prCWA XXXXX

Semantic layer definition and suitability of OASIS EDXL-CAP and OASIS EDXL-SitRep standards for crisis management in Critical Infrastructures

Cover page-CEN workshop

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Foreword

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List of participants.

Introduction

There are some standardised references for defining the structure of the information to be sent during a crisis. The most relevant ones are:

- ISO/TR 22351 Social security – Emergency Management – Message structure for the exchange of information, developed by ISO/TC 292 'Security and resilience'; and
- the EDXL family of standards from OASIS (Evolution of Emergency Data Exchange Language (EDXL): A Framework/Toolkit for Developers, 2017).

These references define the set of fields to be included in their messages. Their specification states the meaning of each field of the message. This makes straightforward to interpret these messages, but it also has two drawbacks:

a) they do not define a field for each type of information gathered, especially for the information collected from sensors, except for the geographical coordinates; and
b) even if those standardised references defined every type of information to gather, they would become obsolete when more information types were needed.

A possible solution for a) can be complementing those standards with standards for the format of the messages transmitted by the sensors. For the sake of brevity, this document will refer to such standards as 'sensor standards'. An example of such sensor standard is SOS (Sensor Observation Service, 2012) from the OGC (Open Geospatial Consortium). OGC-SOS deals with the problem of reporting any kind of information expressing all information as pairs of field names and field values. But the sensor standards do not define the names for the fields to be reported for crisis management. Therefore, there is currently no standard that defines completely how to express all the information gathered during a crisis. This causes that the incorporation of any new device from a third-party provider, forces to upgrade the systems. This upgrade increases significantly the time for adopting the new sensors and the cost for that, because the responders need to wait for the vendor of their command and control systems to:

- accept to upgrade the system to support the new sensor;
- implement and test the upgrade; and
- release and install the upgrade.

This increases not only costs but also adoption times for the new devices. And this increase can result in unnecessary lives losses if a crisis occurs before the system is upgraded.

This document proposes a semantic layer that consists in a list of names for the concepts to be reported during a crisis to use these names as field names. This way, it will allow reporting any type of information by complementing the mentioned standardized references with sensor standards and it will be possible to create generic components that provide data and software modules that exploit them, potentially providing additional information. In practice, this will enable command and control centres to add new generic sensors that will be automatically recognized by the system without any additional support from the software vendors. The semantic layer in this document will make possible to add new sensors and software modules without any additional delays for upgrading the system.

For technical reasons that are explained in 0, the semantic layer is implemented as a namespace, according to the rules specified by the IETF (Moats, 1997). The joint use of this

namespace with sensor standards is proposed as a feasible way to transmit data from sensors in a way that can be interpreted from generic software during a crisis.

Though there are already OASIS EDXL standards for defining the rest of the information to send when reporting an alert and for the reports to be generated from the information contained in the system, it is necessary to evaluate the suitability of those standards for covering the full crisis cycle of automatically collecting information about the crisis and automatically producing situational reports from the information collected in the system.

CWA 17356:2018, *Interoperability of security systems for the surveillance of widezones*, provides guidance on aspects of the information exchange requirements between entities in widezone surveillance systems used in critical infrastructures and recommendations on the operational needs and data interoperability (clause 4 and 6.4 respectively). They have been taken into account as requirements to evaluate the feasibility of OASIS EDXL-CAP (Emergency Data Exchange Language-Common Alerting Protocol, 2012) and OASIS EDXL-SitRep (Emergency Data Exchange Languaje-Situation Reporting, 2016) for the automatic processing of information and generation of situational reports during a crisis involving critical infrastructures. For that purpose, this document:

- gathers the operational needs of the users from several types of responders, including fire services, police services and clinical responders;
- considers the responder's feedback on the TTX (Table Top Exercise) and FSX (Full Scale Exercise) carried out within the Horizon 2020 STRATEGY project (G.A. 883520) to evaluate this CWA;
- identifies the information needed to support those operational needs;
- checks the correspondence of the information included in OASIS EDXL-CAP and OASIS EDXL-SitRep messages with the information identified; and
- comes to conclusions and suggestions based on the correspondence checking.

The operational needs gathered from the users have taken into account some technologies that did not exist when these OASIS Open standards were released. The conclusions of the analysis will allow responders and technology developers which operational needs can be implemented with these standards. For the rest of operational needs these conclusions provide alternatives or suggestions for improvements for OASIS EDXL-CAP and OASIS EDXL-SitRep.

As stated in the terms and definitions of this document, a critical infrastructure is considered to be a facility or network that is necessary for the provision of an essential service.

NOTE The definition of critical infrastructure used in this document is aligned to but more constrained than the definition in the (EU) Directive 2022/2557: (4) critical infrastructure: 'an asset, a facility, equipment, a network or a system, or a part of an asset, a facility, equipment, a network or a system, which is necessary for the provision of an essential service' and essential service is 'a service which is crucial for the maintenance of vital societal functions, economic activities, public health and safety, or the environment'.

1 Scope

This document specifies a formal definition of a semantic layer that contains the list of field names to be used in the messages transmitted during a crisis.

Additionally, the document evaluates the suitability of the following standards:

- OASIS EDXL-CAP for automatically collecting part of the information of a crisis involving critical infrastructures; and
- OASIS EDXL-SitRep for the generation of situation reports from the information collected in the system and their automatic delivery to the strategic command.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CWA 17356:2018, Interoperability of security systems for the surveillance of widezones

RFC2611 – URN Namespace Definition Mechanisms. The Internet Society. Daigle, L. et al. (1999)

RFC2141 – URN Syntax. IETF. Moats, R. (1997).

3 Terms, definitions, abbreviations and acronyms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 22300 and EN ISO/IEC 80000 series, together with the following, apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

3.1.1 Application Programming Interface (API)

Specification of a set of services or methods provided by a software component, so it can be invoked by another software component.

3.1.2 Critical infrastructure (CI)

Facility or network that is necessary for the provision of an essential service.

NOTE The definition of critical infrastructures used in the document is more constrained that the one included in the EU Directive 2022/2557 of the European Parliament. In the Directive, a critical infrastructure is defined as a 'an asset, a facility, equipment, a network or a system, or a part of an asset, a facility, equipment, a network or a system, which is necessary for the provision of an essential service'. The reason for such limitation is the definition included in the directive is so broad that makes impossible in practice to support the evaluation for every possible type of critical infrastructures.

3.1.3 Essential service

Service which is crucial for the maintenance of vital societal functions, economic activities, public health and safety, or the environment.

[SOURCE: EU Directive 2022/2557, article 2 (5)]

3.1.4 Geographic information system

Information system dealing with information concerning phenomena associated with location relative to the Earth.

[SOURCE: ISO 19101-1:2014, 4.1.20]

3.1.5 Incident

An occurrence, natural or manmade, that necessitates a response to protect life or property, planned events as well as emergencies and/or disasters of all kinds and sizes

[SOURCE: FEMA, 2018, Modified]

NOTE This definition is taken almost literally from FEMA (2018), but it is not completely identical. The definition of FEMA makes a reference to NIMS, but that reference has not been included in the definition because though both this document and NIMS are related with crisis management, NIMS is not used as a normative reference.

3.1.6 Information

Knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning.

[SOURCE: ISO-IEC 2382:2015, 2121271]

3.1.7 Information system

Information processing system, together with associated organizational resources such as human, technical, and financial resources, that provides and distributes information.

[SOURCE: ISO/IEC 2382:2015, 2121292]

3.1.8 Interoperability

<distributed data processing>
capability of two or more functional units to process data cooperatively.

[SOURCE: ISO-IEC 2382:2015, 2120585]

3.1.9 Prefix

Any sequence of characters that forms the beginning of a String.

3.1.10 Sensor

Device or system of devices that detect(s)/sense(s) and responds to one or more physical stimuli.

3.1.11 String

Data type consisting of a sequence of one or more characters.

[SOURCE: ISO 2146:2010, 4.6.9]

3.1.12 String field

Part of a record, message or data structure that contains a string.

3.1.13 System

Set of interrelated or interacting elements.

[SOURCE: ISO 9000:2015]

3.2 Abbreviations and acronyms

CBRN	chemical, biological, radiological and nuclear
EN	European standard
EU	European Union
FSX	Full Scale Exercise
HTTP	hypertext transfer protocol
IEC	international Electrotechnical Commission
IP	Internet Protocol

ISO	International Organization For Standardization
JSON	JavaScript Object Notation
NIMS	National Incident Management System
NSS	Namespace Specific String
OASIS Open	Organization for the Advancement of Structured Information Standards
OGC	Open Geospatial Consortium
SSLy	Strategy Semantic Layer
TCP	Transmission Control Protocol
TTX	Table Top Exercise
URI	Uniform resource identifier
URL	Uniform resource locator
URN	Uniform resource name
XML	Extensible markup language

4 Semantic layer definition

4.1 Gap explanation and extent of the semantic layer definition

Any management of a crisis involves the collection of data and their analysis for appropriate response. In the case of computer-based crisis management systems, this means collecting data from either people or sensors, and storing it in the system for its further analysis. In practice, data from people are converted to an electronic form, regardless if they are only an audio file recording of the voice of the person transmitting a warning or somebody using an application reporting a new incident. In all these cases, data from people-as-sensors ends up being stored electronically. Their input can be considered as another sensor, measuring the input from people, audio, video, or webpage input, etc. Thus, from now on we will consider all the input to the system as coming from sensors, regardless of whether empirically measured or any input from people.

Some sensors can be connected directly to the computer that will store and analyse the data, in which case there is no need of transmitting them, but in modern sensing systems this is often not the case. Modern sensing systems are often autonomous sensors able to perform the sensing of data and even some pre-processing on them before sending the result to the crisis management system.

> **EXAMPLE 1:** A gas sensor takes some air samplings and perform some calculations on the results of the physical measurements to identify the gas and whether it poses a threat or not.
>
> In this case, the sensors need to send the data they have gathered or at least their conclusions to a computer that collects the data for their storage and possibly

performs further processing and analysis. After these data are stored, they are available for software modules to access them for several potential reasons.

EXAMPLE 2: A pluviometer sends its measurement to the system, and after that the measurement can be shown in a visual map provided by a Geographic Information System and analysed by another module that generates an alarm based on the value measured, water accumulation over time and a set of pre-configured thresholds.

The situation is not as simple as the sensor sending the data to that computer, because even for the same observed phenomenon to be measured, there can be several sensors able to measure it. And, as in the example, there may be several software modules making use of that set of data. For the system to work, it is necessary that all sensors send the data in a way that the computer collecting the data can understand, and that it stores the data in a way that all software modules that implement the semantic layer can exploit the data, too.

The solution to this problem is that both the sensors and the computer that is receiving their data, and the terms used to express those data comply with a set of protocols for data transmission. This set of protocols for data transmissions will need to allow not only that the data are sent by the source and received by the recipient, but also that it is done in such a way that t can be interpreted later.

The transmission of electronic messages so that they arrive to their destination is currently organized as a stack of different abstract layers, each of them responsible for carrying out one part of the process and supported by one or more standards or specifications. For instance, the transmission stack of protocols for a message compliant with OASIS EDXL-CAP could be:

- IP for addressing the peers of the transmission.
- TCP for handling the connection and the tracking of the different packages sent.
- HTTP for handling the text.
- OASIS EDXL-CAP for specifying the content of the message.

The standards that already exist for defining the format of the information that can be used during a crisis can be considered to belong to one of two categories:

- API oriented standards, which defines specific fields for each information to be transmitted.
- Name-value oriented standards, which sends the information including the name of the field to report and its value.

There already exists some protocols for defining the format of the information to be transmitted during a crisis, such as ISO/TR 22351:2015 and OASIS EDXL-CAP, but they are API standards that do not define all possible information to be sent. Some other standards for the definition of the format of the data to be transmitted by sensors, such as SOS from the OGC, are name-value oriented standards, but they do not define the names of the information they transmit.

A study of the existing standards applicable on crisis management is presented in C.1.

Therefore, though there are already several standardised references that define how to send part of the information during a crisis, and their meaning is covered by them, there is no pre-stablished list of meanings for the fields sent by the sensors.

Figure 1 shows the transmission steps and the gap (in yellow) in data transmission interoperability during a crisis covered by this document.

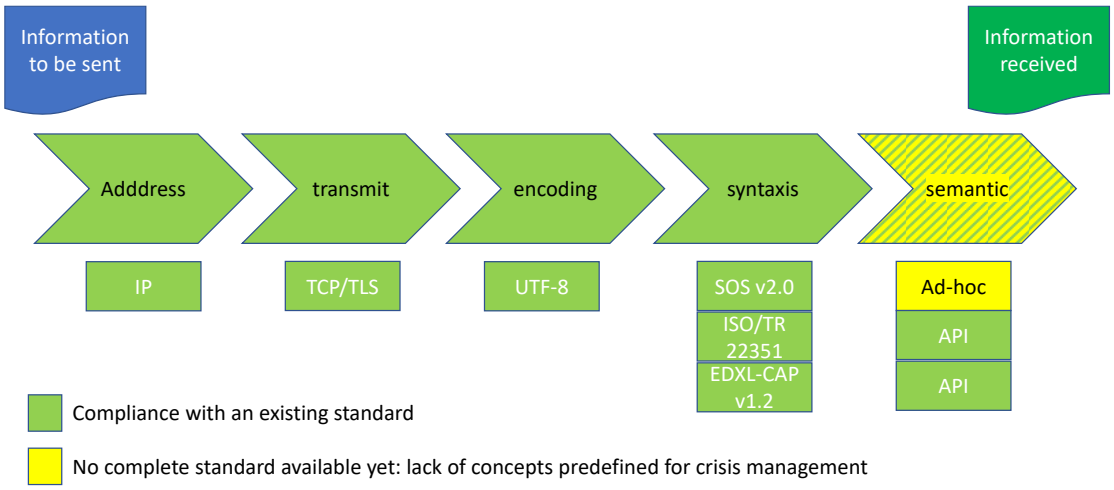

Figure 1: Lack of semantic layer results in incomplete data interoperability

In practice, this lack means that it is impossible to build generic sensors whose input can be exploited directly by a generic software module. Every time that a new sensor is added to the system, the software modules that need to exploit their data must be adapted to look for the specific fields that the new sensor provides. And there is no guarantee that the provider of the software module will be willing to do so, or the time it will take, or even that the adaptation will work with no errors. And this will incur in additional costs, too.

In contrast, the semantic layer specified in this document is designed to allow the sensors and software modules that comply with it to add new sensors and even new software modules as soon as they are created without the need for waiting for the rest of the system to be adapted, because it makes possible for the new sensors and new software modules to be tested against any testing platform compliant with the semantic layer before connecting to the real production system.

The semantic layer for the data provided by sensors is defined in 4.4 to 4.6 and includes:

- a set of possible meanings for the data subject to be provided by the sensors;
- a formal electronic representation for them, and
- a way to check the correctness of the meanings transmitted by sensors compliant with that layer.

As there are already some API oriented standards for the provision of a limited set of data during a crisis, the meanings corresponding to those data are deliberately set out of the scope of the semantic layer. However, there are some limitations to this constraint:

- This document focuses on gaps concerning crisis management in and affects the development of command and control centres for managing crisis and also any environment that sends data from sensors;

The semantic layer is designed to support any type of sensor data, because limiting the concepts included could probably cause not alignment with future sensors standards. In practice, this means that though the semantic layer does not include any field for specifying the data in the existing standards for crisis management (see 4.3), it includes the concepts for generic data input that are currently covered by those standards.

EXAMPLE: ISO/TR 22351:2015 already includes a field for the quantity of a resource. For this reason, the semantic layer does not include a term for specifying the meaning for the field corresponding to that quantity, but it includes a term for specifying the meaning for the field corresponding to a generic quantity, to be used for quantities not associated to a resource.

- Even sensor standards for the definition of the format of the messages transmitted normally include some fields defined in their specification, with date, time and geographic information about coordinates. For that reason, they are included in the semantic layer, either.

4.2 Methodology to define the semantic layer

The specification of the semantic layer is made according to the following steps:

a) Preparation of a list of subject matters that shall not be included in the semantic layer: some subject matters are already covered by some other standard (see C.2).
b) Production of a List of concepts to be included in the definition: before preparing the formal definition, it is necessary to identify which concepts will be included in the semantic layer.
c) Definition of the format of the semantic layer, including the organization of the concepts, the standards to be supported (see 4.3), and the syntax of the definition.
d) Formal definition of the semantic layer, applying the syntax specified in b) to the list of concepts specified in step a).

4.3 Standards to be supported by the definition of the semantic layer

The semantic layer is conveniently defined considering the exclusion of concepts and information already provided in the following relevant standards in order to support them.

NOTE 'Support' does not necessarily means adopting or recommending the adoption of these standards, but it can also consist in following the recommendations or the philosophy of such standards for adding new information or functionalities.

The standards considered for this purpose are:

- OGC-SOS v2.0: a standard that defines the format of data transmitted from geographically referenced sensors.
- OASIS EDXL-CAP v1.2: Emergency Data Exchange Language (EDXL) Common Alerting Protocol v1.2(OASIS, 2012) is a protocol for sending alerts during a crisis-emergency.
- OASIS EDXL-DE v1.0: is the envelope or "wrapper" of the OASIS EDXL-CAP Alert (Payload) or any of the other EDXL messages.

- OASIS EDXL-SitRep v1.0 (2016) describes a set of standard reports and elements that can be used for data sharing among emergency information systems, and that provide incident information for situation awareness.
- OASIS EDXL-HAVE v2.0 / HL7 v2, which is mirrored by HL7, defines a way to collect data on the resource availability of medical facilities in the area of the emergency and adjacent communities.
- OASIS EDXL-TEP v1.1 allows first responders to route the most critical, or the highest triage assessed emergency patients to the best match for the patient's injuries or illness.
- OASIS EDXL-RM v1.0 is a definition of a set of messages for handling all type of messages for logistics and commands.

This document considers the following recommendations in terms of support and alignment with these standards:

- Non-collision: the semantic layer should avoid proposing anything that requires changing anything in the considered standard, except for adding new content, and only if the newly added content is compatible with the previous content of the standard without needing to change it. For this reason, the sematic layer should not allow including concepts already covered by the mentioned standard, or if it did, clarify that they should not be used for the context expressed in that considered standard.
- Compatible with previous philosophy of the considered standards: the semantic layer should try to be compatible with the philosophy implied in the considered standards. For instance, if a considered standard has an implicit design that differentiates between information included in the API and information to be declared in another standard, then the terms of the semantic layer should be part of that information (acting as the different standard).
- Compliance with previous suggestions. If the considered standard already have suggestions on how to define the names of the fields to be transmitted, then the semantic layer should consider compatibility with them.

Annex C provides the landscape study of these existing standards that define the meaning of the information to be transmitted during a crisis and how to maintain compatibility with them according to the expressed criteria.

4.4 List of concepts to be included in the semantic layer definition

4.4.1 General

It is not feasible to define each possible field from every possible sensor to be included in the semantic layer. Instead, the concepts in the semantic layer are constructed around the different quantities associated to measure units defined in EN ISO/IEC 80000 series. the list is completed with some, already known concepts of special relevance that are not covered by those quantities.

EN ISO/IEC 80000 series defines several series of measurement units and the concepts that apply to the physical aspects to be measured. Those documents define only numeric concepts, and for that reason they refer to them as 'quantity'. But the semantic layer is not limited only

to numeric concepts, which is why it uses the more generic term ‘concept’. This document uses many of the quantities defined in the documents of the EN ISO/IEC 80000 series to identify the names corresponding to the concepts to be included in the semantic layer. This correspondence is designed to be univocal so they can be easily referred in a software code. For this reason, redundant names are merged in a univocal form when producing the formal definition.

The document does not include any concept for time and date because practically all standards for sensors already include fields for the time and date of the measurement. However, the standards for space and time include the term ‘duration’ instead.

These lists in 4.4.2 to 4.4.17 are constructed around the concepts instead of the terms chosen to refer to them. When two terms correspond to the same concept, only one of them is kept to avoid redundancy. However, the semantic layer includes the redundant terms as synonyms, as explained in 4.5.2.

The list of concepts does not include any constant, even those included in the EN ISO/IEC 80000 series, because a constant is conceptually something that does not change, and therefore there is no point in measuring it. As there is no need to report it, then there is no need to measure it, either. And as there is no need to measure it, there is no need to define a name for it, either. As EN ISO 80000-2:20019 contains only mathematical signs and symbols, without any concept, the semantic layer does not contain any concept from it.

The EN ISO/IEC 80000 series of standards are used in this document for getting a complete list of concepts that correspond to physical realities corresponding to ordinal values. The intention of this is to reuse the work carried out in those standards, but not use them as a normative reference. The reason for this decision is the semantic layer is designed to be backward compatible in time. That is, if new concepts would appear in the future, the semantic layer could be revised to incorporate them, but the names already included should never be removed to ensure that it is still possible to use it to interpret the data provided by old software and sensors that are compliant with older versions of it. But the EN ISO/IEC 80000 series of standards are not designed to be backward compatible. Some terms could be removed or renamed as these standards are revised, and that would make impossible for the semantic layer to remain backward compatible if all its names would be reviewed accordingly to comply with the new versions of the standards of the EN ISO/IEC 80000 series. For that reason, the semantic layer is designed to be adaptable in the future to the changes in the EN ISO/IEC 80000 series with its synonyms mechanism, which is explained in detail in 4.5.2. The semantic layer includes the concepts based on the terms that are present in those standards in the moment of writing the document, but it is designed so these names should never change in the future due to revisions of the EN ISO/IEC 80000 series. Instead, if one of those standards change, the criteria for upgrading the semantic concept should be:

- New concepts proposed in the EN ISO/IEC 80000 revised standard should be added to the semantic layer according to the syntax stated in 4.5.2.
- Concepts removed from an EN ISO/IEC 80000 or marked as deprecated revised standard should include the infix “(Deprecated)” so it is easy for developers of new sensors to identify they should consider using an alternative name.
- Concepts whose name is changed in an EN ISO/IEC 80000 revised standard should not change their associated name in the semantic layer. Instead, the new name proposed

in the revised standard should be added to the list of synonyms for that concept in the semantic layer, and the explanation should start with the prefix "(deprecated)".
- Synonyms are not removed from the semantic layer even if their corresponding term is removed from an EN ISO/IEC 80000 revised standard, to make sure that existing software that makes use of them continue working.

This way the semantic layer is designed to keep backwards compatibility even as the EN ISO/IEC 80000 series changes.

4.4.2 General concepts in EN-ISO/IEC 80000

The definition of the semantic layer includes all the concepts that are expressed as quantities in ISO 80000-1:2022, with the exception of the following ones included in 4.4.6:

- Electric potential difference.
- Electric resistance electromagnetism.
- Electric conductance.
- Inductance.

NOTE These concepts already have their corresponding equivalent in the specific sections, they refer to specific terms, and for that reason they are considered in 4.4.2.

The following concepts are also considered in this general concepts' list and are not included in the specific information where they have equivalent terms.

- Force (not included in 4.4.4).
- Pressure (not included in 4.4.4), with stress as a synonym.
- Power (not included in 4.4.4).
- Energy (not included in 4.4.5).
- Celsius temperature (not included in 4.4.5).
- Electric charge (not included in 4.4.6).
- Magnetic flux (not included in 4.4.6).
- Magnetic flux density (not included in 4.4.6).
- Capacitance (not included in 4.4.6).
- Luminous flux (not included in 4.4.7).
- Illuminance (not included in 4.4.7).

NOTE ISO 80001:2009 section 6.5, which is the version of the document that this clause is based on, contains units from the International System of Units SI. In the moment of releasing this document, a new version of ISO 80000-1 has been released and has removed all concepts from the SI from the document, though the concepts from the SI are still accepted. The semantic layer still keeps the concepts of the SI that were included in ISO 80001:2009 in the section of general concepts instead of including them in the sections corresponding to the rest of the ISO/IEC 80000 series, because these terms are still widely used as a general term.

4.4.3 Space and time

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-3:2020, with the exception of the following ones:

- Height, depth, altitude is included as 'Height'.

- Path length, with Path Length as a synonym.
- Rotation Frequency instead of the term frequency, to avoid it collide with the general term, whose meaning is similar but not necessarily applied to rotations.

The concept ‘thickness’ shall not be included because it is the same as ‘width’, which is included.

4.4.4 Mechanics

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-4:2019, with the exception of the following ones:

- Relative density, with relative mass density as a synonym.
- Static friction, with relative static friction force as a synonym.
- Modulus of elasticity, with young modulus as a synonym.
- Modulus of compression, bulk modulus, with bulk modulus as a synonym.
- Static friction coefficient, with static friction factors and coefficient of static friction as synonyms.
- Kinetic friction factor, with dynamic friction factor as a synonym.
- Drag coefficient, drag factor: This term also appears in the section of characteristic numbers, and for the same concept. As it is necessary to differentiate them, the semantic layer includes the term drag factor, which only appears here.
- Viscosity, with Dynamic Viscosity as a synonym.
- Volume flow rate, with ‘wind speed’ as synonym in the context of meteorology.

4.4.5 Thermodynamics

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-5:2019, with the exception of the following ones:

- Temperature (Thermodynamic temperature) with Thermodynamic temperature as a synonym.
- Heat, amount of heat with amount of heat as a synonym.
- Thermal insulance, coefficient of thermal insulance, thermal resistance in building technology with coefficient of thermal insulance and thermal resistance in building technology as synonyms.
- Thermal conductance, with transfer coefficient as a synonym.
- Isentropic exponent, with isentropic expansion factor as a synonym.
- Internal Energy, with thermodynamic energy as a synonym.
- Helmboltz energy, with Hemboltz function as a synonym.
- Gibbs energy, with Gibbs function as a synonym.
- Specific internal energy, with specific thermodynamic energy as a synonym.
- Specific Helmholtz energy, specific Helmholtz function as a synonym.
- Mass concentration of water vapour, with absolute humidity as synonym.

4.4.6 Electromagnetism

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN IEC 80000-6:2008 and upgraded with the contents of new version EN IEC 80000-6:2022, according to the upgrading criteria stated in 4.4, with the exception of the following ones:

- The constants included among the quantities in the document are deliberately skipped because there is no point in a sensor reporting a constant.
- Electric charge density, with volumetric electric charge as a synonym.
- Voltage, with electric tension as a synonym.
- Linked flux, with protoflux as a synonym, and make its description start with the prefix '(deprecated)'.
- Coercivity, with coercive field strength as a synonym.
- Scalar magnetic potential, with Magnetic potential as a synonym.
- Magnetic moment, with magnetic area moment as a synonym.
- Magnetic field strength, with magnetizing field as a synonym.
- Electromagnetic-energy density, with volumic electro-magnetic energy as a synonym.
- Source voltage, source tension source tension as a synonym.
- Voltage phasor, with electric tension phasor as a synonym.
- Resistance, with resistance to alternating current as a synonym.
- Inductance, with self inductance as a synonym.
- Instantaneous power, also referred simply as power, but as it is conflicting with the term power from mechanics, the semantic layer shall include only instantaneous power in this context.
- Loss factor, with dissipation factor as a synonym.
- Apparent impedance, with modulus of impedance as a synonym.
- Impedance, with complex impedance as a synonym.
- The description of the concept Magnetic flux density includes the infix '(Deprecated)'.
- The description of the concept Magnetic flux starts with the prefix '(Deprecated)'.
- The description of the concept Magnetic field strength includes the infix '(Deprecated)'.

4.4.7 Light

The definition of the semantic layer includes all the concepts that are expressed as quantities in ISO 80000-7:2019, with the exception of the following ones:

- Electromagnetic Radiant energy electromagnetism: The term in the standard was only 'radiant Energy' but applied only to the field of Electromagnetism. The reason for naming it this way is to avoid the collision with the term radiant energy for ionic radiation.
- Spectral radiant flux, with spectral radiant power as a synonym.
- Luminous exposure, with illumination and light exposure as synonyms.
- Photon number, number of photons, with number of photons as a synonym.
- Transmittance optical density, with optical transmittance density, and decadic absorbance density as synonyms.
- Linear attenuation coefficient, with linear extinction coefficient as a synonym.

4.4.8 Acoustics

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-8:2020.

4.4.9 Physical chemistry and molecular physics:

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-9:2019, with the exception of the following ones:

- Amount of substance, with number of moles as a synonym.
- Latent heat of phase transition, with enthalpy of phase transition as a synonym.
- Osmotic factor of solvent, osmotic coefficient of solvent as a synonym.
- Standard equilibrium constant, with thermodynamic equilibrium constant as a synonym.
- Equilibrium constant <pressure basis> is included in the semantic layer as Equilibrium constant pressure bases.
- Equilibrium constant <concentration basis> is included in the semantic layer as Equilibrium constant concentration basis.
- Grand-canonical partition function, with grand partition function as a synonym.
- Degeneracy, with multiplicity as a synonym.
- Degree of dissociation, with dissociation fraction as a synonym.
- Transport number of the ion B, with current fraction of the ion B as a synonym.

4.4.10 Atomic and nuclear physics

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-10:2019, with the exception of the following ones:

- Atomic number, with proton number as a synonym.
- Nucleon number, with mass number as a synonym.
- Charge number, with ionization number as synonym.
- Gyromagnetic ratio, with magnetogyric ratio gyromagnetic coefficient as a synonym.
- Gyromagnetic ratio of the electron, with magnetogyric ratio of the electron and gyromagnetic coefficient of the electron as synonyms.
- Landé factor, with g factor of atom as a synonym.
- Gyroradius, with Larmor radius as synonym.
- Decay constant, with disintegration as synonym.
- Mean duration of life, with mean life time as synonym.
- Specific activity, with massic activity as synonym.
- Activity density, with volumic activity and activity concentration as synonyms.
- Volumic cross section, with macroscopic cross section as synonym.
- Volumic total cross section, with macroscopic total cross section as synonym.

- Ionic radiant energy: Actually, the original term in the standard was only ‘radiant energy’ for ionic radiation, but the term ‘ionic’ is included instead to avoid the collision with the term of the Subject Matter Light.
- Total linear stopping power, with linear stopping power as synonym.
- Total mass stopping power, with mass stopping power as synonym.
- Ion numbed density, ion density as synonym.
- Diffusion coefficient, with diffusion coefficient for particle number density as synonym.
- Quality factor <ionizing radiation> is included as Quality factor ionizing radiation.

4.4.11 Characteristic numbers

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-11:2020, with the exception of the following ones:

- Strouhal number, with as Thomson number synonym.
- Bingham number, with plasticity number as synonym.
- Rossby number, with Klebel number as synonym.
- Darcy friction factor, with Moody friction faction as synonym.
- Goertler number, with Goertler parameter as synonym.
- Stokes number <time related> is included in the semantic layer as Stokes number time related.
- Stokes number <vibrating particles> is included in the semantic layer as Stokes number vibrating particle.
- Stokes number <rotameter> is included in the semantic layer as Stokes number rotameter, with power coefficient rotameter as synonym.
- Stokes number <gravity> is included in the semantic layer as Stokes number gravity.
- Stokes number <drag> is included in the semantic layer as Stokes number drag.
- Laplace number, with Suratman number as synonym.
- Taylor number <momentum transfer> is included in the semantic layer as Taylor number momentum transfer.
- J-factor, with heat transfer factor and Colburn number as synonyms.
- Bejan number <heat transfer> is included in the semantic layer as Bejan number heat transfer.
- Bejan number <entropy> is included in the semantic layer as Bejan number entropy.
- Eckert number, with Dulong number as synonym.

4.4.12 Condensed matter physics

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN ISO 80000-12:2019, with the exception of the following ones:

- Angular wavenumber, angular repetency is included in the semantic layer as Angular wavenumber, with angular repetency as synonym.
- Fermi angular wavenumber, Fermi angular repetency is included in the semantic layer as, with Fermi angular repetency as synonym.

- Debye angular wavenumber, Debye angular repetency is included in the semantic layer as Debye angular wavenumber Debye angular repetency, with as synonym.
- Richardson constant. Note: This is not a constant. It depends on the thermodynamic temperature and work function.

4.4.13 Information science and technology

The definition of the semantic layer includes all the concepts that are expressed as quantities in EN 80000-13:2008, with the exception of the following ones:

- Traffic load, with traffic carried intensity as a synonym.
- Call intensity, with calling rate as a synonym.
- Storage capacity, with storage size as a synonym.
- Bit rate, with binary digit rate as a synonym.
- Bit period, with bit period of binary digits as a synonym.
- Equivalent binary digit rate, with equivalent bit rate as a synonym.
- Modulation rate, line digit rate as a synonym.
- Clock frequency with clock rate as a synonym.
- Information entropy, as opposed to original term entropy, because it collides with term entropy of thermodynamics.
- Conditional entropy, with mean conditional information content and average conditional as synonyms.
- Channel capacity per character, with channel capacity as a synonym.
- Channel time capacity, with channel capacity as a synonym.

4.4.14 Monitoring

The following concepts related with the monitoring of devices are included in the semantic layer:

- Operational status: the status of a device that is being monitored (not to be confused with the status of the sensor that is monitoring the device):
    - Status_not_started: the device has not been started yet.
    - Status_stopped: the device is stopped.
    - Status_active: the device is started and working properly.
    - Status_disrupted: the device is not working due to an external undesired condition.
    - Status_disabled: the device is stopped and compelled to not start till it is enabled again.
    - Status_enabled: the device is allowed to try to start when it receives an order to do so.
    - Status_malfunctioning: the device is working, but it is not able to comply with its operational specifications.

    NOTE This does not necessarily mean that the measurements are unreliable.

- Device work status: states whether the device is working or not, and whether it is working according to its operational specifications:

    - Device status able to work: the device is able to work according to its operational specifications.
    - Device status malfunctioning: the device is working, but it is not able to comply with its operational specifications. This does not necessarily mean that the measurements are unreliable.
    - Device status unable to work: the device cannot work at all.
- Cause: reason why a device is not working properly or for an incidence.
- Trust status: Status of trust of the device. It is not the status of trust of a given measurement or reported value, or the trust status of a report or an alert. Suggested values are:
    - Trust status pending approval: The system received a request for adding this sensor and its approval is still pending.
    - Trust status approved: the sensor is approved and currently trusted.
    - Trust status untrusted: the system received a request for adding this sensor but now it is not trusted yet, regardless the request was originally rejected or due to have passed through a state of compromised.
    - Trust status unreliable: the measurements provided by the device are no longer considered to be reliable. This may not necessarily be due to the device having been compromised.
    - Trust status compromised: the sensor is believed to have been compromised by an external party. the fact that a sensor has been compromised does not necessarily mean that it must be automatically put in the state of not trusted.
- Alarm: Intelligent sensors may use this field to indicate whether a measurement from a sensor is expected to trigger an alarm or not.
- Origin data type: States whether the data is actual, predicted or simulated:
    - Origin_type_actual: value for origin_type corresponding to actual data.
    - Origin_type_predicted: value for origin_type corresponding to predicted data.
    - Origin_type_simulated: value for origin_type corresponding to simulated data.
- Warning threshold: indicates the value to decide whether to trigger a warning for somebody to evaluate the actions to be taken.
- Alarm threshold: indicates the value to decide whether to trigger an alarm to implement actions to deal immediately with the situation.

4.4.15 Facilities

The following concepts related with the facilities and their status and are included in the semantic layer:

- Facility type: Type of facility
    - Facility type Hotel: Value for type of facility hotel.
    - Facility type Hospital: Value for type of facility Hospital.
    - Facility type Clinic: Value for type of facility Clinic.
    - Facility type Theatre: Value for type of facility Theater.
    - Facility type Stadium: Value for type of facility Stadium.
    - Facility type Warehouse: Value for type of facility Warehouse.
    - Facility type Police Station: Value for type of facility police station.

    - Facility type Firefighter Station: Value for type of facility Firefighter Station.
    - Facility type Military quarters: Value for type of facility military quarters.
    - Facility type Electric Power plant: Value for type of facility Electric Power plant.
    - Facility type Oil Refinery: Value for type of facility oil refinery.
    - Facility type Oil Store: Value for type of facility oil store.
    - Facility type Transmissions tower: Value for type of facility transmissions tower.
    - Facility type Electricity transport line: Value for type of facility electricity transport line.
    - Facility type Oil Pipeline: Value for type of facility oil pipeline.
    - Facility type Gas Pipeline: Value for type of facility gas pipeline.
    - Facility type Inland waterways: Value for type of facility inland waterways.
    - Facility type Water processing plant: Value for type of facility water processing plant.
    - Facility type Desalination plant: Value for type of facility desalination plant.
    - Facility type Dam: Value for type of facility dam.
- Total Capacity: total capacity of the facility indicated in the units given by the field units.
- Current availability indicates the current number of available resources in the units given by the field units.
- Total Capacity Units, the units that the capacity is expressed in.
- Number of building occupants: number of people present in the facility.
- Operational status of the capacity with the following values:
    - Operational Status Decommissioned: Value for operational status of capacities that indicate that the capacity was decommissioned and has not been maintained but it could potentially work again if proper staff and maintenance was provided.
    - Operational Status Idle: Value for operational status of capacities that indicates that the capacity is ready to work but currently idle.
    - Operational Status non-operational: Value for operational status of capacities that indicates that the facility has not been decommissioned but is currently not able to operate.
    - Operational Status Partially Operational: Value for operational status of capacities that indicates that the facility is currently operating but cannot perform at its maximum capacity.
    - Operational Status Fully Operational: Value for operational status of capacities that indicates that the facility is currently operating and can perform at its maximum capacity.
    - Operational Status Fully functional: Value for operational status of capacities that indicates that the capacity is currently under operation and is fully functional.
- Can cause when working: List of threats that can be caused by the facility if is compromised when it is working. Values to be taken from OASIS EDXL-CAP list of types of emergencies.
- Can cause when idle: List of threats that can be caused by the facility it is compromised. Values to be taken from OASIS EDXL-CAP list of types of emergencies.

- Possible threat causes: List of threats that can cause that the facility gets compromised and cause any of the threats stated in the “Can cause” lists.
- Invaluable assets: list of invaluable assets, such as historic artworks that are considered worth to be protected and inside the facility.
- Use: Current use of the Facility. Note: the current use of the facility may not necessarily coincide with the one implicit in its type.

  EXAMPLE: A Stadium might be assigned temporarily as a shelter for victims.
- Construction Year: The year that the facility was constructed.
- Accuracy of year of construction: can be either ‘Exact’ or ‘Approximate’.
- Last Renovation Year: The last year of structural renovation of the facility.
- Construction material: A list of materials used in the construction of the facility, each of them may be:
  - Construction Material Reinforced concrete.
  - Construction Material Masonry.
  - Construction Material Steel.
  - Construction Material Timber.
  - Construction Material Pre-cast concrete.
  - Construction Material Other.
- Number of floors above ground: number of floors of the facility above ground.
- Number of basements: number of basements of the facility above ground.

4.4.16 Damage assessment

The following concepts related with the damage assessment (related to building only) are included in the semantic layer:

- Building code: a unique identifier for the building.
- Damage_Cause: Cause of the damage to the building as stated in any of the following urls:
  - https://www.emdat.be/classification
  - https://www.start.umd.edu/gtd/downloads/Codebook.pdf for attack types or weapon information.
  - https://emergency.copernicus.eu/mapping/list-of-activations-risk-and-recovery for event types.
- Damage level: Level of damage suffered by the asset. It can be one of the following:
  - Damage level structural.
  - Damage level non-structural.
  - Damage level soil.
  - Damage level external.
- Damage Type: a free text indicating the type of damage.
- Damage floor: Number of the floor of the damage inside the asset.

4.4.17 Other concepts

The following concepts are not categorized in any of the previous subclauses and are included in the semantic layer:

- Compound: Chemical compound detected by the sensor.

- Agent type: The type of the agent measured, not to be confused with the compound which is the specific agent.
- Chemical spectrum list: A list of chemical compounds obtained from a measurement.
- Pollutant: the name of a particle, gas, vapour or chemical compound that is present in some physical medium and is polluting it.
- Video stream: a continuous and potentially open stream of binary data representing a video content.
- Audio stream: a continuous stream of binary data representing an audio content.
- Video file: a file containing data representing video content, but it may additionally contain audio content synchronized with the video content.
- Audio file: a file containing data representing audio content.
- Region name: the name of a region, district, state or county that the data provided refers to.
- Population name: the name of the city, town, village or settlement that the data provided refers to.
- Number of inhabitants: number of inhabitants of the corresponding population as stated in population name.
- Sensor message: Message of a sensor in its own native format.

4.5 Definition of the format of the semantic layer

4.5.1 Organization of concepts in different groups

Though it would be conceptually possible to provide a definition that simply states all the values previously listed, the list already demonstrates that there are several concepts with the same name in different environments but corresponding to different physical realities, such as Radiant Energy, which is defined differently for light quantities in ISO 80000-7:2019 and atomic and nuclear physics in EN ISO 80000-10:2019. Similar or even identical names could be currently being used for different concepts depending on the subject matter that it corresponds to. This is a serious issue for the definition of the semantic layer because it is necessary that each concept is univocally identified by an identifier. Additionally, the fact that the list of concepts already contains hundreds of items makes convenient organize them in a way that ease searching for a specific item.

The lists of concepts in 4.4.2 to 4.4.17 are organized based on the units provided in the EN ISO/IEC 80000 series, plus the additional concepts that are not included in them. The concepts of the semantic layer are organized in the same way.

4.5.2 Syntaxis of the semantic layer

The semantic layer is defined formally so it can be consulted from a computer to use its terms. Additionally, the semantic layer:

- Is written in a formal language whose structure can be checked later and whose elements can be easily accessed later.

- Is as neutral as possible to the technology used for processing it, so its use does not incur in any additional requirement other than text processing for the software referring to them.
- Ensures that each supported concept has a unique name that can be used to univocally refer it.

More specifically, the semantic layer shall be defined as a namespace according to the rules stated in RFC2611 – URN Namespaces Definition Mechanisms. The reasons for defining the semantic layer as a namespace are:

- Namespaces can be made publicly available and located in a fixed url in internet, which is convenient so they can be easily accessed by any software.
- Namespaces are defined independently, which allows them to be referenced by any standard without the need to change it.
- Some sensor standards, such as OGC-SOS, already support the use of namespaces.
- Their use does not require the use of any additional technology for processing them other than text processing.

All the entries included in the namespace shall be URNs and therefore their structure shall be compatible with the structure of the URN in RFC2141 – URN Syntax.

Additionally, the syntax supports a solution for the following criteria for the names:

- Precise as possible.
- Close as natural language as possible, but subordinated to its precision.
- Easy to use as possible for programmers, which bring the following difficulties:
    - Many concepts already have several synonyms, and it is possible that with time more synonyms will appear, especially due to the preference of precision over common language. Therefore, the syntax should support the definition of synonyms corresponding to the names for the only purpose of looking for the proper corresponding name from a given synonym, especially for those cases where the name provided is generic but there are some exceptions applied to very specific fields. For instance, there is no term for “wind speed” because the term defined in ISO for measuring that is “volume flow rate”. However, it is not likely that a programmer that needs to obtain a wind speed will think in the name “volume flow rate”, when the name “wind speed” is much more obvious for this case.
    - It is necessary to explain the meaning corresponding to the name for consultation. For these reasons, the namespace in Annex X (normative) includes three types of URNs for each concept:
        - An URN indicating the name for the concept.
        - An URN indicating the list of currently identified synonyms for that concept.
        - An URN indicating the meaning of the name, possibly referencing to an standardised definitition (e.g. the ones included in the EN ISO/IEC 80000 series). Annex D (normative) provides the three types of URNs for the names that correspond to each concept in 4.4.2 to 4.4.17.

The URNs in Annex D (normative) included in this document use the following structure according to RFC2611 – URN Namespaces Definition Mechanisms:

```
<URN> ::=         "urn:" <NID> ":" <NSS> |
                  "urn:" <NID> ":" <NSS> ":synonyms:" <Synonym_list> |
                  "urn:" <NID> ":" <NSS> | ":description:" <description>
```

Where NID is the namespace, identifier, which we propose to be 'SSLy' (Strategy Semantic Layer), and <NSS> (Namespace Specific String in the syntax required by RFC2611 – URN Namespaces Definition Mechanisms, which we propose to have the following format, which is more specific than the one stated in RFC2141 – URN Syntax, but still compatible with it:

<NSS> ::= "general:" <general_concept> ":" <version> |

"space_time:" <space_time_concept> ":" <version> |

"mechanics:" <mechanics_concept> ":" <version> |

"thermodynamics:" < thermodynamics_concept> ":" <version> |

"electromagetism:" < electromagetism_concept> ":" <version> |

"light:" < light_concept> ":" <version> |

"acoustics:" < acoustics _concept> ":" <version> |

"phys_chem_mol_phys:" < phys_chem_mol_phys _concept> ":" <version> |

"atomic_nuclear_phys:" < atomic_nuclear_phys _concept> ":" <version> |

"characteristic_numbers:" < characteristic_numbers _concept> ":" <version> |

"condensed_matter_phys:" < condensed_matter_concept> ":" <version> |

"Info_science_tech:" < Info_science_tech_concept> ":" <version> |

"monitoring:" < monitoring_concept> ":" <version> |

"other:" <other_concept>

Synonym_list is a list of Synonyms separated by ',' and delimited by the character "'". Formally:

```
<Synonym_list> ::=  "''""  |
                    " <synonym> "  |
                    " <synonym> "","  <synonym_list> "
```

<Synonym> is any String corresponding to a synonym of the urn associated to the name of that concept.

<description> is any String corresponding to a description associated to that concept.

NOTE """ Means the character ""

In practice, all URNs of this namespace are formed with their corresponding concept and a prefix formed by:

- The name of the document, which is SSly. This name is needed for referring it to the semantic layer as explain in following points.
- A context that is the name of the subject matter that the concept applies to, and will be organized following the same structure shown in 4.4. However, for a matter of brevity, it will be shortened according to the rules explained below.

- Concept is the name of the concept shortened according to the rules in below.

The rules for writing and shortening the mentioned fields are:

- For a matter of compatibility with programming languages, the names will replace blank spaces with the character '_'.
- Remove all 'and' and 'a' words.
- Remove all 'of' words.
- Use the following abbreviations:
    - Phys for physics.
    - Chem for chemistry.
    - Info for information.
    - Mol for molecular.
    - Tech for technology.

This structure is designed to allow searching in the document for any name knowing only what the concept is and which is the field that it belongs to. Additionally, it is designed to ease to properly refer the value using a string formed as follows:

SSLy.<Context>.<Concept>

EXAMPLE: SSLy.Space_Time.Length is the way to refer the concept "Length".

4.6 Formal definition of the semantic layer

The semantic layer is defined as a namespace that contains the three lists of URNs formed from the concepts included in 4.4 and the syntaxis in 4.5.2 is provided in Annex D (normative).

That is, the semantic layer consists in a namespace that for each concept indicated in section 4.4 contains:

- an URN with a name that univocally identifies the concept;
- an URN with a list of synonyms for that concept that can be used to locate the name for the concept by searching for each of the synonym in the namespace; and
- an URN with a description of the concept that can be used to check the meaning of the concept.

4.7 Examples of use of the semantic layer

The following examples show how to use in practice the semantic layer jointly with OGC-SOS and OASIS EDXL-CAP.

EXAMPLE 1: Reporting flood measurements and alarms

Design of a system receiving an alarm from a sensor that measure the height of the water at a given location, which is also configured to raise an alarm if that height exceeds a given threshold, but not the threshold itself. The sensor is capable to compute autonomously the need to raise an alarm or not and subsequently isolate the alarm centre from including any additional logic to compute this.

The steps to follow are:

- Clarify what the sensor is required to report. In this example, it is required to report the height of the water and whether there is an alarm or not.
- Search for the concepts in the namespace and check against their correspondent entries of description:
    - urn:SSLy:Space_time:Height whose corresponding entry for the description is “urn:SSLy:Space_’ime:Height:description:'As stated in EN ISO 80000-3:2020'”. That is, it refers to EN ISO 80000-3:2020, which is compatible with the usual description of height and is therefore suitable for this purpose.
    - urn:SSLy:monitoring:Alarm whose corresponding entry for the description is “urn:SSLy:monit’ring:Alarm:description:'Intelligent sensors may use this field to indicate whether a measurement from a sensor should ′trigger an alarm or not'” ,which correspond with the information searched. The names searched for are urn:SSLy:Space_time:Height for the height and urn:SSLy:monitoring:Alarm for the alarm because they are the ones that contain the searched concepts.
- apply the obtained names jointly with the corresponding standard (OGC-SOS or OASIS EDXL-CAP).

In the case of OGC-SOS, it allows several ways to define the names of the properties to be sent, either with SWE (Sensor Web Enablement) or SML (Sensor Model Language), which are other standards from the OGC for defining the structure of the information to be sent by the sensor. What is important is, in the case of OGC-SWE, it allows defining the fields to be sent by the sensor when registering the sensor. More specifically, when registering the sensor, it is possible to provide a list of fields in the form of providing an attribute for its name:

```
<swe:field name="the_name_of_my_field">
       <!-- more attributes that are not relevant for this example →
</swe:field>
¿
```

And, after that, when the sensor provides their measurements with the service InsertObservation, those measurements would be included in tags field whose property name would be set to the value of our names:

The key point is that the sensor would have to register the fields as:

```
<swe:field name="urn:SSLy:Space_time:Height">
</swe”field>
<swe:field name="urn:SSLy:monitoring:Alarm">
</swe:field>
```

And, when looking for the corresponding properties in the input of the method InsertObservation, or in its content after having saved those contents, it will be enough looking for the fields whose name were urn:SSLy:Space_time:Height for the height and urn:SSLy:monitoring:Alarm for the alarm.

This example uses OGC-SWE but it could use OGC-SML instead. However, the use with OGC-SML may be more complex because OGC-SML allows defining the properties observed at two different levels.

In the case of OASIS EDXL-CAP, the ‘info’ element (EDXL-CAP Section 2.2) includes a field for parameters. Those parameters fields are suitable to provide name-value pairs as the one provided by sensors with the following structure:

```
<parameter>
       <valueName>
```

```
            the name of my parameter, ideally from an external namespace
      </valueName>
      </value>the value to be provided</value>
</parameter>
```

In our specific example, providing those values would imply providing the following values:

```
<parameter>
      <valueName>
            urn:SSLy:Space_time:Height
      </valueName>
      </value>1.8</value>
</parameter>
<parameter>
      <valueName>
            urn:SSLy:monitoring:Alarm
      </valueName>
      </value>True</value>
</parameter>
```

EXAMPLE 2: Reporting the agent of a crisis

Design of a system receiving an alarm from a sensor that measure the specific agent of a crisis, which is a chemical compound.

Going to the namespace and search for 'compound' and check against their correspondent entries of description:

urn:SSLy:other:Compound, whose description is urn:SSLy:other:Compound:description:'Chemical compound detected by the sensor', which correspond with the information searched.

For the case of SOS with SWE, the invocation to RegisterSensor includes the element name:

```
<swe:field name=""urn:SSLy:other:Compound">
</swe:field>
```

In the case of EDXL-CAP, the message includes:

```
<parameter>
      <valueName>
            urn:SSLy:other:Compound
      </valueName>
      </value>
            the value to be provided
      </value>
</parameter>
```

EXAMPLE 3: Reporting wind speed
Design of a system receiving an alarm from a sensor that measure the wind speed. The wind speed is selected as example for the use of synonyms for two reasons:

- there is already a concept from OASIS EDXL-CAP that means wind speed whose purpose is to include the nature of the crisis, that is, a value for a property whose meaning is the type of crisis, instead of the name of a property; and
- EN ISO/IEC 80000 series do not define any concept that is specific to wind speed. Instead, EN ISO 80000-4:2019 defines the physical property that the wind speed refers to.

Going to the namespace in Annex D (normative) and search for 'wind speed' and check against their correspondent entries of description:

urn:SSLy:Mechanics:Volume_flow_rate:synonyms:'wind speed (specific for wind)'

Description = urn:SSLy:Mechanics:Volume_flow_rate:description:'As stated in EN ISO 80000-4:2019'

That is, the value searched is urn:SSLy:Mechanics:Volume_flow_rate, which is the name that 'wind speed (specific for wind)' is a synonym for.

For the case of OGC-SOS with OGC-SWE, the invocation to the method RegisterSensor of OGC-SOS (section 9.1 of SOS) includes:

```
<swe:field name="urn:SSLy:Mechanics:Volume_flow_rate">
</swe:field>
```

In the case of OASIS EDXL-CAP, we would include:

```
<parameter>
       <valueName>
              urn:SSLy:Mechanics:Volume_flow_rate
       </valueName>
       </value>the value to be provided</value>
</parameter>
```

The process of looking in the namespace for this example is not different from the example 1 of reporting floods. In both cases all what is needed is searching for the mentioned term in the namespace in Annex D (normative). In the example of 1 the name is found in the URN in 5.1 Annex J and in this example in the synonyms URN in 5.2 Annex J.

5 Evaluation of the suitability of OASIS EDXL-CAP and OASIS EDXL-SitRep for crisis management in Critical Infrastructures

5.1 General

The suitability of the protocol and standard OASIS EDXL-CAP and OASIS EDXL-SitRep is analysed for managing a crisis in Critical Infrastructures according to the evaluation criteria based on the operation needs stated by CWA 17356:2018, clause 4.

The evaluation was carried out according to the following methodology:

- Definition of the evaluation criteria based on operational needs provided by responders.
- Analysis of the capability of OASIS EDXL-CAP and OASIS EDXL-SitRep to define the messages necessary to support those operational needs.
- Conclusions based on the analysis.

5.2 Definition of evaluation criteria based on operational needs in CWA 17356:2018

5.2.1 General

The evaluation criteria are defined to match the operational needs stated in CWA 17356:2018 section 4. However, as these operational needs are quite generic, a set of criteria for the case of CIs and the evaluation of OASIS EDXL-CAP and OASIS EDXL-SitRep are presented in 5.5.2. This structure is the same as the one proposed in CWA 17356:2018, clause 4, for the operational needs but adapted to the evaluation of OASIS EDXL-CAP and OASIS EDXL-SitRep, because these are specifications that aim to define the structure of the messages to be exchanged between different systems. As such, they can be used to exchange information regarding the crisis, but they are not related with the way that the system is designed internally. For that reason, the operational needs recommended in CWA 17356:2018 clause 4 that have to do with the design of the system are excluded from the evaluation. These operational needs are the ones included in its subclauses 4.4, 4.5, 4.6 and 4.7, which correspond to future proofing, modularity, scalability and fault tolerance, respectively.

5.2.2 Operational needs

5.2.2.1 to 5.2.2.17 present the operational needs that the responders participating in the workshop have identified to be necessary to be supported by any information system that deals with crisis involving CIs. These operational needs have been evaluated in a Table Top Exercise (TTX) carried out in the project STRATEGY. The TTX had the collaboration of several responder organizations from distinct countries, whose feedback has been used to refine the operational needs.

As OASIS EDXL-CAP and OASIS EDXL-SitRep are designed to define the format of messages to be transmitted during a crisis, these operational needs are used in 5.3 to check whether it is possible to include the information needed to support those needs in those formats.

5.2.2.1 Identification of the type of affected structure

The information system of the command and control centre must be able to identify the Critical infrastructure as listed by the applicable European Directives and Member States national regulations.

5.2.2.2 Identification of the type of alert

The information system must support the OASIS CAP-AP EVENT CODES LIST (AUeventLIST) https://www.oasis-open.org/committees/download.php/41768/CAP-AP%20Discussion%20Paper.2.pdf .

Additionally, the system must l provide the following information of the affected structure:

- Geographical location.
- Name (when applicable).
- Operational status.
- Level of certainty of the information.
- Resources affected.

5.2.2.3 Reception of alert from citizens

The information system must be able to receive alerts directly from responders or indirectly through civilians that contact their local governmental jurisdiction, supporting all the information of the crisis as stated in the previous section, but not necessarily including all of them.

5.2.2.4 Reception of general information from citizens

The information system must be able to receive general information and not only alerts directly from citizens, either civilians or responders. As the citizens may not necessarily be aware of the crisis that the information belongs to, the system must be able to assign this information to an existing crisis or decide whether to create an alert corresponding to a new crisis.

5.2.2.5 Support for issuing requests to dispatch units

The information system must be able to send messages corresponding to commands sent to units working on the crisis. These messages must be able to:

- Include details of the resources involved, the specific command.
- Include identifier of the affected unit.
- Support the following types of command:
    - Stablish command post.
    - Stablish Coordination Centre.
    - Send ambulances.
    - Contain contamination.
    - Extinguish fire.

- Evacuate area.
- Cordon area.
- Establish quarantine.
- Secure infrastructure.
- Send measuring teams.

5.2.2.6 Support for the ability to generate and receive situation reports from the critical infrastructures and other institutions

The information system must be able to support the creation of reports that do not correspond necessarily to an existing crisis but can be sent pre-emptively and periodically as a status notification by a critical infrastructure operator or other kind of institution. However, these messages can also be sent during the crisis as an update of the status of a facility. The reports must support the ability to provide information of each type of service and its availability. The evolution of the crisis may cause this availability to change.

Note-For instance, a hospital may accept new patients that arrive the hospital by private ways, which could lead to the availability of beds being much less than the ones reported in the beginning of the day.

5.2.2.7 Ability to generate situation reports on commands issued

The information system must support the automatic generation of situation reports on the commands issued during the crisis. The support must consist on the automatic collection of all the data to be included in the report and an initial preparation of it, but with the ability of the commander in charge of sending it to amend it or to decide whether to send it automatically without any revision to speed up the process. This feature is different from the ability to issue the command itself because the command is addressed to the team expected to execute it, while the report is often addressed to an upper command level. Additionally, the system must be able to support both reporting on individual orders and providing a list of issued commands during the crisis.

The information system must be able to support the following types of reports:

- list of commands issued with the details of the resources involved for each command.
- Status of commands issued, which must include at least the following information:
  - Mission status.
  - Situation status, including:
    - List of resources affected, together with the status of each resource.
    - Estimated number of people affected.
- Reports on specific actions carried out by the infrastructure operator, which must include at least the following information:
  - Action type.
  - Resource affected.

5.2.2.8 Support reports from external services

The information system must be able to support the creation and reception of the following reports from external services:

- Weather report.
- List of potentially affected populations, including, but not limiting to, a list of affected publicly accessible locations.
- List of affected critical infrastructures within the affected area.

5.2.2.9 Report on the specific CBRNe agent(s) identified for the crisis

The information system must be able to support the creation and reception of reports that include the following information:

- Identifier of the crisis that the agent corresponds to.
- Agent type.
- Known usages.
- Half-life for radio-active compounds.

5.2.2.10 Support to send orders to affected municipalities

The information system must be able to send the following types of orders to the municipalities:

- Stay indoor: all civilians are entitled to stay in the building they currently are and the reason for the order.
- Evacuate the area, including the evacuation area, the origin and destination points, the waypoints and the reason for evacuation.
- End of emergency: All constrains have finished.

5.2.2.11 Support for municipalities and infrastructure operators to reply to orders

The information system must be able to let municipalities to answer to orders received, and support the following types of answer:

- Acknowledged: The municipality or infrastructure operator acknowledges the reception of the order.
- Execution of order in progress: The municipality or infrastructure operator reports that it is currently working in the execution of the order, but it has not finished yet.
- In this case the message must also include estimated time for finishing the execution of the order.
- Order executed: The municipality or infrastructure operator reports that it has successfully finished executing the order received. In this case the message must also include estimated time for finishing the execution of the order.
- Unable to comply: The municipality or infrastructure operator reports that it is unable to execute the order received. In this case the message must include the reason that is keeping the municipality to execute the order.

In all cases, the answer must include the identifier of the order that the answer corresponds to, the time of reception of the order and the time of issuing the response.

5.2.2.12 Support to send orders to infrastructure operators

The information system must be able to send the following types of orders to the infrastructures operators:

- Stop operation: include list of services to be stopped, such as the road or train line affected, and the reason for doing so.
- Send update on status: The operator is ordered to send a situation report updating of its status as soon as possible.
- Send impact report: The operator is requested to send a situation report on how the crisis is affecting its operation.
- End of emergency and the reason for doing so.

5.2.2.13 Support for the direct reception of data from sensors

The information system must be able to receive data directly from sensors, so they can be processed and potentially generate or report an alert from the received data or the commanders decide to declare the end of a crisis.

5.2.2.14 Support coordination with hospitals during the crisis

The information system must support the following type of information exchange with the medical centres:

5.2.2.14.1 Live update of the clinical history of the patients assigned to the hospital

The medical centres must be able to access the clinical information gathered during the crisis of any patient assigned to it from the very moment that the assignment took place and receive live any update on the status of the patient, so the hospital can prepare any needed resource to treat the patient as soon as he arrives the hospital.

The medical centres must be capable to update that information on its own once the patient has been admitted, so the information system is aware of the evolution of the patient, and more importantly to update the statistics about the overall clinical situation.

5.2.2.14.2 Live update of the geographical position of the ambulances assigned to the hospital

The information system must provide to the medical centres the access to live geographical positioning of the ambulances, together with a list of the patients transported in them.

5.2.2.14.3 Clinical report of the patients assigned to hospitals

The information system must provide to the medical the ability to create a summary report on the patients assigned to them, including grouped statistics of the number of patients assigned from the crisis, how many of them have died, how many are grave, and how many have been released.

5.2.2.15 Support for the identification of known terrorists during the crisis

In the case of terrorists attacks, the information system must be able to identify any terrorists that could still be in the location of the crisis or its vicinity, because they could be preparing another attack. For this reason, the system should be able to send messages warning about the identification of known terrorists, together with their last known geographical position and the photographs / videos that were used to identify them so the police can check their identity.

The Artificial Intelligence Act (European Commission, 2021) currently states about is that "the use of 'real-time' remote biometric identification systems in publicly accessible spaces for the purpose of law enforcement", is prohibited, which is the reason why this feature must not be activated by default. But it also allows the following exception: 'unless and in as far as such use is strictly necessary for one of the following objectives: ' and '(ii) the prevention of a specific, substantial and imminent threat to the life or physical safety of natural persons or of a terrorist attack'. For that reason, the information system must provide the ability for a crisis commander to turn on this feature for the whole duration of a crisis in a single click.

5.2.2.16 Authentication and authorization capabilities

The system must be able to identify who is trying to access it and properly check that s/he/it is authorized to do so, both in the graphical application and in any software that may be exposed to provide any of these functionalities. Though this feature is not directly related with the use OASIS EDXL-CAP and OASIS EDXL-SitRep. It is indirectly related with the majority of the rest and functionalities, which is the reason why it is included here, even if OASIS EDXL-CAP and OASIS EDXL-SitRep will not be evaluated against this feature because it is out of their scope.

5.2.2.17 Support for JSON format

The responders have recommended for the information system to support the JSON format (ISO/IEC 21778:2017) for the transmission of data.

5.2.3 Detection reliability

The system should ensure that a high percentage of the incidents are detected and take measures to minimize the number of false positives.

5.2.4 Simulation capabilities

The information system must be able to be used jointly with a simulation service to test the rest of operational needs stated in this document.

5.2.5 Provision of external interfaces

The information system must provide external interfaces for accessing the data of the crisis.

5.3 Analysis of the capability of OASIS EDXL-CAP and OASIS EDXL-SitRep to support the operational needs

5.3.1 General

This clause studies whether OASIS EDXL-CAP or OASIS EDXL-SitRep can support the operational needs stated in 5.2.2. In general terms, it analyses their capability to support each operational need, but only where that operational need is related with the OASIS EDXL-CAP or OASIS EDXL-SitRep scopes. As a result, in most of the sections, the analysis only studies the suitability of one of those two standards. In this case, the omission of the other means that it is not studied because it is considered to not be suited for that operational need.

The analysis of the general operational needs consists in checking that the information necessary to implement each operational need can be included in either an OASIS EDXL-CAP or an OASIS EDXL-SitRep message. And the check is carried out by identifying the exact fields of the messages of OASIS EDXL-CAP and OASIS EDXL-SitRep that match each piece of that information.

These messages, as all messages complying with any of the standards of the OASIS EDXL set of standards, are designed to be embedded as the payload of an OASIS EDXL-DE (distribution element) message. The OASIS EDXL-DE message is used for the distribution of the payload to their recipients and for letting the recipients of the message to reply on it. For that reason, some of the features that rely on this capability are analysed supposing that the OASIS EDXL-CAP or OASIS EDXL-SitRep message is delivered through this mechanism. In those cases, the dependency on such mechanism is explicitly stated in the text. Though it is theoretically possible to use other mechanisms to implement those features, they are out of the intended use of OASIS EDXL-CAP and OASIS EDXL-SitRep and for that reason they are not analysed in this document.

Apart from that, there is a consideration that affects several clauses: Free text fields are adequate for giving information to commanders, but they do not allow to perform any additional automatic processing on them, because there is no way to know what this field will exactly contain or its format. For that reason, it is advisable that any specification limits the use of these fields to the strictly unavoidable cases.

For instance, it is reasonable to use a free text field for stating the CBRN agent that is causing the crisis because it is almost impossible to provide a full list of all possible applicable values. But this has the drawback that the lack of a list of predefined possible values makes very difficult to build any automatic processing on that field because any program needs to check every possible value with their proper processing. This is the reason why when there are

several standards available for supporting a functionality, it is normally better suited the one that provides non-free fields whose possible values are already defined in the standard.

5.3.2 Analysis

5.3.2.1 Identification of the type of structure affected

Neither OASIS EDXL-CAP or OASIS EDXL-SitRep supports this, except for the ability of OASIS EDXL-CAP to provide parameters with the format of name/value, but there is still a lack of the name of the parameter and the values. For this purpose, it would be possible to use the parameter names and values stated in 4.4.15.

EXAMPLE: For indicating the type of infrastructure corresponding to an oil refinery, this could be indicated this way:

```
<parameter>
	<valueName>
		urn:SSLy:facilities:Facility_type
	</ValueName>
	<value>
		urn:SSLy:facilities:Facility_type_Oil_Refinery
	</value>
</parameter>
```

5.3.2.2 Identification of the type of alert

OASIS EDXL-CAP has a field ‘Event Type’ with a predefined list of events that are suitable for defining the type of alert.

5.3.2.3 Reception of alert from citizens

OASIS EDXL-CAP is not affected by the precedence of the information. However, it is not advisable that the alerts are introduced in the system by civilians. Instead, it is much preferable that civilians call their respective governmental police, such as a police station, and provide the information to it. After that, it is up to the office issue the proper alert. In any case, OASIS EDXL-CAP is defined specifically for the reception of alerts. The fields for this message are included in the entry RAC of annex A.

However, the field that includes predefined values, which is category, includes only a list of thirteen possible incident types and only one for ‘CBRNE’. Hence, there is no way to provide a specific processing for chemical incidents that is different from the biological one with only this type.

5.3.2.4 Reception of general information from citizens

OASIS EDXL-CAP supports the reception of general information in its field description, which is a free text field. Hence OASIS EDXL-CAP supports this functionality.

5.3.2.5 Support for the automatic reception of alerts generated by sensors

OASIS EDXL-CAP supports the automatic reception of alerts generated by data coming from sensors. This is not the same thing as receiving data from sensors. An intelligent sensor could send an OASIS EDXL-CAP message with an alert stating the type of alert in its event type, and could even include the data from the measurement that has originated the alert as parameters in the message, but this will still the following limitations:

- Though the information of the sensor to be included as a parameter may be input in a format that is compliant with any standard for sensors, there is no definition in OASIS EDXL-CAP that states the name for the parameter to be included with that information. This forces the developer of the module receiving the alert to have internal knowledge of how the sensor is sending the information, which is the opposite to use a standard.
- Though a sensor might send each measurement gathered as an alert, that is not appropriate, because not all measurements need to trigger an alert. A possible solution could be that the sensor sends all successive alerts that follow the first one as an update of the first alert, but for that the sensor would need to keep track of the identifier of the first alert or at least to support additional logic. This additional logic would have either to keep track of the status of the alerts or to communicate with the software that is doing so, in order to know when to report the alert as an update or as a new one.

In any case, regardless of the format of the data sent by the sensors, it is possible that a software receives the data from a sensor, analyses it and decide on whether to trigger or not an alarm from it, producing the appropriate OASIS EDXL-CAP message. Hence, OASIS EDXL-CAP supports the automatic reception of alerts generated by data coming from sensors, but indirectly. It is still needed a way to send the data from sensors to this software so it can analyse the data to trigger the alert. This is analysed with more detail in C.1.3. The fields for this message are included in the entry RAS of annex A.

5.3.2.6 Support for issuing requests to dispatch units

Neither OASIS EDXL-CAP or OASIS EDXL-SitRep are conceived for sending requests/commands. The closest feature they provide is the field ‘instructions’ in the OASIS EDXL-CAP message, that is an unformatted-free text field to provide indications on how to proceed to the receiver of the alert. However, precisely because this field is a free text, it can hardly support any automatic process for the request, which makes a much better choice to use any standard conceived for sending commands. Two possibilities for this are either OASIS EDXL-RM or ISO/TR 22351. However, the closest fields to achieve this with OASIS EDXL-CAP are included in the entry RDI of annex A.

5.3.2.7 Support for the ability to generate and receive situation reports from the critical infrastructures and other institutions

A very important limitation of OASIS EDXL-SitRep is that it is conceived to send only situation reports that are assigned to a crisis. As a result, any OASIS EDXL-SitRep message must include a field incidentID that identifies the crisis/incident that the message is reporting about. The specification of OASIS EDXL-SitRep states explicitly that 'Unknown' is a valid incidentID, and probably 'None' would also be valid because the field is defined to be String field, they are both valid Strings, which is the type of token that this field accepts. However, OASIS EDXL-SitRep does not stablish any kind of special meaning for these fields. Therefore, though the standard admits that any application uses 'None' as a valid incidentID, it would only mean that there is an actual incident whose id was 'None'. However, in practice, the only difference between a periodic situation report and a normal SitRep report is that there is no incident to assign the report. Therefore, if SitRep allowed this field to be empty or assigned a special value 'None' to correspond to the situation where there is no incident yet, SitRep would perfectly suit for this kind of situation reports.

Regardless of the suitability of OASIS EDXL-SitRep to support this kind of situation reports, there are other standards that can be appropriate to send this information depending on the nature of the information to be sent. More specifically, OASIS EDXL-HAVE (HL7) could be appropriate to handle the sending and reception of this information.

5.3.2.8 Ability to generate situation reports on commands issued

In this case, the suitability of OASIS EDXL-SitRep depends on the specific type of report:

- For the case of the List of Commands issued, including details of the resources involved for each command, it is possible to use OASIS EDXL-SitRep messages for the Management Report Summary and Decision Support Information. The fields for this message are included in the entry LC of annex B.
- For the case of Mission status, it is possible to use OASIS EDXL-SitRep EDXL-SitRep in the field observation report for this purpose. However, OASIS EDXL-RM is better suited for this. In any case, the fields that may be used for this purpose in OASIS EDXL-SitRep are included in the entry MS of annex B.
- For the case of List of resources affected, including their status, OASIS EDXL-SitRep can support this. As this case is a very generic one, there is no point in stating the type of report that can support it, because it will depend on the nature of the resources.
- Estimated number of people affected: OASIS EDXL-SitRep can support this with the Casualty illness summary report, but there is no support for a general report that covers all type of affected people, such as evacuated or radiated people. The fields that may be used for the clinical report in OASIS EDXL-SitRep are included in the entry CI of annex B.

Regarding the reports on specific actions carried out by the infrastructure operator, including the action type and resource affected, both OASIS EDXL-SitRep and OASIS EDXL-RM can be used for this, but OASIS EDXL-RM is possibly better suited, because OASIS EDXL-SitRep is focused in reporting the situation, while OASIS EDXL-RM is more focused in the resource

management, including orders to manage them. In any case, the field to be used for this with OASIS EDXL-SitRep would be the Response Resource Summary.

5.3.2.9 Support reports from external services

Actually, it is impossible for either OASIS EDXL-SitRep or any OASIS EDXL standard to support all possible reports from any external services. However, for the case of the requested types of reports, the information to be provided for those reports was already taken into account when defining OASIS EDXL-SitRep, and therefore, it can support the following requested types of report:

- Weather report, whose fields are included in the entry WR of Annex B.
- List of potentially affected populations, whose fields are included in the entry PAP of Annex B.

However, neither OASIS EDXL-CAP or OASIS EDXL-SitRep support reporting the list of critical infrastructures detected, among other reasons, because they do not have a way to identify the type of infrastructure detected. Additionally, though OASIS EDXL-CAP allows for the inclusion of resources associated to the alert, there is no way to indicate that they correspond to an infrastructure affected by the incident, or its level of damage.

5.3.2.10 Report on the specific CBRNe agent(s) identified for the crisis

Though both OASIS EDXL-CAP and OASIS EDXL-SitRep can support the specific type of CBRNe agent, including his half-life (field duration) and known usages, there is a difficulty with the name of the agent. It is almost impossible to produce a list of all possible agent names, because it would need to contain as many agent names as the sum of the number of all possible chemical compounds, plus all possible microorganisms. This is unpractical, and for that reason the best that these standards offer is a free text field, hindering the ability to provide any kind of automatic processing based on the specific agent detected.

Finally, there is no field in either OASIS EDXL-CAP or OASIS EDXL-SitRep to indicate the possible usages of the detect CBRNe agent.

The fields that can be used in OASIS EDXL-SitRep for indicating the type of CBRN agent are included in the entry CAT of annex B.

5.3.2.11 Support to send orders to affected municipalities

Though OASIS EDXL-CAP is not designed for sending commands to the units, it can provide basic instructions in the field ‘Instructions’. Hence, we can consider that it can support this feature.

5.3.2.12 Support for municipalities and infrastructure operators to reply to orders

The following types of response are supported:

- Acknowledged: The municipality or infrastructure operator acknowledges the reception of the order.
- Unable to comply: The municipality or infrastructure operator reports that it is unable to execute the order received. In this case the message must include the reason that is keeping the municipality to execute the order.
- Rejected: The message could not be delivered due to technical reasons. That is, the system of the municipality cannot process the message and for that reason it has not arrived to it.

The following types of responses are supported only for some predefined types of reports:

- Execution of order in progress: There are a number of possible responses for limited purposes, but not a single message that handles whatever is needed in a status report.
- Order executed.

The way that OASIS EDXL-SitRep supports this is that it is possible to issue another message corresponding to a mission status setting the field DistributionType to a proper value. The values to be set for that purpose are included in the Annex B with the rest of the fields corresponding to the report of Mission Status in the entry MS of Annex B.

5.3.2.13 Support to send orders to infrastructure operators

OASIS EDXL-CAP can support all the requested operations in its 'instructions' field, but as it is a free text message, it does not allow to provide any automatic processing in the operator side. For that it would be necessary to use OASIS EDXL-RM instead. In any case, the fields for sending such message are the same ones as for sending messages for requesting the dispatch of units, and therefore they are included in the entry RDU of Annex A.

5.3.2.14 Support for the direct reception of data from sensors

Neither OASIS EDXL-CAP or OASIS EDXL-SitRep are conceived to include data coming from sensors. Such data can only be included as initial parameters, which could fit the initial triggering of the alarm, but would hardly be convenient for periodic reporting of the sensors, because these sensors may be designed to send data every second and there is less point in producing an alarm for each of them.

Though it might be possible to provide the information of sensors as parameters in OASIS EDXL-CAP and use the semantic layer proposed in this document to define the names of the parameters, this approach could serve for sending alerts and the initial values of the measurements. But this approach would force to send an alert for each measurement taken. This would be also values for measurements corresponding to safe values, because they would be necessary to report on the finalisation of the crisis. Sending each measurement embedded in an alert could not only increase unnecessarily the traffic of data in the system, but it could also hinder the comprehension of alerts by the users, because of the generation of so many alerts as data arriving from sensors.

A more reasonable approach is sending the measurements of sensors in separate messages complying with any standard for the definition of data from sensors, such as OGC-SOS. In this

case, the names to be included in the messages from the sensors can be extracted from the semantic layer.

5.3.2.15 Support coordination with hospitals during the crisis

The system must support the following type of information exchange with the hospitals:

5.3.2.15.1 Live update of the clinical history of the patients assigned to the hospital

Neither OASIS EDXL-CAP or OASIS EDXL-SitRep are conceived for transmitting the clinical information of the patients during the crisis. In fact, there is another standard conceived for this, which is OASIS EDXL-TEP.

5.3.2.15.2 Live update of the geographical position of the ambulances assigned to the hospital

Not even OASIS EDXL-TEP supports the tracking of the geographical position of the ambulance assigned to a patient. However, OASIS EDXL-TEP includes a field to state the ambulance assigned to a patient. Hence, it is possible to implement this functionality by combining OASIS EDXL-TEP for the clinical information of the patient and linking it with a positioning sensor in the ambulance.

5.3.2.15.3 Clinical report of the patients assigned to hospitals

OASIS EDXL-SitRep supports this with the Response Resources Summary Report. The corresponding fields are included in the entry CR of Annex B.

5.3.2.16 Support for the identification of known terrorists during the crisis

OASIS EDXL-CAP supports this feature partially because it includes an unstructured field in the distribution element to send this information. This field can contain a picture of a terrorist, whose description can be set to indicate that the picture/video matches with a known terrorist, and also his name and the percentage of match. This, used jointly with an event type explaining the identification of a known terrorist can support this feature. However, a more advanced processing could possibly need to add more information fields for this feature, such as a connection with a police information service. Additionally, though the description of the resource may include the indicated information, it is currently set as a free text, and therefore it would be a better practice to upgrade OASIS EDXL-CAP to contain a list of possible threats that support this feature.

The fields to be used for such alert are included in the entry IKT of Annex A.

5.3.2.17 Authentication and authorization capabilities

Neither OASIS EDXL-CAP or OASIS EDXL-SitRep currently include any specific field for authentication or authorization because it is out of their scope. But this is not necessarily a limitation, because current technology trends on this feature tend to extract all security functionalities to an external security layer.

5.3.2.18 Support for JSON format

OASIS EDXL-CAP and OASIS EDXL-SitRep are based on XML and they do not support the JSON format for the moment, but they are working on doing so, as stated in the presentation from OASIS to the Emergency Interoperability Consortium carried out in 2017 (OASIS, Evolution of Emergency Data Exchange Language (EDXL): A Framework/Toolkit for Developers, 2017).

5.3.3 Detection reliability

OASIS EDXL-CAP includes a field for stating the certainty level of an alarm. Apart from that, the reliability of the detection does not rely on the format of the messages transmitted, which is the scope of the OASIS EDXL standards. The field for this included in entry DR of Annex A.

5.3.4 Simulation capabilities

Both OASIS EDXL-CAP and OASIS EDXL-SitRep can work with simulated data and therefore can be used in simulations, but it is out of their scope to provide the simulation software.

Additionally to that, these capabilities are supported by the OASIS EDXL-CAP <status> element, defined as “The code denoting the appropriate handling of the alert message (REQUIRED)”, which accept the Code Values:

- “Actual” - Actionable by all targeted recipients.
- “Exercise” - Actionable only by designated exercise participants; exercise identifier SHOULD appear in <note>.
- “System” - For messages that support alert network internal functions.
- “Test” - Technical testing only, all recipients disregard.
- “Draft” - A preliminary template or draft, not actionable in its current form.

Hence, a CAP message with <status>Exercise</status> is able to seamlessly support system simulation capabilities.

5.3.5 Provision of external interfaces

Both OASIS EDXL-CAP and OASIS EDXL-SitRep are public standards that define the exchange of messages between different information Systems. Hence, they support this operational need.

5.4 Conclusions on the evaluation

Both OASIS EDXL-CAP and OASIS EDXL-SitRep are standards conceived for defining the information to be transmitted during a crisis with different scopes. OASIS EDXL-CAP is defined for the transmission of alerts and OASIS EDXL-SitRep for the creation of situational reports, and as such, they are suited for these goals with some needs of improvement that come from the new functionalities. However, there are other needs that exceed the scope of these standards and therefore some other complementary standards are more suited for this.

More specifically, the following groups of information are out of the scope of these standards:

- The transmission of data from the sensors, which can be carried out using a standard specific for that, such as OGC-SOS.
- The sending of commands and requests to the units, which can be carried out either with OASIS EDXL-RM or ISO/TR 22351.
- The logistics aspects of the crisis, which can be carried out either with OASIS EDXL-RM for general purposes or OASIS EDXL-HAVE for clinical supplies.
- The clinical information of the patients, which can be transmitted with OASIS EDXL-TEP.
- The periodic availability reports from hospitals, which can be transmitted with OASIS EDXL-HAVE.

Apart from this information, which can be transmitted using any of the mentioned alternatives, this document has also identified the possible improvements for OASIS EDXL-CAP and OASIS EDXL-SitRep:

- The main lack of OASIS EDXL-CAP and OASIS EDXL-SitRep when dealing with emergencies that involve critical infrastructures is the lack of a field for expressing the type of critical infrastructure or even the type of facility affected. Though it is still possible to indicate that in the field 'Event' of OASIS EDXL-CAP, this field is a free text and for that reason it does not allow to associate any automatic process based on the type of infrastructure affected. For that reason, the main recommendation from these conclusions would be to include the type of infrastructure affected in the free text field event till OASIS offers a better solution for this.
- There is a need for availability reports from the critical infrastructures. As the main difference of these reports with a situation report will be that these availability reports do not need to be assigned to an incident, it could suffice to let the 'incidentID' field of the situation report to be empty or to define a special value 'None' to be used for that field in this case.
- The list of categories included in OASIS EDXL-CAP that states the type of incidence only includes nine types of categories and only 'CBRNE' for any type of 'CBRNE' incidents. It would be interesting that OASIS EDXL-CAP expands this list in future versions to allow for a more fine-grained process of the information.
- OASIS EDXL-DE can provide partially the status of a previous request, but it does not have any way to express that it is not possible to comply with a request.
- OASIS EDXL-CAP could benefit from the inclusion of a field to state the type of structure affected.
- OASIS EDXL-CAP does not include any fields for indicating threats associated to an incident, such as known terrorists located in its scene. The best that OASIS EDXL-CAP offers for this is using the resource element to include resources that can be

associated to the threat and explain that in the free text fields, such as the description, but the usage of free text fields hinder any automatic processing associated with that, because require to embed in the implementation knowledge about the content of that free text that is not defined in the standard. For that reason, OASIS EDXL-CAP could benefit from adding support for threats associated with an incident.

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ANNEX A (informative)

OASIS EDXL-CAP fields for each type of information needed to be included in the alarms

This annex provides an explanation of how to include the information corresponding to the messages needed to support the operational needs stated in section 5.2 in an OASIS EDXL-CAP message. It is a proof that OASIS EDXL-CAP messages can contain such information. For more details on the structure of OASIS EDXL-CAP, the reader may read it.

The list is not exhaustive. It only contains the fields that are conceptually essential to support each referenced functional need, but OASIS EDXL-CAP supports much more fields.

Table 1: Correspondence of operational needs with OASIS EDXL-CAP fields

Id	Operational need	Required field	OASIS EDXL-CAP fields
TA	Identification of the type of alert	Alert type	Info.Event text denoting the type of the subject event of the alert message combined with one of Info.Event Code or Info.Category
RAC	Reception of Alert from Citizens	Alert type	Info.Event Type Or info.EventCode
		Type of incident	Info.Category a code indicating the type of incident, such as 'CBRNE, 'fire', etc. See OASIS EDXL-CAP specification for full list of values
		Alert description	Info.Event Description
		location	Info.area.Area polygon for the location coordinates
			Infor.area.Area Description for an optional description of the location
RAS	Automatic reception of alerts generated by sensors	Alert type	Info.Event Type
		Sensor data	Info.parameter containing the message from the sensor, which may complain to any sensor standard. However there is no predefined name in OASIS EDXL-CAP for this field. We suggest using the name for Sensor message included in the Semantic layer
		Alert location	Info.area information that will specify at least a polygon

			corresponding to the geographical position of the sensor
RDU	Issuing requests to dispatch units	Type of request / command	Info.instructions
		Type of action recommended (OPTIONAL)	Info.Response Type any of the action types included in the list specified in OASIS EDXL-CAP specification as per indicated in info.instructions
		location	Info.area.Area Polygon for the location coordinates
			Infor.area.Area Description for an optional description of the location
IKT	Identification of known terrorists	Alert type	Info.Event Type with an explanation of a terrorist being identified
		File/video with the identification	Info.resource.uri for an uri containing the content with the image or video of the identification
		Explanation of the identification of the subject and his level of match	Info.resource.description set to contain such explanation and the percentage of match of the identified subject with the provided file/video
DR	Detection Reliability	Certainty level	Info.certainty.code A certainty code corresponding to any of the five possible values stated in OASIS EDXL-CAP definition
		Type of incident	Category a code indicating the type of incident, such as 'CBRNE, 'fire', etc. See OASIS EDXL-CAP specification for full list of values

ANNEX B (informative)

OASIS EDXL-SitRep fields for each kind of needed report

This annex provides an explanation of how to include the information corresponding to the reports needed to support the operational needs stated in section 5.2 in an OASIS EDXL-SitRep messages. It is a proof that OASIS EDXL-CAP messages can contain such information. For more details on the structure of a report, the reader may read OASIS EDXL-SitRep.

Table 1: Correspondence of operational needs with OASIS EDXL-SitRep fields

Id	Operational need	Required field	OASIS EDXL-SitRep fields
LC	List of commands issued	Destination location of the command	reportToLocation: ct:EDXLLocationType
		Work assigned	workAssignment: ct:EDXLStringType
		Special instructions	specialInstructions: xs:string
		Units to be assigned	organizationAndAssignments
MS	Mission status: general fields	Action type	EDXL-SitRep ManagementReportingSummary: Situation Summary:
		Resource affected	ResponseResouresTotalsReportType:Resource Information: ResourceDetailType:
		Count of personnel assigned	resourcePersonnelCount: xs:unsignedInt
		Personnel unassigned	unassignedResourcePersonnel: xs:unsignedInt
		Number of resources required	resourceRequiredCount: xs:unsignedInt
		Number of resources committed	resourceCommittedCount: xs:unsignedInt
		Count of resources on hand	resourceOnHandCount: xs:unsignedInt
		Count of resources still needed	resourceStillNeededCount: xs:unsignedInt
		Count of resources requested	resourceRequestedCount: xs:unsignedInt
		Date and time of the order	dateTimeOrdered: ct:EDXLDateTimeType

		Date and time requested for the arrival	requestedArrival: ct:EDXLDateTimeType
		Estimated date and time of arrival	estimatedArrival: ct:EDXLDateTimeType
		Location to Report to	reportToLocation: ct:EDXLLocationType
		Overhead position	overheadPosition: ct:ValueKeyIntPairType
		Work / mission assigned	workAssignment: ct:EDXLStringType
		Special instructions to be added to the mission	specialInstructions: xs:string
		Special equipment and supplies to be assigned to the mission	specialEquipmentAndSupplies: xs:string
		Additional organizations assigned to the mission	additionalAssistingOrganizations: xs:string
		Status of a resource	resourceStatus: ResourceStatusType
	Mission status: status types	Acknowledgement to order	A SitRep message in response with the field DistributionType to Ack, which means acknowledgement to a previous message
		Execution in progress	There are several fields to state the status of an action, but they depend on the type of situational report. That is, they can be used for those types of actions that match that that type of record, but there is not any general field for this
		Order executed	The message is embedded in an OASIS EDXL-DE message that includes the identifier of the original message that is being responded. It is possible for any software receiving the reply to go back to the original message from that identifier and collect the details of the request, including the type of request.
		Unable to comply	Distribution type set to Update. The software receiving the reply needs to infer this from the content of the reply.
		Rejected	Distribution type set to Error, which means - Rejection of an earlier message (for technical reasons).

WR	Weather report	Area affected	weatherEffects [0..1]: ct:WeatherInfoType
		Effects window	weatherEffects [0..1]: ct:WeatherInfoType Definition:Text indicating **current and predicted weather** and related factors that may affect or cause concern for the incident and related areas, in the form of a short synopsis on weather factors.
		Weather effects	SitRep: **ManagementReportingSummary** Report Type weatherEffects [0..1]: ct:WeatherInfoType
PAP	List of potentially affected populations See (generalPopulationStatus) below for specification of generalPopulationStatus	The list of specific fields will depend on each type of specific report	SitRep ; **CasualtyAndIllnessSummary** Report Type: Complex Type: **NotifiableDiseaseNumbers** : Sub-element: countOfSuspectedCases countOfSuspectedCases
	General status description of the general population in designated counties during emergencies or disasters	General population status, including population name, their geographical location and status	**SituationSummaryType: generalPopulationStatus jurisdictionInformation** (closestSitRep element for the population name and geographical location. The incident name with the geographical boundaries of jurisdiction(s) involved (county or counties affected) taken together describe and define a population name
CAT	fields corresponding to the CBRN agent type	Agent type (note that this field can also be used for natural hazards)	**IncidentInformationType**: incidentKind, **SituationSummaryType**: incidentCause
		Jurisdiction authority	JurisdictionInformation: **Reference to a legal governmental organization or agency that has "Authority" over something geographically defined area, population and resources in response to an emergency or crisis** (such as an incident, or a set of identified resources). Jurisdiction in this sense may be general, such as "federal", "city", or "state", or may be specific agency names such as "Warren County", "US Coast Guard", "Panama City", and "NYPD".

		Known usages (optional)	No field in SitRep for this
CR	Clinical report with a list of all patients assigned to hospitals		Response Resources Summary Report. SitRep: **CasualtyAndIllnessSummary** Report Type: Complex Type: **Summary Count Type**: Sub-element: **nonResponderSummaryCount**
CI	Summary clinical report of the crisis	Total Number of fatalities	NumberOfFatalities
		Total number of hospitalized people	NumberOfHospitalized
		Number of injured / ill people	NumberOfWithInjury/Illness
		Number of people in need of rescue	NumberOfTrapped/In need of rescue
		Number of missing people	NumberOfMissing
		Number of evacuated people	NumberOfEvacuated
		Number of sheltered in place people	NumberOfSheltering In Place
		Number of people in temporary shelters	NumberInTemporaryShelters
		Number of people in quarantine	NumberInQuarantine
		Number of people that have received mass immunization	HaveReceivedMassImmunizationsCount
		Number of people pending for mass immunization	RequireMassImmunizationsCount

ANNEX C (informative)

Analysis of compatibility with other standards

C.1 General

This analysis studies which standards already exist for defining the format of the information to be transmitted during a crisis and how to keep compatibility with them according to the criteria expressed in 4.3. With this purpose, it presents a study on the existing standards and how to keep compatibility with them. As for many of them, the way to keep that compatibility is to omit their concepts from the semantic layer, it also includes a section which explains which information is included in those standards and selected to be left out of the scope of the semantic layer.

C.2 Study of the landscape of existing standards on crisis management

C.2.1 General

This clause presents a high-level overview of the standards that already define the meaning of the information to be transmitted during a crisis. None of those standards are designed to cover the definition of all possible information but only part of it. The standards and initiatives relevant for this study are only those ones that include the definition of the meaning of the information to be transmitted, at least implicitly. The standards that are related with crisis management but not with the definition of the meaning of the data to be transmitted are not relevant for this study.

> **EXAMPLE**: TLS deals with cyphering transmissions and authenticating peers. It is used in crisis management but it is not considered because it does not deal with the meaning of the information transmitted.

These standards refer to complex sets of information that involve complex data structures that are related with each other, normally using keys that identify each element of a structure. The fields that correspond to such keys, which are often named identifiers, often include the suffix id for that reason. These fields are necessary to structure the information and for letting the message to refer to any information that was previously received. That is, the keys are not included in the message to provide any information on its own, but to be used as a link to the rest of information. For that reason, the fields corresponding to the keys are not considered to be concepts to be taken into account. Hence, they are excluded from the semantic layer.

Additionally, some of these standards refer to some type of message or order types that are specific for them, such as OASIS EDXL-RM, which includes a type for message content (MessageContentType) that basically refers to the type of message being sent, but this information corresponds to the flow of messages inside the protocol, and therefore does not correspond to any information that is necessary to be sent outside of that protocol. For that reason, these kinds of fields are not considered in this section to be removed from the semantic layer, either, as they only have sense when used in their respective protocols and

therefore, they would never be included in the semantic layer, making unnecessary to contemplate the need for their removal.

C.2.2 ISO/TR 22351

ISO/TR 22351 is the ISO Technical Report for data transmission in crisis management. It is an API oriented document specific for crisis management. As such, it already covers a limited set of concepts that the semantic layer should not include. However, it does not provide a way to include information provided by sensors except for the fields included in its specification.

C.2.3 OGC-SOS v2.0

The Sensor Observation Service (SOS) from the Open Geospatial Consortium (OGC) is a standard that defines the format of data transmitted from geographically referenced sensors. It is built on SensorML (OGC, Sensor Model Language, 2000), which is another standard of the OGC. Both are part of the Sensor Web Enablement (SWE) family of standards suggested in CWA 17356:2018 for the transmission of data from sensors. Additionally, it is compatible with standard WMS (Web Map Service), also from OGC, which is a standard commonly used by GIS systems to display geographical maps, and therefore one of the key standards in the development of command and control centres.

Though OGC-SOS is an API oriented for the transmission of data of sensors, the format of the message for transmitting the data is based on sending the name of the concepts (which are referred as 'observer properties' in OGC-SOS) and their values. As such, it is an ideal candidate for the use of a semantic layer for the definition of such names. Moreover, it already provides a way for defining the meaning of the fields sent and even a solution also based in namespaces. It even provides suggestions for the name structure of their URNs. What OGC-SOS v2.0 does not provide is a list of URNs that define the possible meanings of information. Therefore, the semantic layer defined in this document seems to be an ideal counterpart for OGC-SOS if it is built using the proposed structure of OASIS for the construction of URNs.

C.2.4 OASIS EDXL-CAP v1.2

Emergency Data Exchange Language (EDXL) Common Alerting Protocol (CAP), 2012. is a protocol for sending alerts during a crisis-emergency, endorsed by OASIS Open. OASIS EDXL-CAP is a (almost) fully API oriented protocol. It is deliberately focused to define the information to be included in alerts. However, it still includes a <parameter> field for including raw data from a sensor without entering the structure of that message. That is, its implied philosophy is that the format of the data sent by the sensors is out of its scope, but it still allows including sensor data to complement the information of the alerts, and this sensor data may (and should) comply with some standard for the definition of the format of messages sent by sensors, such as OGC-SOS.

The "parameters" field of OASIS EDXL-CAP provides a large degree of freedom to describe specific data in a standard format. But different senders can use the same parameters with different meanings. OASIS EDXL-CAP has also been specifically designed to describe alerts, together with the intended recipients and the geographical area that the alert refers to. The

use of OASIS EDXL-CAP to embed sensor readings could substantially increase the size of the messages, without providing substantial advantages.

C.2.5 OASIS EDXL-DE v1.0

OASIS Open, Emergency Data Exchange Language - Distribution Element v1.0 (2006) is the envelope or “wrapper” of the OASIS EDXL-CAP Alert (Payload) or any of the other OASIS EDXL messages. OASIS EDXL-DE v1.0 specifies the XML tag <targetArea> for distribution of the payload message, and the XML tag <contentObject> as the container element for specific messages. OASIS EDXL-DE v1.0 is the preferred version for its straightforward simplicity.

NOTE Though there is a version 2.0 of EDXL-DE, version 1.0 is the preferred version, and is used more than 2.0.

C.2.6 OASIS EDXL-SitRep v1.0 (2016)

OASIS Emergency Data Exchange Language Situation Reporting (EDXL-SitRep) Version 1.0. (2016) describes a set of standard reports and elements that can be used for data sharing among emergency information systems, and that provide incident information for situation awareness on which incident commanders can base decisions. Though OASIS EDXL-SitRep is completely applicable to crisis management in critical infrastructures, its support is a special case compared with the rest of standards to be supported. In the rest of cases the compatibility with the standard consists in avoiding the collision of scope by keeping the concepts covered by the supported standard out of the semantic layer, and possibly adapting the structure of the semantic layer to be compatible with the philosophy of the supported standard. But in the case of OASIS EDXL-SitRep the collision is mostly impossible for the following reason: the semantic layer is conceived to express concepts from devices (mainly sensors) that collect information from the crisis. OASIS EDXL-SitRep is conceived to produce situational reports that summarize this collected information, but it is not designed to report it directly. And in the exceptional case where a situational report would include information collected directly from the field, the way that OASIS EDXL-Sitrep defines for providing it is through the use of external namespaces, such as the semantic layer defined in this document. The way that the semantic layer supports OASIS EDXL-Sitrep is including their concepts in an external namespace that can be referenced in OASIS EDXL-Sitrep.

C.2.7 OASIS EDXL-HAVE v2.0 / HL7 v2

OASIS EDXL-Hospital Availability Exchange v2.0 is an XML messaging standard primarily for exchange of information related to health facilities in the context of emergency management. Its objective is that first responders, emergency managers, coordinating organizations, hospitals, care facilities, and the health community can provide each other with a coherent view of the health system. It provides a way for communicating a snapshot of the local area Emergency Medical Service/Systems in an emergency incident and updating information for responders to direct emergency patients to a facility that has the capability to treat those patients more efficiently. OASIS EDXL-Have was used during the 2010 Haiti earthquake, and the lessons learned from that event have been brought into OASIS EDXL-HAVE v2.0. One of the chief takeaways that the need for such instant snapshot of the local area Emergency Medical Service/Systems.

Of the two health-related OASIS specifications, OASIS EDXL-HAVE v2.0 supplies the most current availability of equipment and personnel in an emergency incident's area, which allows responders to also gather and transmit the patient's vital signs and send it on ahead of the patient.

Used in conjunction with OASIS EDXL-TEP v1.1 and the Transformation Committee Note, it defines the format for the information of emergency patients being transported to best match among the area's Health Community medical facilities and teams. This allows the first responders to have the most current information available to make the most effective decisions.

Similarly to OASIS EDXL-HAVE v2.0, OASIS collaborated with HL7 to craft a follow-on document setting forth a mapping of term-datatypes between HL7 v2 and OASIS EDXL-TEP v1.1.

C.2.8 OASIS EDXL-TEP v1.1

OASIS Emergency Data Exchange Language (EDXL) Tracking of Emergency Patients (TEP) Version 1.1 (2018), is an XML messaging standard primarily for exchange of emergency patient and tracking information from the point of patient encounter through definitive care admission or field release. OASIS EDXL-TEP v1.1 defines the format of the messages used for transmitting the route and the triage assessed for emergency patients, which allows the best match for the patient's injuries or illness and a quicker response. At the same time, a system sending OASIS EDXL-TEP messages can reduce or eliminate the need to re-keyboard the patient's information. This also reduces the time needed at the destination facility because the vitals and incidental information can be sent ahead to the medical institutions, in the form of the receiving organization's version of HL7 v2's based form, the Admit, Discharge, or Transfer form.

Along with OASIS EDXL-HAVE v2.0 and the OASIS TEP v1.1-HL7 v2-Transforms-v1.0, these specifications can allow systems implementing them to provide a better Emergency Medical Service/System crossing national and-local boundaries, though it does need to be translated into the required languages.

Of the two health related OASIS specifications, OASIS EDXL-TEP v1.1 supplies the patient centered information to complement and work with the healthcare availability information of OASIS EDXL-HAVE v2.0

C.2.9 OASIS EDXL-RM v1.0

OASIS Emergency Data Exchange Language Resource Messaging (EDXL-RM) v1.0 (2008), describes 'a suite of standard messages for data sharing among emergency and other information systems that deal in requesting and providing emergency equipment, supplies, people and teams'. As such, it may be used for handling all type of messages for logistics and commands.

C.3 Subject matters out of the scope of the semantic Layer

C.3.1 General

This clause identifies the different subject matters that are covered by a standard that already provide a mean to define the meaning of their concepts. The objective is to identify the pieces of information that are included in those standards to make sure the semantic layer does not include them.

C.3.2 Information included in ISO/TR 22351

The following figure shows the elements that compose an Emergency Management Shared Information (EMSI) message.

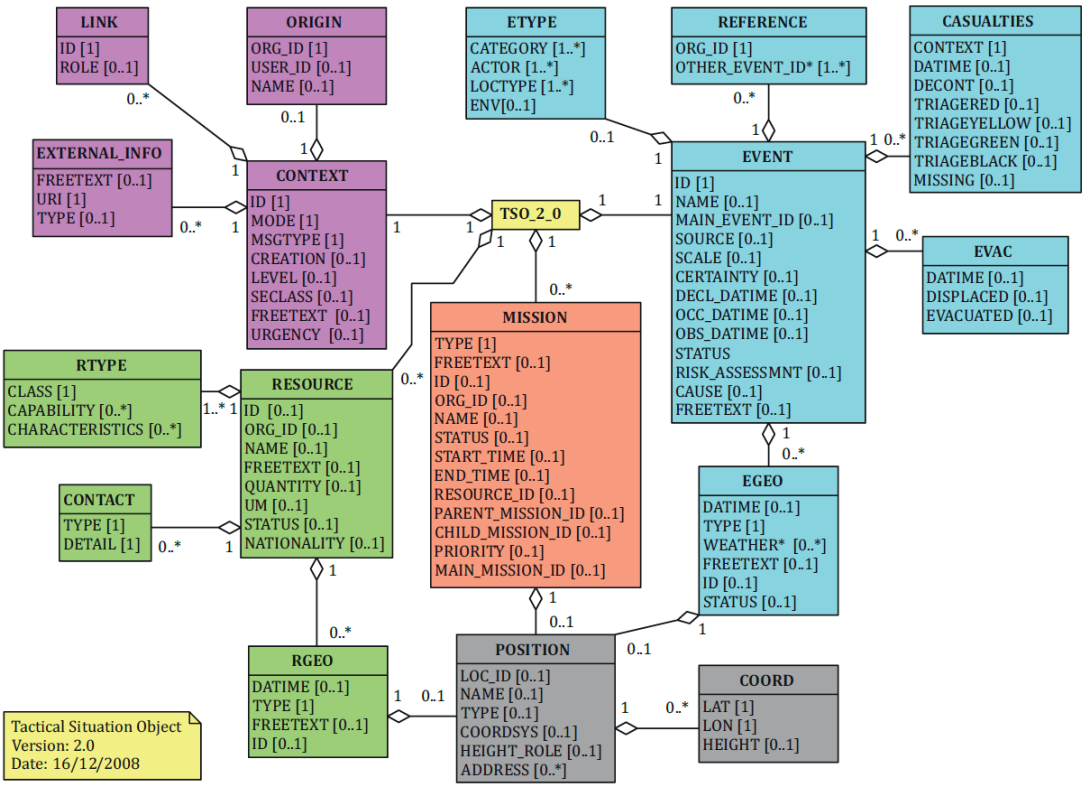

Figure 2: Elements that comprise an EMSI message from CWA 15931-1

NOTE Figure 2 is Equivalent to figure 1 in ISO/TR 22351:2015.

The following concepts are covered by the structure of an EMSI message and therefore they are not included in the semantic layer:

- Dates and times corresponding to the information transmitted.
- Geographical coordinates corresponding to the information transmitted.
- Overall statistics of the number of casualties together with their decontamination and triage status, as shown in the Casualties box in the figure.
- Number of displaced and evacuated people, as shown in the Evac box in the figure.
- Resources (teams) available in the crisis, including their amounts, status and nationality, as stated in the Resource box of the figure.
- Capabilities and characteristics of the resources mentioned, as stated in the RType box of the figure.
- Contact details of the resource.
- Details of the missions assigned including their names, status and relationship with the rest of the information.
- Details and description of the incident input as free text by the responders.

ISO/TR 22351 includes identifiers that are necessary for managing internally the relationships between the different concepts stated in the message but corresponds to information that is implicitly derived from the structure of the message sent, due to its hierarchical nature. This makes unnecessary to express them explicitly and therefore to define their meaning and for that reason they are not considered in this document.

C.3.3 Information included in OASIS EDXL-CAP

The information that is included in OASIS EXDL-CAP messages and should therefore be excluded from the Semantic layer is:

- Dates and times corresponding to the information transmitted.
- Geographical coordinates corresponding to the information transmitted.
- Identifiers: number or string identifying:
    - The CAP alert message.
    - The originator-sender or recipient of the alert message.
    - The particular source of the alert message.
    - A reference to previous alert message(s).
    - The language of the alert message.
    - A full, absolute URI for an HTML page or other text resource with additional or reference information regarding the alert message.
    - A mimeType as speficied in (N. Freed, 1996)[RFC2046] (formerly known as mimeTypes) and Media Subtypes as specified by the IANA at http://www.iana.org/assignments/media-types/media-types.xhtml
    - A uri of a resource file.
- Status: takes enumerated code values for the type of CAP alert message: “Actual”, “Exercise”, “System”, “Test”, “Draft”.
- Resource: The container for all component parts of the resource sub-element of the info sub-element of the alert element:
    - resourceDesc: the human-readable text describing the type and content, such as “map” or “photo”, of the resource file.
    - mimeType, described previously under Identifier.
    - size: approximate size of the resource file in bytes; for<uri> based resources, <size> SHOULD be included if available.
    - uri as defined previously under Identifier.
    - derefUri MAY be used either with or instead of the <uri> element in messages transmitted over one-way (e.g., broadcast) data links where retrieval of a resource via a URI is not feasible; and for other requirements from the specification published for EDXL-CAP v1.2.
- Capabilities and characteristics of the four blocks of the CAP Message: <alert>, <info>, <resource> and <area> not specifically mentioned in this section.
- Incident(s): The group listing naming the referent incident(s) of the alert message.
- Category: a value from the list of categories in the EDXL-CAP v1.2 specification.
- Event: The text denoting the type of the subject event of the alert message.
- Event Code: A system-specific code identifying the event type of the alert message in the form:

```
<eventCode>
```

```
    <valueName>valueName</valueName>
    <value>value</value>
  </eventCode>
```

- Description: text describing the subject event of the alert message as free text by the responders.

The Event Code above became the genesis of the valueListUri/valueType mechanism adopted in later EDXL standards and specifications.

The EDXL family of standards groups the different terms that are related with any of the EDXL standards in the following categories:

- **CommonTypes** designated in use as the namespace abbreviation ct: for edxl-ct for use as such as EDXLDateTimeType, EDXLStringType, ValueListURIType, ValueType, etc. This specification can be found at http://docs.oasis-open.org/emergency/edxl-ct/v1.0/edxl-ct-v1.0.pdf. These common types are designed to be able to use external namespaces defined in the valueListURIType that includes entries in the form of ValueTypes, which are entries that provide the name and value of the property to be reported. This allows EDXL-CAP to reference concepts that could not be included when defining the protocol through the inclusion of such concepts in external namespaces, which is precisely the approach of the semantic layer.
- **Contact Information** for a person or organization designated in use as the namespace abbreviation ciq: for edxl-ciq which is the Emergency Data Exchange Language (EDXL) Customer Information Quality (CIQ) Profile Version 1.0 Committee Specification Draft 04 available at http://docs.oasis-open.org/emergency/edxl-ciq/v1.0/edxl-ciq-v1.0.pdf.
- **Location Information** using datum WGS84 designated in use as the namespace abbreviation gsf: for edxl-gsf which is the Emergency Data Exchange Language (EDXL) GML Simple Features Profile Version 1.0 Committee Specification Draft 02 available at http://docs.oasis-open.org/emergency/edxl-gsf/v1.0/edxl-gsf-v1.0.pdf.

The first two of these supporting information sets contain references to source specifications, including component specifications. The third does not. The third is also consistent with the OGC, Open Geospatial Consortium, as used in this document. This is the EDXL Profile of the OGC Special Features Profile of GML.

While most OASIS Emergency Management Technical Committee's EDXL specifications make use of supporting specifications, OASIS EDXL-CAP v1.2 and OASIS EDXL-DE v1.0 do not.

With the exception of the external namespaces, there is much in these two specifications that can be safely excluded from the semantic layer. These sets to be excluded from the semantic layer are:

- Taken from OASIS EDXL-CAP, and included in OASIS EDXL-SitRep, the element **urgency** is given a value from the enumerated list:
    - "Immediate" - Responsive action SHOULD be taken immediately.
    - "Expected" - Responsive action SHOULD be taken soon (within next hour).
    - "Future" - Responsive action SHOULD be taken in the near future.
    - "Past" - Responsive action is no longer required.
    - "Unknown" - Urgency not known

- Taken from OASIS EDXL-CAP, and included in OASIS EDXL-SitRep, the element **severity** is given a value from the enumerated list:
    - "Extreme" - Extraordinary threat to life or property.
    - "Severe" - Significant threat to life or property.
    - "Moderate" - Possible threat to life or property.
    - "Minor" – Minimal to no known threat to life or property.
    - "Unknown" - Severity unknown.
- Taken from OASIS EDXL-CAP, and not included in OASIS EDXL-SitRep, the element **certainty** is given a value from the enumerated list:
    - "Observed" – Determined to have occurred or to be ongoing.
    - "Likely" - Likely (p > ~50%).
    - "Possible" - Possible but not likely (p <= ~50%).
    - "Unlikely" - Not expected to occur (p ~ 0).
    - "Unknown" - Certainty unknown.

- Taken from OASIS EDXL-SitRep, the element **reportConfidence** is given a value from the enumerated list:
    - "HighlyConfident" – Topmost level of confidence.
    - "SomewhatConfident" – Medium level of confidence.
    - "Unsure" – Low level of confidence.
    - "NoConfidence" – Lack of confidence – Can be used to support cancellation of previous report.

There is another special case between OASIS EDXL-DE v1.0 (the preferred version) and OASIS EDXL-SitRep v1.0.

This occurs with the distributionType element of OASIS EDXL-DE v1.0 which takes one of the enumerated values:

- Response - A response to a previous request.
- Dispatch – A commitment of resources or assistance.
- Ack - Acknowledgment of receipt of an earlier message.
- Error - Rejection of an earlier message (for technical reasons).
- SensorConfiguration - These messages are for reporting configuration during power up or after Installation or maintenance.
- SensorControl - These are messages used to control sensors/sensor concentrator components behavior.
- SensorStatus - These are concise messages which report sensors/sensor concentrator component status or state of health.
- SensorDetection – These are high priority messages which report sensor detections.
- The following is excerpted from EDXL-SitRep v1.0.

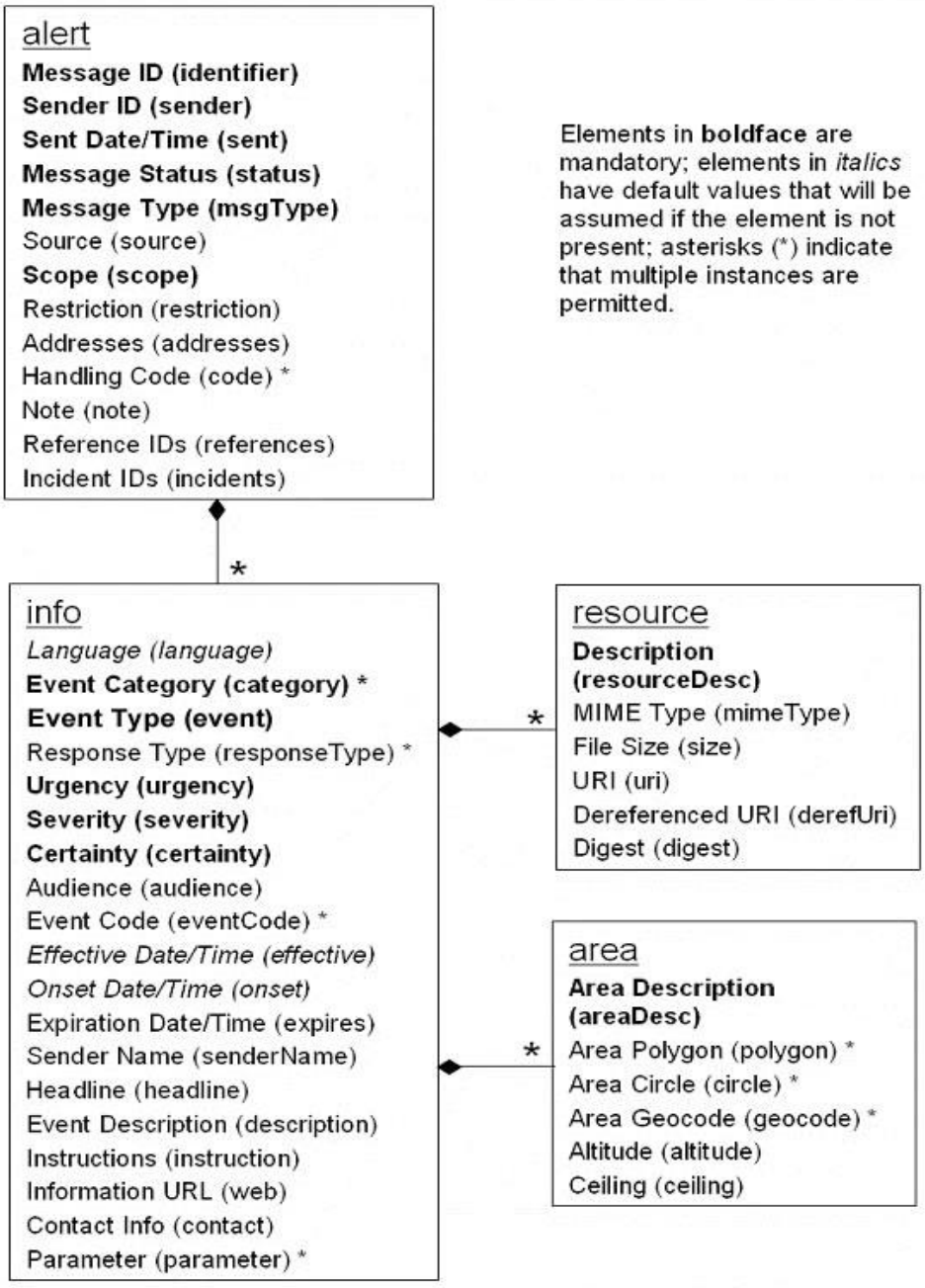

Figure 3: OASIS EDXL-CAP v1.2 Element Reference Model (Based on Document Object Model circa 2004)

Figure 4 borrowed from OASIS EDXL-CAP shows the high-level structure of the elements that form the Element Reference Model.

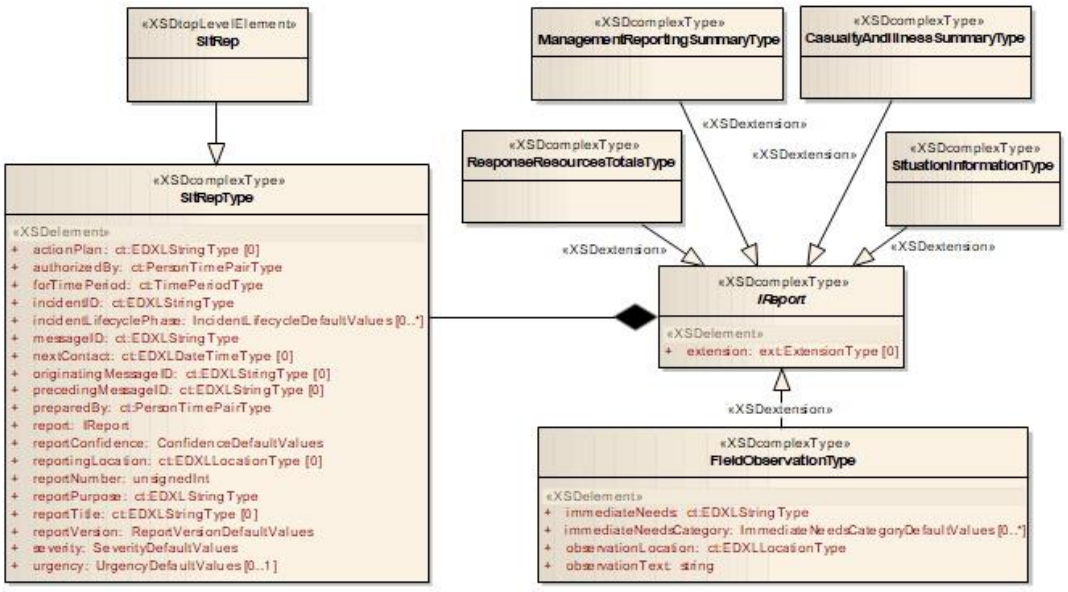

Figure 4 EDXL-SitRep v1.0 Element Reference Model

C.3.4 Geographical referencing of data

Practically all standards for transmitting information in crisis management and from sensors include specific fields for stating geographical positions in fixed fields and therefore there is no point in defining names for such fields whose meaning will be implicit in the definition of the standard.

C.3.5 Information included in OASIS EDXL-HAVE / HL7

An OASIS EDXL-HAVE (Section 3.5) message contains information on:

- The organization that is responsible for the reporting facilities.
- Facility name and location.
- Overall facility status.
- Services.
- Operations.
- Resources.
- Staffing.
- Emergency department.

The overall facility status itself contains information on:

- Name of the facility.
- Kind of facility.
- ReportingPeriod.
- LastUpdate.
- OrganizationInformation.
- Status.
- Services.
- FutureServices.
- ActivityInPeriod.
- Operations.

- ResourceInformation.
- Staffing.
- EmergencyDepartment.
- TraumaCenter.
- Remarks.

Among those values, the kind of facility is defined to be one of the following values:

- Hospital.
- LongTermCare.
- UrgentCareClinic.
- TemporaryFacility.
- Other.

All these types of information are not included in the semantic layer accordingly.

NOTE The kind of facility differs from the facility type stated in 4.4.15. The kind of facility is designed to provide information on the capabilities and limitations of a clinical facility in terms of healthcare and treatment. It provides information that is specific to the clinical context. In contrast, facility type is a general term that is designed to provide information on the type or category of facility, but it is not designed to provide any information that is specific any context, including the clinical one. As such, both concepts complement each other, which is the reason why the facility type has not been removed from 4.4.15.

C.3.6 Information included in OASIS EDXL-TEP

OASIS EDXL-TEP supports patient tracking across the Emergency Medical Services (EMS) care continuum. It also supports hospital evacuations and patient transfers. It is designed for providing real-time information to responders, Emergency Management, coordinating organizations and care facilities in the chain of care and transport.

A TEP message (TEP section 3.6) contains a group of elements that describes the patient in terms of:

- Personal identifying information such as gender, race, date of birth, hair colour, etc.
- Communication / contact information such as spoken languages, family unification code.
- Special needs regarding transportation, medical attention, barriers to care, allergies.
- Situation information such as incident, location, time.
- Healthcare provider information such as kind, name, jurisdiction.
- Patient encounter information such as location, time, triage, care.

All these types of information are not included in the semantic layer accordingly.

C.3.7 Information included in OASIS EDXL-RM

OASIS EDXL-RM defines a set of messages that can be exchanged between an entity asking for resources and an entity that can provide them. These messages follow a complex data structure that is shown in the Figure 5 below. As such, the message structure contemplates the identifiers of the entities related with each part of the message, which are needed for establishing the relationship between the different entities to be included in the message.

Figure 5 taken from the OASIS EDXL-RM specification shows the high-level entities contemplated in OASIS EDXL-RM.

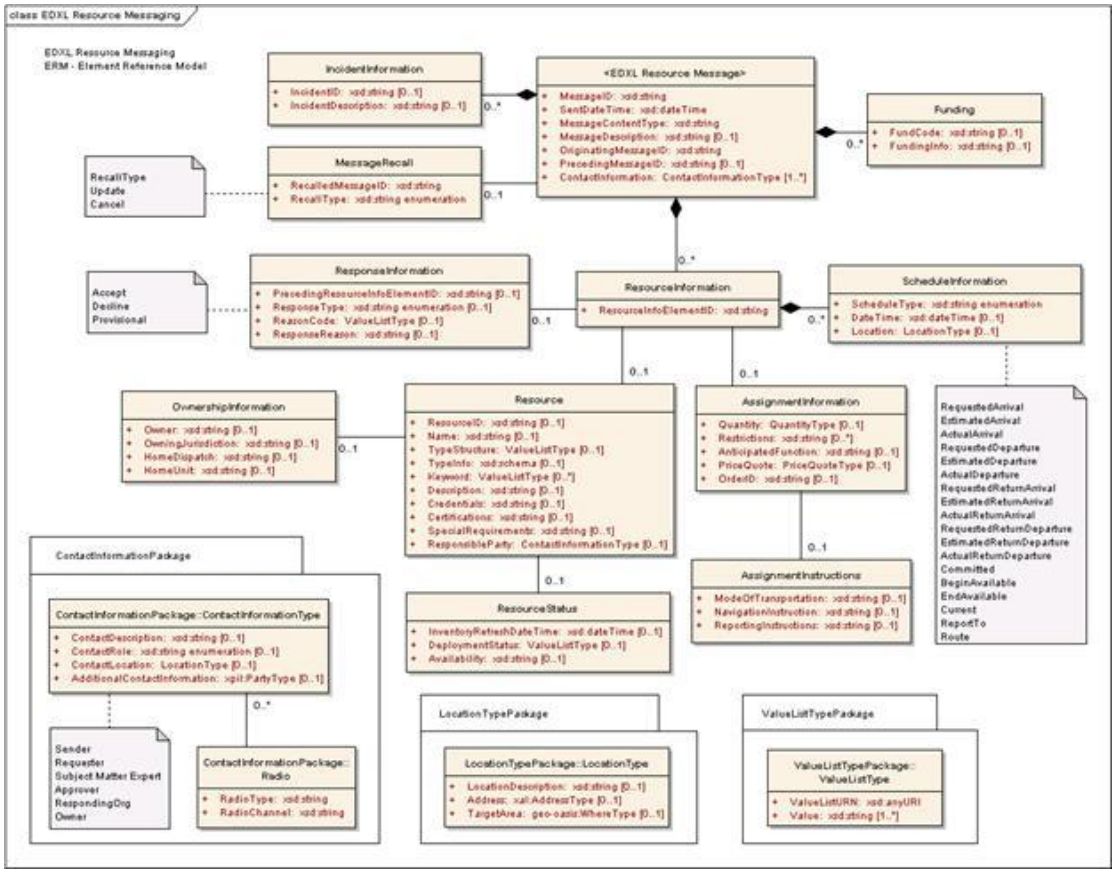

Figure 5: Class diagram for the entities contemplated in OASIS EDXL-RM

The following is a list of concepts included in OASIS EDXL-RM that are not included in the definition of the sematic layer:

- Recall Type: specifies whether a resource was recalled because of a cancel or update message.
- Fund Code: The funds that will pay for the resource.
- Funding info: Additional information on the funds that will pay for the resource.
- Type of response: can be either accept, decline or provisional.
- Response reason: Explanation for a declined or provisional response.
- Type of resource being requested.
- Description of the resource characteristics.
- List of credentials of a requester for authorization purposes.
- Special requirements for a resource.
- Certifications that recognize which special requirements the resource fulfils.
- Contact information for the person responsible for a resource.
- Owner of the resource.
- Owning jurisdiction of the resource.
- Name of the Resource home agency that dispatches the resource.
- Name of the unit that from which the resource works or is used.
- Date and time when resource inventory counts were last updated.
- Status of a resource request.

- Availability of resource, including possible limitations.
- Quantity of resources required.
- Restrictions on resources available.
- Anticipated function for the resource.
- Description of quoted cost to acquire a resource.
- Method of transportation.
- Navigation instructions that describe how to get to the destination.
- Reporting instructions that explain to whom or where the resource are expected to be reported upon arrival.
- Scheduled event related with the provision of the resource.
- Description of the contact associated with the resource.
- Role of the contact associated with the resource.
- Geographical location of the contact.
- Additional contact information.
- Contact radio type.
- Contact radio channel.
- Location description.
- Address in an internationally applicable format.
- Target area for the resource.
- Type of the target area.
- Name of a certified list maintained by a Community of Interest for the value referenced.

NOTE The concepts are listed here according to their meaning, instead of their exact name in the protocol to ease the reading. These concepts are referred to the management of resources and teams. They do not refer to similar topics out of this context.

ANNEX D (normative)

Full semantic layer

D.1 URNs for the field names

urn:SSLy:General:Plane_angle

urn:SSLy:General:Solid_angle

urn:SSLy:General:Frequency

urn:SSLy:General:Activity_radionuclide

urn:SSLy:General:Absorbed_dose

urn:SSLy:General:Close_equivalent

urn:SSLy:General:Catalytic_activity

urn:SSLy:General:Force

urn:SSLy:General:Pressure

urn:SSLy:General:Power

urn:SSLy:General:Energy

urn:SSLy:General:Celsius_temperature

urn:SSLy:General:Electric_charge

urn:SSLy:General:Magnetic_flux

urn:SSLy:General:Magnetic_flux_density

urn:SSLy:General:Capacitance

urn:SSLy:General:Luminous_flux

urn:SSLy:General:Illuminance

urn:SSLy:Space_time:Length

urn:SSLy:Space_time:Width

urn:SSLy:Space_time:Height

urn:SSLy:Space_time:Diameter

urn:SSLy:Space_time:Radius

urn:SSLy:Space_time:Path_length

urn:SSLy:Space_time:Arc_length

urn:SSLy:Space_time:Distance

urn:SSLy:Space_time:Radial_distance

urn:SSLy:Space_time:Position_vector

urn:SSLy:Space_time:Displacement

urn:SSLy:Space_time:Curvature

urn:SSLy:Space_time:Area

urn:SSLy:Space_time:Volume

urn:SSLy:Space_time:Angular_measure

urn:SSLy:Space_time:Rotational_displacement

urn:SSLy:Space_time:Angular_displacement

urn:SSLy:Space_time:Phase_angle:

urn:SSLy:Space_time:Solid_angular_measure

urn:SSLy:Space_time:Duration

urn:SSLy:Space_time:Velocity

urn:SSLy:Space_time:Speed

urn:SSLy:Space_time:Acceleration

urn:SSLy:Space_time:Angular_velocity

urn:SSLy:Space_time:Angular_acceleration

urn:SSLy:Space_time:Period_duration,_period

urn:SSLy:Space_time:Time_constant

urn:SSLy:Space_time:Rotation

urn:SSLy:Space_time:Rotation_frequency

urn:SSLy:Space_time:Rotational_frequency

urn:SSLy:Space_time:Angular_frequency

urn:SSLy:Space_time:Wavelength

urn:SSLy:Space_time:Repetency

urn:SSLy:Space_time:Wavenumber

urn:SSLy:Space_time:Wave_vector

urn:SSLy:Space_time:Angular_repetency

urn:SSLy:Space_time:Angular_wavenumber

urn:SSLy:Space_time:Phase_velocity

urn:SSLy:Space_time:Phase_speed

urn:SSLy:Space_time:Group_velocity

urn:SSLy:Space_time:Group_speed

urn:SSLy:Space_time:Damping_coefficient

urn:SSLy:Space_time:Logarithmic_decrement

urn:SSLy:Space_time:Attenuation

urn:SSLy:Space_time:Extinction

urn:SSLy:Space_time:Phase_coefficient

urn:SSLy:Space_time:Propagation_coefficient

urn:SSLy:Mechanics:Mass

urn:SSLy:Mechanics:Density

urn:SSLy:Mechanics:Mass_density

urn:SSLy:Mechanics:Specific_Volume

urn:SSLy:Mechanics:Relative_density

urn:SSLy:Mechanics:Specific_volume

urn:SSLy:Mechanics:Relative_density

urn:SSLy:Mechanics:Relative_mass_density

urn:SSLy:Mechanics:Surface_density

urn:SSLy:Mechanics:Surface_mass_density

urn:SSLy:Mechanics:Linear_density

urn:SSLy:Mechanics:Linear_mass_density

urn:SSLy:Mechanics:Moment_inertia

urn:SSLy:Mechanics:Momentum

urn:SSLy:Mechanics:Weight

urn:SSLy:Mechanics:Static_friction

urn:SSLy:Mechanics:Kinetic_friction

urn:SSLy:Mechanics:Dynamic_friction_force

urn:SSLy:Mechanics:Rolling_resistance

urn:SSLy:Mechanics:Rolling_drag

urn:SSLy:Mechanics:Rolling_friction_mode

urn:SSLy:Mechanics:Drag_force

urn:SSLy:Mechanics:Impulse

urn:SSLy:Mechanics:Angular_momentum

urn:SSLy:Mechanics:Torque

urn:SSLy:Mechanics:Angular_impulse

urn:SSLy:Mechanics:Gauge_pressure

urn:SSLy:Mechanics:Normal_stress

urn:SSLy:Mechanics:Shear_stress

urn:SSLy:Mechanics:Strain

urn:SSLy:Mechanics:Relative_linear_strain

urn:SSLy:Mechanics:Shear_strain

urn:SSLy:Mechanics:Relative_volume_strain

urn:SSLy:Mechanics:Poisson_number

urn:SSLy:Mechanics:Modulus_elasticity

urn:SSLy:Mechanics:Modulus_compression

urn:SSLy:Mechanics:Compressibility

urn:SSLy:Mechanics:Second_axial_moment_area

urn:SSLy:Mechanics:Second_polar_moment_area

urn:SSLy:Mechanics:Section_modulus

urn:SSLy:Mechanics:Static_friction_coefficient

urn:SSLy:Mechanics:Kinetic_friction_factor

urn:SSLy:Mechanics:Rolling_resistance_factor

urn:SSLy:Mechanics:Drag_factor

urn:SSLy:Mechanics:Viscosity

urn:SSLy:Mechanics:Kinematic_viscosity

urn:SSLy:Mechanics:Surface_tension

urn:SSLy:Mechanics:Potential_energy

urn:SSLy:Mechanics:Kinetic_energy

urn:SSLy:Mechanics:Mechanical_energy

urn:SSLy:Mechanics:Work,_mechanical_work

urn:SSLy:Mechanics:Efficiency

urn:SSLy:Mechanics:Mass_flow

urn:SSLy:Mechanics:Mass_flow_rate

urn:SSLy:Mechanics:Mass_change_rate

urn:SSLy:Mechanics:Volume_flow_rate

urn:SSLy:Mechanics:Action

urn:SSLy:Thermodynamics:Temperature

urn:SSLy:Thermodynamics:Linear_expansion_coefficient

urn:SSLy:Thermodynamics:Cubic_expansion_coefficient

urn:SSLy:Thermodynamics:Relative_expansion_coefficient

urn:SSLy:Thermodynamics:Relative_pressure_coefficient

urn:SSLy:Thermodynamics:Pressure_coefficient

urn:SSLy:Thermodynamics:Isothermal_compressibility

urn:SSLy:Thermodynamics:Isentropic_compressibility

urn:SSLy:Thermodynamics:Heat

urn:SSLy:Thermodynamics:Latent_heat

urn:SSLy:Thermodynamics:Heat_flow_rate

urn:SSLy:Thermodynamics:Density_heat_flow_rate

urn:SSLy:Thermodynamics:Thermal_conductivity

urn:SSLy:Thermodynamics:Coefficient_heat_transfer

urn:SSLy:Thermodynamics:Surface_coefficient_heat_transfer

urn:SSLy:Thermodynamics:Thermal_insulance

urn:SSLy:Thermodynamics:Thermal_resistance

urn:SSLy:Thermodynamics:Thermal_conductance

urn:SSLy:Thermodynamics:Thermal_diffusivity

urn:SSLy:Thermodynamics:Heat_capacity

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_constant_pressure

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_constant_volume

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_saturated_vapour_pressure

urn:SSLy:Thermodynamics:Ratio_specific_heat_capacities

urn:SSLy:Thermodynamics:Isentropic_exponent

urn:SSLy:Thermodynamics:Entropy

urn:SSLy:Thermodynamics:Specific_entropy

urn:SSLy:Thermodynamics:Internal_Energy,_thermodynamic_energy

urn:SSLy:Thermodynamics:Enthalpy

urn:SSLy:Thermodynamics:Helmboltz_energy

urn:SSLy:Thermodynamics:Gibbs_energy

urn:SSLy:Thermodynamics:Specific_energy

urn:SSLy:Thermodynamics:Specific_internal_energy

urn:SSLy:Thermodynamics:Specific_enthalpy

urn:SSLy:Thermodynamics:Specific_Helmholtz_energy

urn:SSLy:Thermodynamics:Specific_Gibbs_energy

urn:SSLy:Thermodynamics:Specific_Gibbs_function

urn:SSLy:Thermodynamics:Massieu_function

urn:SSLy:Thermodynamics:Planck_function

urn:SSLy:Thermodynamics:Joule-Thomson_coefficient

urn:SSLy:Thermodynamics:Thermodynamic_Efficiency

urn:SSLy:Thermodynamics:Maximum_efficiency

urn:SSLy:Thermodynamics:Specific_gas_constant

urn:SSLy:Thermodynamics:Mass_concentration_water

urn:SSLy:Thermodynamics:Mass_concentration_water_vapour

urn:SSLy:Thermodynamics:Mass_ratio_water_to_dry_matter

urn:SSLy:Thermodynamics:Mass_ratio_water_vapour_to_dry_gas

urn:SSLy:Thermodynamics:Mass_fraction_water

urn:SSLy:Thermodynamics:Mass_fraction_dry_matter

urn:SSLy:Thermodynamics:Relative_humidity

urn:SSLy:Thermodynamics:Relative_mass_concentration_vapour

urn:SSLy:Thermodynamics:Relative_mass_ratio_vapour

urn:SSLy:Thermodynamics:Dew-point_temperature

urn:SSLy:Electromagnetism:Electric current

urn:SSLy:Electromagnetism:Elementary_charge

urn:SSLy:Electromagnetism:Electric_charge_density

urn:SSLy:Electromagnetism:Surface_density_electric_charge

urn:SSLy:Electromagnetism:Linear_density_electric_charge

urn:SSLy:Electromagnetism:Electric_dipole_moment

urn:SSLy:Electromagnetism:Electric_polarization

urn:SSLy:Electromagnetism:Electric_current_density

urn:SSLy:Electromagnetism:Linear_electric_current_density

urn:SSLy:Electromagnetism:Electric_field_strength

urn:SSLy:Electromagnetism:Electric_potential

urn:SSLy:Electromagnetism:Electric_potential_difference

urn:SSLy:Electromagnetism:Voltage

urn:SSLy:Electromagnetism:Induced_voltage

urn:SSLy:Electromagnetism:Electric_flux_density

urn:SSLy:Electromagnetism:Permittivity

urn:SSLy:Electromagnetism:Relative_permittivity

urn:SSLy:Electromagnetism:Electric_susceptibility

urn:SSLy:Electromagnetism:Electric_flux

urn:SSLy:Electromagnetism:Displacement_current_density

urn:SSLy:Electromagnetism:Displacement_current

urn:SSLy:Electromagnetism:Total_current

urn:SSLy:Electromagnetism:Total_current_density

urn:SSLy:Electromagnetism:Linked_flux

urn:SSLy:Electromagnetism:Magnetic_flux

urn:SSLy:Electromagnetism:Total_magnetic_flux

urn:SSLy:Electromagnetism:Magnetic_moment

urn:SSLy:Electromagnetism:Magnetization

urn:SSLy:Electromagnetism:Magnetic_field_strength

urn:SSLy:Electromagnetism:Permeability

urn:SSLy:Electromagnetism:Relative_permeability

urn:SSLy:Electromagnetism:Magnetic_susceptibility

urn:SSLy:Electromagnetism:Magnetic_polarization

urn:SSLy:Electromagnetism:Magnetic_dipole_moment

urn:SSLy:Electromagnetism:Coercivity

urn:SSLy:Electromagnetism:Magnetic_vector_potential

urn:SSLy:Electromagnetism:Electromagnetic-energy_density

urn:SSLy:Electromagnetism:Pointing_vector

urn:SSLy:Electromagnetism:Phase_speed_electromagnetic_waves

urn:SSLy:Electromagnetism:Source_voltage

urn:SSLy:Electromagnetism:Scalar_magnetic_potential

urn:SSLy:Electromagnetism:Magnetic_tension

urn:SSLy:Electromagnetism:Magnetomotive_force

urn:SSLy:Electromagnetism:Current_linkage

urn:SSLy:Electromagnetism:Number_turns_is_winding

urn:SSLy:Electromagnetism:Reluctance

urn:SSLy:Electromagnetism:Permeance

urn:SSLy:Electromagnetism:Inductance

urn:SSLy:Electromagnetism:Mutual_inductance

urn:SSLy:Electromagnetism:Coupling_factor

urn:SSLy:Electromagnetism:Leakage_factor

urn:SSLy:Electromagnetism:Conductivity

urn:SSLy:Electromagnetism:Resistivity

urn:SSLy:Electromagnetism:instantaneous_power

urn:SSLy:Electromagnetism:Resistance

urn:SSLy:Electromagnetism:Conductance

urn:SSLy:Electromagnetism:Phase_difference

urn:SSLy:Electromagnetism:Electric_current_phasor

urn:SSLy:Electromagnetism:Voltage_phasor

urn:SSLy:Electromagnetism:Impedance

urn:SSLy:Electromagnetism:impedance_vacuum

urn:SSLy:Electromagnetism:wave_impedance_in_vacuum

urn:SSLy:Electromagnetism:Resistance_to_alternating_current

urn:SSLy:Electromagnetism:Reactance

urn:SSLy:Electromagnetism:Apparent_impedance

urn:SSLy:Electromagnetism:Admittance

urn:SSLy:Electromagnetism:admittance_vacuum

urn:SSLy:Electromagnetism:apparent_admittance

urn:SSLy:Electromagnetism:Conductance_for_alternating_current

urn:SSLy:Electromagnetism:Susceptance

urn:SSLy:Electromagnetism:Modulus_admittance

urn:SSLy:Electromagnetism:Quality_factor

urn:SSLy:Electromagnetism:Loss_factor

urn:SSLy:Electromagnetism:Loss_angle

urn:SSLy:Electromagnetism:Active_power

urn:SSLy:Electromagnetism:Apparent_power

urn:SSLy:Electromagnetism:Power_factor

urn:SSLy:Electromagnetism:Complex_power

urn:SSLy:Electromagnetism:Reactive_power

urn:SSLy:Electromagnetism:Non-active_power

urn:SSLy:Electromagnetism:Active_energy

urn:SSLy:Light:Speed_light_in_medium

urn:SSLy:Light:Refractive_index

urn:SSLy:Light:Electromagnetic_Radiant_energy

urn:SSLy:Light:Spectral_radiant_energy

urn:SSLy:Light:Radiant_energy_density

urn:SSLy:Light:Spectral_radiant_energy_density_terms_wavelength

urn:SSLy:Light:Spectral_radiant_energy_density_terms_wavenumber

urn:SSLy:Light:Radiant_flux,_radiant_power

urn:SSLy:Light:Spectral_radiant_flux

urn:SSLy:Light:Radial_intensity

urn:SSLy:Light:Spectral_radiant_intensity

urn:SSLy:Light:Radiance

urn:SSLy:Light:Spectral_radiance

urn:SSLy:Light:Irradiance

urn:SSLy:Light:Spectral_irradiance

urn:SSLy:Light:Radiant_exitance_(deprecated)

urn:SSLy:Light:Spectral_radial_exitance

urn:SSLy:Light:Radiant_exposure

urn:SSLy:Light:Spectral_radiant_exposure

urn:SSLy:Light:Luminous_efficiency

urn:SSLy:Light:Spectral_luminous_efficiency

urn:SSLy:Light:Luminous_efficacy_radiation

urn:SSLy:Light:Spectral_luminous_efficacy

urn:SSLy:Light:Maximum_luminous_efficacy

urn:SSLy:Light:Luminous_efficacy_source

urn:SSLy:Light:Luminous_energy_(deprecated)

urn:SSLy:Light:Luminous_intensity

urn:SSLy:Light:Luminance

urn:SSLy:Light:Luminous_exitance

urn:SSLy:Light:Luminous_exposure

urn:SSLy:Light:Photon_number

urn:SSLy:Light:Photon_energy

urn:SSLy:Light:Photon_flux

urn:SSLy:Light:Photon_intensity

urn:SSLy:Light:Photon_radiance

urn:SSLy:Light:Photon_irradiance

urn:SSLy:Light:Photon_exitance

urn:SSLy:Light:Photon_exposure

urn:SSLy:Light:Tristimulus_values_for_CIE_1931

urn:SSLy:Light:Tristimulus_values_for_CIE_1964

urn:SSLy:Light:CIE_colour-matching_functions_for_CIE_1931

urn:SSLy:Light:CIE_colour-matching_functions_for_CIE_1964

urn:SSLy:Light:Chromaticity_coordinates_CIE_1931

urn:SSLy:Light:Chromaticity_coordinates_CIE_1964

urn:SSLy:Light:Colour_temperature

urn:SSLy:Light:Correlated_colour_temperature

urn:SSLy:Light:Emissivity

urn:SSLy:Light:Emissivity_at_specified_wavelength

urn:SSLy:Light:Absorptance

urn:SSLy:Light:Luminous_absorptance

urn:SSLy:Light:Reflectance

urn:SSLy:Light:Luminous_reflectance

urn:SSLy:Light:Transmittance

urn:SSLy:Light:Luminous_transmittance

urn:SSLy:Light:Transmittance_optical_density

urn:SSLy:Light:Napierian_absorbance

urn:SSLy:Light:Radiance_factor

urn:SSLy:Light:Luminance_factor

urn:SSLy:Light:Reflectance_factor

urn:SSLy:Light:Linear_attenuation_coefficient

urn:SSLy:Light:Linear_absorption_coefficient

urn:SSLy:Light:Mass_attenuation_coefficient

urn:SSLy:Light:Mass_absorption_coefficient

urn:SSLy:Light:Molar_absorption_coefficient

urn:SSLy:Acoustics:Logarithmic_frequency_rate

urn:SSLy:Acoustics:Static_pressure

urn:SSLy:Acoustics:Sound_pressure

urn:SSLy:Acoustics:Sound_particle_displacement

urn:SSLy:Acoustics:Sound_particle_velocity

urn:SSLy:Acoustics:Sound_particle_acceleration

urn:SSLy:Acoustics:Volume_velocity,_volume_flow_rate

urn:SSLy:Acoustics:Sound_energy_density

urn:SSLy:Acoustics:Sound_energy

urn:SSLy:Acoustics:Sound_power

urn:SSLy:Acoustics:Sound_intensity

urn:SSLy:Acoustics:Sound_exposure

urn:SSLy:Acoustics:Characteristic_impedance_medium_for_longitudinal_waves

urn:SSLy:Acoustics:Acoustic_impedance

urn:SSLy:Acoustics:Sound_pressure_level

urn:SSLy:Acoustics:Sound_power_level

urn:SSLy:Acoustics:Sound_exposure_level

urn:SSLy:Acoustics:Reverberation_level

urn:SSLy:Phys_chem_mol_phys:Number_entities

urn:SSLy:Phys_chem_mol_phys:Amount_substance

urn:SSLy:Phys_chem_mol_phys:Relative_atomic_mass

urn:SSLy:Phys_chem_mol_phys:Molar_mass

urn:SSLy:Phys_chem_mol_phys:Molar_volume

urn:SSLy:Phys_chem_mol_phys:Molar_internal_energy

urn:SSLy:Phys_chem_mol_phys:Molar_enthalpy

urn:SSLy:Phys_chem_mol_phys:Molar_Helmholtz_energy

urn:SSLy:Phys_chem_mol_phys:Molar_Gibbs_energy

urn:SSLy:Phys_chem_mol_phys:Molar_heat_capacity

urn:SSLy:Phys_chem_mol_phys:Molar_entropy

urn:SSLy:Phys_chem_mol_phys:Particle_concentration

urn:SSLy:Phys_chem_mol_phys:Molecular_concentration

urn:SSLy:Phys_chem_mol_phys:Mass_concentration

urn:SSLy:Phys_chem_mol_phys:Mass_fraction

urn:SSLy:Phys_chem_mol_phys:Amount_substance_concentration

urn:SSLy:Phys_chem_mol_phys:Standard_amount_substance_concentration

urn:SSLy:Phys_chem_mol_phys:Amount_substance_fraction

urn:SSLy:Phys_chem_mol_phys:Volume_fraction

urn:SSLy:Phys_chem_mol_phys:Molality

urn:SSLy:Phys_chem_mol_phys:Latent_heat_phase_transition

urn:SSLy:Phys_chem_mol_phys:Chemical_potential

urn:SSLy:Phys_chem_mol_phys:Absolute_activity

urn:SSLy:Phys_chem_mol_phys:Partial_pressure

urn:SSLy:Phys_chem_mol_phys:Fugacity

urn:SSLy:Phys_chem_mol_phys:Standard_chemical_potential

urn:SSLy:Phys_chem_mol_phys:Activity_factor

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity

urn:SSLy:Phys_chem_mol_phys:Activity_solute

urn:SSLy:Phys_chem_mol_phys:Relative_activity_solute

urn:SSLy:Phys_chem_mol_phys:Activity_coefficient

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity

urn:SSLy:Phys_chem_mol_phys:Activity_solvent,_relative_activity_solvent

urn:SSLy:Phys_chem_mol_phys:Osmotic_factor_solvent,_osmotic_coefficient_solvent

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity_solvent

urn:SSLy:Phys_chem_mol_phys:Osmotic_pressure

urn:SSLy:Phys_chem_mol_phys:Stoichiometric_number_substance

urn:SSLy:Phys_chem_mol_phys:Affinity_chemical_reaction

urn:SSLy:Phys_chem_mol_phys:Extent_reaction

urn:SSLy:Phys_chem_mol_phys:Standard_equilibrium_constant

urn:SSLy:Phys_chem_mol_phys:Equilibrium_constant_pressure_basis

urn:SSLy:Phys_chem_mol_phys:Equilibrium_constant_concentration_basis

urn:SSLy:Phys_chem_mol_phys:Microcanonical_partition_function

urn:SSLy:Phys_chem_mol_phys:Canonical_partition_function

urn:SSLy:Phys_chem_mol_phys:Grand-canonical_partition_function

urn:SSLy:Phys_chem_mol_phys:Molecular_partition_function

urn:SSLy:Phys_chem_mol_phys:Partition_function_molecule

urn:SSLy:Phys_chem_mol_phys:Statistical_weight_subsystem

urn:SSLy:Phys_chem_mol_phys:Degeneracy,_multiplicity

urn:SSLy:Phys_chem_mol_phys:Molar_gas_constant

urn:SSLy:Phys_chem_mol_phys:Specific_gas_constant

urn:SSLy:Phys_chem_mol_phys:Mean_free_path

urn:SSLy:Phys_chem_mol_phys:Diffusion_coefficient

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_ratio

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_factor

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_coefficient

urn:SSLy:Phys_chem_mol_phys:Ionic_strength

urn:SSLy:Phys_chem_mol_phys:Degree_dissociation,_dissociation_fraction

urn:SSLy:Phys_chem_mol_phys:Electrolytic_conductivity

urn:SSLy:Phys_chem_mol_phys:Molar_conductivity

urn:SSLy:Phys_chem_mol_phys:Transport_number__ion_B,_current_fraction__ion_B

urn:SSLy:Phys_chem_mol_phys:Angle_optical_rotation

urn:SSLy:Phys_chem_mol_phys:Molar_optical_rotatory_power

urn:SSLy:Phys_chem_mol_phys:Specific_optical_rotatory_power

urn:SSLy:Phys_chem_mol_phys: Need_for_additional_field_for_concept_B?

urn:SSLy:Atomic_nuclear_phys:Atomic_number

urn:SSLy:Atomic_nuclear_phys:Neutron_number

urn:SSLy:Atomic_nuclear_phys:Nucleon_number

urn:SSLy:Atomic_nuclear_phys:Rest_mass

urn:SSLy:Atomic_nuclear_phys:Rest_energy

urn:SSLy:Atomic_nuclear_phys:Atomic_mass

urn:SSLy:Atomic_nuclear_phys:Nuclidic_mass

urn:SSLy:Atomic_nuclear_phys:Unified_atomic_mass_constant

urn:SSLy:Atomic_nuclear_phys:Elementary_charge

urn:SSLy:Atomic_nuclear_phys:Charge_number

urn:SSLy:Atomic_nuclear_phys:Bohr_radius

urn:SSLy:Atomic_nuclear_phys:Rydberg_constant

urn:SSLy:Atomic_nuclear_phys:Hartree_energy

urn:SSLy:Atomic_nuclear_phys:Magnetic_dipole_moment

urn:SSLy:Atomic_nuclear_phys:Bohr_magneton

urn:SSLy:Atomic_nuclear_phys:Nuclear_magneton

urn:SSLy:Atomic_nuclear_phys:Spin

urn:SSLy:Atomic_nuclear_phys:Total_angular_momentum

urn:SSLy:Atomic_nuclear_phys:Gyromagnetic_ratio

urn:SSLy:Atomic_nuclear_phys:Gyromagnetic_ratio__electron

urn:SSLy:Atomic_nuclear_phys:Quantum_number

urn:SSLy:Atomic_nuclear_phys:Principal_quantum_number

urn:SSLy:Atomic_nuclear_phys:Orbital_angular_momentum_quantum_number

urn:SSLy:Atomic_nuclear_phys:Magnetic_quantum_number

urn:SSLy:Atomic_nuclear_phys:Spin_quantum_number

urn:SSLy:Atomic_nuclear_phys:Total_angular_momentum_quantum_number

urn:SSLy:Atomic_nuclear_phys:Nuclear_spin_quantum_number

urn:SSLy:Atomic_nuclear_phys:Hyperfine_structure_quantum_number

urn:SSLy:Atomic_nuclear_phys:Landé_factor

urn:SSLy:Atomic_nuclear_phys:g_factor

urn:SSLy:Atomic_nuclear_phys:Larmor_angular_frequency

urn:SSLy:Atomic_nuclear_phys:Larmor_frequency

urn:SSLy:Atomic_nuclear_phys:Nuclear_precession_angular_frequency

urn:SSLy:Atomic_nuclear_phys:Cyclotron_angular_frequency

urn:SSLy:Atomic_nuclear_phys:Gyroradius

urn:SSLy:Atomic_nuclear_phys:Nuclear_quadrupole_moment

urn:SSLy:Atomic_nuclear_phys:Nuclear_radius

urn:SSLy:Atomic_nuclear_phys:Electron_radius

urn:SSLy:Atomic_nuclear_phys:Compton_wavelength

urn:SSLy:Atomic_nuclear_phys:Mass_excess

urn:SSLy:Atomic_nuclear_phys:Mass_defect

urn:SSLy:Atomic_nuclear_phys:Relative_mass_excess

urn:SSLy:Atomic_nuclear_phys:Relative_mass_defect

urn:SSLy:Atomic_nuclear_phys:packing_fraction

urn:SSLy:Atomic_nuclear_phys:Binding_fraction

urn:SSLy:Atomic_nuclear_phys:Decay_constant

urn:SSLy:Atomic_nuclear_phys:Mean_duration_life

urn:SSLy:Atomic_nuclear_phys:Level_width

urn:SSLy:Atomic_nuclear_phys:Activity

urn:SSLy:Atomic_nuclear_phys:Specific_activity

urn:SSLy:Atomic_nuclear_phys:Activity_density

urn:SSLy:Atomic_nuclear_phys:Surface-activity_density

urn:SSLy:Atomic_nuclear_phys:Half_life

urn:SSLy:Atomic_nuclear_phys:Alpha_disintegration_energy

urn:SSLy:Atomic_nuclear_phys:Maximum_beta-particle_energy

urn:SSLy:Atomic_nuclear_phys:Beta_disintegration_energy

urn:SSLy:Atomic_nuclear_phys:Internal_conversion_factor

urn:SSLy:Atomic_nuclear_phys:Particle_emission_rate

urn:SSLy:Atomic_nuclear_phys:Reaction_energy

urn:SSLy:Atomic_nuclear_phys:Resonance_energy

urn:SSLy:Atomic_nuclear_phys:Cross_section

urn:SSLy:Atomic_nuclear_phys:Total_cross_section

urn:SSLy:Atomic_nuclear_phys:Direction_distribution_cross_section

urn:SSLy:Atomic_nuclear_phys:Energy_distribution_cross_section

urn:SSLy:Atomic_nuclear_phys:Direction_and_energy_distribution_cross_section

urn:SSLy:Atomic_nuclear_phys:Volumic_cross_section

urn:SSLy:Atomic_nuclear_phys:Volumic_total_cross_section

urn:SSLy:Atomic_nuclear_phys:Particle_fluence

urn:SSLy:Atomic_nuclear_phys:Particle_fluence_rate

urn:SSLy:Atomic_nuclear_phys:Ionic_radiant_energy

urn:SSLy:Atomic_nuclear_phys:Energy_influence

urn:SSLy:Atomic_nuclear_phys:Energy_influence_rate

urn:SSLy:Atomic_nuclear_phys:Particle_current_density

urn:SSLy:Atomic_nuclear_phys:Linear_attenuation_coefficient

urn:SSLy:Atomic_nuclear_phys:Mass_attenuation_coefficient

urn:SSLy:Atomic_nuclear_phys:Molar_attenuation_coefficient

urn:SSLy:Atomic_nuclear_phys:Atomic_attenuation_coefficient

urn:SSLy:Atomic_nuclear_phys:Half-value_thickness

urn:SSLy:Atomic_nuclear_phys:Total_linear_stopping_power

urn:SSLy:Atomic_nuclear_phys:Total_mass_stopping_power

urn:SSLy:Atomic_nuclear_phys:Mean_linear_range

urn:SSLy:Atomic_nuclear_phys:Mean_mass_range

urn:SSLy:Atomic_nuclear_phys:Linear_ionization

urn:SSLy:Atomic_nuclear_phys:Total_ionization

urn:SSLy:Atomic_nuclear_phys:Average_energy_loss_per_elementary_charge_produced

urn:SSLy:Atomic_nuclear_phys:Mobility

urn:SSLy:Atomic_nuclear_phys:Particle_number_density

urn:SSLy:Atomic_nuclear_phys:Ion_numbed_density

urn:SSLy:Atomic_nuclear_phys:Recombination_coefficient

urn:SSLy:Atomic_nuclear_phys:Diffusion_coefficient

urn:SSLy:Atomic_nuclear_phys:Diffusion_coefficient_for_fluence_rate

urn:SSLy:Atomic_nuclear_phys:Particle_source_density

urn:SSLy:Atomic_nuclear_phys:Slowing-down_density

urn:SSLy:Atomic_nuclear_phys:Resonance_escape_probability

urn:SSLy:Atomic_nuclear_phys:Lethargy

urn:SSLy:Atomic_nuclear_phys:Average_logarithmic_energy_decrement

urn:SSLy:Atomic_nuclear_phys:Mean_free_path

urn:SSLy:Atomic_nuclear_phys:Slowing-down_area

urn:SSLy:Atomic_nuclear_phys:Diffusion_area

urn:SSLy:Atomic_nuclear_phys:Migration_area

urn:SSLy:Atomic_nuclear_phys:Slowing-down_length

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urn:SSLy:Atomic_nuclear_phys:Migration_length

urn:SSLy:Atomic_nuclear_phys:Neutron_yield_per_absorption

urn:SSLy:Atomic_nuclear_phys:Fast_fission_factor

urn:SSLy:Atomic_nuclear_phys:Thermal_utilization_factor

urn:SSLy:Atomic_nuclear_phys:Non-leakage_probability

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urn:SSLy:Atomic_nuclear_phys:Infinite_multiplication_factor

urn:SSLy:Atomic_nuclear_phys:Reactor_time_constant

urn:SSLy:Atomic_nuclear_phys:Energy_imparted

urn:SSLy:Atomic_nuclear_phys:Main_energy_imparted

urn:SSLy:Atomic_nuclear_phys:Absorbed_dose

urn:SSLy:Atomic_nuclear_phys:Specific_energy_imparted

urn:SSLy:Atomic_nuclear_phys:Quality_factor_ionizing_radiation

urn:SSLy:Atomic_nuclear_phys:Dose_equivalent

urn:SSLy:Atomic_nuclear_phys:Dose_equivalent_rate

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urn:SSLy:Atomic_nuclear_phys:Kerma

urn:SSLy:Atomic_nuclear_phys:Kerma_rate

urn:SSLy:Atomic_nuclear_phys:Mass_energy-transfer_coefficient

urn:SSLy:Atomic_nuclear_phys:Exposure

urn:SSLy:Atomic_nuclear_phys:Exposure_rate

urn:SSLy:Characteristic_numbers:Reynolds_number

urn:SSLy:Characteristic_numbers:Euler_number

urn:SSLy:Characteristic_numbers:Froude_number

urn:SSLy:Characteristic_numbers:Grash_number

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urn:SSLy:Characteristic_numbers:Bagnold_number

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urn:SSLy:Characteristic_numbers:Ekman_number

urn:SSLy:Characteristic_numbers:Elasticity_number

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urn:SSLy:Characteristic_numbers:Reech_number

urn:SSLy:Characteristic_numbers:Stokes_number_time_related

urn:SSLy:Characteristic_numbers:Stokes_number_vibrating_particles

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urn:SSLy:Characteristic_numbers:Stokes_number_gravity

urn:SSLy:Characteristic_numbers:Stokes_number_drag

urn:SSLy:Characteristic_numbers:Laplace_number

urn:SSLy:Characteristic_numbers:Blake_number

urn:SSLy:Characteristic_numbers:Sommerfeld_number

urn:SSLy:Characteristic_numbers:Taylor_number_momentum_transfer

urn:SSLy:Characteristic_numbers:Galilei_number

urn:SSLy:Characteristic_numbers:Womersley_number

urn:SSLy:Characteristic_numbers:Fourier_number

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urn:SSLy:Characteristic_numbers:Rayleigh_number

urn:SSLy:Characteristic_numbers:Froude_number

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urn:SSLy:Characteristic_numbers:Blot_number

urn:SSLy:Characteristic_numbers:Stanton_number

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urn:SSLy:Characteristic_numbers:Bejan_number_heat_transfer

urn:SSLy:Characteristic_numbers:Bejan_number_entropy

urn:SSLy:Characteristic_numbers:Stefan_number

urn:SSLy:Characteristic_numbers:Brinkman_number

urn:SSLy:Characteristic_numbers:Clausius_number

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urn:SSLy:Characteristic_numbers:Pomerantsev_number

urn:SSLy:Characteristic_numbers:Boltzmann_number

urn:SSLy:Characteristic_numbers:Stark_number

urn:SSLy:Condensed_matter_phys:Lattice_vector

urn:SSLy:Condensed_matter_phys:Fundamental_lattice_vectors

urn:SSLy:Condensed_matter_phys:Angular_reciprocal_lattice_vector

urn:SSLy:Condensed_matter_phys:Fundamental_reciprocal_lattice_vectors

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urn:SSLy:Condensed_matter_phys:Short-range_order_parameter

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urn:SSLy:Condensed_matter_phys:Atomic_scattering_factor

urn:SSLy:Condensed_matter_phys:Structure_factor

urn:SSLy:Condensed_matter_phys:Burgers_vector

urn:SSLy:Condensed_matter_phys:Particle_position_vector

urn:SSLy:Condensed_matter_phys:Equilibrium_position_vector

urn:SSLy:Condensed_matter_phys:Displacement_vector

urn:SSLy:Condensed_matter_phys:Debye-Waller_factor

urn:SSLy:Condensed_matter_phys:Angular_wavenumber

urn:SSLy:Condensed_matter_phys:Fermi_angular_wavenumber

urn:SSLy:Condensed_matter_phys:Debye_angular_wavenumber

urn:SSLy:Condensed_matter_phys:Debye_angular_frequency

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urn:SSLy:Condensed_matter_phys:Density_vibration_states

urn:SSLy:Condensed_matter_phys:Thermodynamic_Grüneisen_parameter

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urn:SSLy:Condensed_matter_phys:Mean_free_path_photons

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urn:SSLy:Condensed_matter_phys:Energy_density_states

urn:SSLy:Condensed_matter_phys:Residual_resistivity

urn:SSLy:Condensed_matter_phys:Lorenz_coefficient

urn:SSLy:Condensed_matter_phys:Hall_coefficient

urn:SSLy:Condensed_matter_phys:Thermoelectric_voltage

urn:SSLy:Condensed_matter_phys:Seebeck_coefficient

urn:SSLy:Condensed_matter_phys:Peltier_coefficient

urn:SSLy:Condensed_matter_phys:Thomson_coefficient

urn:SSLy:Condensed_matter_phys:Work_function

urn:SSLy:Condensed_matter_phys:Ionization_energy

urn:SSLy:Condensed_matter_phys:Electron_affinity

urn:SSLy:Condensed_matter_phys:Richardson_constant

urn:SSLy:Condensed_matter_phys:Fermy_energy

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urn:SSLy:Condensed_matter_phys:Fermi_temperature

urn:SSLy:Condensed_matter_phys:Electron_density

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urn:SSLy:Condensed_matter_phys:Donor_density

urn:SSLy:Condensed_matter_phys:Acceptor_density

urn:SSLy:Condensed_matter_phys:Effective_mass

urn:SSLy:Condensed_matter_phys:Mobility_ratio

urn:SSLy:Condensed_matter_phys:Relaxation_time

urn:SSLy:Condensed_matter_phys:Carrier_lifetime

urn:SSLy:Condensed_matter_phys:Diffusion_length

urn:SSLy:Condensed_matter_phys:Exchange_integral

urn:SSLy:Condensed_matter_phys:Curie_temperature

urn:SSLy:Condensed_matter_phys:Néel_temperature

urn:SSLy:Condensed_matter_phys:Superconductor_transition_temperature

urn:SSLy:Condensed_matter_phys:Thermodynamic_critical_magnetic_flux_density

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urn:SSLy:Condensed_matter_phys:Upper_critical_magnetic_flux_density

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urn:SSLy:Condensed_matter_phys:London_penetration_gap

urn:SSLy:Condensed_matter_phys:Coherence_length

urn:SSLy:info_science_tech:Traffic_intensity

urn:SSLy:info_science_tech:Traffic_offered_intensity

urn:SSLy:info_science_tech:traffic load

urn:SSLy:info_science_tech:Mean_queue_length

urn:SSLy:info_science_tech:Loss_probability

urn:SSLy:info_science_tech:Waiting_probability

urn:SSLy:info_science_tech:Call_intensity

urn:SSLy:info_science_tech:Completed_call_intensity

urn:SSLy:info_science_tech:Storage_capacity

urn:SSLy:info_science_tech:Equivalent_binary_storage_capacity

urn:SSLy:info_science_tech:Transfer_rate

urn:SSLy:info_science_tech:Period_data_elements

urn:SSLy:info_science_tech:bit_rate

urn:SSLy:info_science_tech:bit_period

urn:SSLy:info_science_tech:equivalent_bit_rate

urn:SSLy:info_science_tech:Modulation_rate

urn:SSLy:info_science_tech:Quantizing_distortion_power

urn:SSLy:info_science_tech:Carrier_power

urn:SSLy:info_science_tech:Signal_energy_per_binary_digit

urn:SSLy:info_science_tech:Error_probability

urn:SSLy:info_science_tech:Hamming_distance

urn:SSLy:info_science_tech:Clock_frequency

urn:SSLy:info_science_tech:Decision_content

urn:SSLy:info_science_tech:Information_content

urn:SSLy:info_science_tech:Information_entropy

urn:SSLy:info_science_tech:Maximum_entropy

urn:SSLy:info_science_tech:Relative_entropy

urn:SSLy:info_science_tech:Redundancy

urn:SSLy:info_science_tech:Relative_redundancy

urn:SSLy:info_science_tech:Joint_information_content

urn:SSLy:info_science_tech:Conditional_information_content

urn:SSLy:info_science_tech:Conditional_entropy

urn:SSLy:info_science_tech:Equivocation

urn:SSLy:info_science_tech:Irrelevance

urn:SSLy:info_science_tech:Transinformation_content

urn:SSLy:info_science_tech:Mean_transinformation_content

urn:SSLy:info_science_tech:Character_mean_entropy

urn:SSLy:info_science_tech:Average_information_rate

urn:SSLy:info_science_tech:Character_mean_transinformation_content

urn:SSLy:info_science_tech:Average_transinformation_rate

urn:SSLy:info_science_tech:Channel_capacity_per_character

urn:SSLy:info_science_tech:Channel_time_capacity

urn:SSLy:monitoring:Operational_status

urn:SSLy:monitoring:Status_not_started

urn:SSLy:monitoring:Status_stopped

urn:SSLy:monitoring:Status_active

urn:SSLy:monitoring:Status_disrupted

urn:SSLy:monitoring:Status_disabled

urn:SSLy:monitoring:Status_enabled

urn:SSLy:monitoring:Status_malfunctioning

urn:SSLy:monitoring:Device_work_status

urn:SSLy:monitoring:Device_status_able_to_work

urn:SSLy:monitoring:Device_Status_malfunctioning

urn:SSLy:monitoring:Device_status_unable_to_work

urn:SSLy:monitoring:Cause

urn:SSLy:monitoring:Trust_status

urn:SSLy:monitoring:Trust_status_pending_approval

urn:SSLy:monitoring:Trust_status_approved

urn:SSLy:monitoring:Trust_status_untrusted

urn:SSLy:monitoring:Trust_status_unreliable

urn:SSLy:monitoring:Trust_status_compromised

urn:SSLy:monitoring:Alarm

urn:SSLy:monitoring:Origin_data_type

urn:SSLy:monitoring:Origin_type_actual

urn:SSLy:monitoring:Origin_type_predicted

urn:SSLy:monitoring:Origin_data_simulated

urn:SSLy:monitoring:Warning threshold

urn:SSLy:monitoring:Alarm Threshold

urn:SSLy:facilities:Facility_type

urn:SSLy:facilities:Facility_type_Hotel

urn:SSLy:facilities:Facility_type_Hospital

urn:SSLy:facilities:Facility_type_Clinic

urn:SSLy:facilities:Facility_type_Theater

urn:SSLy:facilities:Facility_type_Stadium

urn:SSLy:facilities:Facility_type_Warehouse

urn:SSLy:facilities:Facility_type_Police_Station

urn:SSLy:facilities:Facility_type_Firefighter_Station

urn:SSLy:facilities:Facility_type_Military_quarters

urn:SSLy:facilities:Facility_type_Electric_Power_Plant

urn:SSLy:facilities:Facility_type_Oil_Refinery

urn:SSLy:facilities:Facility_type_Oil_Store

urn:SSLy:facilities:Facility_type_Transmissions_Towe

urn:SSLy:facilities:Facility_type_Electricity_Transport_Line

urn:SSLy:facilities:Facility_type_Oil_Pipeline

urn:SSLy:facilities:Facility_type_Gas_Pipeline

urn:SSLy:facilities:Facility_type_Inland_Waterways

urn:SSLy:facilities:Facility_type_Water_Processing_Plant

urn:SSLy:facilities:Facility_type_Deaslination_Plant

urn:SSLy:facilities:Total_Capacity

urn:SSLy:facilities:Total_Capacity_Units

urn:SSLy:facilities:Current_availability

urn:SSLy:facilities:Operational_status

urn:SSLy:facilities:Operational_status_Decomissioned

urn:SSLy:facilities:Operational_status_idle

urn:SSLy:facilities:Operational_status_Non-operational

urn:SSLy:facilities:Operational_status_Partially_Operational

urn:SSLy:facilities:Operational_status_Fully_operational

urn:SSLy:facilities:Can_cause_when_working

urn:SSLy:facilities:Can_cause_when_idle

urn:SSLy:facilities:Possible_threat_cases

urn:SSLy:facilities:Invaluable_assets

urn:SSLy:facilities:Use

urn:SSLy:facilities:Construction_year

urn:SSLy:facilities:Last_Renovation_Year

urn:SSLy:facilities:Construction_material

urn:SSLy:facilities:Construction_material_Reinforced_Concrete

urn:SSLy:facilities:Construction_material_Masonry

urn:SSLy:facilities:Construction_material_Steel

urn:SSLy:facilities:Construction_material_Timber

urn:SSLy:facilities:Construction_material_Pre-cast_Concrete

urn:SSLy:facilities:Construction_material_Other

urn:SSLy:facilities:accuracy_year_construction

urn:SSLy:facilities:Number_floors_on_ground

urn:SSLy:facilities:Number_Basements

urn:SSLy:facilities:Number_occupants

urn:SSLy:damage_assessment:building_code

urn:SSLy:damage_assessment:Damage_Cause

urn:SSLy:damage_assessment:Damage_Type

urn:SSLy:damage_assessment:Damage_Level

urn:SSLy:damage_assessment:Damage_Level_Structural

urn:SSLy:damage_assessment:Damage_Level_Non-structural

urn:SSLy:damage_assessment:Damage_Level_Soil

urn:SSLy:damage_assessment:Damage_Level_External

urn:SSLy:damage_assessment:Damage_Type

urn:SSLy:damage_assessment:Damage_Floor

urn:SSLy:other:Compound

urn:SSLy:other:Agent_type

urn:SSLy:other:Chem_spectrum_list

urn:SSLy:other:Pollutant

urn:SSLy:other:Video_stream

urn:SSLy:other:Audio_stream

urn:SSLy:other:Video_file

urn:SSLy:other:Audio_file

urn:SSLy:other:Region_name

urn:SSLy:other:Population_name

urn:SSLy:other:Number_inhabitants

urn:SSLy:other:Sensor_message

D.2 URNs for the synonyms of the field names

urn:SSLy:General:Plane_angle:synonyms:''

urn:SSLy:General:Solid_angle:synonyms:''

urn:SSLy:General:Frequency:synonyms:''

urn:SSLy:General:Activity_radionuclide:synonyms:''

urn:SSLy:General:Absorbed_dose:synonyms:''

urn:SSLy:General:Close_equivalent:synonyms:''

urn:SSLy:General:Catalytic_activity:synonyms:''

urn:SSLy:General:Force:synonyms:''

urn:SSLy:General:Pressure:synonyms:'stress'

urn:SSLy:General:Power:synonyms:''

urn:SSLy:General:Energy:synonyms:''

urn:SSLy:General:Celsius_temperature:synonyms:''

urn:SSLy:General:Electric_charge:synonyms:''

urn:SSLy:General:Magnetic_flux:synonyms:'Magnetic flow'

urn:SSLy:General:Magnetic_flux_density:synonyms:'Magnetic flow density'

urn:SSLy:General:Capacitance:synonyms:''

urn:SSLy:General:Luminous_flux:synonyms:''

urn:SSLy:General:Illuminance:synonyms:''

urn:SSLy:Space_time:Length:synonyms:''

urn:SSLy:Space_time:Width:synonyms:'Breadth'

urn:SSLy:Space_time:Height:synonyms:'depth, altitude'

urn:SSLy:Space_time:Diameter:synonyms:''

urn:SSLy:Space_time:Radius:synonyms:''

urn:SSLy:Space_time:Path_length:synonyms:'Arc length'

urn:SSLy:Space_time:Arc_length:synonyms:'Path Lenght'

urn:SSLy:Space_time:Distance:synonyms:''

urn:SSLy:Space_time:Radial_distance:synonyms:''

urn:SSLy:Space_time:Position_vector:synonyms:''

urn:SSLy:Space_time:Displacement:synonyms:''

urn:SSLy:Space_time:Curvature:synonyms:''

urn:SSLy:Space_time:Area:synonyms:'surface'

urn:SSLy:Space_time:Volume:synonyms:''

urn:SSLy:Space_time:Angular_measure:synonyms:''

urn:SSLy:Space_time:Rotational_displacement:synonyms:''

urn:SSLy:Space_time:Angular_displacement:synonyms:''

urn:SSLy:Space_time:Phase_angle::synonyms:''

urn:SSLy:Space_time:Solid_angular_measure:synonyms:''

urn:SSLy:Space_time:Duration:synonyms:''

urn:SSLy:Space_time:Velocity:synonyms:''

urn:SSLy:Space_time:Speed:synonyms:''

urn:SSLy:Space_time:Acceleration:synonyms:''

urn:SSLy:Space_time:Angular_velocity:synonyms:''

urn:SSLy:Space_time:Angular_acceleration:synonyms:''

urn:SSLy:Space_time:Period_duration,_period:synonyms:''

urn:SSLy:Space_time:Time_constant:synonyms:''

urn:SSLy:Space_time:Rotation:synonyms:''

urn:SSLy:Space_time:Rotation_frequency:synonyms:''

urn:SSLy:Space_time:Rotational_frequency:synonyms:''

urn:SSLy:Space_time:Angular_frequency:synonyms:''

urn:SSLy:Space_time:Wavelength:synonyms:''

urn:SSLy:Space_time:Repetency :synonyms:''

urn:SSLy:Space_time:Wavenumber:synonyms:''

urn:SSLy:Space_time:Wave_vector:synonyms:''

urn:SSLy:Space_time:Angular_repetency:synonyms:''

urn:SSLy:Space_time:Angular_wavenumber:synonyms:''

urn:SSLy:Space_time:Phase_velocity:synonyms:''

urn:SSLy:Space_time:Phase_speed:synonyms:''

urn:SSLy:Space_time:Group_velocity:synonyms:''

urn:SSLy:Space_time:Group_speed:synonyms:''

urn:SSLy:Space_time:Damping_coefficient:synonyms:''

urn:SSLy:Space_time:Logarithmic_decrement:synonyms:''

urn:SSLy:Space_time:Attenuation:synonyms:''

urn:SSLy:Space_time:Extinction:synonyms:''

urn:SSLy:Space_time:Phase_coefficient:synonyms:''

urn:SSLy:Space_time:Propagation_coefficient:synonyms:''

urn:SSLy:Mechanics:Mass:synonyms:''

urn:SSLy:Mechanics:Density:synonyms:''

urn:SSLy:Mechanics:Mass_density:synonyms:''

urn:SSLy:Mechanics:Specific_Volume:synonyms:''

urn:SSLy:Mechanics:Relative_density:synonyms:'relative mass density'

urn:SSLy:Mechanics:Specific_volume:synonyms:''

urn:SSLy:Mechanics:Relative_density:synonyms:''

urn:SSLy:Mechanics:Relative_mass_density:synonyms:''

urn:SSLy:Mechanics:Surface_density:synonyms:''

urn:SSLy:Mechanics:Surface_mass_density:synonyms:''

urn:SSLy:Mechanics:Linear_density:synonyms:''

urn:SSLy:Mechanics:Linear_mass_density:synonyms:''

urn:SSLy:Mechanics:Moment_inertia:synonyms:''

urn:SSLy:Mechanics:Momentum:synonyms:''

urn:SSLy:Mechanics:Weight:synonyms:''

urn:SSLy:Mechanics:Static_friction:synonyms:'Static friction force'

urn:SSLy:Mechanics:Kinetic_friction:synonyms:''

urn:SSLy:Mechanics:Dynamic_friction_force:synonyms:''

urn:SSLy:Mechanics:Rolling_resistance:synonyms:''

urn:SSLy:Mechanics:Rolling_drag:synonyms:''

urn:SSLy:Mechanics:Rolling_friction_mode:synonyms:''

urn:SSLy:Mechanics:Drag_force:synonyms:''

urn:SSLy:Mechanics:Impulse:synonyms:''

urn:SSLy:Mechanics:Angular_momentum:synonyms:''

urn:SSLy:Mechanics:Torque:synonyms:''

urn:SSLy:Mechanics:Angular_impulse:synonyms:''

urn:SSLy:Mechanics:Gauge_pressure:synonyms:''

urn:SSLy:Mechanics:Normal_stress:synonyms:''

urn:SSLy:Mechanics:Shear_stress:synonyms:''

urn:SSLy:Mechanics:Strain:synonyms:''

urn:SSLy:Mechanics:Relative_linear_strain:synonyms:''

urn:SSLy:Mechanics:Shear_strain:synonyms:''

urn:SSLy:Mechanics:Relative_volume_strain:synonyms:''

urn:SSLy:Mechanics:Poisson_number:synonyms:''

urn:SSLy:Mechanics:Modulus_elasticity:synonyms:'young modulus'

urn:SSLy:Mechanics:Modulus_compression:synonyms:'bulk modulus'

urn:SSLy:Mechanics:Compressibility:synonyms:''

urn:SSLy:Mechanics:Second_axial_moment_area:synonyms:''

urn:SSLy:Mechanics:Second_polar_moment_area:synonyms:''

urn:SSLy:Mechanics:Section_modulus:synonyms:''

urn:SSLy:Mechanics:Static_friction_coefficient:synonyms:'coefficient of static friction'

urn:SSLy:Mechanics:Kinetic_friction_factor:synonyms:'dynamic friction factor'

urn:SSLy:Mechanics:Rolling_resistance_factor:synonyms:''

urn:SSLy:Mechanics:Drag_factor:synonyms:''

urn:SSLy:Mechanics:Viscosity:synonyms:'Dynamic viscosity'

urn:SSLy:Mechanics:Kinematic_viscosity:synonyms:''

urn:SSLy:Mechanics:Surface_tension:synonyms:''

urn:SSLy:Mechanics:Potential_energy:synonyms:''

urn:SSLy:Mechanics:Kinetic_energy:synonyms:''

urn:SSLy:Mechanics:Mechanical_energy:synonyms:''

urn:SSLy:Mechanics:Work,_mechanical_work:synonyms:''

urn:SSLy:Mechanics:Efficiency:synonyms:''

urn:SSLy:Mechanics:Mass_flow:synonyms:''

urn:SSLy:Mechanics:Mass_flow_rate:synonyms:''

urn:SSLy:Mechanics:Mass_change_rate:synonyms:''

urn:SSLy:Mechanics:Volume_flow_rate:synonyms:'wind speed (specific for wind)'

urn:SSLy:Mechanics:Action:synonyms:''

urn:SSLy:Thermodynamics:Temperature:synonyms:'Thermodynamic temperature'

urn:SSLy:Thermodynamics:Linear_expansion_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Cubic_expansion_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Relative_expansion_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Relative_pressure_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Pressure_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Isothermal_compressibility:synonyms:''

urn:SSLy:Thermodynamics:Isentropic_compressibility:synonyms:''

urn:SSLy:Thermodynamics:Heat:synonyms:'amount of heat'

urn:SSLy:Thermodynamics:Latent_heat:synonyms:''

urn:SSLy:Thermodynamics:Heat_flow_rate:synonyms:''

urn:SSLy:Thermodynamics:Density_heat_flow_rate:synonyms:''

urn:SSLy:Thermodynamics:Thermal_conductivity:synonyms:''

urn:SSLy:Thermodynamics:Coefficient_heat_transfer:synonyms:''

urn:SSLy:Thermodynamics:Surface_coefficient_heat_transfer:synonyms:''

urn:SSLy:Thermodynamics:Thermal_insulance:synonyms:'coefficient of thermal insulancethermal resistance in building technology'

urn:SSLy:Thermodynamics:Thermal_resistance:synonyms:''

urn:SSLy:Thermodynamics:Thermal_conductance:synonyms:'transfer coefficient'

urn:SSLy:Thermodynamics:Thermal_diffusivity:synonyms:''

urn:SSLy:Thermodynamics:Heat_capacity:synonyms:''

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_constant_pressure:synonyms:''

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_constant_volume:synonyms:''

urn:SSLy:Thermodynamics:Specific_heat_capacity_at_saturated_vapour_pressure:synonyms:''

urn:SSLy:Thermodynamics:Ratio_specific_heat_capacities:synonyms:''

urn:SSLy:Thermodynamics:Isentropic_exponent:synonyms:', isentropic expansion factor'

urn:SSLy:Thermodynamics:Entropy:synonyms:''

urn:SSLy:Thermodynamics:Specific_entropy:synonyms:''

urn:SSLy:Thermodynamics:Internal_Energy,_thermodynamic_energy:synonyms:''

urn:SSLy:Thermodynamics:Enthalpy:synonyms:''

urn:SSLy:Thermodynamics:Helmboltz_energy:synonyms:', Hemboltz function'

urn:SSLy:Thermodynamics:Gibbs_energy:synonyms:', Gibbs function'

urn:SSLy:Thermodynamics:Specific_energy:synonyms:''

urn:SSLy:Thermodynamics:Specific_internal_energy:synonyms:', specific thermodynamic energy'

urn:SSLy:Thermodynamics:Specific_enthalpy:synonyms:''

urn:SSLy:Thermodynamics:Specific_Helmholtz_energy:synonyms:', specific Helmholtz function'

urn:SSLy:Thermodynamics:Specific_Gibbs_energy:synonyms:''

urn:SSLy:Thermodynamics:Specific_Gibbs_function:synonyms:''

urn:SSLy:Thermodynamics:Massieu_function:synonyms:''

urn:SSLy:Thermodynamics:Planck_function:synonyms:''

urn:SSLy:Thermodynamics:Joule-Thomson_coefficient:synonyms:''

urn:SSLy:Thermodynamics:Thermodynamic_Efficiency:synonyms:''

urn:SSLy:Thermodynamics:Maximum_efficiency:synonyms:''

urn:SSLy:Thermodynamics:Specific_gas_constant:synonyms:''

urn:SSLy:Thermodynamics:Mass_concentration_water:synonyms:''

urn:SSLy:Thermodynamics:Mass_concentration_water_vapour:synonyms:', absolute humidity'

urn:SSLy:Thermodynamics:Mass_ratio_water_to_dry_matter:synonyms:''

urn:SSLy:Thermodynamics:Mass_ratio_water_vapour_to_dry_gas:synonyms:''

urn:SSLy:Thermodynamics:Mass_fraction_water:synonyms:''

urn:SSLy:Thermodynamics:Mass_fraction_dry_matter:synonyms:''

urn:SSLy:Thermodynamics:Relative_humidity:synonyms:''

urn:SSLy:Thermodynamics:Relative_mass_concentration_vapour:synonyms:''

urn:SSLy:Thermodynamics:Relative_mass_ratio_vapour:synonyms:''

urn:SSLy:Thermodynamics:Dew-point_temperature:synonyms:''

urn:SSLy:Electromagnetism:Electric current:synonyms:''

urn:SSLy:Electromagnetism:Elementary_charge:synonyms:''

urn:SSLy:Electromagnetism:Electric_charge_density:synonyms:'volumetric electric charge'

urn:SSLy:Electromagnetism:Surface_density_electric_charge:synonyms:''

urn:SSLy:Electromagnetism:Linear_density_electric_charge:synonyms:''

urn:SSLy:Electromagnetism:Electric_dipole_moment:synonyms:''

urn:SSLy:Electromagnetism:Electric_polarization:synonyms:''

urn:SSLy:Electromagnetism:Electric_current_density:synonyms:''

urn:SSLy:Electromagnetism:Linear_electric_current_density:synonyms:''

urn:SSLy:Electromagnetism:Electric_field_strength:synonyms:''

urn:SSLy:Electromagnetism:Electric_potential:synonyms:''

urn:SSLy:Electromagnetism:Electric_potential_difference:synonyms:'difference of potential'

urn:SSLy:Electromagnetism:Voltage:synonyms:'electric tension'

urn:SSLy:Electromagnetism:Induced_voltage:synonyms:''

urn:SSLy:Electromagnetism:Electric_flux_density:synonyms:''

urn:SSLy:Electromagnetism:Permittivity:synonyms:''

urn:SSLy:Electromagnetism:Relative_permittivity:synonyms:''

urn:SSLy:Electromagnetism:Electric_susceptibility:synonyms:''

urn:SSLy:Electromagnetism:Electric_flux:synonyms:''

urn:SSLy:Electromagnetism:Displacement_current_density:synonyms:''

urn:SSLy:Electromagnetism:Displacement_current:synonyms:''

urn:SSLy:Electromagnetism:Total_current:synonyms:''

urn:SSLy:Electromagnetism:Total_current_density:synonyms:''

urn:SSLy:Electromagnetism:Linked_flux:synonyms:'protoflux'

urn:SSLy:Electromagnetism:Magnetic_flux:synonyms:''

urn:SSLy:Electromagnetism:Total_magnetic_flux:synonyms:''

urn:SSLy:Electromagnetism:Magnetic_moment:synonyms:'Magnetic area moment'

urn:SSLy:Electromagnetism:Magnetization:synonyms:''

urn:SSLy:Electromagnetism:Magnetic_field_strength:synonyms:'magnetizing field'

urn:SSLy:Electromagnetism:Permeability:synonyms:''

urn:SSLy:Electromagnetism:Relative_permeability:synonyms:''

urn:SSLy:Electromagnetism:Magnetic_susceptibility:synonyms:''

urn:SSLy:Electromagnetism:Magnetic_polarization:synonyms:''

urn:SSLy:Electromagnetism:Magnetic_dipole_moment:synonyms:''

urn:SSLy:Electromagnetism:Coercivity:synonyms:'coercive field strength'

urn:SSLy:Electromagnetism:Magnetic_vector_potential:synonyms:''

urn:SSLy:Electromagnetism:Electromagnetic-energy_density:synonyms:'volumic electro-magnetic energy'

urn:SSLy:Electromagnetism:Pointing_vector:synonyms:''

urn:SSLy:Electromagnetism:Phase_speed_electromagnetic_waves:synonyms:''

urn:SSLy:Electromagnetism:Source_voltage:synonyms:'source tension'

urn:SSLy:Electromagnetism:Scalar_magnetic_potential:synonyms:'Magnetic potential'

urn:SSLy:Electromagnetism:Magnetic_tension:synonyms:''

urn:SSLy:Electromagnetism:Magnetomotive_force:synonyms:''

urn:SSLy:Electromagnetism:Current_linkage:synonyms:''

urn:SSLy:Electromagnetism:Number_turns_is_winding:synonyms:''

urn:SSLy:Electromagnetism:Reluctance:synonyms:''

urn:SSLy:Electromagnetism:Permeance:synonyms:''

urn:SSLy:Electromagnetism:Inductance:synonyms:'self inductance'

urn:SSLy:Electromagnetism:Mutual_inductance:synonyms:''

urn:SSLy:Electromagnetism:Coupling_factor:synonyms:''

urn:SSLy:Electromagnetism:Leakage_factor:synonyms:''

urn:SSLy:Electromagnetism:Conductivity:synonyms:''

urn:SSLy:Electromagnetism:Resistivity:synonyms:''

urn:SSLy:Electromagnetism:instantaneous_power:synonyms:'power'

urn:SSLy:Electromagnetism:Resistance:synonyms:''

urn:SSLy:Electromagnetism:Conductance:synonyms:''

urn:SSLy:Electromagnetism:Phase_difference:synonyms:''

urn:SSLy:Electromagnetism:Electric_current_phasor:synonyms:''

urn:SSLy:Electromagnetism:Voltage_phasor:synonyms:'electric tension phasor'

urn:SSLy:Electromagnetism:Impedance:synonyms:'complex impedance'

urn:SSLy:Electromagnetism:impedance_vacuum:synonyms:''

urn:SSLy:Electromagnetism:wave_impedance_in_vacuum:synonyms:''

urn:SSLy:Electromagnetism:Resistance_to_alternating_current:synonyms:'Resistance'

urn:SSLy:Electromagnetism:Reactance:synonyms:''

urn:SSLy:Electromagnetism:Apparent_impedance:synonyms:'modulus of impedance'

urn:SSLy:Electromagnetism:Admittance:synonyms:'complex admittance'

urn:SSLy:Electromagnetism:admittance_vacuum:synonyms:''

urn:SSLy:Electromagnetism:apparent_admittance:synonyms:''

urn:SSLy:Electromagnetism:Conductance_for_alternating_current:synonyms:''

urn:SSLy:Electromagnetism:Susceptance:synonyms:''

urn:SSLy:Electromagnetism:Modulus_admittance:synonyms:''

urn:SSLy:Electromagnetism:Quality_factor:synonyms:''

urn:SSLy:Electromagnetism:Loss_factor:synonyms:'dissipation factor'

urn:SSLy:Electromagnetism:Loss_angle:synonyms:''

urn:SSLy:Electromagnetism:Active_power:synonyms:''

urn:SSLy:Electromagnetism:Apparent_power:synonyms:''

urn:SSLy:Electromagnetism:Power_factor:synonyms:''

urn:SSLy:Electromagnetism:Complex_power:synonyms:''

urn:SSLy:Electromagnetism:Reactive_power:synonyms:''

urn:SSLy:Electromagnetism:Non-active_power:synonyms:''

urn:SSLy:Electromagnetism:Active_energy:synonyms:''

urn:SSLy:Light:Speed_light_in_medium:synonyms:''

urn:SSLy:Light:Refractive_index:synonyms:''

urn:SSLy:Light:Electromagnetic_Radiant_energy:synonyms:''

urn:SSLy:Light:Spectral_radiant_energy:synonyms:''

urn:SSLy:Light:Radiant_energy_density:synonyms:''

urn:SSLy:Light:Spectral_radiant_energy_density_terms_wavelength:synonyms:''

urn:SSLy:Light:Spectral_radiant_energy_density_terms_wavenumber:synonyms:''

urn:SSLy:Light:Radiant_flux,_radiant_power:synonyms:''

urn:SSLy:Light:Spectral_radiant_flux:synonyms:'spectral radiant power'

urn:SSLy:Light:Radial_intensity:synonyms:''

urn:SSLy:Light:Spectral_radiant_intensity:synonyms:''

urn:SSLy:Light:Radiance:synonyms:''

urn:SSLy:Light:Spectral_radiance:synonyms:''

urn:SSLy:Light:Irradiance:synonyms:''

urn:SSLy:Light:Spectral_irradiance:synonyms:''

urn:SSLy:Light:Radiant_exitance_(deprecated):synonyms:''

urn:SSLy:Light:Spectral_radial_exitance:synonyms:''

urn:SSLy:Light:Radiant_exposure:synonyms:''

urn:SSLy:Light:Spectral_radiant_exposure:synonyms:''

urn:SSLy:Light:Luminous_efficiency:synonyms:''

urn:SSLy:Light:Spectral_luminous_efficiency:synonyms:''

urn:SSLy:Light:Luminous_efficacy_radiation:synonyms:''

urn:SSLy:Light:Spectral_luminous_efficacy:synonyms:''

urn:SSLy:Light:Maximum_luminous_efficacy:synonyms:''

urn:SSLy:Light:Luminous_efficacy_source:synonyms:''

urn:SSLy:Light:Luminous_energy_(deprecated):synonyms:''

urn:SSLy:Light:Luminous_intensity:synonyms:'light intensity'

urn:SSLy:Light:Luminance:synonyms:''

urn:SSLy:Light:Luminous_exitance:synonyms:''

urn:SSLy:Light:Luminous_exposure:synonyms:'quantity of illumination, light exposure'

urn:SSLy:Light:Photon_number:synonyms:'number of photons'

urn:SSLy:Light:Photon_energy:synonyms:''

urn:SSLy:Light:Photon_flux:synonyms:''

urn:SSLy:Light:Photon_intensity:synonyms:''

urn:SSLy:Light:Photon_radiance:synonyms:''

urn:SSLy:Light:Photon_irradiance:synonyms:''

urn:SSLy:Light:Photon_exitance:synonyms:''

urn:SSLy:Light:Photon_exposure:synonyms:''

urn:SSLy:Light:Tristimulus_values_for_CIE_1931:synonyms:''

urn:SSLy:Light:Tristimulus_values_for_CIE_1964:synonyms:''

urn:SSLy:Light:CIE_colour-matching_functions_for_CIE_1931:synonyms:''

urn:SSLy:Light:CIE_colour-matching_functions_for_CIE_1964:synonyms:''

urn:SSLy:Light:Chromaticity_coordinates_CIE_1931:synonyms:''

urn:SSLy:Light:Chromaticity_coordinates_CIE_1964:synonyms:''

urn:SSLy:Light:Colour_temperature:synonyms:''

urn:SSLy:Light:Correlated_colour_temperature:synonyms:''

urn:SSLy:Light:Emissivity:synonyms:''

urn:SSLy:Light:Emissivity_at_specified_wavelength:synonyms:''

urn:SSLy:Light:Absorptance:synonyms:''

urn:SSLy:Light:Luminous_absorptance:synonyms:''

urn:SSLy:Light:Reflectance:synonyms:''

urn:SSLy:Light:Luminous_reflectance:synonyms:''

urn:SSLy:Light:Transmittance:synonyms:''

urn:SSLy:Light:Luminous_transmittance:synonyms:''

urn:SSLy:Light:Transmittance_optical_density:synonyms:'optical density, transmittance density, decadic absorbance'

urn:SSLy:Light:Napierian_absorbance:synonyms:''

urn:SSLy:Light:Radiance_factor:synonyms:''

urn:SSLy:Light:Luminance_factor:synonyms:''

urn:SSLy:Light:Reflectance_factor:synonyms:''

urn:SSLy:Light:Linear_attenuation_coefficient:synonyms:'linear extinction coefficient'

urn:SSLy:Light:Linear_absorption_coefficient:synonyms:''

urn:SSLy:Light:Mass_attenuation_coefficient:synonyms:''

urn:SSLy:Light:Mass_absorption_coefficient:synonyms:''

urn:SSLy:Light:Molar_absorption_coefficient:synonyms:''

urn:SSLy:Acoustics:Logarithmic_frequency_rate:synonyms:''

urn:SSLy:Acoustics:Static_pressure:synonyms:''

urn:SSLy:Acoustics:Sound_pressure:synonyms:''

urn:SSLy:Acoustics:Sound_particle_displacement:synonyms:''

urn:SSLy:Acoustics:Sound_particle_velocity:synonyms:''

urn:SSLy:Acoustics:Sound_particle_acceleration:synonyms:''

urn:SSLy:Acoustics:Volume_velocity,_volume_flow_rate:synonyms:''

urn:SSLy:Acoustics:Sound_energy_density:synonyms:''

urn:SSLy:Acoustics:Sound_energy:synonyms:''

urn:SSLy:Acoustics:Sound_power:synonyms:''

urn:SSLy:Acoustics:Sound_intensity:synonyms:''

urn:SSLy:Acoustics:Sound_exposure:synonyms:''

urn:SSLy:Acoustics:Characteristic_impedance_medium_for_longitudinal_waves:synonyms:''

urn:SSLy:Acoustics:Acoustic_impedance:synonyms:''

urn:SSLy:Acoustics:Sound_pressure_level:synonyms:''

urn:SSLy:Acoustics:Sound_power_level:synonyms:''

urn:SSLy:Acoustics:Sound_exposure_level:synonyms:''

urn:SSLy:Acoustics:Reverberation_level:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Number_entities:synonyms:'Number of entities'

urn:SSLy:Phys_chem_mol_phys:Amount_substance:synonyms:'Number of moles'

urn:SSLy:Phys_chem_mol_phys:Relative_atomic_mass:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_mass:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_volume:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_internal_energy:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_enthalpy:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_Helmholtz_energy:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_Gibbs_energy:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_heat_capacity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_entropy:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Particle_concentration:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molecular_concentration:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Mass_concentration:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Mass_fraction:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Amount_substance_concentration:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_amount_substance_concentration:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Amount_substance_fraction:synonyms:'mole fraction'

urn:SSLy:Phys_chem_mol_phys:Volume_fraction:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molality:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Latent_heat_phase_transition:synonyms:'enthalpy of phase transition'

urn:SSLy:Phys_chem_mol_phys:Chemical_potential:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Absolute_activity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Partial_pressure:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Fugacity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_chemical_potential:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Activity_factor:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Activity_solute:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Relative_activity_solute:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Activity_coefficient:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Activity_solvent,_relative_activity_solvent:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Osmotic_factor_solvent,_osmotic_coefficient_solvent:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_absolute_activity_solvent:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Osmotic_pressure:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Stoichiometric_number_substance:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Affinity_chemical_reaction:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Extent_reaction:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Standard_equilibrium_constant:synonyms:'thermodynamic equilibrium constant'

urn:SSLy:Phys_chem_mol_phys:Equilibrium_constant_pressure_basis:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Equilibrium_constant_concentration_basis:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Microcanonical_partition_function:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Canonical_partition_function:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Grand-canonical_partition_function:synonyms:'grand partition function'

urn:SSLy:Phys_chem_mol_phys:Molecular_partition_function:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Partition_function_molecule:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Statistical_weight_subsystem:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Degeneracy,_multiplicity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_gas_constant:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Specific_gas_constant:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Mean_free_path:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Diffusion_coefficient:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_ratio:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_factor:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Thermal_diffusion_coefficient:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Ionic_strength:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Degree_dissociation,_dissociation_fraction:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Electrolytic_conductivity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_conductivity:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Transport_number__ion_B,_current_fraction__ion_B :synonyms:''

urn:SSLy:Phys_chem_mol_phys:Angle_optical_rotation:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Molar_optical_rotatory_power:synonyms:''

urn:SSLy:Phys_chem_mol_phys:Specific_optical_rotatory_power:synonyms:''

urn:SSLy:Phys_chem_mol_phys: Need_for_additional_field_for_concept_B?:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Atomic_number:synonyms:'proton number'

urn:SSLy:Atomic_nuclear_phys:Neutron_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nucleon_number:synonyms:'mass number'

urn:SSLy:Atomic_nuclear_phys:Rest_mass:synonyms:'proper mass'

urn:SSLy:Atomic_nuclear_phys:Rest_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Atomic_mass:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nuclidic_mass:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Unified_atomic_mass_constant:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Elementary_charge:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Charge_number:synonyms:'ionization number'

urn:SSLy:Atomic_nuclear_phys:Bohr_radius:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Rydberg_constant:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Hartree_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Magnetic_dipole_moment:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Bohr_magneton:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nuclear_magneton:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Spin:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Total_angular_momentum:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Gyromagnetic_ratio:synonyms:' magnetogyric ratio, gyromagnetic coefficient'

urn:SSLy:Atomic_nuclear_phys:Gyromagnetic_ratio__electron:synonyms:'magnetogyric ratio of the electron, gyromagnetic coefficient of the electron'

urn:SSLy:Atomic_nuclear_phys:Quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Principal_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Orbital_angular_momentum_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Magnetic_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Spin_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Total_angular_momentum_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nuclear_spin_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Hyperfine_structure_quantum_number:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Landé_factor:synonyms:'g factor atom'

urn:SSLy:Atomic_nuclear_phys:g_factor:synonyms:'nucleus or nuclear particle'

urn:SSLy:Atomic_nuclear_phys:Larmor_angular_frequency:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Larmor_frequency:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nuclear_precession_angular_frequency:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Cyclotron_angular_frequency:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Gyroradius:synonyms:'Larmor radius'

urn:SSLy:Atomic_nuclear_phys:Nuclear_quadrupole_moment:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Nuclear_radius:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Electron_radius:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Compton_wavelength:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mass_excess:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mass_defect:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Relative_mass_excess:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Relative_mass_defect:synonyms:''

urn:SSLy:Atomic_nuclear_phys:packing_fraction:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Binding_fraction:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Decay_constant:synonyms:'disintegration'

urn:SSLy:Atomic_nuclear_phys:Mean_duration_life:synonyms:'mean life time'

urn:SSLy:Atomic_nuclear_phys:Level_width:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Activity:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Specific_activity:synonyms:'massic activity'

urn:SSLy:Atomic_nuclear_phys:Activity_density:synonyms:'volumic activity, activity concentration'

urn:SSLy:Atomic_nuclear_phys:Surface-activity_density:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Half_life:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Alpha_disintegration_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Maximum_beta-particle_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Beta_disintegration_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Internal_conversion_factor:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Particle_emission_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Reaction_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Resonance_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Cross_section:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Total_cross_section:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Direction_distribution_cross_section:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Energy_distribution_cross_section:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Direction_and_energy_distribution_cross_section:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Volumic_cross_section:synonyms:'macroscopic cross section'

urn:SSLy:Atomic_nuclear_phys:Volumic_total_cross_section:synonyms:'macroscopic total cross section'

urn:SSLy:Atomic_nuclear_phys:Particle_fluence:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Particle_fluence_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Ionic_radiant_energy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Energy_influence:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Energy_influence_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Particle_current_density:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Linear_attenuation_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mass_attenuation_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Molar_attenuation_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Atomic_attenuation_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Half-value_thickness:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Total_linear_stopping_power:synonyms:'linear stopping power'

urn:SSLy:Atomic_nuclear_phys:Total_mass_stopping_power:synonyms:'mass stopping power'

urn:SSLy:Atomic_nuclear_phys:Mean_linear_range:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mean_mass_range:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Linear_ionization:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Total_ionization:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Average_energy_loss_per_elementary_charge_produced:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mobility:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Particle_number_density:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Ion_numbed_density:synonyms:'ion density'

urn:SSLy:Atomic_nuclear_phys:Recombination_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Diffusion_coefficient:synonyms:'diffusion coefficient for particle number density'

urn:SSLy:Atomic_nuclear_phys:Diffusion_coefficient_for_fluence_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Particle_source_density:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Slowing-down_density:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Resonance_escape_probability:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Lethargy:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Average_logarithmic_energy_decrement:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mean_free_path:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Slowing-down_area:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Diffusion_area:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Migration_area:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Slowing-down_length:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Diffusion_length:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Migration_length:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Neutron_yield_per_absorption:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Fast_fission_factor:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Thermal_utilization_factor:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Non-leakage_probability:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Multiplication_factor:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Infinite_multiplication_factor:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Reactor_time_constant:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Energy_imparted:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Main_energy_imparted:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Absorbed_dose:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Specific_energy_imparted:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Quality_factor_ionizing_radiation:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Dose_equivalent:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Dose_equivalent_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Linear_energy_transfer:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Kerma:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Kerma_rate:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Mass_energy-transfer_coefficient:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Exposure:synonyms:''

urn:SSLy:Atomic_nuclear_phys:Exposure_rate:synonyms:''

urn:SSLy:Characteristic_numbers:Reynolds_number:synonyms:''

urn:SSLy:Characteristic_numbers:Euler_number:synonyms:''

urn:SSLy:Characteristic_numbers:Froude_number:synonyms:''

urn:SSLy:Characteristic_numbers:Grash_number:synonyms:''

urn:SSLy:Characteristic_numbers:Weber_number:synonyms:''

urn:SSLy:Characteristic_numbers:Mach_number:synonyms:''

urn:SSLy:Characteristic_numbers:Knudsen_number:synonyms:''

urn:SSLy:Characteristic_numbers:Strouhal_number:synonyms:'Thomson number'

urn:SSLy:Characteristic_numbers:Drag_coefficient :synonyms:''

urn:SSLy:Characteristic_numbers:Bagnold_number:synonyms:''

urn:SSLy:Characteristic_numbers:Lift_coefficient:synonyms:''

urn:SSLy:Characteristic_numbers:Thrust_coefficient:synonyms:''

urn:SSLy:Characteristic_numbers:Dean_number:synonyms:''

urn:SSLy:Characteristic_numbers:Bejan_number:synonyms:''

urn:SSLy:Characteristic_numbers:Lagrange_number:synonyms:''

urn:SSLy:Characteristic_numbers:Bingham_number:synonyms:'plasticity number'

urn:SSLy:Characteristic_numbers:Hedström_number:synonyms:''

urn:SSLy:Characteristic_numbers:Bodenstein_number:synonyms:''

urn:SSLy:Characteristic_numbers:Rossby_number:synonyms:'Klebel number'

urn:SSLy:Characteristic_numbers:Ekman_number:synonyms:''

urn:SSLy:Characteristic_numbers:Elasticity_number:synonyms:''

urn:SSLy:Characteristic_numbers:Darcy_friction_factor:synonyms:'Moody friction faction'

urn:SSLy:Characteristic_numbers:Fanning_number:synonyms:''

urn:SSLy:Characteristic_numbers:Goertler_number:synonyms:'Goertler parameter'

urn:SSLy:Characteristic_numbers:Hagen_number:synonyms:''

urn:SSLy:Characteristic_numbers:Laval_number:synonyms:''

urn:SSLy:Characteristic_numbers:Poiseuille_number:synonyms:''

urn:SSLy:Characteristic_numbers:Power_number:synonyms:''

urn:SSLy:Characteristic_numbers:Richardson_number:synonyms:''

urn:SSLy:Characteristic_numbers:Reech_number:synonyms:''

urn:SSLy:Characteristic_numbers:Stokes_number_time_related:synonyms:''

urn:SSLy:Characteristic_numbers:Stokes_number_vibrating_particles:synonyms:''

urn:SSLy:Characteristic_numbers:Stokes_number_rotameter:synonyms:' power coefficient rotameter'

urn:SSLy:Characteristic_numbers:Stokes_number_gravity:synonyms:''

urn:SSLy:Characteristic_numbers:Stokes_number_drag:synonyms:''

urn:SSLy:Characteristic_numbers:Laplace_number:synonyms:'Suratman number'

urn:SSLy:Characteristic_numbers:Blake_number:synonyms:''

urn:SSLy:Characteristic_numbers:Sommerfeld_number:synonyms:''

urn:SSLy:Characteristic_numbers:Taylor_number_momentum_transfer:synonyms:''

urn:SSLy:Characteristic_numbers:Galilei_number:synonyms:''

urn:SSLy:Characteristic_numbers:Womersley_number:synonyms:''

urn:SSLy:Characteristic_numbers:Fourier_number:synonyms:''

urn:SSLy:Characteristic_numbers:Péclet_number:synonyms:''

urn:SSLy:Characteristic_numbers:Rayleigh_number:synonyms:''

urn:SSLy:Characteristic_numbers:Froude_number:synonyms:''

urn:SSLy:Characteristic_numbers:Nusselt_number:synonyms:''

urn:SSLy:Characteristic_numbers:Blot_number:synonyms:''

urn:SSLy:Characteristic_numbers:Stanton_number:synonyms:''

urn:SSLy:Characteristic_numbers:J-factor:synonyms:'heat transfer factor, Colburn number'

urn:SSLy:Characteristic_numbers:Bejan_number_heat_transfer:synonyms:''

urn:SSLy:Characteristic_numbers:Bejan_number_entropy:synonyms:''

urn:SSLy:Characteristic_numbers:Stefan_number:synonyms:''

urn:SSLy:Characteristic_numbers:Brinkman_number:synonyms:''

urn:SSLy:Characteristic_numbers:Clausius_number:synonyms:''

urn:SSLy:Characteristic_numbers:Carnot_number:synonyms:''

urn:SSLy:Characteristic_numbers:Eckert_number:synonyms:'Dulong number'

urn:SSLy:Characteristic_numbers:Graetz_number:synonyms:''

urn:SSLy:Characteristic_numbers:Heat_transfer_number:synonyms:''

urn:SSLy:Characteristic_numbers:Pomerantsev_number:synonyms:''

urn:SSLy:Characteristic_numbers:Boltzmann_number:synonyms:''

urn:SSLy:Characteristic_numbers:Stark_number:synonyms:''

urn:SSLy:Condensed_matter_phys:Lattice_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Fundamental_lattice_vectors:synonyms:''

urn:SSLy:Condensed_matter_phys:Angular_reciprocal_lattice_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Fundamental_reciprocal_lattice_vectors:synonyms:''

urn:SSLy:Condensed_matter_phys:Lattice_plane_spacing:synonyms:''

urn:SSLy:Condensed_matter_phys:Bragg_angle:synonyms:''

urn:SSLy:Condensed_matter_phys:Short-range_order_parameter:synonyms:''

urn:SSLy:Condensed_matter_phys:Long-range_order_parameter:synonyms:''

urn:SSLy:Condensed_matter_phys:Atomic_scattering_factor:synonyms:''

urn:SSLy:Condensed_matter_phys:Structure_factor:synonyms:''

urn:SSLy:Condensed_matter_phys:Burgers_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Particle_position_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Equilibrium_position_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Displacement_vector:synonyms:''

urn:SSLy:Condensed_matter_phys:Debye-Waller_factor:synonyms:''

urn:SSLy:Condensed_matter_phys:Angular_wavenumber:synonyms:'angular repetency'

urn:SSLy:Condensed_matter_phys:Fermi_angular_wavenumber:synonyms:'Fermi angular repetency'

urn:SSLy:Condensed_matter_phys:Debye_angular_wavenumber:synonyms:'Debye angular repetency'

urn:SSLy:Condensed_matter_phys:Debye_angular_frequency:synonyms:'Debye angular frequency'

urn:SSLy:Condensed_matter_phys:Debye_temperature:synonyms:''

urn:SSLy:Condensed_matter_phys:Density_vibration_states:synonyms:''

urn:SSLy:Condensed_matter_phys:Thermodynamic_Grüneisen_parameter:synonyms:''

urn:SSLy:Condensed_matter_phys:Grüneisen_parameter:synonyms:''

urn:SSLy:Condensed_matter_phys:Mean_free_path_photons:synonyms:''

urn:SSLy:Condensed_matter_phys:Mean_free_path_electrons:synonyms:''

urn:SSLy:Condensed_matter_phys:Energy_density_states:synonyms:''

urn:SSLy:Condensed_matter_phys:Residual_resistivity:synonyms:''

urn:SSLy:Condensed_matter_phys:Lorenz_coefficient:synonyms:''

urn:SSLy:Condensed_matter_phys:Hall_coefficient:synonyms:''

urn:SSLy:Condensed_matter_phys:Thermoelectric_voltage:synonyms:''

urn:SSLy:Condensed_matter_phys:Seebeck_coefficient:synonyms:''

urn:SSLy:Condensed_matter_phys:Peltier_coefficient:synonyms:''

urn:SSLy:Condensed_matter_phys:Thomson_coefficient:synonyms:''

urn:SSLy:Condensed_matter_phys:Work_function:synonyms:''

urn:SSLy:Condensed_matter_phys:Ionization_energy:synonyms:''

urn:SSLy:Condensed_matter_phys:Electron_affinity:synonyms:''

urn:SSLy:Condensed_matter_phys:Richardson_constant:synonyms:''

urn:SSLy:Condensed_matter_phys:Fermy_energy:synonyms:''

urn:SSLy:Condensed_matter_phys:Gap_energy:synonyms:''

urn:SSLy:Condensed_matter_phys:Fermi_temperature:synonyms:''

urn:SSLy:Condensed_matter_phys:Electron_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Hole_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Intrinsic_carrier_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Donor_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Acceptor_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Effective_mass:synonyms:''

urn:SSLy:Condensed_matter_phys:Mobility_ratio:synonyms:''

urn:SSLy:Condensed_matter_phys:Relaxation_time:synonyms:''

urn:SSLy:Condensed_matter_phys:Carrier_lifetime:synonyms:''

urn:SSLy:Condensed_matter_phys:Diffusion_length:synonyms:''

urn:SSLy:Condensed_matter_phys:Exchange_integral:synonyms:''

urn:SSLy:Condensed_matter_phys:Curie_temperature:synonyms:''

urn:SSLy:Condensed_matter_phys:Néel_temperature:synonyms:''

urn:SSLy:Condensed_matter_phys:Superconductor_transition_temperature:synonyms:''

urn:SSLy:Condensed_matter_phys:Thermodynamic_critical_magnetic_flux_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Lower_critical_magnetic_flux_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Upper_critical_magnetic_flux_density:synonyms:''

urn:SSLy:Condensed_matter_phys:Superconductor_energy_gap:synonyms:''

urn:SSLy:Condensed_matter_phys:London_penetration_gap:synonyms:''

urn:SSLy:Condensed_matter_phys:Coherence_length:synonyms:''

urn:SSLy:info_science_tech:Traffic_intensity:synonyms:''

urn:SSLy:info_science_tech:Traffic_offered_intensity:synonyms:''

urn:SSLy:info_science_tech:traffic load:synonyms:'Traffic carried intensity'

urn:SSLy:info_science_tech:Mean_queue_length:synonyms:''

urn:SSLy:info_science_tech:Loss_probability:synonyms:''

urn:SSLy:info_science_tech:Waiting_probability:synonyms:''

urn:SSLy:info_science_tech:Call_intensity:synonyms:'calling rate'

urn:SSLy:info_science_tech:Completed_call_intensity:synonyms:''

urn:SSLy:info_science_tech:Storage_capacity:synonyms:'storage size'

urn:SSLy:info_science_tech:Equivalent_binary_storage_capacity:synonyms:''

urn:SSLy:info_science_tech:Transfer_rate:synonyms:''

urn:SSLy:info_science_tech:Period_data_elements:synonyms:''

urn:SSLy:info_science_tech:bit_rate:synonyms:'binary digit rate'

urn:SSLy:info_science_tech:bit_period:synonyms:'Period of binary digits'

urn:SSLy:info_science_tech:equivalent_bit_rate:synonyms:'Equivalent binary digit rate'

urn:SSLy:info_science_tech:Modulation_rate:synonyms:'line digit rate'

urn:SSLy:info_science_tech:Quantizing_distortion_power:synonyms:''

urn:SSLy:info_science_tech:Carrier_power:synonyms:''

urn:SSLy:info_science_tech:Signal_energy_per_binary_digit:synonyms:''

urn:SSLy:info_science_tech:Error_probability:synonyms:''

urn:SSLy:info_science_tech:Hamming_distance:synonyms:''

urn:SSLy:info_science_tech:Clock_frequency:synonyms:'clock rate'

urn:SSLy:info_science_tech:Decision_content:synonyms:''

urn:SSLy:info_science_tech:Information_content:synonyms:''

urn:SSLy:info_science_tech:Information_entropy:synonyms:''

urn:SSLy:info_science_tech:Maximum_entropy:synonyms:''

urn:SSLy:info_science_tech:Relative_entropy:synonyms:''

urn:SSLy:info_science_tech:Redundancy:synonyms:''

urn:SSLy:info_science_tech:Relative_redundancy:synonyms:''

urn:SSLy:info_science_tech:Joint_information_content:synonyms:''

urn:SSLy:info_science_tech:Conditional_information_content:synonyms:''

urn:SSLy:info_science_tech:Conditional_entropy:synonyms:'mean conditional information content, average conditional information content'

urn:SSLy:info_science_tech:Equivocation:synonyms:''

urn:SSLy:info_science_tech:Irrelevance:synonyms:''

urn:SSLy:info_science_tech:Transinformation_content:synonyms:''

urn:SSLy:info_science_tech:Mean_transinformation_content:synonyms:''

urn:SSLy:info_science_tech:Character_mean_entropy:synonyms:''

urn:SSLy:info_science_tech:Average_information_rate:synonyms:''

urn:SSLy:info_science_tech:Character_mean_transinformation_content:synonyms:''

urn:SSLy:info_science_tech:Average_transinformation_rate:synonyms:''

urn:SSLy:info_science_tech:Channel_capacity_per_character:synonyms:'channel capacity'

urn:SSLy:info_science_tech:Channel_time_capacity:synonyms:'channel capacity'

urn:SSLy:monitoring:Operational_status:synonyms:''

urn:SSLy:monitoring:Status_not_started:synonyms:''

urn:SSLy:monitoring:Status_stopped:synonyms:''

urn:SSLy:monitoring:Status_active:synonyms:''

urn:SSLy:monitoring:Status_disrupted:synonyms:''

urn:SSLy:monitoring:Status_disabled:synonyms:''

urn:SSLy:monitoring:Status_enabled:synonyms:''

urn:SSLy:monitoring:Status_malfunctioning:synonyms:''

urn:SSLy:monitoring:Device_work_status:synonyms:''

urn:SSLy:monitoring:Device_status_able_to_work:synonyms:''

urn:SSLy:monitoring:Device_Status_malfunctioning:synonyms:''

urn:SSLy:monitoring:Device_status_unable_to_work:synonyms:''

urn:SSLy:monitoring:Cause:synonyms:''

urn:SSLy:monitoring:Trust_status:synonyms:''

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urn:SSLy:monitoring:Trust_status_compromised:synonyms:''

urn:SSLy:monitoring:Alarm:synonyms:''

urn:SSLy:monitoring:Origin_data_type:synonyms:''

urn:SSLy:monitoring:Origin_type_actual:synonyms:''

urn:SSLy:monitoring:Origin_type_predicted:synonyms:''

urn:SSLy:monitoring:Origin_data_simulated:synonyms:''

urn:SSLy:monitoring:Warning threshold:synonyms:''

urn:SSLy:monitoring:Alarm Threshold:synonyms:''

urn:SSLy:facilities:Facility_type:synonyms:''

urn:SSLy:facilities:Facility_type_Hotel:synonyms:''

urn:SSLy:facilities:Facility_type_Hospital:synonyms:''

urn:SSLy:facilities:Facility_type_Clinic:synonyms:''

urn:SSLy:facilities:Facility_type_Theater:synonyms:''

urn:SSLy:facilities:Facility_type_Stadium:synonyms:''

urn:SSLy:facilities:Facility_type_Warehouse:synonyms:''

urn:SSLy:facilities:Facility_type_Police_Station:synonyms:''

urn:SSLy:facilities:Facility_type_Firefighter_Station:synonyms:''

urn:SSLy:facilities:Facility_type_Military_quarters:synonyms:''

urn:SSLy:facilities:Facility_type_Electric_Power_Plant:synonyms:''

urn:SSLy:facilities:Facility_type_Oil_Refinery:synonyms:''

urn:SSLy:facilities:Facility_type_Oil_Store:synonyms:''

urn:SSLy:facilities:Facility_type_Transmissions_Towe:synonyms:''

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urn:SSLy:facilities:Facility_type_Oil_Pipeline:synonyms:''

urn:SSLy:facilities:Facility_type_Gas_Pipeline:synonyms:''

urn:SSLy:facilities:Facility_type_Inland_Waterways:synonyms:''

urn:SSLy:facilities:Facility_type_Water_Processing_Plant:synonyms:''

urn:SSLy:facilities:Facility_type_Deaslination_Plant:synonyms:''

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urn:SSLy:facilities:Total_Capacity_Units:synonyms:''

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urn:SSLy:facilities:Operational_status_Non-operational:synonyms:''

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urn:SSLy:facilities:Use:synonyms:''

urn:SSLy:facilities:Construction_year:synonyms:''

urn:SSLy:facilities:Last_Renovation_Year:synonyms:''

urn:SSLy:facilities:Construction_material:synonyms:''

urn:SSLy:facilities:Construction_material_Reinforced_Concrete:synonyms:''

urn:SSLy:facilities:Construction_material_Masonry:synonyms:''

urn:SSLy:facilities:Construction_material_Steel:synonyms:''

urn:SSLy:facilities:Construction_material_Timber:synonyms:''

urn:SSLy:facilities:Construction_material_Pre-cast_Concrete:synonyms:''

urn:SSLy:facilities:Construction_material_Other:synonyms:''

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urn:SSLy:facilities:Number_Basements:synonyms:''

urn:SSLy:facilities:Number_occupants:synonyms:''

urn:SSLy:damage_assessment:building_code:synonyms:''

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urn:SSLy:damage_assessment:Damage_Level:synonyms:''

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urn:SSLy:damage_assessment:Damage_Level_Non-structural:synonyms:''

urn:SSLy:damage_assessment:Damage_Level_Soil:synonyms:''

urn:SSLy:damage_assessment:Damage_Level_External:synonyms:''

urn:SSLy:damage_assessment:Damage_Type:synonyms:''

urn:SSLy:damage_assessment:Damage_Floor:synonyms:''

urn:SSLy:other:Compound:synonyms:''

urn:SSLy:other:Agent_type:synonyms:''

urn:SSLy:other:Chem_spectrum_list:synonyms:''

urn:SSLy:other:Pollutant:synonyms:''

urn:SSLy:other:Video_stream:synonyms:''

urn:SSLy:other:Audio_stream:synonyms:''

urn:SSLy:other:Video_file:synonyms:''

urn:SSLy:other:Audio_file:synonyms:''

urn:SSLy:other:Region_name:synonyms:''

urn:SSLy:other:Population_name:synonyms:''

urn:SSLy:other:Number_inhabitants:synonyms:''

urn:SSLy:other:Sensor_message:synonyms:'sensor payload, sensor measurement'

D.3 URNs for the descriptions of the field names

urn:SSLy:General:Plane_angle:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Solid_angle:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Frequency:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Activity_radionuclide:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Absorbed_dose:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Close_equivalent:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Catalytic_activity:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Force:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Pressure:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Power:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Energy:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Celsius_temperature:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Electric_charge:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Magnetic_flux:description:'(Deprecated) As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Magnetic_flux_density:description:'(Deprecated) As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Capacitance:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Luminous_flux:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:General:Illuminance:description:'As stated in EN ISO 80000-1:2022'

urn:SSLy:Space_time:Length:description:'As stated in EN ISO 80000-3:2020'

urn:SSLy:Space_time:Width:description:'As stated in EN ISO 80000-3:2020'

urn:SSLy:Space_time:Height:description:'As stated in EN ISO 80000-3:2020'

urn:SSLy:Space_time:Diameter:description:'As stated in EN ISO 80000-3:2020'

urn:SSLy:Space_time:Radius:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Space_time:Position_vector:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Space_time:Speed:description:'As stated in EN ISO 80000-3:2020'

urn:SSLy:Space_time:Acceleration:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Space_time:Angular_acceleration:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Space_time:Rotation:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Space_time:Wavenumber:description:'As stated in EN ISO 80000-3:2020'

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urn:SSLy:Mechanics:Strain:description:'As stated in EN ISO 80000-4:2019'

urn:SSLy:Mechanics:Relative_linear_strain:description:'As stated in EN ISO 80000-4:2019'

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urn:SSLy:Mechanics:Relative_volume_strain:description:'As stated in EN ISO 80000-4:2019'

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urn:SSLy:Mechanics:Mechanical_energy:description:'As stated in EN ISO 80000-4:2019'

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urn:SSLy:Mechanics:Efficiency:description:'As stated in EN ISO 80000-4:2019'

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urn:SSLy:Thermodynamics:Isentropic_exponent:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Entropy:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Specific_entropy:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Internal_Energy,_thermodynamic_energy:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Enthalpy:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Helmboltz_energy:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Gibbs_energy:description:'As stated in EN ISO 80000-5:2019'

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urn:SSLy:Thermodynamics:Specific_Gibbs_energy:description:'As stated in EN ISO 80000-5:2019'

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urn:SSLy:Thermodynamics:Joule-Thomson_coefficient:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Thermodynamic_Efficiency:description:'As stated in EN ISO 80000-5:2019'

urn:SSLy:Thermodynamics:Maximum_efficiency:description:'As stated in EN ISO 80000-5:2019'

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urn:SSLy:Thermodynamics:Mass_fraction_water:description:'As stated in EN ISO 80000-5:2019'

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urn:SSLy:Thermodynamics:Dew-point_temperature:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric current:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Elementary_charge:description:'As stated in IEC 80000-6:2023'

urn:SSLy:Electromagnetism:Electric_charge_density:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Surface_density_electric_charge:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Linear_density_electric_charge:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric_dipole_moment:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric_polarization:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric_current_density:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Linear_electric_current_density:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric_field_strength:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Electric_potential:description:'As stated in IEC 80000-6:2022'

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urn:SSLy:Electromagnetism:Voltage:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Induced_voltage:description:'As stated in IEC 80000-6:2023'

urn:SSLy:Electromagnetism:Electric_flux_density:description:'As stated in IEC 80000-6:2022'

urn:SSLy:Electromagnetism:Permittivity:description:'As stated in IEC 80000-6:2022'

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urn:SSLy:info_science_tech:Relative_redundancy:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Joint_information_content:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Conditional_information_content:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Conditional_entropy:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Equivocation:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Irrelevance:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Transinformation_content:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Mean_transinformation_content:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Character_mean_entropy:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Average_information_rate:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Character_mean_transinformation_content:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Average_transinformation_rate:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Channel_capacity_per_character:description:'As stated in EN 80000-13:2008'

urn:SSLy:info_science_tech:Channel_time_capacity:description:'As stated in EN 80000-13:2008'

urn:SSLy:monitoring:Operational_status:description:'the status of a device that is being monitored (not to be confused with the status of the sensor that is monitoring the device)'

urn:SSLy:monitoring:Status_not_started:description:'the device has not been started yet.'

urn:SSLy:monitoring:Status_stopped:description:'the device is stopped'

urn:SSLy:monitoring:Status_active:description:'the device is started and working properly'

urn:SSLy:monitoring:Status_disrupted:description:'the device is not working due to an external undesired condition'

urn:SSLy:monitoring:Status_disabled:description:'the device is stopped and compelled to not start till it is enabled again'

urn:SSLy:monitoring:Status_enabled:description:'the device is allowed to try to start when it receives an order to do so'

urn:SSLy:monitoring:Status_malfunctioning:description:'the device is working, but it is not able to comply with its operational specifications. Note that this does not necessarily mean that the measurements are unreliable'

urn:SSLy:monitoring:Device_work_status:description:'states whether the device is working or not, and whether it is working according to its operational specifications'

urn:SSLy:monitoring:Device_status_able_to_work:description:'the device is able to work according to its operational specifications'

urn:SSLy:monitoring:Device_Status_malfunctioning:description:'the device is working, but it is not able to comply with its operational specifications. Note that this does not necessarily mean that the measurements are unreliable'

urn:SSLy:monitoring:Device_status_unable_to_work:description:'the device cannot work at all'

urn:SSLy:monitoring:Cause:description:'reason why a device is not working properly or for an incidence'

urn:SSLy:monitoring:Trust_status:description:'Status of trust of the device, not to be confused with the status of trust of a given measurement or reported value'

urn:SSLy:monitoring:Trust_status_pending_approval:description:'The system received a request for adding this sensor and its approval is still pending'

urn:SSLy:monitoring:Trust_status_approved:description:'The sensor is approved and currently trusted'

urn:SSLy:monitoring:Trust_status_untrusted:description:'The system received a request for adding this sensor but now it is not trusted yet, regardless the request was originally rejected or due to have passed through a state of compromised'

urn:SSLy:monitoring:Trust_status_unreliable:description:'the measurements provided by the device are no longer considered to be reliable. Note that this may not necessarily be due to the device having been compromised'

urn:SSLy:monitoring:Trust_status_compromised:description:'the sensor is believed to have been compromised by an external party. Note that the fact that a sensor has been compromised does not necessarily mean that it must be automatically put in the state of not trusted'

urn:SSLy:monitoring:Alarm:description:'Intelligent sensors may use this field to indicate whether a measurement from a sensor should trigger an alarm or not'

urn:SSLy:monitoring:Origin_data_type:description:'States whether the data is actual, predicted or simulated'

urn:SSLy:monitoring:Origin_type_actual:description:'value for origin_type corresponding to actual data'

urn:SSLy:monitoring:Origin_type_predicted:description:'value for origin_type corresponding to predicted data'

urn:SSLy:monitoring:Origin_data_simulated:description:'States whether the data is actual, predicted or simulated'

urn:SSLy:monitoring:Warning threshold:description:'Indicates the value to decide whether to trigger a warning for somebody to evaluate the actions to be taken'

urn:SSLy:monitoring:Alarm Threshold:description:'Indicates the value to decide whether to trigger an alarm to implement actions to deal immediately with the situation'

urn:SSLy:facilities:Facility_type:description:'Type of facility'

urn:SSLy:facilities:Facility_type_Hotel:description:'Value Type for facility Hotel'

urn:SSLy:facilities:Facility_type_Hospital:description:'Value Type for facility Hospital'

urn:SSLy:facilities:Facility_type_Clinic:description:'Value Type for facility Clinic'

urn:SSLy:facilities:Facility_type_Theater:description:'Value Type for facility Theater'

urn:SSLy:facilities:Facility_type_Stadium:description:'Value Type for facility Stadium'

urn:SSLy:facilities:Facility_type_Warehouse:description:'Value Type for facility Warehouse'

urn:SSLy:facilities:Facility_type_Police_Station:description:'Value Type for facility Police Station'

urn:SSLy:facilities:Facility_type_Firefighter_Station:description:'Value Type for facility Firefighter station'

urn:SSLy:facilities:Facility_type_Military_quarters:description:'Value Type for facility military quarters'

urn:SSLy:facilities:Facility_type_Electric_Power_Plant:description:'Value Type for facility electric power plant'

urn:SSLy:facilities:Facility_type_Oil_Refinery:description:'Value Type for facility Oil Refinery'

urn:SSLy:facilities:Facility_type_Oil_Store:description:'Value Type for facility Oil Store'

urn:SSLy:facilities:Facility_type_Transmissions_Towe:description:'Value Type for facility transmissions tower'

urn:SSLy:facilities:Facility_type_Electricity_Transport_Line:description:'Value Type for facility electricity transport line'

urn:SSLy:facilities:Facility_type_Oil_Pipeline:description:'Value Type for facility oil pipeline'

urn:SSLy:facilities:Facility_type_Gas_Pipeline:description:'Type of facility gas pipeline'

urn:SSLy:facilities:Facility_type_Inland_Waterways:description:'Type of facility inland waterways'

urn:SSLy:facilities:Facility_type_Water_Processing_Plant:description:'Type of facility water processing plant'

urn:SSLy:facilities:Facility_type_Deaslination_Plant:description:'Type of facility desalination plant'

urn:SSLy:facilities:Total_Capacity:description:'Total capacity of a facility'

urn:SSLy:facilities:Total_Capacity_Units:description:'Units in which the total capacity are expressed'

urn:SSLy:facilities:Current_availability:description:'current number of available resources indicated in the units given by the field units'

urn:SSLy:facilities:Operational_status:description:'Operational status of the capacity'

urn:SSLy:facilities:Operational_status_Decomissioned:description:'Value for operational status of capacities that indicate that the capacity was decommissioned and has not been maintained but it could potentially work again if proper staff and maintenance was provided '

urn:SSLy:facilities:Operational_status_idle:description:'Value for operational status of capacities that indicates that the capacity is ready to work but currently idle'

urn:SSLy:facilities:Operational_status_Non-operational:description:'Value for operational status of capacities that indicates that the facility has not been decommissioned but is currently not able to operate'

urn:SSLy:facilities:Operational_status_Partially_Operational:description:'Value for operational status of capacities that indicates that rhe facility is currently operating but cannot perform at its maximum _Fcapacity'

urn:SSLy:facilities:Operational_status_Fully_operational:description:'Value for operational status of capacities that indicates that the facility is currently operating and can perform at its maximum capacity'

urn:SSLy:facilities:Can_cause_when_working:description:'List of threats that can be caused by the facility if is compromised when it is working. Values to be taken from EDXL-CAP list of types of emergencies'

urn:SSLy:facilities:Can_cause_when_idle:description:'List of threats that can be caused by the facility it is compromised. Values to be taken from EDXL-CAP list of types of emergencies'

urn:SSLy:facilities:Possible_threat_cases:description:'List of threats that can cause that the facility gets compromised and cause any of the threats stated in the 'Can cause' lists'

urn:SSLy:facilities:Invaluable_assets:description:'list of invaluable assets, such as historic artworks that are considered worth to be protected and inside the facility'

urn:SSLy:facilities:Use:description:'Use of the facility'

urn:SSLy:facilities:Construction_year:description:'The year that the facility was constructed'

urn:SSLy:facilities:Last_Renovation_Year:description:'The last year of structural renovation of the facility'

urn:SSLy:facilities:Construction_material:description:'A list of materials used in the construction of the facility'

urn:SSLy:facilities:Construction_material_Reinforced_Concrete:description:'Value for construction material Reinforced Concrete'

urn:SSLy:facilities:Construction_material_Masonry:description:'Value for construction material Masonry'

urn:SSLy:facilities:Construction_material_Steel:description:'Value for construction material Steel'

urn:SSLy:facilities:Construction_material_Timber:description:'Value for construction material Timber'

urn:SSLy:facilities:Construction_material_Pre-cast_Concrete:description:'Value for construction material Pre-cast Concrete'

urn:SSLy:facilities:Construction_material_Other:description:'Value for construction material Other'

urn:SSLy:facilities:accuracy_year_construction:description:'Can be either ‘Exact’ or ‘Approximate’'

urn:SSLy:facilities:Number_floors_on_ground:description:'Number of floors over the ground'

urn:SSLy:facilities:Number_Basements:description:'Number of Bsaements of the facility'

urn:SSLy:facilities:Number_occupants:description:'Number of people present in the facility'

urn:SSLy:damage_assessment:building_code:description:'A unique identifier of the asset'

urn:SSLy:damage_assessment:Damage_Cause:description:'Cause of the damage to the building as stated in any of the following urls: https://www.emdat.be/ https://www.desinventar.net/ https://inspire.ec.europa.eu/ https://www.start.umd.edu/gtd/ https://emergency.copernicus.eu/mapping/list-of-activations-risk-and-recovery'

urn:SSLy:damage_assessment:Damage_Type:description:'Free text indicating hte damage'

urn:SSLy:damage_assessment:Damage_Level:description:'Level of damage suffered by the asset'

urn:SSLy:damage_assessment:Damage_Level_Structural:description:'Value of damage level corresponding to structural damage'

urn:SSLy:damage_assessment:Damage_Level_Non-structural:description:'Value of damage level corresponding to non-structural damage'

urn:SSLy:damage_assessment:Damage_Level_Soil:description:'Value of damage level corresponding to Soil damage'

urn:SSLy:damage_assessment:Damage_Level_External:description:'Value of damage level corresponding to external damage'

urn:SSLy:damage_assessment:Damage_Type:description:'a free text indicating the type of damage'

urn:SSLy:damage_assessment:Damage_Floor:description:'Number of the floor of the damage inside the asset. Applicable only to assets of type facility'

urn:SSLy:other:Compound:description:'Chemical compound detected by the sensor'

urn:SSLy:other:Agent_type:description:'The type of the agent measured, not to be confused with the compound which is the specific agent'

urn:SSLy:other:Chem_spectrum_list:description:'A list of chemical compounds obtained from a measurement'

urn:SSLy:other:Pollutant:description:'the name of a particle, gas, vapour or chemical compound that is present in some physical medium and is polluting it'

urn:SSLy:other:Video_stream:description:'a continuous and potentially open stream of binary data representing a video content'

urn:SSLy:other:Audio_stream:description:'a continuous stream of binary data representing an audio content'

urn:SSLy:other:Video_file:description:'a file containing data representing video content, but it may additionally contain audio content synchronized with the video content'

urn:SSLy:other:Audio_file:description:'a file containing data representing audio content'

urn:SSLy:other:Region_name:description:'the name of a region, district, state or county that the data provided refers to'

urn:SSLy:other:Population_name:description:'the name of the city, town, village or settlement that the data provided refers to'

urn:SSLy:other:Number_inhabitants:description:'number of inhabitants of the corresponding population as stated in population name'

urn:SSLy:other:Sensor_message:description:'Message of a sensor in its own native format'