

Introduction to Global Data Types in SAP NetWeaver PI 7.1 (preview)

Applies to:

SAP NetWeaver Process Integration IT Scenarios in Version 7.1

Summary

This article introduces the core components technical specification and how it is used to create the global data types.

Author(s): Daniel Horacio Bianchin

Company: SAP

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Author Bio



Daniel has been working with SAP technology since 1996, and in 1997 he joined SAP. Over the last 10 years he has worked on more than 35 projects plus consulting, training and presales activities.

At SAP, he started as an ABAP and RFC (C++) consultant later began to work with ALE interfaces, doing quality assurance, development optimization, in-house software development and design, and then CRM Internet Sales implementation and interface architecture design. After that, he has been leading development and integration teams using SAP BC and XI. In 2005 he joined the SAP NetWeaver Regional Implementation Group.

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Introduction and Motivation

Nowadays the definition of company wide data formats for atomic message exchange (like BAPIs or IDocs) is not enough. There are international standards organizations working in the definition of rich business semantics to help semantic interoperability.

One of these standards is introduced in this document and is also the basis of SAP global data types definition.

The Standard Core Components Technical Specification

The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) has defined a suite of standards that together create a new paradigm in semantic interoperability. At the heart of this standards stack is the “Core Components Technical Specification” (CCTS). It describes and specifies a semantic-based approach to the well-understood problem of the lack of information interoperability within and between applications and data bases in the e-business arena.



CCTS is gaining widespread adoption in vertical and horizontal standards development organizations around the globe and will enable SAP to provide the highest level of semantic interoperability possible between SAP and non-SAP applications.

Also, SAP is significantly engaged in UN/CEFACT CCTS work, to improve the CCTS standards stack as the methodology of choice to create true worldwide, business semantic interoperability.

CCTS basically provides a semantic for data modeling in a general and reusable way, making the modeled objects both human readable and also machine processable, it is described in the ISO (International Organization for Standardization) Technical Specification 15000 Part 5 Version 2.01

To recap the benefits, it provides:

- A methodology for semantic data modeling, achieving a common understanding of data structures and message types on a syntax independent level.

- A way to identify, capture and maximize the re-use of business information to support and enhance information interoperability across multiple business situations.

ISO/TS 15000 consists of the following parts, under the general title *Electronic business eXtensible mark-up language (ebXML)*:

Part 1: Collaboration-protocol profile and agreement specification (ebCPP)

Part 2: Message service specification (ebMS)

Part 3: Registry information model specification (ebRIM)

Part 4: Registry services specification (ebRS)

Part 5: ebXML Core Components Technical Specification, Version 2.01 (ebCCTS)

ebXML

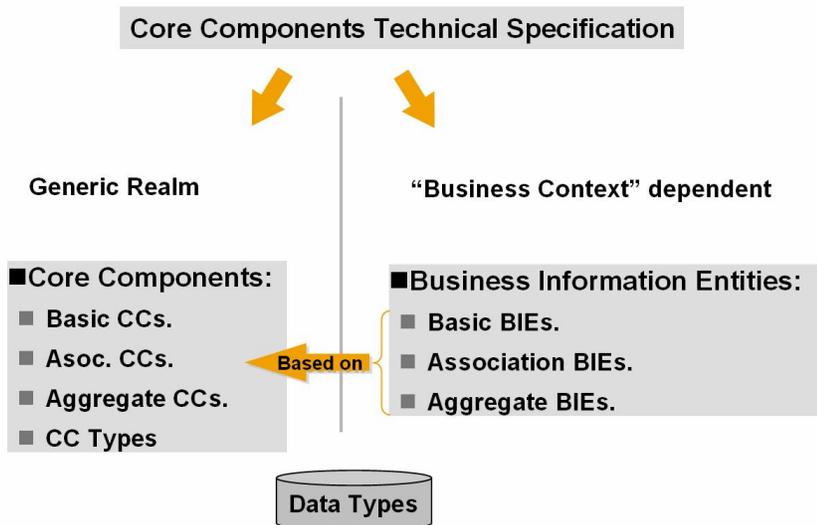
it stands for “Electronic Business using eXtensible Markup Language”, is a family of XML based standards sponsored by OASIS and UN/CEFACT whose mission is to provide an open, XML-based infrastructure that enables the global use of electronic business information in an interoperable, secure, and consistent manner by all trading partners.

The ebXML architecture is a unique set of concepts; part theoretical and part implemented in the existing ebXML standards work.

The ebXML work stemmed from earlier work on ooEDI (object oriented EDI), UML / UMM, XML markup technologies and the X12 EDI “Future Vision” work sponsored by ANSI X12 EDI.

CCTS Basic Components Overview

Let’s see some basic CCTS objects definitions, and how they are connected.



The “*Core Component*” is a semantic building block, which is used as a basis to construct all electronic business messages.

The “*Business Context*” is the formal description of a specific business circumstance as identified by the values of a set of “*Context Categories*”, allowing different business circumstances to be uniquely distinguished.

The “*Business Information Entity*” (BIE): Is a piece of business data or a group of pieces of business data with a unique *Business Semantic* definition.

And finally the “*Data Type*”: defines the set of valid values that can be

used for a particular *Basic Core Component Property* or *Basic Business Information Entity Property*. It is defined by specifying restrictions on the *Core Component Type* that forms the basis of the *Data Type*.

For example, a generic “Address” core component could be defined using other components and finally using data types. But when that address, is used in the business context of a particular sales order type, to identify the delivery address for a customer, it becomes a business information entity.

Implementation in SAP NetWeaver PI

SAP Global Data Types (GDT) are based on the CCTS components. In the following example, you can see the correspondence between the CCTS definition and the implementation in PI.

Core Data Types

Some GDTs are based on Core Data Types (CDT).

CDTs:

- ...are syntax neutral and represent the smallest and most generic pieces of information in a business data model.
- ...have a library that currently consists of 22 discrete types such as Amount.Type, BinaryObject.Type, Code.Type, DateTime.Type, Identifier.Type, Measure.Type, Text.Type, etc.
- ...are intermediate data types, that are a level above primitive types - such as Decimal, String, Boolean, Binary, and Numeric.
- ...differ from primitives because they carry relevant characteristics, which further define and refine the CDT value domain.
- have only a primarily business meaning and can thus be used by all existing Basic Core Components (BCCs) and their affiliated contextualized Basic Business Information Entities (BBIEs) as a means for characterizing the actual type of information (e.g. Amount, Identifier, etc.).

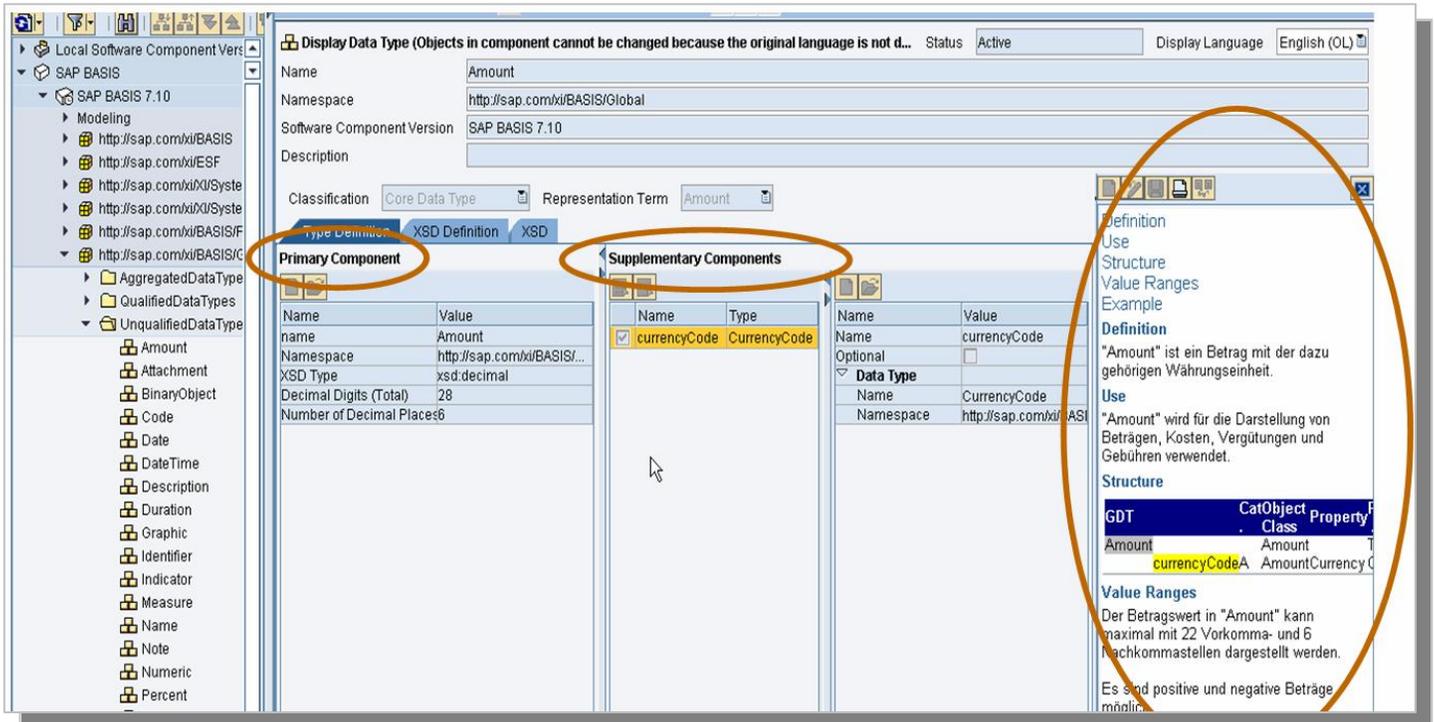
ISO/DTS 15000-5:2006 2nd Edition Working Draft B

A1 Permissible Representation Terms

Representation Term	Definition	Related Core Data Type
Amount	A number of monetary units specified in a currency where the unit of currency is explicit or implied.	Amount.Type
Binary Object	Object of finite-length sequences of binary characters. [Note: This term shall also be used for representing graphics.]	Binary Object.Type
Code	A syntactic	

In these pictures you can see the definition and relationship between the CCTS specification and SAP Implementation for the Amount, Binary Object and Date GDTs based on a CDT

Dictionary Entry Name	Object Class Term	Property Term	Representation Term	Suffix	Primitive Type	Card	Restriction	Definition	Remarks
Amount.Type	Amount			Type					
Amount.Content	Amount			Content	Decimal	1..1	Total Digits Fractional Digits Min. Inclusive Max. Inclusive Min. Exclusive Max. Exclusive	A number of monetary units	
Amount-Currency-Identification.Code	Amount Currency	Identification	Code		String	1..1	Expression Length	The currency of the amount	ISO 4217 alpha codes are recommended, and these are also published



GDTs could be either more complex, which is comparable to a CCTS “Aggregated Business Information Entity” or even simple that is comparable with a CCTS “Basic Business Information Entity Property” (which is newly defined in CCTS V3.0 working draft).

In the PI 7.1 Enterprise Services Repository screenshot you can also see the example details of the simple “Amount” GDT, it has:

- A “classification” to determine if it is based on a Core or aggregated data type along with its representation term.
- A Set of “Primary components” like name, namespace, XSD type, etc.
- “Supplementary components” with their specific properties detail
- plus a comprehensive documentation that covers the definition, usage, structure, value ranges and an example

In the SAP NetWeaver PI 7.1, Software Component Version “SAP BASIS 7.10”, namespace “http://sap.com/xi/BASIS/global”, you will find a set of folders with GDTs.

As mentioned before, a GDT can be simple or more complex as you aggregate them. They are distinguished in Basic GDTs and Aggregated GDTs. Basic GDTs are always built directly on a CDT. Aggregated GDTs on the other hand, are built either on Basic or Aggregated GDTs.

Take a look at the following example:

- The Basic DateTime GDT is based on the CDT “DateTime”
- The Aggregated TimePoint GDT is using the DateTime simple GDT as one of its components
- And in also been used as a component in a more complex aggregated GDT.

The screenshot illustrates the structure of Global Data Types (GDTs) in SAP NetWeaver PI. It shows three windows:

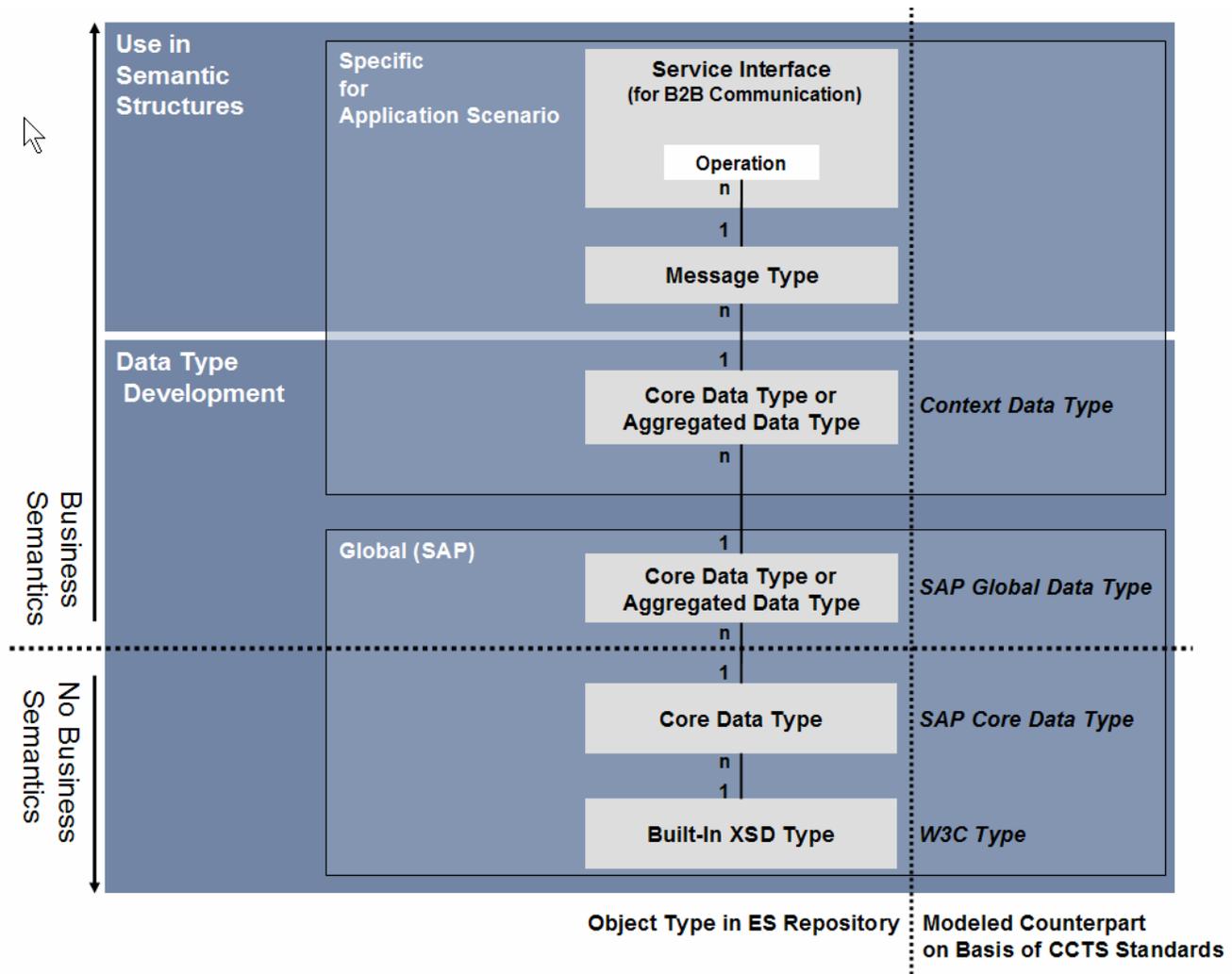
- Top Window:** Displays the 'TimePoint' GDT, classified as an 'Aggregated Data Type'. It lists its components: TypeCode, Date, Time, and DateTime.
- Bottom Window:** Displays the 'DateTime' GDT, classified as a 'Core Data Type'. It is shown as a 'Primary Component' of the 'TimePoint' GDT.
- Right Window:** Displays a more complex aggregated GDT (BusinessRuleParameterDefinitionVersionElementContextValueElements) which includes 'TimePoint' as one of its elements.

Orange arrows indicate the relationships: 'DateTime' is a component of 'TimePoint', and 'TimePoint' is a component of the more complex aggregated GDT.

Name	Category	Type	Occurrence	Default	Details	Description
TimePoint	Complex Type					
TypeCode	Element	TimePointTypeCoc1	0..1			
Date	Element	Date	0..1			
Time	Element	Time	0..1			
DateTime	Element	DateTime	1			
timeZoneCode	Attribute	TimeZon				
daylightSavingTim	Attribute	xsd:bool				

Now let's see the different steps and stages to use a simple XSD type in a SAP NetWeaver PI service interface operation (as shown in the next picture):

- It starts from a basic built-in XSD type,
- That then is used in an SAP Core Data Type,
- What in turn, is used again to build the GDTs with a business semantic orientation.
- These GDTs are included in “Context Data Types” specific for an Application Scenario,
- Later a set of this Context Data Types could be used to create the:
 - PI Message Types,
 - and Service Interfaces Operations.



SAP Global Data Types Summary

To summarize, GDTs are based on the rules described in the international standard UN/CEFACT CCTS (Core Component Technical Specification)

They are reusable semantic building blocks for service interfaces and business objects used in PI through the corresponding Message Types and are SAP-wide established and reconciled data types with business-related content.

The GDT the catalog collects all the GDTs approved by the Governance Process for Business Content (embedded in the SAP standard 'Application Integration & Interfaces') of the SAP Process Integration Council (PIC).

They have been defined in the Enterprise Service Repository, are described by XML schema and have been documented in accordance with the documentation templates. Therefore within SAP, it is mandatory to use GDTs to define business object attributes and service interface parameters (also called signatures). With this

approach, SAP ensures that if the same attribute occurs in business object nodes or service interfaces, it is always described by the same or a derived GDT.

SAP uses the CCTS as a basis for the development of the new SAP GDTs, which will be the open integration technology in the long term.

For SAP it is crucial to support open standards when defining business objects and service interfaces, with the basis being Global Data Types (GDTs). GDTs represent a set of data types with clear business semantics mandatory for all SAP applications.

All in all, GDTs have the following characteristics:

- Re-usable data types for service interfaces and business object nodes.
- Development based on the data type development methodology described in the international Standards ISO 15000-5 and UN/CEFACT CCTS (Core Component Technical Specification).
- Defined in ES Repository using Extensible Markup Language (XML) schema.
- Approved SAP-wide by the Governance Process for Business Content (advanced by Process Integration Council (PIC))

Display Data Type (Objects in component cannot be changed because the original la... Status: Active Display Language: English (OL)

Name: SalesOrderElements
 Namespace: http://sap.com/xi/ESF
 Software Component Version: SAP BASIS 7.10
 Description: Sales Order Elements

Classification: Aggregated Data Type

Type Definition XSD

Name	Category	Type	Occurrence	Default	Details	Description	UI Text Object
SalesOrderElements	Complex Type						
ID	Element	p1:BusinessTransf	1		minLength="1"; max		SalesOrderID
TypeCode	Element	p1:BusinessTransf	1		minLength="1"; max		SalesOrderTypeCod
PostingDateTime	Element	p1:GLOBAL_Date	1		pattern="[0-9]{4}-[0-9]		SalesOrderPostingD
SystemAdministrativeData	Element	p1:SystemAdmini	1				
CreationDateTime	Element	p1:GLOBAL_Date	1		pattern="[0-9]{4}-[0-9]		
CreationIdentityUUID	Element	p1:UUID	0..1		minLength="36"; m		
CreationUserAccountID	Element	p1:UserAccountID	0..1		minLength="1"; max		
LastChangeDateTime	Element	p1:GLOBAL_Date	0..1		pattern="[0-9]{4}-[0-9]		
LastChangeIdentityUUID	Element	p1:UUID	0..1		minLength="36"; m		
LastChangeUserAccountID	Element	p1:UserAccountID	0..1		minLength="1"; max		
SellerParty	Element	SellerParty	1				
SellerID	Element	PartyPartyID	1		minLength="1"; max		Seller
BuyerParty	Element	BuyerParty	1				
Incoterms	Element	Incoterms	0..1				
TotalGrossAmount	Element	p1:Amount	1		totalDigits="28"; frac		SalesOrderTotalGro
TotalNetAmount	Element	p1:Amount	1		totalDigits="28"; frac		SalesOrderTotalNet
currencyCode	Attribute	p1:CurrencyCode	required		minLength="3"; max		
TotalTaxAmount	Element	p1:Amount	1		totalDigits="28"; frac		SalesOrderTotalTax
CurrencyCode	Element	p1:CurrencyCode	1	EUR	minLength="3"; max		SalesOrderCurrency
PurchaseOrderPostingDate	Element	p1:GLOBAL_Date	1		pattern="[0-9]{4}-[0-9]		SalesOrderPOPosti
PurchaseOrderReference	Element	p1:BusinessTransf	1		minLength="1"; max		SalesOrderPORefer
Status	Element	SalesOrderStatus	0..1				

- Development methodology designed for composing a consistent data type model out of a predefined and controlled semantic vocabulary and predefined XML fragments within a community

GDTs:

- Are company wide defined data types based on international standards
- Defined in a standards based way in the ES Repository
- SAP-wide approved with reference to the Governance process
- Semantic building blocks for service interfaces enabling reuse
- Based on ISO 15000-5 and UN/CEFACT CCTS
- Basis for Message Types in the ES Repository
- Will be the open integration technology in the long term.

Needless to say, SAP plays a leading role in CCTS adoption and implementation, and the UN/CEFACT organization recognizes this level of engagement.

The screenshot shows the UN/CEFACT Techniques and Methodologies Group (TMG) website. The header includes the UN/CEFACT logo and the text 'United Nations Centre for Trade Facilitation and Electronic Business' and 'Techniques and Methodologies Group'. The main content area is titled 'News from the Working Groups and Projects of TMG' and contains several news items. A yellow circle highlights the following news item:

SAP uses Core Component Technical Specification
SAP uses ISO 15000-5 CCTS to define SAP Global Data Types (GDTs) as the basis for Business Objects and Enterprise Services. [Read more...](#)

Other news items include: 'Next UN/CEFACT Forum meeting in Dublin', 'Final Technical Specifications for UMM Modules released', 'Registration for New Delhi Forum Meeting is open', 'AIAG Cross-Industry Core Components Workshop', and 'CEN/ISSS Workshop working on Core Component Models for eGovernment'. The sidebar on the right includes 'NEXT TMG MEETING:' (UN/CEFACT Forum Meeting 26th to 30th March 2007, Dublin, Ireland), 'TMG CALENDAR' (May 2007), and 'WHO'S ONLINE' (We have 16 guests online).

This is a screenshot shows the UN/CEFACT Techniques and Methodologies Group home page, where you can see an important reference to SAP GDTs as basis for the business objects and Enterprise Services.

Related Content

- [SDN pages about UN/CEFACT CCTS \(Core Component Technical Specification\)](#)
- [Article - How to Solve the Business Standards Dilemma - CCTS Key Model Concepts](#)
- [Article - How to Solve the Business Standards Dilemma - The Context Driven Business Exchange](#)
- [Article - How to Solve the Business Standards Dilemma - The CCTS based Core Data Types](#)

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