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SERIES M: TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Supplement on directory of external terminology schemas

ITU-T M-series Recommendations – Supplement 7

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Supplement 7 to ITU-T M-series Recommendations

Supplement on directory of external terminology schemas

Summary

The Directory of external terminology schemas is a directory to a coordinated set of Recommendations/standards for management of telecommunication services and resources. The external terminology schemas define data for end user interfaces and for management applications. Data for communication over other management interfaces may be derived from the external terminology schemas.

Source

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Data, definitions, human-computer interface, network, order, service, telecom.

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1 Scope

External terminology schemas define data as they are presented to end users of telecommunication management applications. The syntax of these data needs to be communicated over data communication interfaces to other management applications within one operator or within other companies, or to the network or service platform.

External terminology schemas define identifiers, name spaces, name bindings and other data that are efficient in use to the end users. This may lead to new object classes and relations between object classes as compared to a pure conceptual approach. Hence, conceptual definitions of the information conveyed by these interfaces are not sufficient, as data syntax requirements may lead to additions and modifications of the conceptual definitions.

The set of external terminology schemas is a resource of data definitions to be shared in telecommunication management applications. External terminology schemas define data used at the human-computer interfaces (HCI) and to be communicated over data communication interfaces. External terminology schemas do not define these interfaces. However, [ITU-T Z.601], Data Architecture, indicates how external terminology schema definitions relate to the interface definitions.

External terminology schemas define the terminology and grammar of end users at their HCI. The terminology and grammar used for communication over data communication interfaces using a particular technology are defined in an internal terminology schema. Future Recommendations may provide a mapping between these schemata, but such a mapping is not provided in this supplement. This mapping may or may not be provided via an intermediate concept schema.

External terminology schemas are common for a set of user functions, data communication interfaces, and processes supported by management applications. Hence, the Directory of external terminology schemas will not have separate Recommendations for each of these.

In summary, the following requirements apply to this directory:

[R1] External terminology schemas shall define data for end user interfaces and support but do not define data communication interfaces.

[R2] The use of external terminology schemas with respect to information models, e.g., [b-ITU-T M.3100]-neutral, shall be defined. (See Appendix I, Business needs.)

[R3] The use of external terminology schemas with respect to [b-ITU-T M.3050.x] shall be defined. (See Appendix I.)

[R4] The use of external terminology schemas within the ITU-T M.3020 methodology shall be defined. (See clause 5, Rationale.)

2 References

[ITU-T M.1401] Recommendation ITU-T M.1401 (2006), *Formalization of interconnection designations among operators' telecommunication networks*.

[ITU-T M.1402] Recommendation ITU-T M.1402 (2007), *Formalization of data for service management*.

[ITU-T M.1403] Recommendation ITU-T M.1403 (2007), *Formalization of generic orders*.

[ITU-T M.1404] Recommendation ITU-T M.1404 (2007), *Formalization of orders for interconnections among operators' networks*.

[ITU-T M.1405] Recommendation ITU-T M.1405 (2007), *Formalization of orders for service management among operators*.

[ITU-T Z.601] Recommendation ITU-T Z.601 (2007), *Data architecture of one software system*.

3 Definitions

This supplement uses the following terms:

3.1 concept schema: See [ITU-T Z.601].

3.2 external terminology schema: See [ITU-T Z.601].

3.3 internal terminology schema: See [ITU-T Z.601].

4 Abbreviations and acronyms

This supplement uses the following abbreviations:

HCI Human-Computer Interface

tML telecommunications Markup Language

XML eXtensible Markup Language

5 Rationale

The business requirement of the Directory of external terminology schemas is to have a common terminology and grammar across operators. The notion of a grammar may be elaborated a bit. It does not mean only definition of terms, but it specifies what terms may appear together to make up a statement. In short, a statement is a connected path through a schema graph. Also, in external terminology schemas, the terms are not defined independently of the grammar. The terms are defined within the grammar, and some terms act as name spaces for other terms.

External terminology schemas define the abstract syntax of data, such that two terminal users in different operating companies communicating via different management applications should be able to understand each other also when having manual communication of the same data.

The end user at his/her terminal is the ultimate user of external terminology schemas. However, designers will have to use external terminology schemas in order to meet the needs of the end user.

[ITU-T Z.601] provides a framework for positioning external terminology schemas and related Recommendations. Appendix III of [b-ITU-T M.3020] places the external terminology schemas and the related Recommendations into this framework in the Requirement phase of [b-ITU-T M.3020].

[ITU-T Z.601] depicts specifications for various interfaces by seven kinds of schemata. Annex A of [ITU-T Z.601] provides a set of numbered Requirements on the various schemata in the data architecture. [ITU-T Z.601] explains how data can be transformed between the human-computer interface (HCI) and data communication interfaces.

The business need of the external terminology schemas is the need to harmonize end user terminology and grammar across various HCIs, which cannot be accomplished by standardizing concepts in a conceptual specification.

6 Directory of external terminology schemas

This clause identifies the components of the Directory of external terminology schemas and outlines their contents and interrelationships.

6.1 The relevant Recommendation set

Directory of external terminology schemas (Supplement to the M-series Recommendations)

The intention of the Directory of external terminology schemas is given in the Scope. This clause provides a synopsis of the coordinated set of Recommendations/standards for the management of telecommunication services and resources.

Formalization of interconnection designations among operators' networks [ITU-T M.1401]

This Recommendation contains data definitions for designations of interconnections and other information about network resources that are required to be communicated between operators. The focus is on design of object identifiers, their name spaces and name bindings. The Recommendation provides a data structure for the management of logical network resources. The objects of communication are network interconnection points (places, stations, nodes, etc.), interconnection links, terminating and originating connections, and transit connections. Correct terms for these are provided by the application schema defined in this Recommendation.

Formalization of orders for interconnections among operators' networks [ITU-T M.1404]

This Recommendation extends [ITU-T M.1401] and ensures the use of [ITU-T M.1401] in orders containing designations of interconnections among operators' networks. Any statement that can be made according to [ITU-T M.1401] can be made within a Message of an Order. Data definitions for inventory management according to [ITU-T M.1401] are reused for order management according to this Recommendation. Hence, the data design is made to fit both domains. A mapping between the two domains is provided. This mapping allows recording of all statements about a particular resource.

Formalization of designations for service management among operators [ITU-T M.1402]

This Recommendation defines data for products, customers, accounts, contracts, deals, addresses, prices, and various segments and relationships among all of these. The focus is on design of object identifiers, their name spaces and name bindings. Also, care is taken to design lists that provide easy overview of data by the end users, since conceptual designs are not sufficient.

This Recommendation reuses data in product catalogues as schemata for product instances within the customer database. These product instances are again reused as schemata for service usage. Reuse over several application domains is accomplished through use of recursion. Hence, the data definitions span many application domains, such as product catalogues, customer relationship management, order management, rating and service platforms. However, the Recommendation does not claim to be complete in any of these domains. Particular emphasis has been made to simplify the data structure and functions of the service platform.

Formalization of designations of orders for service management among operators [ITU-T M.1405]

This Recommendation extends [ITU-T M.1402] and ensures the use of [ITU-T M.1402] in orders containing service management information. Any statement that can be made according to [ITU-T M.1402] can be made within a Message of an Order. Data definitions for service management according to [ITU-T M.1402] are reused for order management according to this Recommendation. Hence, the data design is made to fit both domains. A mapping between the two domains is provided. This mapping allows recording of all statements about a particular object.

[ITU-T M.1405] is a twin to [ITU-T M.1404]. Customer requests and orders according to [ITU-T M.1405] may be expanded to become network orders according to [ITU-T M.1404]. The application designers should take great care to choose whether message-based communication by orders or object-based communication by [ITU-T M.1401] or [ITU-T M.1402] should be used over a particular interface.

Formalization of generic orders among operators [ITU-T M.1403]

This Recommendation defines orders and messages within orders. The orders may contain data for designations of interconnections and other information about services and network resources that are required to be communicated between operators.

Generation of derived orders is described, and reuse of messages is described through the design of message templates.

This Recommendation provides a skeleton that can be extended with any contents and allow for any use of the orders. Finally, a theory of orders puts the definitions into a usage context.

Data architecture [ITU-T Z.601]

This Recommendation identifies a set of data structures and formats of one software system.

These data forms appear at the various interfaces to and media of the system and comprise intermediate forms for transformations between the external forms.

The Directory of external terminology schemas addresses the Application layer of the Data Architecture.

Requirements on each layer are found in Annex A of the Recommendation.

Appendix II provides a comparison with [b-ITU-T M.3020].

6.2 Associated standards

Identification of physical network resources [b-ATIS-0300007]

This ATIS standard extends [ITU-T M.1401] on logical resources with definitions of data for physical resources. Focus is on identification of physical resources and ensuring that data about physical resources are registered in a complete way. Also, a mapping is made from ATIS interconnection standards to data about both logical and physical resources. The ATIS standards are incorporated in [ITU-T M.1401] as Local identifiers.

Appendix I

Business needs

External terminology schemas define identifiers, name spaces, name bindings and other data that are efficient in use for the end users. This may lead to new object classes and relations between object classes as compared to a pure conceptual approach. Hence, conceptual definitions of the information conveyed by these interfaces are not sufficient, as data syntax requirements may lead to additions and modifications of the conceptual definitions. (Methods for design of efficient end user data are found in [b-ITU-T Z.352].) The following are examples of how the syntactical approach completes the data definition needed by end users as compared to conceptual specifications.

1) A conceptual approach might define one Identifier attribute for a Trail. However, [ITU-T M.1401] defines seven attributes that are used together to identify a Trail, and these are organized into a hierarchy of attribute groups, because this is how identifiers are designed for use at the HCI according to [b-ITU-T M.1400]. In [ITU-T M.1404], eleven attributes are needed to identify a Trail in an Order. This complexity, and the treatment of context of these are typically not addressed in conceptual approaches. One attribute in a conceptual specification may correspond to eleven attributes organized in attribute groups in a data specification. Not all eleven attributes are needed in every context, so software must become aware of the contexts and present what is needed.

2) A conceptual design may be adequate for design of a prototype, but it may not take into account the full complexity of the HCI.

3) Some classes in the external terminology schemas come in addition to the pure conceptual specification, others may replace the conceptual classes. A conceptual specification may define a Company class, where a company instance may span several countries. The Company class may span both customers and operators. The external terminology schemas may introduce Operator (company) class within a Country. This class replaces some of the instances of the Company class, and restricts the definition of an Operator to be within one Country only. The Operator class is only introduced to define name spaces. Its definition is affected by the definition of Country, and it will itself affect what can be contained in it.

4) The instances of conceptual specifications and of the external terminology may also become very different. A conceptual specification may assume that there is only one instance of a particular country. In the External layer, Country is mentioned within different Corporations, and it is essential to distinguish the different occurrences of a Country, as they represent different data for different Corporations. This distinction would, e.g., be essential if data from several Corporations were downloaded to the same service platform.

5) In a conceptual approach, an object class is only assigned attributes that are associated to the entity as such, as if it could exist alone in a context-independent world. In the external terminology schemas, attributes are assigned according to their context. A Company in the external terminology layer may have the attribute Number of customers, i.e., the Number of customers of that Corporation in that Country. A conceptual approach would have to introduce a relational object to specify the same. This becomes more complex as we go further from the root of the data tree in the external terminology layer. Typically, the external terminology uses only one- or two-way (i.e., binary) references, where a conceptual approach would need n-ary relationships.

6) A conceptual specification typically uses global class labels. The external terminology schemas use local class labels. This means that in the external terminology layer, the name binding of the instances is homomorphic (many-to-one mapping) to the name binding of the classes. This allows the users to see the close correspondence between the structure of the instances and the structure of the classes.

7) A conceptual specification typically only covers basic concepts and not every notion that may be derived from the basic concepts. The external terminology schemas intend to cover all data that can be seen by the end user at his HCI. This includes derived data, and derived data should be consciously designed into the external terminology schemas.

Additional comparisons/considerations

8) The scope of data definitions in the external terminology schemas may be different from the scope of a conceptual specification. The external terminology schemas only define data that will appear at the HCI. A conceptual specification may include other concepts. The external terminology schemas may comprise data of Products that appear at the HCI of customer order request and customer relationship management. The end user may not need to see service identifiers and service attributes as used in the service platform. The service notions may be included in the conceptual specification, but may not be needed in the external terminology schemas.

9) A conceptual specification may contain extra classes for structuring and organizational purposes, such as Fragments, Aggregated business entities and Superclasses. The external terminology schemas define only the data that will appear at the HCI, and introduces no extra class.

10) If a conceptual specification is designed independently of data design for end users at their HCI, the conceptual design and data design may become very different. If the data design is taken as requirements for the conceptual specification, they can become much better aligned. This is what is recommended in appendices to [b-ITU-T M.3020] and [ITU-T Z.601].

11) Due to the use of different name spaces and other conventions in conceptual specifications and the data specifications, they cannot become fully aligned to have an isomorphic mapping (1:1) between them. The only way to achieve an isomorphic mapping is to use the data language also for the conceptual specification, but this may contradict some designers' notions of what conceptual means.

12) [ITU-T Z.601] can be understood as an elaboration of Ogden's triangle from a linguistics viewpoint, which distinguishes between terms, concepts and things. The appendices to [ITU-T M.1403] elaborate on this. There is a mapping between all corners of Ogden's triangle. The mapping from terms via concepts to things is the longest path. The shortest path is a direct mapping from terms to things. Similarly, when using the external terminology schemas, we do not need to map via the concept schema to internal terminology schemata. A shorter and more efficient path is to map directly from the end users' terminology and grammar in the external terminology schema to implementations in internal terminology schemata. Refer to [b-ITU-T M.3030], *Telecommunications Markup Language (tML) Framework*. (It is proposed that a Recommendation be developed for deriving tML schemata from external terminology schemata for each required message type.)

13) In summary, designers should be aware of the differences in concepts and data:

- The classes may be different
- The relationships may be different
- The class labels may be different
- The instances may be different
- The external terminology schemas may introduce redundant data, which the conceptual specifications may not have.
- The external terminology schemas only cover end-user data, while conceptual approaches may have a larger scope.

- The conceptual specifications may include structuring classes, such as superclasses, aggregated business entities and fragments that the external terminology schemas do not have.

In positioning the external terminology schemas in reference to process frameworks, the external terminology schemas are common for a set of user functions, data communication interfaces, and processes supported by management applications. Hence, the external terminology schemas will not have separate Recommendations for each of these. This means that for the external terminology schemas, we need not do process decomposition and specify data for each elementary process. The data are independent of the processes they may be considered to appear in. In fact, in the external terminology schemas, the processing may be specified subordinate to the data; therefore, process decomposition is not needed, and often the process decomposition can be misleading. In the external terminology schemas, the data themselves provide the basic structuring. The external terminology schemas do not take process decomposition into account. The external terminology schemas are available to support processes as needed.

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