EIOPA Solvency II DPM Documentation

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I Abstract

This document described the Data Point Model [DPM] defined by EIOPA to support reporting of Solvency II data. It introduces the DPM terminology, presents the resulting artefacts (DPM Dictionary and Annotated Templates) and explains in details the approach applied for data modelling.

II Introduction

One of the aims of EIOPA is to improve harmonisation and support coherent application of rules applied for financial institutions and markets across the European Union. In order to achieve this goal a set of common legal acts has been published: the Framework Directive, the Implementing Technical Standards and the Public Guidelines. These acts define among others a set of data to be reported by the undertakings (in particular in the Reporting Templates and supporting Business Logs).

In order to facilitate the data exchange process, EIOPA decided to use an XBRL standard as a mean for technical definition of information requirements (in form of XBRL taxonomies) and as a technical data submission format (XBRL instance documents).

The Data Point Modelling methodology has emerged in the evolution process of application of the XBRL standard for financial and prudential reporting[1]. In the beginning and for the first few years XBRL taxonomies have been developed by the IT experts who basically translated the tabular representation of information requirements to the technical format. At some point though the maintenance and updates started to require increasing business input and the business domain experts had been more and more involved in the process. This caused the need for definition of a formal model for description of requested data which could be provided by the data users and translated to technical format by the IT without any loss of information or space for interpretation. The resulting methodology has been called the Data Point Modelling to emphasise the shift in the approach from the form centric representation of information requirements (based on tabular views) to the data centric definitions (detailing properties of each exchanged piece of information).

[1] http://eurofiling.info/portal/data-point-model/

Currently DPM methodology is considered as an intermediary layer between the information requirements definition in legal acts and its technical representation. Following other European supervisors (such as EBA) and some National Competent Authorities (NCAs) EIOPA decided to use this methodology to properly reflect in XBRL all relevant properties of the exchanged data.

The result of the DPM modelling process is a structured description of the model in form of a dictionary (listing and naming all breakdowns and their components identified in the process of analysing the legal acts) and a set of annotated templates (tabular views of requested data with description from the dictionary). These two documents are subsequently used as the inputs for XBRL taxonomy generation process.

The result of application of the DPM methodology shall support fulfilment of the following requirements:

- remove redundancy of metadata definitions (no duplicated data points),
- increase consistency of metadata definitions (clarity and explicitness of definitions),
- increase efficiency of data tagging and mapping (accuracy of assigning tags to data points for generation to/from existing systems),
- advance metadata maintenance procedures (change management and communication),
- facilitate non-IT technical experts' involvement (data modelling is performed by the business users),
- support data mapping procedures (manual and automatic).

III General building blocks and terminology of DPM methodology

An important impact on the organization of the DPM has the process of its definition. The starting point is a set of legal acts composed of the text of regulations, guidelines, international standards and the tabular representation of the information requirements. These input materials are analysed in order to define consistent classifications (breakdowns with enumerated properties) used to categorise the content

of the tables[2]. The main division of in the DPM is therefore a clear separation of a **dictionary** (definition of breakdowns in general) and the tabular representation of current information requirements gathered in **frameworks** (which in case of the EIOPA DPM takes form of the Annotated Templates). This is particularly important from the standpoint of maintenance. While dictionary is expected to steadily grow in time and assure backward compatibility (i.e. to support all previous versions), frameworks can change more drastically and dynamically depending on actual information requirements.

III.1 DPM dictionary

Dictionary defines the classifications used in data description. It does it by identifying elements: metrics (that may be arranged in relationship sets), domains and their value constraints or members (plus relationships between them) and dimension as presented on Figure 1 and explained in the next paragraphs.

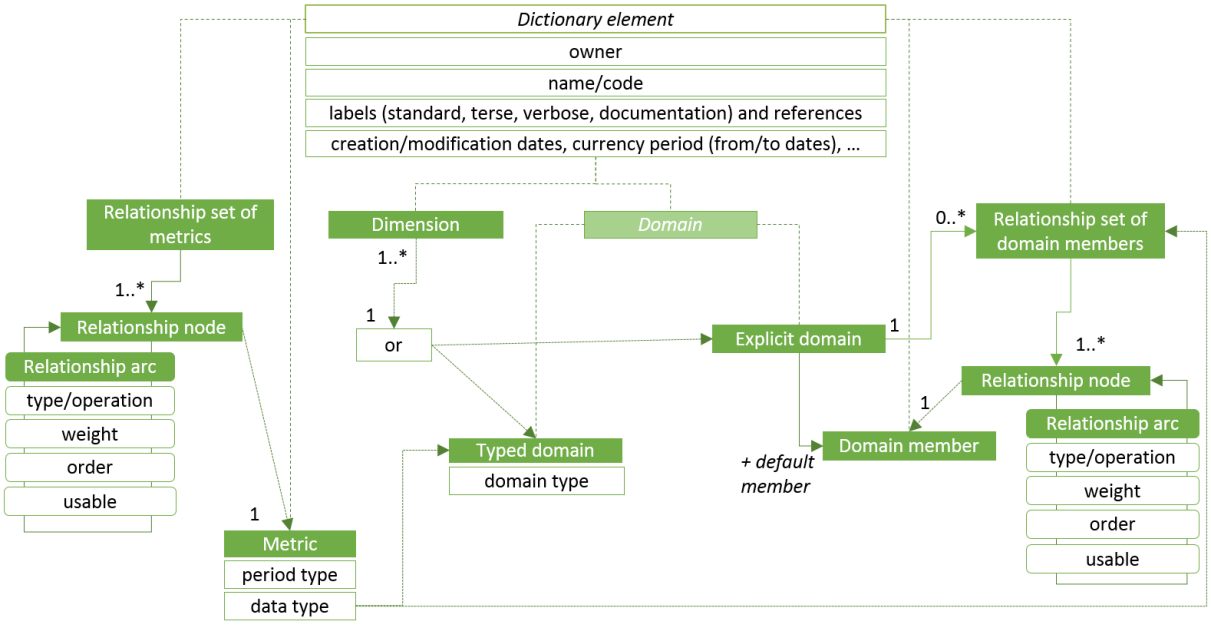

Figure 1. DPM dictionary

[2] Ideally though, the process should be reversed, i.e. start with the definition of breakdowns that would subsequently be applied in description of information requirements presented in the tabular format.

Each dictionary element must have a unique (in scope of its definition[3]) name/code and identify an owner (authority who defined it/is responsible for its maintenance). Additionally it should have a human readable label (in one – usually English – or more languages and optionally serving different roles/purposes) and may contain other documentary properties (e.g. references to underlying legislation or guidelines, more verbose explanations, etc.). For maintenance purposes declaration of each element must contain a creation date, may include a date of last modification as well as a currency period (from and to dates) when the element is considered to be in application.

A **metric** is the minimum description of each data point (each data point in the model must include in its definition one, and only one, metric). It carries the information on the expected value (data type) and the time context (period type)[4]. It may include other semantics (business properties) depending on the approach taken by the author of the model.

Other classifications are represented by domains. A **domain** is a set of elements/values sharing a specified semantic nature. Domain can be of one of two kinds: explicit and typed. An **explicit domain** has its elements enumerated in the model while a **typed domain** values are assigned in the reports based on a specified format (data type).

Elements of an explicit domain are called domain members. A **domain member** (or simply a member) is enumerated element of an explicit domain. All members from a domain share a certain common nature defined subjectively but applied consistently by the model's author. A typical example of a domain is "Geographical areas". Members of this domain could be different areas of the Earth, classified according to the physical geography ("Europe", "Pacific Ocean", "Himalayas", …) and/or human geography ("France", "EU", "G-20 major economies", …). Combining physical and human geography into one domain is already the author's subjective view of the classification. The number of members in explicit domains varies from two (e.g. "Yes" and "No") to hundreds (in case of countries or currencies).

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[3] In general name/code must be unique for a given owner for metrics, domains and dimensions. Relationship set and members' names/codes must be unique for an owner and a domain that they belong to.

[4] Time context could be also carried by dimensional attributes.

An example of a typed domain could be the ISIN identifier (used to identify uniquely financial instruments) which is restricted to a certain number of characters.

In order to document the relations between domain members or between metrics, they can be gathered in **relationship sets** (sometimes called subdomains or hierarchies). A **relationship** is constructed from nodes and arcs. A **node** refers to a metric (in relationship sets for metrics) or to a domain member (in relationship set of domain members). Nodes are arranged as directed graphs. An **arc** (edge) identifies the source node, the target node and the order of the relation in a relationship set. It may also identify a node as used for organizational purposes only (with usable property). Arcs may also document the basic arithmetic relations by identifying the type of operation ("≥", "≤" or "=") and weight by which the target node contributes to the value of a source node (in applications of the DPM so far constrained mainly to identification of a sign, i.e. "+1" and "-1"). In general all members of explicit domains should participate in hierarchical relationships and whenever possible, these relationships shall reflect arithmetical dependencies as presented in Table 1.

Table 1. Example of arithmetical dependencies between domain members expressed in the DPM as a hierarchy (subdomain)

Member	Comparison operator	Sign and weight
Calculated as a sum of best estimate and risk margin	=	
Best estimate	=	+1
Best estimate [before adjustment for expected losses due to counterparty default]		+1
Adjustment for expected losses due to counterparty default		-1
Risk margin		+1

In some cases a hierarchy (subdomain) is defined as a flat list of members to be used in a certain scenario (e.g. applied to a particular dimension, driven by information requirements of a template or set of members referenced by an enumerated metric).

Usually hierarchies include only some members of a domain, especially when there could be alternative classifications, e.g. "Poland"/"Other than Poland" and "EU"/"Other than EU" would never form a single hierarchy as "EU" includes "Poland" plus some other countries while "Other than EU" includes "Other than Poland" minus some countries.

Hierarchies are an important part of the model as they help to maintain coherence within a domain.

In order to be used in description of information requirements a domain member or a typed domain value requires a **dimension** that provides a context of its application. In other words dimensions contextualise domain members when applied to a data point i.e. they contribute to the semantics of a member which, without a dimension, may be insufficient to represent the full meaning of a property. For instance, in case of "Geographical areas" domain, "Spain" as a member could represent "Location of an issuer" of a financial instrument, "Location of a stock exchange" where this instrument is traded, "Location of a broker" who participated as a middleman in the transaction or finally "Location of a buyer" who purchased this instrument. The same domain member "Spain" was contextualised in this example by four different dimensions. A similar situation may appear in case of a typed domain whose restriction could be different based on the dimension contextualising its value, e.g. code = 123-345-567-890 could be the "Identification number for tax purposes" or "Company registration number", where the kind/type of the number is given by the dimension.

Each dimension must be associated with a domain and may contextualize any member or value of this domain. A domain may have associated more than one dimension, in such a case a member of a domain can be contextualized with many dimension when representing a reportable piece of information.

Explicit domain should specify a **default member** that is assumed to be applied to all dimensions referring to this domain in case they are not explicitly used in description of the required data, i.e. these default members are implicitly applied to every data point that is not explicitly characterised by a particular dimension. For example, a dimension "Original currency" may be associated with a default member "All currencies". This means that when a data point does not explicitly mention the "Original currency" dimension, it is assumed that it takes the "All currencies" member for this dimension.

Default members are very useful when defining the model, as otherwise every data point would have to explicitly mention each dimension and the applicable member. With default members it is enough for a data point to name only the properties that are important to distinguish this data point from other data points. Although technically in XBRL the "default" is a property of a member with respect to a dimension, the DPM assumes that all dimensions referring to a certain domain would have the same default member. This means that only one member in a domain can be assigned as a default and shall apply to all dimensions referring to this domain.

There could be dimensions in the model that do not apply to some data points. For example, a data point representing "Equity instruments" is unlikely to be linked to the

"Original maturity" dimension (shares and other ownership rights usually do not have maturity). Therefore, the default member is usually named "Total/Not-applicable".

Data types of metrics and typed domains are in particular: monetary, decimal, percentage, integer, boolean, date and URI but can be further extended (by defining new data types or restricting existing data types) if needed. A metric may also be restricted to a specific type of a typed domain or to an enumerated list of members. In the latter case it refers to a relationship set of members, identifies a starting member and whether it is included in the set of allowed values. In specific cases it may also inform how many generations (children, grandchildren, …) of members form the list of allowed values and take into account also the usable property (that may characterise the use of a member in a hierarchy merely for grouping purposes).

III.2 DPM framework

Framework represents information requirements for a specified scope. Frameworks components and relations between them are presented schematically on Figure 2.

A **taxonomy** is a version of a framework, identified by a reference to the underlying legal acts (name and version of information requirements) plus a date stamp (taxonomy publication date). A taxonomy consists of one or more tables that are usually gathered in table groups and further referenced from modules. It is possible that a taxonomy refers to and reuses tables from previous versions of a framework.

A **module** represents a set of information requirements that are supposed to be submitted in a single report. Typical factors taken into account when defining the scope of a module include:

- data nature homogeneity,
- frequency of reporting (i.e. scope of data transmitted on monthly, quarterly, yearly basis),
- subject scope (e.g. solo and consolidated data),
- accounting or other regulations impacting definitions of data.

Reporting entity classifies a report for submission according to one of modules predefined in the taxonomy.

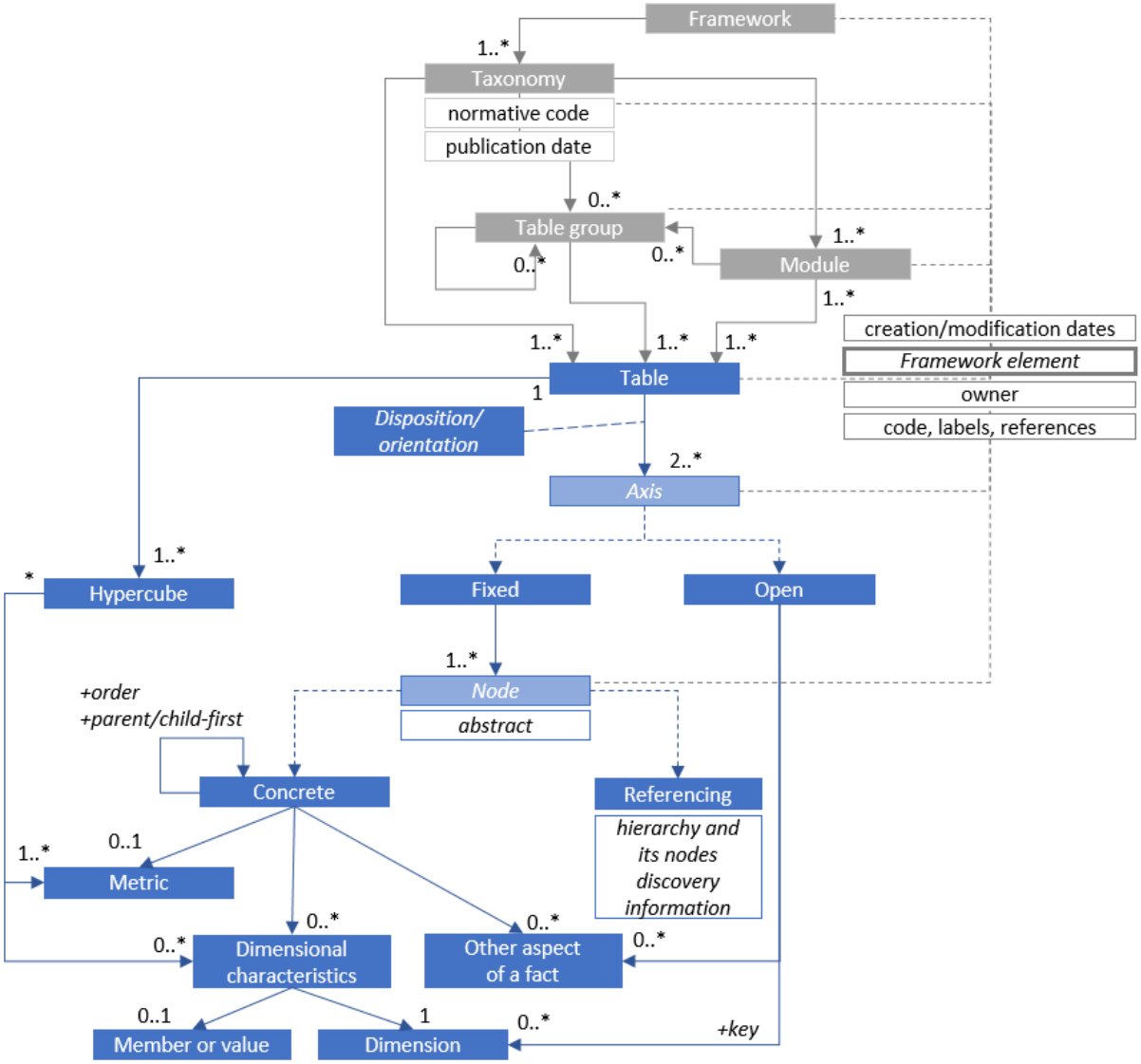


Figure 2. DPM framework

A **table group** typically gather tables in so called reporting units as defined in the underlying legal acts. Table groups, referred also as templates, can be nested in case another thematic classification may be applied.

A **table** is a graphical representation of information requirements and a format for data presentation.

An **axis** is a basic component of a table representing columns, rows, or sheets (i.e. multiplication of a table based on a property specified on this axis). Axis disposition/orientation is defined as in the Cartesian coordinates system where "x" axis defines columns, "y" axis - rows and "z" axis - sheets. Every table must have at least one axis for columns and one for rows but may also include more than one axis of certain kind (e.g. two or more axis representing rows). Axis can be fixed or open.

A **fixed axis** consist of nodes. Nodes can be concrete or referencing.

A **concrete node** is each header of a fixed axis. Nodes can be arranged in nested structures. In such a case relationships between nodes identify ordering and the manner of presentation of child nodes before or after (for rows) or to the left or right (for columns) in relation to the parent node. Moreover a concrete node can be classified as abstract if it is included in the table merely for the purpose of organization of headers rather than a resulting in a line containing data.

A **referencing node** points to a relationship set (of metrics or domain members) in a dictionary, specifies the starting node and informs if it included in the set of selected values. The resulting visualisation converts the hierarchy nodes into concrete nodes of an axis. Referencing node is basically an alternative to explicit enumeration of concrete nodes with the benefit of reusing already defined breakdowns and also several constraints (e.g. limited customization of header titles/labels, lack of possibility of inclusion of other codes or marking of unreportable cells and unambiguous treatment of unreported data).

An **open axis** refers to a dimension (usually typed) or other aspects of facts, in particular the temporal reference, entity or unit specific information (for more details see then next section in this document). Nodes (headers) are therefore dynamically constructed based on values contained in a report. In case when a table contains more than one axis of certain kind, the resulting visualisation is a Cartesian product of nodes or values of each axis. This is typically done in so called open tables (i.e. tables with undefined number of rows, when one or more columns are row keys provided in a report) or when there are several axes multiplying the table in sheets.

A concrete node may refer to a metric, dimension member pairs or specific typed dimension values and other aspects of a fact. This reference is inherited from parent nodes to child nodes unless prohibited or overridden by a different metric or member for a given dimension.

Content of a table is additionally defined by hypercubes. A **hypercube** links metrics to dimension member pairs or typed dimensions (and their specific values if applicable). They are constructed as defined in the XBRL Dimensions specification and are technical artefacts. In DPM model reflection of a framework, such as the Annotate Templates it is enough to reflect reportable and prohibited (non-reportable) cells.

Cells in tables appear on and are described by properties (including inheritance) from intersection of row and column headers and information from the sheet (i.e.

particular multiplication of a table). Non-reportable cells (usually marked graphically as criss-crossed or grey shaded and excluded from reporting as illogical or simply unrequested) are a result superposition of the hypercubes (that define only allowed combinations) on the table visualization (based on axes and their content).

Similarly to dictionary elements, framework elements such as frameworks itself, taxonomy, module, table group, table, axis and node are identified by a code/name, human readable label and owner. Axis nodes usually contain also a code (called "rc-code") that facilitates addressing of cells in a table.

III.3 Data point and fact

Relation between a data point and fact is schematically presented on Figure 3.

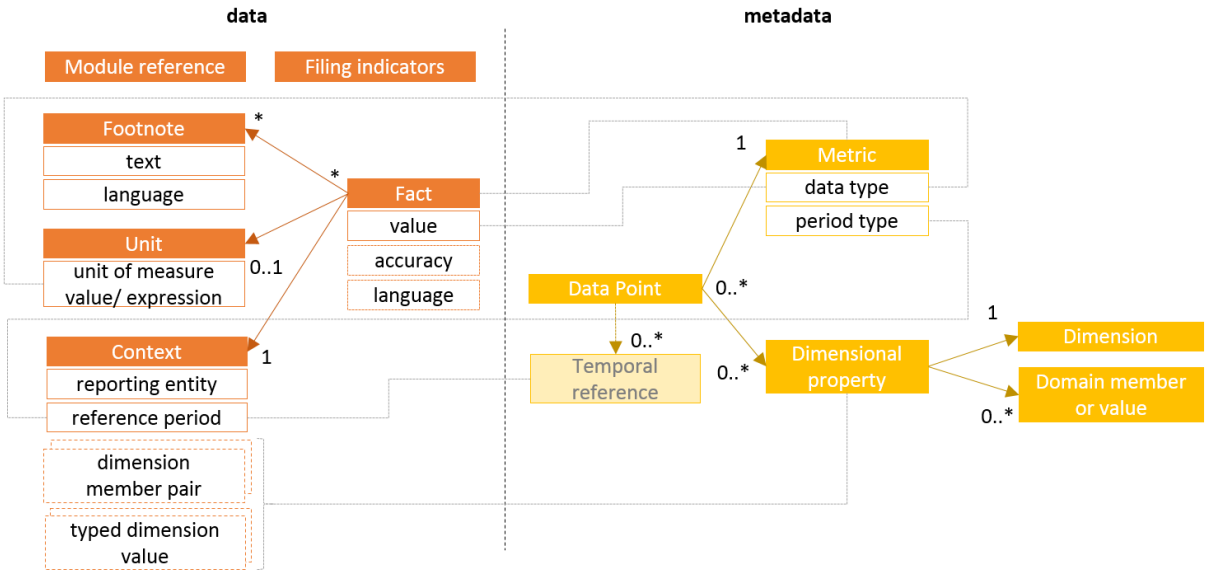


Figure 3. Data point and fact

A **data point** is characterised by a metric and may be further described by dimensional properties. It may also be provided a temporal reference i.e. identification of a period that is different to the default reference period of a report.

A **fact** refers to a data point by applying a metric as defined by a data point and linking to a context that contains dimensional properties corresponding to those defined by a data point.

A **context** apart from dimensional properties contains also identification of a reporting entity (using an identifier value according to the provided scheme) and a reference period that in general informs about the moment or time interval for measurement/expression of a fact value.

Non-numeric facts may contain an attribute informing about the language for its textual value.

Numeric facts contain an attribute expressing data accuracy and refer to declaration of a **unit** of measure.

Footnotes can be provide additional textual explanation on facts.

As explained in the previous sections, a report must also identify a module based on which it was created and contain a list of filing indicators referring to reported units (table groups or tables) that are further used as preconditions for evaluations of validation rules.

IV Data Point Model for Solvency II

Solvency II Data Point Model follows the organization as presented in the previous section. However it has also many unique features that differentiate it from other existing DPMs (such as the EBA model used in banking supervision). These are in particular:

- two layers approach (MD and HD),
- significant portion of complex open tables (with unknown and potentially large number of rows) which requires simplification of their modelling in order to allow usability,
- high number of entry points (modules) reflecting various reporting scenarios,
- Excel format for definition of the model in form of the DPM Dictionary and Annotated Templates (aiming to resemble the Business Templates from the Solvency II legal acts),
- technical constructs applied in these Excel files in order to extract all DPM metadata in an automated manner to a structured format of a DPM database and subsequently to XBRL taxonomy syntax.

The chapter describes in details the approach applied in the DPM modelling of Solvency II information requirements.

IV.1 Input materials: Reporting Templates and Business Logs

The main inputs for definition of the Solvency II DPM model are the Reporting Templates and the Business Logs provided by EIOPA.

Reporting Templates reflect Solvency II information requirements arranged in the form of tabular views while the Business Logs specify in more detail manner the

requested content by giving the meaning of information described by particular rows and columns of each template.

From the data modelling perspective, they provided all necessary information for identification of the general breakdowns describing the requested data (defined in the DPM Dictionary), current reporting requirements (in the form of sets of data points represented by the DPM Annotated Templates) as well as the checks and constraints on values to be reported[5].

IV.2 MD and HD versions of the DPM

The main purpose of the DPM methodology is to identify each reportable piece of information (a data point) in a precise and unambiguous manner. As a result the DPM defines usually high number of dimensions. This situation has a number of advantages:

- the model is data centric and independent from the particular views of data (templates),
- each data point is classified in detailed according to all applicable characteristics that are defined separately,
- dependencies between concepts are explicit and clearly identifiable,
- supports change management (based on defining specific differences),
- applied breakdowns can be used for various purposes including data querying for analysis,
- a bridge with other reporting frameworks can be established using specific properties on each data point,
- data model is less subjective and has fewer space for arbitrary modelling decisions (e.g. if a certain property shall be included in the semantics of a metrics or represented by a dimensional property).

Detailed definition of each property comes however at cost of readability of a model. It also impacts the technical representation of the model in the XBRL format: instance documents are larger in terms of size and code which hinders performance of their parsing and validation. Additionally the XBRL Formula assertions require to use a

[5] Must be noted that Annotated Templates, due to implementation assumption, could contain more information than Reporting templates (find more details in chapter V).

high number of dimensions in order to properly filter the facts for evaluation of variables in the context of a report.

To overcome the drawbacks while maintaining of all benefits the Solvency II DPM applies two layers for data modelling and representation:

- a Highly Dimensional (HD) approach and
- a Moderately Dimensional (MD) approach.

In HD approach the model is defined according the DPM methodology where metrics resemble the very basic properties of a data point that typically determine only its data type. In MD approach the semantics of each metric is extended by inclusion in its definition a number of dimensional properties that in the HD approach are represented by separate and independent dimension-member pairs. Decision on which properties are included in the MD metric is closely aligned with the template view of the required data set (as described in the next paragraphs of this chapter). Other dimensional properties are shared between the two approaches and applied to data points in both versions. This means that MD and HD versions resemble the same model, but MD includes some of the business properties in the definition of a metric while the HD approach keeps all business semantics as dimension-member pairs.

The relation between MD and HD data points is schematically presented in Figure 4.

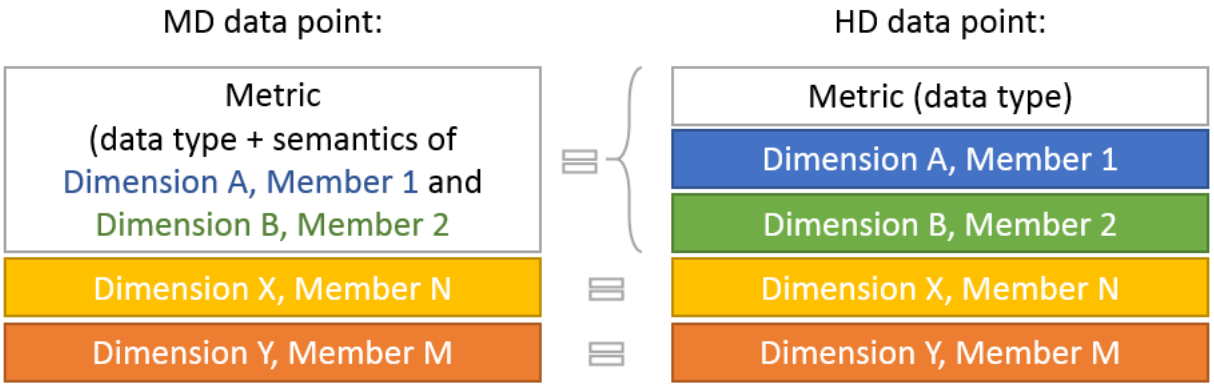


Figure 4. Schematic relation between MD and HD data points

The DPM dictionary contains definitions of properties for both HD and MD approach. The Annotated Templates contain references to the HD components with additional information (based on the applied font colouring convention) to allow the equivalent MD references to be derived.

The process of deriving the MD model from HD is different for closed and open templates.

For closed tables (i.e. tables with all rows and columns identified and named), the derivation process is determined by the placement of the HD metric either on rows, columns or as the table multiplication (z-axis) property. MD metrics are derived by

combination of the HD metric and some of the dimensional annotations. The decision on which annotations are combined is determined by their application in all closed tables of the model. By design it is not possible to include in a metric definition an annotation that is reflected in different sections (i.e. either rows, columns or table multiplication z-axis properties) of a table (in other words, all properties of a metric must be always defined in a single section of a table). All dimensions that must not be included in the definition of MD metrics in closed tables are marked in the DPM Dictionary as "Dimension in MD closed"[6].

Open tables (i.e. tables with unknown number of rows) include three types of columns:

a) columns which are a part of a key for unique identification of each row (and are therefore modelled as typed or explicit dimensions)[7],

b) columns which are not part of a key and are modelled as dimensions,

c) columns that resemble data points to be reported for each row (annotation of these columns include identification of metrics).

Columns which can be part of the key (a) or are not part of a key but are modelled as dimensions (b) are resembled in the same way in the MD version as they are in the HD version. Columns that resemble data points (c) are in MD version described as a single metric that combines information from the HD metric and all HD dimensional properties. Note that in this case the "Dimension in MD closed" property is not applicable for exclusion of certain dimensions from being included in the MD metric definition as it is very important for the XBRL file size and processing performance that all facts in a row

[6] Dimensions are marked as "Dimension in MD closed" when such dimension is used on a different section (row/columns/table multiplication) than a metric in at least one of the closed table of the model. In such case the dimension cannot be merged in the MD metric definition. This helps to avoid situations of the same data point being defined differently in the MD model (i.e. using two different MD metrics).

[7] In some cases, particularly when multiple columns contribute to a key (resulting in a so-called composite natural key), the DPM may include an additional property that should serve solely as a unique key (also known as an artificial key). This property is represented by a typed dimension, whose domain is a set of identifiers for rows defined by each filer in the submitted report.

have the same dimensional description (identified by the dimensions which are part of a key).

As a result the same data point appearing in an open and closed table of the model may be theoretically defined in a different manner in the MD approach (using a different metric that in case of open table includes some dimensional annotation in its definition while in a close table this annotation is defined separately to the metric).

In general annotations which identify a default member for a dimension should not be present in the Annotate Templates. If such case occurs that annotation would never be included in the MD metric definition.

MD metric labels are derived from the HD model by concatenating the HD metric label and those HD dimension-member pairs that are included in MD metric definition (as explained in derivation process above). These dimension-member pairs are ordered according to an algorithm (sorted alphabetically by domain code, dimension code and member label) to ensure consistency, and are separated by pipe characters ("|"). As a result, labels of MD metrics follow the general pattern:

Metric: {label of HD metric}|{dimension code}/{label of domain member}|{dimension code}/{label of domain member}|…

For example:

Metric: Monetary|TA/Maximum value|VG/Solvency II|BC/Loss|CC/Facultative

Please note that technical XBRL representation of the Solvency II framework components and reporting in XBRL format is made only in the MD version of the model; the HD version is defined for reference purposes only.

IV.3 Structure of the Solvency II DPM

There is no single predefined format for representation of the DPM. The ones commonly used is an Excel workbook (in this format the DPM is usually created and

edited)[8], a database (used for maintenance and quality/consistency checks) and an XBRL taxonomy (applied for reporting in XBRL). EIOPA applies all these three formats. The latter two are IT artefacts explained in separate documentations. This document focuses on description of an Excel format where the business users define the DPM.

As described in the section III of this document, a DPM consists of Dictionary and Framework. The latter can be organized for instance in a form of an Analysis Matrix, as in case of the EBA, or as Annotated Templates in case of EIOPA. Annotated Templates have several advantages over the Analysis Matrix:

- they are close to the Business Templates,
- each table is modelled at once (not by row/columns/table multiplication approach),
- it is possible to identify crossed-out cells in a single view.

The original disadvantage of the Annotated Templates was high flexibility of its structure which made it complex to develop an automated process of XBRL taxonomy development. This obstacle has been overcome in the current Solvency II DPM Annotated Templates by applying named ranges and cell styles.

In order to help to trace differences in DPM Dictionary and Annotated Templates following color convention was used:

New information. For example new entry point, template or table column.
Information changed (other than label). For example templates affected by change in modelling, remodeling of particular column or row of existing table.
Deleted information. For example removed annotation.
Label change (not affected template modelling).

IV.3.1 Solvency II DPM Dictionary

Solvency II DPM Dictionary is defined in the form of an MS Excel workbook. It consists of numerous worksheets as described below and presented on screenshot on Figure 5:

- worksheet listing all owners together with their codes[9],

[8] Excel format is commonly known to the business experts developing the model and open source or inexpensive commercial tools allow editing and reviewing of its content.

[9] As explained in section III.1 of this document Owner is an authority who defines the concepts in the dictionary and is responsible for their maintenance.

- worksheet listing all domains together with their codes and types (explicit/typed),
- worksheet listing all dimensions together with their codes and reference to domains,
- two worksheets listing metrics, one for HD and one for MD version of the model; declaration of a metric includes identification of the constraint towards the reportable values to a specified type (e.g. monetary, string, etc.) or enumeration (by identification of the hierarchy and optionally also the starting member whose descendants – taking into account the usable property – form the list of allowed values to be reported),
- one worksheet for each explicit domain defining (among others):
    - unstructured list of all domain members (of which at least one is marked as a default member),
    - relationships between domain members (arithmetical if possible).

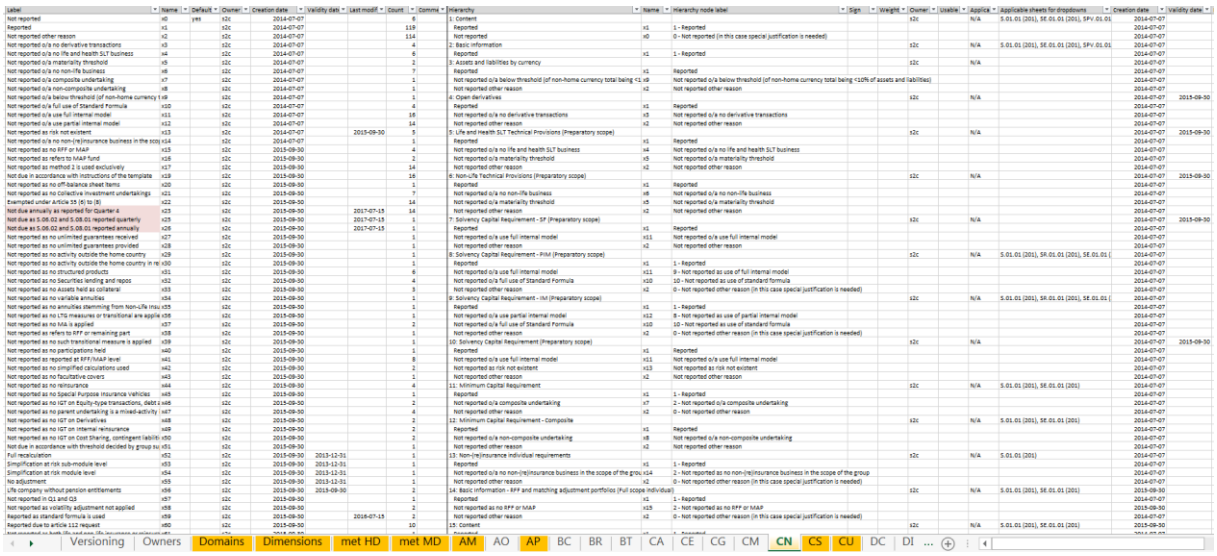


Figure 5. Structure of Solvency II DPM Dictionary

Dimensions in the DPM are used not only to reflect typical breakdowns (i.e. "Currencies", "Lines of business") but certain notion of data points (e.g. "Consolidation scope") or expression of temporal characteristics ("Instant or duration").

All concepts in dictionary are described with information helpful for maintenance and versioning:

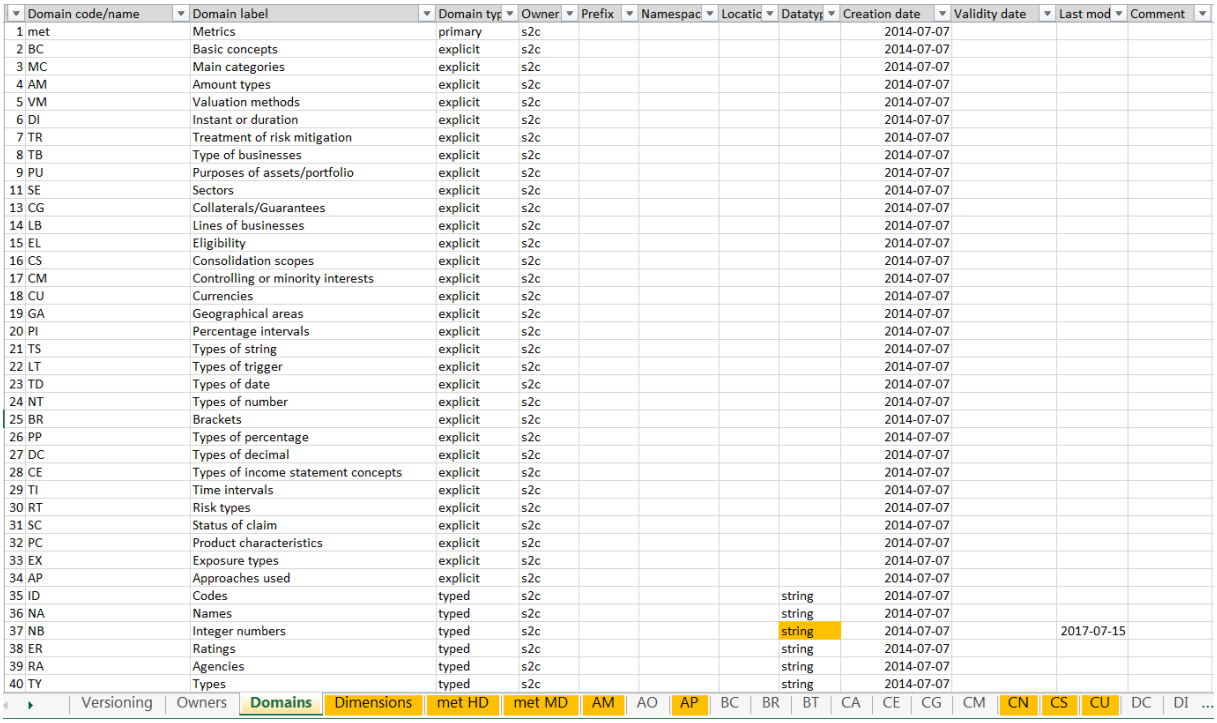
- creation date,
- validity date is the last reference date for which the concept is used in Annotated Templates[10],

[10] For instance in 2.1.0 release validity dates are specified as follows:

– last modified date (i.e. date of last upgrade to the label).

IV.3.1.1 Domains worksheet

Domains worksheet (Figure 6) contains among others information about domains code/name, label (in English), domain type (primary, explicit or typed) and owner. Primary domain type is used for metrics. Data type is identified for typed domains.



	Domain code/name	Domain label	Domain ty	Owner	Prefix	Namespac	Locatic	Datatyı	Creation date	Validity date	Last mod	Comment
1	met	Metrics	primary	s2c					2014-07-07			
2	BC	Basic concepts	explicit	s2c					2014-07-07			
3	MC	Main categories	explicit	s2c					2014-07-07			
4	AM	Amount types	explicit	s2c					2014-07-07			
5	VM	Valuation methods	explicit	s2c					2014-07-07			
6	DI	Instant or duration	explicit	s2c					2014-07-07			
7	TR	Treatment of risk mitigation	explicit	s2c					2014-07-07			
8	TB	Type of businesses	explicit	s2c					2014-07-07			
9	PU	Purposes of assets/portfolio	explicit	s2c					2014-07-07			
11	SE	Sectors	explicit	s2c					2014-07-07			
13	CG	Collaterals/Guarantees	explicit	s2c					2014-07-07			
14	LB	Lines of businesses	explicit	s2c					2014-07-07			
15	EL	Eligibility	explicit	s2c					2014-07-07			
16	CS	Consolidation scopes	explicit	s2c					2014-07-07			
17	CM	Controlling or minority interests	explicit	s2c					2014-07-07			
18	CU	Currencies	explicit	s2c					2014-07-07			
19	GA	Geographical areas	explicit	s2c					2014-07-07			
20	PI	Percentage intervals	explicit	s2c					2014-07-07			
21	TS	Types of string	explicit	s2c					2014-07-07			
22	LT	Types of trigger	explicit	s2c					2014-07-07			
23	TD	Types of date	explicit	s2c					2014-07-07			
24	NT	Types of number	explicit	s2c					2014-07-07			
25	BR	Brackets	explicit	s2c					2014-07-07			
26	PP	Types of percentage	explicit	s2c					2014-07-07			
27	DC	Types of decimal	explicit	s2c					2014-07-07			
28	CE	Types of income statement concepts	explicit	s2c					2014-07-07			
29	TI	Time intervals	explicit	s2c					2014-07-07			
30	RT	Risk types	explicit	s2c					2014-07-07			
31	SC	Status of claim	explicit	s2c					2014-07-07			
32	PC	Product characteristics	explicit	s2c					2014-07-07			
33	EX	Exposure types	explicit	s2c					2014-07-07			
34	AP	Approaches used	explicit	s2c					2014-07-07			
35	ID	Codes	typed	s2c				string	2014-07-07			
36	NA	Names	typed	s2c				string	2014-07-07			
37	NB	Integer numbers	typed	s2c				string	2014-07-07		2017-07-15	
38	ER	Ratings	typed	s2c				string	2014-07-07			
39	RA	Agencies	typed	s2c				string	2014-07-07			
40	TY	Types	typed	s2c				string	2014-07-07			

Versioning | Owners | Domains | Dimensions | met HD | met MD | AM | AO | AP | BC | BR | BT | CA | CE | CG | CM | CN | CS | CU | DC | DI ...

- 2013-12-31 for concepts not used in 1.5.2.c release nor in 2.0.1 release of Annotated Templates. Validity date can be earlier than creation date for concepts that were never used in production releases,

- 2015-09-30 for concepts used in 1.5.2.c release but not in 2.0.1 release of Annotated Templates,

- 2016-07-15 for concepts used in 2.0.1 release but not in 2.1.0 release of Annotated Templates,

- 2017-07-15 for concepts used in 2.1.0 release but not in 2.2.0 release of Annotated Templates.

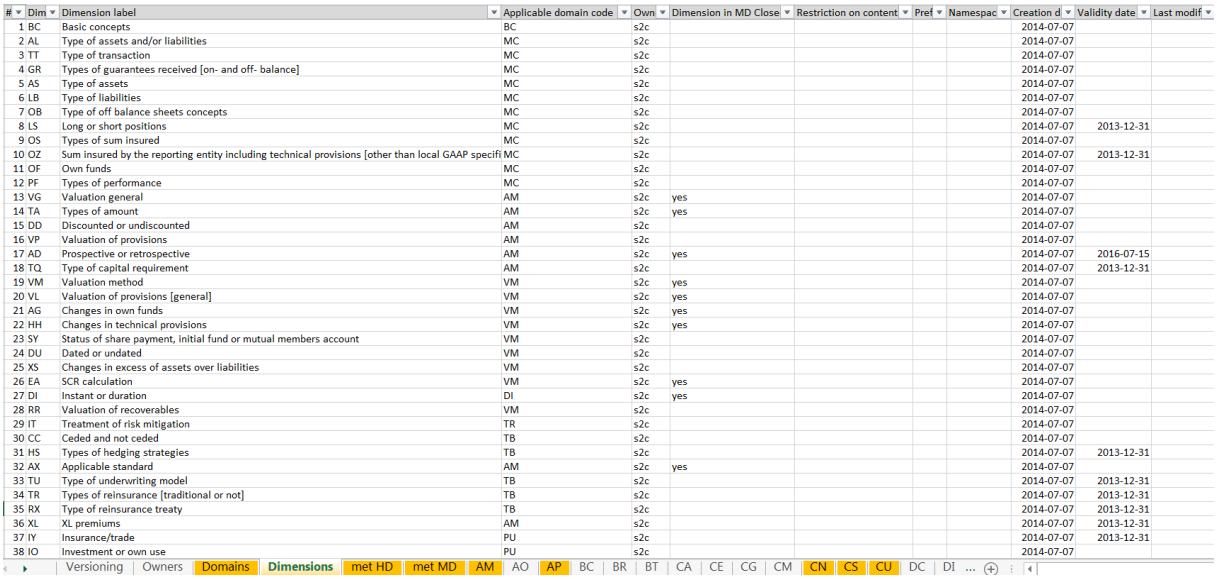
Figure 6. Structure of domains worksheet in Solvency II DPM Dictionary

IV.3.1.2 Dimensions worksheet

Dimensions worksheet (Figure 7) contains among others information about its code/name, label (in English), applicable domain code, owner, dimension in MD closed information.

Applicable domain code identifies the domain that each dimension relates to. There must be one and only one applicable domain identified for each dimension but in the same time more than one dimension can be applicable for a single domain.

"Yes" in "dimension in MD Closed" column identifies those dimensions that can't be included into MD metrics applicable in closed tables (see: IV.2).



#	Dim	Dimension label	Applicable domain code	Own	Dimension in MD Close	Restriction on content	Pref	Namespac	Creation d	Validity date	Last modif
1	BC	Basic concepts	BC	s2c					2014-07-07		
2	AL	Type of assets and/or liabilities	MC	s2c					2014-07-07		
3	TT	Type of transaction	MC	s2c					2014-07-07		
4	GR	Types of guarantees received [on- and off- balance]	MC	s2c					2014-07-07		
5	AS	Type of assets	MC	s2c					2014-07-07		
6	LB	Type of liabilities	MC	s2c					2014-07-07		
7	OB	Type of off balance sheets concepts	MC	s2c					2014-07-07		
8	LS	Long or short positions	MC	s2c					2014-07-07	2013-12-31	
9	OS	Types of sum insured	MC	s2c					2014-07-07		
10	OZ	Sum insured by the reporting entity including technical provisions [other than local GAAP specifi	MC	s2c					2014-07-07	2013-12-31	
11	OF	Own funds	MC	s2c					2014-07-07		
12	PF	Types of performance	MC	s2c					2014-07-07		
13	VG	Valuation general	AM	s2c	yes				2014-07-07		
14	TA	Types of amount	AM	s2c	yes				2014-07-07		
15	DD	Discounted or undiscounted	AM	s2c					2014-07-07		
16	VP	Valuation of provisions	AM	s2c					2014-07-07		
17	AD	Prospective or retrospective	AM	s2c	yes				2014-07-07	2016-07-15	
18	TQ	Type of capital requirement	AM	s2c					2014-07-07	2013-12-31	
19	VM	Valuation method	VM	s2c	yes				2014-07-07		
20	VL	Valuation of provisions [general]	VM	s2c	yes				2014-07-07		
21	AG	Changes in own funds	VM	s2c	yes				2014-07-07		
22	HH	Changes in technical provisions	VM	s2c	yes				2014-07-07		
23	SY	Status of share payment, initial fund or mutual members account	VM	s2c					2014-07-07		
24	DU	Dated or undated	VM	s2c					2014-07-07		
25	XS	Changes in excess of assets over liabilities	VM	s2c					2014-07-07		
26	EA	SCR calculation	VM	s2c	yes				2014-07-07		
27	DI	Instant or duration	DI	s2c	yes				2014-07-07		
28	RR	Valuation of recoverables	VM	s2c					2014-07-07		
29	IT	Treatment of risk mitigation	TR	s2c					2014-07-07		
30	CC	Ceded and not ceded	TB	s2c					2014-07-07		
31	HS	Types of hedging strategies	TB	s2c					2014-07-07	2013-12-31	
32	AX	Applicable standard	AM	s2c	yes				2014-07-07		
33	TU	Type of underwriting model	TB	s2c					2014-07-07	2013-12-31	
34	TR	Types of reinsurance [traditional or not]	TB	s2c					2014-07-07	2013-12-31	
35	RX	Type of reinsurance treaty	TB	s2c					2014-07-07	2013-12-31	
36	XL	XL premiums	AM	s2c					2014-07-07	2013-12-31	
37	IY	Insurance/trade	PU	s2c					2014-07-07	2013-12-31	
38	IO	Investment or own use	PU	s2c					2014-07-07		

Versioning | Owners | Domains | Dimensions | met HD | met MD | AM | AO | AP | BC | BR | BT | CA | CE | CG | CM | CN | CS | CU | DC | DI ...

Figure 7. Structure of dimensions worksheet in Solvency II DPM Dictionary

IV.3.1.3 Metrics worksheet

There are two worksheets dedicated to metrics: met HD and met MD (Figure 8). The structure of those worksheets is the same. Both contain among others information about labels (in English), names, owners, data types, domains, hierarchies and period

types[11]. MD metrics labels are derived from HD components according to procedure described in section IV.2.

Domain information is applicable only to enum:enumerationItemType metrics. Two additional columns are referenced in those cases:

- Hierarchy – identifying the a relationship set of domain members that are potential value of a metric. The set can be of nested structure,
- Member (optional) - it identifies in case of nested relationship sets starting nodes that are excluded from the set of selected values (i.e. if it is "Total/NA" then it means that children of "Total/NA" are available values but "Total/NA" is not).

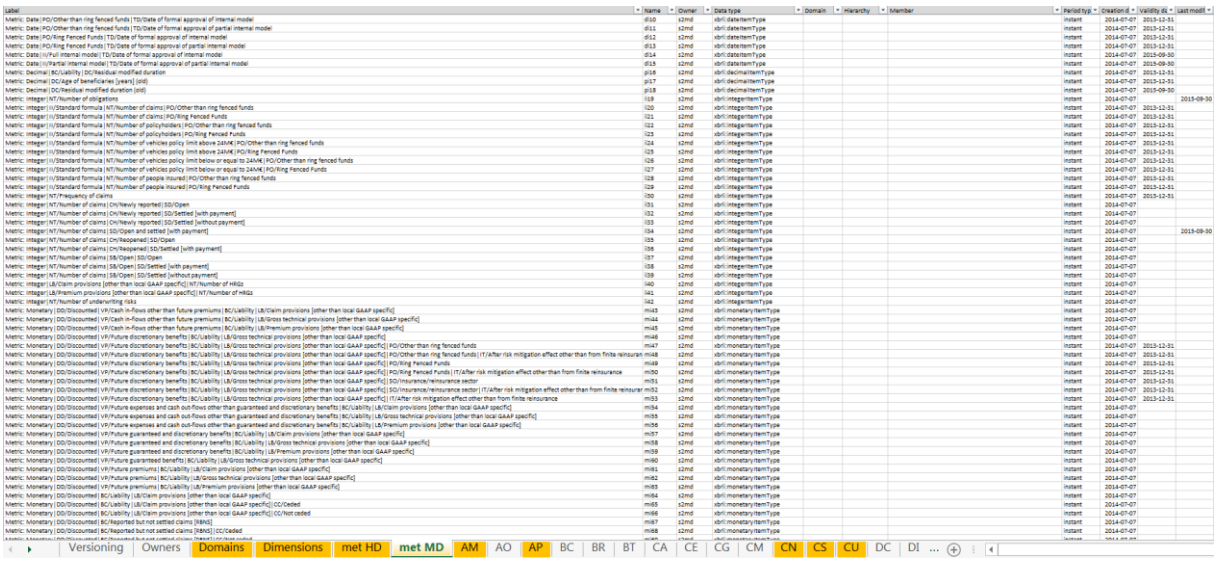


Figure 8. Structure of metrics worksheet in Solvency II DPM Dictionary

IV.3.1.4 Domain worksheet

Domain worksheets (Figure 9) contain two sections of information:

- unstructured list of elements, including its label (in English), name and owner. This section is also used to identify a default member ("Yes" in "Default" column) and to count, how many times each domain member is being referenced from relationship sets section ("Count" column),

[11] All Solvency II metrics are of instant period type. DI domain is used to specify period type attribute.

- information describing the relationship sets that are defined between domain members[12].

Each relationship set is described by its number and label (i.e. "2: Tiers"). Domain members used in those relationship sets are organized in hierarchical structures (represented in column "Hierarchy"). There can be arithmetical relationship between domain members in a hierarchy described using "Sign" and "Weight" columns. If a hierarchy is referenced by a metric then usable attribute (in "Usable" column) can be used to identify those domain members that can't be chosen as potential value of this particular metric[13].

For each relationship set an owner is identified, as well as applicable dimension code. If a relationship set is referenced exclusively by a metric (not dimension) then N/A is specified (for technical reasons).

Label	Name	Default	Owner	Creation dat	Validity date	Last modi	Count	Comment
Total/NA	x0	yes	s2c	2014-07-07			3	
Collateral	x1		s2c	2014-07-07	2013-12-31		0	
Collateral for reinsurance accepted [CR]	x2		s2c	2014-07-07			1	
Collateral for securities borrowed [CB]	x3		s2c	2014-07-07			1	
Collateral pledged [CP]	x4		s2c	2014-07-07			1	
Collateralised	x5		s2c	2014-07-07	2013-12-31		1	
Collateralised/guaranteed	x6		s2c	2014-07-07	2013-12-31		1	
Full capital protection	x7		s2c	2014-07-07			1	
Guaranteed	x8		s2c	2014-07-07	2013-12-31		1	
Guaranteed minimum accumulation benefit [GMA	x9		s2c	2014-07-07			2	
Guaranteed minimum death benefit [GMDB]	x10		s2c	2014-07-07			2	
Guaranteed minimum income benefit [GMIB]	x11		s2c	2014-07-07			2	
Guaranteed minimum withdrawal benefits [GMWI	x12		s2c	2014-07-07			2	
No [N]	x13		s2c	2014-07-07			1	
No capital protection	x14		s2c	2014-07-07			1	
Not collateral	x15		s2c	2014-07-07			1	
Not collateralised/guaranteed	x16		s2c	2014-07-07	2013-12-31		1	
Not sensitive [NS]	x17		s2c	2014-07-07			1	
On policies	x18		s2c	2014-07-07	2015-09-30		1	
Other than on policies and not collateralised	x19		s2c	2014-07-07	2015-09-30		1	
Partial [P]	x20		s2c	2014-07-07			1	
Partial capital protection	x21		s2c	2014-07-07			1	
Repos [R]	x22		s2c	2014-07-07			1	
SPV not sufficiently collateralised	x23		s2c	2014-07-07			1	
SPV sufficiently collateralised	x24		s2c	2014-07-07			1	
Yes [Y]	x25		s2c	2014-07-07			1	
Collateralisation performed on a portfolio basis	x26		s2c	2014-07-07			2	
Collateralisation performed on a single contract l	x27		s2c	2014-07-07			2	
Other	x28		s2c	2015-09-30			1	
Encumbered	x29		s2c	2015-09-30			1	
Unencumbered	x30		s2c	2015-09-30			1	
No collateral	x31		s2c	2015-09-30			1	

Hierarchy	Name	Hierarchy Sign	Weight	Owner	Usable	Applicabl	Applicable sheets for dropdowns	Creation date	Validity date
1: Collateral/Guarantee				s2c		N/A		2014-07-07	
Total/NA	x0	Total/NA	=					2014-07-07	
Collateralised/guaranteed	x6	Collateral	=	+				2014-07-07	2013-12-31
Collateralised	x5	Collateralised		+				2014-07-07	2013-12-31
Guaranteed	x8	Guaranteed		+				2014-07-07	2013-12-31
Not collateralised/guaranteed	x16	Not collateralised/g		+				2014-07-07	2013-12-31
2: Being collateral or not				s2c		N/A	S.06.02 (201), SE.06.02 (201)	2014-07-07	
Collateral pledged [CP]	x4	1 - Assets in the balance sheet that are collateral pledged						2014-07-07	
Collateral for reinsurance accepted [CR]	x2	2 - Collateral for reinsurance accepted						2014-07-07	
Collateral for securities borrowed [CB]	x3	3 - Collateral for securities borrowed						2014-07-07	
Repos [R]	x22	4 - Repos						2014-07-07	
Not collateral	x15	9 - Not collateral						2014-07-07	
3: Collateral				s2c		N/A		2014-07-07	
Total/NA	x0	Total/NA	=					2014-07-07	
On policies	x18	On policies		+				2014-07-07	2015-09-30
Other than on policies and not collateralised	x19	Other than on polici		+				2014-07-07	2015-09-30
4: SPV sufficiently collateralised or not				s2c		N/A		2014-07-07	
SPV sufficiently collateralised	x24	SPV sufficiently collateralised						2014-07-07	
SPV not sufficiently collateralised	x23	SPV not sufficiently collateralised						2014-07-07	
5: Capital protection				s2c		N/A	S.07.01 (201)	2014-07-07	
Full capital protection	x7	1 - Full capital protection						2014-07-07	
Partial capital protection	x21	2 - Partial capital protection						2014-07-07	
No capital protection	x14	3 - No capital protection						2014-07-07	
6: Types of guarantee (Preparatory scope)				s2c		N/A		2014-07-07	2015-09-30
Total/NA	x0	Total/NA						2014-07-07	
Guaranteed minimum death benefit [GMDB]	x10	Guaranteed minimum death benefit [GMDB]						2014-07-07	
Guaranteed minimum accumulation benefit [G	x9	Guaranteed minimum accumulation benefit [GMAB]						2014-07-07	
Guaranteed minimum income benefit [GMIB]	x11	Guaranteed minimum income benefit [GMIB]						2014-07-07	
Guaranteed minimum withdrawal benefits [GM	x12	Guaranteed minimum withdrawal benefits [GMWB]						2014-07-07	
7: Hedge application				s2c		N/A	S.15.02 (201)	2014-07-07	
Yes [Y]	x25	1 – Hedged						2014-07-07	
No [N]	x13	2 – Not hedged						2014-07-07	
Partial [P]	x20	3 – Partially hedged						2014-07-07	
Not sensitive [NS]	x17	4 – Guarantee not sensitive to						2014-07-07	

Figure 9. Structure of domain worksheet in Solvency II DPM Dictionary

Hierarchy node label provides labels that should be used when particular hierarchy is referenced as a dropdown list.

[12] This section is reflected also for metrics but in fact is not used there at the moment.

[13] This mechanism is used for example for NACE codes when it was beneficial to reflect entire structure of those codes including those, that can't be reported according to Solvency II rules. Those cases are identified with „no" in „Usable" column.

IV.3.2 Solvency II Annotated Templates

Solvency II Annotated Templates reflect DPM framework (see section III.2). They provide a mapping between the Reporting Templates and DPM dictionary.

The Annotated Templates contain the HD model only and enough information to derive the MD from it (see section IV.2). This means that the Annotated Templates do not have to duplicate information (which must be kept in sync between the two models) causing a maintenance burden and a risk of errors.

Annotated Templates are defined in the form of an Excel workbook containing a number of worksheets. In general one worksheet describes one Business Template (however more than one graphical table may be annotated in one worksheet).

DPM qualifiers used in annotation represent the codes or labels of concepts defined in the dictionary. They may be associated with each row, column and entire table (if applicable). Details explaining the DPM qualifiers are described in the next sections of this chapter.

IV.3.2.1 Organization of Annotated Templates

Organization of Annotated Templates follows the Technical Standard (ITS). The general assumption is to assign the same template code when a template is used, without any changes, across different variants and entry points (modules). For example, S.02.02 is the same for solo and group variants, therefore in the Annotate Templates codification there is one template S.02.02.01 used in two entry points (01 and 04).

Table codes in Annotated Templates use the predefined structure *{AA.XX.YY.ZZ.WW}* comprising the following elements:

- *AA*: an alphanumeric code for the global reporting package. For Solvency II reporting it is either regular *S* (for regular Solvency II) or *SR* (for ring-fenced funds)[14]. Other frameworks like the Solvency II ECB add-ons or Special Purpose Vehicles (SPVs) have different prefixes:

[14] There is also prefix T used for technical table that was introduced to address potential mistakes in the DPM resulting in missing datapoint containers to report necessary information.

    - SE for Solvency II templates extended to meet ECB add-on reporting requirements,
    - E for ECB add-on specific templates,
    - SPV for Special Purpose Vehicles specific templates,
    - PF for Pension Funds specific templates (for future use),
    - T for Technical Tables which are not part of a specific business regulation.
- *XX*: a numeric code for the templates group, for example 01 (for Basic Information), 02 (for Balance Sheet), etc.,
- *YY*: a numeric code for the specific template (sequential code kept stable over time),
- *ZZ*: two digits assigned to an entry point (reporting obligation) which can be reused by other entry points (with a higher number) if the template is the same[15] as presented on Figure 10.
    - the annual individual templates are considered the "default" one (as it is the largest package) and has code "01";
    - for other entry points it is assessed if the template with code "01" can be reused; if not, the template is assigned a sequential code: "02"; subsequent entry points may reuse template "01" or "02" if they are identical; if not the template is assigned another sequential code "03" and so on (see example for S.01.03 in Figure 10),
- *WW:* table number within an Annotated Template (Excel Worksheet); it is related to the XBRL taxonomy implementation; EIOPA has made a commitment to keep the code stable as long as there are no business changes to the particular table requirements (if there are substantial modifications, a new table with a new code will be assigned and the previous table will become obsolete or will be replaced)[16].

[15] A similar approach was used for this code in the IT implementation of the codification for the Solvency II Preparatory Phase.

[16] This helps, for example, during an IT mapping exercise to identify tables that need to be remapped because something has changed.

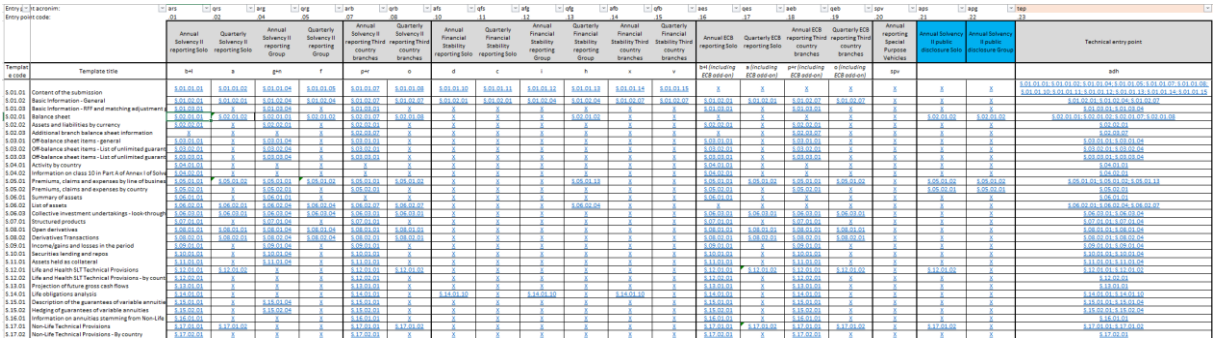


Figure 10. Organisation of Annotated Templates

IV.3.2.2 Annotation process

The process of annotating templates aims to associate the Reporting Templates with comprehensive, precise and explicit descriptions of business characteristics relevant to all data cells.

The characteristics (breakdowns and their components) used to annotate the cells are documented in a comprehensive manner in the DPM Dictionary.

The annotation process consists of the following steps:

1. Business experts analyse a template row by row, column by column, including the header information (e.g. title of a template) and related documentation (in particular Business Logs).
2. In case of an open table (with unknown number of rows) the key columns are identified and annotated as typed or explicit dimensions. They serve as a key to each row. If among columns there is no candidate for the key or the number of potential keys is high a new columns serving as an artificial key is added to a table.
3. HD metric (primary characteristic) must be assigned to every data cell, either as a property of a table and hence applying to the entire content of a table (all cells in a table), or to all rows or columns,
4. Remaining applicable business properties (pairs of dimension-members) are assigned to data cells similarly as in case of metrics, as a table header or for one or more rows/columns,
5. Consistency of characteristics is verified and (optionally) DPM is updated for required but missing metrics or remaining business properties (dimensions, domains and members).

IV.3.2.3 Annotation convention

Annotation of Business Templates is conducted through assignment of metrics and other business properties (dimension-member pairs) to each identifiable data cell by their application to the entire table, its row or column (and hence to a data cell which is on the intersection). It is possible to apply multiple sets of characteristics to each data cell.

Characteristics applicable to data cells are arranged graphically in either subsequent vertical columns (below each column of an annotated template) or horizontal rows (on the right-hand side of each row of an annotated template). Characteristics applicable to the entire table are described in a separate location on the worksheet (as a "Z axis:" property usually above the table). In case of semi open tables (i.e. which rows or columns are multiplied by a specified explicit dimension members hierarchy) the expandable rows or columns are annotated as "X axis:" or "Y axis:".

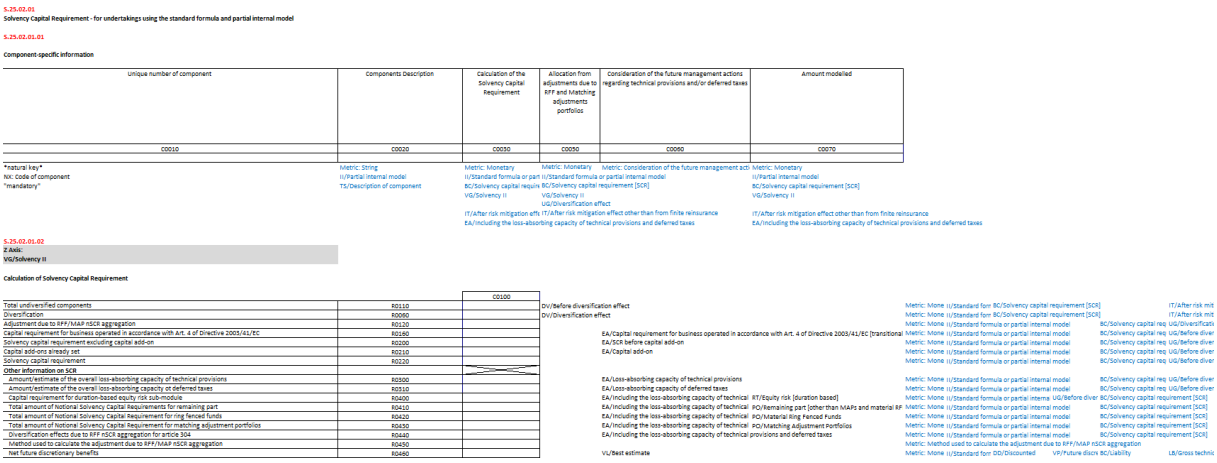


Figure 11. Example of an Annotated Template

An example illustrating how annotations have been applied to the templates is presented on Figure 11. As described above, annotations have been applied to columns, rows or the whole tables ("Z axis:").

Annotations may refer to:

- metrics in which case the metric label is prefixed with "Metric:", i.e. "Metric:Monetary",
- dimension-member pairs for explicit dimensions according to the pattern {dimension code}/{label of domain member}, i.e. "II/Partial internal model",

- set of explicit dimension-member pairs following the pattern {dimension code}/"All members" with identification of a subdomain that defines applicable domain members,
- typed dimensions annotated as {dimension code}:{label of dimension}, i.e. "NF: Number of fund".

Note that when there are multiple variants of a template which differ only by the "Z axis:" property, they can be combined onto one sheet using multiple "Z axis:" sections.

For open tables, the columns which, if reported, uniquely identify the row are annotated with identification of the type of key:

- *natural key* if a column is provided by Business templates and is required to uniquely identify the row,
- *artificial key*, when a columns was introduced to Annotated templates in addition to a number of potential *natural keys* to replace them in a 'key' function (i.e. 'XF: S.10.01.zz.01 line identification', where 'XF' is a code of typed dimension; 'zz' specifies that the line identification code is attributable to each variant of particular table)
- *foreign key* to identify the relation between tables that were normalized (i.e. *foreign key to S.06.02.01.02*). In a table where information is classified as *foreign key* such information can be reported multiple times.In a table where the foreign key refers to (S.06.02.01.02 in provided example) information can be reported just once.

Additional information provided for columns of open tables modelled with typed or explicit dimensions is if those columns are "mandatory" or "optional". Information in "mandatory" column is expected to be provided for each row when the table is reported. Information in "optional" columns doesn't have to be provided for all rows and detailed scenarios are explained in the legal documentation.

Blue font identifies the HD annotation that is replaced by the MD metric (for each row, column or table "Z axis:" property. Black font identifies dimensional annotation applicable to both MD and HD approaches.

IV.3.2.4 Named ranges and cell styles

Table 2. Examples of named ranges

Item	Explanation	Example
S.XX.YY.ZZ	The IT code given to the specific table.	S.01.02.01
S.XX.YY.ZZ.NN	The IT code given to the specific sub-table.	S.01.02.01.01
S.XX.YY.ZZ.NN.TD	Covers rectangular area enclosing the data cells.	S.01.02.01.01.TD
S.XX.YY.ZZ.NN.TL	Concerns the business labels, located on the far left side of a table.	S.01.02.01.01.TL
S.XX.YY.ZZ.NN.TLC	The business labels codes, located on the right side of the business labels .TL column.	S.01.02.01.01.TLC
S.XX.YY.ZZ.NN.TT	The business labels on the top of a table.	S.01.02.01.01.TT
S.XX.YY.ZZ.NN.TTC	The business labels codes, located below of the business labels .TT row.	S.01.02.01.01.TTC
S.XX.YY.ZZ.NN.TC	The caption of the table.	S.01.02.01.01.TC
S.XX.YY.ZZ.NN.TK	The line of identification labels for the table.	S.01.02.01.01.TK
S.XX.YY.ZZ.NN.TKC	Codes for the line of the identification labels.	S.01.02.01.01.TKC
S.XX.YY.ZZ.NN.X	X axis annotations produced by the DPM analysis.	S.01.02.01.01.X
S.XX.YY.ZZ.NN.Y	Y axis annotations produced by the DPM analysis. In case of open table create a unique key of the row.	S.01.02.01.01.Y
S.XX.YY.ZZ.NN.Z	Z axis annotations produced by the DPM analysis.	S.01.02.01.01.Z
S.XX.YY.ZZ.NN.XAX	The second X axis	S.01.02.01.01.XAX
S.XX.YY.ZZ.NN.YAX	The second Y axis	S.01.02.01.01.YAX
S.XX.YY.ZZ.NN.ZHI	The second Z axis	S.01.02.01.01.ZHI
S.XX.YY.ZZ.NN.YHI	Part of the key in the open table, which used a dropdown list.	S.01.02.01.01.YHI

To allow the automated process of parsing of the Annotated Templates to a structured format (database, XBRL, etc.), each template and table is described using MS Excel named ranges and (if applicable) cell styles. Examples and explanation of some named ranges is provided in Table 2. Content of each table (identified as '.TD' named range) is described with one of two cell styles:

- 'DPM_EmptyCell' for not reportable cells,
- 'DPM_CellCode' for reportable cell.

Location of named ranges for different use cases is presented in Figure 12.

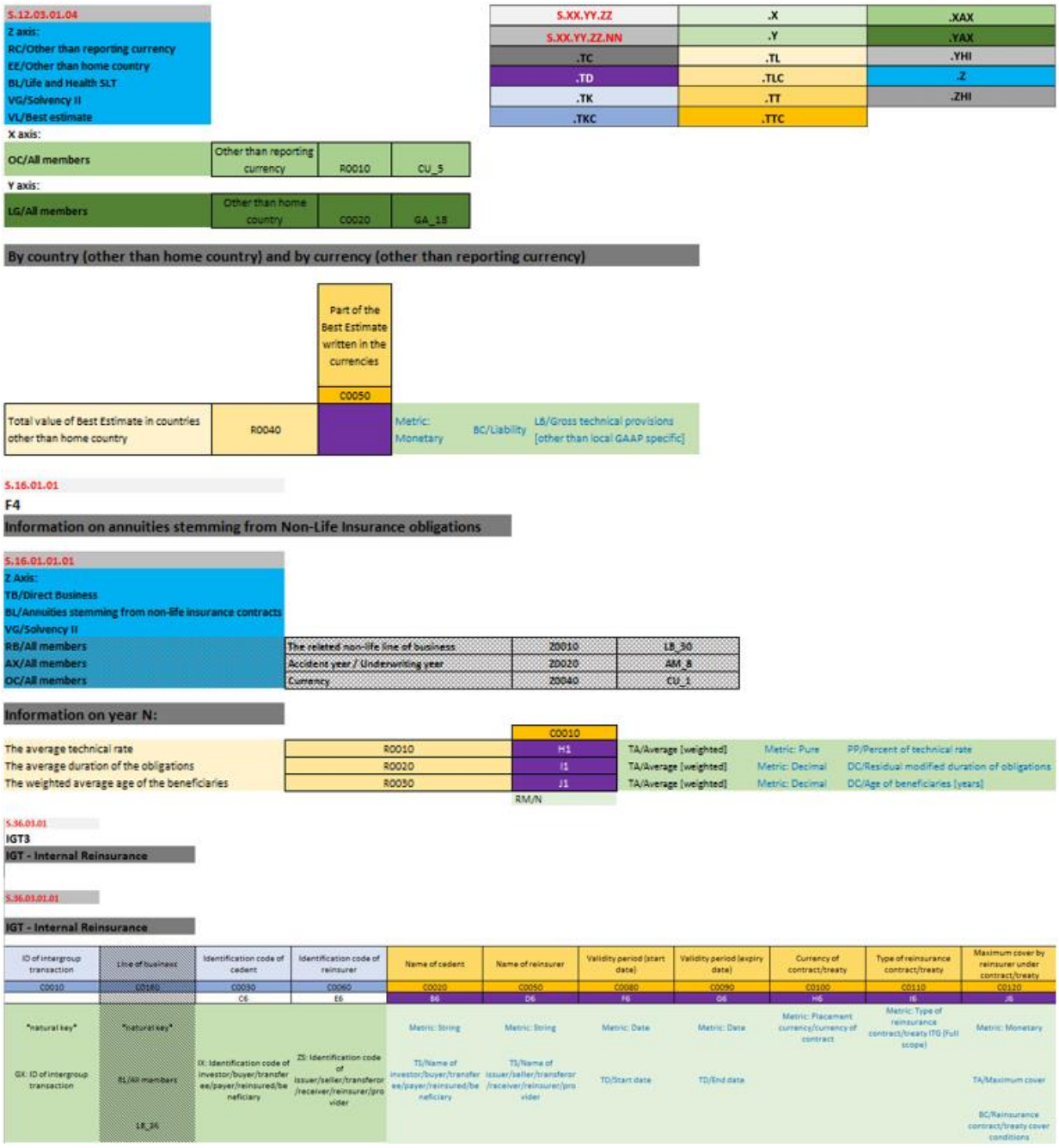


Figure 12. Location of named ranges for different use cases

V Particularities of the DPM technical implementation

Solvency II DPM and XBRL Taxonomy should be as close as possible to Business templates and Business logs. However, some differences occurred due to technical restrictions coming from the particular technical implementation (DPM and XBRL) or in order to facilitate the reporting. This chapter aims to document the main differences, some of them may be also amended in the Business templates and Business logs in future.

V.1 Differences between Reporting Templates and Annotated Templates

V.1.1 Introduction of "*artificial keys*"

In case of each open table it is necessary to identify at least one column constituting unique key for a row. The preferred situation is when there is a column provided in Business templates and described in Business logs that could be used as *natural key*. However in some cases it is necessary to introduce *artificial key* column not present in Business templates[17]. In general there could be two situations like that:

- it is necessary due to table construction but potential candidate for *natural key" is not recommended from implementation perspective. For example "Description (…)" type of column, like C0010 defined in S.23.04 business templates, provides too much flexibility to be efficiently used as a unique key of a row,
- set of „natural keys" to uniquely identify a row would be very complex (i.e. S.06.02 business templates).

V.1.2 Using URIs, being combination of "code" and "type of code"

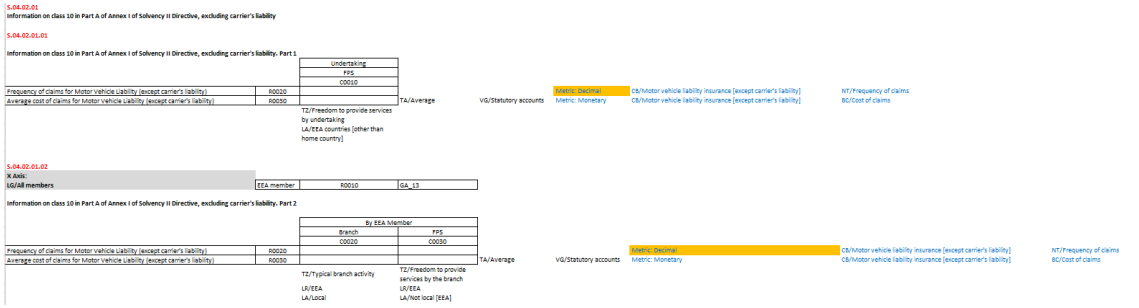
Information defined in Business templates separately for „code" (URN) and „type of code" (URL) could be merged in Annotated templates constituting „type of code"/"code" information (URI). Such an approach is used in Solvency II DPM for entity codes and instrument codes.[18] As a result column from Business templates representing „type of code" is not reflected in Annotated templates for those cases.

[17] See IV.3.2.1 for details.

[18] See Filing rules, V.1 and V.2 for details.

V.1.3 Splitting templates

According to DPM methodology it is currently necessary to separate closed and open or semi-open parts of Business Templates. As a result it could be perceived as another difference between Business and Annotated templates. However it must be noted that splitting Business templates no new information is requested by Annotated templates (see Figure 13).



Annex I
S.04.02.01
Information on class 10 in Part A of Annex I of Solvency II Directive, excluding carrier's liability

		Undertaking	By EEA Member		...	
		FPS	Branch	FPS	Branch	FPS
		C0010	C0020	C0030	...	
Country	R0010					
Frequency of claims for Motor Vehicle Liability (except carrier's	R0020					
Average cost of claims for Motor Vehicle Liability (except carrier's liability)	R0030					

Figure 13. Example of Business Template that needs to be split in Annotated Templates for modelling reasons

V.1.4 Necessity to reorganize the columns in open tables

Organization of open tables in Annotated templates due to technical constrains must follow predefined order: (1) typed dimensions, (2) explicit dimensions and (3) MD metrics. Inside of each of three components of Annotated templates above order from Business templates is being followed however it can be perceived as another discrepancy between Business and Annotated templates (see Figure 14).

S.06.02.01
List of assets

S.06.02.01.01
Z Axis:
SU/Assets other than derivatives and Assets held as collateral

Information on positions

Line identification	Asset ID Code and Type of code	Fund number	Matching portfolio number	Portfolio	Asset held in unit linked and index linked contracts	Asset pledged as collateral
C0001	C0040	C0070	C0080	C0060	C0090	C0100
artificial key|"mandatory" XA: S.06.02.zz.01 line identification	*foreign key to S.06.02.01.02*|"mandatory" UI: URI	"optional" NF: Number of fund	"optional" MP: Matching portfolio number	Metric: Portfolio (investment, securities lending and repo)[210]	Metric: Held in unit linked and index linked funds	Metric: Asset pledged as collateral

Annex I
S.06.02.01
List of assets

Information on positions held

Asset ID Code	Asset ID Code type	Portfolio	Fund number	Matching portfolio number	Asset held in unit linked and index linked contracts	Asset pledged as collateral
C0040	C0050	C0060	C0070	C0080	C0090	C0100

Figure 14. Example of Business Template for which columns need to be reordered in Annotated Templates

V.1.5 Removing redundant and problematic information

"Legal name of undertaking" is potentially a shared datapoint between S.32.01 and S.35.01 Business templates. However information provided in S.35.01 Business template from this datapoint perspective is a subset of information to be reported in S.32.01 Business template. Modelling "Legal name of undertaking" column in both S.32.01 and S.35.01 Annotated templates would result in redundant rows in S.35.01 Annotated template that would be filled in only for "Legal name of undertakings" column. To solve the issue it was decided to remove column C0020 from S.35.01 Annotated template (see Figure 15). It should be noticed that this information is already provided for each code of undertaking in S.32.01 Annotated template.

S.35.01.04
Contribution to group Technical Provisions

S.35.01.04.01

Contribution to group Technical Provisions

Identification code and type of code of the undertaking	Method of group solvency calculation used	Total amount of TP		Technical Provisions - Non-Life (excluding Health)			Technical Provisions - Health (similar to non-life)			Technical Provisions - Health (similar to life)			Technical Provisions - Life (excluding health and index-linked and unit-linked)		
		Amount of TP gross of IGT	Amount of TP net of IGT	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)
C0020	C0040	C0050	C0060	C0070	C0080	C0090	C0100	C0110	C0120	C0130	C0140	C0150	C0160	C0170	C0180
natural key|"manda CE: Identification code of entity	Metric: Method of g	Metric: Monetary BC/Liability LB/Gross technical VG/Solvency II	Metric: Monetary BC/Liability LB/Gross technical VG/Solvency II	Metric: Monet BC/Liability BL/Non-life IG/Excluding intra-g IG/Excluding ir	Metric: Monet BC/Liability BL/Non-life LB/Gross tech LB/Gross technical provisions IG/Excluding intra-group tran	Metric: Pure BL/Non-life PP/Contributio LB/Gross tech LB/Gross technical provisions IG/Excluding intra-group tran	Metric: Monet BC/Liability BL/Health non LB/Gross tech LB/Gross technical provisions IG/Excluding ir	Metric: Monet BC/Liability BL/Health non LB/Gross tech LB/Gross technical provisions IG/Excluding intra-group tran	Metric: Pure BL/Health non PP/Contributio LB/Gross tech LB/Gross technical provisions IG/Excluding ir	Metric: Monet BC/Liability BL/Health SLT LB/Gross tech LB/Gross technical provisions IG/Excluding ir	Metric: Monet BC/Liability BL/Health SLT LB/Gross tech LB/Gross technical provisions IG/Excluding intra-group tran	Metric: Pure BL/Health SLT PP/Contributio LB/Gross tech LB/Gross technical provisions IG/Excluding ir	Metric: Monet BC/Liability BL/Life and an LB/Gross tech LB/Gross technical provisions IG/Excluding ir	Metric: Monet BC/Liability BL/Life and an LB/Gross tech LB/Gross technical provisions IG/Excluding intra-group tran	Metric: Pure BL/Life [other PP/Contributio LB/Gross tech LB/Gross technical provisions IG/Excluding ir
				VV/Amount be VG/Solvency II	VV/Amount before transitiona VG/Solvency II		VV/Amount be VG/Solvency II	VV/Amount before transitiona VG/Solvency II		VV/Amount be VG/Solvency II	VV/Amount before transitiona VG/Solvency II		VV/Amount be VG/Solvency II	VV/Amount before transitiona VG/Solvency II	

Annex I
S.35.01.04
Contribution to group Technical Provisions

				Total amount of TP		Technical Provisions - Non-Life (excluding Health)			Technical Provisions - Health (similar to non-life)		
Legal name of each undertaking	Identification code of the undertaking	Type of code of the ID of the undertaking	Method of group solvency calculation used	Amount of TP gross of IGT	Amount of TP net of IGT	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)	Amount of TP gross of IGT	Amount of TP net of IGT	Net contribution to Group TP (%)
C0010	C0020	C0030	C0040	C0050	C0060	C0070	C0080	C0090	C0100	C0110	C0120

Figure 15. Example of Business Template and Annotated template where redundant information (C0010) was removed from annotated template

V.1.6 'Link' metric

According to DPM methodology each datapoint must include one and only one metric. As a result it is challenging to reflect a simple relation between two or more information modelled as typed dimension. As such challenge exists also in Solvency II DPM EIOPA decided to solve it by attaching a meaningless metric to set of typed dimensions if necessary. Such a metric is created based on Boolean data type where the only acceptable value is 'true' - to reflect the existence of mentioned relation (see:Figure 16).

S.14.01.01.04

Information on products and homogeneous risk groups

Product ID code	HRG code	Link
C0220	C0230	C0250
natural key|"mandatory" IP: ID code of product	*foreign key to S.14.01.01.03*|*natural key*|"mandatory" HX: ID code of HRG	Metric: Link

Figure 16. Example of application of Metric: Link

V.1.7 Differences in columns meaning

In the template S.21.02, cell C0080 labeled as "Currency" is modelled as 'Original currency of exposure/transaction/instrument' to avoid a clerical error requesting the reporting currency that is provided already in the Basic information template.

V.2 Differences between DPM Dictionary and Business logs

V.2.1 Differences in enumerations

Enumerations provided by Business logs should be reflected in DPM Dictionary as hierarchy node labels. However Business logs dedicated to SPV reporting specify in Content table option "9" for cases when particular table doesn't have to be reported. For all other entry points it is option "0" that is supposed to be used. To assure internal consistency of DPM "0 - Not reported (in this case special justification is needed)" needs to be provided when according to Business logs "9 - Not reported (in this case justification is required)" should be chosen. This issue relates to SPV.01.01.20.01 table only (Table 3).

Table	Row code	Business logs	DPM Dictionary
SPV.01.01.20.01	R0020	1 - Reported 9 - Not reported (in this case justification is required)	1 - Reported 0 - Not reported (in this case special justification is needed)
SPV.01.01.20.01	R0030	1 - Reported 2 - Not reported o/a no off-balance sheet items 9 - Not reported other reason (in this case justification is required)	1 - Reported 2 - Not reported as no off-balance sheet items 0 - Not reported other reason (in this case special justification is needed)
SPV.01.01.20.01	R0040	1 - Reported 9 - Not reported (in this case justification is required)	1 - Reported 0 - Not reported (in this case special justification is needed)
SPV.01.01.20.01	R0050	1 -Reported 9 - Not reported (in this case justification is required)	1 - Reported 0 - Not reported (in this case special justification is needed)

Table 3. Differences in enumerations between Business logs and DPM Dictionary

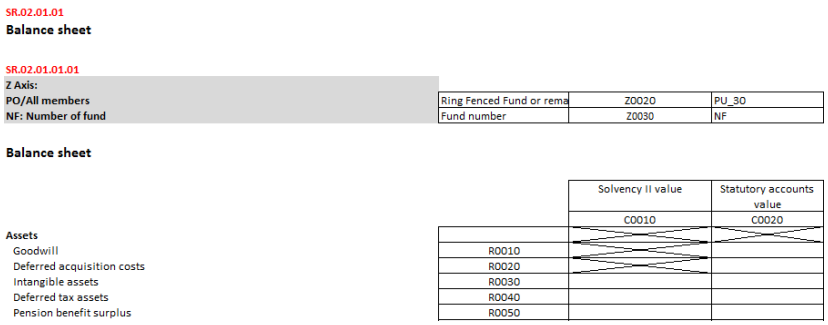
V.3 Specific DPM-based solutions applied in Solvency II

V.3.1 Addressing RFFs/MAPs/Remaining part reporting scenarios

Some of EIOPA Solvency II templates are dedicated to report information (i) for potentially unlimited number of 'Ring fenced funds', (ii) potentially unlimited number of 'Matching adjustment portfolios' and (iii) singe 'Remaining part'. Codes of such templates start with 'SR'. To make the number of technical tables as low as possible EIOPA decided, comparing to the approach used for Preparatory phase, to use a mechanism that would allow to apply the same technical table to all of three scenarios above. As it could be necessary to multiply each template which code starts with 'SR' at least two dimensions are used on the Z-axis:

- one explicit dimension to specify if the table is reported for RFF, MAP or Remaining part[19],
- one typed dimension to identify the code of RFF, MAP or Remaining part[20].

See Figure 17Figure 17 as an example of organization of Z-axis in case of templates dedicated to RFF/MAP reporting.



SR.02.01.01
Balance sheet

SR.02.01.01.01

Z Axis:			
PO/All members	Ring Fenced Fund or rema	Z0020	PU_30
NF: Number of fund	Fund number	Z0030	NF

Balance sheet

		Solvency II value	Statutory accounts value
		C0010	C0020
Assets			
Goodwill	R0010		
Deferred acquisition costs	R0020		
Intangible assets	R0030		
Deferred tax assets	R0040		
Pension benefit surplus	R0050		

Figure 17. Organization of Z-axis in case of templates dedicated to RFF/MAP reporting

V.3.2 Application of Article 112

Article 112 provides to NCAs a possibility to request from filer figures calculated according to standard formula even when more complex approaches were already approved[21]. This option was introduced by EIOPA to the DPM using 'AO' dimension on a Z-axis. This dimension refers to hierarchy of 'AO' domain with two potential options:

- 'No', that is default value applicable implicitly across all the tables,
- 'Yes', that identifies the application of article 112.

See Figure 18 as an example of organization of Z-axis in case of templates for which article 112 could be potentially applied.

---

[19] In some tables also other option is possible: 'Ring fenced fund or Matching adjustment portfolio'.

[20] Must be noted that the scope of 'Remaining part' is the same, no matter of number of RFFs or MAPs reported.

[21] Under this scenario for example template S.25.01 could be requested together with S.25.03, but S.25.01 according to article 112.

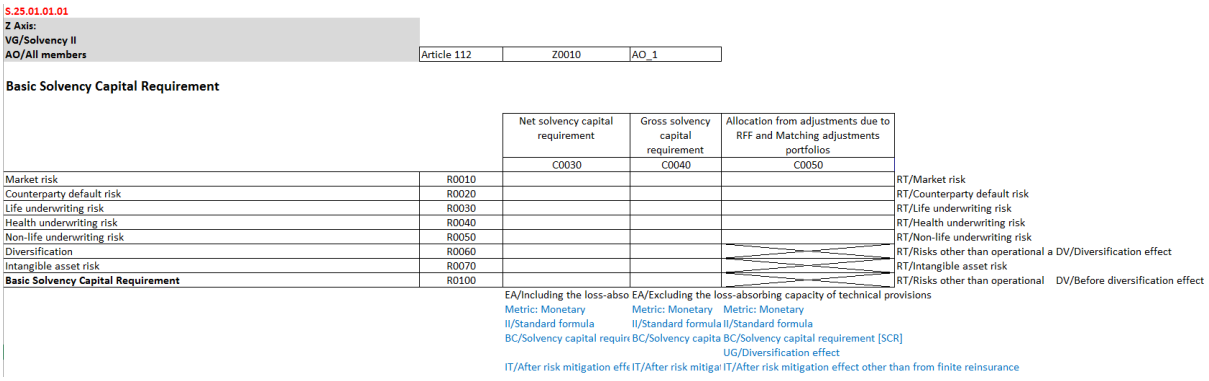


Figure 18. Organization of Z-axis in case of templates for which article 112 could be potentially applied

V.3.3 Splitting of information between open and closed tables

Modelling Solvency II reporting requirement quite often it was necessary to split between different tables information that initially was perceived to be homogenous. The reason was that for some facts business table was supposed to be closed (i.e. small explicit list of countries), for the other – open (i.e. list of other countries). In the same time it was a role of DPM not to allow reporting of countries from closed table in the open one. To solve the challenge EIOPA decided in the second case to refer from a dimension on an open axis to the dedicated subset of countries (GA_25). Figure 19 presents the organisation of template dedicated to 'Health Catastrophe risk - Concentration accident'.

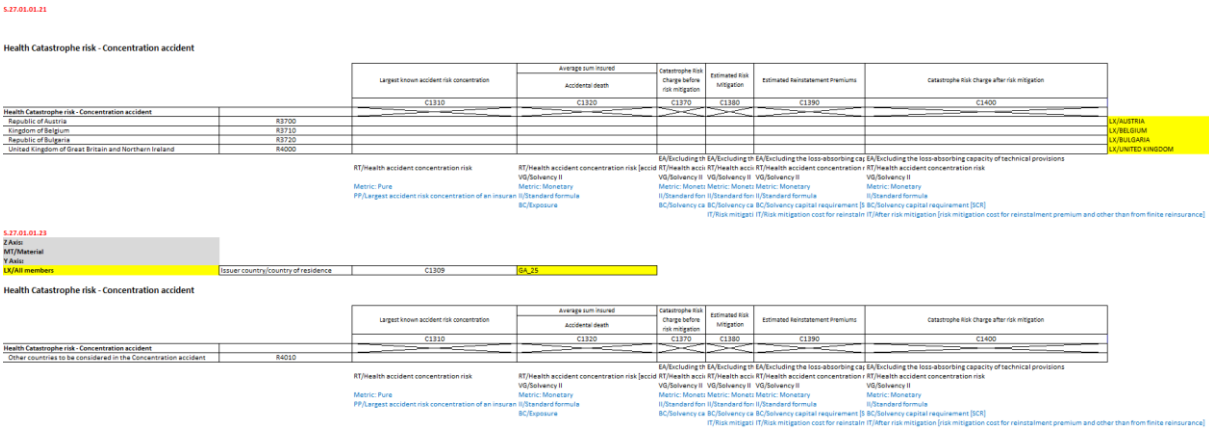


Figure 19. Organisation of template dedicated to 'Health Catastrophe risk - Concentration accident' reporting for both: closed and open list of countries

V.3.4 Introduction of T.99.01.01 technical template

One of the issues which may prevent to report all requested data could be due to the DPM modelling describing two separate business concepts as a single datapoint. As a consequence there would be just a single container while filer would have to report two separate facts.

T.99.01.01
Technical table

T.99.01.01.01
Technical table

Table	X axis	Y axis	Z axis	Comment	Monetary	String	Date	Integer	Decimal	Pure	Boolean
C0010	C0020	C0030	C0040	C0050	C0060	C0070	C0080	C0090	C0100	C0110	C0120
artificial key|"mandatory"	*artificial key*|"optional"	*artificial key*|"optional"	*artificial key*|"optional"	Metric: String|TS/Comment to technical table	Metric: Monetary	Metric: String	Metric: Date	Metric: Integer	Metric: Decimal	Metric: Pure	Metric: Boolean
YM: T.99.01.01.01 line identification (Table)	YN: T.99.01.01.01 line identification (X axis)	YO: T.99.01.01.01 line identification (Y axis)	YR: T.99.01.01.01 line identification (Z axis)								

Figure 20. T.99.01.01.01 technical table

In order to provide a workaround (instead issuing a full taxonomy hotfix with more impact on systems) a technical container to be used for such a cases was defined: T.99.01.01 (**Figure** 20). Systems should be designed taking into account that this table may need to be used, however if the needs arrives a full description of how to use it to overcome the specific issue would be published by EIOPA. In order to prevent the unintentional use of this table T.99, as normally is no to be used, the taxonomy includes a set of validations (TV60-TV65) preventing reporting of data which will be deactivated only if the needs arrives. Please also note that in no case new business data is required, but this is only allowing to submit the required data that when is not possible to be done with the regular tables.

As an overview of the functionality of the table please note that it consists of three sets of information:

- reference to potential placeholder for a given fact. It is organized as a combination of four typed dimension:
    - dimension defining the table where the fact should have been displayed, e.g. 'S.02.01.01.01',
    - dimension defining a column (X axis), e.g. 'C0010',

- dimension defining a row (Y axis), e.g. 'R0020'[22].
- dimension giving information on the Z axis[23].

- fact itself in a column dedicated to particular datatype of potential fact to be reported,
- comments.

The solution is flexible enough to explicitly define and provide any missing fact.

[22] In case of open tables detailed solution regarding Y axis for given issue will be described in the 'List of known issues' document available on EIOPA webpage.

[23] In case where it would be necessary to provide information about Z-axis detailed solution for given issue will be described in the 'List of known issues' document available on EIOPA webpage.