation. The similar would be expected to happen if an unrealistic or irrelevant scenario is used as example in a survey or a workshop. For theoretical modelling the realism may be less important in the first place but it would still be needed in order to convince stakeholders about the usefulness of models.

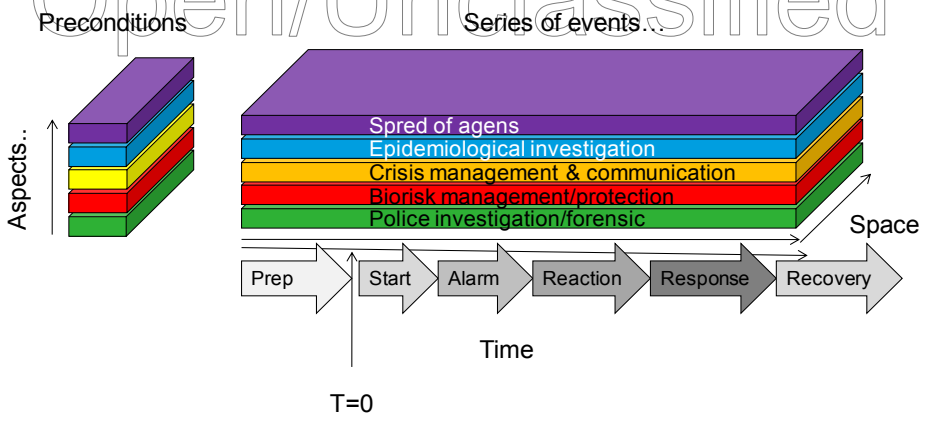


Figure 1. The *core scenario* (Sv « Ramscenario » = « frame scenario ») consists of a set of preconditions including basic facts of the agents (epidemiological etc, the actor (=perpetrator) the target, season, involved agencies etc). The core scenario also consists of a description of the events taking place (possible alternative series). The events take place at several levels. There will (usually) be a spatiotemporal spread of the agent but in addition there may be an epidemiological investigation, a police investigation, crisis management etc going on

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

According to our suggested definition the *core scenario* consists of a set of preconditions (epidemiological potential of agent etc) that sets the « rules » for the development of the scenario. In addition the *core scenario* contains a description of the series of events taking place. The series of events take place at many levels where the spread of the agent is one and the epidemiological investigation is another. (Figure 1) Of course, not all these levels can be described in detail and thus the *core scenario* will be described at a « low resolution ».

The levels that are described/modelled depend on the intended use of the scenario. However, since a main purpose with the core scenario is to provide realism a « level » should not be omitted too casually. For example, the spread of the disease is not independent of the epidemiological investigation and resulting interventions. Thus the ability to detect the spread, the response time and the power of interventions must be taken into considerations, for the sake of realism.
Likewise, if a crime is suspected or confirmed the police investigations may provide clues to the epidemiological investigation.

Sub- and User- scenarios

The scenarios that are actually needed in the project are what we at present call « user scenarios ». The scenario may be needed for exercise, scenario analysis or modelling or simply for illustration or raising awareness.

The key feature of the user scenario is that it comes with an aim and a goal. (Figure 2) The aim is typically to train or study one or several capabilities. When constructing a *user scenario* the core scenario or agenise is subordinate to the aim/purpose. However, since, in most cases, the user scenario needs realism and relevance the « core scenario » must still be kept in mind though not necessarily documents and in many cases a scenario constructer with experience in the subject could do this intuitively. However, the problem arises when the subject is complex and no single expert holds the knowledge to construct a scenario which is relevant realistic, challenges the right capabilities and involves the right actors. In this case even the construction of a very simple user scenario may still demand a great deal of background research to provide the realism.

In addition, several activities should be based on *risk rated* scenarios something which calls for even more background research and in practice may mean that the core scenarios must be more formally described.

Thus the philosophy of AniBioThreat task 1.1 is that we use joint effort to construct a small set of core scenarios that are as different as possible not only with respect to agent but also with respect to capabilities challenged and actors involved. The idea is that a few core scenarios should meet the demands of all user scenarios needed in AniBioThreat.

By re-using a limited number of core scenarios for several purposes we can ensure that the user scenarios are based realistic and risk rated core scenarios.

When the goal of the *user scenario* has been specified it can be connected to a core scenario. For practically any purpose (except possible a huge exercise) the user scenario will be based on a *sub-scenario* from the core scenario. In many situations this kind of sub-scenarios from a (often implicit) core-scenario is referred to as “the scenario”. As shown in fig 2, the sub-scenario that forms the basis of the user scenario is delimited not only in time and space but also in the aspects covered. It may deal for example only with the decision making at agency x at a

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

particular window in time. Since the sub-scenario is the part of the scenario that will be used the series of event will be described in more detail than for the core scenario.

If the user scenario is an "exercise scenario" it also may contain detailed descriptions of situation that a parson faces and should react upon. These "snapshots" are referred to as *viginettes.* (Figure 2). Such "viginettes" may also serve a purpose in other scenarios for other purposes, e.g. illustration or awareness rising.

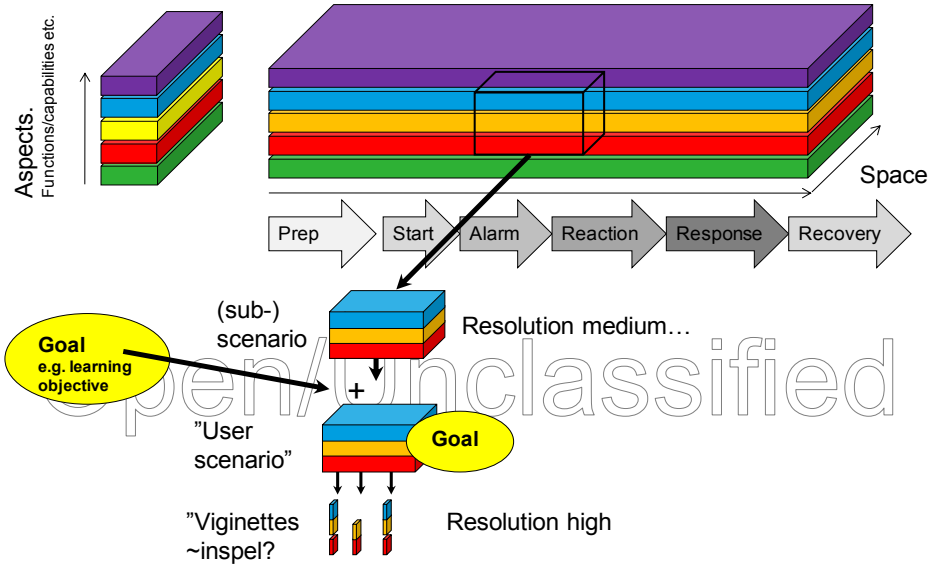


Figure 2. Relation between core scenario, (sub-) scenarios and "user scenarios". A main feature of the "user scenario" is that it has an intended use and an aim/goal, e.g. a tabletop exercise with the aim of improving decision making and communication.

Scenario descriptors.

One goal in AniBioThreat is to create a database of scenarios. During the first months of the projects there has been confusion about the usage as well as the content and structure of such a database. If a scenario database should be more than a collection of text files a uniform format for describing scenarios is needed.
A unified format for describing a scenario is also a useful tool for constructing scenarios, in particular when scenario construction is a "joint exercise". In addition a unified format is useful for sharing and re-using scenarios.

Based on the discussion we propose that a modular approach could be used to describe scenarios. In figure three we propose a structure where the description of scenarios is subdivided in "modules" that can be represented as objects of the class "core scenario", class "sub scenario" or class "user scenario" (Figure 3).

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

The different “modules” or what we choose to call them would hold different kind of information. An example of what information that would be stored for a “core scenario” a “sub-scenario” or a “user scenario” is given in figure 4. In this document we have named the descriptors “attributes” (in Swedish “egenskaper”). In figure 4 attributes have been grouped under larger headings e.g. “Agent” “Target area”, “Capabilities”, “delimitations” etc.

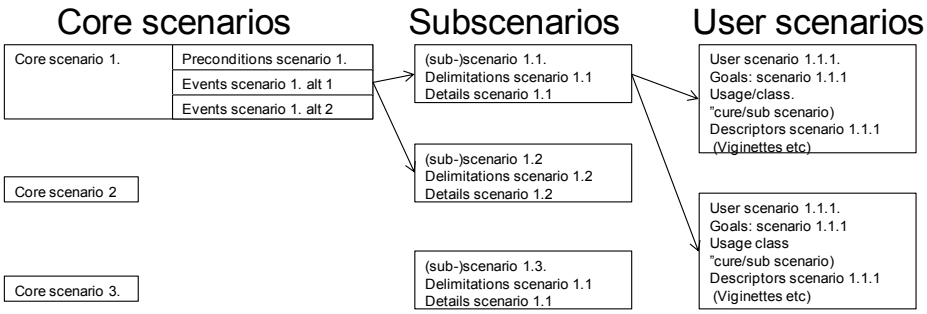


Figure 3. Proposed structure for a database of scenarios.

Sometimes we used the term “modules” when referring to such groups of attributes. The green and yellow boxes in figure 4 (Preconditions + series of events) corresponds to the information provided in the scenario template used for the WP1 meeting in Rome Jan 2011. As example of this, the scenario “anthrax in feed- covert” from the kickoff-meeting is described in this template (Appendix 1)

The sub scenario and user scenario descriptors would correspond to the information given in “user scenario contingency plan” in this document. However, in addition to the general descriptors other information may need to be included in the sub-scenario.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

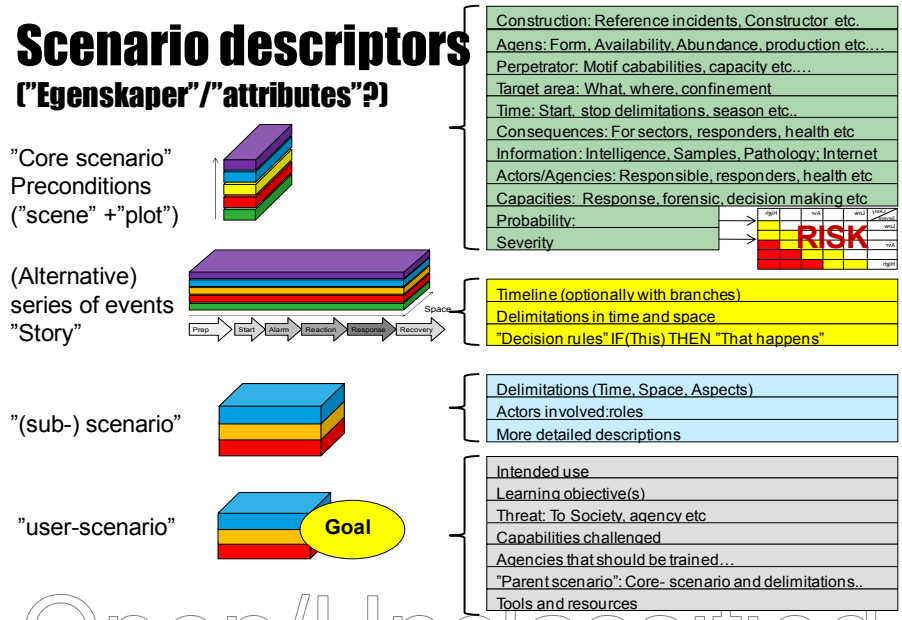


Figure 4. Descriptors of the scenario.

Strategic vs. Tactical scenarios

The scenario templates sketched above only considers scenarios which are built around one "incident" which may be a release of an agent or a suspicion that it happened. Although the timeline of the scenario may start before the "incident" the "reference time point" (t0) is still the "Incident".

Although a common view, many scenarios relevant for AniBioThreat does not fit into this template. One example is a scenario where an "attacker" is planning an attack and the "defences" tries to prevent it. In this case neither time of attack nor agent may be fixed and there may not be an incident at all…

For the time being we refer to the scenarios built around an incident as "tactical scenarios" whereas the broader scenarios (e.g. Involving multiple possible attacks) may be referred to as "strategic scenarios". (Fig. 5). The strategic scenarios would define the higher strategic goal of the "attacker" (destroy economy) as well as boundary conditions. Depending on the strategic decisions made by the attacker (allocation of resources, choice of target and weapon etc) we would end up in different "tactical scenarios" with different preconditions. These "tactical preconditions will determine the (set of alternative) series of events and the consequences (optionally a set of alternative consequences with probabilities). In a strategic scenario the description of the series of events for each alternative tactical scenario will be of very "low resolution" or maybe even replaced by a threat assessment…

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

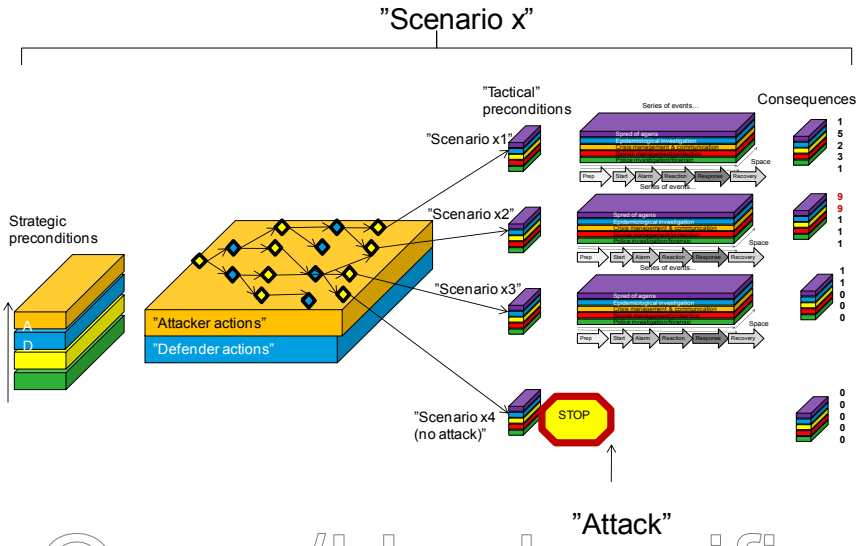


Fig.5. Relation between strategic and tactical scenarios

As an example of strategic scenario fig 5 shows an “attacker defender scenario”. However. It should be recognized that a strategic scenario is not necessarily an “attacker defender scenario”. Rather a scenario that describes moves by attacker and defender may be considered a special case of a strategic scenario and the event tree shown in fig 1 may be an “attribute” of some strategic scenarios but not all.

User scenarios can of course be based on a (sub scenario of) a strategic scenario. An exercise in e.g. decision making does not necessarily have to be based on a scenario where “weapon” and “target” is already fixed. A “strategic” decision making scenario for e.g. a tabletop exercise could start with the information there is a suspected increase threat level (“attacker suspected to have made move x”) and the “defender” should decide on a countermove (e.g. ban all work with select agent, build a 15ft concrete wall round SVA, install video monitoring at farms etc…)

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

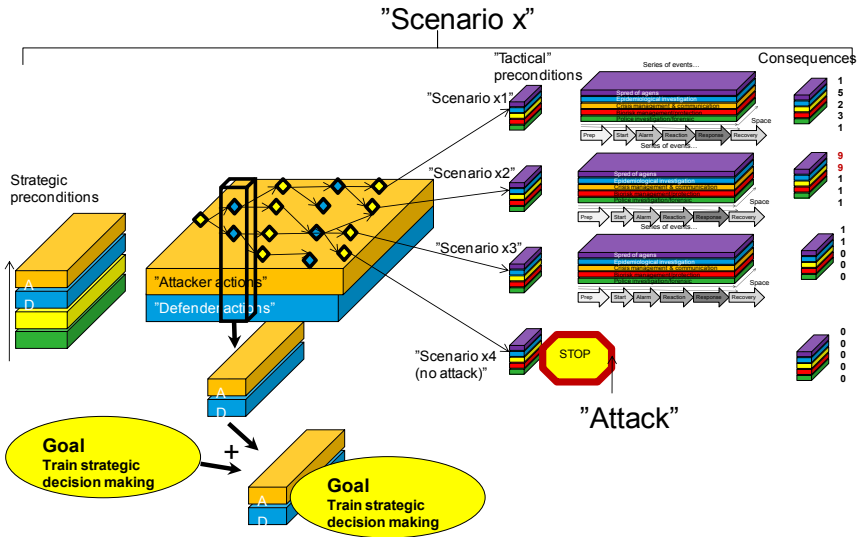


Fig 6. User scenarios from a strategic scenario. The colored layers represent different aspects of the strategic scenario, in this case actions taken by the attacker and defender. (The event tree showed combined output of the layers "attacker actions" and "defender actions".) Other strategic scenarios may deal with other aspects…

Sub- and user scenarios (e.g. exercise scenarios) can be based on either a "strategic" or a "tactical" scenario (or maybe both?). A tactical scenario can be connected to a strategic scenario if relevant. (E.g. one may separate preconditions in "strategic" and "tactical". For most "tactical" exercise scenarios the "strategic information" would probably be there only to add realism. A strategic scenario may or may not be connected with a set of alternative "tactical scenarios" that would represent alternative outcomes of for example an "attacker defender game". It may also be relevant to include clusters of tactical scenarios or "generalized tactical scenarios" for examples tactical scenarios for examples scenarios where the agent share some key properties (e.g. virulence properties or epidemiological properties).

A scenario database (or "scenario repository") hosting also strategic scenarios is sketched in figure 7. In this view strategic and tactical scenarios are two classes of scenarios. A strategic scenario may be connected to a set of tactical scenarios and a tactical scenario may be connected to one or several strategic scenarios but the relation is not necessarily as simple as a tactical scenario being part of a strategic scenario.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Tactical scenarios constructed to be used in combination with a strategic scenario may be very simple and contain fewer descriptors compared with more elaborate tactical scenarios used for e.g. exercises…

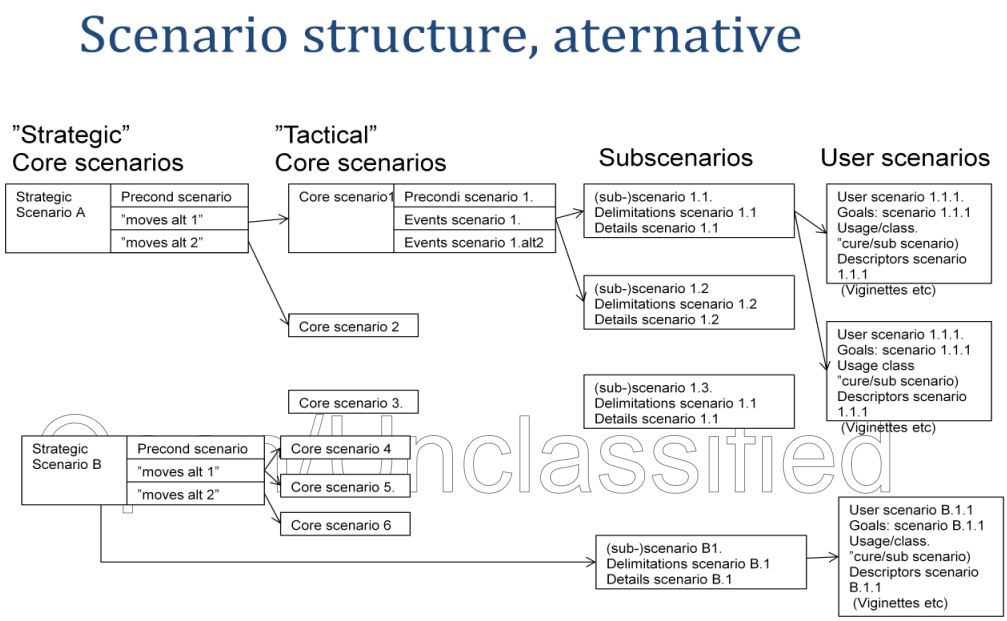


Fig. 7. A scenario structure distinguishing between strategic and tactical core scenarios

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Task 1.1,Appendix 6, Summary of core-scenarios from AniBioThreat							
	Title	**Agent**	**Target**	**Route**	**Actor/motif**	**Class**	**Key features**
1	Anthrax in feed	*Bacillus anthracis*	Cows	Industrial feed (at feedmill)	Activist/ Climate	Overt / covert	Most sensitive target species. Hard to distinguish from natural outbreak
2	FMDV at resting place	Foot and Mouth Disease virus (FMDV	Farm animals	Animal transport	Activist/ Animal rights	Covert	Low-tech scenario. Potentially large economical & societal consequences
3	Botulism outbreaks in chicken farm	*Clostridium botulinum* *	Poultry	Industrial Feed (local event)	Farmer/ Fraud	Covert	Evaluation of sampling results as forensic evidence (bacteria/toxin)
4	Attack on laying farms with HPAIV	High Pathogenic Avian Influenza Virus (HPAIV)	Layers	Water	Activist/ Animal rights	Covert	Potential for rapidly escalating epizootic where early warning is critical.
5	Possible accidental spread of African Swine Fever virus (ASFV)	African Swine Fewer Virus (ASFV)	Wild boars	Food waste	Tourist/ Smuggling	Accident	ASFV in wildboar population puts pig farms at risk. Evaluation of sampling results as forensic evidence
6	Large scale outbreak of NDV and HPAIV	Newcastle Disease Virus (NDV) & Avian Influenza Virus (AIV)	Poultry & workers	Water	Activist/ Animal rights /revenge	Overt	Large scale outbreak with transfer of disease from poultry to humans. Panic potential.
7	Contamination of local milk supply	*Clostridium botulinum*/ staphylococcal neurotoxin	Human consumers	Milk supply	Activist/environment	Overt	Toxin in food chain (milk) which could originate from natural source (mastitis) or intentional release
8	Svinarp Salmonella	Salmonella enterica	Pigs	Feed or wild birds	n.a.	Accident	A reoccurring biotracing- scenario analogous to intentional release in food or feed.
9	Airborne anthrax	*Bacillus anthracis**	Human	Air	Activist/ Animal rights	Overt	Attack on humans with zoonotic agents from a veterinary institute laboratory.
10	Twitter attack	Salmonella enterica /zoonotic virus*	Human	Food Simulated	Activist/ Climate??	Simulated /hoax	Simulated attack with a zoonotic agent as prime hypothesis.
11	Poisoned dog	Ethylene glycol	Dog	Water	Neighbor conflict	Covert	Forensic scenario where symptoms could support intentional poisoning, disease or accident.
12	Poisoned racing horse	Selenium	Horse	Feed/Injection	Working relations	Covert	Complex forensic scenario with alternative cause of death and modus operandi.
13	Anthrax in white powder	*Bacillus anthracis*	Human	Milk substitute in coffee machine	Private person/ Hate against authorities	Overt	Forensic scenario: Need to rule out that the agent was disseminated in the production line.
14	Raindeer FMD	Possible FMDV	Reindeer	Unprocessed heeds from infected animals	Private/ local conflict	Covert	Police and mountain rescue team encounters epizootic agent under harsh environmental conditions
15	Missing strains	*Bacillus anthracis*	Cattle	unknown	unknown	Covert	Appearance of anthrax at several farms. Pattern indicates intentional release Typing information compared with strains in stock and strains sent to other laboratories. Information on strains in database deleted

	Title	Agent	Target	Route	Actor/motif	Class	Key features
16	SAMBIO2013	*Bacillus anthracis*	Cows + humans	Feed/ pastry pieces at a cafeteria and over napkins.	Activists/Rainforest pillage	Initially Covert	Attack at a feedmill and at a cafeteria in a major store. Unusual epidemiology indicates bioterrorism. Actor declares responsible for disseminating anthrax without specifying where or how. Information sharing between police and disease controlling authorities is essential for investigating the crime and minimizing the consequences.
17	OvZoo	High Pathogenic Avian Influenza Virus (HPAIV)	Poultry + wild birds	Infected birds	Activist/Animal welfare	Overt	Letter to authorities indicating that HPAI has been disseminated at several poultry farms and in wild bird populations in major cities.
18	CovZoo	High Pathogenic Avian Influenza Virus (HPAIV)	Poultry + wild birds	Infected birds	Activist/Animal welfare	Covert	Suspicion on HPAI raised at six different poultry farms in different parts of the country. Also human cases. The virus has capacity to be transmitted between humans.
19	Nobel Banquet	*Bacillus anthracis*	Human	Food	Activist/Anti animal trial	Covert	Attack on a mass gathering event while accidents and crises take place in other parts of society.
20	Riot and social instability	*Bacillus anthracis*	Human	Airborne	Activist/copycats	Hoax	Riot triggers other extremists to threaten governmental agencies.

Task 1.1,Appendix 7:, User scenarios for activities in AniBioThreat						
No	**Activity/user scenario**	**Core scenario**	**Scenario features**	**Aim**	**Lessons learned**	**Reference**
1	Insider exercise Dec 2011	1	• Anthrax outbreak in cows resulting from intentional contamination of feed. • Suspect insider of the authority responsible for epidemiological investigation.	• Evaluate function of contingency plan in case of exceptional event (Animal bioterrorism) • Evaluate collaboration between Veterinary institute and Police.	• Epidemiological investigation and crime investigation in parallel challenges organization of work. • Valuable to involve top management in exercise. • Joint exercise between security police and veterinary institute increases understanding. • A threat assessment may not be undertaken and documented when a normal outbreak is the prime hypothesis.	Deliverable 4.1, Appendix x
2	Scenario workshop at WP5 meeting Dec 2011	1,3,5	• Confirm or reject presence of anthrax spores in feed (overt/ hoax?). • Is botulism cause of death in poultry (sabotage?). • Is African Swine Fewer the cause of death in wild boars? (Illegal import of meat)	• Evaluate ability to interpret test results using validation reports and results from quality control and control samples. • Identify terms and definitions related to analysis of samples and quality control samples	• Raised awareness about the is intrinsic uncertainty in analytic results • Revealed that different laboratories have very different ideas about which controls are necessary and relevant. • Should be followed up by additional WP1-WP5 workshops	Deliverable 1.1, Appendix 11.
3	Scenarioforensic result evaluation Jan 2012	8	• Were livestock killed by wild predator? • Was feed source of Salmonella at farm?	• Introduce forensic approach to result evaluation to veterinarians and microbiologists.	• The forensic approach to result evaluation seems applicable to pathological and epidemiological investigations • A common structured approach to result evaluation could potentially facilitate collaboration between veterinary and forensic institutes when investigating biocrimes. •	Deliverable 1.1, Appendix 9.

No	Activity/user scenario	Core scenario	Scenario features	Aim	Lessons learned	Reference
4	Local/Regional Bioterrorism Exercise – "Exercise Skåne" Dec 2011	9	• Animal welfare activists with motive to infect humans instead of animals • An overt bioterrorism attack in the city of Malmö	• Evaluate gaps at the local and regional level related to bioterrorism preparedness • Cooperation between the local/regional level and the national level	• The alarm chain is crucial • Many agencies will be involved • Extreme media pressure • Several laws will be used at the same time • Declaration of a bioterrorism attack will take place after declaration of the disease outbreak • Forensic sampling of facilities/buildings will be difficult since there is a lack of samplers • Tracing of (i) perpetrators, (ii) microorganisms, (iii) humans that have been exposed, (iv) rumors and speculations in social media.	FOI-R—3411-SE, ISSN 1650-1942, april 2012
5	Social Media attack – Social Media Workshop Sep 2011	10	• Young activists and extremists with motive to cause harm at governmental agencies • A hoax scenario and all of a sudden people starts to report severe diarrheal illness	• To trigger a response at governmental agencies • To handle information with uncertainty	• Lack of preparedness of social media incidents • Communication between agencies is difficult • Lack of awareness about the possibility of simulated attacks. • Lack of knowledge on how to react on hyper reporting in social media.	Workshop in social media and its dual use in biopreparedness. In: ISSN: SVA´s Report Series 17 ISSN 1654-7098
6	Workshop: Evaluation of evidence – pathology, Sept 2012	11,12	• Racing horse dead after transport. Possibly intentional intoxication by selenium. • The pathologist have to evaluate alternative hypotheses regarding the cause of death and route of selenium intake.	• Evaluate how the approach for evaluation of evidence from the National Forensic Institute applies to a case in veterinary pathology	• The approach is potentially useful • Presenting uncertainty as numbers may be a useful tool to assess and express the degree of uncertainty but there could be a danger if it gives a false impression of certainty. • The approach can serve as a tool to structure and document the reasoning. • Representing a pathology case as a Bayesian network is not simple since neither the hypotheses nor the observed results are independent.	Deliverable 1.1, Appendix 10.
7	Exercise. Evaluation of evidence in Bioterrorism sampling, Nov 2012	13	• Humans infected by B anthracis via milk substitute. • Actor claims to have contaminated production line.	• To assess whether current methods can be used to declare a site free from a biological agent.	• Routines are needed to document decisions, assumptions and calculation underlying the planning and evaluation and to ensure that messages are correctly understood. • Mandates and responsibilities in relation to the reporting of evidence needs to be clarified.	Deliverable 1.1, Appendix 8.

No	Activity/user scenario	Core scenario	Scenario features	Aim	Lessons learned	Reference
8	Decision making workshop nr 1 Mar 2012	9	• Animal welfare activists with motive to infect humans. • Overt bioterrorism attack in stockholm.	Identifying needs for decision makers during bioterrorism incident	Coordination of information is crucial Many organizations are involved Decision making will take place at many levels.	AniBioThreat bridging compendium month 1-18. In: ISSN: SVA´s Report Series 17 ISSN 1654-7098
9	Outdoor security training	14	• Lonely activist • Contaminate the water supply intended for reindeer using unprocessed heed from wild boar • Foot and mouth disease • Caught up in an avalanche	Joint training with local police, dog unit and mountain rescue team How does law enforcement work with only basic knowledge of B-agens? Identify problems working with B agens in severe conditions such as snow, wind and low temperatures	Regular policemen need more B training to be able to work safely with B -agens Proper decontamination of equipment and dogs is adequate SOPS is needed for B events Correct information from the call center to the police? This is a possible scenario- the virus can easily spread unless proper actions are taken.	AniBioThreat Third annual meeting compendium. In: ISSN: SVA´s Report Series 17 ISSN 1654-7098)
	Decision making workshop nr 2 Sep 2012.	17, 18	Complex scenario Overt and covert	• Study alarm pathways and rapid alert procedures • Compare overt and covert attacks.	• Many organisations become involved • Forensic awareness is often low among public and animal health organisations	Holmdahl, L. Granelli, K, Lorentzon, P, Danielsson, C, Knutsson, R., Muren, S. LRN 2011-1. In: ISSN: SVA´s Report Series 17 ISSN 1654-7098)
10	Decision making exercise Nov 2012	19	• Multiple incidents in society must be managed simultaneously • Many humans infected • High media impact	• Train decision makers from disciplines to manage bioterrorism attack	• Different authorities focus on different aspects • Lack of overall perspective • Difficulties to coordinate decision making • The police was associated into network of authorities managing zoonotic incidents.	Task 3.2
11	Strategic Communication workshop	-	-	• Study communication strategy • Who takes the lead during bioterrorism incident with B-agens.	• Communication plans are not coordinated	Task 3.1/3.2

No	Activity/user scenario	Core scenario	Scenario features	Aim	Lessons learned	Reference
12	SHARE SEC Exercise Mar 2013	15	Missing strains and deleted information calls for transaction analysis	• Study exchange of information during incident	• Different legal frameworks may collide • Need to improve collaboration with law enforcement/police.	Task 2.2
13	SAMBIO2013	*16*	• Environmental activist with motive to harm both animals and humans. • Starts with seemingly unrelated cases in humans and cows. • The motive is to get attention because of the import of certain raw material and how the rain forest in South America is being destroyed. • Outbreak investigation meets crime investigation.	• Identify problems concerning collaboration between organizations responsible for coordination, law enforcement authorities and authorities responsible for prevention of communicable diseases on national level (table-top exercise) • Coordinated epidemiological and forensic investigation (field training exercise).	**Table-top exercise** • Authorities responsible for law enforcement, communicable diseases and coordination have different roles and responsibilities, which may lead to conflicts between objectives • Authorities involved need to find common guidelines on how to handle the sharing of information and coordinated decision-making. • Several networks are established that have different approaches and focus. In case of unusual events new members may be included in the established networks. • Understanding the legal framework for sharing secure information is crucial. **Field training exercise** • Legal framework must be updated to promote efficient work in hot zone • Routines for sharing information at the scene of crime/damage are needed. • The technical systems for sharing information could be improved. • A further harmonization of methods and equipment used by different organizations at a scene of crime/damage would be beneficial. • Countious training and exercising is essential.	Task 6.3 Evaluation report (in preparation) fråga Ekelöv om namn..
14	Legal advisory network meeting May 2013		Riot and Social instability trigger other activists Threats against authorities during handling of riots. Table top exercise	• To improve awareness about legal challenges associated with riots and biothreats	• Current legislation does not support efficient early warning • Current legislation is not supporting collaboration between agencies and disciplines in this kind of incidents.	Task 3.2

Appendix 8:
Report from tabletop exercise – evaluation of results

Results are reported as restricted (Annex X). The annex has been classified in accordance with the Swedish law "Offentlighets- och sekretesslagen (SFS 2009:400)": Chapter 15, § 1, Chapter 15, § 2, and Chapter 18, § 13.

AniBioThreat

Partner: SVA

Type: Report
Reg. no.: ABT2012-WP1-21
Project: HOME/2009/ISEC/AG/191
Date: 29/4 2013

Levels of classification:
☐ EU Restricted
☐ Internal use
☒ Open/Unclassified
Choose classification level:

WORKSHOP IN EVALUATION OF EVIDENCE, JAN 26 2012

Table of Contents

1. Summary

A workshop in evidence evaluation was arranged at SVA in collaboration with SKL. Approximately 25 participated from SVA representing epidemiology, pathology, microbiology, virology and chemistry. There was also participants from FOI and SLU. The aim was to give an introduction to forensic evaluation of results and discuss how methodology from SKL can be applied to scenarios relevant for SVA. The workshop is part of a process to improve the ability of SVA to write forensic reports for courts and and decision makers. The expected outcome is more structured reports where results are evaluated in relation to explicitly defined hypotheses.
The day started with lectures where Birgitta Rasmusson (SKL) explained how evaluation of results is conducted as SKL using examples from pathology and epidemiology. Anders Nordgaard (SKL) gave an introduction to the Bayesian framework for evaluation of results used at SKL and to the scales used to report how strongly the result supports a hypothesis.
In the afternoon the participants worked in groups evaluating results from a hypothetical scenario focusing on Salmonella on a pig farm. Sampling and typing

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

results were combined with expert knowledge to produce a statement on how strongly the results supported introduction of Salmonella via the feed supplier versus introduction via wild animals.
Most participants found the working methodology useful and applicable to cases at SVA and recommended to follow up by additional workshops focusing on other scenarios representing activities at SVA.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

2. Description of the scenario and outcome.

The workshop scenario focused on the investigation of a feed –borne outbreak of Salmonella in a Pig-herd. After discovery of Salmoenlla in the herd the farmer accuses the feedmill of haveing delivered salmonella contaminated feed. However, the feedmill denies liability and states that there are other sources of contamination, including wild birds, rodents, locally produced crops and visitors.

Evidence in the form of results from sampling at the feedmill and farm, typing of isolates (PFGE) and the salmonella status of other farms that bought feed from the same feedmill were presented as « fact cards » when the participants requested the information.

The scenario was presented as a slideshow in Swedish. Se illustrations below. The scenario was used to construct a draft Bayesian Belief Network illustrating the relation between pieces of evidence (Fig 1).

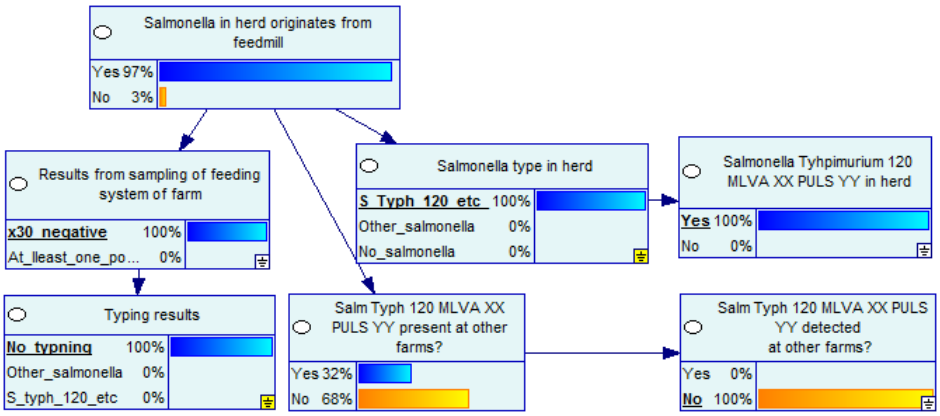


Figure 1. Draft of Bayesian Belief Network based on the workshop scenario. A

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

3. Original slides from workshop (In Swedish)

(1)Inledande händelser

- Lymfknuta från eko-gris slaktad vid slakteriet i Svinarp positiv för Salmonella Typhimurium fagtyp DT40
- Vid provtagning på gården återfinns smittan
- Utökad provtaging av gården inleds.

(2) Inledande händelser, forts

Resutat av utökad provtagning (träckprover)

Suggor (inomhus) 0/30 prov positiva
Individuella träckprover

Ekogrisar (utomhus) 7/30 prov positiva (Typh. DT40)
Samlingsprover –plock. Motsv 300 grisar)

(3) Har grisarna smittats via foder

- Gården har köpt pelleterat koncentrat. Blandar med egen spannmål. Separata system för ekogrisfoder o suggfoder.
- Provtagning av gårdens fodersystem negativ för Salmonella (0/30) i vardera suggfoder, o ekosvinfoder)
  - SJVprovtagningsinstruktion: 5*silotopp spannmål (Plåtsilo); 5*silotopp koncentrat; 5* intag; 5*torrfoderblandare;5*spill i foderhus; 5* silotopp färdigfodersilo.
- Provtagning av stallmiljö. 25 prover hos vardera suggor o ekogrisar. Positivt prov i foderautomat hos ekogrisar (1/5) samt dammprov i stallmiljö (1/5) (Typhimurium XXX).

(4)Har det funnits Salmonella hos foderlevernatören?

- Fem månader tidigare hittades Salmoenlla Typhimurium DT40 i prover från elevatorfot (före värmebehandling) vid foderfabriken i Svinarp.
- Vid uppföljning var 1 av 35 prover positiva (Provtagning längs produktionslinjen) för Typhimurium DT40. Också ett fynd av Salmonella Senftenberg gjordes.
- Efter sanering provtogs anläggning av Jordbruksverket. Ingen Salmonella hittades (0/40)
- Samma stam (DT40) hittats en månad senare i råvarukontroll av ekologisk solroskaka (råvara i ekofoder) importerad från Ungern.
- Salmonella Typhimurium är relativt ovanlig i foderprover. Kan delvis bero på att den är svårare att isolera. DT40 har ej tidigare hittats hos fodertillverkare.

(5) Finns Salmonella hos foderleverantören idag?

- Efter fyndet på gården utanför Svinarp provtas foderfabriken. Prover tas från linjen före värmebehandling samt på ekofoder-linjen efter värmebehandling (n=40) och från utlastningsprover(n=10). Inget fynd av Typhimurium DT40.
- Ett prov taget före värmebehandling är positivt för S Yoruba.
- Efter ny sanering provtas anläggningen igen. Inga fynd av Salmonella (n=40)

(6) Finns Salmonella i grannskapet och hos andra köpare av foder?

- Inga fler fynd gjordes på slakteriet.
  - Endast enstaka prover av lymfknutor tas genom kontroll program. Ej troligt att Salmonella skulle hittats hos grisar från granngård även om smittan funnits.
- Salmonella har inte hittats på andra gårdar med samma leverantör). (30 gårdar varav 10 med ekogrisar).
  - Provtagningen har endast utgjorts av utlastnings-prover av foder (två 25g prov per leverans).

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

(7) Kan salmonella förts in via djur eller fåglar?

- S typhimurium DT40 förekommer hos tättingar i Sverige o Europa. Denna fagtyp är den dominerande hos svenska småfåglar. Data saknas på hur vanligt det är att fåglar är smittade
- I 13 av de 31 gårdar där Salmonella typhimurium hittades under 1993-2010 var fagtypen DT40.
- Totalt hittades Salmonella i 54 svinbesättningar under 93-2010
- S typhimurium DT40 är ovanligt hos andra djur (Hittats hos katter vid fågelbord)
- S typhimurium DT40 har inte tidigare hittats hos lantbruksdjur i trakten(ej heller undersökt)
- Gnagare o husdjur på gården har ej undersökts.

(8) Kan människor fört in Salmonella till gården?

- Några fall (En vuxen 3 barn) av S typhimurium DT40 rapporterades från människa tidigare under året (7 månader sedan) Bland annat en familj i Svinarp. Smittkällan antogs vara familjens katt som ätit småfåglar vid fågelbordet.
- Dessa personer har inte besökt gården men varit i skogen intill.
- S Typhimurium DT40 utgör inte mer än högst 0,2-0,4% av alla svenska Salmonellafall. Främst barn.
  - (gissning utifrån source attribution)
- Inga personer med symptom liknande Salmonella har besökt gården under det sista året.

(9) Kan prover från foderfabriken ha kontaminerats på laboratoriet?

- I samband med utredningen av humansmitta analyserades salmonella Typh DT40 på SVA (från katten). Detta gjordes ca tre veckor innan det första fyndet av Typhimurium DT40 på foderfabriken,
- Efter detta gjordes också en pulsfält analys av olika isolat av typhimurium DT40 (ca 3 månader innan utredningen av utbrottet hos svin)
- Analys av humanprover & subtypning utfördes vid SMI.
- Proverna från gården och foderanläggningen i Svinarp analyserades av Eurofins och isolerad Salmonella serotypades på SVA. Isolaten fagtypades vid SMI.

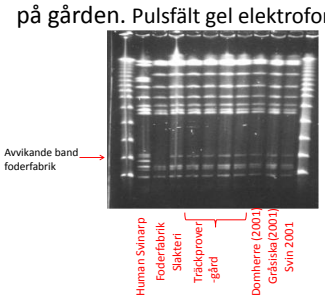
(10) Är det verkligen samma klon på fabriken och på gården. (MVLA)

- Multilocus Variable-Number Tandem-Repeat Analysis. Analyserar 5 loci.
- Upplösning anses vara i klass med fagtypning (generellt påstående i abstract..) . Upplösning inom fagtyp är oklar…
- Perfekt överensstämmelse mellan isolat från lymfknuta gård o fabrik. (typ 3-12-9-14-211)
- Humanisolatet avviker (3-12-12-14-212)

(11) Är det samma klon i fabriken som på gården. Pulsfält gel elektrofores (PFGE)

- Identiska isolat från lymfknuta & gård
- Ett band saknas i fabriksisolatet. (nästa bild)
- Humanisolatet avviker i flera band
- Den aktuell PFGE-typen tycks inte vara helt ovanlig bland fåglar i Sverige
- viss ”evolution” av PFGE-typ kan ske under utbrott.
- Oklart hur stor variationen i PFGE-typ är inom DT40

(12) Är det samma klon i fabriken som på gården. Pulsfält gel elektrofores (PFGE)



With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

(13) Vad skulle få er att ändra er uppfattning?

- Ett fynd av salmonella typh DT40 gjorts i gårdens fodersystem för Ekogris-foder. (1/5 prover från silotopp – pelleterat koncentrat)
- Salmonella typh DT40 återfunnits vid undersöknineng av foderfabriken i samband med utbrottet (Före värmebehandling. 1 positivt av 40)
- Om 100 negativa prover analyserats från utlastat Ekogris foder (inkl flera gårdar) och 10 negativa prover tagits från silotopp på gård (pelleterat ekofoder) – i samband med utredning av gårdssmitta.
- Det inte fanns någon avvikelse mellan pulstyp från gård och foderfabrik
- Humanisolatet från Svinarp haft samma pulstyp som den i svinen.
- Ytterligare en gård i trakten med eko-grisar visats vara smittad med Typhimurium DT40 och samma pulstyp.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

4. Result from evaluation of workshop, SVA/SKL, 2012-01-26

(from ABT2011-WP1-14)

Totalintryck av seminariet? (1-5, där 5 är mycket bra)
4555555455
Kommentarer :
Bra introduktion
Mycket bra föreläsningar - tankeväckande
Intressant o givande. Gav många tankvärda aspekter till ämnet

Lärde du dig mycket? (1-5 där 5 är "Ja mycket"!)
5555545545
Kommentarer :
Jag lärde mig mycket ock det låg på en bra nivå.
Detta ger bra struktur tankemässigt i utredningar

Kursledarnas kunskaper i ämnet? (1-5 där 5 är mycket goda)
5555555555
Kommentarer :
Bra. Det gick att översätta frågeställningar mellan dicipliner
SKL har verkligen en gedigen kunskap i ämnet med många rutiner som SVA borde ta efter

Planering och genomförande av seminariet? (1-5 där 5 är mycket goda)
45545555555
Kommentarer :
Allt bra!
Ngt mer tid för diskussion skulle behövas i anslutnign till presentationer
Bra
Bra
bra mix av exempel, föreläsningar och grupparbeten.

Hur upplevde du arbetsprocessen under grupparbetet?

Ngt spretig till en början men tydlighet uppnågges under arbetets gång.

Lite svårt, behövde guidning i processen och hur arbetet skulle läggs upp -> drivs framåt.

Givande. Kul med så många kompetenser

Kreativ, engagerad

Verkar användbar och i grupp med experter från olika områden styrker den svaret.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

OK men lite rörig. Fokus tappades ofta och man fastnade i detaljerna. Tror att scenariot var lite komplivcerat som startscenario

(ej med)

Intressant! Vi lyckades använda förmiddagens information om hur man arbetar igenomett fall. Frågor uppstod men dessa löstes vartefter av experterna som guidade.

Något trög

bra

Först lite trevande, och så saknade vi lite kompetens, men det blev bra och vi hade bra diskussioner. Kräver lite träning att tänka i dessa banor.

Hur upplevde du de scenarior som användes	**(realism (1-5), relevans(1-5)?**
Föreläsningsexempel EHEC	3454? 4554?
Föreläesningsexempel Vilt:	445245554? 4453455544?
Grupparbetsseminarium Salmonella:	54544?554? 5454455544?

Kommentarer?
Är inte veterinär och har svårt att avgöra realism o relevans men det varr mycket bra att jämföra "enkla brott" med "sva problem" för att lättare förstå hur hypoteser skall ställas upp.
Har ingen kunskap att bedöma detta, men jag tyckte fr a viltexemplet var väldigt talande.

Vilken del av seminariet var mest användbar?
Se att det finns många likhetet med arbete-arbetsgång SVA-SKL

Grupparbetet gav mycket, men föreläsningarna gav verktyg far att klara av övningen

Grupparbetet

Föreläsnignarna

Tyckte överlag att det var ett intressant seminarium som kan vara användbart framöver. Känns som om man hade velat ha ännu mer information.

Diskussionerna. –Men viktigt med grunderna..

Föreläsning från SKL

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Sättet att tänka, som säkert kan appliceras på andra områden i SVA:s verksamhet också.

Vilka delar av seminariet skulle kunna förbättras?
Lite trögt i hur grupparbetet skulle genomföras

Just nu tid till reflerktion

Kanske börja med några korta resultatövningar i ökande svårighetsgrad i ställe tför ett stort

Öppning på eftermiddagen – bättre fördelning av experter.

Förmiddagen
Jag tror att uppdelningen i grupper var något olycklig då grupp2 fick trögare diskussion. Se till att det vid grupparbetena finns de kompetenser som krävs för att det ska blir ett realistiskt tänk.

Finns det behov av att följa upp med fler seminarier/kurser?
(Om "ja" - Förslag på focus?)
Ja, fortsatt typfall från SVAs verksamhet
JA
Ja
Ja – diagnostik.
Ja, genom att försöka implementera ett liknande arbetssätt på SVA, självklart anpassat efter SVAs förhållanden
Ja, kanske fr a i en misstanke utbrott/utredningssituation, men säkert även för andra delar. Måste fundera mer på det.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Partner: SVA

Type: Report
Reg. no.: ABT2013-WP4-8
Project: HOME/2009/ISEC/AG/191
Date: 2013-05-08

Levels of classification:
☐ EU Restricted
☐ Internal use
☒ Open/Unclassified
Choose classification level:

WORKSHOP IN EVALUATION OF EVIDENCE IN CASES INVOLVING VETERINARY PATHOLOGY AND CHEMISTRY

National Veterinary Institute (SVA). Sept 12 2012.

Gunnar Andersson, Therese Ottinger

Abstract
In a collaborative project between SVA and SKL we are investigating the possibility of applying the Bayesian approach to forensic evidence evaluation to pathology. The aim is that statements from the veterinary institute should be correctly understood in cases of animal abuse, poisoning or intentional dissemination of pathogenic microorganisms. The workshop focused on evaluation of evidence in pathology cases involving suspect poisoning of animals. The scenario was based on a real incident where polo ponies were intoxicated with a lethal dose of selenium. During the progress of the workshop the participants were presented with clinical symptoms and findings from necroscopy and chemical analyses and were asked list the alternative hypotheses on the cause of death and propose further investigations.
After that an attempt was made to represent the knowledge in the form of a draft Bayesian Belief Network. Representing the case as a Bayesian network was not simple since neither the sets of hypotheses nor the different observed results were independent. The process was found to be useful as a way to structure the information but whether the Bayesian belief network is an appropriate way of representing the process is still an open question.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Table of Contents

Introduction & Background

Evaluation of forensic evidence is an important part in the reconstruction of a possible CBRN incident. In recent years the state of the art in forensic interpretation is to evaluate forensic evidence using likelihood ratios in the framework of Bayesian hypothesis testing. In framework it is used to evaluate to what extent results from forensic investigation speak in favor of the prosecutors or defendants hypotheses. This framework is currently used at the Swedish national forensic institute (SKL). However, in the aftermath of a CBRN incident other institutes with less experience in forensic investigation will contribute to the investigation. In order to promote a joint approach to evaluation and reporting of results a series of workshops was initiated in collaboration between AniBioThreat tasks 1.1, 4.2 and 4.3. In the AniBioThreat project the framework of forensic statistics has been applied to veterinary forensic pathology, tracing of pathogenic microorganisms and post mortem interval estimation by forensic entomology.
The work was co-funded by a 2-4 grant from the Swedish Civil Contingency Agency (MSB) “MSB-Säkprov”.

The aim of the workshop was stated as:

> “To give an introduction to forensic evaluation of evidence and through discussions learn how a forensic approach can be applied to questions relevant for a veterinary institute and more specifically when results from sampling and chemical analyses should be part of the pathologists´ report”.

A summary of the workshop program is given in table 1.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Table 1. Workshop program.			
Tid	**Activity**	**Speaker**	**Subject**
09:00-09:15	**Introduction and Background**	**Gunnar Andersson (SVA) Researcher**	Background to the work Introduction to the day Ongoing activities
09:15-9:30	**Forensic Pathology**	**Therese Ottinger (SVA)**	Work on developing forensic pathology at SVA
9.30-10:00	**Scenario metodik**	**Gunnar Andersson (SVA)**	Expressing uncertainty in statements
10:00-10:15	Coffee break		
10:15-10:45 11:00-12:00	**Introduction to work** **Work in groups**	**Therese Ottinger/Vera Galgan (SVA)** **Andersson, Nordkvist, Ottinger, Hård av Segerstad mfl.**	Background story. Phrasing questions and hypotheses. Identifying data need.
12:00-13:00	**Lunch**		
13:00-14:30	**Continued work**	**Andersson, Nordkvist, Ottinger, Hård av Segerstad mfl.**	Evaluation of evidence Model construction Statements
15:00-15:30	Kaffe		
15:30-16:00	**Summary**	**Gunnar Andersson (SVA)**	Presentation of results Discussion and questions Evaluation

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

Scenario summary

Before writing the scenario a specification was made according to the AniBioThreat conceptual framework for scenario building (ABT2011-WP4-5).

Scenario title: Evaluation of result, pathology chemistry

- Aim/goal:
  - Evaluate how the approach for evaluation of evidence from the National Forensic Institute applies to a case in veterinary pathology
- *Actors*:
  - SVA-pathology dept. SVA-chemistry, Statistician Decision maker (SJV?)
- *Threat/challenge*:
  - Complex Multidisciplinary question.
  - The report should be transparent and comprehensive.
- *Capacity challenged*:
  - Evaluation of evidence.
  - Communication
- *Tools*:
  - Case data
  - Articles and Reference values
  - Software for Bayesian network construction
- Core-scenario:
  - Selenium intoxication of horse.
  - (This user scenario may be fitted to other core-scenarios as well)
- *Series of events*:
  - ”act 1
  - Case presented. Initial observation.
  - ”Act 2
  - Report from necropsy
  - ”Act 3
  - Data from specific investigations including feed.
  - Act 4
  - Crime suspicion presented

Scenario description

The scenario was based on a real incident where polo ponies were accidently intoxicated with a lethal dose of selenium (Desta et al.). The clinical symptoms and findings from necropsyand chemical analyses are taken from this report whereas the frame story was modified to include additional hypotheses on cause of death and on the means of administrating the selenium to the horse. The scenario was represented as a slide show (Figure 1-3). At the beginning of the workshop the participants were

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

presented the introduction and the initial symptoms of the dead horse (Figure 1). When reaching the slide “Initial Hypothesis” (Figure 2) a discussion was initiated. During the course of the workshop participants requested analyses to be made, based on the hypotheses. The results from the analyses were presented as “fact cards” (Figure 2).

Figure 1. Introduction to the scenario and initial symptoms.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

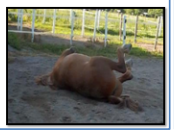
AniBioThreat

Classification level: Open/Unclassified

Initial hypotheses

Before necropsy:

- What is the main hypothesis?
- Is there any secondary hypotheses/differential diagnoses?
- Is additional information needed? And if so, what information?



Card 1. Necropsy findings.

- Multifocal to coalescing acute hemorrhages in skeletal- and cardiac muscle.
  - Histology: Acute ischemic degeneration of myofibers and myocardium.
- Marked laryngeal hemorrhages and edema. Pulmonary edema, hemorrhages, hyperemia and profuse tracheal froth.
- Marked hyperemia and hemorrhage with submucosal edema in the small and large intestines.

Card 2.

Selenium koncentration in tissues.

Organ	Selenkoncentration	Reference range
Liver	5,8 mg/kg	0,30-1,00 mg/kg
Kidney	4,4 mg/kg	0,70-2,00 mg/kg
Serum	1,4 µg/ml	0,140-0,250 µg/ml

Card 3. Feed.

- The horse has, in addition to hay and grain, been fed a powder mix of minerals and vitamins.
- This powder is designed for the high performing racehorse and contains garlic, herbs, glucosamine, and algae in addition to vitamins, minerals and trace elements

Kalcium
Fosfor
Magnesium
Koksalt
Koppar E4 (kelat)
Selen E8 (selenjäst)
Jod E2 (kaliumjodat)
Järn E1 (sulfat)
Kobolt E3 (karbonat)
Mangan E5 (oxid)
Zink E6 (oxid)
Vitamin A
Vitamin D3
Vitamin E
Vitamin B1
Vitamin B2
Vitamin B6
Vitamin B12
Pantotensyra
Niacin
Folinsyra
Biotin
Vitlök
Alger
Örter
Glukosamin

Card 4. Feed.

- Analysis of the powdremix showed a seleniumkoncentration 5 times higher than stated on the package.
- Main selenium source in selenium yeast imported from China.

Figure 2. Initial questions to participants and additional information given in response to investigations proposed by participants.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

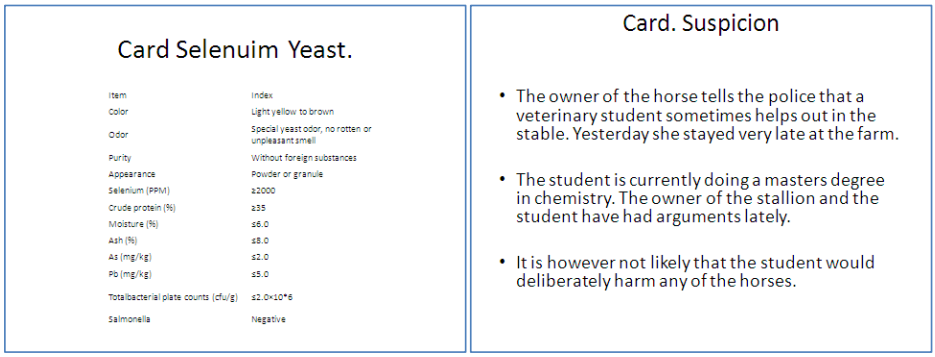


Figure 2 - continued. Initial questions to participants and additional information given in response to investigations proposed by participants.

Figure 3. References to original case presented to participants after the workshop.

Progress of workshop:
The presentation of initial symptoms and later the findings from the proposed investigations was followed by extensive discussion among participants. The discussion included:

- Listing alternative hypotheses
- Estimate probability of obtaining the different results under the hypotheses
- Which hypotheses and results are independent?

During most of the workshop the whiteboard was used to list hypotheses and results and to indicate the relation between them (Figure 4 left). Attempts were made to estimate the magnitude of probabilities (figure 4, right). The participants were often able to set an approximate estimate for the probabilities although it was explicitly agreed that the estimates were preliminary and could not be used to calculate the value of evidence without revision.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

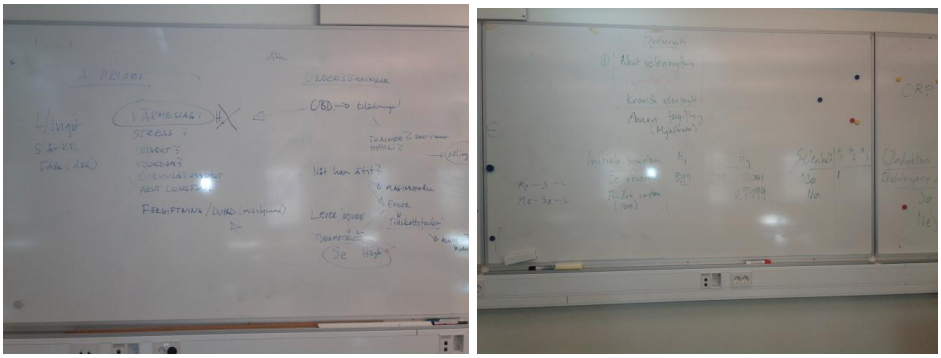


Figure 4. Screenshots from workshop.

The following bullet points summarize the discussions.
After presenting participants with case:

- Points of discussion after seeing initial symptoms: What diagnoses would be possible?
- Heat stroke/hyperthermia.
- Oxygen deprivation/entrapment suffocation.
- Stress.
- Cardiac arrest.
- Disease.
- Circulatory collapse.
- Poisoning or failed doping.
- Rupture of the aorta.

Points of discussion after obtaining results from necropsy:

- Bleedings in muscles- what does that mean? Are they related to death or could it be normal for this population of horses especially after a stressful transport?
- Absence of pathogenic bacteria – what does it mean? What findings would we expect in an animal that died from infection and an animal that did not?
- Is it probable that an apparently healthy horse dies acutely of an infection?
- Is it possible that one out of five horses dies from oxygen deprivation? What is the status of the other horses?

Points of discussion after analysis of selenium:

- Are we sure that these levels are lethal?
- Could the observed levels be result from eating selenium?
- If these levels where a result of eating high doses over a period of time - is it probable that the horse would show no symptoms of chronic selenium poisoning what so ever?

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

- Calculations on selenium level via feed – It is deemed impossible to reach measured levels by feeding a horse with the feed additives that were analyzed.
- Chronic intoxication – Are the selenium levels compatible with the healthy appearance before transport…
- Bleedings are in concordance with acute selenium but are they also in support… We would expect bleedings in case of high selenium doses but it may not be unexpected in a non-intoxicated racing horse after transport?? The bleedings may not be unexpected if oxygen deprivation, hyperthermia or stress is cause of death.
- Do the high selenium levels rule out other disease?
- Are we misled by the toxicology results?

Representing scenario as a Bayesian Network
After listing hypotheses and results an attempt was made to represent the knowledge in the form of a draft Bayesian Belief Network (Figure 5).

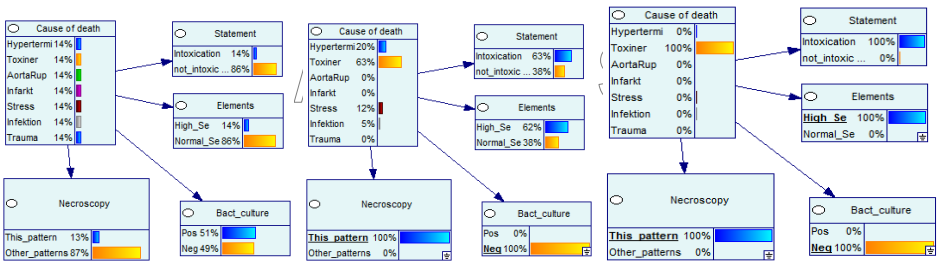


Figure 5. Draft Bayesian network constructed during workshop. Left: Network with prior probabilities. Middle: Network after seeing the pattern from necropsy and negative bacterial culture. Left: Network after adding evidence from selenium analysis.

Before necropsy there are seven groups of hypotheses judged equally probable.(Figure 5 left) The prior odds for The Hypothesis “The horse died from intoxication” is approximately 14/86 = 0.16. When evidence from necropsy and bacterial culture are inserted the odds have changed to 63/38=1.65. This corresponds to a value of evidence (Bayes factor) of 10.2 for the combined evidence of necropsy and bacterial culture and using the scale of conclusions from SKL the result speaks to some extent in favor of intoxication. (V>6).
With addition of the observation “High Selenium” the odds will change strongly in favor of “intoxication” compared with “not intoxication” (Odds =0.99998/0.00012). It was discussed whether or not there was some, small, probability that the high selenium could have been a result of the horse being fed selenium containing additives, and not the cause of death. A quick calculation of the amounts of selenium that a horse could have taken up from feed indicated that the levels seen could not possibly have been

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

reached by feeding the selenium additive in question. It was also noted that if a horse had accumulated these levels by feeding it would have shown signs of chronic selenium intoxication before the transport.
Consequently the combined result of a) the horse being healthy before transport, b) no signs of chronic selenium intoxication and c) extremely high levels of selenium in organs would be an expected result if the horse had been injected with a high dose of selenium just prior to transport.
In contrast, these results would be very unlikely under the alternative hypotheses evaluated.
Two main sets of hypotheses on activity level are identified.
1: Hp= High levels of selenium the cause of death; Hd1 =Other cause of death (from list); Hd2, The high levels of selenium *contributed* to death by some of the causes, e.g. High selenium + stress.
2: Hp= High levels of selenium caused by injection; Hd= levels reached by feeding.

Observation during the workshop
Validity of the network structure
A general observation is that neither were the two sets of hypotheses independent, nor the observed results from different investigations. Representing the case as a Bayesian network is clearly not simple. However, interpreting results as being independent while they are not is one of the important fallacies in the interpretation of evidence (e.g. Aitken, Roberts & Jackson) and in order to judge how strongly the results support one of the hypotheses over another these questions need to be addressed. The complex interplay is illustrated in the hypothetical network in figure 6, which was constructed by the organizers after the workshop. However, there may be more efficient ways of representing this problem.
Birgitta Rasmusson, SKL, observed that the process had similarities with that of e.g. an investigation of a fire where new hypotheses and pieces of evidence are added stepwise. Whether the network or influence diagram is an appropriate way of representing the process remains to be determined.

Need for hard data versus qualified guess on probabilities
Another point of discussion was whether or not is appropriate or not to set probabilities for results based on expert opinions/qualified guesses. The conclusion was that model building is a way of structuring data. Before actually collecting data it is necessary to identify relevant reference population. The estimated numbers of p(E|Hx) inserted in the BNN should be seen as preliminary. When the first conceptual analysis of the case is completed the critical parameters should be identified and their preliminary probabilities should be updated using literature data, data from relevant databases or possible from control experiments. Differences between human and veterinary pathology was discussed. One point was made that there might be fewer documented cases which the pathologist could use as reference. However, on the contrary the veterinary pathologist may instead have access to reference data based on animal testing for e.g. toxicity of substances or side effects of drugs.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

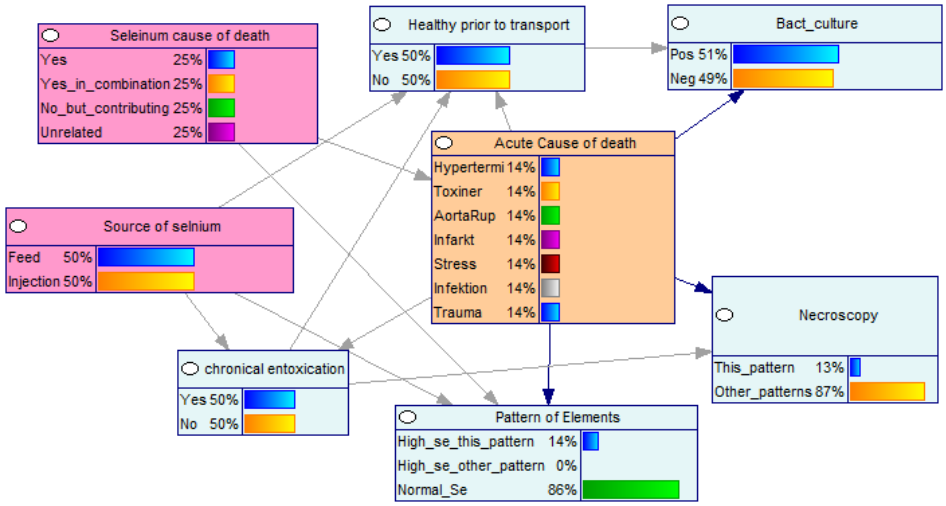


Figure 6: Hypothetical network structure illustrating the complex interaction between hypotheses and results. The red nodes illustrate the activity level hypotheses related to cause of death and source of elevated selenium respectively. The orange node is the acute cause of death.

What happens to alternative diagnoses?

It was observed that some hypothesis will appear, be dropped and reappear again during the course of the investigation. Excluding a hypothesis in response to e.g. necropsy results is equivalent to setting the probability of the observed evidence given that hypothesis to zero. In a pathological investigation there will be a very large number of hypotheses which may be raised and dropped, some of which may be explicitly indicated. It will, for practical reason, not be possible to assign probabilities to all these hypotheses using data from databases or literature. Even providing an expert´s qualified guess to each hypothesis might be difficult. However, even though each hypothesis might be improbable their total probability might not be neglectable.

Appropriate level of detail

It was noted by the participants that in addition to the key hypotheses at activity level the problem may contain several sub-hypotheses. A result of an investigation, particularly a micro- or macroscopic investigation, is a combination of an observation and interpretation. For example, when dissecting the kidneys of a dead animal crystal like structures may be observed which then could be interpreted as oxalate crystals. When evaluating probability of evidence a large number of oxalate crystals is a probable result in case of poisoning with ethylene glycol or certain plants whereas it is a very unlikely result under most other hypotheses.

However, interpreting the morphological structure as, for example, an oxalate crystal may be influenced by the prime hypothesis (e.g. ethylene glycol poisoning). A formally correct evaluation should thus include the probability of observing a structure resembling oxalate crystals under the alternative hypotheses, until the identity of the crystals have been confirmed.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

- Taking this to the extreme would probably result in an absurd BBNs and reports. However, the failure to reinterpret an observation retrospectively when faced with new facts or indices is a fallacy commonly observed among junior scientists probably as a result of how the human mind works (GA personal observation. However also senior experts may be influenced by a cognitive fallacies as pointed out in a lecture by I Dror at the EAFS2012 conference (plenary Aug 23). Consequently the order of appearance, and prior probabilities for the activity level propositions could potentially bias the interpretation of evidence in relation to identity level propositions…. (http://cognitiveconsultantsinternational.com/index.php?sub=drorspublist)

Conclusions

Result of evaluation

At the evaluation the participant were asked for their opinion on the scenario and the approach for evaluating evidence in a forensic pathology

The participant´s comments on the scenario:

- Realism – good
- Relevance – good.
- Complexity – OK, this scenario is representative for the complexity of pathology cases – they are rarely simpler.

The participant´s comments on the use of Bayesian approach:

- Potentially useful, worth testing.
- There were different views on the expression of value of evidence as numbers
  - It could be a danger if it gives a false impression of certainty
  - It could be a useful tool to assess and express the degree of uncertainty.
- The Bayesian networks could be useful for combining evidence from several investigations.
- The approach can serve as a tool to document the reasoning.
- It would be interesting to see how a court would look at it.

The participants were asked if there is a contradiction between the formulation of working hypotheses and the ideal of “working without prior assumptions”. The participants asked where the statement comes from (First seminar on evaluation of evidence). Perhaps there is a difference between pathology and epidemiology when it comes to the method of working? ”. It was agreed that a pathologist can never look for everything and thus need to have some hypotheses that can tell them what to look for. It was agreed that it is advantageous to explicitly indicate all hypotheses and assumptions for traceability

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Conclusions about process

Setting numbers on probabilities is a two step process. The first estimate is preliminary and may be seen as a way of making implicit assumptions explicit. In this process it is also important to identify relevant reference populations. A first analysis of the model will give an indication about what data would be the most important for the overall conclusion (sensitivity analysis). This may help the investigator to focus the data collection on the most significant data from the right reference population.

Before the workshop the following steps were proposed:

1. Define the question(s) to be answered
2. Define main hypothesis and alternative hypotheses (differential diagnoses)
3. Perform necropsy – macroscopic investigation
    i. Filter hypotheses – exclude irrelevant differential diagnoses
4. Perform selected investigations
    i. E.g. Histopathology, chemical analyses, bacteriology.
5. Evaluate results in the light of remaining hypotheses

Based on the discussions the following, updated process was proposed:

1. Define the question(s) to be answered
2. Define main hypothesis and alternative hypotheses (differential diagnoses)
3. Perform necropsy – macroscopic investigation
    i. Filter hypotheses – exclude irrelevant differential diagnoses
4. Perform selected investigations
    i. E.g. Histopathology, chemical analyses, bacteriology.
5. Perform selected investigations
    i. E.g. Histopathology, chemical analyses, bacteriology.
6. Investigate the structure of the problem
7. Identify relevant reference populations / reference data (Important!)
8. Identify dependencies between results from different investigations.
9. Make preliminary estimate of probability of results given alternative hypotheses.
10. Investigate which of the estimated probabilities will be most important for the value of evidence in the case (sensitivity analysis).
11. Search literature/databases for data that can be used to justify or update estimates of probability.
12. Estimate the value of evidence for remaining hypotheses.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Partner: SVA, DTU, , CVI, RIVM, SLU and ANSES

Type: Meeting report
Reg. no.: ABT2011-WP5-3
Project: HOME/2009/ISEC/AG/191
Date: 20111220

Levels of classification:
☐ EU Restricted
☐ Internal use
☒ Open/Unclassified
Choose classification level:

Meeting report from Scenario workshop at the WP5 meeting at ANSES Dec 1 2011

Aim and Background
The workshop was part of the work in Task 1.1 with focus on terms and definitions and conceptual modeling.

The specific aims were to:

- Evaluate the ability to interpret test results using validation reports and results from quality control and control samples
- Identify terms and definitions related to analysis of samples and quality control samples

The workshop was a pilot activity in AniBioThreat and as such a further aim was to evaluate the applicability of the workshop format and the scenarios in achieving the goals.

Before the workshop the specifications for a user-scenario "terms and definitions" were set by the task 1.1 scenario group (Appendix 1). The user scenario was applied to sub-scenarios representing four different core scenarios focusing on (i) anthrax in feed, (ii) poultry botulism, (iii) Swine Fewer in wild boars and (iv) unknown zoonotic viruses in water used for feed (Appendix 2) in a seminar in December 2011 by a working group formed by members from SVA, DTU, RIVM, SLU, CVI and ANSES. Each sub-scenario was divided into two acts.

In act 1 the participants should:

- Instruct sampler (no. and type of samples and control samples to take)
- Perform risk assessment
- Define scope and delimitations
- Prioritize samples to be analyzed (order of samples, controls that should be included)

In act 2 the results from sampling are ready and participants:

- should interpret the results
- explain the results and confidence therein to a decision maker

The workshop started with a short introduction by Gunnar Andersson (SVA) representing AniBioThreat task 1.1. After that the attendants were divided in three groups named tasks 1, 2 and 3. One person in each group was appointed chairman and was given a more detailed introduction to the specific core scenario. Notes were taken with color pens on paper and transferred to computer by a secretary. Each

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

group worked for about 2 h after which the participants were gathered and results summarized in a 30 min session.

Workshop Evaluation:
In general, the participants found the workshop very useful as it identified a lot of questions for future work. The different groups had various concerns. It was concluded that the user scenario/instructions should define more precisely what to discuss in order to reach the specific goals in the set time. Several participants commented that if it would have been possible to identify technical requirements, had the discussions not been allowed to drift into other topics.

All participants found the workshop very interesting, learning and worth to follow up. The information from the different groups should be summed up and followed up in a telephone meeting.

Several participants commented that the workshop was very useful for raising awareness about the intrinsic uncertainty in analytic results and the problems with interpretation. The discussions also revealed that different laboratories may have very different ideas about which controls are necessary and relevant. One such aspect relates to the tradeoff between need for process controls and risks of contamination. The use of readily identified stimulants which may be used as process controls without causing problems with contamination and false positives was discussed.

The question was raised whether more joint WP1 and WP5 workshops are needed. This question will be discussed later during the course of the project.

Some practical issues were also brought up, such as the use of separates rooms should be preferable as the noise level was reported by Group 1 and 2 to be high when sharing one large meeting room. Eight participants per group worked well for the discussions.

Scenario specific issues

1. Anthrax in feed scenario:
   The anthrax scenario was deemed good. However, the participants identified the need for statistical expertise for being able to solve the problem related to planning of sampling.

2. Poultry botulism scenario:
   The scenario discussions worked out well. Toxin and DNA detection were identified as crucial to continue to discuss.

3. African Swine Fewer Virus (ASFV) in wild boars scenario:
   The scenario worked well. More defined scenarios are needed to sort out sampling and control needs.

4. Unknown zoonotic viruses in water scenario
   This scenario was not studied due to limited time

.

Controls
A discussion of the need for controls in the different parts of the analysis chain resulted in the identification of the following controls:

- Process controls – remains to be defined but refers to the full analytic chain including pre-enrichment steps. The relevant process control depends strongly in the analysis and scenario.
- Assay controls – Controls for the detection method.
- Full lab process control (Botulism) – preliminary term, needs to be defined in further work
- DNA assay control (before DNA extraction)
- Microbiological process controls vs. chemical (toxins) full process control.
- DNA integration, false negative.
- Control for checking DNA - Could be possible to link to forensic investigations.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

AniBioThreat

Classification level: Open/Unclassified

SUMMARY OF DISCUSSIONS FROM INDIVIDUAL WORKING GROUPS

Scenario 1: Anthrax in feed

Act 1. Background to identify samples and controls to use

First we made the assumption that there were no validated methods to use. This is similar to the EHEC outbreak in 2011 where there was no validated method for the sample type to be analyzed. We identified the needs to include control in the analytical chain where particularly internal amplification control and process controls (the whole analytical chain) were considered important.

We proposed to use a generic approach for samples that you do not known as it is impossible to validate every method for all possible sample types. However, clinical samples may be validated. A comparison of suspicious object /protocol with clinical validated methods was discussed.

Next the aim of sampling was discussed. The analysis protocol might differ depending on the aim, e.g. forensic protocol, suspicious objects protocols and clinical sampling. The sampling strategies should be defined, e.g. by making a flow chart of the process. We also discussed how to define the feed silo in the scenario; is this a crime scene?

Different sampling approaches were discussed next, including automated sampling and sampling of the sheep, cows and maggots. Resources for sampling should be defined; no. of persons, sampling kits etc. as well as the no. and type of samples to take.

The need to specify the analytical methods was identified, e.g. which methods to use (visualize the analysis chain in a flow chart), controls to include (process control, PCR control).

We discussed different possibilities to learn more from international expertise and reference laboratories and some contacts were identified, e.g. the OIE anthrax reference laboratories and the WHO anthrax reference laboratories. The Critical Reagents Program (CRP) has been established in the US. The CRP collection includes inactivated antigens of select agent, genomic materials from biothreat agents and monoclonal and polyclonal antibodies of biothreat agents (CRP, 2011). This could be interesting to look into further. Under the WHO anthrax reference laboratory Global Foodborne Infections Network, Region Specific Pathogens (Ba) and training courses were mentioned. A contact that we thought could be interesting to contact at the OIE Reference Laboratories was identified (Dr Elizabeth Golsteyn-Thomas, Canadian Food Inspection Agency. Email: bett.golsteyn-thomasnspectioins.gc.ca).

The need to run reference material was identified as crucial. We also discussed that a response team should be supplemented with statistical support and that the sampler (possibly a veterinarian) should be trained to sample adequately.

Finally we summed up the discussions about the sampling, samples and controls: (i) the need for sampling should be defined, (ii) the resources for sampling should be clarified, (iii) the sampler is important, and (iv) the needs for process and internal controls.

Terms for sampling was then discussed and some conclusions drawn:

- All samples negative: it is certain that the level in the sample is below a level of contamination in the samples analyzed from the big sample.
- One weak positive sample: SOP on interpreting the PCR results needed, sample should possibly be rerun
- Controls: Process controls, assay control should be included.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Act 2
In this part of the scenario it was concluded that there is no “yes or no answer” and that odds should be used instead. Terms for controls are available at the Forensic Institute and these should be investigated further. Finally the logistics considering sampling was discussed and a question about the throughput was raised.

Future scenarios:
The group suggested including the interpretation of a positive PCR result in future scenarios.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Scenario 2: Poultry botulinum

Discussion botulinum scenario
First, the scenario frame was changed into a more relevant case. The scenario has previously been described in the scenario work within the project.

Next we discussed the different controls used by different labs and which ones are necessary to be able to answer the questions of the scenario as well as possible. In this context we first discussed a "process control". This term was used by some to define a control that is included in the first step in the lab and then in every step along the process, and by others it was defined as a control included first in the DNA extraction process. We therefore suggest two different terms; a "full process control" = A control that is run along with (or in) the samples from the first step of the lab process and through the whole process, and a "DNA process control"= a control that is run along with (or in) the samples from the step when the sample is prepared for DNA extraction and through the rest of the process.

We also agreed that a "negative process control" is good to include; which in our case will be a tube with the media which is left uncapped through the whole preparation of enrichment procedure and cultivated along with the other samples. This control will tell us if there are contaminations in the lab or during the sample preparation.

Next we discussed PCR controls. We had different names for positive PCR controls, but decided it would be good to use the ISO standards (e.g. ISO 22174) for this. We also discussed different Internal Amplification Controls (IACs) used in different methods and labs.

Next, there was a discussion about validation of lab methods. All the different labs that participated in task 5.2 use different protocols for enrichment, as well as for DNA extraction and PCR. We discussed the idea of making a spore preparation and dilute it down to below the detection limit and send these preps around to the different labs to evaluate if the same limit of detection is achieved. Many labs have used the same protocols for many years, and it could be a good opportunity to optimize the protocol. Perhaps change the enrichment broth or detection technique.

Last, we discussed how many samples to analyze, both the number of samples to be collected, but also where and if replicates should be included. We felt that this discussion will have to be continued if we get sampling data, and the no. of replicates is a financial question for each lab, and is depending on the situation.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

Scenario 3: ASFV in wild boars

Unintentional spread of ASFV

The scenario has previously been described in the scenario work within the project.

Discussion during the workshop

The need for a nucleic acid degradation control was the most discussed issue. This is especially important in order to establish the risk of false negatives while analyzing partially decomposed carcasses.

Sampling in the environment and technical controls (sampling, extraction and detection) were discussed. Analytical pathways within the institutes were also disclosed for the participants.
It was considered prudent to use an established standard method for detection (based on OIE methods, terrestrial manual etc.). This will then be modified with a protocol for establishing DNA integrity from the sample; forensic methods should be able to solve the problem. More work will be invested in a short literature study about the possibilities to adapt existing forensic methods for integrity tests to AniBioThreat perspectives.

For act two the discussion centered on communication. The possibility of false negatives were also discussed (false positives are highly unlikely with the current methodology). Since the results will be similar to current results a new statement to stakeholders should not be needed (aka we should not fix something that works).

Possible fallout from the work now is an additional method to establish DNA integrity in samples. Terminology for controls must be discussed so that consensus is reached within the project.

Intentional spread of virus

Discussion never entered the second scenario for time reasons.

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs

TITLE
"Bio-preparedness measures concerning prevention, detection and response to animal bioterrorism threats"

ACRONYM
AniBioThreat

TOTAL COST
€7.003.992,26

FINANCES
With the financial support from the Prevention of and Fight against Chrime Programme of the European Union. European Commission – Directorate-General Home Affairs.

GRANT AGREEMENT NR
HOME/2009/ISEC/AG/191

START DATE OF THE PROJECT
1 October 2010

DURATION
3 years

COORDINATOR
National Veterinary Institute
SVA, Sweden

AniBioThreat

www.anibiothreat.com

BRIDGING SECURITY, SAFETY AND RESEARCH

The aim of the project AniBioThreat is to improve the EU's capacity to counter biological animal bioterrorism threats in terms of awareness, prevention and contingency.

The project will contribute to create a safer and more secure world. To succeed, we need to carry on a borderless dialogue.

AniBioThreat builds bridges across boundaries dividing countries, competencies, and disciplines.

In our work, we strive to be Collaborative, Learning, Efficient, and Alert, to be a Robust organization. Keep it CLEAR!

With the financial support from the Prevention of and Fight against Crime Programme of the European Union
European Commission – Directorate – General Home Affairs