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**Advanced Tools for fighting Online illegal trafficking**

**D4.2 – System Specification**

|  |  |
| --- | --- |
| WP number and title | WP4 – Use cases, Requirements and System Architecture |
| Lead Beneficiary | CERTH |
| Contributor(s) | ENG, EXPSYS, AIT, IBEC, IIP, SYSTRAN, TIU-JADS |
| Deliverable type | Report |
| Planned delivery date | 31/01/2019 |
| Last Update | 30/01/2019 |
| Dissemination level | CO |

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Document History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **VERSION** | **DATE** | **STATUS** | **AUTHORS, REVIEWER** | **DESCRIPTION** |
| 0.1 | 14/09/2018 | Draft | Apostolos Axenopoulos, (CERTH) | Table of Contents |
| 0.2 | 14/12/2018 | Draft | Apostolos Axenopoulos, (CERTH) |  |
| 1.0 | 31/12/2018 | Draft | ENG, SYSTRAN, EXPSYS, IBEC, TIU-JADS | Integration of input from all technical partners |
| 1.3 | 02/01/2019 | Draft | Georgios Papadopoulos (CERTH), Anastasios Dimou (CERTH), Konstantinos Stavridis (CERTH) |  |
| 1.4 | 20/01/2019 | draft | Peter van de Crommert (DITSS), Arne Dormaels (VIAS) | First internal review |
| 2.0 | 22/01/2019 | draft | Georgios Papadopoulos (CERTH) | Revised version |
| 3.0 | 28/01/2019 | draft | Elsa Sklavounou (SYSTRAN), Valentina Mazzonello (ENG), Ernesto La Mattina (ENG), Joachim Klerx (AIT), Damian Tamburri (TIU-JADS), Vincenzo Mascucci (EXPSYS), Riccardo Zucca (IBEC) | Updates from technical partners |
| 4.0 | 30/01/2019 | Complete version | Georgios Papadopoulos (CERTH), Anastasios Dimou (CERTH), Konstantinos Stavridis (CERTH) | Consolidated final version |
|  |  |  |  |  |
|  |  |  |  |  |
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Definitions, Acronyms and Abbreviations

|  |  |
| --- | --- |
| **ACRONYMS / ABBREVIATIONS** | **DESCRIPTION** |
| DMP | Data Management Plan |
| FAIR | Findable, Accessible, Interoperable and Reusable |
| LEA | Law Enforcement Agency |
| ORD | Open Research Data |
| OSINT | Open-Source INTelligence |

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# Executive Summary

The goal of the current deliverable is to gather system requirements in order to define the specification of ANITA system. The acquisition of requirements has been done taking into account the end-users’ needs. The latter have been defined in Deliverable 4.1 (Requirements, use cases and user scenarios).

After a number of face-to-face meetings with the end-users, during the first months of the project, a set of high-level user needs has been produced. This input has been exploited by the technical partners of ANITA to extract the technical requirements, i.e. the required functionalities (Functional Requirements) and constraints (Non-Functional Requirements) of all constituting parts (components) of the system. These system requirements will eventually influence the design of the ANITA architecture and the implementation of the system as a whole.

Moreover, a set of appropriate metrics (Validation Indicators) is defined to assist in the validation of the system in Task 9.6.

Based on the above, it is obvious that system specification constitutes a significant part in the context of ANITA, since the outputs of this work will be used as reference and will guide several technical tasks throughout the project duration.

It should be stressed that the specifications analysed in this deliverable focus only on the functionality and constraints of the components in a way that they are able to fulfil the end-user needs. No technical details are provided on how each component will be implemented (e.g. technologies, algorithms, etc.). These will be extensively covered in technical WPs (WP5-WP9), while a reference to technologies required for the implementation of the system will be provided in Deliverable D4.3 (*System Architecture*).

# Introduction

## Overview

The aim of ANITA is to develop a novel investigation system for analysing heterogeneous online and offline resources for illegal trafficking activities, through the combination of big data analytics, deep/dark web analysis, blockchain technology, capturing, modelling, inferring, processing and storing knowledge in human understandable forms, incorporation of human perception/cognition principles in the system processing pipelines and transferring of domain knowledge/expertise from the expert users to the novice ones. To achieve this, ANITA will deliver an automatic, large-scale, user-driven, cognitive system for the efficient detection, tracking, monitoring and eventual prevention of the illegal online trafficking activities (including the popular trends related to: a) counterfeit/falsified medicine, drugs and NPS, b) weapons and firearms, and c) terrorism funding). This covers all aspects ranging from Surface-Web/Deep-Web/Dark-Nets source discovery/analysis to sophisticated Big Data analytics and high-level semantic reasoning services. Particular attention will be given on collecting knowledge for the application domain and re-using it for training new/novice officers.

In this document, a high-level logical view of the ANITA system is presented and the key structural requirements are identified. Each of the ANITA modules is analysed in terms of its functionality and the responsibilities it must deliver. The deliverable assumes that the reader is familiar with the User Requirements (*Deliverable D4.1*).

This document will also cover key non-functional requirements such as efficiency, interoperability, security, privacy and ethics. It will present a detailed analysis of how the user requirements are satisfied by the Functional Requirements gathered in this document and provide the reader with a clear understanding of how the ANITA platform will transition user needs to delivered features. Finally, the deliverable will present validation criteria to be employed in determining the quality of delivery of the final ANITA platform.

The outcome of this work is the definition of system-level requirements that will be used as input for the design of the overall system architecture. The timeline of the task resulting to this deliverable expands from the 1st until the 9th Month of the project.

## Context Framework

ANITA will implement a complex investigation system that will integrate several tools or modules. Any component or tool that will produce explicit functionality and will be integrated in the ANITA framework will be called *Module*. This term will be used from this point onwards. For the purposes of the project, a total number of 33 modules have been identified. Technical work packages (WP5-WP9) will be responsible for the development of those modules. In Table 1, the ANITA modules are listed according to the WP they belong to. Apart from the modules that correspond to workpackages WP-WP9, there are also 6 system-level modules.

|  |  |
| --- | --- |
|  | **System Level** |
| 1 | User Management |
| 2 | Investigation Management |
| 3 | Resource Management |
| 4 | Information Management |
| 5 | Resource Analysis |
| 6 | Information Validation |
|  | **Data sources and stream analysis (WP5)** |
| 1 | Machine Learning Risk Assessment module |
| 2 | Black markets discovery and monitoring |
| 3 | Crawler for Surface web |
| 4 | Block-chain analysis for illicit activity discovering |
| 5 | Construction of source network and filtering |
|  | **Big Data analysis and analytics (WP6)** |
| 6 | Multilingual text analysis module |
| 7 | Object recognition module |
| 8 | Concept detection module |
| 9 | Event detection module |
| 10 | Multilingual automated translation module |
| 11 | Multilingual speech to text module |
| 12 | Topic Modelling System |
| 13 | Word Frequency Analysis module |
| 14 | Video and Image Indexing module |
|  | **Knowledge generation and reasoning (WP7)** |
| 15 | Knowledge modelling module |
| 16 | Black markets and illegal shops and products tracking module |
| 17 | Criminal network reconstruction module |
| 18 | Knowledge search and retrieval module |
| 19 | Knowledge based browsing module |
| 20 | Knowledge acquisition from deep neural networks |
|  | **Integration of human factor in the analysis loop (WP8)** |
| 21 | Implicit and explicit user capturing framework |
| 22 | Adaptive user modelling module |
| 23 | Conscious and subconscious user feedback module |
| 24 | Knowledge transfer module |
|  | **Novel applications for LEAs and system Integration (WP9)** |
| 25 | Source monitoring module |
| 26 | Knowledge management module |
| 27 | Graph exploration module |
| 28 | Import of new evidence module |
| 29 | Suggestion validation module |
| 30 | Visual analytics module |
| 31 | Chain of evidence module |
| 32 | Chain of custody module |
| 33 | Export module |

Table 1: List of ANITA modules

Overall, the objectives of WP4 can be summarized below:

1. To study and specify the user requirements;
2. To define Use Cases and user scenarios;
3. To study and specify the system level requirements;
4. To provide the system specification of the ANITA infrastructure that will be able to fulfil existing and future users’ demands;
5. To design the overall system architecture, based on the system requirements.

While objectives 1 and 2 are addressed in Deliverable D4.1 (Requirements, use cases and scenarios) and 5 is within the scope of D4.3 (System architecture), the objectives 3 and 4 are relevant to this deliverable. The role of System Specification is two-fold: i) to facilitate the transition from the User Requirements to the System Architecture by elucidating the non-functional requirements and constraints that the architecture must consider and accommodate in the overall design and ii) to clearly identify the functional requirements that individual module contributors should satisfy to enable a sophisticated, co-operative sequence of analysis flows.

The process and objectives of the investigations are summarized in Figure 1.



Figure 1: System Specification Objectives

Gathering of the functional requirements has been accomplished with the collaborative effort of all technical partners, in close interaction with the LEA to meet the requirement definitions. D4.2 will not only a list of requirements but it aims to expose the complete path from use case scenario to the technical objectives of each module.

The process followed is presented below in Figure 2.



Figure 2: From Use Case to Module

## Relation to other documents

The reader should be familiar with Deliverable D4.1 (*Requirements, use cases and user scenarios*) of ANITA [1], which will be used as input to the current deliverable. This deliverable will basically provide input to Deliverable D4.3 (*System Architecture*). Moreover, all technical tasks (WP5-WP9) and related deliverables will consult this document in order to drive the research process to be inline with each module’s functional and non-functional requirements.

## Structure of the deliverable

The deliverable is structured as reported below:

In **Section 2** – **Methodology** – a report on the methodology for requirements acquisition is presented, starting with requirements engineering, the process of communicating the system specifications among ANITA partners and a short reference to the three ANITA Use Cases (UCs) defined in D4.1, which will provide a reference for the definition of the system requirements.

In **Section 3** – **Functional Requirements** – and **Section 4** – **Non-Functional Requirements** – the full list of all modules’ functional and non-functional requirements is provided, respectively.

In **Section 5** – **System Validation** – the validation process is described and the Validation Indicators (Vis) for assessing each module are analysed. In this way, each requirement can be validated against the respective VI during Task 9.6 – System Validation, which aims to assess if we are building the ‘right’ system.

# Methodology

This section describes the methodology that has been adopted in order to realise the system specification of ANITA. It describes the system development lifecycle of the project, the process for acquisition of the requirements, a brief description of the use cases and the basic workflows for each use case, as well as a mapping of the user requirements to the system requirements.

## Requirements engineering

The main objective of this deliverable is to define a set of requirements to describe the ANITA system functionalities as a whole and for each individual module. All technical partners have contributed to specification of individual modules. These specifications describe what the system or modules must do in order to be effective and fully address the user requirements.

The System Development Lifecycle (SDLC) of ANITA involves the following phases:

1. Requirements Acquisition
2. System Specification
3. Architectural Design
4. Detailed Design
5. System Implementation
6. System Integration

Requirement Acquisition and System Specification constitute important parts for the effective development of ANITA system. Requirements Engineering (RE) occurs after the definition of the high-level user requirements (i.e. User Needs) and prior to the explicit system design phase. However, in a complex system like ANITA, it is expected that the requirement definition will not be covered by a sequential approach and, therefore, it is expected that more requirement analysis iterations will be required throughout the system development process.

The requirements will be used, during the system implementation phase, to enable the functionality of system, as well as for testing individual modules. During the last development phases of ANITA, the technical requirements will be used to direct the validation testing process, which answers the question of whether the developed system satisfies the stakeholders’ needs.

The System Development Lifecycle (SDLC) of ANITA is depicted in Figure 3. It is important to stress the association of the actual project phases with the project monitoring and validation phases, which is achieved by introducing certain Validation Indicators (VI). The Validation Indicators are defined at the same point as the requirements. Therefore, a specific Validation Indicator is assigned to each requirement. This way, the progress of each phase can be quantified and validated. The definition of the Validation Indicators for each measurable requirement is produced in this deliverable. Section 5 examines the details of how ANITA will be validated (validation will take place in Task 9.6 - System Validation). It is worth mentioning that the validation phase within ANITA will not be performed only once at the end of the project. It will be an iterative process that will be realised in several validation phases that will follow the development phases of the project. Apart from system validation, user evaluation will be also taken into account. The latter will be done during ANITA pilot testing (WP10) and will result in further improvements of the ANITA framework.



Figure 3: ANITA System Development Lifecycle

## Negotiating requirements

The main stakeholders of ANITA are the six end-users of the consortium, i.e. KWPG, AoC, CAST, NPN, GDCOC and LPV. Τhe design and development efforts within ANITA will try to satisfy their needs that have been analytically documented in Deliverable 4.1. At the requirements phase, all partners needed to make a contribution, in order to make evident the impact of ANITA and its innovative features. Producing innovative ideas, expressing them as requirements and linking them to the user needs generated by the stakeholders is a challenging task and a way to achieve this is through a creative technique in the requirement acquisition process. Within ANITA, three workshops have been organised between technical partners and end-users during the first six months of the project:

1. ANITA Kick-off Meeting (Rome, May 2018);
2. 2nd ANITA General Assembly (‘s-Hertogenbosch, July 2018);
3. 3rd ANITA General Assembly & First end-user meeting (Belgrade, October 2018).

These workshops have been considered as an opportunity to collect and produce draft requirements. The primary output of the workshops was a set of Use Case specifications and scenarios that were presented in Deliverable D4.1. The Use Case specifications were the medium that triggered new requirements and ideas that resulted from negotiations between all partners participating during the workshops.

## Use Case driven requirements specification

ANITA has been developed using a scenario-based approach. This means that the starting point for setting the boundaries of the system was the description of the scenarios involved. Scenario identification and description took place at the first phase of the methodology (the user requirements phase) and its conclusion drove a clear definition of the system’s goals, actors and requirements which in turn drove the development of the project and demonstrated the final results of ANITA. It is of high importance that a use case scenario should be well-defined and complete in order to cope (in conjunction with the environment) with all the necessary information to allow the extraction of concrete end users’ goals and requirements. It is worth mentioning that the cases described in this document originate in real events and real challenges faced by law enforcement authorities. Hence, they are not artificially created but carefully drafted in conjunction with the project end users to ensure a broad and useful functionality of the final ANITA system.

A clear description of ANITA Use Cases and scenarios is available in *Deliverable D4.1 – Requirements, use cases and user scenarios*. The focus of this document is to describe how these scenarios will be implemented in the context of ANITA framework by utilising the ANITA modules. In order to have a graphical representation of how the ANITA modules interact, specific flow diagrams have been designed for each use case. These flow diagrams have been created after close collaboration between technical partners and LEA users of the ANITA consortium. Feedback from LEA users (AoC, KWPG, NPN, GDCOC, LPV and DSTL) was particularly important to create valid flow diagrams.

### Use Case 1: Drugs, Medicine, NPS

In Figure 4, the flow diagram of UC1 is depicted. The column at the left side of the diagram entitled *User Interaction* contains those modules that allow direct interaction with the user, while the rest of the modules are running in the back-end. The interaction with the user is indicated with the red-coloured arrows.

More specifically, the user can interact with the ANITA system in order to fulfil multiple actions:

* Import evidence to the system to be analysed (*Evidence Import*).
* Monitor data gathering process from multiple sources (*Source monitoring and data gathering*)
* Monitor/manage the knowledge management process (*Knowledge management*)
* Query, browse, search and retrieve relevant content (*Browsing search and retrieval*)
* Visualise the relevant content (*Advanced big data visual analytics*)
* Provide feedback to the retrieved results implicitly or explicitly (*Implicit and explicit user feedback capturing*)
* Transfer knowledge to new officers (*Knowledge transfer to new officers*)
* Export evidence in a way appropriate for the court (*Chain of custody and evidence export*)

UC1 deals with illegal trafficking of counterfeit/falsified medicine, drugs and NPS. According to the description in Section 2.2 of Deliverable D4.1, this case covers several sub-cases related to buying drugs from a Dark market using cryptocurrency, semi-legal business selling NPS, e-mail spam messages offering falsified medicine, person-to-person drugs delivery and delivery of drugs to a PO address.

The objectives of police are focused on tracing all crypto-currency transactions that have illegal behaviour, in order to find helpful information about other suspects that are connected with the case. In particular, the police try to discover the real individuals behind the Dark Nets, as well as discovering new transactions in the predefined structures that have been detected. More specifically, the police should be able to detect the owners from the Dark Web sites that sell ‘opioids’, the owners of the enterprises that trade NPS and drugs on the edge of the law, and to detect individuals that make trade of medicines and pills relevant to sexual performance. To address this, links among persons should be identified, while the level of interaction among them should be identified.

The basic steps of the workflow in UC1 are described below. In Figure 5, the workflow focusing only on the back-end modules is presented.

The input to the system may include the following data:

* E-mails of users which buy NPS and drugs from Dark Nets such as ([janedoe@jane.com](mailto:janedoe@jane.com))
* Known marketplaces of Dark Nets that sell drugs and NPS
* The browsing history of the buyer’s computer that has been seized
* Nicknames of the buyer and seller (“Smithsopioids”, “DoeJane”)
* The website that the suspect uses to sell the NPS (www.odczynnikichemiczne.net.pl)
* A list of NPS substances that are used to make drugs
* E-mail messages with full headers
* Images of the NPS or drugs in various file formats (.png, .jpeg, .gif)
* Logos/addresses of the involved firms
* Slang phrases that the peers used while selling the drugs
* Facebook accounts of the drug dealers that were arrested
* Data of crypto-currency transactions (with most of them being Bitcoin) that were found on drug dealer’s personal computer
* Open source data that were obtained from online search engines such as “Duckduckgo” and “carrot2search”, when given as search query terms the personal data of the drug dealer that were collected during his house research.

Large-scale information that has been collected form Dark and Shallow Web, using *Black markets discovery and monitoring* and *Content acquisition from Surface Web* modules, after a *Data source risk assessment* step, is further analysed using visual (*Image analysis* and *Visual indexing*) and textual (*Multilingual automated translation* and *Multilingual text analysis*) processing modules. *Illegal trafficking and trend analysis* may also be performed in the data. *Visual indexing* modulewill enable fast retrieval of relevant visual content, such as detection of fake advertisements in large scale databases as well as detecting wallet addresses that are hidden from large-scale visual content. The role of *Knowledge Base* is to provide a set of ontologies to model all crime aspects, including events, suspicious and illegal activities, threats, persons and organisations. The *Knowledge base* will provide services such as *Knowledge browsing search and retrieval* that allows searching for similar visual and textual content that has been uploaded on social media accounts, emails and personal sites in order to identify other persons or organisations, which are relevant to a specific case. The Knowledge base can be continuously updated by exploiting the results of the analysis modules, through *Extraction of evolving knowledge* and *Knowledge modelling* modules.

An important part of the process is the role of user feedback, which can be added to the system either explicitly or implicitly (capturing user’s interaction with the system), through the *Implicit and explicit user feedback capturing* module. This user feedback will be used in several ways: i) to improve the existing analysis modules through the Incorporation of user feedback in deep learning representations; ii) to transfer knowledge to new officers (*Knowledge transfer to new officers* module).

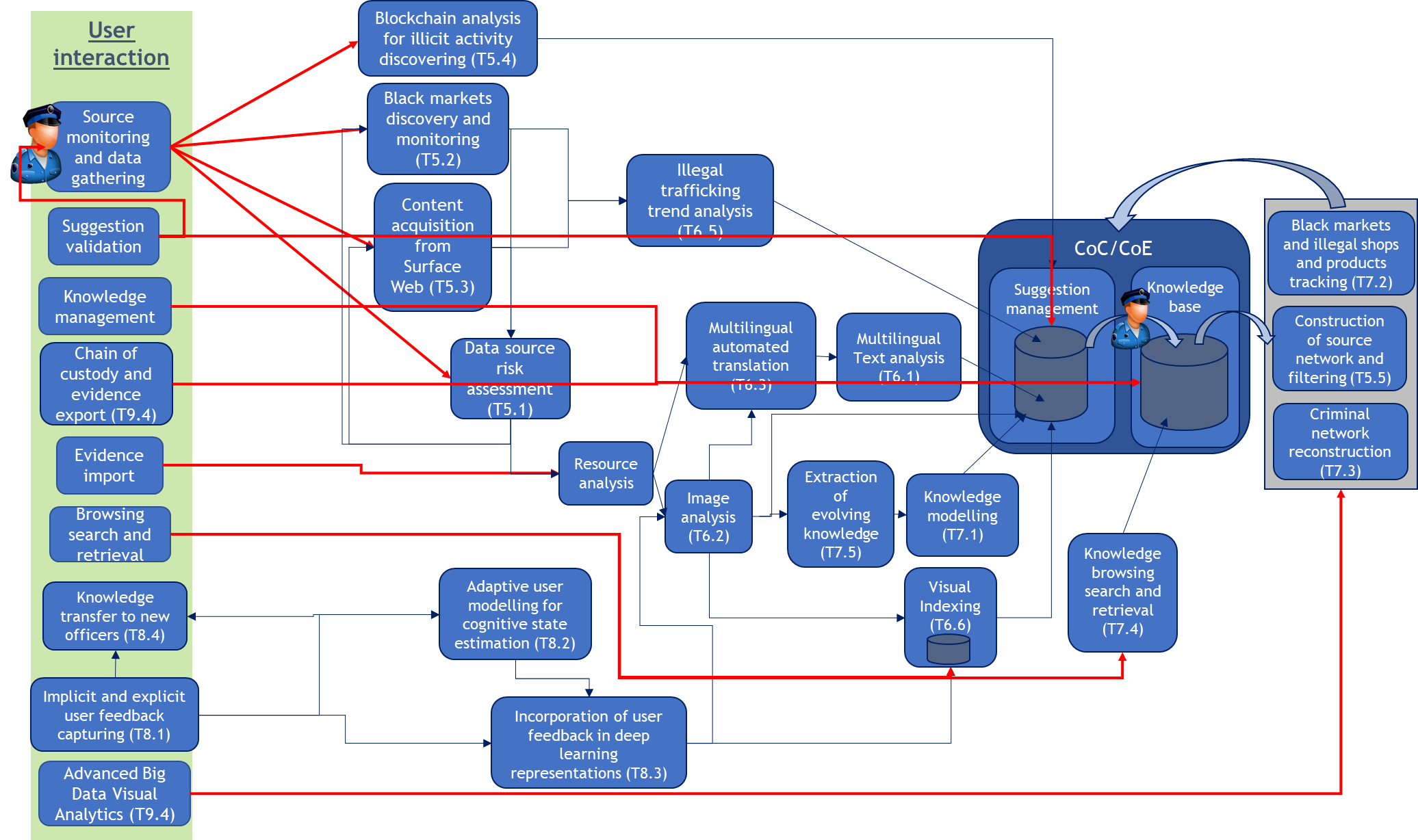


Figure 4: UC1 workflow

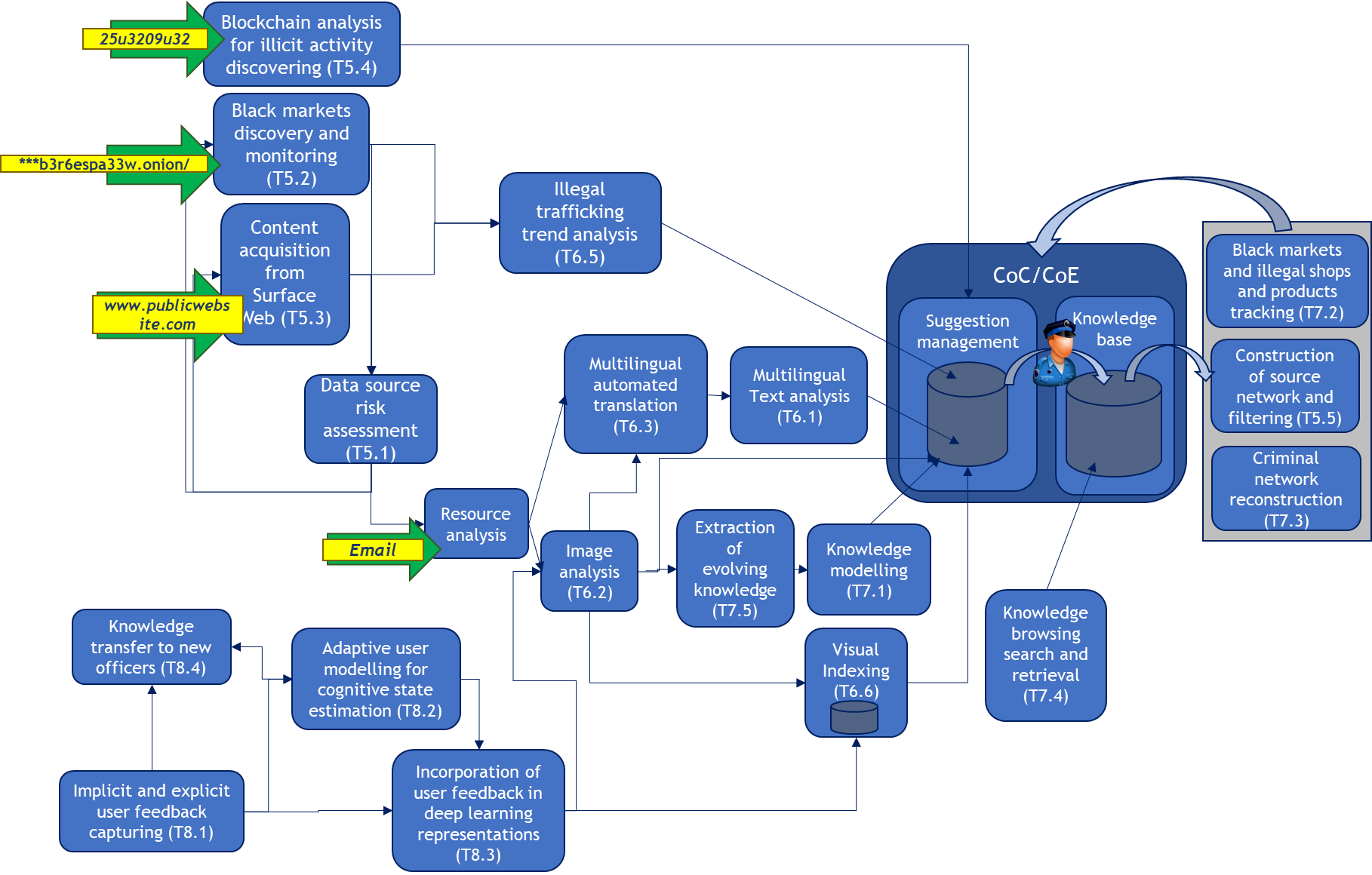


Figure 5: UC1 workflow (back-end processes)

### Use Case 2: Weapons

In Figure 6 and Figure 7, the flow diagram of UC2 is depicted, either with or without showing the “*Novel applications*” panel, respectively. Apart from some slight differences (e.g. some modules may be more useful in UC1 than in UC2), UC2 workflow is similar to UC1, in terms of modules interaction.

UC2 deals with weapons trafficking. According to the description in Section 2.3 of Deliverable D4.1, this case covers several scenarios related to cyberspace weapon trafficking and online arms/weapons commerce.

The objectives of police are focused on finding influencers and searching for political and other people related to weapon trafficking crimes. To address this, the investigators perform multi-modal (audio, video, text) analysis, in order to find weapon explanation speeches and online markets of Dark Web sites that sell weapons. In particular, the officers aim at identifying people or objects from images, finding similar images or textual information, and extracting correlations among them, in order to create a profile of a team or an individual that sells weapons and firearms. Moreover, police aim to detect similar content that is published on the Web, in order to spot similar sites that sell parts of weapons. In particular, the detection of parts of guns is needed. Additionally, detection of visual content that could be suspicious (e.g. a picture of a gun in a personal computer) could also be helpful. On the other hand, the detection of concealed objects would be helpful. Frauds, were mock-ups are presented as legal objects, need to be detected (e.g. bullets can be presented as shells).

The input to the system may include the following data:

* IP addresses of websites that advertise weapon commerce via Dark Web or sites where the seller sells the weapons and the ammunition
* Social media profiles of the users, which post content (textual, audio, video) in order to explain the functionality of the weapons/firearms
* List of URLs that sell weapons and firearms on Dark Web that have been revealed from a detailed analysis of the offenders’ computers (already solved investigations)
* Images and phrases that are depicted on advertisements of weapons and firearms
* Pictures of real weapons and ammunition that have been found in suspect’s computer
* Documents that have been forged in the buyer’s house
* Social media profiles of a persons posing with a gun
* The list of the addresses that the different parts of the weapon have been delivered.

The above input is acquired in ANITA system in a similar way as in UC1. The *Image analysis* module will be responsible for automatically detecting potentially useful information, such as objects (weapons, firearms), concepts and events (e.g. showing how to use a weapon etc.), detection of weapon advertising or even detect people in photos posing with a gun in order to further search for the user profile. Additionally, the management of huge amounts of textual information is critical. *Multilingual automatic translation* and *Multilingual text analysis* will be used for searching for phrases that are used among the sellers and buyers, and mining private messages are shared on the Dark Web, translation into several languages (that can be used for communication). Moreover, *Multilingual speech to text* functionality, in order to make available the analysis of audio data from speech and then transcription to text supporting multiple languages, is often needed. Finally, the police aim to find the location of the photos that are uploaded on the Web. To this end, a combination of *Knowledge modelling* and *Image analysis* modules could be applied, in order to recognize the exact places where a picture is captured. Therefore, *Image analysis* could help by focusing on elements that lie in the background.

The rest of functionalities related to knowledge modelling and browsing, and user feedback are similar to UC1 and have been described in the previous subsection.

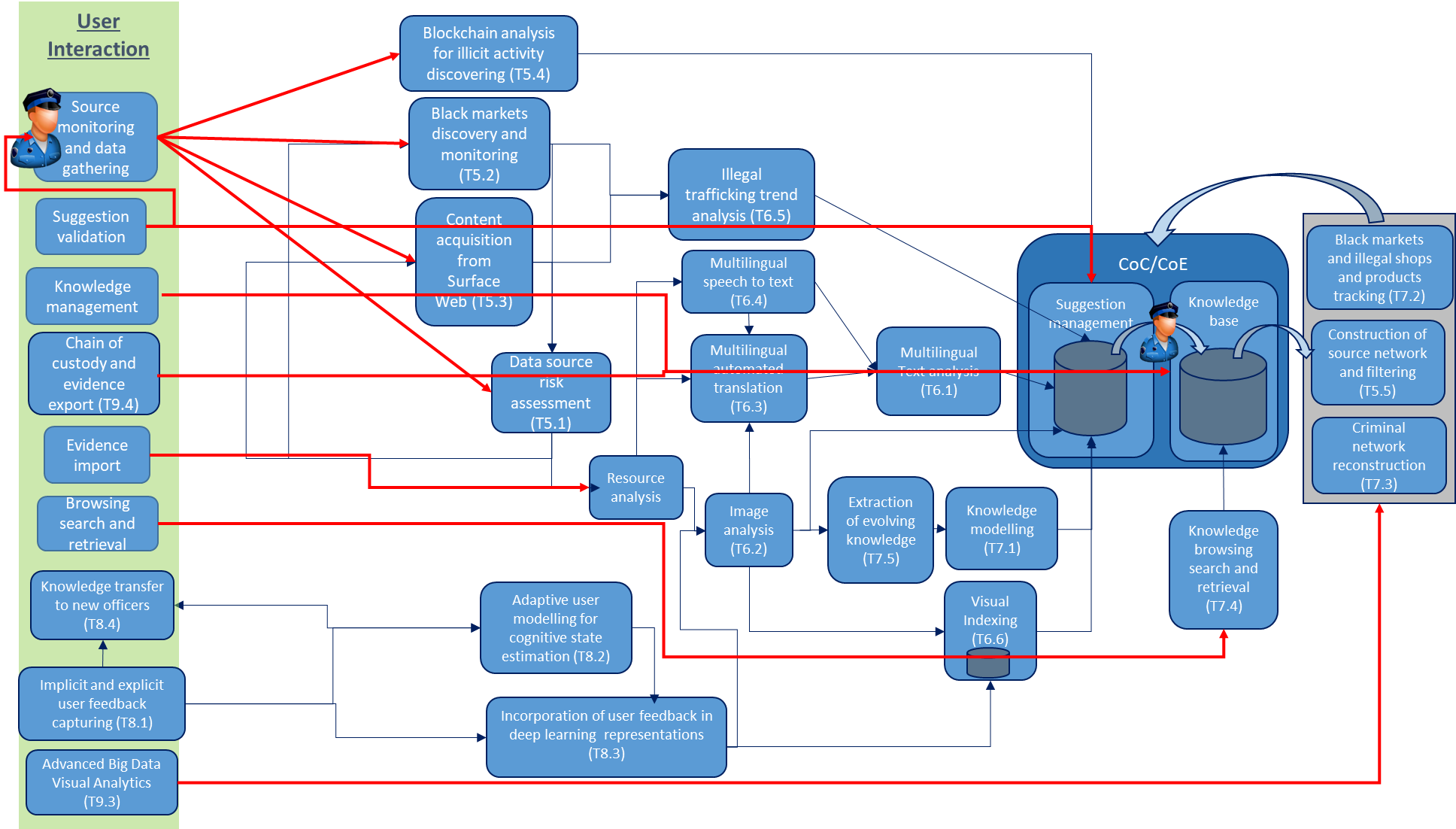


Figure 6: UC2 workflow

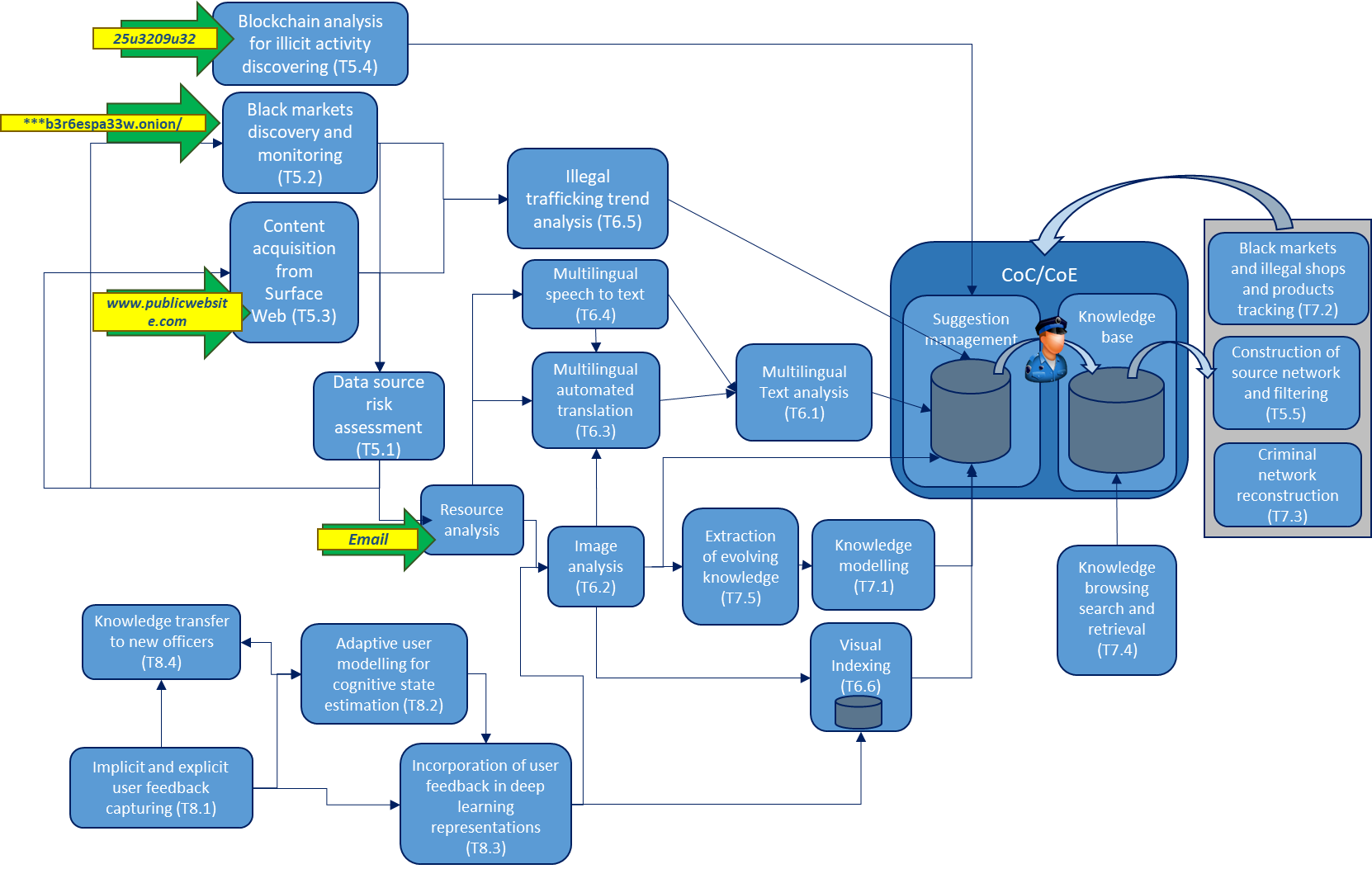


Figure 7: UC2 workflow (back-end processes)

### Use Case 3: Trafficking related to terrorism funding

In Figure 8, the flow diagram of UC3 is depicted. UC3 deals with the cases where terrorist organisations exploit various ways to obtain funding, such as terrorist-related financial networks, fake charities, fund-raising campaigns. More specifically, UC3 focuses on two main scenarios: transactions using block-chain technology and financial crimes of terrorists.

In the former scenario, the objective of the police is to investigate if a person has been radicalized from terrorists (transactions among terrorist groups and persons that have signs of radicalization). Signs of radicalisation can be found within the websites they are visiting, the videos they are watching, the messages, images, videos that are spread in their social profile as well as their links among people and the level of interaction. In the latter scenario, the police aim to search in the Web in order to find relations among suspects and to define a hierarchy or links among them, as well as to search for similar visual content (videos and images) collected from social media networks and audio content of speeches.

The input to the system may include the following data:

* visited websites, cookies, downloaded videos
* police databases, Facebook/Twitter accounts, Telegram channels
* Suspicious crypto-currency transactions that have been detected during the investigation (Monero, Ethereum, Bitcoin and Ripple)
* wallet addresses
* Chat conversations, historical communication data/user information
* Lists with names of persons who are taking part in terrorist activities

The process starts with the Source discovery and monitoring, which crawls information from Surface Web, Deep Web and Darknet. Several functionalities are included in this phase, such as analysing the computers (e.g. in an asylum shelter) for crypto-currency transactions (wallet addresses), email addresses, bank account numbers, phone numbers and vehicle license plates, search for specific IP addresses, tracing websites, spotting email addresses. Moreover, investigation may include detection of money trail that has been tracked using block-chain technology, monitoring of financial transactions and the detection of the suspicious ones. Then, the big data analytics modules will further process the gathered information to identify links among the aforementioned people and for similar content (both visual and textual). Examples include detecting and extracting wallet addresses that have been incorporated in visual content in the form of a picture or in a video (using image processing and visual indexing), speech-to-text functionalities to enrich the investigation with additional knowledge. The gathered knowledge will be further exploited for criminal network reconstruction and will be accessible to the user through knowledge-based browsing search and retrieval. Finally, user feedback could be incorporated in a similar way as in previous Use Cases (see previous subsections).

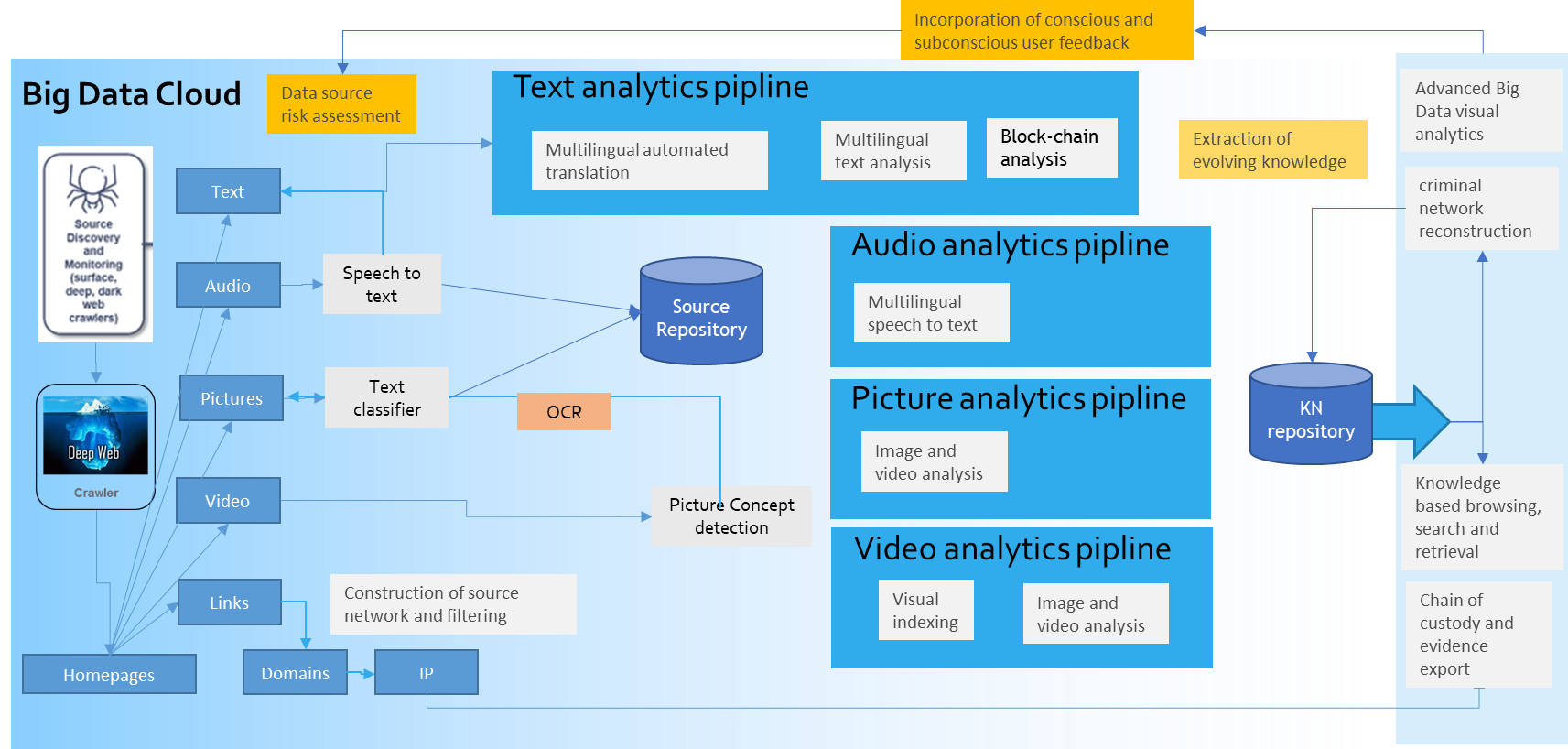


Figure 8: UC3 workflow

## User requirements mapping

In Table 2 below, we present the linkage between each of the three Use Cases described above and the low-level functional requirements (Section 3). With ‘Y’, we indicate that the specific functional requirement is leveraged by the Use Case.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Module | Functional Requirement | UC1 SC1 | UC2 SC1 | UC2 SC2 | UC3 SC1 | UC3 SC2 |
| Data sources and stream analysis | | | | | | |
| Black markets discovery and monitoring module |  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Crawler for Surface web | Crawl Social Networks | Y | Y | Y | Y | Y |
| Crawl URLs in Surface Web | Y | Y | Y | Y | Y |
| Acquire content from local sources | Y | Y | Y | Y | Y |
| Blockchain analysis |  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Construction of source network and filtering |  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Big Data analysis and analytics | | | | | | |
| Multilingual text Analysis | Categorisation | Y | Y | Y | Y | Y |
| Entities Extraction | Y | Y | Y | Y | Y |
| Stylometric analysis | Y | Y | Y | Y | Y |
| Object recognition | Detect and recognise relevant objects | Y | Y | Y | Y | Y |
| Output Content | Y | Y | Y | Y | Y |
| Concept detection | Detect and recognise concepts | Y | Y | Y | Y | Y |
| Produce hierarchical concept structure | Y | Y | Y | Y | Y |
| Event detection | Detect particular events | Y | Y | Y | Y | Y |
| Multilingual automated translation | Translate a given text or document | Y | Y | Y | Y | Y |
| Handle terminology | Y | Y | Y | Y | Y |
| Identify the language of a given text | Y | Y | Y | Y | Y |
| utilise state-of-the-art machine learning (Deep Learning) technologies | Y | Y | Y | Y | Y |
| Multilingual speech-to-text | Transcript audio file to text |  | Y | Y | Y | Y |
| Support audio formats |  | Y | Y | Y | Y |
| Language support |  | Y | Y | Y | Y |
| Machine Learning Risk Assessment module | Predict risks and vulnerabilities | Y | Y | Y | Y | Y |
| Input data sources | Y | Y | Y | Y | Y |
| Input data types | Y | Y | Y | Y | Y |
| Topic Modelling System | discover the topics from a collection of documents | Y | Y | Y | Y | Y |
| generate JSON or CSV file formats | Y | Y | Y | Y | Y |
| use Latent Dirichlet Allocation (LDA) as statistical modelling technique | Y | Y | Y | Y | Y |
| Word Frequency Analysis | create statistics on word frequency from a given dataset | Y | Y | Y | Y | Y |
| Video and Image Indexing | Binary descriptor extraction | Y | Y | Y | Y | Y |
| Search and preview similar videos and images | Y | Y | Y | Y | Y |
| Exploit detected objects | Y | Y | Y | Y | Y |
| Update binary conversion process | Y | Y | Y | Y | Y |
| Knowledge generation and reasoning | | | | | | |
| Knowledge modelling | model all crime aspects | Y | Y | Y | Y | Y |
| Black markets and illegal shops and products tracking | Inference and reasoning | Y | Y | Y | Y | Y |
| Criminal network reconstruction | Node creation | Y | Y | Y | Y | Y |
| Node type selection | Y | Y | Y | Y | Y |
| Node deletion | Y | Y | Y | Y | Y |
| Relationship creation | Y | Y | Y | Y | Y |
| Relationship type selection | Y | Y | Y | Y | Y |
| Relationship deletion | Y | Y | Y | Y | Y |
| Produce suggestions on discovered relationships | Y | Y | Y | Y | Y |
| Produce suggestions on new crawling sessions | Y | Y | Y | Y | Y |
| Produce suggestions on new analysis sessions | Y | Y | Y | Y | Y |
| Search and retrieval | Search by user query | Y | Y | Y | Y | Y |
| Default order of search results | Y | Y | Y | Y | Y |
| Additional order criteria of search results | Y | Y | Y | Y | Y |
| Search results filter by type | Y | Y | Y | Y | Y |
| Additional order criteria of search results | Y | Y | Y | Y | Y |
| Browsing | Stored content read | Y | Y | Y | Y | Y |
| Knowledge acquisition from deep neural networks | Infer new and evolving knowledge | Y | Y | Y | Y | Y |
| Validate and refine data-driven knowledge | Y | Y | Y | Y | Y |
| Integration of human factor in the analysis loop | | | | | | |
| Implicit and explicit user capturing framework | Capture implicit and explicit user responses | Y | Y | Y | Y | Y |
| Adaptive user modelling | Estimate user cognitive/affective states and performance | Y | Y | Y | Y | Y |
| Conscious and subconscious user feedback | Model explicit and implicit human responses | Y | Y | Y | Y | Y |
| enhance deep learning models for image retrieval | Y | Y | Y | Y | Y |
| enhance deep learning models for object detection | Y | Y | Y | Y | Y |
| Knowledge transfer | Tutoring system | Y | Y | Y | Y | Y |
| Applications, visualisation and evidence export | | | | | | |
| Source monitoring | Add new source to monitor | Y | Y | Y | Y | Y |
| Start monitoring a source | Y | Y | Y | Y | Y |
| Select end time of monitoring | Y | Y | Y | Y | Y |
| Stop monitoring a source | Y | Y | Y | Y | Y |
| Access crawled resources | Y | Y | Y | Y | Y |
| Storing cached content | Y | Y | Y | Y | Y |
| Remove source to monitor | Y | Y | Y | Y | Y |
| Risk assessment indicators | Y | Y | Y | Y | Y |
| Knowledge graph exploration | Knowledge graph exploration | Y | Y | Y | Y | Y |
| Suggestion validation | Suggestion validation | Y | Y | Y | Y | Y |
| Investigative hypothesis management | Investigative hypothesis management | Y | Y | Y | Y | Y |
| Visual Analytics | Visualization of analytics on stored information | Y | Y | Y | Y | Y |
| Interaction with analytics on stored information | Y | Y | Y | Y | Y |
| Geo-temporal event visualization | Y | Y | Y | Y | Y |
| Chain of Evidence | Digital mark of new stored resource | Y | Y | Y | Y | Y |
| Verification of resource originality when exported | Y | Y | Y | Y | Y |
| Scheduled verification of resource originality | Y | Y | Y | Y | Y |
| Alert when corrupted resource is found | Y | Y | Y | Y | Y |
| Chain of Custody | Track user accesses on resources | Y | Y | Y | Y | Y |
| Export module | Investigation export | Y | Y | Y | Y | Y |
| Investigation information import | Y | Y | Y | Y | Y |

Table 2: Mapping of use case scenarios to requirements and modules

# Functional Requirements

A high-level functional view of the ANITA system is depicted in Figure 9. This diagram illustrates the interactions among the different ANITA modules. A more in-depth study of the system architecture will be performed within Task 4.3 and documented in D4.3 (*System Architecture*) of ANITA. This section will describe the functional requirements for each module. The functional requirements have been defined by ANITA technical partners in a way to address the user requirements (D4.1).

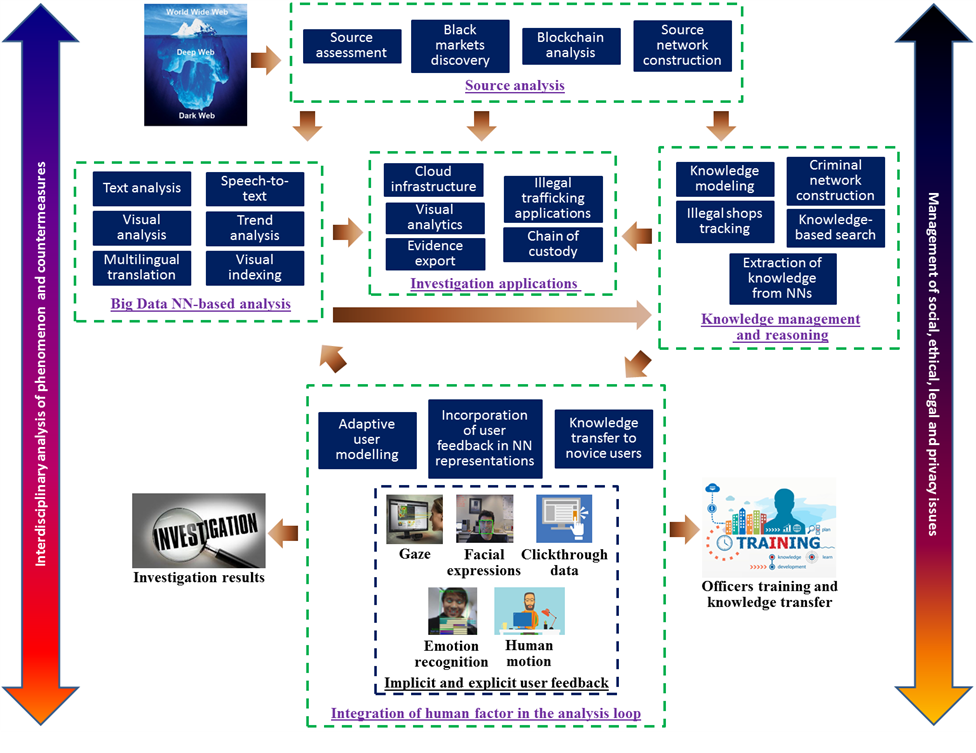


Figure 9: High-level ANITA functional view.

## System level requirements

### User management

***User management – Roles***

|  |  |
| --- | --- |
| **Requirement No** | REQ-1 |
| **Requirement Id** | REQ-UM-1 |
| **Description** | The system MUST provide at least three types of user roles: Administrator, InvestigatorManager and Investigator. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if it is possible to assign a user with at least one role among Administrator, InvestigatorManager and Investigator. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – Create user***

|  |  |
| --- | --- |
| **Requirement No** | REQ-2 |
| **Requirement Id** | REQ-UM-2 |
| **Description** | The system MUST allow a user with Administrator role to create a new user |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to successfully create a new user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – Administrator can update user information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-3 |
| **Requirement Id** | REQ-UM-3 |
| **Description** | The system MUST allow a user with Administrator role to update information of a user |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to successfully update information of a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – User can update his/her own information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-4 |
| **Requirement Id** | REQ-UM-4 |
| **Description** | The system MUST allow a user to update his/her own information |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to successfully update information of his/her profile. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – Administrator can read user information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-5 |
| **Requirement Id** | REQ-UM-5 |
| **Description** | The system MUST allow a user with Administrator role to read information of a user |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to successfully read information of a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – User can read his/her own information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-6 |
| **Requirement Id** | REQ-UM-6 |
| **Description** | The system MUST allow a user to read his/her own information |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to successfully read information of his/her profile. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management – Remove user***

|  |  |
| --- | --- |
| **Requirement No** | REQ-7 |
| **Requirement Id** | REQ-UM-7 |
| **Description** | The system MUST allow a user with Administrator role to delete a user |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to successfully delete a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***User management –Change user role***

|  |  |
| --- | --- |
| **Requirement No** | REQ-8 |
| **Requirement Id** | REQ-UM-8 |
| **Description** | The system MUST allow a user with Administrator role to change role of a user |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to change the role of a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Investigation management

***Investigation management – Create investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-9 |
| **Requirement Id** | REQ-IM-1 |
| **Description** | The system MUST allow a user with InvestigationManager role to create a new Investigation |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to successfully create a new Investigation with unique identifier. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Update metadata of an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-10 |
| **Requirement Id** | REQ-IM-2 |
| **Description** | The system MUST allow a user with InvestigationManager role to update metadata of an Investigation that the user created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to update metadata of an Investigation that he created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Remove investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-11 |
| **Requirement Id** | REQ-IM-3 |
| **Description** | The system MUST allow a user with InvestigationManager role to delete an Investigation that the user created |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to delete an Investigation that he created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Add user to an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-12 |
| **Requirement Id** | REQ-IM-4 |
| **Description** | The system MUST allow a user with InvestigationManager role to add a user to an Investigation that the InvestigatorManager created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to add a new user to the list of users associated to an Investigation that he created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Change user role into an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-13 |
| **Requirement Id** | REQ-IM-5 |
| **Description** | The system SHOULD allow a user with InvestigationManager role to change the role of a user added to an Investigation that the InvestigatorManager created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to change the role of a user associated to an Investigation that he created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Remove user from an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-14 |
| **Requirement Id** | REQ-IM-6 |
| **Description** | The system MUST allow a user with InvestigationManager role to remove a user from an Investigation that the InvestigatorManager created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role is able to remove a user from the list of users associated to an Investigation that he created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Read metadata of an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-15 |
| **Requirement Id** | REQ-IM-7 |
| **Description** | The system MUST allow a user to read metadata of an Investigation that the user is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to read metadata of an Investigation he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Investigation management – Investigation access***

|  |  |
| --- | --- |
| **Requirement No** | REQ-16 |
| **Requirement Id** | REQ-IM-8 |
| **Description** | The system MUST allow a user to access only Investigations that he has been added to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to access Investigations that he has been associated to and is not able to access other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Resource management

ANITA will distinguish between a resource (the data that will be upload or downloaded into ANITA and that can constitute the evidence for the court) and an information (that is extracted from a resource through an analysis or added manually by users or inferred from previous information). Information can be labelled as validated and non-validated: the former is for information added manually by users, while the latter is that produced by any automatic process (analysis of a resource, inference and reasoning). Non-validated information can become validated only after user validation. For this reason, non-validated information will be treated as “suggestion” for the users, while validated information will be treated as ensured “knowledge”.

Both resources and information are associated to an investigation: they can be updated only by users that are part of that investigation and have visibility only for that investigation. An Investigation Manager should have the capability to change their visibility to public: in this case, resources and information made public should be accessed by all users (but not modified or deleted).

Below requirements related to management of resource will be reported. Information management are described in the next paragraph.

***Resource management – Reference to investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-17 |
| **Requirement Id** | REQ-RM-1 |
| **Description** | The system MUST allow resource to be associated to at least one investigation. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if resource metadata contain an identifier to at least one investigation. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Investigation-level visibility***

|  |  |
| --- | --- |
| **Requirement No** | REQ-18 |
| **Requirement Id** | REQ-RM-2 |
| **Description** | The system MUST allow resource to have investigation-level visibility. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if resource with investigation-level visibility is visible only by users that are associated to the same investigations to which resource is associated. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Public visibility***

|  |  |
| --- | --- |
| **Requirement No** | REQ-19 |
| **Requirement Id** | REQ-RM-3 |
| **Description** | The system SHOULD allow resource to have public visibility. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if resource with public-level visibility is visible to all users. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Import new resource into an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-20 |
| **Requirement Id** | REQ-RM-4 |
| **Description** | The system MUST allow user to import a resource into an investigation he is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to import a resource into an investigation he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Imported resource associated to an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-21 |
| **Requirement Id** | REQ-RM-5 |
| **Description** | The system MUST associate imported resource to the investigation into which it was imported. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if an imported resource has a reference to the investigation into which it was imported by a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Assign investigation-level visibility to imported resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-22 |
| **Requirement Id** | REQ-RM-6 |
| **Description** | The system MUST set the visibility of an imported resource at investigation-level. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a resource imported into an investigation is visible only by users that are associated to that investigation |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Resource upload***

|  |  |
| --- | --- |
| **Requirement No** | REQ-23 |
| **Requirement Id** | REQ-RM-7 |
| **Description** | The system MUST allow users to import a resource through upload. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can upload a resource into an Investigation he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Resource download***

|  |  |
| --- | --- |
| **Requirement No** | REQ-24 |
| **Requirement Id** | REQ-RM-8 |
| **Description** | The system SHOULD allow user to import a resource through download from a URL. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can import a new resource to an Investigation he is associated to by downloading it from a URL. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Resource metadata extraction***

|  |  |
| --- | --- |
| **Requirement No** | REQ-25 |
| **Requirement Id** | REQ-RM-9 |
| **Description** | The system SHOULD automatically extract and store metadata of an imported resource. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can access metadata of a resource imported into an Investigation he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Resource originality maintenance***

|  |  |
| --- | --- |
| **Requirement No** | REQ-26 |
| **Requirement Id** | REQ-RM-10 |
| **Description** | The system MUST NOT allow user to modify the original content of a resource added to an Investigation. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the system does not integrate any explicit functionality to enable users to modify the content of a resource. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Update metadata of resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-27 |
| **Requirement Id** | REQ-RM-11 |
| **Description** | The system MUST allow user to update only metadata of resources associated to investigation he is also associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can update metadata of resources of Investigations he is associated to and not of other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Remove resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-28 |
| **Requirement Id** | REQ-RM-12 |
| **Description** | The system MUST allow user to remove resources only from investigations he is associated. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can remove resources from Investigations he is associated to and not those from other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Change visibility of resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-29 |
| **Requirement Id** | REQ-RM-13 |
| **Description** | The system SHOULD allow only a user with InvestigationManager role to change visibility of resources of Investigations he created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role can change visibility of resources of Investigation he created from investigation- to public-level and vice versa. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource management – Read resource with public visibility***

|  |  |
| --- | --- |
| **Requirement No** | REQ-30 |
| **Requirement Id** | REQ-RM-14 |
| **Description** | The system SHOULD allow a user to read resources with public visibility. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can read resource with visibility set to public level. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Information management

***Information management – Reference to investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-31 |
| **Requirement Id** | REQ-INM-1 |
| **Description** | The system MUST ensure stored information to be associated to at least one investigation. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if stored information contains an identifier to at least one investigation. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Investigation-level visibility***

|  |  |
| --- | --- |
| **Requirement No** | REQ-32 |
| **Requirement Id** | REQ-INM-2 |
| **Description** | The system MUST allow stored information to have investigation-level visibility. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if stored information with investigation-level visibility is visible only by users that are associated to the same investigations to which information is associated. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Public visibility***

|  |  |
| --- | --- |
| **Requirement No** | REQ-33 |
| **Requirement Id** | REQ-INM-3 |
| **Description** | The system SHOULD allow stored information to have public visibility. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if stored information with public-level visibility is visible to all users. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Person***

|  |  |
| --- | --- |
| **Requirement No** | REQ-34 |
| **Requirement Id** | REQ-INM-4 |
| **Description** | The system MUST provide the possibility to store information of a Person entity |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Person can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Organization***

|  |  |
| --- | --- |
| **Requirement No** | REQ-35 |
| **Requirement Id** | REQ-INM-5 |
| **Description** | The system MUST provide the possibility to store information of an Organization entity |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of an Organization can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Event***

|  |  |
| --- | --- |
| **Requirement No** | REQ-36 |
| **Requirement Id** | REQ-INM-6 |
| **Description** | The system MUST provide the possibility to store information of an Event |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of an Event can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Transaction***

|  |  |
| --- | --- |
| **Requirement No** | REQ-37 |
| **Requirement Id** | REQ-INM-7 |
| **Description** | The system MUST provide the possibility to store information of a financial Transaction |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a financial Transaction can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Social account***

|  |  |
| --- | --- |
| **Requirement No** | REQ-38 |
| **Requirement Id** | REQ-INM-8 |
| **Description** | The system MUST provide the possibility to store information of a Social account |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Social account can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Crypto address***

|  |  |
| --- | --- |
| **Requirement No** | REQ-39 |
| **Requirement Id** | REQ-INM-9 |
| **Description** | The system MUST provide the possibility to store information of a Crypto address |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Crypto address can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Market account***

|  |  |
| --- | --- |
| **Requirement No** | REQ-40 |
| **Requirement Id** | REQ-INM-10 |
| **Description** | The system MUST provide the possibility to store information of a Market account |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Market account can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Product***

|  |  |
| --- | --- |
| **Requirement No** | REQ-41 |
| **Requirement Id** | REQ-INM-11 |
| **Description** | The system MUST provide the possibility to store information of a Product related to illegal trafficking domain |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Product can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Market item***

|  |  |
| --- | --- |
| **Requirement No** | REQ-42 |
| **Requirement Id** | REQ-INM-12 |
| **Description** | The system MUST provide the possibility to store information of a Market item, considered as a Product sold in an online market |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of a Market item can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information of Email account***

|  |  |
| --- | --- |
| **Requirement No** | REQ-43 |
| **Requirement Id** | REQ-INM-13 |
| **Description** | The system MUST provide the possibility to store information of an Email account |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if metadata of an Email account can be stored into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Add new information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-44 |
| **Requirement Id** | REQ-INM-14 |
| **Description** | The system MUST allow user to add new information into an Investigation |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can add new information about an entity handled by the system into an investigation he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Information associated to an investigation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-45 |
| **Requirement Id** | REQ-INM-15 |
| **Description** | The system MUST associate new information to the investigation into which it was added. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if new information has a reference to the investigation into which it was added by a user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Assign investigation-level visibility to new information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-46 |
| **Requirement Id** | REQ-INM-16 |
| **Description** | The system MUST set the visibility of new information to investigation-level. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if new information added into an investigation is visible only by users that are associated to that investigation |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Update information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-47 |
| **Requirement Id** | REQ-INM-17 |
| **Description** | The system MUST allow user to update only information associated to investigation he is also associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can update information of Investigations he is associated to and not of other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Remove information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-48 |
| **Requirement Id** | REQ-INM-18 |
| **Description** | The system MUST allow user to remove information only from investigations he is associated. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can remove information from Investigations he is associated to and not those from other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information management – Change visibility of information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-49 |
| **Requirement Id** | REQ-INM-19 |
| **Description** | The system SHOULD allow only a user with InvestigationManager role to change visibility of information of Investigations he created. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user with InvestigationManager role can change visibility of information of Investigation he created from investigation- to public-level and vice versa. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Resource analysis

***Resource analysis – Start analysis***

|  |  |
| --- | --- |
| **Requirement No** | REQ-50 |
| **Requirement Id** | REQ-RA-1 |
| **Description** | The system MUST allow a user to start an analysis on a resource of an Investigation that he is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can start an analysis on a resource that belongs to the same investigation of the user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource analysis – Stop analysis***

|  |  |
| --- | --- |
| **Requirement No** | REQ-51 |
| **Requirement Id** | REQ-RA-2 |
| **Description** | The system MUST allow a user to stop an analysis on a resource of an Investigation that he is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can stop an analysis on a resource that belongs to the same investigation of the user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource analysis – Automatic analysis of new resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-52 |
| **Requirement Id** | REQ-RA-3 |
| **Description** | The system SHOULD start automatically the analyses as soon as a new resource is added to an Investigation. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a new resource is automatically analyzed as soon as it is stored into the system in the context of an Investigation. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource analysis – Read analysis result***

|  |  |
| --- | --- |
| **Requirement No** | REQ-53 |
| **Requirement Id** | REQ-RA-4 |
| **Description** | The system MUST allow a user to read only analysis results done on a resource of an Investigation he is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can read the results of analysis done on resources of Investigations he is associated to and no other analysis results that belong to other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Resource analysis – Remove analysis result***

|  |  |
| --- | --- |
| **Requirement No** | REQ-54 |
| **Requirement Id** | REQ-RA-5 |
| **Description** | The system MUST allow a user to remove only analysis results done on a resource of an Investigation he is associated to. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user can remove the results of analysis done on resources of Investigations he is associated to and no other analysis results that belong to other Investigations. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Information validation

***Information validation – Distinguish between validated and not-validated information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-55 |
| **Requirement Id** | REQ-IV-1 |
| **Description** | The system MUST distinguish stored information between “validated” and “not-validated” by users |
| **Type** | Functional |
| **Fit Criterion** | In order to avoid misguiding users in what is real knowledge and what is only produced by analysis, the system must separate between these two types of information. The requirement shall be met if every information is clearly identified as validated by users or not. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information validation – Information added by user as validated information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-56 |
| **Requirement Id** | REQ-IV-2 |
| **Description** | The system MUST treat information added by user as validated information. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if every information added by a user into an investigation is labelled as not-validated information. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information validation – Analysis result as not-validated information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-57 |
| **Requirement Id** | REQ-IV-3 |
| **Description** | The system MUST treat analysis results as not-validated information. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if every analysis result is labelled as not-validated information. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information validation – User validation***

|  |  |
| --- | --- |
| **Requirement No** | REQ-58 |
| **Requirement Id** | REQ-IV-4 |
| **Description** | The system MUST allow user to validate a non-validated information. |
| **Type** | Functional |
| **Fit Criterion** | Only users must have the final decision in considering what is validated information or not. The requirement shall be met if a user can label a non-validated information as validated. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Information validation – Validation rollback***

|  |  |
| --- | --- |
| **Requirement No** | REQ-59 |
| **Requirement Id** | REQ-IV-5 |
| **Description** | The system SHOULD allow user to invalidate a validated information. |
| **Type** | Functional |
| **Fit Criterion** | Only users must have the final decision in considering what is validated information or not. The requirement shall be met if a user can label validated information as non-validated. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

## Data sources and stream analysis

### Black markets discovery and monitoring (AIT, ENG)

@AIT, ENG: define T5.2 modules and requirements

#### Black markets discovery and monitoring module – Keep updates in chronological order

Requirement ID: the ID should follow the following structure: REQ-BMDM-1,

where “REQ” stands for requirement

“BMDM” stands for Black Markets Discovery and Monitoring

and 1 denotes that this is the first requirement of this specific module.

|  |  |
| --- | --- |
| Requirement No | REQ-60 |
| Requirement ID | REQ-BMDM-1 |
| Description | The module should keep updates in chronological order from the discovered content when changes are made in the online content |
| Type | Functional |
| Fit Criterion | How specific requirement is achieved |
| Use Case & Scenario | e.g. UC1-SC1, … |
| Source partner | e.g. AIT |
| Last Update | 18/11/2018 |

#### <Module\_Name> - <Requirement\_Name>

### Content acquisition from Surface Web and pre-processing

The goal of this task is to acquire contents both from open sources on Surface Web, like RSS, Social Networks (Twitter, Facebook), Web, Blogs and from local sources like files in the most common formats (i.e.: pdf, word, excel, power point, mail etc.) stored in folders or repositories. Heterogeneous resources (image, video, text) will be extracted from contents acquired by the targeted sources. The adopted approach will also include a preliminary study for selecting relevant data sources to be monitored for intercepting illegal trafficking activities. Specific taxonomies will be defined for supporting contents pre-processing.

#### Crawler for Surface web

***Crawler for Surface web - crawl Social Networks***

|  |  |
| --- | --- |
| **Requirement No** | REQ-61 |
| **Requirement Id** | REQ-SWC-1 |
| **Description** | This module SHOULD acquire contents from Twitter and Facebook |
| **Type** | Functional |
| **Fit Criterion** | Successfully retrieve content from Twitter and Facebook |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

***Crawler for Surface web - crawl URLs in Surface Web***

|  |  |
| --- | --- |
| **Requirement No** | REQ-62 |
| **Requirement Id** | REQ-SWC-2 |
| **Description** | This module SHOULD crawl URLs in the Surface Web |
| **Type** | Functional |
| **Fit Criterion** | Successfully retrieve content from configured URL |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

***Crawler for Surface web - acquire content from local sources***

|  |  |
| --- | --- |
| **Requirement No** | REQ-63 |
| **Requirement Id** | REQ-SWC-3 |
| **Description** | This module SHOULD acquire contents from local sources |
| **Type** | Functional |
| **Fit Criterion** | Successfully retrieve content from local sources like files in the most common formats (i.e.: pdf, word, excel, power point, mail etc.) |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

### Blockchain analysis for illicit activity discovering (AIT)

@AIT: define T5.4 modules and requirements

#### <Module\_Name> - <Requirement\_Name>

REQ-64

### Construction of source network and filtering (AIT, ENG, EXPSYS)

@AIT, ENG, ECPSYS: define T5.5 modules and requirements

#### <Module\_Name> - <Requirement\_Name>

REQ-65

## Big Data analysis and analytics

### Multilingual text analysis

The goal of this task is content categorization and entities extraction. The categorization process will be implemented according to taxonomies that will be specifically defined around the online illegal trafficking domain. The engine will be enriched with capabilities to extract advanced information, like temporal references and relationships among the extracted entities. Stylometric analysis (a.k.a. writeprint) will be also included in order to support illegal trafficking clustering.

#### Multilingual text Analysis

***Multilingual text Analysis - Categorization***

|  |  |
| --- | --- |
| **Requirement No** | REQ-66 |
| **Requirement Id** | REQ-MTA-1 |
| **Description** | This module SHOULD collect textual documents according to specifically defined taxonomy related to the online illegal trafficking domain |
| **Type** | Functional |
| **Fit Criterion** | Successfull categorization of textual documents according to taxonomy |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

***Multilingual text Analysis - Entities Extraction***

|  |  |
| --- | --- |
| **Requirement No** | REQ-67 |
| **Requirement Id** | REQ-MTA-2 |
| **Description** | This module SHOULD recognize People, Organizations and Places specifically defined around the online illegal trafficking domain |
| **Type** | Functional |
| **Fit Criterion** | Successfull recognition of standard entities (People, Organizations and Places) |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

***Multilingual text Analysis - Stylometric analysis***

|  |  |
| --- | --- |
| **Requirement No** | REQ-68 |
| **Requirement Id** | REQ-MTA-3 |
| **Description** | Given a set of at least X documents by an author, the system SHOULD be able to tag a new document as likely being written by the same author |
| **Type** | Functional |
| **Fit Criterion** | The service performs a stylometric analysis of the document with estimated similarity to known author(s). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

### Image and video analysis

#### Object recognition

The goal is to locate and identify the real-world objects that may be presented in the visual medium. ANITA aims at introducing effective and time-efficient generic object localization and recognition methods, exploiting multiple-level contextual information in a complementary way to global and local visual information. For achieving this, multiple-level contextual information is going to be exploited, in complementary way to global and local visual features. The latter will be realized by the design and implementation of appropriate probabilistic and kernel-based algorithms, which will be further reinforced by ensemble learning techniques.

***Object recognition – Detect and recognise relevant objects***

|  |  |
| --- | --- |
| **Requirement No** | REQ-69 |
| **Requirement Id** | REQ-ORM-1 |
| **Description** | This module MUST detect and recognise relevant objects in image and video content |
| **Type** | Functional |
| **Fit Criterion** | Demonstrated ability of the module to detect objects under various circumstances (i.e. rotation, scaling and partially occluded images). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

***Object recognition – Output Content***

|  |  |
| --- | --- |
| **Requirement No** | REQ-70 |
| **Requirement Id** | REQ-ORM-2 |
| **Description** | The output of the Object detection module MUST be ROI, a bounding box and utf-8 data |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a ROI, a bounding box and utf-8 encoded data is provided as output from this module. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

#### Concept detection

The objective is to robustly detect a wide range of high-level semantic entities that are included in the visual medium. These entities may correspond to many different levels of semantic granularity or abstraction, e.g. ranging from specific object types to individual scene categories. In particular, ANITA will develop a large-scale visual-based semantic concept detection framework, taking significantly into account the respective scalability issues that are expected to be present in the domain of illegal trafficking-related activities.

***Concept detection – Detect and recognise concepts***

|  |  |
| --- | --- |
| **Requirement No** | REQ-71 |
| **Requirement Id** | REQ-CDRM-1 |
| **Description** | The Concept Detection and Recognition Module SHOULD detect and recognize concepts that are present in the domain of illegal trafficking-related activities |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the module can detect concepts and classify image/video input as a specific concept category. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

***Concept detection – Produce hierarchical concept structure***

|  |  |
| --- | --- |
| **Requirement No** | REQ-72 |
| **Requirement Id** | REQ-CDRM-2 |
| **Description** | The Concept Detection and Recognition Module MUST produce as output a concept library that can will be utilized from Event Detection module. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the module produces a hierarchical structure of concepts (library) that can be used for event detection based on multiple concepts. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

#### Event detection

This aims to deliver a service to identify both high-level as well as primitive semantic events related to the activities of the depicted individuals. ANITA will concentrate on the implementation and training of classifiers for static images (i.e. one-shot event detection).

***Event detection – Detect particular events***

|  |  |
| --- | --- |
| **Requirement No** | REQ-73 |
| **Requirement Id** | REQ-EDM-1 |
| **Description** | Given a video, this module SHOULD detect particular (pre-defined) semantic events, related to the illegal trafficking content in analysis, and retrieve only the desired part of the video for each detected concept |
| **Type** | Functional |
| **Fit Criterion** | The output will be a sorted timeline of the video highlighting the enclosing frames, the corresponding concept label and a confidence value for each detected concept. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

### Multilingual automated translation

#### Multilingual automated translation module

***Multilingual automated translation module - translate a given text or document***

|  |  |
| --- | --- |
| Requirement No | REQ-74 |
| Requirement ID | REQ-MLAT-1 |
| Description | The Multilingual automated translation module should be able to translate a given text or document into another language defined by the user. Any of the input languages should be able to be translated into English (and vice versa). |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

***Multilingual automated translation module - handle terminology***

|  |  |
| --- | --- |
| Requirement No | REQ-75 |
| Requirement ID | REQ-MLAT-2 |
| Description | The Multilingual automated translation module should be able to handle terminology. |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

***Multilingual automated translation module - identify the language of a given text***

|  |  |
| --- | --- |
| Requirement No | REQ-76 |
| Requirement ID | REQ-MLAT-3 |
| Description | The Multilingual automated translation module should be able to automatically identify the language of a given text (support of more than 50 languages). |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

***Multilingual automated translation module - utilise state-of-the-art machine learning (Deep Learning) technologies***

|  |  |
| --- | --- |
| Requirement No | REQ-77 |
| Requirement ID | REQ-MLAT-4 |
| Description | The Multilingual automated translation module should utilise state-of-the-art machine learning (Deep Learning) technologies to have improved performance, better translation quality and fluidity. |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

### Multilingual speech to text

#### Multilingual speech-to-text module

***Multilingual speech-to-text module – transcript audio file to text***

|  |  |
| --- | --- |
| Requirement No | REQ-78 |
| Requirement ID | REQ-MLSTTM-1 |
| Description | The technological module applied to Speech Machine Translation via speech transcription to text SHOULD be able to transcript an audio file into translated text in English and from English. |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

***Multilingual speech-to-text module – support audio formats***

|  |  |
| --- | --- |
| Requirement No | REQ-79 |
| Requirement ID | REQ-MLSTTM-2 |
| Description | The Multilingual speech to text module SHOULD be able to support multiple audio formats (audio/x-wav, audio/WAVE, audio/wav, audio/L8, audio/L16, audio/PCMA). |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

***Multilingual speech-to-text module – language support***

|  |  |
| --- | --- |
| Requirement No | REQ-80 |
| Requirement ID | REQ-MLSTTM-3 |
| Description | The Multilingual speech to text module SHOULD be able to support more than 10 languages and more than 20 dialects. (English: USA, UK, Canada, Australia, South Africa, US Broadcast - French: Canada, Europe - German - Portuguese: Brazil, Europe – Spanish Mexico, USA, Spain, Columbia, Argentina, Chile, Guatemala - Catalan - Hebrew - Italian - Japanese - Korean - Arabic: World, Gulf - Mandarin: China, Taiwan - Cantonese: Hong Kong – Dutch) |
| Type | Functional |
| Fit Criterion | Product, Applied Research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

### Illegal trafficking trend analysis

#### Machine Learning Risk Assessment module

***Machine Learning Risk Assessment module - predict risks and vulnerabilities***

|  |  |
| --- | --- |
| Requirement No | REQ-81 |
| Requirement ID | REQ-MLRA-1 |
| Description | Α Machine-Learning (ML) approach which combines classification and regression shall be used in order to make a risk and vulnerability assessment. The ML approach should be able to predict (using appropriate training set) risks and vulnerabilities using known indicators from the state of the art. |
| Type | Functional |
| Fit Criterion | Experimental Prototyping, Empirical Research |
| Use Case & Scenario | ALL |
| Source partner | TIU-JADS, AIT |
| Last Update | 12/12/2018 |

***Machine Learning Risk Assessment module - input data sources***

|  |  |
| --- | --- |
| Requirement No | REQ-82 |
| Requirement ID | REQ-MLRA-2 |
| Description | Machine Learning will receive the necessary data from the tasks 5.3 and 5.2 from the rest of ANITA technical baseline. Further data is assumed to be obtained from other sources of data produced or elaborated as part of remaining tasks. The data will be in CSV or JSON format. |
| Type | Functional |
| Fit Criterion | Experimental Prototyping, Empirical Research, API Modelling |
| Use Case & Scenario | ALL |
| Source partner | TIU-JADS, AIT |
| Last Update | 12/12/2018 |

***Machine Learning Risk Assessment module - input data types***

|  |  |
| --- | --- |
| Requirement No | REQ-83 |
| Requirement ID | REQ-MLRA-3 |
| Description | The data received from the other tasks will contain links, type of attacks, type of risks, the type of data retrieved after the attack, and all the general information in order to make the ML approach working properly, matching as much as possible all of the data specified as part of T5.1. |
| Type | Functional |
| Fit Criterion | API Modelling |
| Use Case & Scenario | ALL |
| Source partner | TIU-JADS, AIT |
| Last Update | 12/12/2018 |

#### Topic Modelling System

***Topic Modelling System – discover the topics from a collection of documents***

|  |  |
| --- | --- |
| **Requirement No** | REQ-84 |
| **Requirement Id** | REQ-TMS-1 |
| **Description** | The Topic Modelling System is a statistical model to discover the topics from a collection of documents. In the ANITA context, the approach will uncover hidden structure in a collection of texts describing online sources. A document target will contain different topics in different proportions, the topics produced by topic modelling techniques have to be a cluster of similar words matching the indicators defined in T5.1. |
| **Type** | Functional |
| **Fit Criterion** | Topic Modelling, Feature Engineering |
| **Use Case & Scenario** | ALL |
| **Source Partner** | TIU-JADS |
| **Last Update** | 6/12/2018 |

***Topic Modelling System – generate JSON or CSV file formats***

|  |  |
| --- | --- |
| **Requirement No** | REQ-85 |
| **Requirement Id** | REQ-TMS-2 |
| **Description** | The Topic Modelling System will generate JSON or CSV file formats consistent with the results of the statistical analysis and further analysis which will waterfall from T6.5. The JSON or CSV file contains the number of different topics from the dataset and a list of most salient terms. |
| **Type** | Functional |
| **Fit Criterion** | Exploratory Prototyping |
| **Use Case & Scenario** | ALL |
| **Source Partner** | TIU-JADS |
| **Last Update** | 6/12/2018 |

***Topic Modelling System – use Latent Dirichlet Allocation (LDA) as statistical modelling technique***

|  |  |
| --- | --- |
| **Requirement No** | REQ-86 |
| **Requirement Id** | REQ-TMS-3 |
| **Description** | The Topic Modelling System will use Latent Dirichlet Allocation (LDA) as statistical modelling technique. LDA is a method for fitting topic modelling, it uses the document as a collection of topics, and each topic as a collection of words. This create the overlap among documents in terms of content. The Topic Modelling System will use lemmatization before applying LDA in order to preprocess the text to analyze. The lemmatization process is in charge of reduce any given word to its base form thereby reducing multiple forms of a word to a single word. |
| **Type** | Functional |
| **Fit Criterion** | Exploratory Prototyping |
| **Use Case & Scenario** | ALL |
| **Source Partner** | TIU-JADS |
| **Last Update** | 6/12/2018 |

#### Word Frequency Analysis module

***Word Frequency Analysis module – create statistics on word frequency from a given dataset***

|  |  |
| --- | --- |
| **Requirement No** | REQ-87 |
| **Requirement Id** | REQ-WFA-1 |
| **Description** | The Word Frequency Analysis tool is in charge of create statistics on word frequency from a given dataset. The tool will first lemmatize the test in order to reduce any given word to its base form, then will plot a bar chart with the results of the analysis. |
| **Type** | Functional |
| **Fit Criterion** | Exploratory Prototying |
| **Use Case & Scenario** | ALL |
| **Source Partner** | TIU-JADS |
| **Last Update** | 12/12/2018 |

### Visual Indexing

#### Video and Image Indexing module

***Video and Image Indexing module - Binary descriptor extraction***

|  |  |
| --- | --- |
| **Requirement No** | REQ-88 |
| **Requirement Id** | REQ-VII-1 |
| **Description** | The Video and Image Indexing Module shall convert images or video streams to binary descriptors |
| **Type** | Functional |
| **Fit Criterion** | The requirement SHOULD be met if binary code describing certain video streams or an image which is extracted from video frames or image respectively |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 6/12/2018 |

***Video and Image Indexing module – Search and preview similar videos and images***

|  |  |
| --- | --- |
| **Requirement No** | REQ-89 |
| **Requirement Id** | REQ-VII-2 |
| **Description** | The Video and Image Indexing Module shall search and preview similar videos and images |
| **Type** | Functional |
| **Fit Criterion** | The requirement SHOULD be met if the retrieved images or videos are relevant to query input |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 6/12/2018 |

***Video and Image Indexing module – Exploit detected objects***

|  |  |
| --- | --- |
| **Requirement No** | REQ-90 |
| **Requirement Id** | REQ-VII-3 |
| **Description** | The Video and Image Indexing Module shall process video and images taking into account the objects that have been detected from object detection requirement REQ-ORM-1. |
| **Type** | Functional |
| **Fit Criterion** | Retrieve similar visual content and enable multi-label search |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 6/12/2018 |

***Video and Image Indexing module – Update binary conversion process***

|  |  |
| --- | --- |
| **Requirement No** | REQ-91 |
| **Requirement Id** | REQ-VII-4 |
| **Description** | The Video and Image Indexing Module shall process video and images and update the binary conversion process, when is necessary. |
| **Type** | Functional |
| **Fit Criterion** | The mapping of the visual content to a lower-dimensional space should be updated when the database is enriched with new content. |
| **Source Partner** | CERTH |
| **Last Update** | 6/12/2018 |

## Knowledge generation and reasoning

### Knowledge modelling for illegal trafficking

This task will focus on knowledge modelling for illegal trafficking. A proper set of ontologies will be defined in order to model all crime aspects including events, suspicious and illegal activities, threats, people, organisations, places, black-markets and illegal shops, products and their relationships. The defined ontologies will constitute the starting point for the definition of inference and reasoning rules and mechanisms that will be developed.

#### Knowledge modelling - model all crime aspects

|  |  |
| --- | --- |
| **Requirement No** | REQ-92 |
| **Requirement Id** | REQ-KMM-1 |
| **Description** | ANITA MUST be able to model all crime aspects including events, suspicious and illegal activities, threats, people, organisations, places, black-markets and illegal shops, products and their relationships |
| **Type** | Functional |
| **Fit Criterion** | In ANITA users have to be provided with a functional and supportive access to the knowledge stored into the system. For this reason, to facilitate such an access, all activities, entities and events related to illegal trafficking must be represented in a suitable way. Moreover, the use of common taxonomies, ontologies and metadata enable analysis modules to represent their outcomes in a unified way, which facilitates integration and reasoning processes. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

### Black markets and illegal shops and products tracking

This task aims at delivering inference and reasoning services to analyse relevant information extracted in order to discover, correlate and track the evolution of black markets, illegal shops and products involved in illegal trafficking activities.

#### Black markets and illegal shops and products tracking - Inference and reasoning

|  |  |
| --- | --- |
| **Requirement No** | REQ-93 |
| **Requirement Id** | REQ-BMISPT-1 |
| **Description** | ANITA MUST provide automatic tools for inference and reasoning in order to analyse and merge information extracted by analysis modules into complex events. |
| **Type** | Functional |
| **Fit Criterion** | Low level events extracted by analysis modules are reasoned with and used to infer higher level complex events. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |

### Reasoning mechanisms for criminal network reconstruction

This task aims at delivering a module that will use reasoning mechanisms to merge and fuse information coming from multiple sources and analysis results with stored knowledge, in order to produce suggestions on new knowledge related to potential relationships among individuals, groups, events and resources. Involvement of users in network reconstruction is also considered, in terms of creation and deletion of nodes and relationships into the network.

#### Criminal network reconstruction

#### Criminal network reconstruction – Node creation

|  |  |
| --- | --- |
| **Requirement No** | REQ-94 |
| **Requirement Id** | REQ-CNR-1 |
| **Description** | ANITA MUST allow users to create a new node into the criminal network. |
| **Type** | Functional |
| **Fit Criterion** | Reconstruction of criminal network has to include information coming from user prior knowledge. To this end, ANITA must provide users with the possibility to add new nodes to the network. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Node type selection

|  |  |
| --- | --- |
| **Requirement No** | REQ-95 |
| **Requirement Id** | REQ-CNR-2 |
| **Description** | ANITA MUST allow users to choose the type of a node during its creation. |
| **Type** | Functional |
| **Fit Criterion** | Nodes of the criminal network can have different types (person, group, event, etc.). Thus, ANITA must provide users with the possibility to select the type of a new node when it is created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Node deletion

|  |  |
| --- | --- |
| **Requirement No** | REQ-96 |
| **Requirement Id** | REQ-CNR-3 |
| **Description** | ANITA MUST allow users to delete a node from the criminal network. |
| **Type** | Functional |
| **Fit Criterion** | When no more useful, users must be able to delete a node. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Relationship creation

|  |  |
| --- | --- |
| **Requirement No** | REQ-97 |
| **Requirement Id** | REQ-CNR-4 |
| **Description** | ANITA MUST allow users to create a new relationship between two nodes into the criminal network. |
| **Type** | Functional |
| **Fit Criterion** | Reconstruction of criminal network has to include information coming from user prior knowledge. To this end, ANITA must provide users with the possibility to add a new relationship between two nodes to the network. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Relationship type selection

|  |  |
| --- | --- |
| **Requirement No** | REQ-98 |
| **Requirement Id** | REQ-CNR-5 |
| **Description** | ANITA MUST allow users to choose the type of a relationship during its creation. |
| **Type** | Functional |
| **Fit Criterion** | Relationships of the criminal network can have different types, based on the types of the nodes involved. Thus, ANITA must provide users with the possibility to choose the type of a new relationship when it is created. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Relationship deletion

|  |  |
| --- | --- |
| **Requirement No** | REQ-99 |
| **Requirement Id** | REQ-CNR-6 |
| **Description** | ANITA MUST allow users to delete a relationship from the criminal network. |
| **Type** | Functional |
| **Fit Criterion** | When no more useful, users must be able to delete a relationship. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Produce suggestions on discovered relationships

|  |  |
| --- | --- |
| **Requirement No** | REQ-100 |
| **Requirement Id** | REQ-CNR-7 |
| **Description** | ANITA MUST produce suggestions about discovered potential relationships among people, groups, events and resources through automatic reasoning mechanisms. |
| **Type** | Functional |
| **Fit Criterion** | Results from analyses, information related to sources of interest and previous knowledge will be used and merged to provide suggestions about discovered potential relationships among actors (people and groups), events and resources. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Produce suggestions on new crawling sessions

|  |  |
| --- | --- |
| **Requirement No** | REQ-101 |
| **Requirement Id** | REQ-CNR-8 |
| **Description** | ANITA SHOULD suggest user new crawling sessions when information to reconstruct the criminal network is missing. |
| **Type** | Functional |
| **Fit Criterion** | Lack of information could lead to a partial reconstruction of the criminal network. ANITA should then provide suggestions to user on what to search and crawl in order to complete or confute previous reconstructions. Involvement of user in the decision is essential in order to allow users to have always the last decision in the processing loop. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

#### Criminal network reconstruction – Produce suggestions on new analysis sessions

|  |  |
| --- | --- |
| **Requirement No** | REQ-102 |
| **Requirement Id** | REQ-CNR-9 |
| **Description** | ANITA SHOULD suggest to users new analysis sessions on stored resources when information to reconstruct the criminal network is missing. |
| **Type** | Functional |
| **Fit Criterion** | Lack of information could lead to a partial reconstruction of the criminal network. ANITA should then provide suggestions to user on which analyses should be done on available resources in order to complete or confute previous reconstructions. Involvement of user in the decision is essential in order to allow users to have always the last decision in the processing loop. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |

### Knowledge-based browsing, search and retrieval

This task will develop advanced semantically based service for search and retrieval of information stored into ANITA system.

#### Search and retrieval

#### Search and retrieval – Search by user query

|  |  |
| --- | --- |
| **Requirement No** | REQ-103 |
| **Requirement Id** | REQ-SRM-1 |
| **Description** | ANITA **MUST** provide capability of searching stored contents starting from a user query. |
| **Type** | Functional |
| **Fit Criterion** | Users must have the possibility to search stored contents starting from a query. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Search and retrieval – Default order of search results

|  |  |
| --- | --- |
| **Requirement No** | REQ-104 |
| **Requirement Id** | REQ-SRM-2 |
| **Description** | ANITA **MUST** order search results by query matching score by default. |
| **Type** | Functional |
| **Fit Criterion** | Results must be shown to users in an ordered way according to a criterion. In ANITA, the default criterion is the query matching score. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Search and retrieval – Additional order criteria of search results

|  |  |
| --- | --- |
| **Requirement No** | REQ-105 |
| **Requirement Id** | REQ-SRM-3 |
| **Description** | ANITA **SHOULD** provide the possibility of selecting an alternative order criterion for search results (date, alphabetic, etc.). |
| **Type** | Functional |
| **Fit Criterion** | Based on attributes that will be part of a search result, ANITA should allow users to order the search result according to criteria different from the default one. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Search and retrieval – Search results filter by type

|  |  |
| --- | --- |
| **Requirement No** | REQ-106 |
| **Requirement Id** | REQ-SRM-4 |
| **Description** | ANITA **SHOULD** provide the possibility of filter search results by one type. |
| **Type** | Functional |
| **Fit Criterion** | Results can be of different types, according to those supported by ANITA (texts, images, videos, audio files, etc.). Users should be able to select which type of results to visualize. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Browsing – Stored content read

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| --- | --- |
| **Requirement No** | REQ-107 |
| **Requirement Id** | REQ-KBM-1 |
| **Description** | ANITA **MUST** provide users with the possibility to read stored contents. |
| **Type** | Functional |
| **Fit Criterion** | Users must be able to read contents (texts, images, audios, videos, information of different nature) that are stored into ANITA system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

### Extraction of evolving knowledge from deep neural network representations

#### Knowledge acquisition from deep neural networks

***Knowledge acquisition from deep neural networks – Infer new and evolving knowledge***

|  |  |
| --- | --- |
| **Requirement No** | REQ-108 |
| **Requirement ID** | REQ-KADNN-1 |
| **Description** | ANITA MUST be able to infer new and evolving knowledge from trained deep neural networks. |
| **Type** | Functional |
| **Fit criterion** | Successfully formally represent knowledge in the form of hierarchical or non-hierarchical logical axioms, extracted from data interrelations as they are embodied in deep neural networks; the latter should be trained in the premises of ANITA and in relation to its use cases. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

***Knowledge acquisition from deep neural networks – Validate and refine data-driven knowledge***

|  |  |
| --- | --- |
| **Requirement No** | REQ-109 |
| **Requirement ID** | REQ-KADNN-2 |
| **Description** | ANITA’s data-driven knowledge MUST be validated and verified. |
| **Type** | Functional |
| **Fit criterion** | Successfully validate the produced knowledge’s consistency through relevant reasoning services. Successfully verify the produced knowledge’s soundness against ‘golden standard’ knowledge base(s) and/or in relation to particular tasks within ANITA’s scenarios. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

## Integration of human factor in the analysis loop

### Implicit and explicit user feedback capturing

#### Implicit and explicit user capturing framework

The goal is to capture in a reliable way the implicit and explicit user’s response (gaze patterns, pupil response, head/body posture, facial expressions, clicks, electrodermal activity) while he/she is interacting with the ANITA system. For achieving this, we will design and implement a modular sensing architecture capable to acquire, time-synchronize and store the signals from different sources that will be used in the definition of the user model.

#### Implicit and explicit user capturing framework - Capture implicit and explicit user responses

|  |  |
| --- | --- |
| **Requirement No** | REQ-110 |
| **Requirement Id** | REQ-IEUFC-1 |
| **Description** | The module should be able to capture physiological measures of the user and the explicit interactions with the system (e.g. mouse clicks, key presses) |
| **Type** | Functional |
| **Fit Criterion** | Development of a framework to acquire, stream and record the signals towards a software that centralizes them synchronized for their usage. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 10/12/2018 |

### Adaptive user modelling for cognitive states estimation

The goal is to transform the low-level primitives acquired through the sensing framework into more abstract, high level descriptions of user’s cognitive/affective states and performance. For achieving this, we will develop a model of the user which estimates his current state.

#### Adaptive user modelling – Estimate user cognitive/affective states and performance

|  |  |
| --- | --- |
| **Requirement No** | REQ-111 |
| **Requirement Id** | REQ-AUMCSE-1 |
| **Description** | The module should be able to Infer high-level descriptions of user cognitive and affective states (i.e., workload, frustration, arousal, engagement, stress, confidence) using low-level primitives (EDR, gaze patterns, pupil size, facial expressions, task related actions) while the user interacts with the system |
| **Type** | Functional |
| **Fit Criterion** | A set of algorithms to obtain metrics that transform the acquired low-level primitives (i.e., raw signals) into high-level descriptions of cognitive/affective states (I.e., attention, engagement, confusion, drowsiness, workload, arousal, frustration, stress). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 10/12/2018 |

### Incorporation of conscious and subconscious user feedback in deep learning representations

#### Conscious and subconscious user feedback

***Conscious and subconscious user feedback – Model explicit and implicit human responses***

|  |  |
| --- | --- |
| **Requirement No** | REQ-112 |
| **Requirement Id** | REQ-CSUF-1 |
| **Description** | The module should be able to model explicit and implicit human responses (captured signals) in appropriate representations that can be exploited by deep learning architectures. |
| **Type** | Functional |
| **Fit Criterion** | A set of representations (e.g. heatmaps, sequences, distance embeddings) should be generated. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Conscious and subconscious user feedback – enhance deep learning models for image retrieval***

|  |  |
| --- | --- |
| **Requirement No** | REQ-113 |
| **Requirement Id** | REQ-CSUF-2 |
| **Description** | The module should be able to use the appropriate representation (Req. as defined above) and enhance deep learning based models for image retrieval. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the model used for image retrieval is able to return improved results |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Conscious and subconscious user feedback – enhance deep learning models for object detection***

|  |  |
| --- | --- |
| **Requirement No** | REQ-114 |
| **Requirement Id** | REQ-CSUF-3 |
| **Description** | The module should be able to use the appropriate representation (Req. as defined above) and enhance deep learning based models for object detection. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the model used for object detection is able to return improved results |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

### Knowledge transfer to new officers

#### Knowledge transfer - Tutoring system

|  |  |
| --- | --- |
| **Requirement No** | REQ-115 |
| **Requirement Id** | REQ-KTM-1 |
| **Description** | The module should be able to provide appropriate training material to the novice user that is tailored to his capabilities and current cognitive state based on the model inferred. |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if the learning gain of the user is improved |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 12/12/2018 |

## Applications, visualisation and evidence export

### Applications for illegal trafficking

ANITA system will be equipped with applications that will facilitate the work of LEAs in illegal trafficking domain. The need of some applications have been elicited from use cases. They are mainly:

* **Investigation management** – case-based workspaces in which users can be added and information can be handled with different types of visibility;
* **Source monitoring** - to monitor online sources of interest (websites, social account, black markets and blockchain analysis);
* **Evidence import** – to import new data and select analyses to perform on them;
* **Evidence export** – to export data related to an investigation, with all its CoE/CoC (chain of evidence and custody);
* **Search and retrieval** – to retrieve stored information with advanced search functionalities;
* **Graph exploration** – to browse and manage stored information;
* **Suggestion validation** – to enable users to verify information produced by analysis and reasoning mechanisms and validate it as useful knowledge.

Requirements for investigation management, evidence import and suggestion validation have been covered in Section 3.1. Requirements for evidence export will be reported in Section 3.6.3. Requirements for the rest of applications are reported below. It is worth noting that, since the applications can be subject to changes during the project duration according to end user feedback, some minor changes could be applied (and reported in deliverables D9.2, D9.3, D9.9 and D9.10).

#### Source monitoring

***Source monitoring – Add new source to monitor***

|  |  |
| --- | --- |
| **Requirement No** | REQ-116 |
| **Requirement Id** | REQ-SM-1 |
| **Description** | ANITA **MUST** provide the possibility to add a new source (website, social account, black market) to monitor |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to add a new source to the list of sources to monitor |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Start monitoring a source***

|  |  |
| --- | --- |
| **Requirement No** | REQ-117 |
| **Requirement Id** | REQ-SM-2 |
| **Description** | ANITA **MUST** provide the possibility to start monitoring a source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to start monitoring a source from the list of available sources |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Select end time of monitoring***

|  |  |
| --- | --- |
| **Requirement No** | REQ-118 |
| **Requirement Id** | REQ-SM-3 |
| **Description** | ANITA **MUST** provide the possibility to select the end time for monitoring a source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to insert the end time of a source before starting its monitoring |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Stop monitoring a source***

|  |  |
| --- | --- |
| **Requirement No** | REQ-119 |
| **Requirement Id** | REQ-SM-4 |
| **Description** | ANITA **MUST** provide the possibility to stop monitoring a source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to stop monitoring a source |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Access crawled resources***

|  |  |
| --- | --- |
| **Requirement No** | REQ-120 |
| **Requirement Id** | REQ-SM-5 |
| **Description** | ANITA **MUST** provide the possibility to access the list of cached resources crawled from a monitored source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to see the list of cached resources crawled from a monitored source |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Storing cached content***

|  |  |
| --- | --- |
| **Requirement No** | REQ-121 |
| **Requirement Id** | REQ-SM-6 |
| **Description** | ANITA **MUST** provide the possibility to store content cached from a monitored source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to select the content to store from the list of contents that have been cached from monitoring a source |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Remove source to monitor***

|  |  |
| --- | --- |
| **Requirement No** | REQ-122 |
| **Requirement Id** | REQ-SM-7 |
| **Description** | ANITA **MUST** provide the possibility to remove a source to monitor |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to remove a source to the list of sources to monitor |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Source monitoring – Risk assessment indicators***

|  |  |
| --- | --- |
| **Requirement No** | REQ-123 |
| **Requirement Id** | REQ-SM-8 |
| **Description** | ANITA **SHOULD** provide risk assessment indicators of a monitored source |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if, for each monitored source, indicators for risk assessment of a source are provided to users |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Knowledge graph exploration

|  |  |
| --- | --- |
| **Requirement No** | REQ-124 |
| **Requirement Id** | REQ-KGE-1 |
| **Description** | ANITA **MUST** allow users to explore stored knowledge under the form of a graph |
| **Type** | Functional |
| **Fit Criterion** |  |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Suggestion validation

|  |  |
| --- | --- |
| **Requirement No** | REQ-125 |
| **Requirement Id** | REQ-SV-1 |
| **Description** | ANITA **MUST** allow users to validate or discard results coming from analysis and reasoning services |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if information produced by analysis and reasoning services can be validated or deleted by users before being considered trusted knowledge. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Investigative hypothesis management

|  |  |
| --- | --- |
| **Requirement No** | REQ-126 |
| **Requirement Id** | REQ-IHM-1 |
| **Description** | ANITA **SHOULD** allow users to manage hypotheses in the context of an Investigation |
| **Type** | Functional |
| **Fit Criterion** | The requirement shall be met if users are able to manage information related to an Investigation, as well as public information, in order to draw investigative hypotheses for their case |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Big data visual analytics

A visual analytics module will be integrated into ANITA to represent trends of online illegal trafficking crimes.

***Visual Analytics – Visualization of analytics on stored information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-127 |
| **Requirement Id** | REQ-VA-1 |
| **Description** | ANITA **MUST** include tool for the visualization of analytics on stored information. |
| **Type** | Functional |
| **Fit Criterion** | Analytics on large amounts of information will be shown according to indicators that end users will indicate as relevant in the context of illegal trafficking domain. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

***Visual Analytics – Interaction with analytics on stored information***

|  |  |
| --- | --- |
| **Requirement No** | REQ-128 |
| **Requirement Id** | REQ-VA-2 |
| **Description** | ANITA **SHOULD** allow users to select the variables of the analytics to include in the visualization tool. |
| **Type** | Functional |
| **Fit Criterion** | Since variables of interest can change during an investigation, users should be able to select which variables they want to take into account in the visualization of analytics. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

***Visual Analytics - Geo-temporal event visualization***

|  |  |
| --- | --- |
| **Requirement No** | REQ-129 |
| **Requirement Id** | REQ-VA-3 |
| **Description** | ANITA **SHOULD** provide users with the possibility of visualizing one or more events in geographical maps and timelines. |
| **Type** | Functional |
| **Fit Criterion** |  |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Chain of custody and evidence export

In order to use stored resources in court, ANITA must trace the Chain of Evidence (CoE) and the Chain of Custody (CoC) for each resource. Moreover, when a resource has to be exported, the export must also include its CoE/CoC.

#### Chain of Evidence

***Chain of Evidence – Digital mark of new stored resource***

|  |  |
| --- | --- |
| **Requirement No** | REQ-130 |
| **Requirement Id** | REQ-COE-1 |
| **Description** | ANITA **MUST** digitally mark each new resource to store. |
| **Type** | Functional |
| **Fit Criterion** | A digital mark (like hash value) must be computed for a new stored resource, in order to prove successively that the resource has not been altered from its acquisition into ANITA system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

***Chain of Evidence – Verification of resource originality when exported***

|  |  |
| --- | --- |
| **Requirement No** | REQ-131 |
| **Requirement Id** | REQ-COE-2 |
| **Description** | ANITA **MUST** verify the originality of the resource when it is exported. |
| **Type** | Functional |
| **Fit Criterion** | When a resource is exported, ANITA must recalculate the digital mark and compare it with that calculated at the resource acquisition time, in order to avoid exporting corrupted resources. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

***Chain of Evidence – Scheduled verification of resource originality***

|  |  |
| --- | --- |
| **Requirement No** | REQ-132 |
| **Requirement Id** | REQ-COE-3 |
| **Description** | ANITA **SHOULD** verify the originality of stored resources at scheduled time. |
| **Type** | Functional |
| **Fit Criterion** | Since resources might be corrupted at any time, it is of vital importance to detect these resources before proceeding in their analysis. Thus, for each stored resource, ANITA should calculate periodically the digital mark and compare it with that calculated at the resource acquisition time, in order to detect corrupted resources. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

***Chain of Evidence – Alert when corrupted resource is found***

|  |  |
| --- | --- |
| **Requirement No** | REQ-133 |
| **Requirement Id** | REQ-COE-4 |
| **Description** | ANITA **MUST** alert users when a corrupted resource is detected |
| **Type** | Functional |
| **Fit Criterion** | Since a corrupted resource can mislead user investigations, ANITA has to alert users when a resource has been manipulated, so that users can decide if delete it or not. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Chain of Custody – Track user accesses on resources

|  |  |
| --- | --- |
| **Requirement No** | REQ-134 |
| **Requirement Id** | REQ-COC-1 |
| **Description** | ANITA **MUST** maintain the history of all accesses of users to a stored resource |
| **Type** | Functional |
| **Fit Criterion** | ANITA must track actions performed by users on each stored resource. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Export module – Investigation export

|  |  |
| --- | --- |
| **Requirement No** | REQ-135 |
| **Requirement Id** | REQ-EM-1 |
| **Description** | ANITA **MUST** allow an InvestigationManager to export (all or part of) information and resources (with CoE/CoC) related to an Investigation that he manages. |
| **Type** | Functional |
| **Fit Criterion** | In order to enable exchange of information between different ANITA instances or to produce evidence for the court, the requirement shall be met if an InvestigatorManager can export information and resources related to an Investigation he manages. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

#### Export module – Investigation information import

|  |  |
| --- | --- |
| **Requirement No** | REQ-136 |
| **Requirement Id** | REQ-EM-2 |
| **Description** | ANITA **MUST** allow an InvestigationManager to import information and resources previously exported by another Investigation into an Investigation that he manages. |
| **Type** | Functional |
| **Fit Criterion** | In order to enable exchange of information between different ANITA instances, the requirement shall be met if an InvestigatorManager can import information and resources into an Investigation he manages. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 11/01/2019 |

# Non-Functional Requirements

*“Non-functional requirements are the behavioural properties that the specified functions must have, such as performance, usability, etc. Non-functional requirements can be assigned a specific measurement“* [2]. In this section, the non-functional requirements that have been acquired to guide the design of the ANITA system are described. The outcome will be a list of constraints that will provide input for the design of the System Architecture.

## Non-functional requirements classification

The non-functional requirements that will be defined within ANITA can be classified into different categories, which are outlined in the Table below.

|  |  |
| --- | --- |
| **Non-functional classification** | **Comment** |
| Security | Restrict the use of the platform and services to appropriate users |
| Availability | Resilience of the platform |
| Efficiency | Ability to perform activities accurately and with optimal use of resources |
| Privacy | Protection of personal data |
| Flexibility | Ability of the platform to adapt and offer flexible configurable behaviour |
| Usability | Ease of use of the platform from a user perspective |
| Interoperability | Integration between ANITA and existing LEA services and also with the integration of services developed within the ANITA platform itself |
| Maintainability | Transparency and tractability of the system so that it can be easily upgraded, installed and investigated |
| Scalability | Ability of the platform to handle large volumes of traffic |
| Integrity | Ensures that the lineage of data can be ascertained and that communication failures are appropriately dealt with. |
| Legal & Ethical | Compliance with relevant legal and ethical obligations |

## System level requirements

### Security

ANITA is intended to be run within a secure environment inside. Three key security and privacy concerns permeate the platform: Authentication, Authorization and Auditing.

#### Authentication

|  |  |
| --- | --- |
| **Requirement No** | REQ-137 |
| **Requirement Id** | REQ-SEC-1 |
| **Description** | ANITA MUST ensure that only authenticated users are granted access to the system |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if only registered users are allowed to interact with the system functionalities |
| **Use cases / Scenarios** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Authorization

|  |  |
| --- | --- |
| **Requirement No** | REQ-138 |
| **Requirement Id** | REQ-SEC-2 |
| **Description** | ANITA MUST ensure that users have the appropriate permissions associated with their account for all user interaction with the system |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if users are restricted to interact with the system according to their account privileges |
| **Use cases / Scenarios** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Auditing

|  |  |
| --- | --- |
| **Requirement No** | REQ-139 |
| **Requirement Id** | REQ-SEC-3 |
| **Description** | ANITA MUST log all user interaction with the system |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if a log of user interactions with the system is maintained including authentication and authorization failures. |
| **Use cases / Scenarios** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Protected platform communications

|  |  |
| --- | --- |
| **Requirement No** | REQ-140 |
| **Requirement Id** | REQ-SEC-4 |
| **Description** | Communications between ANITA system and outside networks/services MUST be encrypted |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if requests are using encrypted sessions and access to hosts is made through secure channels only. |
| **Use cases / Scenarios** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Data retention

#### Data retention – Set expiration time

|  |  |
| --- | --- |
| **Requirement No** | REQ-141 |
| **Requirement Id** | REQ-DR-1 |
| **Description** | ANITA MUST provide the possibility for an Administrator to set an expiration time for resources and stored information |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to set an expiration time for resources and information to store into the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Data retention – Data removal after expiration time

|  |  |
| --- | --- |
| **Requirement No** | REQ-142 |
| **Requirement Id** | REQ-DR-2 |
| **Description** | ANITA MUST delete a resource or an information when its expiration time is reached |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if a resource or an information is no more stored into the system after its expiration time. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Data retention – Alert before expiration time

|  |  |
| --- | --- |
| **Requirement No** | REQ-143 |
| **Requirement Id** | REQ-DR-3 |
| **Description** | ANITA SHOULD alert users if a resource or an information is going to reach its expiration time |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if users are alerted when the difference of the expiration time of a resource or an information and the current time is minus than a fixed threshold. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Data retention – Set threshold for alert before expiration time

|  |  |
| --- | --- |
| **Requirement No** | REQ-144 |
| **Requirement Id** | REQ-DR-4 |
| **Description** | ANITA SHOULD allow an Administrator to set the threshold after which users are alerted about a resource or an information that is going to reach its expiration time |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if a user with Administrator role is able to set the threshold under which alert is produced for resources or information that are going to expire. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Data retention – Extend expiration time

|  |  |
| --- | --- |
| **Requirement No** | REQ-145 |
| **Requirement Id** | REQ-DR-5 |
| **Description** | ANITA SHOULD allow a user to extend the expiration time of a resource or an information |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if a user is able to extend the expiration time of a resource or an information associated to one of the investigations which he is associated to. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Scalability

#### Horizontal scalability

|  |  |
| --- | --- |
| **Requirement No** | REQ-146 |
| **Requirement Id** | REQ-SCA-1 |
| **Description** | ANITA SHOULD support horizontal scalability of its components and modules |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if the entire system can be scaled on multiple servers, according to end user need. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Horizontal scalability at runtime

|  |  |
| --- | --- |
| **Requirement No** | REQ-147 |
| **Requirement Id** | REQ-SCA-2 |
| **Description** | ANITA COULD support horizontal scalability of its components and modules |
| **Type** | Non Functional |
| **Fit Criterion** | Due to variable quantity of resources and information to process, the requirement shall be met if the entire system can be scaled at runtime, without any shutdown. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Availability

#### Detect unresponsive modules

|  |  |
| --- | --- |
| **Requirement No** | REQ-148 |
| **Requirement Id** | REQ-AV-1 |
| **Description** | ANITA MUST be able to detect when modules become unresponsive |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if the system can detect when its modules terminate abnormally or becomes unresponsive to requests |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Restart or raise alarm for unresponsive applications

|  |  |
| --- | --- |
| **Requirement No** | REQ-149 |
| **Requirement Id** | REQ-AV-2 |
| **Description** | ANITA SHOULD be able to recover when unexpected module outages are observed |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if the system is able to restart a module that is unresponsive or raise an alarm for those that require manual intervention. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Disaster recovery

|  |  |
| --- | --- |
| **Requirement No** | REQ-150 |
| **Requirement Id** | REQ-AV-3 |
| **Description** | Data Backup and recovery procedures SHOULD be documented to allow put processes in place to recover from catastrophic data loss |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if documented procedures for performing data backup and recovery are available. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Usability

#### Usability – Graphical interface

|  |  |
| --- | --- |
| **Requirement No** | REQ-151 |
| **Requirement Id** | REQ-US-1 |
| **Description** | The system MUST provide graphical interface to allow users to interact with the system |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if graphical interfaces are available to users to access and use the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Usability – Intuitiveness of using interfaces

|  |  |
| --- | --- |
| **Requirement No** | REQ-152 |
| **Requirement Id** | REQ-US-2 |
| **Description** | The system MUST provide graphical interface easy to learn and navigate |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if graphical interfaces are evaluate by end users as easy to learn and navigate. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Usability – Help messages

|  |  |
| --- | --- |
| **Requirement No** | REQ-153 |
| **Requirement Id** | REQ-US-3 |
| **Description** | Graphical interface SHOULD include help messages to guide users to correctly use the system. |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if graphical interfaces includes help messages to explain the functionalities of the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Usability – Error messages

|  |  |
| --- | --- |
| **Requirement No** | REQ-154 |
| **Requirement Id** | REQ-US-4 |
| **Description** | Graphical interface SHOULD include user-friendly error messages in case of impossibility to satisfy their request. |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if graphical interfaces includes error messages that alert users if something went wrong (network error, unavailability of services, etc.). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Internationalization

#### Internationalization – Graphical interface internationalization

|  |  |
| --- | --- |
| **Requirement No** | REQ-155 |
| **Requirement Id** | REQ-INTL-1 |
| **Description** | The system SHOULD provide graphical interfaces that support internationalization |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if graphical interfaces are designed to support internationalization. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Internationalization – Module internationalization

|  |  |
| --- | --- |
| **Requirement No** | REQ-156 |
| **Requirement Id** | REQ-INTL-2 |
| **Description** | Modules operating into the system SHOULD support internationalization |
| **Type** | Non Functional |
| **Fit Criterion** | The requirement shall be met if modules are able to operate supporting internationalization. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Flexibility

|  |  |
| --- | --- |
| **Requirement No** | REQ-157 |
| **Requirement Id** | REQ-FLE-1 |
| **Description** | The system SHOULD support service oriented approach |
| **Type** | Non Functional |
| **Fit Criterion** | The system shall adopt a service oriented approach in order to have the possibility to easily integrate additional modules in the future. This should also enable the extensibility of the system. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Extensibility

|  |  |
| --- | --- |
| **Requirement No** | REQ-158 |
| **Requirement Id** | REQ-EXTE-1 |
| **Description** | The system COULD provide interfaces to enable the integration of new modules at runtime. |
| **Type** | Non Functional |
| **Fit Criterion** | The system shall expose interfaces to enable adding new modules at runtime, with a plugin-based approach, in order to be extensible and open to functionalities that might be needed in the future by end users. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

## Data sources and stream analysis

### Data source risk assessment in the Surface Web, Deep Web and Dark Nets

#### Performance - Time for Analysis

|  |  |
| --- | --- |
| **Requirement No** | REQ-159 |
| **Requirement Id** | REQ-TFA-1 |
| **Description** | The whole operation in order to analyse the risks and the vulnerabilities of a website from the Surface, Deep or Dark web will last among five and thirty minutes depending on the size of the website to analyse. |
| **Type** | Non Functional |
| **Fit Criterion** | Threshold |
| **Use Case & Scenario** | UC1-SC1, UC2-SC1 SC2 |
| **Source Partner** | TIU-JADS, AIT |
| **Last Update** | 12/12/2018 |

#### Throughput

***Throughput - Percentage of Data covered***

|  |  |
| --- | --- |
| **Requirement No** | REQ-160 |
| **Requirement Id** | REQ-PDC-1 |
| **Description** | The Reachability of Internet, the portion of the surface, deep and dark web, reached from our tool will be estimated in 50% in one day. |
| **Type** | Non Functional |
| **Fit Criterion** | Throughput |
| **Use Case & Scenario** | UC1-SC1, UC2-SC1 SC2 |
| **Source Partner** | TIU-JADS, AIT |
| **Last Update** | 12/12/2018 |

***Throughput - Percentage of Data covered***

|  |  |
| --- | --- |
| **Requirement No** | REQ-161 |
| **Requirement Id** | REQ-PDC-2 |
| **Description** | The system will cover up to 50% of each use case scenario. We will analyse and make a risk assessment for all the scenario from the use case. |
| **Type** | Non Functional |
| **Fit Criterion** | Throughput |
| **Use Case & Scenario** | UC1-SC1, UC2-SC1 SC2 |
| **Source Partner** | TIU-JADS, AIT |
| **Last Update** | 12/12/2018 |

### Black markets discovery and monitoring (AIT, ENG)

@AIT, ENG: define T5.2 modules and requirements

#### Black markets discovery and monitoring module – Keep updates in chronological order

#### <Module\_Name> - <Requirement\_Name>

### Content acquisition from Surface Web and pre-processing

It is important that we equip ANITA with a means to remove and expunge content gathered after a configurable period. Each item of evidence has an optional expiry date. If an item does not become part of an official investigation after a defined period of time (system configurable) then it is removed from ALL data stores. The expiry date associated with an item of evidence will be recorded in the Content Store. A periodic task will examine the Content Store for items that have surpassed their expiry date. It will then orchestrate removal of the item and its artefacts from the Content Store, the Knowledge Base and the cached content in the Source Index database.

***Crawler for Surface web – Content data expiry***

|  |  |
| --- | --- |
| **Requirement No** | REQ-162 |
| **Requirement Id** | REQ-CSW-1 |
| **Description** | ANITA **MUST** remove content[[1]](#footnote-1) and all associated analysis once its expiry time has been reached |
| **Type** | Non-functional (Privacy, Maintainability) |
| **Fit Criterion** | The requirement shall be met if content is removed from ANITA within 24 hours after it has expired. Any and all analysis directly derived from the content will also be removed |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Crawler for Surface web – Register with SIF***

|  |  |
| --- | --- |
| **Requirement No** | REQ-163 |
| **Requirement Id** | REQ-CSW-2 |
| **Description** | Crawlers of the surface web **MUST** register with the ANITA crawling infrastructure to make themselves available for use |
| **Type** | Non-functional ((Interoperability) |
| **Fit Criterion** | New crawlers become available and visible to ANITA web monitoring |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

### Blockchain analysis for illicit activity discovering (AIT)

@AIT: define T5.4 modules and requirements

#### <Module\_Name> - <Requirement\_Name>

### Construction of source network and filtering (AIT, ENG, EXPSYS)

@AIT, ENG, ECPSYS: define T5.5 modules and requirements

#### <Module\_Name> - <Requirement\_Name>

## Big Data analysis and analytics

### Multilingual text analysis

#### Multilingual Text Analysis

***Multilingual Text Analysis – Standard Service***

|  |  |
| --- | --- |
| **Requirement No** | REQ-164 |
| **Requirement Id** | REQ-MTA-4 |
| **Description** | The service **MUST** be available as a Web Service. |
| **Type** | Non-functional (interoperability, Maintainability) |
| **Fit Criterion** | Can be run as a Web Service. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – Standard Input***

|  |  |
| --- | --- |
| **Requirement No** | REQ-165 |
| **Requirement Id** | REQ-MTA-5 |
| **Description** | The service **MUST** support JSON input payloads |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The service can be invoked with a JSON formatted input containing the text to be summarized, the length of the summary, and any other complementary data. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – Standard Output***

|  |  |
| --- | --- |
| **Requirement No** | REQ-166 |
| **Requirement Id** | REQ-MTA-6 |
| **Description** | The service **MUST** support JSON output payload. |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The service will output a JSON formatted object containing the summary, the length of the summary and any other complementary data. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis –Utf-8 format***

|  |  |
| --- | --- |
| **Requirement No** | REQ-167 |
| **Requirement Id** | REQ-MTA-7 |
| **Description** | The module **MUST** receive in input Plain text encoded in utf-8 format |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The module will successfully accept only UTF-8 encoded text for processing |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – Max size***

|  |  |
| --- | --- |
| **Requirement No** | REQ-168 |
| **Requirement Id** | REQ-MTA-8 |
| **Description** | The module **MUST** receive in input a textual file with a maximum size of 100 KB |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The module will successfully accept only textual content items up to 100KB in size |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – Min size***

|  |  |
| --- | --- |
| **Requirement No** | REQ-169 |
| **Requirement Id** | REQ-MTA-9 |
| **Description** | Input text for the module **MUST** contain a minimum of 100 characters for best quality of the service |
| **Type** | Non-Functional (Efficiency) |
| **Fit Criterion** | The module will successfully accept textual content exceeding 100 characters in length |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – Size boundaries***

|  |  |
| --- | --- |
| **Requirement No** | REQ-170 |
| **Requirement Id** | REQ-MTA-10 |
| **Description** | Input text **SHOULD** be within a size range of 1KB-20KB for real-time analysis |
| **Type** | Non-Functional (Efficiency) |
| **Fit Criterion** | The module will efficiently perform real-time analysis on textual content that is between 1KB and 20KB in size |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – un-manipulated text***

|  |  |
| --- | --- |
| **Requirement No** | REQ-171 |
| **Requirement Id** | REQ-MTA-11 |
| **Description** | Input text **MUST** not have been manipulated |
| **Type** | Non-Functional (Interoperability) |
| **Fit Criterion** | The module will exhibit acceptable accuracy on un-encrypted text (Ex. No obfuscation of personal data, data removal, Encryption) |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

***Multilingual Text Analysis – stylometry con***

|  |  |
| --- | --- |
| **Requirement No** | REQ-172 |
| **Requirement Id** | REQ-MTA-12 |
| **Description** | Regarding the stylometric analysis, the module **MUST** receive in input only English text, multilingual file is not supported |
| **Type** | Non-Functional (Interoperability) |
| **Fit Criterion** | The module works correctly with text in English language |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

### Image and video analysis

#### Object detection

***Object detection – image and video format***

|  |  |
| --- | --- |
| **Requirement No** | REQ-173 |
| **Requirement Id** | REQ-OD-1 |
| **Description** | The Object detection module must process images/videos conforming to a typical format |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The requirement shall be met if the module successfully processes an image or video presented in a defined format (.png, .jpg, .avi, .mpeg). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 06/12/2018 |

***Object detection – Scalability***

|  |  |
| --- | --- |
| **Constraint No** | REQ-174 |
| **Constraint Id** | REQ-OD-2 |
| **Description** | **Scalability** of input data |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module is capable to handle a growing amount of data |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Object detection – Security***

|  |  |
| --- | --- |
| **Constraint No** | REQ-175 |
| **Constraint Id** | REQ-OD-3 |
| **Description** | **Security** of personal data. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module does not store personal data such as name. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Object detection – Reliability***

|  |  |
| --- | --- |
| **Constraint No** | REQ-176 |
| **Constraint Id** | REQ-OD-4 |
| **Description** | **Reliability** of the methods. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the proposed methods of the module perform reliably without causing operational malfunctions. |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Object detection – Time efficiency***

|  |  |
| --- | --- |
| **Constraint No** | REQ-177 |
| **Constraint Id** | REQ-OD-5 |
| **Description** | **Time-efficient** operations. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module’s operations perform time-efficiently without causing delays to the user. |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Object detection – interoperability***

|  |  |
| --- | --- |
| **Constraint No** | REQ-178 |
| **Constraint Id** | REQ-OD-6 |
| **Description** | The detection services MUST be available as Web Services |
| **Type** | Non-Functional (Interoperability, Maintainability) |
| **Fit Criterion** | The service can be run as a Web Service |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

### Multilingual automated translation

#### Multilingual automated translation module – third-party integration

|  |  |
| --- | --- |
| Requirement No | REQ-179 |
| Requirement ID | REQ-MLAT-5 |
| Description | A technological module applied to Machine Translation services can easily be integrated into any third-party application (e.g. using the SOAP protocol or any REST architecture) |
| Type | Non Functional |
| Fit Criterion | OpenSource framework, WebService, Applied research |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

### Multilingual speech to text

#### Multilingual speech-to-text module – Operating modes

|  |  |
| --- | --- |
| Requirement No | REQ-180 |
| Requirement ID | REQ- MLSTTM-4 |
| Description | A technological module applied to Speech Machine Translation via speech transcription to text be able to transcript an audio file using different operating modes according to speed, accuracy and hardware requirements. |
| Type | Non Functional |
| Fit Criterion | Product, web service |
| Use Case & Scenario | ALL |
| Source partner | SYSTRAN |
| Last Update | 24/01/2019 |

### Visual Indexing

#### Video and Image Indexing module

***Video and Image Indexing module – Time efficiency***

|  |  |
| --- | --- |
| **Requirement No** | REQ-181 |
| **Requirement ID** | REQ-VII-5 |
| **Description** | The process of retrieval of similar visual content (both video and image) shall be executed in a short period of time. (Performance) |
| **Type** | Non-Functional |
| **Fit Criterion** | The time-consumption is affected directly from the size of the dataset |
| **Source Partner** | CERTH |
| **Last Update** | 6/12/2018 |

## Knowledge generation and reasoning

### Knowledge modelling for illegal trafficking

#### Knowledge modelling

***Knowledge modelling – standard***

|  |  |
| --- | --- |
| **Requirement No** | REQ-182 |
| **Requirement Id** | REQ-KMM-2 |
| **Description** | Ontologies **MUST** be modelled using the main standard |
| **Type** | Non-Functional (Interoperability) |
| **Fit Criterion** | Inputs of inference and reasoning tools must have access to the ontologies |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

### Black markets and illegal shops and products tracking

#### Black markets and illegal shops and products tracking

***Black markets and illegal shops and products tracking – standard***

|  |  |
| --- | --- |
| **Requirement No** | REQ-183 |
| **Requirement Id** | REQ-BMISPT-1 |
| **Description** | Inputs and outputs of inference and reasoning tools **MUST** be represented according to the common taxonomies, ontologies and metadata. |
| **Type** | Non-Functional (Interoperability) |
| **Fit Criterion** | ANITA should be able to discover, correlate and track the evolution of black markets, illegal shops and products involved in illegal trafficking activities |
| **Use Case & Scenario** | ALL |
| **Source Partner** | EXPSYS |
| **Last Update** | 19/12/2018 |

### Reasoning mechanisms for criminal network reconstruction

#### Reasoning mechanisms for criminal network reconstruction – Interoperability

|  |  |
| --- | --- |
| **Requirement No** | REQ-184 |
| **Requirement Id** | REQ-CNR-10 |
| **Description** | Inputs and outputs of reasoning mechanisms MUST be represented according to the common taxonomies, ontologies and metadata. |
| **Type** | Non-functional (Interoperability) |
| **Fit Criterion** | The requirement shall be met if inputs and outputs of reasoning mechanisms are compliant with the common taxonomies, ontologies and metadata. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### 

### Knowledge-based browsing, search and retrieval

#### Knowledge-based browsing, search and retrieval – Efficiency

|  |  |
| --- | --- |
| **Requirement No** | REQ-185 |
| **Requirement Id** | REQ-KBM-2 |
| **Description** | The system SHOULD provide search results in less than 10 seconds. |
| **Type** | Non-functional (Efficiency) |
| **Fit Criterion** | The requirement shall be met if any search within content stored into the system provide results in less than 10 seconds. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Extraction of evolving knowledge from deep neural network representations

#### Knowledge acquisition from deep neural networks

***Knowledge acquisition from deep neural networks - Integrity***

|  |  |
| --- | --- |
| **Requirement No** | REQ-186 |
| **Requirement ID** | REQ-KADNN-3 |
| **Description** | ANITA MUST maintain referential integrity across original data and all  subsequent knowledge produced |
| **Type** | Non-functional (Integrity) |
| **Fit criterion** | ANITA should preserve a linkage between an item of data analysed in deep neural networks and all subsequent patterns and knowledge inferred in relation to that item. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

***Knowledge acquisition from deep neural networks - Efficiency***

|  |  |
| --- | --- |
| **Requirement No** | REQ-187 |
| **Requirement ID** | REQ-KADNN -4 |
| **Description** | ANITA SHOULD deliver at least one formal knowledge base, relevant to the project’s use cases, which will be used either as the golden standard to validate data-driven new knowledge or as the baseline knowledge to evolve with novel hypotheses. |
| **Type** | Non-functional (Efficiency) |
| **Fit criterion** | At least one formal knowledge base must be engineered, modelling the domain(s) of ANITA’s use cases. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

***Knowledge acquisition from deep neural networks - Interoperability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-188 |
| **Requirement ID** | REQ-KADNN-5 |
| **Description** | Data-driven produced knowledge MUST be re-usable and share-able, at least within ANITA, or even with third-parties (if opted by the consortium). |
| **Type** | Non-functional (Interoperability) |
| **Fit criterion** | Produced knowledge must be represented in accepted and widely used knowledge representation standards, such as propositional logic premises and/or OWL2. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

***Knowledge acquisition from deep neural networks - Interoperability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-189 |
| **Requirement ID** | REQ-KADNN-6 |
| **Description** | Data-driven produced knowledge MUST represent uncertainty and probability in inferred hypotheses and beliefs. |
| **Type** | Non-functional (Interoperability) |
| **Fit criterion** | Produced knowledge must allow for representation of fuzzy assertion and probabilistic weight modifiers, preferably in accepted KR standards such as Fuzzy OWL2. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

***Knowledge acquisition from deep neural networks - Interoperability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-190 |
| **Requirement ID** | REQ-KADNN-7 |
| **Description** | The metadata to be fed into the deep neural network(s), to be subsequently used for knowledge acquisition, SHOULD be in English. Multilingual resources annotated with English metadata are supported but multilingual annotation is not supported. |
| **Type** | Non-functional (Interoperability) |
| **Fit criterion** | Successfully accept and analyse English metadata. |
| **UC & scenario** | All |
| **Source partner** | CERTH |
| **Last update** | 04/12/2018 |

## Integration of human factor in the analysis loop

### Implicit and explicit user feedback capturing

#### Implicit and explicit user capturing framework

***Implicit and explicit user capturing framework - Security***

|  |  |
| --- | --- |
| **Requirement No** | REQ-191 |
| **Requirement Id** | REQ-IEUFC-2 |
| **Description** | Security of personal data |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if the module does not store data that potentially could identify the person |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 06/12/2018 |

***Implicit and explicit user capturing framework – Time-efficiency***

|  |  |
| --- | --- |
| **Requirement No** | REQ-192 |
| **Requirement Id** | REQ-IEUFC-3 |
| **Description** | Time-efficient operations. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module’s operations perform time-efficiently without causing delays to the user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

***Implicit and explicit user capturing framework – Non-invasiveness***

|  |  |
| --- | --- |
| **Requirement No** | REQ-193 |
| **Requirement Id** | REQ-IEUFC-4 |
| **Description** | Non-invasiveness. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module’s does include obtrusive acquisition systems |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

***Implicit and explicit user capturing framework - Reliability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-194 |
| **Requirement Id** | REQ-IEUFC-5 |
| **Description** | Reliability of the methods. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the proposed framework performs reliably without causing operational malfunctions. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

***Implicit and explicit user capturing framework – Acquisition and storage format***

|  |  |
| --- | --- |
| **Requirement No** | REQ-195 |
| **Requirement Id** | REQ-IEUFC-6 |
| **Description** | Acquisition and storage format |
| **Type** | Non-functional (interoperability) |
| **Fit Criterion** | The requirement shall be met if the framework successfully processes and store data in a standard defined format (.csv, .mat, hd5). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 06/12/2018 |

### Adaptive user modelling for cognitive states estimation

#### Adaptive user modelling

***Adaptive user modelling - Security***

|  |  |
| --- | --- |
| **Requirement No** | REQ-196 |
| **Requirement Id** | REQ-AUMCSE-2 |
| **Description** | Security of personal data |
| **Type** | Non-functional |
| **Fit Criterion** | The requirement shall be met if the module does not store data that potentially could identify the person |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 06/12/2018 |

***Adaptive user modelling - Reliability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-197 |
| **Requirement Id** | REQ-AUMCSE-3 |
| **Description** | Reliability of the methods. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the proposed methods of the module perform reliably without causing operational malfunctions. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

### Incorporation of conscious and subconscious user feedback in deep learning representations

#### Conscious and subconscious user feedback

***Conscious and subconscious user feedback - Security***

|  |  |
| --- | --- |
| **Requirement No** | REQ-198 |
| **Requirement Id** | REQ-CSUF-4 |
| **Description** | Security of personal data. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module does not store personal data such as name. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Conscious and subconscious user feedback - Reliability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-199 |
| **Requirement Id** | REQ-CSUF-5 |
| **Description** | Reliability of the methods. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the proposed methods of the module perform reliably without causing operational malfunctions. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Conscious and subconscious user feedback – Time efficiency***

|  |  |
| --- | --- |
| **Requirement No** | REQ-200 |
| **Requirement Id** | REQ-CSUF-6 |
| **Description** | Time-efficient operations. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module’s operations perform time-efficiently without causing delays to the user. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

***Conscious and subconscious user feedback – Usability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-201 |
| **Requirement Id** | REQ-CSUF-7 |
| **Description** | Usable user interface. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the end users can become familiar with the user interface and can easily achieve image retrieval in the loop and object detection. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | CERTH |
| **Last Update** | 30/11/2018 |

### Knowledge transfer to new officers

#### Knowledge transfer to new officers

***Knowledge transfer to new officers - Security***

|  |  |
| --- | --- |
| **Requirement No** | REQ-202 |
| **Requirement Id** | REQ-KTM-2 |
| **Description** | Security of personal data. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the module does not store sensitive personal data |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

***Knowledge transfer to new officers - Usability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-203 |
| **Requirement Id** | REQ-KTM-3 |
| **Description** | Usable user interface. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the end users can become familiar with the user interface and can easily interact with the proposed tutoring scenarios. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

***Knowledge transfer to new officers - Reliability***

|  |  |
| --- | --- |
| **Requirement No** | REQ-204 |
| **Requirement Id** | REQ-KTM-4 |
| **Description** | Reliability of the methods. |
| **Type** | Non-Functional |
| **Fit Criterion** | The requirement shall be met if the proposed methods of the module perform reliably without causing operational malfunctions. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | IBEC |
| **Last Update** | 30/11/2018 |

## Applications, visualisation and evidence export

### Applications for illegal trafficking

#### Applications – Usability

|  |  |
| --- | --- |
| **Requirement No** | REQ-205 |
| **Requirement Id** | REQ-AILTR-1 |
| **Description** | Graphical interfaces of applications MUST include help tooltips and/or messages. |
| **Type** | Non-functional (Usability) |
| **Fit Criterion** | The requirement shall be met if the graphical interfaces of the applications include some visual messages or tooltips to guide user in using them. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Big data visual analytics

#### Big data visual analytics – Usability

|  |  |
| --- | --- |
| **Requirement No** | REQ-206 |
| **Requirement Id** | REQ-VA-4 |
| **Description** | The system MUST provide graphical representation of visual analytics results. |
| **Type** | Non-functional (Usability) |
| **Fit Criterion** | In order to be exploitable by users, the requirement shall be met if analytics are represented with graphical elements (charts, diagrams, etc.). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Big data visual analytics – Efficiency

|  |  |
| --- | --- |
| **Requirement No** | REQ-207 |
| **Requirement Id** | REQ-VA-5 |
| **Description** | The system SHOULD provide results of visual analytics in less than 1 minute. |
| **Type** | Non-functional (Efficiency) |
| **Fit Criterion** | Since data can change rapidly into the system, analytics can change after a minute. Thus the requirement shall be met if any kind of analytics can be calculated in less than 1 minute. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

### Chain of custody and evidence export

#### Export module – Usability

|  |  |
| --- | --- |
| **Requirement No** | REQ-208 |
| **Requirement Id** | REQ-EM-3 |
| **Description** | The system MUST provide graphical interface to perform information export. |
| **Type** | Non-functional (Usability) |
| **Fit Criterion** | In order to be exploitable by users, the requirement shall be met if export can be done by users through graphical interface |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Import module – Usability

|  |  |
| --- | --- |
| **Requirement No** | REQ-209 |
| **Requirement Id** | REQ-IMP-1 |
| **Description** | The system SHOULD provide graphical interface to perform information import from previously generated export. |
| **Type** | Non-functional (Usability) |
| **Fit Criterion** | In order to be exploitable by users, the requirement shall be met if import of a previously generated export can be done by users through graphical interface |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Export module – Investigation export in JSON format – Interoperability

|  |  |
| --- | --- |
| **Requirement No** | REQ-210 |
| **Requirement Id** | REQ-EM-4 |
| **Description** | ANITA **MUST** allow exporting information and resources (with CoC/CoE) in JSON format. |
| **Type** | Non-functional (Interoperability) |
| **Fit Criterion** | In order to enable exchange of information between different ANITA instances, the requirement shall be met if the export is produced in JSON format. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Import module – Investigation import in JSON format – Interoperability

|  |  |
| --- | --- |
| **Requirement No** | REQ-211 |
| **Requirement Id** | REQ-IMP-2 |
| **Description** | ANITA SHOULDallow importing information and resources (with CoC/CoE) in JSON format. |
| **Type** | Non-functional (Interoperability) |
| **Fit Criterion** | In order to enable exchange of information between different ANITA instances, the requirement shall be met if the import module accepts as input a previously generated export in JSON format. |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

#### Export module – Investigation export in human-readable format – Interoperability

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| --- | --- |
| **Requirement No** | REQ-212 |
| **Requirement Id** | REQ-EM-5 |
| **Description** | ANITA SHOULDallow exporting information and resources (with CoC/CoE) in human-readable format. |
| **Type** | Non-functional (Interoperability) |
| **Fit Criterion** | In order to allow user to store information related to an Investigation into external police database for future reuse, the requirement shall be met if the export is produced in human-readable format (e.g. pdf, zip, etc.). |
| **Use Case & Scenario** | ALL |
| **Source Partner** | ENG |
| **Last Update** | 21/01/2019 |

# System Validation

The goal of system validation is to explore how the implemented framework will be validated against the defined requirements. The first subsection presents the validation process that has been selected to achieve the aforementioned goal. Then, a description of the applicable Validation Indicators, which will be attached to each requirement, follows. The section concludes by providing the list of identified Validation Indicators in relation to the requirements that they complement.

## Validation Process

A role of Use Case Scenarios is to explore the impact of changes to ANITA. These can be considered as impact scenarios, where each scenario is a projection of how ANITA will operate in and impact on the environment in which it will be applied. The scenario provides a starting point for a simple impact analysis, which takes place by using a set of predefined questions to ask about different actors and actions in the environment. This way, unforeseen negative impacts in the environment or behaviour can be explored. The impact analysis shall be performed as soon as the requirement acquisition phase is relatively complete, so that accurate projections about ANITA’s impact on the environment can be made. Therefore, such impact analysis will take place only after the application of Use Cases to check that the requirements are complete with respect to the events that they are going to handle. It is important to maintain some trace between changes in the environment resulting from implementation of certain requirements. As a result, during subsequent scenario analysis, if there is a likely negative impact, it is possible to trace the impact back to the original requirement.

Within ANITA, the approach selected to validate the requirements and the development system is by examining the produced prototype in realistic test conditions (WP10 Pilots/demonstration in relevant environments). There are two basic approaches to prototyping: i) *Throwaway* prototyping and ii) *Evolutionary* prototyping. In the former approach, after validating the prototype, it is discarded and the system is developed using other implementation methods. On the contrary, evolutionary prototyping takes place after more considered and careful investigation. In ANITA, more structured ways are used to build the module and system prototypes. The reason for this is that the resulting system, rather than been discarded, forms the heart of the final ANITA framework. Additional requirements and functionality extensions may be added to the system.

In general, scenario generation and usage is interrelated with evolutionary prototyping, which produces working versions of the framework. Combining scenarios and prototyping produces symbiotic effects. That is, without such evolutionary developments, the value of using scenarios would drop significantly and vice versa. Such combination was essential for producing ANITA in a way that can satisfy the end-user needs. The validation process is presented at this point. In this phase of the project, the domain experts (i.e. AoC, KWPG, NPN, GDCOC, LPV and DSTL) of the project have produced a set of scenarios to communicate application knowledge and their system vision to system engineers. Based on these, we developed a requirements specification with which ANITA’s implementation is going to be developed. The proposed scenarios will assist the validation of the module/system implementation and, indirectly the requirements specification. Evaluating versions of the implementation (through pilot testing – WP10) will lead to the detection of misunderstandings between the domain experts and the system functionalities. Equally important, validating the implementation against the initial scenarios will enable the domain experts to validate the scenarios themselves so that missing functionality, over-specifications, errors and even unintended side effects are detected. Revealing such gaps will assist the development process to improve the scenarios or adapt the implementations or specifications to the new detected requirements. This way, an evolutionary systems development process is established and applied to the project development phases. ANITA’s Task 9.6 – System Validation is intended to support this activity.

The ANITA system will be tested by various stakeholders involved in the project – end-users, developers and legal entities. Testing will focus on the validation indicators that are presented in the following sub-section. In essence, the agreement of the produced functionality will be validated against the user needs. ANITA pilots will be established under realistic conditions. As a result, the system and its modules will be validated regarding their utility and usability features because this type of evaluation will be accomplished by real users. Work Package 10 – *Demonstration in relevant environment* is intended to support this activity.

## Validation Indicators

The last phase of Requirements Engineering in a project is the validation of the acquired requirements. Sommerville and Kotonya [3] mention that “(…) *the aim of requirements validation is to ‘validate’ the requirements, i.e. check the requirements to certify that they represent an acceptable description of the system which is to be implemented. The process involves system stakeholders, requirements engineers and system designers who analyse requirements for problems, omissions and ambiguities*” [3]. In ANITA, we utilise a set of Validation Indicators that are capable of assessing each requirement that has been produced in the context of this deliverable. Table 3 presents the available Validation Indicator types. Each requirement that has been defined was attached with a certain Validation Indicator. This way, when testing the requirements, in *Task 9.6 – System Validation*, we can produce an informative outcome about the integrity, rationale and satisfaction of each requirement.

|  |  |
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| **Validation Indicator** | **Description** |
| **Yes or No** | A single Boolean value that indicates the satisfaction of the requirement |
| **Short Answer** | The validator must respond with a short answer describing the satisfaction of the requirement |
| **Observation** | The validator must confirm the satisfaction of the requirement from the behaviour of the module/system while using it |
| **Demonstration** | The system engineers must prepare and present a short demonstration of the module/system, in order to conclude whether the requirement has been satisfied |

Table 3: Validation Indicator types

Apart from validation of the requirements, it is important to validate the overall security of the system. Since ANITA will be an online system, the following issues should be taken into account by the developers of the ANITA system:

* Injection (online database)
* Broken Authentication and Session Management
* Cross-Site Scripting (XSS)
* Insecure Direct Object References
* Security Misconfiguration
* Sensitive Data Exposure
* Missing Function Level Access Control
* Cross-Site Request Forgery (CSRF)
* Using Components with Known Vulnerabilities
* Unvalidated Redirects and Forwards
* Cipher algorithm is used for the SSL/TLS

This section concludes with the following tables, which present the assessment method that was selected to test each requirement.

### Functional requirements

#### System requirements

###### User management

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 1 | REQ-UM-1 | The system MUST provide at least three types of user roles: Administrator, InvestigatorManager and Investigator. | Functional | Observation |
| 2 | REQ-UM-2 | The system MUST allow a user with Administrator role to create a new user | Functional | Yes/No |
| 3 | REQ-UM-3 | The system MUST allow a user with Administrator role to update information of a user | Functional | Yes/No |
| 4 | REQ-UM-4 | The system MUST allow a user to update his/her own information | Functional | Yes/No |
| 5 | REQ-UM-5 | The system MUST allow a user with Administrator role to read information of a user | Functional | Yes/No |
| 6 | REQ-UM-6 | The system MUST allow a user to read his/her own information | Functional | Yes/No |
| 7 | REQ-UM-7 | The system MUST allow a user with Administrator role to delete a user | Functional | Yes/No |
| 8 | REQ-UM-8 | The system MUST allow a user with Administrator role to change role of a user | Functional | Yes/No |

###### Investigation management

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| --- | --- | --- | --- | --- |
| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 9 | REQ-IM-1 | The system MUST allow a user with InvestigationManager role to create a new Investigation | Functional | Yes/No |
| 10 | REQ-IM-2 | The system MUST allow a user with InvestigationManager role to update metadata of an Investigation that the user created. | Functional | Yes/No |
| 11 | REQ-IM-3 | The system MUST allow a user with InvestigationManager role to delete an Investigation that the user created | Functional | Yes/No |
| 12 | REQ-IM-4 | The system MUST allow a user with InvestigationManager role to add a user to an Investigation that the InvestigatorManager created. | Functional | Yes/No |
| 13 | REQ-IM-5 | The system SHOULD allow a user with InvestigationManager role to change the role of a user added to an Investigation that the InvestigatorManager created. | Functional | Yes/No |
| 14 | REQ-IM-6 | The system MUST allow a user with InvestigationManager role to remove a user from an Investigation that the InvestigatorManager created. | Functional | Yes/No |
| 15 | REQ-IM-7 | The system MUST allow a user to read metadata of an Investigation that the user is associated to. | Functional | Yes/No |
| 16 | REQ-IM-8 | The system MUST allow a user to access only Investigations that he has been added to. | Functional | Yes/No |

###### Resource management

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| --- | --- | --- | --- | --- |
| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 17 | REQ-RM-1 | The system MUST allow resource to be associated to at least one investigation. | Functional | Demonstration |
| 18 | REQ-RM-2 | The system MUST allow resource to have investigation-level visibility. | Functional | Demonstration |
| 19 | REQ-RM-3 | The system SHOULD allow resource to have public visibility. | Functional | Demonstration |
| 20 | REQ-RM-4 | The system MUST allow user to import a resource into an investigation he is associated to. | Functional | Demonstration |
| 21 | REQ-RM-5 | The system MUST associate imported resource to the investigation into which it was imported. | Functional | Yes/No |
| 22 | REQ-RM-6 | The system MUST set the visibility of an imported resource at investigation-level. | Functional | Yes/No |
| 23 | REQ-RM-7 | The system MUST allow users to import a resource through upload. | Functional | Demonstration |
| 24 | REQ-RM-8 | The system SHOULD allow user to import a resource through download from a URL. | Functional | Demonstration |
| 25 | REQ-RM-9 | The system SHOULD automatically extract and store metadata of an imported resource. | Functional | Demonstration |
| 26 | REQ-RM-10 | The system MUST NOT allow user to modify the original content of a resource added to an Investigation. | Functional | Observation |
| 27 | REQ-RM-11 | The system MUST allow user to update only metadata of resources associated to investigation he is also associated to. | Functional | Demonstration |
| 28 | REQ-RM-12 | The system MUST allow user to remove resources only from investigations he is associated. | Functional | Demonstration |
| 29 | REQ-RM-13 | The system SHOULD allow only a user with InvestigationManager role to change visibility of resources of Investigations he created. | Functional | Demonstration |
| 30 | REQ-RM-14 | The system SHOULD allow a user to read resources with public visibility. | Functional | Demonstration |

###### Information management

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 31 | REQ-INM-1 | The system MUST ensure stored information to be associated to at least one investigation. | Functional | Demonstration |
| 32 | REQ-INM-2 | The system MUST allow stored information to have investigation-level visibility. | Functional | Demonstration |
| 33 | REQ-INM-3 | The system SHOULD allow stored information to have public visibility. | Functional | Demonstration |
| 34 | REQ-INM-4 | The system MUST provide the possibility to store information of a Person entity | Functional | Demonstration |
| 35 | REQ-INM-5 | The system MUST provide the possibility to store information of an Organization entity | Functional | Demonstration |
| 36 | REQ-INM-6 | The system MUST provide the possibility to store information of an Event | Functional | Demonstration |
| 37 | REQ-INM-7 | The system MUST provide the possibility to store information of a financial Transaction | Functional | Demonstration |
| 38 | REQ-INM-8 | The system MUST provide the possibility to store information of a Social account | Functional | Demonstration |
| 39 | REQ-INM-9 | The system MUST provide the possibility to store information of a Crypto address | Functional | Demonstration |
| 40 | REQ-INM-10 | The system MUST provide the possibility to store information of a Market account | Functional | Demonstration |
| 41 | REQ-INM-11 | The system MUST provide the possibility to store information of a Product related to illegal trafficking domain | Functional | Demonstration |
| 42 | REQ-INM-12 | The system MUST provide the possibility to store information of a Market item, considered as a Product sold in an online market | Functional | Demonstration |
| 43 | REQ-INM-13 | The system MUST provide the possibility to store information of an Email account | Functional | Demonstration |
| 44 | REQ-INM-14 | The system MUST allow user to add new information into an Investigation | Functional | Demonstration |
| 45 | REQ-INM-15 | The system MUST associate new information to the investigation into which it was added. | Functional | Yes/No |
| 46 | REQ-INM-16 | The system MUST set the visibility of new information to investigation-level. | Functional | Yes/No |
| 47 | REQ-INM-17 | The system MUST allow user to update only information associated to investigation he is also associated to. | Functional | Demonstration |
| 48 | REQ-INM-18 | The system MUST allow user to remove information only from investigations he is associated. | Functional | Demonstration |
| 49 | REQ-INM-19 | The system SHOULD allow only a user with InvestigationManager role to change visibility of information of Investigations he created. | Functional | Demonstration |

###### Resource analysis

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 50 | REQ-RA-1 | The system MUST allow a user to start an analysis on a resource of an Investigation that he is associated to. | Functional | Demonstration |
| 51 | REQ-RA-2 | The system MUST allow a user to stop an analysis on a resource of an Investigation that he is associated to. | Functional | Demonstration |
| 52 | REQ-RA-3 | The system SHOULD start automatically the analyses as soon as a new resource is added to an Investigation. | Functional | Observation |
| 53 | REQ-RA-4 | The system MUST allow a user to read only analysis results done on a resource of an Investigation he is associated to. | Functional | Demonstration |
| 54 | REQ-RA-5 | The system MUST allow a user to remove only analysis results done on a resource of an Investigation he is associated to. | Functional | Demonstration |

###### Information validation

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 55 | REQ-IV-1 | The system MUST distinguish stored information between “validated” and “not-validated” by users | Functional | Observation |
| 56 | REQ-IV-2 | The system MUST treat information added by user as validated information. | Functional | Demonstration |
| 57 | REQ-IV-3 | The system MUST treat analysis results as not-validated information. | Functional | Demonstration |
| 58 | REQ-IV-4 | The system MUST allow user to validate a non-validated information. | Functional | Demonstration |
| 59 | REQ-IV-5 | The system SHOULD allow user to invalidate a validated information. | Functional | Demonstration |

#### Data sources and stream analysis

###### Black markets discovery and monitoring

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 60 | REQ-BMDM-1 |  | Functional |  |
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###### Content acquisition from Surface Web and pre-processing

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 61 | REQ-SWC-1 | This module SHOULD acquire contents from Twitter and Facebook | Functional |  |
| 62 | REQ-SWC-2 | This module SHOULD crawl URLs in the Surface Web | Functional |  |
| 63 | REQ-SWC-3 | This module SHOULD acquire contents from local sources | Functional |  |

###### Blockchain analysis for illicit activity discovering

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 64 |  |  |  |  |
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###### Construction of source network and filtering

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 65 |  |  |  |  |
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#### Big data analysis and analytics

###### Multilingual text analysis

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 66 | REQ-MTA-1 | This module SHOULD collect textual documents according to specifically defined taxonomy related to the online illegal trafficking domain | Functional |  |
| 67 | REQ-MTA-2 | This module SHOULD recognize People, Organizations and Places specifically defined around the online illegal trafficking domain | Functional |  |
| 68 | REQ-MTA-3 | the system SHOULD be able to tag a new document as likely being written by the same author | Functional |  |

###### Image and video analysis

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 69 | REQ-ORM-1 | This module MUST detect and recognise relevant objects in image and video content | Functional |  |
| 70 | REQ-ORM-2 | The output of the Object detection module MUST be ROI, a bounding box and utf-8 data | Functional |  |
| 71 | REQ-CDRM-1 | Module SHOULD detect and recognize concepts that are present in the domain of illegal trafficking-related activities | Functional |  |
| 72 | REQ-CDRM-2 | Module MUST produce as output a concept library that can will be utilized from Event Detection module. | Functional |  |
| 73 | REQ-EDM-1 | this module SHOULD detect particular (pre-defined) semantic events, related to the illegal trafficking content in analysis, and retrieve only the desired part of the video for each detected concept | Functional |  |

###### Multilingual automated translation and multilingual speech-to-text

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 74 | REQ-MLAT-1 | module should be able to translate a given text or document into another language defined by the user. Any of the input languages should be able to be translated into English (and vice versa). | Functional |  |
| 75 | REQ-MLAT-2 | module should be able to handle terminology. | Functional |  |
| 76 | REQ-MLAT-3 | module should be able to automatically identify the language of a given text (support of more than 50 languages). | Functional |  |
| 77 | REQ-MLAT-4 | module should utilise state-of-the-art machine learning (Deep Learning) technologies to have improved performance, better translation quality and fluidity. | Functional |  |
| 78 | REQ-MLSTTM-1 | SHOULD be able to transcript an audio file into translated text in English and from English. | Functional |  |
| 79 | REQ-MLSTTM-2 | SHOULD be able to support multiple audio formats (audio/x-wav, audio/WAVE, audio/wav, audio/L8, audio/L16, audio/PCMA). | Functional |  |
| 80 | REQ-MLSTTM-3 | SHOULD be able to support more than 10 languages and more than 20 dialects. | Functional |  |

###### Illegal trafficking trend analysis

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 81 | REQ-MLRA-1 | should be able to predict (using appropriate training set) risks and vulnerabilities using known indicators from the state of the art. | Functional | Demonstration |
| 82 | REQ-MLRA-2 | The data will be in CSV or JSON format. | Functional | Yes or No |
| 83 | REQ-MLRA-3 | The data received from the other tasks will contain links, type of attacks, type of risks, matching as much as possible all of the data specified as part of T5.1. | Functional | Demonstration |
| 84 | REQ-TMS-1 | the approach will uncover hidden structure in a collection of texts describing online sources. A document target will contain different topics in different proportions, the topics produced by topic modelling techniques have to be a cluster of similar words matching the indicators defined in T5.1. | Functional | Demonstration |
| 85 | REQ-TMS-2 | The Topic Modelling System will generate JSON or CSV file formats consistent with the results of the statistical analysis | Functional | Yes or No |
| 86 | REQ-TMS-3 | will use Latent Dirichlet Allocation (LDA) as statistical modelling technique. | Functional | Yes or No |
| 87 | REQ-WFA-1 | The Word Frequency Analysis tool is in charge of create statistics on word frequency from a given dataset. The tool will first lemmatize the test in order to reduce any given word to its base form, then will plot a bar chart with the results of the analysis. | Functional | Demonstration |

###### Visual indexing

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 88 | REQ-VII-1 | The Video and Image Indexing Module shall convert images or video streams to binary descriptors | Functional |  |
| 89 | REQ-VII-2 | The Video and Image Indexing Module shall search and preview similar videos and images | Functional |  |
| 90 | REQ-VII-3 | The Video and Image Indexing Module shall process video and images taking into account the objects that have been detected from object detection requirement REQ-ORM-1. | Functional |  |
| 91 | REQ-VII-4 | The Video and Image Indexing Module shall process video and images and update the binary conversion process, when is necessary. | Functional |  |

#### Knowledge generation and reasoning

###### Knowledge modelling

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 92 | REQ-KMM-1 | ANITA MUST be able to model all crime aspects including events, suspicious and illegal activities, threats, people, organisations, places, black-markets and illegal shops, products and their relationships | Functional |  |

###### Black markets and illegal shops and products tracking

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 93 | REQ-BMISPT-1 | ANITA MUST provide automatic tools for inference and reasoning in order to analyse and merge information extracted by analysis modules into complex events. | Functional |  |

###### Reasoning mechanisms for criminal network reconstruction

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 94 | REQ-CNR-1 | ANITA MUST allow users to create a new node into the criminal network. | Functional | Observation |
| 95 | REQ-CNR-2 | ANITA MUST allow users to choose the type of a node during its creation. | Functional | Demonstration |
| 96 | REQ-CNR-3 | ANITA MUST allow users to delete a node from the criminal network. | Functional | Demonstration |
| 97 | REQ-CNR-4 | ANITA MUST allow users to create a new relationship between two nodes into the criminal network. | Functional | Demonstration |
| 98 | REQ-CNR-5 | ANITA MUST allow users to choose the type of a relationship during its creation. | Functional | Demonstration |
| 99 | REQ-CNR-6 | ANITA MUST allow users to delete a relationship from the criminal network. | Functional | Demonstration |
| 100 | REQ-CNR-7 | ANITA MUST produce suggestions about discovered potential relationships among people, groups, events and resources through automatic reasoning mechanisms. | Functional | Short Answer |
| 101 | REQ-CNR-8 | ANITA SHOULD suggest user new crawling sessions when information to reconstruct the criminal network is missing. | Functional | Short Answer |
| 102 | REQ-CNR-9 | ANITA SHOULD suggest to users new analysis sessions on stored resources when information to reconstruct the criminal network is missing. | Functional | Short Answer |

###### Knowledge-based browsing, search and retrieval

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 103 | REQ-SRM-1 | ANITA MUST provide capability of searching stored contents starting from a user query. | Functional | Demonstration |
| 104 | REQ-SRM-2 | ANITA MUST order search results by query matching score by default. | Functional | Demonstration |
| 105 | REQ-SRM-3 | ANITA SHOULD provide the possibility of selecting an alternative order criterion for search results (date, alphabetic, etc.). | Functional | Demonstration |
| 106 | REQ-SRM-4 | ANITA SHOULD provide the possibility of filtering search results by one type. | Functional | Demonstration |
| 107 | REQ-KBM-1 | ANITA MUST provide users with the possibility to read stored contents. | Functional | Demonstration |

###### Knowledge acquisition from deep neural networks

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| --- | --- | --- | --- | --- |
| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 108 | REQ-KADNN-1 | ANITA MUST be able to infer new and evolving knowledge from trained deep neural networks. | Functional |  |
| 109 | REQ-KADNN-2 | ANITA’s data-driven knowledge MUST be validated and verified. | Functional |  |

#### Integration of human factor in the analysis loop

###### Implicit and explicit user capturing framework

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 110 | REQ-IEUFC-1 | The module should be able to capture physiological measures of the user and the explicit interactions with the system (e.g. mouse clicks, key presses) | Functional | Observation |

###### Adaptive user modelling

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 111 | REQ-AUMCSE-1 | The module should be able to Infer high-level descriptions of user cognitive and affective states (i.e., workload, frustration, arousal, engagement, stress, confidence) using low-level primitives (EDR, gaze patterns, pupil size, facial expressions, task related actions) while the user interacts with the system | Functional | Demonstration |

###### Conscious and subconscious user feedback

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 112 | REQ-CSUF-1 | The module should be able to model explicit and implicit human responses (captured signals) in appropriate representations that can be exploited by deep learning architectures. | Functional | Observation |
| 113 | REQ-CSUF-2 | The module should be able to use the appropriate representation (Req. as defined above) and enhance deep learning based models for image retrieval. | Functional | Short Answer |
| 114 | REQ-CSUF-3 | The module should be able to use the appropriate representation (Req. as defined above) and enhance deep learning based models for object detection. | Functional | Observation |

###### Knowledge transfer

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 115 | REQ-KTM-1 | Knowledge transfer – Tutoring system | Functional | Demontration |

#### Applications, visualization and evidence export

###### Applications for illegal trafficking

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 116 | REQ-SM-1 | ANITA MUST provide the possibility to add a new source (website, social account, black market) to monitor | Functional | Demonstration |
| 117 | REQ-SM-2 | ANITA MUST provide the possibility to start monitoring a source | Functional | Demonstration |
| 118 | REQ-SM-3 | ANITA MUST provide the possibility to select the end time for monitoring a source | Functional | Demonstration |
| 119 | REQ-SM-4 | ANITA MUST provide the possibility to stop monitoring a source | Functional | Demonstration |
| 120 | REQ-SM-5 | ANITA MUST provide the possibility to access the list of cached resources crawled from a monitored source | Functional | Demonstration |
| 121 | REQ-SM-6 | ANITA MUST provide the possibility to store content cached from a monitored source | Functional | Demonstration |
| 122 | REQ-SM-7 | ANITA MUST provide the possibility to remove a source to monitor | Functional | Demonstration |
| 123 | REQ-SM-8 | ANITA SHOULD provide risk assessment indicators of a monitored source | Functional | Demonstration |
| 124 | REQ-KGE-1 | ANITA MUST allow users to explore stored knowledge under the form of a graph | Functional | Demonstration |
| 125 | REQ-SV-1 | ANITA MUST allow users to validate or discard results coming from analysis and reasoning services | Functional | Demonstration |
| 126 | REQ-IHM-1 | ANITA SHOULD allow users to manage hypotheses in the context of an Investigation | Functional | Demonstration |

###### Big data visual analytics

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| --- | --- | --- | --- | --- |
| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 127 | REQ-VA-1 | ANITA MUST include tool for the visualization of analytics on stored information. | Functional | Demonstration |
| 128 | REQ-VA-2 | ANITA SHOULD allow users to select the variables of the analytics to include in the visualization tool. | Functional | Demonstration |
| 129 | REQ-VA-3 | ANITA SHOULD provide users with the possibility of visualizing one or more events in geographical maps and timelines. | Functional | Demonstration |

###### Chain of custody and evidence export

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 130 | REQ-COE-1 | ANITA MUST digitally mark each new resource to store. | Functional | Yes/No |
| 131 | REQ-COE-2 | ANITA MUST verify the originality of the resource when it is exported. | Functional | Observation |
| 132 | REQ-COE-3 | ANITA SHOULD verify the originality of stored resources at scheduled time. | Functional | Observation |
| 133 | REQ-COE-4 | ANITA MUST alert users when a corrupted resource is detected | Functional | Observation |
| 134 | REQ-COC-1 | ANITA MUST maintain the history of all accesses of users to a stored resource | Functional | Demonstration |
| 135 | REQ-EM-1 | ANITA MUST allow an InvestigationManager to export (all or part of) information and resources (with CoE/CoC) related to an Investigation that he manages. | Functional | Demonstration |
| 136 | REQ-EM-2 | ANITA MUST allow an InvestigationManager to import information and resources previously exported by another Investigation into an Investigation that he manages. | Functional | Demonstration |

### Non-functional requirements

#### System requirements

###### Security

|  |  |  |  |  |
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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 137 | REQ-SEC-1 | ANITA MUST ensure that only authenticated users are granted access to the system | Non-functional | Demonstration |
| 138 | REQ-SEC-2 | ANITA MUST ensure that users have the appropriate permissions associated with their account for all user interaction with the system | Non-functional | Observation |
| 139 | REQ-SEC-3 | ANITA MUST log all user interaction with the system | Non-functional | Demonstration |
| 140 | REQ-SEC-4 | Communications between ANITA system and outside networks/services MUST be encrypted | Non-functional | Yes/No |

###### Data retention

|  |  |  |  |  |
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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 141 | REQ-DR-1 | ANITA MUST provide the possibility for an Administrator to set an expiration time for resources and stored information | Non-functional | Demonstration |
| 142 | REQ-DR-2 | ANITA MUST delete a resource or an information when its expiration time is reached | Non-functional | Observation |
| 143 | REQ-DR-3 | ANITA SHOULD alert users if a resource or an information is going to reach its expiration time | Non-functional | Observation |
| 144 | REQ-DR-4 | ANITA SHOULD allow an Administrator to set the threshold after which users are alerted about a resource or an information that is going to reach its expiration time | Non-functional | Demonstration |
| 145 | REQ-DR-5 | ANITA SHOULD allow a user to extend the expiration time of a resource or an information | Non-functional | Demonstration |

###### Scalability

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 146 | REQ-SCA-1 | ANITA SHOULD support horizontal scalability of its components and modules | Non-functional | Observation |
| 147 | REQ-SCA-2 | ANITA COULD support horizontal scalability of its components and modules | Non-functional | Observation |

###### Availability

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 148 | REQ-AV-1 | ANITA MUST be able to detect when modules become unresponsive | Non-functional | Observation |
| 149 | REQ-AV-2 | ANITA SHOULD be able to recover when unexpected module outages are observed | Non-functional | Observation |
| 150 | REQ-AV-3 | Data Backup and recovery procedures SHOULD be documented to allow put processes in place to recover from catastrophic data loss | Non-functional | Yes/No |

###### Usability

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 151 | REQ-US-1 | The system MUST provide graphical interface to allow users to interact with the system | Non-functional | Demonstration |
| 152 | REQ-US-2 | The system MUST provide graphical interface easy to learn and navigate | Non-functional | Short Answer |
| 153 | REQ-US-3 | Graphical interface SHOULD include help messages to guide users to correctly use the system. | Non-functional | Yes/No |
| 154 | REQ-US-4 | Graphical interface SHOULD include user-friendly error messages in case of impossibility to satisfy their request. | Non-functional | Yes/No |

Internationalization

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 155 | REQ-INTL-1 | The system SHOULD provide graphical interfaces that support internationalization | Non-functional | Demonstration |
| 156 | REQ-INTL-2 | Modules operating into the system SHOULD support internationalization | Non-functional | Observation |

###### Flexibility

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 157 | REQ-FLE-1 | The system SHOULD support service oriented approach | Non-functional | Observation |

###### Extensibility

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 158 | REQ-EXTE-1 | The system COULD provide interfaces to enable the integration of new modules at runtime. | Non-functional | Yes/No |

#### Data sources and stream analysis

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 159 | REQ-TFA-1 | The whole operation in order to analyse the risks and the vulnerabilities of a website from the Surface, Deep or Dark web will last among five and thirty minutes depending on the size of the website to analyse | Non-functional |  |
| 160 | REQ-PDC-1 | The Reachability of Internet, the portion of the surface, deep and dark web, reached from our tool will be estimated in 50% in one day. | Non-functional |  |
| 161 | REQ-PDC-2 | The system will cover up to 50% of each use case scenario. We will analyse and make a risk assessment for all the scenario from the use case. | Non-functional |  |
| 162 | REQ-CSW-1 | ANITA **MUST** remove content and all associated analysis once its expiry time has been reached | Non-functional |  |
| 163 | REQ-CSW-2 | Crawlers of the surface web **MUST** register with the ANITA crawling infrastructure to make themselves available for use | Non-functional |  |
| 164 | REQ-MTA-4 | The service **MUST** be available as a Web Service. | Non-functional |  |
| 165 | REQ-MTA-5 | The service **MUST** support JSON input payloads | Non-functional |  |
| 166 | REQ-MTA-6 | The service **MUST** support JSON output payload | Non-functional |  |
| 167 | REQ-MTA-7 | The module **MUST** receive in input Plain text encoded in utf-8 format | Non-functional |  |
| 168 | REQ-MTA-8 | The module **MUST** receive in input a textual file with a maximum size of 100 KB | Non-functional |  |
| 169 | REQ-MTA-9 | Input text for the module **MUST** contain a minimum of 100 characters for best quality of the service | Non-functional |  |
| 170 | REQ-MTA-10 | Input text **SHOULD** be within a size range of 1KB-20KB for real-time analysis | Non-functional |  |
| 171 | REQ-MTA-11 | Input text **MUST** not have been manipulated | Non-functional |  |
| 172 | REQ-MTA-12 | Regarding the stylometric analysis, the module **MUST** receive in input only English text, multilingual file is not supported | Non-functional |  |
| 173 | REQ-OD-1 | The Object detection module must process images/videos conforming to a typical format | Non-functional |  |
| 174 | REQ-MLAT-5 | A technological module applied to Machine Translation services can easily be integrated into any third-party application (e.g. using the SOAP protocol or any REST architecture) | Non-functional |  |
| 175 | REQ- MLSTTM-4 | A technological module applied to Speech Machine Translation via speech transcription to text be able to transcript an audio file using different operating modes according to speed, accuracy and hardware requirements. | Non-functional |  |
| 176 | REQ-VII-5 | The process of retrieval of similar visual content (both video and image) shall be executed in a short period of time. (Performance) | Non-functional |  |

#### Knowledge generation and reasoning

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 182 | REQ-KMM-2 | Ontologies **MUST** be modelled using the main standard | Non-functional |  |
| 183 | REQ-BMISPT-1 | Inputs and outputs of inference and reasoning tools **MUST** be represented according to the common taxonomies, ontologies and metadata. | Non-functional |  |
| 186 | REQ-KADNN-3 | ANITA MUST maintain referential integrity across original data and all  subsequent knowledge produced | Non-functional |  |
| 187 | REQ-KADNN -4 | ANITA SHOULD deliver at least one formal knowledge base, relevant to the project’s use cases, which will be used either as the golden standard to validate data-driven new knowledge or as the baseline knowledge to evolve with novel hypotheses. | Non-functional |  |
| 188 | REQ-KADNN-5 | Data-driven produced knowledge MUST be re-usable and share-able, at least within ANITA, or even with third-parties (if opted by the consortium). | Non-functional |  |
| 189 | REQ-KADNN-6 | Data-driven produced knowledge MUST represent uncertainty and probability in inferred hypotheses and beliefs. | Non-functional |  |
| 190 | REQ-KADNN-7 | The metadata to be fed into the deep neural network(s), to be subsequently used for knowledge acquisition, SHOULD be in English. Multilingual resources annotated with English metadata are supported but multilingual annotation is not supported. | Non-functional |  |

###### Reasoning mechanisms for criminal network reconstruction

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 184 | REQ-CNR-10 | Inputs and outputs of reasoning mechanisms MUST be represented according to the common taxonomies, ontologies and metadata. | Non-functional | Yes/No |

###### Knowledge-based browsing, search and retrieval

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 185 | REQ-KBM-2 | The system SHOULD provide search results in less than 10 seconds. | Non-functional | Yes/No |

#### Integration of human factor in the analysis loop

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 195 | REQ-IEUFC-6 | Implicit and explicit user capturing framework – Acquisition and storage format | Non-functional | Yes or No |

#### Applications, visualisation and evidence export

###### Applications for illegal trafficking

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 205 | REQ-AILTR-1 | Graphical interfaces of applications MUST include help tooltips and/or messages. | Non-functional | Demonstration |

###### Big data visual analytics

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 206 | REQ-VA-4 | The system MUST provide graphical representation of visual analytics results. | Non-functional | Demonstration |
| 207 | REQ-VA-5 | The system SHOULD provide results of visual analytics in less than 1 minute. | Non-functional | Yes/No |

###### Chain of custody and evidence export

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| **VI No** | **Requirement ID** | **Description** | **Type** | **Assesment Method** |
| 208 | REQ-EM-3 | The system MUST provide graphical interface to perform information export. | Non-functional | Demonstration |
| 209 | REQ-IMP-1 | The system SHOULD provide graphical interface to perform information import from previously generated export. | Non-functional | Demonstration |
| 210 | REQ-EM-4 | ANITA MUSTallow exporting information and resources (with CoC/CoE) in JSON format. | Non-functional | Yes/No |
| 211 | REQ-IMP-2 | ANITA SHOULDallow importing information and resources (with CoC/CoE) in JSON format. | Non-functional | Yes/No |
| 212 | REQ-EM-5 | ANITA SHOULDallow exporting information and resources (with CoC/CoE) in human-readable format. | Non-functional | Yes/No |

# Conclusions

The work in WP4 of ANITA is to define the requirements, explore the specifications and produce a clear system architecture. The user needs have been addressed in Task 4.1 and have been used as input to the research activities of Task 4.2. Within Task 4.2, the primary specifications for the core ANITA modules have been derived. These specifications are expressed as requirements, functional and non-functional. The former demonstrate the principal functionality that each module intends to produce while the latter constrain the system behaviour to effectively adopt in the defined operational environment. All technical partners of ANITA consortium that are in charge of specific modules have put effort in order to generate well-defined and feasible descriptions of the respective requirements. In the context of ANITA, special focus was given to acquire requirements that could satisfy certain properties such as confidentiality, integrity, availability and authenticity of the system. Additionally, an attempt to prepare an initial description of the information flow between the participating modules in order to address the different Use Cases has been made, which is expected to provide the basis for more detailed system architecture.

The validation and evaluation phases of ANITA will be responsible to examine whether the implementation of ANITA eventually supports the user needs. In this deliverable, a set of Validation Indicators (VI) has been defined, where each VI has been attached to each requirement to establish the methodology that the requirement will be tested.

# References

1. ANITA. Deliverable 4.1 – Requirements, use cases and user scenarios, 2018.
2. ROBERTSON, J. & ROBERTSON, S. 2003. Volere: Requirements Specification Template. 9th ed.: Technical Report Edition 6.1, Atlantic Systems Guild.
3. SOMMERVILLE, I. & KOTONYA, G. 1998. Requirements Engineering: Processes and Techniques, John Wiley & Sons, Inc.

1. Where appropriate (Content Store), item is replaced with an empty body and the version number increased rather than being deleted [↑](#footnote-ref-1)