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and Automatic Data Interchange (GE.1)
Fifty-fifth session, 19-20 March 1997)

# INTERNATIONAL STANDARDIZATION AFFECTING TRADE INTERCHANGE

## Standards Liaison Meeting Report

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Submitted by the Standards Liaison Rapporteur *

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# INTERNATIONAL STANDARDIZATION AFFECTING TRADE INTERCHANGE

## Standards Liaison Meeting Report

SOURCE: STANDARDS LIAISON RAPPORTEUR
STATUS: RAPPORTEUR REPORT
ACTION: FOR INFORMATION; GE.1; March 1997 Session

## ISO/IEC JTC1/SC30/WG1 (Scenario Definition), Seoul, 14-16 October 1996

Participants to the first meeting of the working group were from USA, UK, Australia, Netherlands, Canada, Japan, Korea, Finland, Norway, Sweden, Italy, Yugoslavia, UN/ECE and EWOS.

The group reviewed all contributions to WG1 by creating two ad-hoc groups. Since the Standards Liaison Rapport had submitted two contributions, he spent all his time in that group (Ad-hoc group A) addressing the Business Operational View (BOV).

Appendix A and B contain the contributions by the SLT Rapporteur. Ad-hoc group A agreed to most of the content of the SL Rapporteur contributions and revised the BOV meta model. However, WG.1 had some disagreement with that result. Since the main contribution was co-authored by Mr. Paul Levine (US delegate to SC30 and an expert supporting the work of AC.1), both authors addressed the issues since than in a new joint submission (see Appendix C) to WG.1. Delegations are urged to read the three Appendixes (A-C) for details on the topics discussed.

## ISO/IEC JTC1/SC30 (Open-EDI), Seoul, 16-18 October 1996

See TRADE/WP.4/R.1269 for summary report.

## ISO/IEC JTC1, Joint Workshop on Modelling, Seattle, USA, 9-13 September 1996

See TRADE/WP.4/R.1269 for summary report.

**Appendix A**

**ISO/IEC JTC 1/SC 30/WG1 Seoul 01**

**1996-10-03**

**ISO/IEC JTC 1/ SC30/WG 1**

**OPEN-EDI**

**TITLE** : **Object Oriented Analysis Approach to Open-edi**

**SOURCE** : **Paul Levine (USA) & Klaus-Dieter Naujok (UN/ECE/TRADE/WP.4 Liaison)**

**STATUS** : **Personal Contribution**

**ACTION** : **For review at the October meeting of SC30/WG1 in Seoul, Korea, under agenda item 7, Topic 14 - Identification and analysis of classes of business requirements in relation to Open-edi scenarios**

# Object Oriented Analysis Approach to Open-edi

## 1 Introduction

This contribution provides definitions and concepts relative to the object oriented analysis approach for Open-edi standards. These concepts result from a synthesis of ISO/IEC JTC 1/SC 30/WG 1 N021 (USA contribution *Open-edi Metamodel*) and ideas that were drafted in the WP.4/GE.1/AC.1 (Research, Strategic Advice and Implementation Planning) task group meeting on 26-28 June, 1996. This contribution is intended to communicate at a high level how object oriented analysis can be used to redirect the focus of EDI standards to be primarily concerned with the business processes that are trying to interoperate. (It should be noted that the scope of this interoperation of business processes includes only those activities that involve information exchange with external trading partners.) This will create standard building blocks that can be readily used to produce EDI compatible software with minimal impact to a business information system. A future contribution will show how these concepts relate to the Open-edi metamodel (ISO/IEC JTC 1/SC 30/WG 1 N005). Additional contributions will illustrate how these concepts can be applied to real-world examples.

## 2 Definitions

Common understanding of concepts begins with definitions that are agreed to. The following list includes definitions that were drafted in the AC.1 meeting on 26-28 June. Other definitions pertinent to the discussion are extracted from:

- ISO/IEC DIS 14662, *Information technology - Open-edi reference model Document*,
- ISO/IEC Standard 11179, *Information Technology - Specification and Standardization of Data Elements*,
- BIM3, *Quick Reference on IDEF0 - Activity Modeling*,
- Dictionary of Object Technology,
- Taylor, David - *Object Oriented Technology: A Manager's Guide.*

Definitions that are quoted are followed by their source in parentheses.

**Object Class or Class** - "A template for defining methods (behavior) and variables (information) for a particular type of object. All objects of a given class are identical in form and behavior, but contain different data in their variables. (James Taylor)

**Object** - An instance of an object class.

**Data Class -** (synonymous with abstract data type) Any encapsulated user defined data type that hides the implementation of its data and operations. (Martin-Odell, Dictionary of Object Technology)

**Activity** - "A task which transforms inputs into outputs via the work of mechanisms under the instruction of controls. Activities occur over time and have identifiable outputs." (BIM3)

**Business Function - "**A description of all aspects of a system that transforms values using processes, mappings, constraints, and dependencies. The emphasis is on processing inputs

into outputs and operations rather than on objects and state." (Rumbaugh, Dictionary of Object Technology)

**Business Practices** - the major management and control systems operated by a business organization.

**Business Processes** - the individual tasks that are involved in operating business practices.

**Business Information System** - a set of business practices, procedures and processes that are implemented by computer application programs.

**Activity Unit** - an activity, that with its input, control, output, mechanism (ICOM) concepts, is a business process component at a low enough level that it is recognized as reusable, and it thus a candidate for standardization. (An activity unit can be represented as an IDEF0 model, and may be further analyzed using an IDEF3 process model.)

**Open-edi scenario** - "a formal specification of a class of business transactions having the same business goal" (ISO/IEC DIS 14662)

**Role** - "Any part played by something, (e.g., a person, piece or equipment, or organization). Note: a role captures the purpose of something, the position it holds, or its capacity, job, or viewpoint. (Dictionary of Object Technology)

**Role** - "a specification that models an intended external behaviour (as allowed within a scenario) of an Open-edi Party" (ISO/IEC DIS 14662)

**Actor** - "any external class that models one of a set of roles played by a perspective user of a business system or information system [Jacobsen, Rumbaugh] Note: the user is the actual person or thing that uses the system, whereas an actor represents a specific role that users can play. Actors capture the roles that users can play, a single user can play the roles of multiple actors. (Dictionary of Object Technology)

**Open-edi Party** - "an organization that participates in Open-edi." (ISO/IEC DIS 14662)

## 3 Discussion

### 3.1 Shift the Focus

Interoperation between application programs requires that there be "common ground" in their exchange of information, so that there can be common understanding and agreement on the information being jointly processed. Common ground in this exchange of information is accomplished in current EDI methodology through a neutral, application independent syntax, i.e., a translated ANSI X12 or UN/EDIFACT interchange file. All consideration of application programs, how to facilitate their interoperation, functionality variations, and the business practices behind them are deliberately ignored. Instead, the current EDI standardization process in X12 and UN/EDIFACT concentrates solely on the structure and content of the translated interchange file. The problems associated with the X12 and UN/EDIFACT standards and the standard development process are well documented and are not repeated here.

However, it is essential to understand that for Open-edi to overcome the current impediments to implementing EDI, a new paradigm must be envisioned that shifts the focus on EDI standards from the interchange file to the information contained in the business processes. While business practices from one business organization to another are highly variable, depending on competitive strategies, experience and management style, they can be decomposed into business processes that are more generic to the type of business. This decomposition analysis will identify activities and object classes that are likely candidates for standardization. We look for standard reusable components from which to construct EDI compatible software. Such a goal is a core concept of object technology.

### 3.2 Activity Units

Business modeling has introduced the concept of activity, process and data modeling using an integrated definition/system analysis design technique (IDEF/SADT). (Refer to Attachment 1 for information on IDEF methods.) Modeling can be used in each of these three areas to formally describe business processes. Business processes are decomposed through various levels of activity. At the lowest level, activity units result that have input(s) and an output that are capable of being modeled as standard object classes. The activity units themselves are capable of being standardized.

Figure 1 illustrates the IDEF0 model of an activity unit, where:

- Input objects are consumed by the activity unit,
- Controls constrain, regulate or limit the output of the activity unit
- The output object is produced by the activity unit,
- The mechanism (or actor) constitutes the people, machines, resources or systems that do the transformation work.

A correct understanding of this model of an activity unit is conveyed by the following: "when we (activity name, e.g., issue an invoice), we transform these inputs into this output via these mechanisms under the constraint of these controls."

**Controls**

**Input Object** **Output Object**

**Activity Unit**

**Mechanism (actor)**

Figure 1 Standard Activity Unit

In this analysis, business functions are broken down into business processes which are in turn broken down into activities. Each activity is a unit, which with its inputs, output, controls and mechanism, can be visualized as part of the role associated with its actor. (This role could be equated with "role" as defined in ISO/IEC DIS 14662 where all of the activity units associated with an actor for a role within an Open-edi scenario comprise the business process corresponding to that role in the Open-edi scenario. However, this concept of role is not fundamental to the specification of an Open-edi scenario. Role in this context will not be specified as part of Open-edi standards. Open-edi standards are now focused on activity units and object classes.)

### 3.3 Absolute Standardization

Common ground in the exchange of information will be accomplished using standard activity unit models and standard object class models. Absolute standardization of activity unit models and object class models implies global acceptance of these concepts and an international standardization process that develops, certifies and registers these models for public use. We assert that these prime standard models are essential to the interoperation of business processes within Open-edi scenarios. These components are the fundamental building blocks of Open-edi. Nonacceptance of such a building block view of Open-edi will ultimately leave us with a "business as usual" EDI, where prior trading agreements must be negotiated for each Open-edi scenario.

### 3.4 Harmonization

Harmonization among Open-edi parties will be accomplished by assembling a standard Open-edi scenario from the absolute standard Open-edi building blocks, i.e., standard activity units and object classes. This process begins with trading partners defining at a high level the business function they choose to use, e.g., customer vs. vendor managed inventory for buyer and seller. Then, each trading partner will construct "standard" process models from libraries of standard activity unit and object class models. (The use of "standard" is to emphasize that process models and Open-edi scenarios are distinct from absolute standards, in that the standard process models and Open-edi scenarios are synthesized from building blocks that are absolute standards.) These process models will provide an interface document that will enable legacy data internal to the business information system to be mapped and translated to the standardized data. This task will be contained and controlled locally by the data administration group responsible for the business information system.

Object technology will not only allow interfaces with legacy systems, but will also allow a dual method of EDI operation to continue in transition from current EDI methods to Open-edi. The interface document provided by the standard business process models will allow both EDI methods to be done together. For example, for a purchase order, all of the data may be transmitted in an EDI message as well as interactively in an Open-edi scenario.

### 3.5 Synthesis of Open-edi Scenarios

Compatible process models of each trading partner, as discussed in Section 3.4, will be assembled to construct a "standard" Open-edi scenario. As discussed, harmonization in information exchange among Open-edi parties will have already been achieved. However, for purposes of reusability, Open-edi scenarios will be registered as "standard" Open-edi scenarios. This is the key to eventually being able to accomplish Open-edi without prior agreement between the trading partners.

AC.1 recognized that an Open-edi scenario may be one of many implementations that handle the activities associated with a business function. ISO/IEC DIS 14662 states that "Open-edi scenarios shall allow for hierarchical decomposition and a modular approach." According to this proposal, this modular approach will be achieved by decomposing business functions into business processes, and business processes into activity units that operate on object classes. An Open-edi scenario will be specified at the level of activity

units and object classes needed to execute the Open-edi scenario. This implies that each "standard" Open-edi scenario will be unique and registered.

Figure 2 illustrates three Open-edi scenarios that are subsets of a common business function model. This example recognizes that in the construction of these three Open-edi scenarios, legitimate variations may exist because of options taken with business processes. Yet, each Open-edi scenario will be registered as a distinct Open-edi scenario.

All activities in a
business function

| Agreed implementation # 1 | Agreed implementation # 2 | Agreed implementation # 3 |
|---|---|---|
| Open-edi scenario 1 | Open-edi scenario 2 | Open-edi scenario 3 |

Figure 2 Open-edi Scenarios

**3.6 Object Classes**

In its discussion of activity modeling, AC.1 confirmed many concepts related to object classes. First, the decomposition of business processes in activity modeling is a functional decomposition that focuses on the operations, not on the object classes. However, this analysis leads to object classes which are the inputs and output of activity units.

An object class is described in terms of data classes, operations that may be performed on the data classes, and lower level object classes that may be contained within the object class. As absolute standards, object classes will be registered as standards within an repository. Object classes can be incorporated within "larger" object classes, i.e., superclasses, as required by the business process. Conversely, special cases of a more general object class are referred to as subclasses. The advantage of defining object classes in a hierarchy is that special cases share all of the properties and operations of their more general cases through a mechanism called inheritance.

In addition to the flexibility and normalization provided by inheritance, object technology allows data classes to be added to the data classes already contained in standard object classes in the specification of activity unit models. Conversely, data classes that are part of standard object classes may be nulled out in activity unit models.

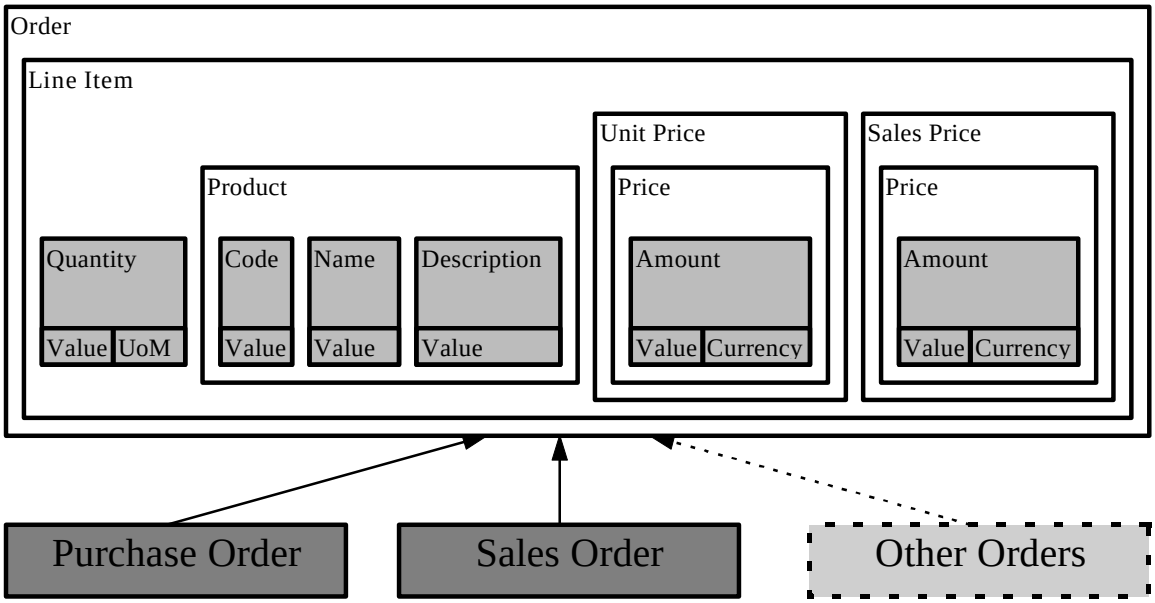


Figure 3 Object Classes and Data Classes

### 3.7 Data Classes

Figure 3 illustrates how object classes can be composed into lower level object classes that are characterized directly by a data class. Data classes included in this proposal are listed in Attachment 2, although more can be added as needed. In this example Quantity, Code, Name, Description and Amount data classes are shown as variables of object classes Line Item, Product and Price. In the analysis of a purchase order, object classes Order, Line Item, Product, Unit Price and Sales Price are broken down to lower level object classes until there is an object class that relates directly to the data class that describes the data type to be exchanged with the trading partner. That is, Quantity relates to Line Item; Code, Name and Description relate to Product; Amount relates to Price.

## 4 Summary

This shift in focus results in Open-edi standards that relate to the Business Operational View as defined by ISO/IEC JTC 1/SC 30, not the Functional Service View. In the analysis, business functions are broken down into business processes, which are in turn broken down into activity units. The activity units have inputs and an output that are object classes. The object classes themselves are decomposed into component object classes and data classes. In this analysis, there is no concern regarding interchange data syntax, implementation of software or the transport infrastructure. The emphasis is on modeling standards and absolute standards for activity units and object classes. We see the data classes as modeled within the standard object classes as the linkage to the FSV.

**Attachment 1**

## Structured Analysis using IDEF Methods

The Integration Definition (IDEF) methods are a powerful set of structured analysis methods that help manage the complexities associated with an organization's evolution toward large-scale system integration. A method is a systematic and structured procedure or mode of inquiry employed by, or relevant to, a particular discipline. In other words, a method encapsulates the best practice in a specific domain of cognitive or physical activity. Different methods address different characteristics of the domain.

The IDEF suite of methods is used to perform modeling activities in support of enterprise integration and reengineering. Perhaps the most compelling argument for a suite of methods is the ever-increasing need for methods that help manage complexity by dividing the system to be analyzed, designed, and developed into discrete, manageable pieces. The methods are designed to embody the knowledge of good practice for a given analysis, design, or fabrication activity. An appropriately designed method serves to raise the performance level of the novice to that of an expert by focusing the modeler's attention on important decisions while diverting attention from unnecessary complexity.

A brief description of the IDEF methods is given below.

IDEFO Function Modeling Method

IDEFO is a method used to produce a function model--a structured representation of both the functions of a system or environment and the information and objects which interrelate those functions. It allows for graceful expansion of the descriptions of a system's functions through the process of decomposition and categorization of the relations between functions (i.e., in terms of input, output, control, and mechanism classification).

IDEF1 Information Modeling Method

The IDEF1 method is used to produce an information model which represents the structure of information needed to support the functions of the system or environment. It is designed to capture descriptions of the information necessary for an organization to manage and accomplish its objectives.

IDEF1X Data Modeling Method

IDEF1X is intended as a mechanism for developing logical designs for relational databases. Once the information requirements are known and the decision to implement in a relational database has been made, IDEF1X helps design the architecture of your database.

IDEF3 Process Description Capture Method

IDEF3 is a process flow and object state description capture method that supports the structuring of process descriptions of a system from the perspectives of various users. It helps capture descriptions of sequences of activities and supports analyzing business systems, designing data life-cycle management, and identifying project management processes and system requirements definition processes. The IDEF3 method also

facilitates the graceful capture of temporal logic and process logic embedded within processes.

Attachment 2

## Data Classes

Amount

A number of monetary units specified with a type of currency.

Code

A system of words, letters, figures or symbols used to represent others for brevity or secrecy. Note. Codes can include both internal (private) and external (public) code sets.

Date

A particular day of a calendar year. Ref: ISO 8601:1988 Note: This will be implemented with the use of a specific date format and a date value in that format.

Description

A series of sentences representing a person, object or event. Note: This can be applied both for definitions, which are generally one or two sentences, and for longer textual passages.

Factor

A number that is used as a multiplier. Note: This is a special use of the property NUMBER.

Indicator

A two value attribute indicating a condition such as on/off, true/false, yes/no, 0/1, etc.

Name

A word or phrase that constitutes the distinctive designation of a person, place, thing or concept. Note: What the person, place thing or concept is known by or called.

Number

An arithmetical expression representing a particular value. Note: This may often be used to imply sequence or a member of a series.

Percent

A rate expressed in hundredths between two values that have the same unit of measure.

Quantity

A number of non-monetary units specified with a unit of measure.

Rate

A quantity or amount measured with respect to another measured quantity or amount. e.g. US dollars/hour, US dollars/French franc, miles/gallon.

Time

The clock time in public use locally. Ref: ISO 8601:1988. Note: This will be implemented with the use of a specific time format and a time value in that format.

(Image)

Data that can be transformed into an optical representation of an object by an electronic device.

(Sound)

Data that can be transformed into an auditory representation of an object by an electronic device.

**Appendix B**

# ISO/IEC JTC 1/SC 30/WG1 Seoul 02

**1996-10-17**

**ISO/IEC JTC 1/
SC30/WG 1**

**OPEN-EDI**

**TITLE: EDI messages as Information Parcels?**

**SOURCE: Klaus-Dieter Naujok (UN/ECE/TRADE/WP.4 Liaison)**

**STATUS: Personal Contribution in response to N003, N004, N005, N007, N008, N021, N042**

**ACTION: For review at the October meeting of SC30/WG1 in Seoul, Korea, under agenda item 7, Topic 14 - Identification and analysis of classes of business requirements in relation to Open-edi scenarios**

## EDI messages as Information Parcels?

It seems that most contributions to WG1 assume that Information Parcel are of the current EDI format. This being either UN/EDIFACT messages or others such as X12 transaction sets.

To start the discussions one must first examining the definition in DIS14662.

**Information Parcel (IP):** the formal description of the semantics of the information exchanged by Open-edi Parties playing roles in an Open-edi scenario.

The IP is used to model the semantic aspects of the business information. Information parcels are constructed using Semantic Components.

**Semantic Component (SC):** a unit of information unambiguously defined in the context of the business goal of the business transaction.

A SC may be atomic or composed of other SCs.

SCs are defined by user groups and proposed for standardization and registration in one or more repositories. Procedures to be used for defining, introducing and updating SCs are BOV related standards. Technical procedures for electronic access to one or more repositories are candidates for standardization.

The information parcel includes the following characteristics:

- All information relevant to the interoperability, within the BOV perspective, of Open-edi systems. It is composed of SCs and describes their relationships.

- Demands on Open-edi Support Infrastructure which reference the functional capabilities (see section 4.2.2) and their quality of service satisfying the Open-edi scenario requirements on IPs. The catalogue of predefined demands on Open-edi Support Infrastructure is a BOV related standard. Such features include but are not limited to:

    - confidentiality of the IP,
    - integrity of the IP.

- Registration and management information pertinent to the reusability of an information parcel such as:

    - name of the IP,
    - purpose of the IP,
    - business rules controlling the content or concept(s) of the IP,
    - regulations governing the content or concept(s) of the IP.

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Based on the above definition of IPs it is clear hat current EDI messages do not meet that criteria and therefore WG1 should not attempt to include references to its work on scenario based on examples containing such EDI messages as IPs.

In order to determine what IPs should be in the new world of open-edi, one needs to review the definition of Semantic Components (SC). Close examination yields that SC are to be defined and later standardized by user groups. However, little detail is given what such SCs are. In its definition, IPs are used as constant reference. In contributions put forward, SCs are the components of EDI messages, such as “Identification of buyer” and “Identification of supplier”. The problem is that those SC are not unambiguously defined. Current EDI messages allow many ways of identification schemas for either buyers and suppliers.

Further the definition of SC states that they are “defined in the context of the business goal of the business transaction”. Business transaction is defined as:

> A predefined set of activities and/or processes of organisations which is initiated by an organisation to accomplish an explicitly shared business goal and terminated upon recognition of one of the agreed conclusions by all the involved organisations although some of the recognition may be implicit.

How can this be achieved without using existing EDI messages and its components? In today's information age the timely exchange of data is important. Current EDI messages batch data which is available over a period of time. What is need, and Open-edi must allow for, is that the information is exchange the moment it is being created as part of the overall business function life cycle. Further, current EDI messages contains old data which has been previously exchanged because traditional "Paper Documents", used as reference in the design stage, contain such duplication for human purpose. It is time for Open-edi to step in to the next millennium by going for a paradigm shift. Let's use true information technology available today for tomorrow and not apply yesterday's ideas.

The Zachman Model shows that "Semantic Models" are based on Data Models and Semantic Models are part of Process/Activity models. If one takes a look at CALS, one sees that the use of IDEF/SADT allows all of those (Processes, semantics and data) being model in cohesive and consistent way.

However, using IDEF/SADT does not solve the issue of reusable scenario building blocks (the term SC is being ignored for a moment). In order for user groups to develop scenarios (see definition of SC) reusable building blocks are essential, further they must be standardized before they are being used. Without reusable building blocks each user group would create their own and interoperability becomes a nightmare.

One technology which can achieve such standard reusable building blocks is Object Technology. At the lowest level would be standard Data Classes (Abstract Data Types) which would be used by Activity Units (registered in Class Libraries) which in turn are used to build high level models (Scenarios and Business [Enterprise/Information] Frameworks). For more details see the personal contribution entitled "Object Oriented Analysis Approach to Open-edi" by Paul Levine (USA) and Klaus-Dieter Naujok (UN/ECE/TRADE/WP.4 Liaison).

## Appendix C

**ISO/IEC JTC 1/SC 30/WG1 Nxxx**

1996-12-04

**ISO/IEC JTC 1/
SC30/WG 1**

**OPEN-EDI**

**TITLE:** **Changes in the Open-edi BOV Metamodel and Rationale**

**SOURCE:** **Paul Levine (USA) & Klaus-Dieter Naujok (UN/ECE/TRADE/WP.4 Liaison)**

**STATUS:** **Personal Contribution**

**ACTION:** **For review by SC30/WG1 under Topic 14 - Identification and analysis of classes of business requirements in relation to Open-edi scenarios**

# Changes in the Open-edi BOV Metamodel and Rationale

Diagram 1 shows the Open-edi Metamodel based on the Expert Contribution by Hovsto and Johansen, Norway (Annex A of SC30/WG1/N003, 96/05/31). The output of SC30/WG1's Ad-hoc Group 1 which was formed during the meeting in Seoul, Korea (96/10/16) is shown in Diagram 2 (SC30/WG1/N052). Based on input from Seoul 1 contribution (SC30/WG1/N045), Object Oriented Approach to Open-edi, the entities Business Transaction, Organization, Activity and Information Flow initially changed in the discussion to Business Function, Business Process, Activity Unit, Input and Output Object Classes, Controls and Mechanism. Definitions for these entities in Seoul 1 are:

⇒ *Business Function* - a description of all aspects of a system that transforms values using processes, mappings, constraints and dependencies. The emphasis is on processing inputs into outputs and operations rather than on objects and state,

⇒ *Business Process* - the individual tasks that are involved in operating business practices, where business practices are the major management and control systems operated by a business organization,

⇒ *Activity Unit* - an activity, that with its input, control, output and mechanism (ICOM) concepts, is a business process component at a low enough level that it is recognized as a candidate for standardization,

⇒ *Input Object Class* - a template for defining methods (behavior) and variables (information) for a particular type of object, which in this case is consumed by an activity unit,

⇒ *Output Object Class* - a template for defining methods and variables for a particular type of object, which in this case is produced by an activity unit,

⇒ *Controls* - the constraints that regulate or limit the output of an activity unit,

⇒ *Mechanism* (or *actor*) - the people, machines, resources or systems that do the transformation work of an activity unit.

Business Transaction was replaced by Business Function because it was felt that Business Function better expressed the sum total of activities that could be included in a major category of business interaction. Activity was replaced by Business Process and Activity Unit to better represent the recursive business analysis process and to distinguish between levels of Business Processes and Activity Unit, which is the lowest level of a Business Process to be modeled. Organization was replaced by Mechanism at the level of Activity Unit. Information Flow (and its inputs and outputs) was replaced by Input Object Class and Output Object Class at the level of Activity Unit. Controls was added at the level of Activity Unit to complete the Activity Unit model in the IDEF methodology.

The next step in the discussion was to relate the business analysis part of the metamodel to the BOV-related standards part of the metamodel. Since the Seoul 1 contribution proposed to make Activity Unit models and Object Class models the fundamental building blocks of Open-edi standards, these entities were introduced to the BOV metamodel. The focus on Activity Unit model resulted in the removal of Role, since each activity unit can be visualized as part of the role associated with its actor or mechanism. Relating this concept of role to Role as defined in ISO/IEC DIS 14662, all of the activity units associated with an actor (mechanism) for a Role within an Open-edi scenario comprise the business process corresponding to that Role in the Open-edi scenario. With this view of role, it was proposed that the Role concept was covered in the aggregation of Activity Units and their associated mechanisms and did not need to be modeled as an Open-edi entity.

An Activity Unit model entity was introduced to replace Role, along with its associated Mechanism, Constraints, Inputs and Outputs. Since, at that point, Activity Unit appeared as both a business analysis entity and a BOV entity, Activity Unit was removed from the business analysis part, leaving Business Process to implicitly include Activity Unit as its lowest level of decomposition. Also, Business Process was related to the BOV Activity Unit model as decomposed to. In order to be more consistent with the prior version of the metamodel, Input Object Class and Output Object Class were combined into Information Flow and related to Business Process as using inputs and creating outputs.

The BOV Activity Unit model and its Input, Controls, Output and Mechanism were proposed to be related to the BOV metamodel entities as follows:

- Open-edi Scenario composed of Activity Unit model, which would provide for Open-edi scenarios to be constructed from Activity Unit models as building blocks,

- Mechanism composed of Activity Unit model, allowing for the same mechanism to be the actor for multiple activity units,

- Mechanism of an Activity Unit model composed of State, showing that the mechanism transitions through states as the activity unit progresses in its execution,

- Activity Unit composed of Action, which is a process sub-component of the activity unit,

- Information Parcel expressed as Object Class of the Activity Unit model, along with its decomposition to Object Class Methods and Data Class in the OOA paradigm, all replacing Data Element, Relationship, Compound Semantic Component and Atomic Semantic Component in the paradigm of semantically complete data elements,

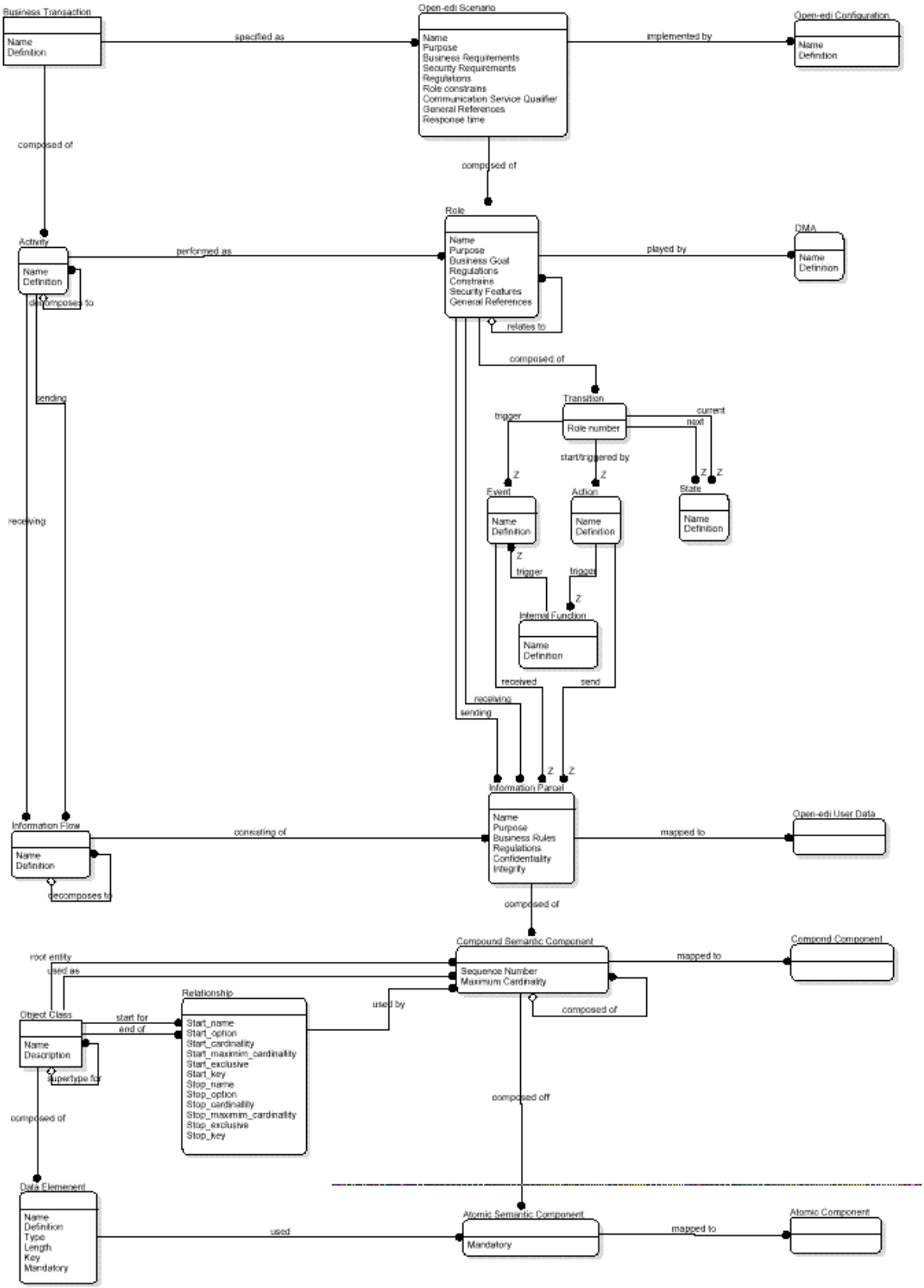
- Controls of the Activity Unit model were introduced as a new entity to complete the Activity Unit model in the IDEF methodology.

It was pointed out by WG 1 that these relationships did not permit reuse of the Activity Unit model. Indeed, the construction of the metamodel resulted in Open-edi Scenario composed of Mechanism composed of Activity Unit, which was not the intent. The intent was to directly represent Open-edi Scenarios as being composed of Activity Unit models. Objections were also raised in WG 1 to the removal of Role from the BOV metamodel as an explicit entity, since it is a key component of Open-edi scenarios in the Open-edi Reference Model. Logic difficulties were also found in relating business function model entities to BOV concept entities in the same entity-relationship diagram. Another objection was that proposing to make Activity Unit models and Object Classes the building blocks of BOV-related standards committed the BOV to a specific Formal Description Technique. It was expected that BOV-related standards should remain at a higher level of abstraction.

As a result of this discussion, the authors of Seoul 1 have revised the Open-edi BOV Metamodel Diagram 3) to show the entities Business Function, Business Process, Activity Unit, Control, Mechanism and Object Class, as proposed in Seoul 1, to all be in the business analysis part of the metamodel. Dotted line relationships with the BOV concept entities are shown as follows:

- Business Function specified as Open-edi Scenario,
- Business Process performed by Role,
- Object Class corresponds to Information Parcel.

Diagram 1 - Open-edi Metamodel




Expert Contribution, Hovsto and Johansen (Norway), 96-03-20

Diagram 2 - Open-edi Metamodel

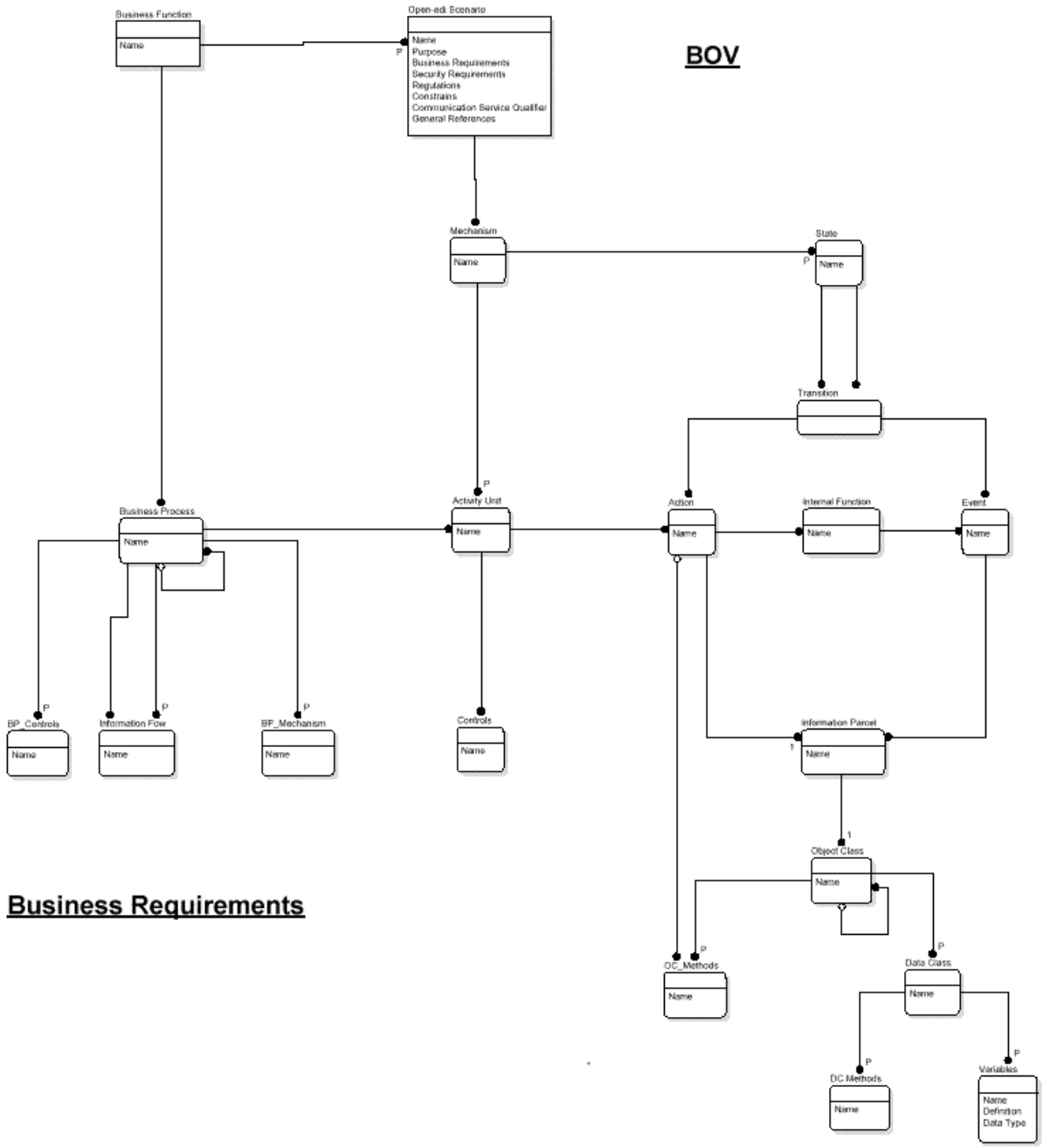
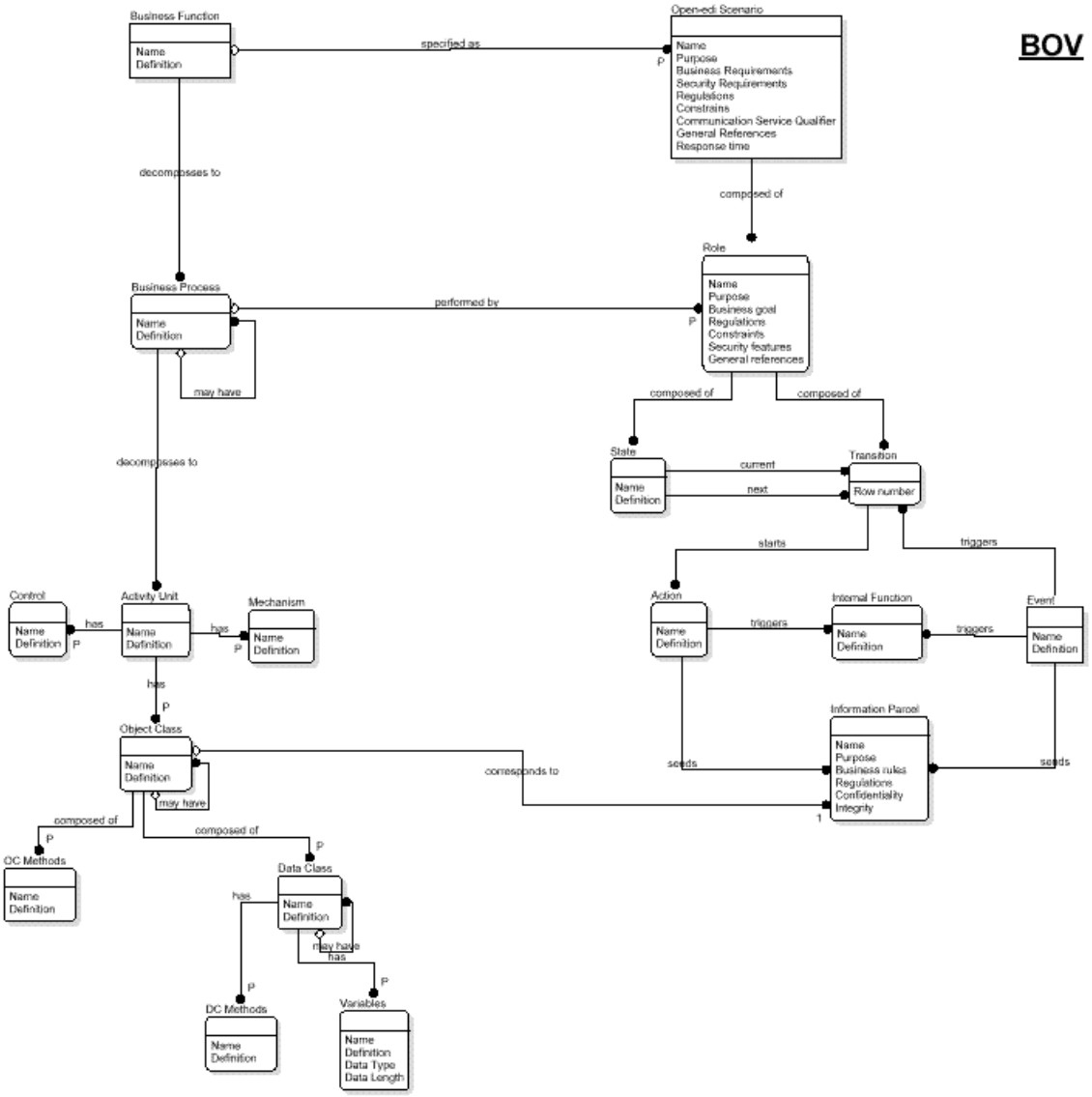


Diagram 3 - Open-edi BOV Meta Model




## Business Requirements

Revised by Paul Levine and Klaus-Dieter Naujok, 96-11-24