AVOIDING AND MITIGATING SAFETY RISKS IN URBAN ENVIRONMENTS

Deliverable D7.5

City.Risks Contribution to Standardisation

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Executive Summary

This report documents the results of task T-7.5 of the City.Risks project.

The development of City.Risks has largely been based on the usage of official or industry / de facto standards. Developments in the technology sector have been also constantly watched to identify best practices as well as emerging technology standards, resulting in a list of relevant standards that has been maintained throughout the project.

The document compiles basic information on these standards along with a short assessment of their applicability and/or shortcomings.

The standards considered range from technical standards on data modelling to predefined domain vocabularies. In most cases, existing standards or a combination of them could be used without adaptation or workarounds.

However, existing taxonomies from the areas of crime categories or emergency management did prove only partially applicable, so that the project had to come up with its own terminology of incident types for safety-aware applications in urban environments. This system of incident types has been documented as a proposed extension to the Common Alerting Protocol (CAP) in form of a CAP profile.

Table of Contents

1. Relevant Standards

The development of City.Risks has largely been based on the usage of official or in-dustry standards throughout the project. Developments in the technology sector have been also constantly watched to identify best practices as well as emerging technology standards.

The following sections compile the standards that have been considered relevant and/or used in the project along with their general purpose and the contexts in which they have been utilised in the project in a concise manner.

The standards fall into the following broad categories.

- Data modelling
- Spatial data management
- Communication
- Software component interfaces
- Software security
- Augmented reality
- Software documentation
- Domain taxonomies

1.1. Data Modelling

1.1.1. URN

Name	Version	Organisation
Uniform Resource Names	RFC 2141	IETF
Web: https://www.rfc-editor.org/rfc/rfc2141.txt		
Purpose: Uniform Resource Names (URNs) […] serve as persistent, location-independent, resource identifiers. [1]		

Usage Contexts: URNs have been used in various parts of the platform to specify readable identifiers for components, resources, and other types of entities.

Assessment: Fully applicable, no gaps identified.

1.1.2. UUID

Name	Version	Organisation
Universally unique identifier	v6	International Telecommunications Union
Web: https://www.itu.int/rec/T-REC-X.667–200409-S/en		
Purpose: A UUID (Universally Unique Identifier) can be used for multiple purposes, from tagging objects with an extremely short lifetime, to reliably identifying very persistent objects across a network […]. UUIDs […] enable users to generate OIDs without any registration procedure. [2]		

Usage Contexts: UUIDs are used throughout the system for generating unique anonymous identifiers for records to represent mobile devices, users, theft detection tags, user reports, incidents, and so on.

Assessment: Fully applicable, no gaps identified.

1.1.3. JSON

Name	Version	Organisation
JavaScript Object Notation	ECMA 404 2nd Edition	Ecma International
Web: http://www.ecma-international.org/publications/files/ECMA-ST/ECMA–404.pdf		
Purpose: JSON […] is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language, Standard ECMA–262 3rd Edition - December 1999. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language. [3]		

Usage Contexts: JSON is used as the general format for a) data communication between the various platform services as well as between services and mobile devices (regardless of the underlying interface paradigm), and b) for storing data persistently in document-based NoSQL databases (e.g., MongoDB).

Assessment: Fully applicable, no gaps identified.

1.1.4. JWT

Name	Version	Organisation
JSON Web Token	RFC 5741	IETF
Web: http://self-issued.info/docs/draft-ietf-oauth-json-web-token.html		
Purpose: JSON Web Token (JWT) is a compact, URL-safe means of representing claims to be transferred between two parties. The claims in a JWT are encoded as a JSON object that is used as the payload of a JSON Web Signature (JWS) structure or as the plaintext of a JSON Web Encryption (JWE) structure, enabling the claims to be digitally signed or integrity protected with a Message Authentication Code (MAC) and/or encrypted. [4]		

Usage Contexts: JSON Web Tokens are used for a) exchanging identity information between devices (e.g., mobile and Web), b) registering theft detection tags with a mobile device. JSON Web Tokens have also be considered for exchanging verifiable personal information about users (City.Risks pass).

Assessment: Fully applicable, no gaps identified.

1.1.5. GeoJSON

Name	Version	Organisation
Geographic JSON	RFC 7946	IETF
Web: https://tools.ietf.org/html/rfc7946		
Purpose: GeoJSON is a geospatial data interchange format based on JavaScript Object Notation (JSON). It defines several types of JSON objects and the manner in which they are combined to represent data about geographic features, their properties, and their spatial extents. GeoJSON uses a geographic coordinate reference system, World Geodetic System 1984, and units of decimal degrees. [5]		

Usage Contexts: GeoJSON is used as a general representation for exchanging geospatial information throughout the system, in particular to represent, locations of user reports or incidents, the geospatial extent of regions affected by public alerts or tracks of activated theft detection tags, as well as for communicating routing information.

Assessment: Fully applicable, no gaps identified.

1.1.6. SKOS

Name	Version	Organisation
Simple Knowledge Organization System	20090818	W3C
Web: https://www.w3.org/TR/2009/REC-skos-reference–20090818/		
Purpose: SKOS provides a standard way to represent knowledge organization systems using the Resource Description Framework (RDF) and the Web Ontology language (OWL). Encoding this information in RDF allows it to be passed between computer applications in an interoperable way. Especially, the definition and utilization of information retrieval oriented controlled vocabularies such as thesauri, taxonomies and lightweight ontologies are well supported. [6]		

Usage Contexts: SKOS has been used to specify the incident ontology that forms the basis for classification and filtering of user reports, as well as for correlating incidents.

Assessment: Fully applicable, no gaps identified.

1.1.7. CAP

Name	Version	Organisation
Common Alerting Protocol	v1.2	OASIS
Web: https://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html		
Purpose: The Common Alerting Protocol (CAP) is a simple but general format for exchanging all-hazard emergency alerts and public warnings over all kinds of networks. CAP allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning effectiveness while simplifying the warning task […] And CAP provides a template for effective warning messages based on best practices identified in academic research and real-world experience. [7]		

Usage Contexts: The general terminology and semantics have been used as a sort of standard vocabulary in the development of the data models for the RMRS service, the operation centre and the mobile application. This approach has proved to be useful in other projects, e.g., KATWARN [8].

Assessment: Partially applicable; gaps include data duplication when creating messages for different languages. CAP provides a generic format for safety-related messages, so instantiation requires additional domain-dependent semantics which are usually describes as CAP profiles (see Annex I: I).

1.2. Spatial Data Management

1.1.1. SFA

Name	Version	Organisation
Simple Feature Access	ISO 19125	OGC
Web: http://www.opengeospatial.org/projects/groups/sfswg		
Purpose: Simple Features (officially Simple Feature Access) is both an Open Geospatial Consortium (OGC) and International Organization for Standardization (ISO) standard that specifies a common storage and access model for geometry objects.		

Usage Contexts: Part 2 of the Simple Features standard, ISO 19125-2 (SFA-SQL), is followed by PostGIS, a spatial extension of the PostgreSQL database to store, index and query data with spatial attributes.

Assessment: Fully applicable, no gaps identified.

1.1.2. WFS

Name	Version	Organisation
Web Feature Service	2.0.2	OGC
Web: http://www.opengeospatial.org/standards/wfs		
Purpose: The Web Feature Service (WFS) specification allows querying and retrieval of spatial features across the web using platform-independent calls.		

Usage Contexts: The WFS interface is used for requesting map vector data via the GeoServer.

Assessment: Fully applicable, no gaps identified.

1.1.3. WMS

Name	Version	Organisation
Web Map Service	1.3.0	OGC
Web: http://www.opengeospatial.org/standards/wms		
Purpose: The Web Map Service (WMS) specification addresses the querying and retrieval of map images (i.e., map tiles).		

Usage Contexts: The WMS interface is used for requesting imagery data via the GeoServer.

Assessment: Fully applicable, no gaps identified.

1.1.4. ECQL

Name	Version	Organisation
Extended Common Query Language	n.a.	OGC
Web: http://docs.geoserver.org/stable/en/user/filter/ecql_reference.html		
Purpose: ECQL is a powerful GeoServer implementation of Common Query Language (CQL), which allows expressing the full range of filters that OGC Filter 1.1 can encode.		

Usage Contexts: The ECQL is used for data filtering or querying in GeoServer.

Assessment: Fully applicable, no gaps identified.

1.1.5. OpenStreetMap

Name	Version	Organisation
Open Street Map	n.a.	OpenStreetMap Foundation (OSMF)
Web: https://www.openstreetmap.org/		
Purpose: OpenStreetMap is an initiative to create and provide free geographic data, such as street maps, to anyone.		

Usage Contexts: OpenStreetMap provides the underlying road network used to enable the safety-aware routing service.

Assessment: Fully applicable, no gaps identified.

1.1.6. DIMACS format

Name	Version	Organisation
DIMACS	n.a.	Center for Discrete Mathematics and Theoretical Computer Science
Web: http://www.dis.uniroma1.it/challenge9/format.shtml		
Purpose: The standard file format convention specified by the DIMACS Implementation Challenge for Shortest Paths algorithms used for the representation of the road network graph.		

Usage Contexts: DIMACS format is used by the modified routing algorithm to find optimal routes that combine both travel cost with a safety-related or popularity-related cost.

Assessment: We needed to extend the original format, that was represented by tuples of the form <U, V, W>, with two additional attributes, <U, V, W, Ws, Wp>, where U is the target node, V is the source node, W is the edge weight, i.e., distance or travel cost, and Ws, Wp represent a safety-related cost and a popularity-related cost, respectively.

1.1.7. GPX

Name	Version	Organisation
Global Positioning eXchange format	1.1	n.a.
Web: http://www.topografix.com/gpx.asp		
Purpose: GPX is a commonly used open file format for exchanging GPS data. It specifies three basic data types, namely waypoints, tracks, and routes. A waypoint may represent a Point of Interest or, more generally, any point on the map. A route is an ordered list of waypoints, representing turn points that determine the route from a source to a target point. A track is a more detailed representation of a path, e.g., comprising the raw output of the GPS recording of the user's movement. However, GPX uses XML schema as data format.		

Usage Contexts: The GPX format was considered for use as a response format of the safety-aware routing service implemented as an HTTP-based RESTful service.

Assessment: Not applied; no standard representation of GPX data to JSON or GeoJSON format.

1.1.8. GTFS

Name	Version	Organisation
General Transit Feed Specification	n.a.	n.a.
Web: https://developers.google.com/transit/gtfs/		
Purpose: GTFS is a common format that mainly targets the specification of public transportation schedules. It initially started as an effort to incorporate transit data into Google Maps, but has since achieved more widespread use. Due to its focus, which is mainly centred on public transport and multimodal routing, its aim is to model various types of information, including information about transit agencies, stop locations and times, itineraries, etc. Specifically, a GTFS dataset may contain from 6 to 13 different CSV files.		

Usage Contexts: The GTFS format was considered for use as a response format of the safety-aware routing service implemented as an HTTP-based RESTful service.

Assessment: Not applied; it offers a level of detail and complexity which was not necessary for our purposes.

1.3. Communication

1.3.1. Bluetooth LE

Name	Version	Organisation
Bluetooth Low Energy	Bluetooth Core 4.0	Bluetooth Special Interest Group (SIG)
Web: www.bluetooth.com		
Purpose: Bluetooth low energy technology is a [..] low energy enhancement to the Bluetooth wireless technology Core Specification that [..] has the potential to communicate with the hundreds of millions of Bluetooth enabled mobile phones, PCs and PDAs[..]. Consuming minimal power, it offers long-lasting connectivity, dramatically extending the range of potential applications and opening the door to brand new web services. Bluetooth low energy technology features ultra-low peak, aver-		

age and idle mode power consumption; ultra-low cost plus small size for accessories and human interface devices (HIDs); minimal cost and size addition to handsets and PCs; global, intuitive and secure multi-vendor interoperability. [9]

Usage Contexts: BLE technology is used in the design and development of the theft detection sensor as well as the theft detection gateway. Sensor and gateway include functionality that allows citizens to locate their assets in real-time through a smartphone application or a cloud-based web application.

Assessment: Fully applicable, no gaps identified.

1.3.2. WLAN

Name	Version	Organisation
Wireless Local Area Networks	802.11 (family)	IEEE
Web: http://grouper.ieee.org/groups/802/11/		
Purpose: WLAN is a set of standards providing a wireless ("over-the-air") interface for communication between a client and a base station or between two wireless clients.		

Usage Contexts: WLAN technology has been specifically explored in the development of City.Risks theft detection gateway as a means to detect Wi-Fi-enabled beacons.

Assessment: Fully applicable, no gaps identified.

1.4. Software Component Interfaces

1.4.1. HTTP

Name	Version	Organisation
Hypertext Transfer Protocol	1.1	IETF/W3C
Web: https://tools.ietf.org/html/rfc2616		
Purpose: The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems. It is a generic, stateless, protocol which can be used for many tasks beyond its use for hypertext, such as name servers and distributed object management systems, through extension of its request methods, error codes and headers. [11]		

Usage Contexts: HTTP is being used as the basis for almost all application level communication between services of the platform as well as for communication between clients (Web and mobile) and those services.

Assessment: Fully applicable, no gaps identified.

1.4.2. REST

Name	Version	Organisation
Representational State Transfer	n.a.	n.a.
Web: http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm		
Purpose: Representational State Transfer has been introduced by Roy Fielding as a way of providing interoperability between internet-connected computer systems. REST is based on using URLs to identify resources and applying HTTP methods (e.g., POST, GET, PUT, DELETE) to manage them. REST is not an actual standard but widely adopted as a pattern for service interfaces. [12]		

Usage Contexts: REST is being used on top of HTTP for almost all application level communication between services of the platform as well as clients and services.

Assessment: Fully applicable, no gaps identified.

1.4.3. HATEOAS

Name	Version	Organisation
Hypermedia As The Engine Of Application State	n.a.	Spring
Web: https://spring.io		
Purpose: With HATEOAS, a client interacts with a network application that application servers provide dynamically entirely through hypermedia. A REST client needs no prior knowledge about how to interact with an application or server beyond a generic understanding of hypermedia.		

Usage Contexts: HATEOAS has been used to create the REST API of the City.Risks core platform, so that remote clients enter the REST application through a simple fixed URL.

Assessment: Fully applicable, no gaps identified.

1.4.4. MQTT

Name	Version	Organisation
OASIS Message Queuing Telemetry Transport (MQTT) TC	v3.1.1	OASIS
Web: http://docs.oasis-open.org/mqtt/mqtt/v3.1.1/os/mqtt-v3.1.1-os.html		
Purpose: MQTT is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium. [13]		

Usage Contexts: MQTT is used for flexible bidirectional communication between components of the platform. The messaging-based communication paradigm facilitated by using MQTT provides for a strict decoupling of components, as well as extensibility of the platform, and real-time, event-based communication flows.

Assessment: Fully applicable, no gaps identified.

1.4.5. SSE

Name	Version	Organisation
Server-sent Events	n.a.	Web Hypertext Application Technology Working Group
Web: https://html.spec.whatwg.org/multipage/server-sent-events.html		
Purpose: Server-sent events are part of the HTML5 standard and enable servers to push data to Web pages over HTTP or using dedicated server-push protocols. [14]		

Usage Contexts: Server-sent Events are used to deliver live information about new and updated incidents from platform services to Web-based clients (e.g., incidents monitor) in an event-driven manner.

Assessment: Fully applicable, no gaps identified.

1.4.6. RTMP

Name	Version	Organisation
Real-Time Messaging Protocol	n.a.	Macromedia (Adobe)/public
Web: https://www.adobe.com/devnet/rtmp.html		
Purpose: The Real-Time Messaging Protocol (RTMP) was designed for high-performance transmission of audio, video, and data.		

Usage Contexts: RTMP has been used to transmit video and audio from the crime scenes directly to the operation centre of City.Risks.

Assessment: Fully applicable, no gaps identified.

1.5. Software Security

1.5.1. TLS

Name	Version	Organisation
Transport Layer Security Protocol	1.2	IETF
Web: https://tools.ietf.org/html/rfc5246		
Purpose: The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery [15]		

Usage Contexts: TLS is used throughout the platform to encrypt traffic from and to application services. It is furthermore used to securely identify communicating parties in server-to-server communication (e.g., when connecting to a message broker) as well as in client-server communication (e.g., for application log monitoring).

Assessment: Fully applicable, no gaps identified.

1.5.2. Ed25519

Name	Version	Organisation
Ed25519	n.a.	n.a.
Web: http://ed25519.cr.yp.to		
Purpose: Ed25519 is a public-key signature system based on elliptic curves that provides for very fast signature creation and verification. [16] Ed25519 is not yet officially standardised.		

Usage Contexts: Ed25519 is used for the creation of private/public keys, which in turn are used for a) anonymous user and device identities (API requests retrieving or manipulating personal or otherwise sensitive information are signed by the clients with their identity, and signatures are being verified on the server side to allow access); and b) as a proposal for certifying and verifying trusted community members.

Assessment: Fully applicable, no gaps identified.

1.6. Augmented Reality

1.6.1. ARML

Name	Version	Organisation
Augmented Reality Markup Language	2.0	Open Geospatial Consortium
Web: http://docs.opengeospatial.org/is/12–132r4/12–132r4.html		
Purpose: ARML 2.0 allows developers to describe virtual objects in an Augmented Reality (AR) scene with their appearances and their anchors (a broader concept of a location) related to the real world. Additionally, ARML 2.0 defines ECMAScript bindings to dynamically modify the AR scene based on user behaviour and user input. [17]		

Usage Contexts: ARML is used in the mobile geo-based augmented reality SDK for description of Points of Interests (POIs).

Assessment: Fully applicable, no gaps identified.

1.6.2. OpenGL

Name	Version	Organisation

Open Graphics Library	4.6	Khronos Group
Web: https://www.opengl.org/		
Purpose: OpenGL is a specification f a platform independent API for the development of 2D and 3D graphic applications. [18]		

Usage Contexts: OpenGL is used in the mobile geo-based augmented reality SDK for a high-performance visualisation of 2D and 3D AR objects.

Assessment: Fully applicable, no gaps identified.

1.6.3. OpenXR

Name	Version	Organisation
OpenXR	n.a.	Khronos Group
Web: https://www.khronos.org/openxr		
Purpose: OpenXR is a working group managed by the Khronos Group consortium with the aim to design a standard for Virtual reality and Augmented reality. The standard will comprise two parts: An API aimed for the application developers. A Device Layer presenting an abstraction interface with the device itself. [19]		

Usage Contexts: OpenXR is used as an “inspiration & orientation” while specifying the API of the mobile AR SDK (molAR) developed in the project.

Assessment: Fully applicable, no gaps identified.

1.7. Documentation

1.7.1. UML 2

Name	Version	Organisation
Unified Modeling Language	2.x	OMG/ISO
Web: https://www.iso.org/standard/32620.html		
Purpose: Unified Modeling Language (UML) [is] a graphical language for visualizing, specifying, constructing, and documenting the artifacts of a software-intensive system. The UML offers a standard way to write a system’s blueprints, including conceptual things such as business processes and system functions, as well as concrete things such as programming language statements, database schemas, and reusable		

software components. [20]

Usage Contexts: UML has been used to describe and communicate the architecture of the platform as well as the structure of the services and components it comprises along with their technical interfaces.

Assessment: Fully applicable, no gaps identified.

1.7.2. FMC

Name	Version	Organisation
Fundamental modeling concepts	n.a.	FMC Consortium
Web: http://www.fmc-modeling.org/		
Purpose: The Fundamental Modeling Concepts (FMC) primarily provide a framework for the comprehensive description of software-intensive systems. It is based on a precise terminology and supported by a graphical notation which can be easily understood. Modeling we call the intellectual activity of creating a model of some system with the goal to capture its essential structures necessary to understand its (existing or planned) behaviour (internal and to its environment) and to describe these structures in a comprehensive way. [21] FMC is not an actual standard, but enables to easily describe system structures, thus complementing UML.		

Usage Contexts: FMC has been used (in combination with UML) to describe and communicate the architecture of platform services and components their information flows.

Assessment: Fully applicable, no gaps identified.

1.7.3. APIB

Name	Version	Organisation
API Blueprint	1A	Apiary Inc
Web: https://apiblueprint.org		
Purpose: API Blueprint is a powerful high-level API description language for RESTful web APIs that is based on plain/text documentation using regular Markdown syntax. [22] API Blueprint is one of the upcoming industry standards for API specification.		

Usage Contexts: API Blueprint has been used to develop and document the specification of the interfaces for service endpoints that are used by mobile clients.

Assessment: Fully applicable, no gaps identified.

1.7.4. Markdown

Name	Version	Organisation
Markdown	1.0.1	n.a.
Web: https://daringfireball.net/projects/markdown/		
Purpose: Markdown is a lightweight mark-up language with plain text formatting syntax. It is designed so that it can be converted to HTML and many other formats. [23] Markdown is not an actual standard but has been widely adopted by the developer community as their documentation tool of choice.		

Usage Contexts: Markdown has been used for development documentation.

Assessment: Fully applicable, no gaps identified.

1.8. Domain Taxonomies

1.8.1. UK Police Crime Categories

Name	Version	Organisation
UK Police Crime Categories	n.a.	UK Police
Web: https://www.police.uk/about-this-site/faqs/#what-do-the-crime-categories-mean		
Purpose: A categorisation of crime incidents recorded by the UK police.		

Usage Contexts: (1) Used in the City.Risks data repository to analyse the spatial distribution of different crime types in the metropolitan area of London, and to train prediction models for predicting the crime rate of an area based on its demographics, Points of Interest, land use, and other associated information. (2) The categories have also been considered as a basis for the project's incident type system.

Assessment: Fully applicable in (1); partial application in (2) as the categories are relatively broad and solely based on crimes.

1.8.2. NFIRS Incident Types

Name	Version	Organisation
National Fire Incident Reporting System Incident Types	5.0	USFA/FEMA
Web: https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf		
Purpose: The NFIRS is a national system for reporting and communicating fire incident information developed and used in the US. The used incident type taxonomy is based on *Standard Classifications for Incident Reporting and Fire Protection Data*, from 1995 (NFPA 901).		

Usage Contexts: The NFIRS incident type codes have been considered for developing the incident type code system for the project.

Assessment: Partially applicable as the incident types are focused on fire incidents.

2. Contribution

2.1. Incident Type Taxonomy

There are several projects aiming at increasing the sense of safety in urban environments through providing facilities for an end user to report situations or circumstances or even about potentially criminal activities to authorities. There is, however, no standard vocabulary that can be used to describe the type of situation or activity for such kind of applications.

With the *Risk Management and Response Service*, the City.Risks project developed a tool that can be used to automatically pre-classify text or image-based end user reports into a predefined set of incident categories. These categories are used in the operation centre to support decision making as well as to communicate safety-related information back to the users.

For this purpose, we initially considered crime categories as well as incident type catalogues from fire brigades or 112 emergency call event codes, but they were only partially applicable.

To build the set of categories, we first identified the types of incidents that we *wanted users to report*, based on the use cases and the general objective of the project. Second, we identified the types of incidents we *expected users to report*, based on the functionality of the app and on how end users would likely use it. Afterwards, we homogenized the respective sets, identified primary and secondary categories and compiled the terms into a single taxonomy.

The initial taxonomy consisted of 67 terms. Some of them have been removed for ethical reasons – in order to not heighten the fear of crime – or because they might mislead the users regarding their understanding and expectations of the systems.

The remaining terms have been organized into a two-tier taxonomy, that is available as an extension to the Common Alerting Protocol (CAP) Standard in form of a CAP-Profile for safety-related applications (see Annex I).

3. Bibliography

[1] URN, https://www.rfc-editor.org/rfc/rfc2141.txt
[2] UUID, https://www.itu.int/en/ITU-T/asn1/Pages/UUID/uuids.aspx
[3] JSON, https://json.org
[4] JWT, http://self-issued.info/docs/draft-ietf-oauth-json-web-token.html
[5] GeoJSON, https://tools.ietf.org/html/rfc7946
[6] SKOS, https://www.w3.org/2004/02/skos/
[7] CAP, https://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html
[8] KATWARN, https://www.katwarn.de/en/
[9] Bluetooth LE, https://www.bluetooth.com
[10] Raspberry Pi, https://www.raspberrypi.org
[11] HTTP, https://tools.ietf.org/html/rfc2616
[12] REST, https://en.wikipedia.org/wiki/Representational_state_transfer
[13] MQTT, http://docs.oasis-open.org/mqtt/mqtt/v3.1.1/os/mqtt-v3.1.1-os.html
[14] SSE, https://html.spec.whatwg.org/multipage/server-sent-events.html
[15] TLS, https://tools.ietf.org/html/rfc5246
[16] Ed25519, http://ed25519.cr.yp.to
[17] ARML, http://www.opengeospatial.org/standards/arml
[18] OpenGL, https://en.wikipedia.org/wiki/OpenGL
[19] OpenXR, https://en.wikipedia.org/wiki/OpenXR
[20] UML, https://www.iso.org/standard/32620.html
[21] FMC, http://www.fmc-modeling.org
[22] APIB, https://apiblueprint.org
[23] Markdown, https://en.wikipedia.org/wiki/Markdown

Annex I: CAP-CRISKS Event Codes

Title	CAP-CRISKS Event Codes
Description	Initial draft proposal
Date	31.3.2018
Version	0.1
Replaces	%
Owner	City.Risks Consortium
Official Website	cityrisks.eu
Reference Standard	OASIS - Emergency Data Exchange Language - Common Alerting Protocol (EDXL-CAP) version 1.2

I.1 Version Control

Version	Date	Author	Change description
0.1	31.3.2018	City.Risks consortium	Initial draft proposal

I.2 Table of Contents

<TO BE INCLUDED>

I.3 Purpose of this Document

This document presents the proposed list of event label and event code references for applications in the area of urban safety. The objective for the creation of this CAP profile has been to specifically support applications aiming at increasing the sense of safety in urban environments through providing facilities for an end user to report situations or circumstances or even about potentially criminal activities to authorities. The event codes can be used to manually, semi-automatically, or automatically classify end user reports into a predefined set of incident categories, in order to facility communication of safety-related information between authorities and citizens.

I.4 Copyright

I.5 Acknowledgements

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I.6 Notices

I.7 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in IETF RFC 2119, available at http://www.ietf.org/rfc/rfc2119.txt

I.8 CAP Event Codes Overview

Event code references in a CAP message are optional and are left to the issuing authority to manage. This document contains a list of proposed codes along with their standard CAP event labels for messages in English, Italian, Bulgarian, Greek, and German.

I.8.1 Event Code List

CAP-CRISKS events are identified as belonging to one of two tiers of event types: Tier I or Tier II. The terms have been compiled with the focus on end-user facing applications.

Tier I events typically refer to a broader class of events, while Tier II events refer to more specific events.

Tier I and Tier II events may be associated with one or more CAP categories. The associations found herein are suggested, but not definitive. It is encouraged to use Tier II selections whenever applicable. Tier I codes are better suited to events which do not have a specific Tier II selection.

The event code list is presented in four columns. The first two columns present the Tier I and Tier II class of events with their default labels in English. The third column provides the event code. The fourth column identifies the CAP categories to which the event may be associated.

Tier I Events	Tier II Events	Event code	CAP Category
Violence against person		violAgPerson	Security, Safety
Sexual assault		sexualAssaul	Security, Safety
Anti-social behaviour		antiSocBehav	Safety
	Bullying	bullying	Safety
	Harassment	harassment	Safety
	Social disorder	socialDisord	Safety
	Street drinking	streetDrinkg	Safety
Public disorder		publicDisord	Safety
	Affray	affray	Safety
	Prostitution	prostitution	Safety
	Gangs	gangs	Safety
	Protest	protest	Safety
Vehicle Crime		vehicleCrim	Security
	Car theft	carTheft	Security, Transport

Theft		theft	Security
	Pickpocketing	pickpocketng	Security, Safety
	Burglary	burglary	Security, Safety
	Robbery	robbery	Security, Safety
	Theft of personal/personal belongings	theftPersBel	Security, Safety
	Shoplifting	shopLifting	Security, Safety
Drugs		drugs	Health, Safety
	Drug dealing	drugDealing	Health, Safety
Property damage		propertyDmge	Safety
	Vandalism	vandalism	Safety
	Arson	arson	Security, Safety
	Graffiti	graffiti	Safety
Environmental issue		environment	Env
	Fly-tipping/ Abandoned waste	flyTipping	Env, Health
	Uncollected commercial waste/Abandoned waste	uncolldWaste	Env, Health
	Littering	littering	Env, Health
	Dog fouling	dogFouling	Env, Health
	Darkness/Fault in lighting	darkness	Safety
	Illegal campsite	illCampsite	Safety
	Alcohol licensing breach	alcLicense	Safety
Driving offence		driving	Safety, Transport

	Speeding and dangerous driving	dangDriving	Safety, Transport
	Drink-driving	drinkDriving	Safety, Transport
	Drug-driving	drugDriving	Safety, Transport
	Illegal parking	illParking	Safety, Transport
Incident		incident	Safety, Other

I.8.2 Event Labels

Event labels are presented in the following table. The first column refers to the default event label in English referring to the Tier I and Tier II events from the event code list. The other columns present translations of the default into the respective language.

English	**Italian**	**Bulgarian**	**Greek**	**German**
Violence against person	Violenza contro la persona	Насилие срещу лице	Βία ενάντια σε άτομο	Gewalt gegen eine Person
Sexual assault	Violenza sessuale	Сексуално насилие	Σεξουαλική επίθεση	Sexueller Übergriff
Anti-social behaviour	Comportamento antisociale	Антисоциално противообществено поведение	Αντι-κοινωνική συμπεριφορά	Asoziales Verhalten
Bullying	Bullismo	Малтретиране	Εκφοβισμός	Mobbing
Harassment	Molestia	Измъчване	Παρενόχληση	Belästigung
Social disorder	Disordine sociale	Социофобия	Κοινωνική Αναταραχή	Soziale Unordnung
Street drinking	Ubriachezza molesta	Консумация на алкохол на обществено място	Κατανάλωση αλκοόλ	Trinken im öffentlichen Raum

Public disorder	Turbamento ordine pubblico	Противообществена проява	Δημόσια Αναταραχή	Öffentliche Unordnung
Affray	Rissa	Нарушение на обществения ред	Συμπλοκή	Schlägerei
Prostitution	Prostituzione	Проституция	Πορνεία	Prostitution
Gangs	Bande	Банди - организирани престъпни групи	Συμμορία	Banden
Protest	Proteste	Протест	Διαμαρτυρία	Protest
Vehicle Crime	Criminalità connessa con veicoli	Престъпления с превозни средства	Εγκληματική ενέργεια με όχημα	Fahrzeugkriminalität
Car theft	Furto di veicolo	Кражба на автомобил	Κλοπή οχήματος	Autodiebstahl
Theft	Furto	Кражба	Κλοπή	Diebstahl
Pickpocketing	Borseggio	Джебчийство	μικροκλοπή	Taschendiebstahl
Burglary	Furto con scasso	Взлом	Διάρρηξη	Einbruch
Robbery	Rapina	Обир	Ληστεία	Raub
Theft of personal belongings	Furto di oggetti personali	Кражба на лични вещи	Κλοπή προσωπικών ειδών	Diebstahl persönlichen Eigentums
Shoplifting	Taccheggio	Кражба от магазин	Κλοπή σε κατάστημα	Ladendiebstahl
Drugs	Droga	Наркотици	Ναρκωτικά	Drogen
Drug dealing	Spaccio di stupefacenti	Търговия с наркотици	Διακίνηση Ναρκωτικών	Drogenhandel
Property damage	Danneggiamento	Разрушаване на имущество	Ζημία σε περιουσία	Sachbeschädigung
Vandalism	Vandalismo	Вандализъм	Βανδαλισμός	Vandalismus

Arson	Incendio doloso	Палеж	Εμπρησμός	Brandstiftung
Graffiti	Graffiti	Графити	Graffiti	Graffiti
Environmental issue	Danno ambientale	Екологичен проблем	Ζήτημα περιβάλλοντος	Umweltproblem
Fly-tipping/ Abandoned waste	Discarica abusiva/Abbandono rifiuti	Контрол върху незаконното изхвърляне на отпадъци/Изоставени отпадъци	Εγκατελειμένα απορρίμματα	Illegale Müllhalde
Uncollected commercial waste/Abandoned waste	Rifiuti commerciali non raccolti/ Abbandono rifiuti	Несъбран търговски отпадък/Изоставени отпадъци	Μη συλλεγμένα Εγκατελειμένα απορρίμματα	Eingestellte Müllabholung
Littering	Abbandono rifiuti	Замърсяване	Απορρίμματα	Vermüllen
Dog fouling	Deiezioni canine	Замърсяване на обществено място с кучешки фекалии	Απορρίμματα Σκύλου	Hundekot
Darkness/Fault in lighting	Illuminazione non funzionante	Повреда на осветление	Ζημιά σε υποδομή φωτισμού	Unzureichende Beleuchtung
Illegal campsite	Campeggio abusivo	Нелегален къмпинг	Παράνομος χώρος κατασκήνωσης	Illegaler Campingplatz
Alcohol licensing breach	Vendita illegale di alcool	Нелицензиран алкохол	Παραβίαση άδειας οινοπνευματωδών	Nicht genehmigter Alkoholausschank
Driving offence	Incidente automobilistico	Преследване на престъпление	Οδηγική παράβαση	Fahrverstoß

Speeding and dangerous driving	Guida pericolosa	Опасно шофиране	Υπερβολική ταχύτητα /Επικίνδυνη οδήγηση	Gefährliches Fahren
Drink-driving	Guida in stato di ebbrezza	Шофиране в нетрезво състояние	Μέθη κατά την οδήγηση	Alkohol am Steuer
Drug-driving	Guida sotto effetto di stupefacenti	Шофиране под влияние на опияти	Επήρεια Ουσιών κατά την οδήγηση	Drogen am Steuer
Illegal parking	Parcheggio abusivo	Незаконно паркиране	Παράνομη στάθμευση	Unerlaubtes Parken
Incident	Incidente	Инцидент	Συμβάν	Sicherheitsrelevanter Vorfall