

# HL7 Reference Information Model Compendium

RIM Version 2.14, July 2006



## Introduction

This is a compendium of the HL7 Reference Information Model containing most of the definitions of the RIM classes in a way that lends itself to be printed on paper and read, preferably from cover to cover. This compendium presents most information in a more compact manner, so that the reader does not need to follow so many references. Most importantly structural vocabulary is presented with the coded attribute that uses this vocabulary. The text was automatically compiled from the standard definitions found in the ballot documents of the latest version.

The structure of this document is as follows. After a very brief overview of data type abbreviations, most major RIM classes are presented in the order of the 6 “backbone” classes: Act and subclasses, Entity and subclasses, Role and subclasses, Participation, ActRelationship and finally RoleLink. An attempt had been made to present related classes together, so the order is not alphabetical but conceptual.

## Overview of Data Types

The following table lists only the data types that are referred to in the RIM. Additional data types exist that are used by derivative specifications from the RIM.

Code	Name	Description
ANY	DataValue	Defines the basic properties of every data value. This is an abstract type, meaning that no value can be just a data value without belonging to any concrete type. Every concrete type is a specialization of this general abstract DataValue type.
BL	Boolean	The Boolean type stands for the values of two-valued logic. A Boolean value can be either true or false, or, as any other value may be NULL.
ED	Encapsulated Data	Data that is primarily intended for human interpretation or for further machine processing outside the scope of HL7. This includes unformatted or formatted written language, multimedia data, or structured information in as defined by a different standard (e.g., XML-signatures.) Instead of the data itself, a ED may contain only a reference (see TEL.) Note that the ST data type is a specialization of the ED data type when the ED media type is text/plain.
ST	Character String	The character string data type stands for text data, primarily intended for machine processing (e.g., sorting, querying, indexing, etc.) Used for names, symbols, and formal expressions.
CD	Concept Descriptor	A concept descriptor represents any kind of concept usually by giving a code defined in a code system. A concept descriptor can contain the original text or phrase that served as the basis of the coding and one or more

This booklet was produced by Gunther Schadow, Regenstrief Institute, in order to promote broader knowledge and understanding of the RIM inside and outside the HL7 developer community. The contents of this booklet is for the most part the original definitions of the RIM elements, very little editing has been done in anticipation of technical corrections to the RIM. However, this booklet may not be complete and may omit parts of the RIM. The reader is advised to refer to the material released by HL7 which is available at <http://www.hl7.org>.

Code	Name	Description
		translations into different coding systems. A concept descriptor can also contain qualifiers to describe, e.g., the concept of a "left foot" as a postcoordinated term built from the primary code "FOOT" and the qualifier "LEFT". In exceptional cases, the concept descriptor need not contain a code but only the original text describing that concept.
CS	Coded Simple Value	Coded data in its simplest form, where only the code is not predetermined. The code system and code system version is fixed by the context in which the CS value occurs. CS is used for coded attributes that have a single HL7-defined value set.
CE	Coded With Equivalents	Coded data that consists of a coded value (CV) and, optionally, coded value(s) from other coding systems that identify the same concept. Used when alternative codes may exist.
SC	Character String with Code	A character string that optionally may have a code attached. The text must always be present if a code is present. The code is often a local code.
II	Instance Identifier	An identifier that uniquely identifies a thing or object. Examples are object identifier for HL7 RIM objects, medical record number, order id, service catalog item id, Vehicle Identification Number (VIN), etc. Instance identifiers are defined based on ISO object identifiers.
TEL	Telecommunication Address	A telephone number (voice or fax), e-mail address, or other locator for a resource mediated by telecommunication equipment. The address is specified as a Universal Resource Locator (URL) qualified by time specification and use codes that help in deciding which address to use for a given time and purpose.
AD	Postal Address	Mailing and home or office addresses. A sequence of address parts, such as street or post office Box, city, postal code, country, etc.
EN	Entity Name	A name for a person, organization, place or thing. A sequence of name parts, such as first name or family name, prefix, suffix, etc. Examples for entity name values are "Jim Bob Walton, Jr.", "Health Level Seven, Inc.", "Lake Tahoe", etc. An entity name may be as simple as a character string or may consist of several entity name parts, such as, "Jim", "Bob", "Walton", and "Jr.", "Health Level Seven" and "Inc.", "Lake" and "Tahoe".
TN	Trivial Name	A restriction of entity name that is effectively a simple string used for a simple name for things and places.
PN	Person Name	A name for a person. A sequence of name parts, such as first name or family name, prefix, suffix, etc. A name part is a restriction of entity name part that only allows those entity name parts qualifiers applicable to person names. Since the structure of entity name is mostly determined by the requirements of person name, the restriction is very minor.

Examples: Spanish, Italian, German, English, American Sign, etc.

Discussion: Communication via spoken or written language is not solely restricted to LivingSubjects. Devices that communicate with persons using human language also must specify in which languages they are capable. Automated voice response systems respond to human language and communicate with other devices or persons using human language.

Rationale: Many individuals and devices have the capability to communicate at varying levels in multiple languages. This code specifies a language capability that the entity wishes to make known.

**LanguageCommunication.modeCode[CE]:** A value representing the method of expression of the language

Examples: expressed spoken, expressed written, expressed signed, received spoken, received written, received signed

**LanguageCommunication.proficiencyLevelCode[CE]:** A value representing the level of proficiency in a language.

Examples: excellent, good, fair, poor

**LanguageCommunication.preferenceInd[BL]:** An indicator specifying whether or not the language is preferred by the entity for the associated mode.

BACKUP	is backup for	This relationship indicates the source Role is available to the target Role as a backup. An entity in a backup role will be available as a substitute or replacement in the event that the entity assigned the role is unavailable. In medical roles where it is critical that the function be performed and there is a possibility that the individual assigned may be ill or otherwise indisposed, another individual is assigned to cover for the individual originally assigned the role. A backup may be required to be identified, but unless the backup is actually used, he/she would not assume the assigned entity role.
REPL	replaces	This relationship indicates that the source Role replaces (or subsumes) the target Role. Allows for new identifiers and/or new effective time for a registry entry or a certification, etc.

**RoleLink.priorityNumber**[INT]: An integer specifying the relative preference for considering this relationship before other like-typed relationships having the same source RoleRelationships with lower priorityNumber values are considered before and above those with higher values.

Examples: For multiple backups specifies which backup is considered before others.

What is the preferred ServiceDeliveryLocation for a Physician working on behalf of a particular Health Authority?

Discussion: The ordering may be a total ordering in which all priority numbers are unique or a partial ordering, which assigns the same priority to more than one relationship.

**RoleLink.effectiveTime**[IVL<TS>]: An interval of time specifying the period during which the connection between Roles is in effect.

## LanguageCommunication

The language communication capabilities for an Entity.

Examples: A patient who originally came from Mexico may have fluent language capabilities to speak, read and write in Spanish, but only rudimentary capabilities in English. A person from Russia may have the capability to communicate equally well in spoken language in Russian, Armenian or Ukrainian, but prefers to speak in Armenian.

Discussion: While it may seem on the surface that this class would be restricted in usage to only the LivingSubject subtypes, Devices also have the ability to communicate, such as automated telephony devices that transmit patient information to live operators on a triage line or provide automated laboratory results to clinicians.

Rationale: Each Entity with the ability to communicate verbally has differing language and proficiency level. This class specifies the languages with which the entity can communicate, the mode of communication (speak, read, write), the proficiency of that communication, and the Entity's preference.

**LanguageCommunication.languageCode**[CE]: A value representing a language for which the Entity has some level of proficiency for written or spoken communication.

Code	Name	Description
ON	Organization Name	A name for an organization. A sequence of name parts.
INT	Integer Number	Integer numbers (-1,0,1,2, 100, 3398129, etc.) are precise numbers that are results of counting and enumerating. Integer numbers are discrete, the set of integers is infinite but countable. No arbitrary limit is imposed on the range of integer numbers. Two NULL flavors are defined for the positive and negative infinity.
REAL	Real Number	Fractional numbers. Typically used whenever quantities are measured, estimated, or computed from other real numbers. The typical representation is decimal, where the number of significant decimal digits is known as the precision.
RTO	Ratio	A quantity constructed as the quotient of a numerator quantity divided by a denominator quantity. Common factors in the numerator and denominator are not automatically cancelled out. The RTO data type supports titers (e.g., "1:128") and other quantities produced by laboratories that truly represent ratios. Ratios are not simply "structured numerics", particularly blood pressure measurements (e.g. "120/60") are not ratios. In many cases the REAL should be used instead of the RTO.
PQ	Physical Quantity	A dimensioned quantity expressing the result of measuring.
MO	Monetary Amount	A monetary amount is a quantity expressing the amount of money in some currency. Currencies are the units in which monetary amounts are denominated in different economic regions. While the monetary amount is a single kind of quantity (money) the exchange rates between the different units are variable. This is the principle difference between physical quantity and monetary amounts, and the reason why currency units are not physical units.
TS	Point in Time	A quantity specifying a point on the axis of natural time. A point in time is most often represented as a calendar expression.
SET	Set	A value that contains other distinct values in no particular order.
LIST	Sequence	A value that contains other discrete values in a defined sequence.
BAG	Bag	An unordered collection of values, where each value can be contained more than once in the bag.
IVL	Interval	A set of consecutive values of an ordered base data type.
GTS	General Timing Specification	A set of points in time, specifying the timing of events and actions and the cyclical validity-patterns that may exist for certain kinds of information, such as phone numbers (evening, daytime), addresses (so called "snowbirds," residing closer to the equator during winter and farther from the equator during summer) and office hours.

## Act

A record of something that is being done, has been done, can be done, or is intended or requested to be done.

Examples: The kinds of acts that are common in health care are (1) a clinical observation, (2) an assessment of health condition (such as problems and diagnoses), (3) healthcare goals, (4) treatment services (such as medication, surgery, physical and psychological therapy), (5) assisting, monitoring or attending, (6) training and education services to patients and their next of kin, (7) and notary services (such as advanced directives or living will), (8) editing and maintaining documents, and many others.

Discussion and Rationale: Acts are the pivot of the RIM; all domain information and processes are represented primarily in Acts. Any profession or business, including healthcare, is primarily constituted of intentional actions, performed and recorded by responsible actors. An Act-instance is a record of such an intentional action. Intentional actions are distinguished from something that happens by forces of nature (natural events). Such natural events are not Acts by themselves, but may be recorded as observed (Observation).

Acts connect to Entities in their Roles through Participations and connect to other Acts through ActRelationships. Participations are the authors, performers and other responsible parties as well as subjects and beneficiaries (which includes tools and material used in the performance of the act, which are also subjects). The moodCode distinguishes between Acts that are meant as factual records, vs. records of intended or ordered services, and the other modalities in which act can appear.

One of the Participations that all acts have (at least implicitly) is a primary author, who is responsible of the Act and who "owns" the act. Responsibility for the act means responsibility for what is being stated in the Act and as what it is stated. Ownership of the act is assumed in the sense of who may operationally modify the same act. Ownership and responsibility of the Act is not the same as ownership or responsibility of what the Act-object refers to in the real world. The same real world activity can be described by two people, each being the author of their Act, describing the same real world activity. Yet one can be a witness while the other can be a principal performer. The performer has responsibilities for the physical actions; the witness only has responsibility for making a true statement to the best of his or her ability. The two Act-instances may even disagree, but because each is properly attributed to its author, such disagreements can exist side by side and left to arbitration by a recipient of these Act-instances.

In this sense, an Act-instance represents a "statement" according to Rector and Nowlan (1991) [Foundations for an electronic medical record. Methods Inf Med. 30.] Rector and Nowlan have emphasized the importance of understanding the medical record not as a collection of facts, but "a faithful record of what clinicians have heard, seen, thought, and done." Rector and Nowlan go on saying that "the other requirements for a medical record, e.g., that it be attributable and permanent, follow naturally from this view." Indeed the Act class is this attributable statement, and the rules of updating acts (discussed in the state-

**ActRelationship.uncertaintyCode[CE]**: A code indicating whether the specific relationship between the source and target Acts has been asserted to be uncertain in any way.

Examples: A particular exposure event is suspected but not known to have caused a particular symptom.

Constraints: Uncertainty asserted using this attribute applies only to the relationship between two acts. The certainty of the acts themselves should be conveyed via Act.uncertaintyCode.

Discussion: Note that very vague uncertainty may be thought related to ActRelationship.negationInd, however, the two concepts are really independent. One may be very uncertain about whether a relationship exists (e.g. not sure whether a drug contains an ingredient) an event, but that does not mean that one is certain about the negation of the relationship (e.g. A drug definitively does not contain an ingredient).

## RoleLink

A connection between two roles expressing a dependency between those roles.

Examples: 1.) A role of assignment or agency depends on another role of employment, such that when the employment role is terminated, the assignments would be terminated as well. This is the dependency of the assignment role with the employment role, or in other words, the assignment is "part of" the employment.

2.) One role has authority over another (in organizational relationships). For example, an employee of type "manager" may have authority over employees of type "analyst" which would be indicated by a role link for "direct authority".

Discussion: RoleLink specifies the relationships between roles, not between people (or other entities). People (or other Entities) are primarily related by their direct player/scoper relationships around the player's Role and more generally through their interactions (i.e. their participations in acts).

**RoleLink.typeCode[CS,mandatory]**: A code specifying the kind of connection represented by this RoleLink, e.g., has-part, has-authority.

Code	Name	Definition
REL	related	An action taken with respect to a subject Entity by a regulatory or authoritative body with supervisory capacity over that entity. The action is taken in response to behavior by the subject Entity that body finds to be undesirable. Suspension, license restrictions, monetary fine, letter of reprimand, mandated training, mandated supervision, etc.Examples:
DIRAUTH	has direct authority over	The source Role has direct authority over the target role in a chain of authority.
INDAUTH	has indirect authority over	The source Role has indirect authority over the target role in a chain of authority.
PART	has part	The target Role is part of the Source Role.

but indicates the author's desire and willingness to attest to the content of the source Act if separated from the target Act. Note that the default for this attribute will typically be "TRUE". Also note that this attribute is orthogonal and unrelated to the RIM's context/inheritance mechanism. If the context of an Act is propagated to nested Acts, it is assumed that those nested Acts are not intended to be interpreted without the propagated context.

**ActRelationship.subsetCode[CS]:** Used to indicate that the target of the relationship will be a filtered subset of the total related set of targets

Used when there is a need to limit the number of components to the first, the last, the next, the total, the average or some other filtered or calculated subset.

Code	Name	Definition
FUTURE	expected future	An occurrence that is scheduled to occur in the future. An Act whose effective time is greater than 'now', where 'now' is the time the instance is authored.
LAST	expected last	Restricted to the latest known occurrence that is scheduled to occur. The Act with the highest known effective time.
NEXT	expected next	Restricted to the nearest recent known occurrence scheduled to occur in the future. The Act with the lowest effective time, still greater than 'now'. ('now' is the time the instance is authored.)
FUTSUM	future summary	Represents a 'summary' of all acts that are scheduled to occur in the future (whose effective time is greater than 'now' where is the time the instance is authored.). The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the total number of repetitions, etc.
PAST	previous	An occurrence that occurred or was scheduled to occur in the past. An Act whose effective time is less than 'now'. ('now' is the time the instance is authored.)
FIRST	first known	Restricted to the earliest known occurrence that occurred or was scheduled to occur in the past. The Act with the lowest effective time. ('now' is the time the instance is authored.)
RECENT	most recent	Restricted to the most recent known occurrence that occurred or was scheduled to occur in the past. The Act with the most recent effective time, still less than 'now'. ('now' is the time the instance is authored.)
PREVSUM	previous summary	Represents a 'summary' of all acts that previously occurred or were scheduled to occur. The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the total number of repetitions, etc. ('now' is the time the instance is authored.)
MAX	maximum	The occurrence whose value attribute is greater than all other occurrences at the time the instance is created.
MIN	minimum	The occurrence whose value attribute is less than all other occurrences at the time the instance is created.
SUM	summary	Represents a 'summary' of all acts that have occurred or were scheduled to occur and which are scheduled to occur in the future. The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the total number of repetitions, etc.

transition model, see Act.statusCode) versus generating new Act-instances are designed according to this principle of permanent attributable statements.

Rector and Nolan focus on the electronic medical record as a collection of statements, while attributed statements, these are still mostly factual statements. However, the Act class goes beyond this limitation to attributed factual statements, representing what is known as "speech-acts" in linguistics and philosophy. The notion of speech-act includes that there is pragmatic meaning in language utterances, aside from just factual statements; and that these utterances interact with the real world to change the state of affairs, even directly cause physical activities to happen. For example, an order is a speech act that (provided it is issued adequately) will cause the ordered action to be physically performed. The speech act theory has culminated in the seminal work by Austin (1962) [How to do things with words. Oxford University Press].

An activity in the real world may progress from defined, through planned and ordered to executed, which is represented as the mood of the Act. Even though one might think of a single activity as progressing from planned to executed, this progression is reflected by multiple Act-instances, each having one and only one mood that will not change along the Act-instance's life cycle. This is because the attribution and content of speech acts along this progression of an activity may be different, and it is often critical that a permanent and faithful record be maintained of this progression. The specification of orders or promises or plans must not be overwritten by the specification of what was actually done, so as to allow comparing actions with their earlier specifications. Act-instances that describe this progression of the same real world activity are linked through the ActRelationships (of the relationship category "sequel").

Act as statements or speech-acts are the only representation of real world facts or processes in the HL7 RIM. The truth about the real world is constructed through a combination (and arbitration) of such attributed statements only, and there is no class in the RIM whose objects represent "objective state of affairs" or "real processes" independent from attributed statements. As such, there is no distinction between an activity and its documentation. Every Act includes both to varying degrees. For example, a factual statement made about recent (but past) activities, authored (and signed) by the performer of such activities, is commonly known as a procedure report or original documentations (e.g., surgical procedure report, clinic note etc.). Conversely, a status update on an activity that is presently in progress, authored by the performer (or a close observer) is considered to capture that activity (and is later superseded by a full procedure report). However, both status update and procedure report are acts of the same kind, only distinguished by mood and state (see statusCode) and completeness of the information.

**Act.classCode[CS,mandatory]:** A code specifying the major type of Act that this Act-instance represents.

Constraints: The classCode domain is a tightly controlled vocabulary, not an external or user-defined vocabulary.

Every Act-instance must have a classCode. If the act class is not further specified, the most general Act.classCode (ACT) is used.

The Act.classCode must be a generalization of the specific Act concept (e.g., as expressed in Act.code), in other words, the Act concepts conveyed in an Act must be specializations of the Act.classCode. Especially, the classCode is not a "modifier" or the Act.code that can alter the meaning of a class code. (See Act.code for contrast.)

Code	Name	Definition
ACT	act	Corresponds to the class Act
ActClassContainer		Used to group a set of acts sharing a common context. Container structures can nest within other context structures - such as where a document is contained within a folder, or a folder is contained within an EHR extract. Open issue: There is a clear conflict between this act and the use of the more general "component" ActRelationship. The question that must be resolved is what should be the class code of the parent (or containing) Act.
COMPOSITION	composition	Corresponds to the class ContextStructure
DOC	document	Corresponds to the class Document
DOCCLIN	clinical document	A clinical document is a documentation of clinical observations and services, with the following characteristics: (1) Persistence - A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements; (2) Stewardship - A clinical document is maintained by a person or organization entrusted with its care; (3) Potential for authentication - A clinical document is an assemblage of information that is intended to be legally authenticated; (4) Wholeness - Authentication of a clinical document applies to the whole and does not apply to portions of the document without the full context of the document; (5) Human readability - A clinical document is human readable."
CDALVLONE	CDA Level One clinical document	A clinical document that conforms to Level One of the HL7 Clinical Document Architecture (CDA)
ENTRY	entry	This context represents the information acquired and recorded for an observation, a clinical statement such as a portion of the patient's history or an inference or assertion, or an action that might be intended or has actually been performed. This class may represent both the actual data describing the observation, inference, or action, and optionally the details supporting the clinical reasoning process such as a reference to an electronic guideline, decision support system, or other knowledge reference.
CLUSTER	Cluster	A group of entries within a composition, topic or category that have a logical association with one another. The representation of a single observation or action might itself be multi-part. The data might need to be represented as a nested set of values, as a table, list, or as a time series. The Cluster class permits such aggregation within an entry for such compound data.

	wait	terminate, then discontinue all the other exclusive wait branches.
K	kill	When all other concurrent branches are terminated, interrupt and discontinue this branch.
W	wait	Wait for this branch to terminate.

**ActRelationship.negationInd[BL]:** An indicator that asserts that the meaning of the link is negated.

Examples: If the relationship without negation specifies that Act A has Act B as a component, then the negation indicator specifies that Act A does not have Act B as a component. If B is a reason for A, then negation means that B is not a reason for A. If B is a pre-condition for A, then negation means that B is not a precondition for A.

Discussion: As the examples show, the use of this attribute is quite limited, notably contrast this with the Act.negationInd that actually requires that the described Act not exist, not be done, etc. whereas the ActRelationship.negationInd merely negates this relationship between source and target act, but does not change the meaning of each Act. This is mostly used for clarifying statements.

Note also the difference between negation and the contrary. A contraindication is the contrary of an indication (reason) but not the negation of the reason. The fact that lower back pain is not a reason to prescribe antibiotics doesn't mean that antibiotics are contraindicated with lower back pain.

**ActRelationship.conjunctionCode[CS]:** A code specifying the logical conjunction of the criteria among all the condition-links of Acts (e.g., and, or, exclusive-or).

Constraints: All AND criteria must be true. If OR and AND criteria occur together, one criterion out of the OR-group must be true and all AND criteria must be true also. If XOR criteria occur together with OR and AND criteria, exactly one of the XOR criteria must be true, and at least one of the OR criteria and all AND criteria must be true. In other words, the sets of AND, OR, and XOR criteria are in turn combined by a logical AND operator (all AND criteria and at least one OR criterion and exactly one XOR criterion). To overcome this ordering, Act criteria can be nested in any way necessary.

Code	Name	Definition
AND	and	This condition must be true.
XOR	exclusive or	One and only one of the XOR conditions must be true.
OR	or	At least one of the condition among all OR conditions must be true.

**ActRelationship.localVariableName[ST]:** A character string name for the input parameter from which the source Act of this ActRelationship derives some of its attributes. The local variable name is bound in the scope of the Act.derivationExpr with its value being an Act selected based on the input parameter specification.

**ActRelationship.seperatableInd[BL]:** This attribute indicates whether or not the source Act is intended to be interpreted independently of the target Act. The indicator cannot prevent an individual or application from separating the Acts,

the conditions do not hold at that time, the branch is abandoned. Conversely execution of a branch may wait until the guard condition turns true.

In exclusive wait branches, the first branch whose guard conditions turn true will be executed and all other branches abandoned. In inclusive wait branches some branches may already be executed while other branches still wait for their guard conditions to turn true.

Code	Name	Definition
E1	exclusive try once	The pre-condition associated with the branch is evaluated once and if true the branch may be entered. All other exclusive branches compete with each other and only one will be selected. This implements a COND, IF and CASE conditionals, or "XOR-split." The order in which the branches are considered may be specified in the priorityNumber attribute.
EW	exclusive wait	A branch is selected as soon as the pre-condition associated with the branch evaluates to true. If the condition is false, the branch may be entered later, when the condition turns true. All other exclusive branches compete with each other and only one will be selected. Each waiting branch executes in parallel with the default join code wait (see below). The order in which the branches are considered may be specified in the Service_relationship.priority_nmb.
I1	inclusive try once	A branch is executed if its associated preconditions permit. If associated preconditions do not permit, the branch is dropped. Inclusive branches are not suppressed and do not suppress other branches.
IW	inclusive wait	A branch is executed as soon as its associated conditions permit. If the condition is false, the branch may be entered later, when the condition turns true. Inclusive branches are not suppressed and do not suppress other branches. Each waiting branch executes in parallel with the default join code wait (see below).

**ActRelationship.joinCode[CS]:** A code specifying how concurrent Acts are resynchronized in a parallel branch construct.

**Discussion:** This attribute is part of the workflow control suite of attributes. An action plan is a composite Act with component Acts. In a sequential plan, each component has a sequenceNumber that specifies the ordering of the plan steps. Branches exist when multiple components have the same sequenceNumber. Branches are parallel if the splitCode specifies that more than one branch can be executed at the same time. The joinCode then specifies if and how the branches are resynchronized.

The principal re-synchronization actions are (1) the control flow waits for a branch to terminate (wait-branch), (2) the branch that is not yet terminated is aborted (kill-branch), (3) the branch is not re-synchronized at all and continues in parallel (detached branch).

A kill-branch is only executed if there is at least one active wait (or exclusive wait) branch. If there is no other wait branch active, a kill-branch is not started at all (rather than being aborted shortly after it is started). Since a detached branch is unrelated to all other branches, active detached branches do not protect a kill-branch from being aborted.

Code	Name	Definition
D	detached	Detach this branch from the other branches so it will not be resynchronized with the other branches.
X	exclusive	Wait for any one of the branches in the set of exclusive wait branches to

		Examples include "Haematology investigations" which might include two or more distinct batteries. A cluster may contain batteries and/or individual entries
BATTERY	battery	A battery specifies a set of observations. These observations typically have a logical or practical grouping for generally accepted clinical or functional purposes, such as observations that are fun together because of automation. A battery can define required and optional components and, in some cases, will define complex rules that determine whether or not a particular observation is made. Examples include "Blood pressure", "Full blood count", "Chemistry panel".
EXTRACT	extract	This context represents the part of a patient record conveyed in a single communication. It is drawn from a providing system for the purposes of communication to a requesting process (which might be another repository, a client application or a middleware service such as an electronic guideline engine), and supporting the faithful inclusion of the communicated data in the receiving system. An extract may be the entirety of the patient record as held by the sender or it may be a part of that record (e.g. changes since a specified date). An extract contains folders or compositions. An extract cannot contain another extract.
EHR	electronic health record	A context that comprises all compositions. The EHR is an extract that includes the entire chart. NOTE: In an exchange scenario, an EHR is a specialization of an extract.
ORGANIZER	organizer	Organizer of entries. Navigational. No semantic content. Knowledge of the section code is not required to interpret contained observations. Represents a heading in a heading structure, or "organizer tree". The record entries relating to a single clinical session are usually grouped under headings that represent phases of the encounter, or assist with layout and navigation. Clinical headings usually reflect the clinical workflow during a care session, and might also reflect the main author's reasoning processes. Much research has demonstrated that headings are used differently by different professional groups and specialties, and that headings are not used consistently enough to support safe automatic processing of the E H R.
CATEGORY	category	A group of entries within a composition or topic that have a common characteristic - for example, Examination, Diagnosis, Management OR Subjective, Objective, Analysis, Plan. The distinction from Topic relates to value sets. For Category there is a bounded list of things like "Examination", "Diagnosis" or SOAP categories. For Topic the list is wide open to any clinical condition or reason for a part of an encounter. A CATEGORY MAY CONTAIN ENTRIES.
DOCBODY	document body	A context that distinguishes the body of a document

		from the document header. This is seen, for instance, in HTML documents, which have discrete <head> and <body> elements.
DOCSECT	document section	A context that subdivides the body of a document. Document sections are typically used for human navigation, to give a reader a clue as to the expected content. Document sections are used to organize and provide consistency to the contents of a document body. Document sections can contain document sections and can contain entries.
TOPIC	topic	A group of entries within a composition that are related to a common clinical theme - such as a specific disorder or problem, prevention, screening and provision of contraceptive services. A topic may contain categories and entries.
FOLDER	folder	A context representing the high-level organization of an extract e.g. to group parts of the record by episode, care team, clinical specialty, clinical condition, or source application. Internationally, this kind of organizing structure is used variably: in some centers and systems the folder is treated as an informal compartmentalization of the overall health record; in others it might represent a significant legal portion of the EHR relating to the originating enterprise or team. A folder contains compositions. Folders may be nested within folders.
CNTRCT	contract	An agreement of obligation between two or more parties that is subject to contractual law and enforcement.
FCNTRCT	financial contract	Corresponds to the class FinancialContract
COV	coverage	When used in the EVN mood, this concept means with respect to a covered party: (1) A health care insurance policy or plan that is contractually binding between two or more parties; or (2) A health care program, usually administered by government entities, that provides coverage to persons determined eligible under the terms of the program. <ul style="list-style-type: none"><li>When used in the definition (DEF) mood, COV means potential coverage for a patient who may or may not be a covered party.</li><li>The concept's meaning is fully specified by the choice of ActCoverageTypeCode (abstract) ActProgramCode or ActInsurancePolicyCode.</li></ul>
CACT	control act	Corresponds to the class ControlAct
ACTN	action	Sender asks addressee to do something depending on the focal Act of the payload. An example is "fulfill this order". Addressee has responsibilities to either reject the message or to act on it in an appropriate way (specified by the specific receiver responsibilities for the interaction).
INFO	information	Sender sends payload to addressee as information. Addressee does not have responsibilities beyond

steps. Before each step is executed, those with preconditions have their conditions tested; where the test is positive, the Act has clearance for execution. The repeatNumber may indicate that an Act may be repeatedly executed. The checkpointCode specifies when the precondition is checked and is analogous to the various conditional statements and loop constructs in programming languages "while-do" vs. "do-while" or "repeat-until" vs. "loop-exit".

For all checkpointCodes, except "end", preconditions are being checked at the time when the preceding step of the plan has terminated and this step would be next in the sequence established by the sequenceNumber attribute.

When the checkpointCode for a criterion of a repeatable Act is "end", the criterion is tested only at the end of each repetition of that Act. When the condition holds true, the next repetition is ready for execution.

When the checkpointCode is "entry" the criterion is checked at the beginning of each repetition (if any) whereas "beginning" means the criterion is checked only once before the repetition "loop" starts.

The checkpointCode "through" is special in that it requires the condition to hold throughout the execution of the Act, even throughout a single execution. As soon as the condition turns false, the Act should receive an interrupt event (see Act.interruptibleInd) and will eventually terminate.

The checkpointCode "exit" is only used on a special plan step that represents a loop exit step. This allows an action plan to exit due to a condition tested inside the execution of this plan. Such exit criteria are sequenced with the other plan components using the ActRelationship.sequenceNumber.

Code	Name	Definition
B	beginning	Condition is tested every time before execution of the service (WHILE condition DO service).
E	end	Condition is tested at the end of a repeated service execution. The service is repeated only if the condition is true (DO service WHILE condition).
S	entry	Condition is tested once before the service is executed (IF condition THEN service).
X	exit	Condition is a loop checkpoint, i.e. it is a step of an activity plan and, if negative causes the containing loop to exit.
T	through	Condition must be true throughout the execution and the service is interrupted (asynchronously) as soon as the condition turns false (asynchronous WHILE loop). The service must be interruptible.

**ActRelationship.splitCode[CS]:** A code specifying how branches in an action plan are selected among other branches.

Discussion: This attribute is part of the workflow control suite of attributes. An action plan is a composite Act with component Acts. In a sequential plan, each component has a sequenceNumber that specifies the ordering of the plan steps. Branches exist when multiple components have the same sequenceNumber. The splitCode specifies whether a branch is executed exclusively (case-switch) or inclusively, i.e., in parallel with other branches.

In addition to exclusive and inclusive split the splitCode specifies how the precondition (also known as "guard conditions" on the branch) are evaluated. A guard condition may be evaluated once when the branching step is entered and if



**ActRelationship.sequenceNumber**[INT]: An integer specifying the relative sequential or temporal ordering of this relationship among other like-types relationships having the same source Act.

Discussion: This attribute is part of the workflow control suite of attributes. An action plan is a composite Act with component Acts. In a sequential plan, each component has a sequenceNumber that specifies the ordering of the plan steps. Multiple components with the same sequenceNumber make a branch. Branches can be exclusive (case-switch) or can indicate parallel processes indicated by the splitCode.

If value is null, the relative position of the target Act is unspecified. (i.e. it may occur anywhere.)

Use the 'priorityNumber' attribute to indicate relative preference instead of order of occurrence.

**ActRelationship.priorityNumber**[REAL]: An integer specifying the relative preference for considering this relationship before other like-typed relationships having the same source Act. Relationships with lower priorityNumber values are considered before and above those with higher values.

Examples: For multiple criteria specifies which criteria are considered before others. For components with the same sequence number, specifies which ones are considered before others. Among alternatives or options that are being chosen by humans, the priorityNumber specifies preference.

Discussion: The ordering may be a total ordering in which all priority numbers are unique or a partial ordering, which assigns the same priority to more than one relationship.

**ActRelationship.pauseQuantity**[PQ]: A quantity of time that should elapse between when an Act is ready for execution and the actual beginning of the execution.

Discussion: This attribute is part of the workflow control suite of attributes. An action plan is a composite Act with component Acts. In a sequential plan, each component has a sequenceNumber that specifies the ordering of the plan steps. Before each step is executed and has preconditions these conditions are tested and if the test is positive, the Act has clearance for execution. At that time the pauseQuantity timer is started and the Act is executed after the pauseQuantity has elapsed.

As a precondition (e.g. administer 3 hours prior to surgery), pause quantity is allowed to be negative provided that it is possible to predict the occurrence of the target condition.

Constraint: Units must be comparable to seconds.

**ActRelationship.checkpointCode**[CS]: A code specifying when in the course of an Act a precondition for the Act is evaluated (e.g., before the Act starts for the first time, before every repetition, after each repetition but not before the first, or throughout the entire time of the Act).

Discussion: This attribute is part of the workflow control suite of attributes. An action plan is a composite Act with component Acts. In a sequential plan, each component has a sequenceNumber that specifies the ordering of the plan

		serving addressee's own interest (i.e., read and memorize if you see fit). This is equivalent to an FYI on a memo.
STC	state transition control	Sender transmits a status change pertaining to the focal act of the payload. This status of the focal act is the final state of the state transition. This can be either a request or a command, according to the mood of the control act.
OBS	observation	Corresponds to the class Observation
COND	Condition	An observable finding or state that persists over time and tends to require intervention or management, and, therefore, distinguished from an Observation made at a point in time; may exist before an Observation of the Condition is made or after interventions to manage the Condition are undertaken. Examples: equipment repair status, device recall status, a health risk, a financial risk, public health risk, pregnancy, health maintenance, chronic illness
CASE	public health case	Corresponds to the class PublicHealthCase
OUTB	outbreak	An outbreak represents a series of public health cases. The date on which an outbreak starts is the earliest date of onset among the cases assigned to the outbreak, and its ending date is the last date of onset among the cases assigned to the outbreak.
OBSSER	observation series	Container for Correlated Observation Sequences sharing a common frame of reference. All Observations of the same cd must be comparable and relative to the common frame of reference. For example, a 3-channel ECG device records a 12-lead ECG in 4 steps (3 leads at a time). Each of the separate 3-channel recordings would be in their own "OBSCOR". And, all 4 OBSCOR would be contained in one OBSSER because all the times are relative to the same origin (beginning of the recording) and all the ECG signals were from a fixed set of electrodes.
OBSCOR	correlated observation sequences	Container for Observation Sequences (Observations whose values are contained in LIST<>'s) having values correlated with each other. Each contained Observation Sequence LIST<> must be the same length. Values in the LIST<>'s are correlated based on index. E.g. the values in position 2 in all the LIST<>'s are correlated. This is analogous to a table where each column is an Observation Sequence with a LIST<> of values, and each row in the table is a correlation between the columns. For example, a 12-lead ECG would contain 13 sequences: one sequence for time, and a sequence for each of the 12 leads.
ActClassROI		Regions of Interest (ROI) within a subject Act. Primarily used for making secondary observations on a subset of a subject observation. The relationship between a ROI and its referenced Act is specified through an ActRelationship of type "subject" (SUBJ), which must always be present.
ROIBND	bounded ROI	A Region of Interest (ROI) specified for a multidimensional observation, such as an Observation

		Series (OBSSER). The ROI is specified using a set of observation criteria, each delineating the boundary of the region in one of the dimensions in the multidimensional observation. The relationship between a ROI and its referenced Act is specified through an ActRelationship of type subject (SUBJ), which must always be present. Each of the boundary criteria observations is connected with the ROI using ActRelationships of type "has component" (COMP). In each boundary criterion, the Act.code names the dimension and the Observation.value specifies the range of values inside the region. Typically the bounded dimension is continuous, and so the Observation.value will be an interval (IVL) data type. The Observation.value need not be specified if the respective dimension is only named but not constrained. For example, an ROI for the QT interval of a certain beat in ECG Lead II would contain 2 boundary criteria, one naming the interval in time (constrained), and the other naming the interval in ECG Lead II (only named, but not constrained).
ROIOWL	overlay ROI	A Region of Interest (ROI) specified for an image using an overlay shape. Typically used to make reference to specific regions in images, e.g., to specify the location of a radiologic finding in an image or to specify the site of a physical finding by "circling" a region in a schematic picture of a human body. The units of the coordinate values are in pixels. The origin is in the upper left hand corner, with positive X values going to the right and positive Y values going down. The relationship between a ROI and its referenced Act is specified through an ActRelationship of type "subject" (SUBJ), which must always be present.
CNOD	Condition Node	An instance of Observation of a Condition at a point in time that includes any Observations or Procedures associated with that Condition as well as links to previous instances of Condition Node for the same Condition
POS	position	Description:An observation representing the physical location of a place based on a reference coordinate system.
POSACC	position accuracy	Description:An observation representing the degree to which the assignment of the spatial coordinates, based on a matching algorithm by a geocoding engine against a reference spatial database, matches true or accepted values.
POSCoord	position coordinate	Description:An observation representing one of a set of numerical values used to determine the position of a place. The name of the coordinate value is determined by the reference coordinate system.
SubjectPhysicalPosition		
ImagingSubjectOrientation		
SubjectBodyPosition		
SFWL	Semi-Fowler's	A semi-sitting position in bed with the head of the bed elevated approximately 45 degrees.
SUP	supine	

	propagating	with the Act, but overrides an association with the same typeCode. However, this overriding association will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Non-Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts. Furthermore, no author participations whatsoever will propagate to any child Acts that allow context to be propagated.
OP	overriding, propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. This overriding association will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts, and will itself be the only author to propagate to any child Acts that allow context to be propagated.
ContextControlPropagating		The association propagates to any child Acts that are related via a conducting ActRelationship (refer to contextConductionInd).
AP	additive, propagating	The association adds to the existing context associated with the Act, and will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts, and will itself propagate with the other authors to any child Acts that allow context to be propagated.
OP	overriding, propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. This overriding association will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts, and will itself be the only author to propagate to any child Acts that allow context to be propagated.

**ActRelationship.contextConductionInd[BL]:** If true, associations in the parent act are conducted across the ActRelationship to the child act.

Discussion: Only associations that have been added to the context of an Act and are marked "propagating" will be conducted. (See contextControlCode on ActRelationship and Participation)

The identification of an Act as a parent or child (and therefore the direction context will be conducted) is determined by how the association is traversed when it is serialized. The first act to be encountered is considered to be the parent. Context conducts across the ActRelationship to the second (child) Act.

Refer to ActRelationship.contextControlCode for rationale and examples.

composite order. The dispense event would carry the patient from the composite order and the diagnosis from the pharmacy order, but no author. The drug protocol would not be associated with a patient, diagnosis or author.

Code	Name	Definition
	ContextControlAdditive	The association adds to the existing context associated with the Act. Both this association and any associations propagated from ancestor Acts are interpreted as being related to this Act.
AN	additive, non-propagating	The association adds to the existing context associated with the Act, but will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Non-Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts for the purpose of this Act. However only the previously propagated authors will propagate to any child Acts that allow context to be propagated.
AP	additive, propagating	The association adds to the existing context associated with the Act, and will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts, and will itself propagate with the other authors to any child Acts that allow context to be propagated.
	ContextControlNonPropagating	The association applies only to the current Act and will not propagate to any child Acts that are related via a conducting ActRelationship (refer to contextConductionInd).
AN	additive, non-propagating	The association adds to the existing context associated with the Act, but will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Non-Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts for the purpose of this Act. However only the previously propagated authors will propagate to any child Acts that allow context to be propagated.
ON	overriding, non-propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. However, this overriding association will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Non-Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts. Furthermore, no author participations whatsoever will propagate to any child Acts that allow context to be propagated.
	ContextControlOverriding	The association adds to the existing context associated with the Act, but replaces associations propagated from ancestor Acts whose typeCodes are the same.
ON	overriding, non-	The association is added to the existing context associated

RTRD	reverse trendelenburg	Lying on the back, on an inclined plane, typically about 30-45 degrees with head raised and feet lowered.
TRD	trendelenburg	Lying on the back, on an inclined plane, typically about 30-45 degrees, with head lowered and feet raised.
LLD	left lateral decubitus	Lying on the left side.
PRN	prone	Lying with the front or ventral surface downward; lying face down.
RLD	right lateral decubitus	Lying on the right side.
SIT	sitting	Resting the body on the buttocks, typically with upper torso erect or semi erect.
STN	standing	To be stationary, upright, vertical, on one's legs.
VERIF	Verification	An act which describes the process whereby a 'verifying party' validates either the existence of a Role and its associated classes, or of an Act and its participations. Discussion: Roles are frequently attested to by some Credential. The activities involved in a Verification act can extend to other attributes, including reference to an original (role) vetting act and its details.
CLNTRL	clinical trial	The set of actions that define an experiment to assess the effectiveness and/or safety of a biopharmaceutical product (food, drug, device, etc.). In definition mood, this set of actions is often embodied in a clinical trial protocol; in event mood, this designates the aggregate act of applying the actions to one or more subjects.
ALRT	detected issue	An observation identifying a potential adverse outcome as a result of an Act or combination of Acts. Examples: Detection of a drug-drug interaction; Identification of a late-submission for an invoice; Requesting discharge for a patient who does not meet hospital-defined discharge criteria. Discussion: This class is commonly used for identifying 'business rule' or 'process' problems that may result in a refusal to carry out a particular request. In some circumstances it may be possible to 'bypass' a problem by modifying the request to acknowledge the issue and/or by providing some form of mitigation. Constraints: the Act or Acts that may cause the adverse outcome are the target of a subject ActRelationship. The subtypes of this concept indicate the type of problem being detected (e.g. drug-drug interaction) while the Observation.value is used to represent a specific problem code (e.g. specific drug-drug interaction id).
DGIMG	diagnostic image	Corresponds to the class DiagnosticImage
INVSTG	investigation	An formalized inquiry into the circumstances surrounding a particular unplanned event or potential event for the purposes of identifying possible causes and contributing factors for the event. This investigation could be conducted at a local institutional level or at the level of a local or national government.
SPCOBS	specimen	An observation on a specimen in a laboratory

	observation	environment that may affect processing, analysis or result interpretation
PROC	procedure	Corresponds to the class Procedure
SPECCOLLECT	Specimen Collection	A procedure for obtaining a specimen from a source entity.
STORE	Storage	The act of putting something away for safe keeping. The "something" may be physical object such as a specimen, or information, such as observations regarding a specimen.
SPLY	supply	Corresponds to the class Supply
DIET	diet	Corresponds to the class Diet
SUBST	Substitution	Definition: Indicates that the subject Act has undergone or should undergo substitution of a type indicated by Act.code. Rationale: Used to specify "allowed" substitution when creating orders, "actual" substitution when sending events, as well as the reason for the substitution and who was responsible for it.
ACSN	accession	A unit of work, a grouper of work items as defined by the system performing that work. Typically some laboratory order fulfillers communicate references to accessions in their communications regarding laboratory orders. Often one or more specimens are related to an accession such that in some environments the accession number is taken as an identifier for a specimen (group).
ACCM	accommodation	An accommodation is a service provided for a Person or other LivingSubject in which a place is provided for the subject to reside for a period of time. Commonly used to track the provision of ward, private and semi-private accommodations for a patient.
ACCT	account	Corresponds to the class Account
PCPR	care provision	
CTTEVENT	clinical trial timepoint event	An identified point during a clinical trial at which one or more actions are scheduled to be performed (definition mood), or are actually performed (event mood). The actions may or may not involve an encounter between the subject and a healthcare professional.
CONS	consent	The Consent class represents informed consents and all similar medico-legal transactions between the patient (or his legal guardian) and the provider. Examples are informed consent for surgical procedures, informed consent for clinical trials, advanced beneficiary notice, against medical advice decline from service, release of information agreement, etc. The details of consents vary. Often an institution has a number of different consent forms for various purposes, including reminding the physician about the topics to mention. Such forms also include patient education material. In electronic medical record communication, consents thus are information-generating acts on their own and need to be managed similar to medical activities. Thus, Consent is modeled

from a folder containing a patient's medical record, the reader will infer that the report deals with the patient, even if there is no direct reference to the patient on the form. However, other pieces of information such as the author of the folder (the hospital that maintains it) may sometimes apply to the contents of the folder (e.g. a report generated by a doctor at the hospital) and other times not (e.g. a copy of a report from another institution). Humans are quite good at making the necessary inferences about what context should be propagated from an item to something within that item. However, incorrect inferences can occur (perhaps the report in the patient's record deals with a relative). Furthermore, computers have substantially more difficulty making such inferences, even though they can be essential for decision-support systems.

Discussion: This attribute allows the clear specification of whether an association adds to the context associated with a particular item (e.g. adding an additional author) or whether it replaces (overrides) part of the context associated with a particular item (e.g. identifying a sole author, independent of the containing item). It also indicates whether the association applies to only this act (non-propagating), or whether it may apply to derived acts as well (propagating).

This attribute is closely linked with ActRelationship.contextConductionInd which determines whether associations that have been marked as propagating will actually be conducted to a child Act. For example, an author participation might be marked as propagating, but still not conducted to a hyperlink to an external document.

If no value or default is specified for this attribute (i.e. it is null), no inference can be made about context. Systems must make their own assumptions on the basis of what data is being represented. (For this reason, HL7 committees are encouraged to specify a default or fixed value for this attribute as part of their designs to ensure consistency of interpretation.)

Examples: An observation event has a patient participation marked "additive, propagating" (AP) and has component observation events linked through act relationships that are marked propagating. This means that the patient participation behaves as a patient participation of those component observation events in addition to the parent observation event.

A composite order is created containing a pharmacy order as well as requests for several lab tests. The composite order has participations for patient and author, and an act relationship to a diagnosis, all marked as "additive, propagating". The "component" association between the composite order and the pharmacy order is marked as conductive (contextConductionInd is TRUE). The pharmacy order has an author participation marked as "additive, non-propagating" (AN), and a reason relationship to a diagnosis, marked as "overriding, propagating" (OP). The order further has a relationship to a dispense event, marked as conductive, and an association to a drug protocol marked as non-conductive (contextConductionInd is FALSE). The meaning would be as follows:

The pharmacy order is interpreted as having the patient from the composite order, and having two authors (the one from the composite order, and the one on the pharmacy order itself). The diagnosis for the pharmacy order would only be the diagnosis specified on the pharmacy order, not the one specified on the

		instantiation may override the master's defaults.
APND	is appendage	An addendum (source) to an existing service object (target), containing supplemental information. The addendum is itself an original service object linked to the supplemented service object. The supplemented service object remains in place and its content and status are unaltered.
MTCH	matches (trigger)	A trigger-match links an actual service (e.g., an observation or procedure that took place) with a service in criterion mood. For example if the trigger is "observation of pain" and pain is actually observed, and if that pain-observation caused the trigger to fire, that pain-observation can be linked with the trigger.
MOD	modifies	Definition: Used to link a newer version or 'snapshot' of a business object (source) to an older version or 'snapshot' of the same business object (target). Usage: The identifier of the Act should be the same for both source and target. If the identifiers are distinct, RPLC should be used instead. Name from source to target = "modifiesPrior" Name from target to source = "modifiesByNew"
REV	reverses	A relationship between a source Act that seeks to reverse or undo the action of the prior target Act. Example: A posted financial transaction (e.g., a debit transaction) was applied in error and must be reversed (e.g., by a credit transaction) the credit transaction is identified as an undo (or reversal) of the prior target transaction. Constraints: the "completion track" mood of the target Act must be equally or more "actual" than the source act. I.e., when the target act is EVN the source act can be EVN, or any INT. If the target act is INT, the source act can be INT.
XFRM	transformation	Used when the target Act is a transformation of the source Act. (For instance, used to show that a CDA document is a transformation of a DICOM SR document.)
UPDT	updates (condition)	A condition thread relationship specifically links condition nodes together to form a condition thread. The source is the new condition node and the target links to the most recent node of the existing condition thread.

**ActRelationship.inversionInd[BL]:** An indicator specifying that the ActRelationship.typeCode should be interpreted as if the roles of the source and target Acts were reversed. The inversion indicator is used when the meaning of ActRelationship.typeCode must be reversed.

**ActRelationship.contextControlCode[CS]:** A code that specifies how this ActRelationship contributes to the context of the current Act, and whether it may be propagated to descendent Acts whose association allows such propagation (see ActRelationship.contextConductionInd).

Rationale: In the interest of reducing duplication, humans tend to rely on context when interpreting information. For example, when reading a report taken

		as a special class of Act. The "signatures" to the consent document are represented electronically through Participation instances to the consent object. Typically an informed consent has Participation.typeCode of "performer", the healthcare provider informing the patient, and "consenter", the patient or legal guardian. Some consent may associate a witness or a notary public (e.g., living wills, advanced directives). In consents where a healthcare provider is not required (e.g. living will), the performer may be the patient himself or a notary public. Some consent has a minimum required delay between the consent and the service, so as to allow the patient to rethink his decisions. This minimum delay can be expressed in the act definition by the ActRelationship.pauseQuantity attribute that delays the service until the pause time has elapsed after the consent has been completed.
CONTREG	container registration	Corresponds to the class DeviceTask
DISPACT	disciplinary action	An action taken with respect to a subject Entity by a regulatory or authoritative body with supervisory capacity over that entity. The action is taken in response to behavior by the subject Entity that body finds to be undesirable. Suspension, license restrictions, monetary fine, letter of reprimand, mandated training, mandated supervision, etc.Examples:
ENC	encounter	Corresponds to the class PatientEncounter
ADJUD	financial adjudication	A transformation process where a requested invoice is transformed into an agreed invoice. Represents the adjudication processing of an invoice (claim). Adjudication results can be adjudicated as submitted, with adjustments or refused. Adjudication results comprise 2 components: the adjudication processing results and a restated (or adjudicated) invoice or claim
XACT	financial transaction	Corresponds to the class FinancialTransaction
INC	incident	An event that occurred outside of the control of one or more of the parties involved. Includes the concept of an accident.
INFRM	inform	The act of transmitting information and understanding about a topic to a subject. Discussion: This act may be used to request that a patient or provider be informed about an Act, or to indicate that a person was informed about a particular act.
INVE	invoice element	Corresponds to the class InvoiceElement
MPROT	monitoring program	An officially or unofficially instituted program to track acts of a particular type or categorization.
REG	registration	Represents the act of maintaining information about the registration of its associated registered subject. The subject can be either an Act or a Role, and includes subjects such as lab exam definitions, drug

		protocol definitions, prescriptions, persons, patients, practitioners, and equipment. The registration may have a unique identifier - separate from the unique identification of the subject - as well as a core set of related participations and act relationships that characterize the registration event and aid in the disposition of the subject information by a receiving system. Usage notes:
REV	review	The act of examining and evaluating the subject, usually another act. For example, "This prescription needs to be reviewed in 2 months."
SPCTRT	specimen treatment	A procedure or treatment performed on a specimen to prepare it for analysis
SBADM	substance administration	Corresponds to the class SubstanceAdministration
TRNS	transportation	Transportation is the moving of a payload (people or material) from a location of origin to a destination location. Thus, any transport service has the three target instances of type payload, origin, and destination, besides the targets that are generally used for any service (i.e., performer, device, etc.)
LIST	working list	Corresponds to the class WorkingList

**Act.moodCode**[CS,mandatory]: A code distinguishing whether an Act is conceived of as a factual statement or in some other manner as a command, possibility, goal, etc.

Constraints: An Act-instance must have one and only one moodCode value.

The moodCode of a single Act-instance never changes. Mood is not state.

To describe the progression of a business activity from defined to planned to executed, etc. one must instantiate different Act-instances in the different moods and link them using ActRelationship of general type "sequel". (See ActRelationship.typeCode.)

Discussion: The Act.moodCode includes the following notions: (1) event, i.e., factual description of an actions that occurred; (2) definition of possible actions and action plans (the master file layer); (3) intent, i.e., an action plan instantiated for a patient as a care plan or order; (4) goal, i.e., an desired outcome attached to patient problems and plans; and (5) criterion, i.e., a predicate used to evaluate a logical expression.

The Act.moodCode modifies the meaning of the Act class in a controlled way, just as in natural language, grammatical form of a verb modify the meaning of a sentence in defined ways. For example, if the mood is factual (event), then the entire act object represents a known fact. If the mood expresses a plan (intent), the entire act object represents the expectation of what should be done. The mood does not change the meaning of individual act properties in peculiar ways.

Since the mood code is a determining factor for the meaning of an entire Act object, the mood must always be known. This means, whenever an act object is instantiated, the mood attribute must be assigned to a valid code, and the mood assignment cannot change throughout the lifetime of an act object.

As the meaning of an act object is factored in the mood code, the mood code affects the interpretation of the entire Act object and with it every property

FLFS	fulfills	The source act fulfills (in whole or in part) the target act. Source act must be in a mood equal or more actual than the target act.
OCCR	occurrence	The source act is a single occurrence of a repeatable target act. The source and target act can be in any mood on the "completion track" but the source act must be as far as or further along the track than the target act (i.e., the occurrence of an intent can be an event but not vice versa).
OREF	references order	Relates either an appointment request or an appointment to the order for the service being scheduled.
SCH	schedules request	Associates a specific time (and associated resources) with a scheduling request or other intent.
RPLC	replaces	A replacement source act replaces an existing target act. The state of the target act being replaced becomes obsolete, but the act is typically still retained in the system for historical reference. The source and target must be of the same type.
SUCC	succeeds	Definition: A new act that carries forward the intention of the original act, but does not completely replace it. The status of the predecessor act must be 'completed'. The original act is the target act and the successor is the source act.
DOC	documents	Corresponds to the class Document
ELNK	episodeLink	Expresses an association that links two instances of the same act over time, indicating that the instance are part of the same episode, e.g. linking two condition nodes for episode of illness; linking two encounters for episode of encounter.
GEVL	evaluates (goal)	A goal-evaluation links an observation (intent or actual) to a goal to indicate that the observation evaluates the goal. Given the goal and the observation, a "goal distance" (e.g., goal to observation) can be "calculated" and need not be sent explicitly.
GEN	has generalization	The generalization relationship can be used to express categorical knowledge about services (e.g., amilorid, triamterene, and spironolactone have the common generalization potassium sparing diuretic).
OPTN	has option	A relationship between a source Act that provides more detailed properties to the target Act. The source act thus is a specialization of the target act, but instead of mentioning all the inherited properties it only mentions new property bindings or refinements. The typical use case is to specify certain alternative variants of one kind of Act. The priorityNumber attribute is used to weigh refinements as preferred over other alternative refinements. Example: several routing options for a drug are specified as one SubstanceAdministration for the general treatment with attached refinements for the various routing options.
INST	instantiates (master)	Used to capture the link between a potential service ("master" or plan) and an actual service, where the actual service instantiates the potential service. The

		chloride-, and bicarbonate-observations. The narrative content (Act.text) of a source act is wholly machine-derived from the collection of target acts.
CAUS	is etiology for	An assertion that a new observation was assumed to be the cause for another existing observation. The assumption is attributed to the same actor who asserts the observation. This is stronger and more specific than the support link. For example, a growth of <i>Staphylococcus aureus</i> may be considered the cause of an abscess. The source (cause) is typically an observation, but may be any service, while the target must be an observation.
MFST	is manifestation of	An assertion that a new observation may be the manifestation of another existing observation or action. This assumption is attributed to the same actor who asserts the manifestation. This is stronger and more specific than an inverted support link. For example, an agitated appearance can be asserted to be the manifestation (effect) of a known hyperthyroxia. This expresses that one might not have realized a symptom if it would not be a common manifestation of a known condition. The target (cause) may be any service, while the source (manifestation) must be an observation.
ITEMSLOC	items located	Items located
LIMIT	limited by	A relationship that limits or restricts the source act by the elements of the target act. For example, an authorization may be limited by a financial amount (up to \$500). Target Act must be in EVN.CRIT mood.
EVID	provides evidence for	Indicates that the target Act provides evidence in support of the action represented by the source Act. The target is not a 'reason' for the source act, but rather gives supporting information on why the source act is an appropriate course of action. Possible targets might be clinical trial results, journal articles, similar successful therapies, etc. Rationale: Provides a mechanism for conveying clinical justification for non-approved or otherwise non-traditional therapies.
REFR	refers to	A relationship in which the target act is referred to by the source act. This permits a simple reference relationship that distinguishes between the referent and the referee.
SUMM	summarized by	An act that contains summary values for a list or set of subordinate acts. For example, a summary of transactions for a particular accounting period.
SEQL	is sequel	An act relationship indicating that the source act follows the target act. The source act should in principle represent the same kind of act as the target. Source and target need not have the same mood code (mood will often differ). The target of a sequel is called antecedent. Examples for sequel relationships are: revision, transformation, derivation from a prototype (as a specialization is a derivation of a generalization), followup, realization, instantiation.
XCRPT	Excerpts	The source is an excerpt from the target.
VRXCRPT	Excerpt verbatim	The source is a direct quote from the target.

(attributes and associations). Note that the mood code affects the interpretation of the act object, and the meaning of the act object in turn determines the meaning of the attributes. However, the mood code does not arbitrarily change the meaning of individual attributes.

Inert vs. descriptive properties of Acts: Acts have two kinds of act properties, inert and descriptive properties. Inert properties are not affected by the mood, descriptive properties follow the mood of the object. For example, there is an identifier attribute Act.id, which gives a unique identification to an act object. Being a unique identifier for the object is in no way dependent on the mood of the act object. Therefore, the "interpretation" of the Act.id attribute is inert with respect to the act object's mood.

By contrast, most of the Act class' attributes are descriptive for what the Act statement expresses. Descriptive properties of the Act class give answer to the questions who, whom, where, with what, how and when the action is done. The questions who, whom, with what, and where are answered by Participations, while how and when are answered by descriptive attributes and ActRelationships. The interpretation of a descriptive attribute is aligned to the interpretation of the entire act object, and controlled by the mood.

Examples: To illustrate the effect of mood code, consider a "blood glucose" observation:

The DEFINITION mood specifies the Act of "obtaining blood glucose". Participations describe in general the characteristics of the people who must be involved in the act, and the required objects, e.g., specimen, facility, equipment, etc. involved. The Observation.value specifies the absolute domain (range) of the observation (e.g., 15-500 mg/dl).

In INTENT mood the author of the intent expresses the intent that he or someone else "should obtain blood glucose". The participations are the people actually or supposedly involved in the intended act, especially the author of the intent or any individual assignments for group intents, and the objects actually or supposedly involved in the act (e.g., specimen sent, equipment requirements, etc.). The Observation.value is usually not specified, since the intent is to measure blood glucose, not to measure blood glucose in a specific range. (But compare with GOAL below).

In REQUEST mood, a kind of intent, the author requests to "please obtain blood glucose". The Participations are the people actually and supposedly involved in the act, especially the placer and the designated filler, and the objects actually or supposedly involved in the act (e.g., specimen sent, equipment requirements, etc.). The Observation.value is usually not specified, since the order is not to measure blood glucose in a specific range.

In EVENT mood, the author states that "blood glucose was obtained". Participations are the people actually involved in the act, and the objects actually involved (e.g., specimen, facilities, equipment). The Observation.value is the value actually obtained (e.g., 80 mg/dL, or <15 mg/dL).

In event-CRITERION mood, an author considers a certain class of "obtaining blood glucose" possibly with a certain value (range) as outcome. The Participations constrain the criterion, for instance, to a particular patient. The

Observation.value is the range in which the criterion would hold (e.g. > 180 mg/dL or 200-300 mg/dL).

In GOAL mood (a kind of criterion), the author states that "our goal is to be able to obtain blood glucose with the given value (range)". The Participations are similar to intents, especially the author of the goal and the patient for whom the goal is made. The Observation.value is the range which defined when the goal is met (e.g. 80-120 mg/dl).

Rationale: The notion of "mood" is borrowed from natural language grammar, the mood of a verb (lat. modus verbi).

The notion of mood also resembles the various extensions of the logic of facts in modal logic and logic with modalities, where the moodCode specifies the modality (fact, possibility, intention, goal, etc.) under which the Act-statement is judged as appropriate or defective.

Code	Name	Definition
ActMoodCompletionTrack		These are moods describing activities as they progress in the business cycle, from defined, through planned and ordered to completed.
INT	intent	An intention or plan to perform a service. Historical note: in previous RIM versions, the intent mood was captured as a separate class hierarchy, called <u>Service_intent_or_order</u> .
PRP	proposal	A non-mandated intent to perform an act. Used to record intents that are explicitly not Orders. Professional responsibility for the 'proposal' may or may not be present.
RMD	recommendation	A non-mandated intent to perform an act where a level of professional responsibility is being accepted by making the proposal.
APT	appointment	A planned Act for a specific time and place.
ARQ	appointment request	A request for the booking of an appointment.
PRMS	promise	An intent to perform a service that has the strength of a commitment, i.e., other parties may rely on the originator of such promise that said originator will see to it that the promised act will be fulfilled. A promise can be either solicited or unsolicited.
RQO	request	A request or order for a service is an intent directed from a placer (request author) to a fulfiller (service performer). Rationale: The concepts of a "request" and an "order" are viewed as different, because there is an implication of a mandate associated with order. In practice, however, this distinction has no general functional value in the inter-operation of health care computing. "Orders" are commonly refused for a variety of clinical and business reasons, and the notion of a "request" obligates the recipient (the fulfiller) to respond to the sender (the author). Indeed, in many regions, including Australia and Europe, the common term used is "request." Thus, the concept embodies both notions, as there is no useful distinction to be made. If a mandate is to be associated with a request, this will be embodied in the "local" business rules applied to the transactions. Should HL7 desire to provide a distinction between these in the future, the individual concepts could be added as specializations of this concept. The critical distinction here, is the difference between this concept and an "intent", of which it is a specialization. An intent

		true boundaries of the secondary observation as opposed to only marking the approximate area. For example, if the start and end of an ST elevation episode is visible in an EKG, this relation would indicate the ROI bounds the "ST elevation" observation -- the ROI defines the true beginning and ending of the episode. Conversely, if a ROI simply contains ST elevation, but it does not define the bounds (start and end) of the episode, the more general "has support" relation is used. Likewise, if a ROI on an image defines the true bounds of a "1st degree burn", the relation "has bounded support" is used; but if the ROI only points to the approximate area of the burn, the general "has support" relation is used.
ActRelationshipTemporallyPertains		
SAS	starts after start of	The source Act starts after the start of the target Act (i.e. if we say "ActOne SAS ActTwo", it means that ActOne starts after the start of ActTwo, therefore ActOne is the source and ActTwo is the target).
NAME	assigns name	Used to assign a "name" to a condition thread. Source is a condition node, target can be any service.
AUTH	authorized by	A relationship in which the target act authorizes or certifies the source act.
COVBY	covered by	A relationship in which the source act is covered by or is under the authority of a target act. A financial instrument such as an Invoice Element is covered by one or more specific instances of an Insurance Policy.
EXPL	has explanation	This is the inversion of support. Used to indicate that a given observation is explained by another observation or condition.
PREV	has previous instance	A relationship in which the target act is a predecessor instance to the source act. Generally each of these instances is similar, but no identical. In healthcare coverage it is used to link a claim item to a previous claim item that might have claimed for the same set of services.
REFV	has reference values	Reference ranges are essentially descriptors of a class of result values assumed to be "normal", "abnormal", or "critical." Those can vary by sex, age, or any other criterion. Source and target are observations, the target is in criterion mood. This link type can act as a trigger in case of alarms being triggered by critical results.
SUBJ	has subject	Relates an Act to its subject Act that the first Act is primarily concerned with. Examples Constraints An Act may have multiple subject acts. Rationale The ActRelationshipType "has subject" is similar to the ParticipationType "subject", Acts that primarily operate on physical subjects use the Participation, those Acts that primarily operate on other Acts (other information) use the ActRelationship.
DRIV	is derived from	Associates a derived Act with its input parameters. E.G., an anion-gap observation can be associated as being derived from given sodium-, (potassium-),



		addressed.
PERT	has pertinent information	This is a very unspecific relationship from one item of clinical information to another. It does not judge about the role the pertinent information plays.
ActRelationshipAccounting		Codes that describe the relationship between an Act and a financial instrument such as a financial transaction, account or invoice element.
ActRelationshipCostTracking		Expresses values for describing the relationship between an InvoiceElement or InvoiceElementGroup and a billable act.
CHRG	has charge	A relationship that provides an ability to associate a financial transaction (target) as a charge to a clinical act (source). A clinical act may have a charge associated with the execution or delivery of the service. The financial transaction will define the charge (bill) for delivery or performance of the service. Charges and costs are distinct terms. A charge defines what is charged or billed to another organization or entity within an organization. The cost defines what it costs an organization to perform or deliver a service or product.
COST	has cost	A relationship that provides an ability to associate a financial transaction (target) as a cost to a clinical act (source). A clinical act may have an inherit cost associated with the execution or delivery of the service. The financial transaction will define the cost of delivery or performance of the service. Charges and costs are distinct terms. A charge defines what is charged or billed to another organization or entity within an organization. The cost defines what it costs an organization to perform or deliver a service or product.
ActRelationshipPosting		Expresses values for describing the relationship between a FinancialTransaction and an Account.
CREDIT	has credit	A credit relationship ties a financial transaction (target) to an account (source). A credit, once applied (posted), may have either a positive or negative effect on the account balance, depending on the type of account. An asset account credit will decrease the account balance. A non-asset account credit will decrease the account balance.
DEBIT	has debit	A debit relationship ties a financial transaction (target) to an account (source). A debit, once applied (posted), may have either a positive or negative effect on the account balance, depending on the type of account. An asset account debit will increase the account balance. A non-asset account debit will decrease the account balance.
SPRT	has support	Used to indicate that an existing service is suggesting evidence for a new observation. The assumption of support is attributed to the same actor who asserts the observation. Source must be an observation, target may be any service (e.g., to indicate a status post.)
SPRTBND	has bounded support	A specialization of "has support" (SPRT), used to relate a secondary observation to a Region of Interest on a multidimensional observation, if the ROI specifies the

		involves decisions by a single party, the author. A request, however, involves decisions by two parties, the author and the fulfiller, with an obligation on the part of the fulfiller to respond to the request indicating that the fulfiller will indeed fulfill the request.
DEF	definition	A definition of a service (master). Historical note: in previous RIM versions, the definition mood was captured as a separate class hierarchy, called Master_service.
EVN	event (occurrence)	A service that actually happens, may be an ongoing service or a documentation of a past service. Historical note: in previous RIM versions, the event mood was captured as a separate class hierarchy, called Patient_service_event, and later Service_event.
ActMoodPredicate		Any of the above service moods (e.g., event, intent, or goal) can be turned into a predicate used as a criterion to express conditionals (or queries.) However, currently we allow only criteria on service events.
GOL	Goal	Definition: An observation that is considered to be desirable to occur in the future. The essential feature of a goal is that if it occurs it would be considered as a marker of a positive outcome or of progress towards a positive outcome. Examples: Target weight below 80Kg, Stop smoking, Regain ability to walk, goal is to administer thrombolytics to candidate patients presenting with acute myocardial infarction. Discussion: INT (intent) reflects a plan for the future, which is a declaration to do something. This contrasts with goal which doesn't represent an intention to act, merely a hope for an eventual result. A goal is distinct from the intended actions to reach that goal. "I will reduce the dose of drug x to 20mg" is an intent. "I hope to be able to get the patient to the point where I can reduce the dose of drug x to 20mg" is a goal. EXPEC (expectation) reflects a prediction rather than a hope. RSK (risk) reflects a potential negative event rather than a hope.
EVN.CRT	event criterion	A criterion or condition over service events that must apply for an associated service to be considered.
EXPEC	expectation	Definition: An act that is considered likely to occur in the future. The essential feature of an act expressed in expectation mood is that it is likely to occur. An expectation may be desirable, undesirable or neutral in effect. Examples: Prognosis of a condition, Expected date of discharge from hospital, patient will likely need an emergency decompression of the intracranial pressure by morning. Discussion: INT (intent) reflects a plan for the future, which is a declaration to do something. This contrasts with expectation, which is a prediction that something will happen in the future. GOL (goal) reflects a hope rather than a prediction. RSK (risk) reflects a potential negative event that may or may not be expected to happen.
OPT	option	An option is an alternative set of property-value bindings. Options specify alternative sets of values, typically used in definitions or orders to describe alternatives. An option can only be used as a group, that is, all assigned values must be used together. Historical note: in HL7 v2.x option existed in the special case for alternative medication routes (RXR segment).

PERM	permission	A kind of service which is authorized to be performed.
PERMRQ	permission request	A request for authorization to perform a kind of service. This is distinct from RQO which is a request for an actual act. PERMRQ is merely a request for permission to perform an act. Discussion:
RSK	risk	Definition: An act that may occur in the future and which is regarded as undesirable. The essential feature of a risk is that if it occurs this would be regarded as a marker of a negative outcome or of deterioration towards a negative outcome. Recording a risk indicates that it is seen as more likely to occur in the subject than in a general member of the population but does not mean it is expected to occur. Examples: Increased risk of DVT, at risk for sub-acute bacterial endocarditis. Discussion: Note: An observation in RSK mood expresses the undesirable act, and not the underlying risk factor. A risk factor that is present (e.g. obesity, smoking, etc) should be expressed in event mood. INT (intent) reflects a plan for the future, which is a declaration to do something. This contrasts with RSK (risk), which is the potential that something negative will occur that may or may not ever happen. GOL (goal) reflects a hope to achieve something. EXPEC (expectation) is the prediction of a positive or negative event. This contrasts with RSK (risk), which is the potential that something negative will occur that may or may not ever happen, and may not be expected to happen.

**Act.id[SET<II>]:** A unique identifier for the Act.

**Act.code[CD]:** A code specifying the particular kind of Act that the Act-instance represents within its class.

Constraints: The kind of Act (e.g. physical examination, serum potassium, inpatient encounter, charge financial transaction, etc.) is specified with a code from one of several, typically external, coding systems. The coding system will depend on the class of Act, such as LOINC for observations, etc.

Conceptually, the Act.code must be a specialization of the Act.classCode. This is why the structure of ActClass domain should be reflected in the superstructure of the ActCode domain and then individual codes or externally referenced vocabularies subordinated under these domains that reflect the ActClass structure.

Act.classCode and Act.code are not modifiers of each other but the Act.code concept should really imply the Act.classCode concept. For a negative example, it is not appropriate to use an Act.code "potassium" together with and Act.classCode for "laboratory observation" to somehow mean "potassium laboratory observation" and then use the same Act.code for "potassium" together with Act.classCode for "medication" to mean "substitution of potassium". This mutually modifying use of Act.code and Act.classCode is not permitted.

Discussion: Act.code is not a required attribute of Act. Rather than naming the kind of Act using an Act.code, one can specify the Act using only the class code and other attributes and properties of the Act. In general and more commonly, the kind of Act is readily specified by an ActRelationship specifying that this Act instantiates another Act in definition mood. Or, even without reference to an act

		relative, absolute) is left as an open issue. The priorityNumber attribute could be used.
PRCN	has pre-condition	A requirement to be true before a service is performed. The target can be any service in criterion mood. For multiple pre-conditions a conjunction attribute (AND, OR, XOR) is applicable.
TRIG	has trigger	A pre-condition that if true should result in the source Act being executed. The target is in typically in criterion mood. When reported after the fact (i.e. the criterion has been met) it may be in Event mood. A delay between the trigger and the triggered action can be specified. Discussion: This includes the concept of a required act for a service or financial instrument such as an insurance plan or policy. In such cases, the trigger is the occurrence of a specific condition such as coverage limits being exceeded.
COMP	has component	A collection of sub-services as steps or subtasks performed for the source service. Services may be performed sequentially or concurrently.
ARR	arrival	The relationship that links to a Transportation Act (target) from another Act (source) indicating that the subject of the source Act entered into the source Act by means of the target Transportation act.
DEP	departure	The relationship that links to a Transportation Act (target) from another Act (source) indicating that the subject of the source Act departed from the source Act by means of the target Transportation act.
CTRLV	has control variable	A relationship from an Act to a Control Variable. For example, if a Device makes an Observation, this relates the Observation to its Control Variables documenting the device's settings that influenced the observation.
OUTC	has outcome	An observation that should follow or does actually follow as a result or consequence of a condition or action (sometimes called "post-condition".) Target must be an observation as a goal, risk or any criterion. For complex outcomes a conjunction attribute
ActRelationshipObjective		The target act is a desired outcome of the source act. Source is any act (typically an intervention). Target must be an observation in criterion mood.
OBJC	has continuing objective	A desired state that a service action aims to maintain. E.g., keep systolic blood pressure between 90 and 110 mm Hg. Source is an intervention service. Target must be an observation in criterion mood.
OBJF	has final objective	A desired outcome that a service action aims to meet finally. Source is any service (typically an intervention). Target must be an observation in criterion mood.
GOAL	has goal	A goal that one defines given a patient's health condition. Subsequently planned actions aim to meet that goal. Source is an observation or condition node, target must be an observation in goal mood.
RISK	has risk	A noteworthy undesired outcome of a patient's condition that is either likely enough to become an issue or is less likely but dangerous enough to be

be automated). During this specification, more and more nested sub-activities will be defined. Still the Act is the same, with varying degrees of detail uncovered in the de-composition relationship.

We described the nature of varying detail saying that Acts are "fractal", ever more decomposable, just as the movements of a robotic arm can be decomposed in many fine control steps.

**ActRelationship.typeCode[CS,mandatory]:** A code specifying the meaning and purpose of every ActRelationship instance. Each of its values implies specific constraints to what kinds of Act objects can be related and in which way.

Discussion: The types of act relationships fall under one of 5 categories:

- 1.) (De)-composition, with composite (source) and component (target).
- 2.) Sequel which includes follow-up, fulfillment, instantiation, replacement, transformation, etc. that all have in common that source and target are Acts of essentially the same kind but with variances in mood and other attributes, and where the target exists before the source and the source refers to the target that it links back to.
- 3.) Pre-condition, trigger, reason, contraindication, with the conditioned Act at the source and the condition or reason at the target.
- 4.) Post-condition, outcome, goal and risk, with the Act at the source having the outcome or goal at the target.
- 5.) A host of functional relationships including support, cause, derivation, etc. generalized under the notion of "pertinence".

Code	Name	Definition
ActRelationshipConditional		Specifies under what circumstances (target Act) the source-Act may, must, must not or has occurred
RSN	has reason	The reason or rationale for a service. A reason link is weaker than a trigger, it only suggests that some service may be or might have been a reason for some action, but not that this reason requires/required the action to be taken. Also, as opposed to the trigger, there is no strong timely relation between the reason and the action. Discussion: In prior releases, the code "SUGG" (suggests) was expressed as "an inversion of the reason link." That code has been retired in favor of the inversion indicator that is an attribute of ActRelationship.
CURE.ADJ	adjunct curative indication	
MTGT.ADJ	adjunct mitigation	
CURE	curative indication	
DIAG	diagnosis	
MITGT	mitigates	The source act removes or lessens the occurrence or effect of the target act.
SYMP	symptomatic relief	Used in the diagnosis of the indicated disease.
CIND	has contra-indication	A contraindication is just a negation of a reason, i.e. it gives a condition under which the action is not to be done. Both, source and target can be any kind of service; target service is in criterion mood. How the strength of a contraindication is expressed (e.g.,

definition, the act may be readily described by other attributes, ActRelationships and Participations. For example, the kind of SubstanceAdministration may be readily described by referring to the specific drug, as the Participation of an Entity representing that drug.

**Act.negationInd[BL]:** An indicator specifying that the Act statement is a negation of the Act as described by the descriptive attributes.

Examples: Used with an Observation event, it allows one to say "patient has NO chest pain". With an Observation criterion it negates the criterion analogously, e.g., "if patient has NO chest pain for 3 days ...", or "if systolic blood pressure is not within 90-100 mm Hg ..."

Discussion: The negationInd works as a negative existence quantifier. This is best explained on Acts in criterion mood, and then translates into all other moods. In criterion mood without negation, one usually only specifies a few critical attributes and relationships (features) of an Act, i.e., only those that are needed to test the criterion. The more features one specifies, the more constrained (specific) is the criterion. For example, to test for "systolic blood pressure of 90-100 mm Hg", one would use only the descriptive attributes Act.code (for systolic blood pressure) and Observation.value (for 90-100 mm Hg). If one would also specify an effectiveTime, i.e., for "yesterday", the criterion would be more constrained. If the negationInd is true for the above criterion, then the meaning of the test is whether a systolic blood pressure of 90-100 mm Hg yesterday does not exist (independent of whether any blood pressure was measured).

The negationInd negates the Act as described by the descriptive properties (including Act.code, Act.effectiveTime, Observation.value, Act.doseQty, etc.) and any of its components. The inert properties such as Act.id, Act.moodCode, Act.confidentialityCode, and particularly the Author-Participation are not negated. These inert properties always have the same meaning: i.e., the author remains to be the author of the negative observation. Also, most ActRelationships (except for components) are not included in the negation.

For example, a highly confidential order written by Dr. Jones, to explicitly not give "succinyl choline" for the "reason" (ActRelationship) of a history of malignant hyperthermia (Observation) negates the descriptive properties "give succinyl choline" (Act.code), but it is still positively an order and written by Dr. Jones and for patient John Smith, and the reason for this order is the patient's history of malignant hyperthermia.

However, additional detail in descriptive attributes will be part of the negation which then limits the effectiveness of the negated statement. For example, had the order not to give a substance included a doseQuantity, it would mean that the substance should not be given at that particular dose (but any other dose might still be O.K.).

An act statement with negationInd is still a statement about the specific fact described by the Act. For instance, a negated "finding of wheezing on July 1" means that the author positively denies that there was wheezing on July 1, and that he takes the same responsibility for such statement and the same requirement to have evidence for such statement than if he had not used negation. Conversely, negation indicator does not just negate that the fact was affirmed or that the

statement had been made. This holds for all moods in the same way, e.g., a negated order is an order not to do the described act, not just the lapidary statement that there is no such order.

**Act.derivationExpr[ST]:** A character string containing a formal language expression that specifies how the Act's attributes are (should be or have been) derived from input parameters associated with derivation relationships.

Discussion: Derived observations can be defined through association with other observations using ActRelationships of type "derivation". For example, to define a derived observation for Mean Corpuscular Hemoglobin (MCH) one will associate the MCH observation with a Hemoglobin (HGB) observation and a Red Blood cell Count (RBC) observation. And the derivation expression encodes the formula:  $MCH = HGB / RBC$ .

The derivation expression is represented as a character string.

[Note: The syntax of that expression is yet to be fully specified. There would be a single standard expression language rather than an optional choice between many expression languages. The syntax would be based on a de-facto standard for many object-oriented languages, such as C++, Java, OCL etc. A concrete specification of this expression language is being worked on now and drafts can be expected within the year 2003.]

**Act.title[ED]:** A word or phrase by which a specific Act may be known among people.

Example: name of a research study (e.g. "Scandinavian Simvastatin Study"), name of a court case (e.g. "Brown v. Board of Education"), name of another kind of work project or operation. For acts representing documents, this is the title of the document.

CONSTRAINT: Previous to release 2.05 of the RIM, this attribute bore the datatype ST. From release 2.05 onwards, the datatype was extended to a constrained restriction of the ED datatype. The constraints to be imposed are identical to those for the ST datatype, except that the mediaType shall be "text/xml" or "text/plain". The intent is to allow sufficient mark-up to convey the semantics of scientific phrases, such as chemical compounds. This markup must not be used to convey simple display preferences. The default mediaType should be "text/plain".

Discussion: This is not a formal identifier but rather a human-recognizable common name. However it is similar to the id attribute in that it refers to a specific Act rather than a 'kind' of act. (For definition mood, the title refers to that specific definition, rather than to a broad category that might be conveyed with Act.code.)

Note: This attribute was not in the normative content balloted and approved for the first release of HL7's Reference Information Model Standard. The attribute will be considered when the RIM is prepared for balloting the second release. The attribute is being used in current HL7 Version 3 designs.

**Act.text[ED]:** A textual or multimedia description (or reference to a description) of the Act.

The ActRelationship class is used to construct action plans and to represent clinical reasoning or judgments about action relationships. Prior actions can be linked as the reasons for more recent actions. Supporting evidence can be linked with current clinical hypotheses. Problem lists and other networks of related judgments about clinical events are represented by the ActRelationship link.

One of the most commonly used ActRelationship types is "has component" to describe the composition and de-composition of Acts. The relationship type allows specifying detail of Acts to varying degrees.

The composition relationship can group actions into "batteries," e.g., LYLES, CHEM12, or CBC, where multiple routine laboratory tests are ordered as a group. Some groupings, such as CHEM12, appear more arbitrary; others, such as blood pressure, seem to naturally consist of systolic and diastolic pressure.

The composition relationships can be arranged in a sequence to form temporal and conditional (non-temporal) action plans (e.g., care plan, critical path, clinical trials protocol, drug treatment protocols). There is a group of attributes in both Act and ActRelationship that we refer to as the "workflow Control suite of attributes", and which allow the detailed specification of executable action plans. These attributes are:

ActRelationship.sequenceNumber arranges the components of an Act as a sequence or as concurrent collections of components, expressing logical branches as well as parallel tasks (tasks carried out at the same time). The ActRelationship attributes splitCode and joinCode control how branches are selected or executable in parallel.

Act.activityTime and ActRelationship.pauseQty allow one to explicitly time an action plan. Act.repeatNumber allows specifying act to repeat (loop).

The ActRelationship type has-precondition allows plan steps to be conditional on the status or outcome of previous actions. The ActRelationship.checkpointCode specifies when pre-conditions of acts are tested during the flow of control.

The composition ActRelationship allows these constructs to be organized in multiple layers of nesting to fully support workflow management. This nesting and the workflow control attributes are designed in analogy to a block-structured programming language with support for concurrency (fork, join, interrupts), and without "goto" statements. It is important to note that ALL plans are established through sequencing components (steps) in a composite act (block) as can be depicted in "Nassi-Schneiderman" diagrams (also known as "Chap Charts" or "Structograms"), not by chain-linking acts as in a flowchart diagram.

With the composition relationship, the detail of Acts can be revealed to different levels for different purposes, without the structure of the Act hierarchy needing to be rearranged. This allows supporting multiple viewpoints on the same business processes. For instance, a billing-viewpoint of a laboratory test battery may be as a single billable act. A clinician's view of the same laboratory test battery is as a set of individual observations, where the ordering among the observations is irrelevant. The laboratory's view of this act will be more detailed, including action plan steps that are never reported to the clinician (e.g., centrifugation, decantation, aliquoting, running certain machines etc.). The laboratory's viewpoint warrants a thorough specification of action plans (that can

however, there is never a need to communicate more than a single status value. therefore, committees are advised to constrain this attribute to a maximum cardinality of 1 in all message designs.

Code	Name	Definition
normal	normal	The 'typical' state. Excludes "nullified" which represents the termination state of a participation instance that was created in error.
active	active	The state representing the fact that the Participation is in progress.
cancelled	cancelled	The terminal state resulting from cancellation of the Participation prior to activation.
completed	completed	The terminal state representing the successful completion of the Participation.
pending	pending	The state representing that fact that the Participation has not yet become active.
nullified	nullified	The state representing the termination of a Participation instance that was created in error.

## ActRelationship

A directed association between a source Act and a target Act. ActRelationship on the same source Act are called the "outbound" act relationships of that Act. ActRelationships on the same target Act are called the "inbound" relationships of that Act. The meaning and purpose of an ActRelationship is specified in the ActRelationship.typeCode attribute.

Examples: 1) An electrolyte observation panel may have sodium, potassium, pH, and bicarbonate observations as components. The composite electrolyte panel would then have 4 outbound ActRelationships of type "has component".

2) The electrolyte panel event has been performed in fulfillment of an observation order. The electrolyte panel event has an outbound ActRelationship of type "fulfills" with the order as target.

3) A Procedure "cholecystectomy" may be performed for the reason of an Observation of "cholelithiasis". The procedure has an outbound ActRelationship of type "has reason" to the cholelithiasis observation.

Discussion: Consider every ActRelationship instance an arrow with a point (headed to the target) and a butt (coming from the source). The functions (sometimes called "roles") that source and target Acts play in that association are defined for each ActRelationship type differently. For instance in a composition relationship, the source is the composite and the target is the component. In a reason-relationship the source is any Act and the target is the reason or indication for the source-Act.

The relationships associated with an Act are considered properties of the source act object. This means that the author of an Act-instance is also considered the author of all of the act relationships that have this Act as their source. There are no exceptions to this rule.

See ActRelationship.typeCode for more overview of the different kinds of ActRelationships.

Examples: For act definitions, the Act.text can contain textbook-like information about that act. For act orders, the description will contain particular instructions pertaining only to that order.

Constraints: No restriction on length or content is imposed on the Act.text attribute.

The content of the description is not considered part of the functional information communicated between computer systems. For Acts that involve human readers and performers, however, computer systems must show the Act.text field to a human user, who has responsibility for the activity; or at least must indicate the existence of the Act.text information and allow the user to see that information.

Free text descriptions are used to help an individual interpret the content and context of the act, but all information relevant for automated functions must be communicated using the proper attributes and associated objects.

**Act.statusCode[CS]:** A code specifying the state of the Act.

Design Advisory: This attribute was defined in the original RIM as repeating, owing to the presence of nested states in the state machines. In actual practice, however, there is never a need to communicate more than a single status value. therefore, committees are advised to constrain this attribute to a maximum cardinality of 1 in all message designs.

Code	Name	Definition
normal	normal	Encompasses the expected states of an Act, but excludes "nullified" and "obsolete" which represent unusual terminal states for the life-cycle.
aborted	aborted	The Act has been terminated prior to the originally intended completion.
active	active	The Act can be performed or is being performed
cancelled	cancelled	The Act has been abandoned before activation.
completed	completed	An Act that has terminated normally after all of its constituents have been performed.
held	held	An Act that is still in the preparatory stages has been put aside. No action can occur until the Act is released.
new	new	An Act that is in the preparatory stages and may not yet be acted upon
suspended	suspended	An Act that has been activated (actions could or have been performed against it), but has been temporarily disabled. No further action should be taken against it until it is released
nullified	nullified	This Act instance was created in error and has been 'removed' and is treated as though it never existed. A record is retained for audit purposes only.
obsolete	obsolete	This Act instance has been replaced by a new instance.

**Act.effectiveTime[GTS]:** A time expression specifying the focal or operative time of the Act, the primary time for which the Act holds, the time of interest from the perspective of the Act's intention.

Examples: For clinical Observations, the effectiveTime is the time at which the observation holds (is effective) for the patient.

For contracts, the effectiveTime is the time for which the contract is in effect.

For consents, the effectiveTime is the time for which the consent is valid.

For substance administrations, the effective time is the time over which the substance is to be administered, including the frequency of administration (e.g. TID for 10 days)

For a surgical procedure (operation), the effectiveTime is the time relevant for the patient, i.e., between incision and last suture.

For transportation acts, the effective time is the time the transported payload is en route.

For patient encounters, this is the "administrative" time, i.e., the encounter start and end date required to be chosen by business rules, as opposed to the actual time the healthcare encounter related work is performed.

Discussion: The effectiveTime is also known as the "primary" time (Arden Syntax) or the "biologically relevant time" (HL7 v2.x). This attribute is distinguished from activityTime.

For observations, the time of the observation activity may be much later than the time of the observed feature. For instance, in a Blood Gas Analysis (BGA), a result will always come up several minutes after the specimen was taken, meanwhile the patient's physiological state may have changed significantly.

For essentially physical activities (surgical procedures, transportations, etc.), the effective time is the time of interest for the Act's intention, i.e., since the intention of a transportation is to deliver a payload from location A to B, the effectiveTime is the time this payload is underway from A to B. However, the Act usually also includes accidental work which is necessary to perform the intention of the Act, but is not relevant for the Act's purpose.

For example, the time a driver needs to go to the pick-up location A and then return from drop-off location B to some home base, is included in the physical activity, but does not matter from the perspective of the payload's transportation. Another example is: a person's work hours (effectiveTime) may be from 8 AM to 5 PM, no matter whether that person needs 10 minutes for the commute or 2 hours. The commute is necessary to be at work, but it is not essential for the work hours.

**Act.activityTime[GTS]:** A time expression specifying when an Observation, Procedure, or other Act occurs, or, depending on the mood, is supposed to occur, scheduled to occur, etc. It tells you when the labor was done for an Act. The activityTime includes the times of component actions (such as preparation and clean-up) For Procedures and Substance Administrations, the activityTime can provide a needed administrative / scheduling function by providing a more complete time that needs to be anticipated for particular acts.

Discussion: The activityTime is more of administrative rather than clinical use. The clinically relevant time is the effectiveTime. When an observation of a prior symptom is made, the activityTime describes the time the observation is made, as opposed to effectiveTime which is the time the symptom occurred. Thus the activityTime may be entirely different than the effectiveTime of the same Act. But even apart from clinical use cases, designers should first consider effectiveTime as the primary relevant time for an Act.

		total number of repetitions, etc.
PAST	previous	An occurrence that occurred or was scheduled to occur in the past. An Act whose effective time is less than 'now'. ('now' is the time the instance is authored.)
FIRST	first known	Restricted to the earliest known occurrence that occurred or was scheduled to occur in the past. The Act with the lowest effective time. ('now' is the time the instance is authored.)
RECENT	most recent	Restricted to the most recent known occurrence that occurred or was scheduled to occur in the past. The Act with the most recent effective time, still less than 'now'. ('now' is the time the instance is authored.)
PREVSUM	previous summary	Represents a 'summary' of all acts that previously occurred or were scheduled to occur. The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the total number of repetitions, etc. ('now' is the time the instance is authored.)
SUM	summary	Represents a 'summary' of all acts that have occurred or were scheduled to occur and which are scheduled to occur in the future. The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the total number of repetitions, etc.

## ManagedParticipation extends Participation

A participation that will be operated on over time and thus whose state and identity must be managed.

Examples: An attending practitioner for an inpatient encounter may change due to leave of absence and it is important to note when this participation will be available.

Rationale: ManagedParticipations are defined as a subclass of Participations to make explicit that not all Participations are stateful. In general, when the sub-activity realized by a Participation is of closer interest and needs to be managed, one SHOULD instead model that sub-activity as an Act component underneath the main Act.

However, in certain environments the view of what these activities really are that the participants perform is not very well recognized and hence modeling those as sub-acts is deemed confusing or burdensome.

Therefore, the ManagedParticipation extends Participation with an identity-attribute and a state-attribute to support these exceptional use cases.

ManagedParticipations should be used with utmost caution so as to avoid confusion with Acts and to avoid having to duplicate the act-management infrastructure around participations.

**ManagedParticipation.id[SET<II>]:** A unique identifier used to refer to a specific instance of a Participation that may have the same Act and the same Role. (See ManagedParticipation.)

**ManagedParticipation.statusCode[CS]:** A code specifying whether the participation instance is pending, active, complete, or cancelled. (See ManagedParticipation.)

Design Advisory: This attribute was defined in the original RIM as repeating, owing to the presence of nested states in the state machines. In actual practice,

Examples: A surgical Procedure act object (representing a procedure report) requires a signature of the performing and responsible surgeon, and possibly other participants. (See also: Participation.signatureText.)

**Participation.signatureText[ED]:** A textual or multimedia depiction of the signature by which the participant endorses his or her participation in the Act as specified in the Participation.typeCode and that he or she agrees to assume the associated accountability.

Examples: 1) An "author" participant assumes accountability for the truth of the Act statement to the best of his knowledge.

2) An information recipient only attests to the fact that he or she has received the information.

Discussion: The signature can be represented in many different ways either inline or by reference according to the ED data type. Typical cases are:

1) Paper-based signatures: the ED data type may refer to some document or file that can be retrieved through an electronic interface to a hardcopy archive.

2) Electronic signature: this attribute can represent virtually any electronic signature scheme.

3) Digital signature: in particular, this attribute can represent digital signatures, for example, by reference to a signature data block that is constructed in accordance to a digital signature standard, such as XML-DSIG, PKCS#7, PGP, etc.

**Participation.performInd[BL]:** Indicates that the resource for this Participation must be reserved before use (i.e. it is controlled by a schedule).

Rationale: This attribute serves a very specific need in the context of resource scheduling. It is not needed in the majority of participation expressions. In most circumstances, it applies to the participation of a particular location or piece of equipment whose use is controlled by a scheduler.

**Participation.substitutionConditionCode[CE]:** Indicates the conditions under which a participating item may be substituted with a different one.

**Participation.subsetCode[CS]:** Used to indicate that the participation is a filtered subset of the total participations of the same type owned by the Act.

Used when there is a need to limit the participations to the first, the last, the next or some other filtered subset.

Code	Name	Definition
FUTURE	expected future	An occurrence that is scheduled to occur in the future. An Act whose effective time is greater than 'now', where 'now' is the time the instance is authored.
LAST	expected last	Restricted to the latest known occurrence that is scheduled to occur. The Act with the highest known effective time.
NEXT	expected next	Restricted to the nearest recent known occurrence scheduled to occur in the future. The Act with the lowest effective time, still greater than 'now'. ('now' is the time the instance is authored.)
FUTSUM	future summary	Represents a 'summary' of all acts that are scheduled to occur in the future (whose effective time is greater than 'now' where is the time the instance is authored.). The effectiveTime represents the outer boundary of all occurrences, repeatNumber represents the

The activityTime is a descriptive attribute, i.e., like effectiveTime, it always describes the Act event as it does or would occur, even when working with different moods. For example, when a procedure is requested, the activityTime describes the requested total time of the procedure. By contrast, the author Participation.time is inert, i.e., author participation time on an order specifies when the order was written and has nothing to do with when the event might actually occur.

ActivityTime indicates when an Act occurs, not when an Act is recorded. Many applications track the time an observation is recorded rather than the precise time during which an observation is made, in which case Participation.time (e.g. of the Author) should be used. These recorded observations can take place during an encounter, and the time of the encounter often provides enough information so that activityTime isn't clinically relevant.

**Act.availabilityTime[TS]:** The point in time at which information about Act-instance (regardless of mood) first became available to a system reproducing this Act.

Examples: An Act might record that a patient had a right-ventricular myocardial infarction effective three hours ago (see Act.effectiveTime), but we may only know about this unusual condition a few minutes ago (Act.availabilityTime). Thus, any interventions from three hours ago until a few minutes ago may have assumed the more common left-ventricular infarction, which can explain why these interventions (e.g., nitrate administration) may not have been appropriate in light of the more recent knowledge.

Discussion: The availabilityTime is a subjective secondary piece of information added (or changed) by a system that reproduces this Act, and is not attributed to the author of the act statement (it would not be included in the material the author would attest to with a signature). The system reproducing the Act is often not the same as the system originating the Act, but a system that received this Act from somewhere else, and, upon receipt of the Act, values the availabilityTime to convey the time since the users of that particular system could have known about this Act-instance.

When communicating availabilityTime to another system, the availabilityTime of an Act A is attributed to the author of another Act B, that refers to or includes A. For example, if a medical record extract is compiled for reporting adverse events, availabilityTimes are attributed to the author who compiles that report.

**Act.priorityCode[SET<CE>]:** A code or set of codes (e.g., for routine, emergency), specifying the urgency under which the Act happened, can happen, is happening, is intended to happen, or is requested/demanded to happen.

Discussion: This attribute is used in orders to indicate the ordered priority, and in event documentation it indicates the actual priority used to perform the act. In definition mood it indicates the available priorities.

**Act.confidentialityCode[SET<CE>]:** A code that controls the disclosure of information about this Act, regardless of mood.

**Discussion:** It is important to note that the necessary confidentiality of the medical record cannot be achieved solely through confidentiality codes to mask individual record items from certain types of users. There are two important problems with per-item confidentiality: one is inference and the other is the danger of holding back information that may be critical in a certain care situation. Inference means that filtered sensitive information can still be assumed given the other information that was not filtered. The simplest form of inference is that even the existence of a test order for an HIV Western Blot test or a T4/T8 lymphocyte count is a strong indication for an existing HIV infection, even if the results are not known. Very often, diagnoses can be inferred from medication, such as Zidovudin for treatment of HIV infections. The problem of hiding individual items becomes especially difficult with current medications, since the continuing administration of the medication must be assured.

To mitigate some of the inference-risk, aggregations of data should assume the confidentiality level of the most confidential action in the aggregation.

**Act.repeatNumber[IVL<INT>]:** An interval of integer numbers stating the minimal and maximal number of repetitions of the Act.

**Examples:** An oral surgeon's advice to a patient after tooth extraction might be: "replace the gauze every hour for 1 to 3 times until bleeding has stopped completely." This translates to repeatNumber with low boundary 1 and high boundary 3.

**Discussion:** This attribute is a member of the workflow control suite of attributes.

The number of repeats is additionally constrained by time. The act will repeat at least the minimal number of times and at most, the maximal number of times. Repetitions will also terminate when the time exceeds the maximal Act.effectiveTime, whichever comes first.

**Usage:** On an Act in Event mood, the repeatNumber is usually 1. If greater than 1, the Act is representing a summary of several event occurrences occurring over the time interval described by effectiveTime

To distinguish occurrences of acts within a sequence of repetitions, use ActRelationship.sequenceNumber

**Act.interruptibleInd[BL]:** An indicator specifying whether Act is interruptible by asynchronous events.

**Discussion:** This attribute is part of the suite of workflow control attributes. Act events that are currently active can be interrupted in various ways. Interrupting events include: (1) when an explicit abort request is received against the Act (2) when the time allotted to this Act expires (timeout); (3) a "through condition" ceases to hold true for this Act (see ActRelationship.checkpointCode); (4) the Act is a component with the joinCode "kill" and all other components in that same group have terminated (see Act.joinCode); and (5) when a containing Act is being interrupted.

If an Act receives an interrupt and the Act itself is interruptible, but it has currently active component-Acts that are non-interruptible, the Act will be interrupted when all of its currently active non-interruptible component-acts have terminated.

covered party participations to establish a coordination of benefits sequence in insurance claims.

**Participation.negationInd[BL]:** If true, indicates that the specified participation did not, is not or should not occur (depending on mood).

**Rationale:** This has two primary uses: (1) To indicate that a particular Role did not/should not participate in an Act. (2) To remove a participant from the context being propagated between Acts.

**Discussion:** A participation with a negationInd set to true is stronger than one with a negationInd of false. In other words, if there is a conflict, the negated participation takes precedence.

**Examples:** Dr. Smith did not participate; Patient Jones did not sign the consent.

**Participation.noteText[ED]:** A textual or multimedia depiction of commentary related to the participation. This note is attributed to this participant only.

**Participation.time[IVL<TS>]:** An interval of time specifying the time during which the participant is involved in the act through this Participation.

**Rationale:** Participation time is needed when the participant's involvement in the act spans only part of the Act's time. Participation time is also used to indicate the time at which certain very common sub-activities happen that are not worth mentioning in full acts.

**Examples:** 1) The time data was entered into the originating system is the Participation.time of the "data entry" participation.

2) The end of the participation time of an author is the time associated with the signature.

3) The Participation.time of a co-signing participation is also the time of that co-signature.

**Participation.modeCode[CE]:** A code specifying the modality by which the Entity playing the Role is participating in the Act.

**Examples:** Physically present, over the telephone, written communication.

**Rationale:** Particularly for author (originator) participants this is used to specify whether the information represented by the act was initially provided verbally, (hand-)written, or electronically.

**Participation.awarenessCode[CE]:** A code specifying the extent to which the Entity playing the participating Role (usually as a target Participation) is aware of the associated Act.

**Examples:** For diagnostic observations, is the patient, family member or other participant aware of the patient's terminal illness?

**Discussion:** If the awareness, denial, unconsciousness, etc. is the subject of medical considerations (e.g., part of the problem list), one should use explicit observations in these matters as well, and should not solely rely on this simple attribute in the Participation.

**Participation.signatureCode[CE]:** A code specifying whether and how the participant has attested his participation through a signature and or whether such a signature is needed.



		Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts. Furthermore, no author participations whatsoever will propagate to any child Acts that allow context to be propagated.
ContextControlOverriding		The association adds to the existing context associated with the Act, but replaces associations propagated from ancestor Acts whose typeCodes are the same.
ON	overriding, non-propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. However, this overriding association will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Non-Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts. Furthermore, no author participations whatsoever will propagate to any child Acts that allow context to be propagated.
OP	overriding, propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. This overriding association will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts, and will itself be the only author to propagate to any child Acts that allow context to be propagated.
ContextControlPropagating		The association propagates to any child Acts that are related via a conducting ActRelationship (refer to contextConductionInd).
AP	additive, propagating	The association adds to the existing context associated with the Act, and will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts, and will itself propagate with the other authors to any child Acts that allow context to be propagated.
OP	overriding, propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. This overriding association will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Propagating" it means that the author will replace the set of author participations that have propagated from ancestor Acts, and will itself be the only author to propagate to any child Acts that allow context to be propagated.

**Participation.sequenceNumber[INT]:** An integer specifying the relative order of the Participation in relation to other Participations of the same Act.

Rationale: The sequencing might be undertaken for functional reasons or to establish a priority between participations. One example is the sequencing of

**Act.levelCode[CE]:** Code specifying the level within a hierarchical Act composition structure and the kind of contextual information attached to composite Acts ("containers") and propagated to component Acts within those containers. The levelCode signifies the position within such a containment hierarchy and the applicable constraints.

Discussion: Readers should be aware that this attribute may be declared "obsolescent" in the next normative release of the HL7 RIM. An alternate representation of this concept using a specified hierarchy of Act classCode values is being considered. If the change is adopted, HL7's RIM maintenance procedures state that the levelCode would be declared "obsolescent" in the next RIM release, and then become "obsolete" in the release following that. Users are advised to check with the latest HL7 internal definitions of the RIM, before using this attribute.

The levelCode concepts have been defined to meet specific health record transfer requirements. While these concepts are known to be applicable to some other types of transactions, they are not intended to be a complete closed list. Options exist for other sets of orthogonal levels where required to meet a business purpose (e.g. a multiple patient communication may be subdivided by a super-ordinate level of subject areas).

Examples: The "extract level" and the "folder level" must contain data about a single individual, whereas the "multiple subject level" may contain data about multiple individuals. While "extract" can originate from multiple sources, a "folder" should originate from a single source. The "composition" level usually has a single author.

Constraints: The constraints applicable to a particular level may include differing requirements for participations (e.g. patient, source organization, author or other signatory), relationships to or inclusion of other Acts, documents or use of templates. The constraints pertaining to a level may also specify the permissible levels that may be contained as components of that level. Several nested levels with the same levelCode may be permitted, prohibited (or limited). Instances of the next subordinate level are usually permitted within any level but some levels may be omitted from a model and it may be permissible to skip several layers.

**Act.independentInd[BL]:** An indicator specifying whether the Act can be manipulated independently of other Acts or whether manipulation of the Act can only be through a super-ordinate composite Act that has this Act as a component. By default the independentInd should be true.

Examples: An Act definition is sometimes marked with independentInd=false if the business rules would not allow this act to be ordered without ordering the containing act group.

An order may have a component that cannot be aborted independently of the other components.

**Act.uncertaintyCode[CE]:** A code indicating whether the Act statement as a whole, with its subordinate components has been asserted to be uncertain in any way.

Examples: Patient might have had a cholecystectomy procedure in the past (but isn't sure).

Constraints: Uncertainty asserted using this attribute applies to the combined meaning of the Act statement established by all descriptive attributes (e.g., Act.code, Act.effectiveTime, Observation.value, SubstanceAdministration.doseQuantity, etc.), and the meanings of any components.

Discussion: This is not intended for use to replace or compete with uncertainty associated with Observation.value alone or other individual attributes of the class. Such pointed indications of uncertainty should be specified by applying the PPD, UVP or UVN data type extensions to the specific attribute. Particularly if the uncertainty is uncertainty of a quantitative measurement value, this must still be represented by a PPD<PQ> in the value and not using the uncertaintyCode. Also, when differential diagnoses are enumerated or weighed for probability, the UVP<CD> or UVN<CD> must be used, not the uncertaintyCode. The use of the uncertaintyCode is appropriate only if the entirety of the Act and its dependent Acts is questioned.

Note that very vague uncertainty may be thought related to negationInd, however, the two concepts are really independent. One may be very uncertain about an event, but that does not mean that one is certain about the negation of the event.

**Act.reasonCode[SET<CE>]:** A code specifying the motivation, cause, or rationale of an Act, when such rationale is not reasonably represented as an ActRelationship of type "has reason" linking to another Act.

Examples: Example reasons that might qualify for being coded in this field might be: "routine requirement", "infectious disease reporting requirement", "on patient request", "required by law".

#### Discussion

Most reasons for acts can be clearly expressed by linking the new Act to another prior Act using an ActRelationship of type "has reason". This simply states that the prior Act is a reason for the new Act (see ActRelationship). The prior act can then be a specific existing act or a textual explanation. This works for most cases, and the more specific the reason data is, the more should this reason ActRelationship be used instead of the reasonCode.

The reasonCode remains as a place for common reasons that are not related to a prior Act or any other condition expressed in Acts. Indicators that something was required by law or was on the request of a patient etc. may qualify. However, if that piece of legislation, regulation, or the contract or the patient request can be represented as an Act (and they usually can), the reasonCode should not be used.

**Act.languageCode[CE]:** The primary language in which this Act statement is specified, particularly the language of the Act.text.

Since participation functions refer to what people do in an Act, these are really sub-activities that may all occur in parallel. If any more detail needs to be said about these activities other than just who does them, one should consider using component acts instead.

**Participation.contextControlCode[CS]:** A code that specifies how this Participation contributes to the context of the current Act, and whether it may be propagated to descendent Acts whose association allows such propagation (see ActRelationship.contextConductionInd).

Discussion: Refer to ActRelationship.contextControlCode for rationale, discussion and examples.

Code	Name	Definition
	ContextControlAdditive	The association adds to the existing context associated with the Act. Both this association and any associations propagated from ancestor Acts are interpreted as being related to this Act.
AN	additive, non-propagating	The association adds to the existing context associated with the Act, but will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Non-Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts for the purpose of this Act. However only the previously propagated authors will propagate to any child Acts that allow context to be propagated.
AP	additive, propagating	The association adds to the existing context associated with the Act, and will propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts, and will itself propagate with the other authors to any child Acts that allow context to be propagated.
	ContextControlNonPropagating	The association applies only to the current Act and will not propagate to any child Acts that are related via a conducting ActRelationship (refer to contextConductionInd).
AN	additive, non-propagating	The association adds to the existing context associated with the Act, but will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Additive, Non-Propagating" it means that the author will be added to the set of author participations that have propagated from ancestor Acts for the purpose of this Act. However only the previously propagated authors will propagate to any child Acts that allow context to be propagated.
ON	overriding, non-propagating	The association is added to the existing context associated with the Act, but overrides an association with the same typeCode. However, this overriding association will not propagate to any descendant Acts reached by conducting ActRelationships (see contextControlCode). Examples: If an 'Author' Participation were marked as "Overriding, Non-

AUTHEN	authenticator	A verifier who attests to the accuracy of an act, but who does not have privileges to legally authenticate the act. An example would be a resident physician who sees a patient and dictates a note, then later signs it. Their signature constitutes an authentication.
LA	legal authenticator	A verifier who legally authenticates the accuracy of an act. An example would be a staff physician who sees a patient and dictates a note, then later signs it. Their signature constitutes a legal authentication.
CST	custodian	An entity (person, organization or device) that is in charge of maintaining the information of this act (e.g., who maintains the report or the master service catalog item, etc.).
GUAR	guarantor party	The target person or organization contractually recognized by the issuer as a participant who has assumed fiscal responsibility for another person's financial obligations by guaranteeing to pay for amounts owed to a particular account Example: The subscriber of the patient's health insurance policy signs a contract with the provider to be fiscally responsible for the patient billing account balance amount owed.
RESP	responsible party	The person or organization that has primary responsibility for the act. The responsible party is not necessarily present in an action, but is accountable for the action through the power to delegate, and the duty to review actions with the performing actor after the fact. This responsibility may be ethical, legal, contractual, fiscal, or fiduciary in nature. Example: A person who is the head of a biochemical laboratory; a sponsor for a policy or government program.

**Participation.functionCode[CD]:** An optional code specifying additional detail about the function that the Participation has in the Act, if such detail is not implied by the Participation.typeCode.

Examples: First surgeon, second surgeon (or first assistant surgeon, the one facing the primary surgeon), second assistant (often standing next to the primary surgeon), potentially a third assistant, scrub nurse, circulating nurse, nurse assistant, anesthetist, attending anesthetist, anesthesia nurse, technician who positions the patient, postoperative watch nurse, assistants, midwives, students, etc.

Constraints: This code, if specified at all, must not be in conflict with the Participation.typeCode. Automated systems should not functionally depend on this code.

No HL7 standard specification may be written to technically depend on the functionCode. If that is deemed necessary, such concepts should be defined in the Participation.typeCode instead.

Discussion: This code can accommodate the huge variety and nuances of functions that participants may perform in the act. The number and kinds of functions applicable depends on the special kind of act. E.g., each operation and method may require a different number of assistant surgeons or nurses.

## Observation extends Act

An act that is intended to result in new information about a subject. The main difference between observations and other acts is that it has a value attribute that is used to state the result of the assessment action described in Act.code.

Discussion: Structurally, many observations are name-value-pairs, where the Observation.code (inherited from Act) is the name and the Observation.value is the value of the property. Such a construct is also known as a "variable" (a named feature that can assume a value); hence, the Observation class is always used to hold generic name-value-pairs or variables, even though the variable valuation may not be the result of an elaborate observation method. It may be a simple answer to a question or it may be an assertion or setting of a parameter.

As with all Act statements, Observation statements describe what was done, and in the case of Observations, this includes a description of what was actually observed ("results" or "answers"); and those "results" or "answers" are part of the observation and not split off into other objects.

The method of action is asserted by the Observation classCode or its subclasses at the least granular level, by the Observation.code attribute value at the medium level of granularity, and by the attribute value of observation.methodCode when a finer level of granularity is required. The method in whole or in part may also appear in the attribute value of Observation.value when using coded data types to express the value of the attribute. Relevant aspects of methodology may also be restated in value when the results themselves imply or state a methodology.

An observation may consist of component observations each having their own Observation.code and Observation.value. In this case, the composite observation may not have an Observation.value for itself. For instance, a white blood cell count consists of the sub-observations for the counts of the various granulocytes, lymphocytes and other normal or abnormal blood cells (e.g., blasts). The overall white blood cell count Observation itself may therefore not have a value by itself (even though it could have one, e.g., the sum total of white blood cells). Thus, as long as an Act is essentially an Act of recognizing and noting information about a subject, it is an Observation, regardless of whether it has a simple value by itself or whether it has sub-observations.

Even though observations are professional acts (see Act) and as such are intentional actions, this does not require that every possible outcome of an observation be pondered in advance of it being actually made. For instance, differential white blood cell counts (WBC) rarely show blasts, but if they do, this is part of the WBC observation even though blasts might not be predefined in the structure of a normal WBC.

Clinical documents commonly have 'Subjective' and 'Objective' findings, both of which are kinds of Observations. In addition, clinical documents commonly contain 'Assessments', which are also kinds of Observations. Thus, the establishment of a diagnosis is an Observation.

The Observation.code (or the reference to the Observation definition) specifies the kind of diagnosis (e.g. "chief complaint" or "discharge diagnosis") and the value specifies the diagnosis code or symptom code.

Examples of Observation:

**Observation.value**[ANY]: Information that is assigned or determined by the observation action.

Constraints: The Observation.value, if not otherwise constrained, can be of any data type.

The appropriate data type of the Observation.value varies with the kind of Observation and can generally be described in Observation definitions or in a simple relation that pairs Act.codes to value data types.

The following guidelines govern the choice of the appropriate value data type.

(1) Quantitative measurements use the data type Physical Quantity (PQ) in general. A PQ is essentially a real number with a unit. This is the general preference for all numeric values, subject to a few exceptions listed below.

Numeric values must not be communicated as simply a character string (ST).

(2) Titer (e.g., 1:64) and very few other ratios use the data type Ratio (RTO). For titers, the ratio would be a ratio of two integer numbers (e.g., 1:128). Other ratios may relate different quantitative data types, such as a "price" specified in Physical Quantity over Monetary Amount.

Sometimes by local conventions titers are reported as just the denominator (e.g., 32 instead of 1/32). Such conventions are confusing and should be converted into correct ratios in HL7 messages.

(3) Index values (a number without unit) uses the Real Number (REAL) data type. When a quantity does not have a proper unit, one can just send the number as a real number. Alternatively one can use a PQ with a dimensionless unit (e.g., 1 or %). An integer number should only be sent when the measurement is by definition an integer, which is an extremely rare case and then is most likely an ordinal (see below).

(4) Ranges (e.g., <3; 12-20) must be expressed as Interval of Physical Quantity (IVL<PQ>) or intervals of other quantity data types.

Sometimes such intervals are used to report the uncertainty of measurement value. For uncertainty there are dedicated data type extensions available.

(5) Ordinals (e.g., +, ++, +++; or I, IIa, IIb, III, IV) use the Coded Ordinal (CO) data type.

(6) Nominal results ("taxons", e.g., organism type). use any of the coded data types (CD, CE) that specify at least a code and a coding system, and optionally original text, translations to other coding systems and sometimes qualifiers.

(7) Imaging results use the Encapsulated Data (ED) type. The encapsulated data type allows one to send an image (e.g., chest X-ray) or a movie (e.g., coronary angiography, cardiac echo) as alternatively inline binary data or as a reference to an external address where the data can be downloaded on demand.

(8) Waveforms can be sent using the Correlated Observation Sequences templates that provide all the data in an HL7 framework. In addition one can use the Encapsulated Data (ED) data type to send waveforms in other than HL7 formats or to refer to waveform data for on-demand download.

(9) The character string data type may exceptionally be used to convey formalized expressions that do not fit in any of the existing data types. However, the string data type must not be used if the meaning can be represented by one of the existing data types.

		e.g., a pacemaker, a prosthesis, an insulin injection equipment (pen), etc. Such material may need to be restocked after he service.
RDV	reusable device	A device that does not change ownership due to the service, i.e., a surgical instrument or tool or an endoscope. The distinction between reuseable and non-reuseable must be made in order to know whether material must be re-stocked.
SBJ	subject	The principle target that the service acts on. E.g. the patient in physical examination, a specimen in a lab observation. May also be a patient's family member (teaching) or a device or room (cleaning, disinfecting, housekeeping). Note: not all direct targets are subjects, consumables, and devices used as tools for a service are not subjects. However, a device may be a subject of a maintenance service.
SPC	specimen	The subject of non-clinical (e.g. laboratory) observation services is a specimen.
BBY	baby	In an obstetric service, the baby.
CSM	consumable	Target that is taken up, is diminished, and disappears in the service.
CSM	consumable	Target that is taken up, is diminished, and disappears in the service.
DON	donor	In some organ transplantation services and rarely in transfusion services a donor will be a target participant in the service. However, in most cases transplantation is decomposed in three services: explantation, transport, and implantation. The identity of the donor (recipient) is often irrelevant for the explantation (implantation) service.
PRD	product	A material target that is brought forth (produced) in the service (e.g., specimen in a specimen collection, access or drainage in a placement service, medication package in a dispense service). It doesn't matter whether the material produced had existence prior to the service, or whether it is created in the service (e.g., in supply services the product is taken from a stock).
LOC	location	The facility where the service is done. May be a static building (or room therein) or a moving location (e.g., ambulance, helicopter, aircraft, train, truck, ship, etc.)
DST	destination	The destination for services. May be a static building (or room therein) or a movable facility (e.g., ship).
ELOC	entry location	A location where data about an Act was entered.
ORG	origin	Corresponds to the class Organization
RML	remote	Some services take place at multiple concurrent locations (e.g., telemedicine, telephone consultation). The location where the principal performing actor is located is taken as the primary location (LOC) while the other location(s) are considered "remote."
VIA	via	For services, an intermediate location that specifies a path between origin an destination.
VRF	verifier	A person who verifies the correctness and appropriateness of the service (plan, order, event, etc.) and hence takes on accountability.

		answers questions about the patient's history). For history questions, the patient is logically an informant, yet the informant of history questions is implicitly the subject.
WIT	witness	Only with service events. A person witnessing the action happening without doing anything. A witness is not necessarily aware, much less approves of anything stated in the service event. Example for a witness is students watching an operation or an advanced directive witness.
IRCP	information recipient	A party, who may or should receive or who has received the Act or subsequent or derivative information of that Act. Information recipient is inert, i.e., independent of mood." Rationale: this is a generalization of a too diverse family that the definition can't be any more specific, and the concept is abstract so one of the specializations should be used.
REFB	Referred By	A participant (e.g. provider) who has referred the subject of an act (e.g. patient). Typically, a referred by participant will provide a report (e.g. referral).
REFT	Referred to	The person who receives the patient
PRCP	primary information recipient	Information recipient to whom an act statement is primarily directed. E.g., a primary care provider receiving a discharge letter from a hospitalist, a health department receiving information on a suspected case of infectious disease. Multiple of these participations may exist on the same act without requiring that recipients be ranked as primary vs. secondary.
TRC	tracker	A secondary information recipient, who receives copies (e.g., a primary care provider receiving copies of results as ordered by specialist).
NOT	urgent notification contact	An information recipient to notify for urgent matters about this Act. (e.g., in a laboratory order, critical results are being called by phone right away, this is the contact to call; or for an inpatient encounter, a next of kin to notify when the patient becomes critically ill).
PRF	performer	A person who actually and principally carries out the action. Need not be the principal responsible actor, e.g. a surgery resident operating under supervision of attending surgeon, and may be the patient in self-care, e.g. fingerstick blood sugar. The traditional order filler is a performer. This information should accompany every service event.
DIST	distributor	Distributes material used in or generated during the act.
PPRF	primary performer	The principal or primary performer of the act.
SPRF	secondary performer	A person assisting in an act through his substantial presence and involvement This includes: assistants, technicians, associates, or whatever the job titles may be.
DIR	direct target	Target that is substantially present in the service and which is directly affected by the service action (includes consumed material, devices, etc.).
DEV	device	Corresponds to the class Device
NRD	non-reuseable device	A device that changes ownership due to the service,

(10) Timestamps should not be sent in Observations if there are more appropriate places to send those, e.g., usually as Act.effectiveTime of some act. (E.g., "specimen received in lab" is in the effectiveTime of an Act describing the specimen transport to the lab, not in an Observation.

(11) Sets of values of any data type, enumerated sets as well as intervals, are often used for Observation criteria (event-criterion mood) to specify "normal ranges" or "decision ranges" (for alerts) etc.

(12) For sequences of observations (repeated measurements of the same property during a relatively short time) a Sequence (LIST) data type is used. Refer to the Correlated Observation Sequences specification for more detail.

(13) Uncertainty of values is specified using the Probability and Probability Distribution data type extensions (UVP, PPD). If a statistical sample is reported with absolute frequencies of categories a Bag collection (BAG) can be used efficiently.

**Observation.interpretationCode[SET<CE>]:** One or more codes specifying a rough qualitative interpretation of the observation, such as "normal", "abnormal", "below normal", "change up", "resistant", "susceptible", etc.

Discussion: These interpretation codes are sometimes called "abnormal flags", however, the judgment of normalcy is just one of the common rough interpretations, and is often not relevant. For example, the susceptibility interpretations are not about "normalcy", and for any observation of a pathologic condition, it does not make sense to state the normalcy, since pathologic conditions are never considered "normal."

**Observation.methodCode[SET<CE>]:** A code that provides additional detail about the means or technique used to ascertain the observation.

Examples: Blood pressure measurement method: arterial puncture vs. sphygmomanometer (Riva-Rocci), sitting vs. supine position, etc.

Constraints: In all observations the method is already partially specified by the Act.code. In this case, the methodCode need not be used at all. The methodCode may still be used to identify this method more clearly in addition to what is implied from the Act.code. However, an information consumer system or process should not depend on this methodCode information for method detail that is implied by the Act.code.

If the methodCode is used to express method detail that is also implied by the Act.code, the methodCode must not be in conflict with the implied method of the Act.code.

Discussion: In all observations the method is already partially specified by simply knowing the kind of observation (observation definition, Act.code) and this implicit information about the method does not need to be specified in Observation.methodCode. For example, many LOINC codes are defined for specific methods as long as the method makes a practical difference in interpretation. Thus, using LOINC, the difference between susceptibility studies using the "minimal inhibitory concentration" (MIC) or the "agar diffusion method" (Kirby-Baur) are specifically assigned different codes. The methodCode therefore is only an additional qualifier to specify what may not be known already from the Act.code.

Also, some variances in methods may be tied to the particular device used. The methodCode should not be used to identify the specific device or test-kit material used in the observation. Such information about devices or test-kits should be associated with the observation as "device" participations.

**Observation.targetSiteCode[SET<CD>]:** A code specifying detail about the anatomical site or system that is the focus of the observation if this information is not already implied by the observation definition or Act.code.

Constraints: The targetSiteCode value, if specified, must not conflict with what is implied about the target site or system from the observation definition and the Act.code.

Discussion: Most observation target sites are implied by the observation definition and Act.code, or Observation.value. For example, "heart murmur" always has the heart as target. This attribute is used only when the observation target site needs to be refined, to distinguish right and left etc.

If the subject of the Observation is something other than a human patient or animal, the attribute is used analogously to specify a structural landmark of the thing where the act focuses. For example, if the subject is a lake, the site could be inflow and outflow, etc. If the subject is a lymphatic node, "hilus," "periphery," etc. would still be valid target sites.

## DiagnosticImage extends Act.Observation

An observation whose immediate and primary outcome (post-condition) is new data about a subject, in the form of visualized images.

**DiagnosticImage.subjectOrientationCode[CE]:** A code specifying qualitatively the spatial relation between an imaged object and the imaging film or detector.

## PublicHealthCase extends Act.Observation

A public health case is an Observation representing a condition or event that has a specific significance for public health. Typically it involves an instance or instances of a reportable infectious disease or other condition. The public health case can include a health-related event concerning a single individual or it may refer to multiple health-related events that are occurrences of the same disease or condition of interest to public health. An outbreak involving multiple individuals may be considered as a type of public health case. A public health case definition (Act.moodCode = "definition") includes the description of the clinical, laboratory, and epidemiologic indicators associated with a disease or condition of interest to public health. There are case definitions for conditions that are reportable, as well as for those that are not. There are also case definitions for outbreaks. A public health case definition is a construct used by public health for the purpose of counting cases, and should not be used as clinical indications for treatment. Examples include AIDS, toxic-shock syndrome, and salmonellosis and their associated indicators that are used to define a case.

**PublicHealthCase.detectionMethodCode[CE]:** Code for the method by which the public health department was made aware of the case. Includes provider report, patient self-referral, laboratory report, case or outbreak investigation,

		excessive presence, or (in deficiency diseases) relative absence is essential, in whole or in part, for the occurrence of a condition. Constraint: The use of this participation is limited to observations.
COV	coverage target	The target participation for an individual in a health care coverage act in which the target role is either the policy holder of the coverage, or a covered party under the coverage.
GUAR	guarantor party	The target person or organization contractually recognized by the issuer as a participant who has assumed fiscal responsibility for another person's financial obligations by guaranteeing to pay for amounts owed to a particular account Example: The subscriber of the patient's health insurance policy signs a contract with the provider to be fiscally responsible for the patient billing account balance amount owed.
HLD	holder	Participant who possesses an instrument such as a financial contract (insurance policy) usually based on some agreement with the author.
RCV	receiver	The person (or organization) who receives the product of an Act.
RCT	record target	The record target indicates whose medical record holds the documentation of this act. This is especially important when the subject of a service is not the patient himself.
ParticipationInformationGenerator		Parties that may or should contribute or have contributed information to the Act. Such information includes information leading to the decision to perform the Act and how to perform the Act (e.g., consultant), information that the Act itself seeks to reveal (e.g., informant of clinical history), or information about what Act was performed (e.g., informant witness).
TRANS	Transcriber	An entity entering the data into the originating system. The data entry entity is collected optionally for internal quality control purposes. This includes the transcriptionist for dictated text transcribed into electronic form.
ENT	data entry person	Corresponds to the class Entity
AUT	author (originator)	A party that originates the Act and therefore has responsibility for the information given in the Act and ownership of this Act. Example: the report writer, the person writing the act definition, the guideline author, the placer of an order, the EKG cart (device) creating a report etc. Every Act should have an author. Authorship is regardless of mood always actual authorship. The author (or authors) has ownership of the Acts that they originate. This means that a party other than this author (or those authors) cannot cancel, abort, complete or modify the state or content of this Act in any other way. A party other than the author may only amend, reverse, override, replace, or follow up in other ways on this Act, whereby the Act remains intact and is linked to another Act authored by that other party.
INF	informant	A source of reported information (e.g., a next of kin who

**Participation.typeCode**[CS,mandatory]: A code specifying the kind of Participation or involvement the Entity playing the Role associated with the Participation has with regard to the associated Act.

Constraints: The **Participation.typeCode** contains only categories that have crisp semantic relevance in the scope of HL7. It is a coded attribute without exceptions and no alternative coding systems allowed.

Code	Name	Definition
PART	Participation	Indicates that the target of the participation is involved in some manner in the act, but does not qualify how. This should not be used except when no more specific participation type is known or when the participation type is further clarified elsewhere. It should not be used lightly, and should never be used as a "placeholder" when a more appropriate specific type does not yet exist.
ParticipationAncillary		Participations related, but not primary to an act. The Referring, Admitting, and Discharging practitioners must be the same person as those authoring the ControlAct event for their respective trigger events.
ADM	admitter	The practitioner who is responsible for admitting a patient to a patient encounter.
ATND	attender	The practitioner that has responsibility for overseeing a patient's care during a patient encounter.
CALLBCK	callback contact	A person or organization who should be contacted for follow-up questions about the act in place of the author.
CON	consultant	An advisor participating in the service by performing evaluations and making recommendations.
DIS	discharger	The practitioner who is responsible for the discharge of a patient from a patient encounter.
ESC	escort	Only with Transportation services. A person who escorts the patient.
REF	referrer	A person having referred the subject of the service to the performer (referring physician). Typically, a referring physician will receive a report.
IND	indirect target	Target that is not substantially present in the act and which is not directly affected by the act, but which will be a focus of the record or documentation of the act.
BEN	beneficiary	Target on behalf of whom the service happens, but that is not necessarily present in the service. Can occur together with direct target to indicate that a target is both, as in the case where the patient is the indirect beneficiary of a service rendered to a family member, e.g. counseling or given home care instructions. This concept includes a participant, such as a covered party, who derives benefits from a service act covered by a coverage act. Note that the semantic role of the intended recipient who benefits from the happening denoted by the verb in the clause. Thus, a patient who has no coverage under a policy or program may be a beneficiary of a health service while not being the beneficiary of coverage for that service.
CAGNT	causative agent	Definition: A factor, such as a microorganism, chemical substance, or form of radiation, whose presence,

contact investigation, active surveillance, routine physical, prenatal testing, perinatal testing, prison entry screening, occupational disease surveillance, medical record review, etc.

**PublicHealthCase.transmissionModeCode**[CE]: Code for the mechanism by which disease was acquired by the living subject involved in the public health case. Includes sexually transmitted, airborne, bloodborne, vectorborne, foodborne, zoonotic, nosocomial, mechanical, dermal, congenital, environmental exposure, indeterminate.

**PublicHealthCase.diseaseImportedCode**[CE]: Code that indicates whether the disease was likely acquired outside the jurisdiction of observation, and if so, the nature of the inter-jurisdictional relationship. Possible values include not imported, imported from another country, imported from another state, imported from another jurisdiction, and insufficient information to determine.

## Procedure extends Act

An Act whose immediate and primary outcome (post-condition) is the alteration of the physical condition of the subject.

Examples: Procedures may involve the disruption of some body surface (e.g. an incision in a surgical procedure) conservative procedures such as reduction of a luxated joint, including physiotherapy such as chiropractic treatment, massage, balneotherapy, acupuncture, shiatsu, etc. Outside of clinical medicine, procedures may be such things as alteration of environments (e.g. straightening rivers, draining swamps, building dams) or the repair or change of machinery etc.

Discussion: Applied to clinical medicine, procedure is but one among several types of clinical activities such as observation, substance-administrations, and communicative interactions (e.g. teaching, advice, psychotherapy, represented simply as Acts without special attributes). Procedure does not subsume those other activities nor is procedure subsumed by them. Notably Procedure does not comprise all acts of whose intent is intervention or treatment. Whether the bodily alteration is appreciated or intended as beneficial to the subject is likewise irrelevant, what counts is that the act is essentially an alteration of the physical condition of the subject.

The choice between representations for real activities is based on whether the specific properties of procedure are applicable and whether the activity or activity step's necessary post-condition is the physical alteration. For example, taking an x-ray image may sometimes be called "procedure", but it is not a Procedure in the RIM sense for an x-ray image is not done to alter the physical condition of the body.

Many clinical activities combine Acts of Observation and Procedure nature into one composite. For instance, interventional radiology (e.g., catheter directed thrombolysis) does both observing and treating, and most surgical procedures include conscious and documented Observation steps. These clinical activities therefore are best represented by multiple component acts each of the appropriate type.

**Procedure.methodCode[SET<CE>]:** Identifies the means or technique used to perform the procedure.

Discussion: For any Procedure there may be several different methods to achieve by and large the same result, but may be important to know when interpreting a report more thoroughly (e.g., cholecystectomy: open vs. laparoscopic). Method concepts can be "pre-coordinated" in the Act definition. There are many possible methods, which all depend heavily on the particular kind of Procedure, so that defining a vocabulary domain of all methods is difficult. However, a code system might be designed such that it specifies a set of available methods for each defined Procedure concept. Thus, a user ordering a Procedure could select one of several variances of the act by means of the method code. Available method variances may also be defined in a master service catalog for each defined Procedure. In act definition records (Act.moodCode = DEF) the methodCode attribute is a set of all available method codes that a user may select while ordering, or expect while receiving results.

**Procedure.approachSiteCode[SET<CD>]:** The anatomical site or system through which the procedure reaches its target (see targetSiteCode).

Examples:

Nephrectomy can have a trans-abdominal or a primarily retroperitoneal approach

An arteria pulmonalis catheter targets a pulmonary artery but the approach site is typically the vena carotis interna or the vena subclavia, at the neck or the fossa subclavia respectively.

For non-invasive procedures, e.g., acupuncture, the approach site is the punctured area of the skin.

Discussion: If the subject of the Act is something other than a human patient or animal, the attribute is used analogously to specify a structural landmark of the thing where the act focuses.

Some approach sites can also be "pre-coordinated" in the Act definition, so that there is never an option to select different body sites. The same information structure can handle both the pre-coordinated and the post-coordinated approach.

**Procedure.targetSiteCode[SET<CD>]:** The anatomical site or system that is the focus of the procedure.

Examples:

A Nephrectomy's target site is the right or left kidney

An arteria pulmonalis catheter targets a pulmonary artery.

For non-invasive procedures, e.g., acupuncture, the target site is the organ/system that is sought to be influenced (e.g., "the liver").

Discussion: If the subject of the Act is something other than a human patient or animal, the attribute is used analogously to specify a structural landmark of the thing where the act focuses.

Some target sites can also be "pre-coordinated" in the Act definition, so that there is never an option to select different body sites. The same information structure can handle both the pre-coordinated and the post-coordinated approach.

## Participation

An association between an Act and a Role with an Entity playing that Role. Each Entity (in a Role) involved in an Act in a certain way is linked to the act by one Participation-instance. The kind of involvement in the Act is specified by the Participation.typeCode.

Examples: 1) Performers of acts (surgeons, observers, practitioners).

2) Subjects of acts, patient, devices

3) Locations

4) Author, co-signer, witness, informant

5) Addressee, information recipient

Rationale: Participations represent performance while Roles represent competence. Participations specify the actual performance of an Entity in a certain Act, and thus a Participation is scoped by its specific Act. Conversely, Roles specify the competence of an Entity (i.e., how it may principally participate in what kinds of acts) irrespective of any individual Act.

For example, the professional credentials of a person (Role) may be quite different from what a person actually does (Participation). A common example is interns and residents performing anesthesia or surgeries under (more or less) supervision of attending specialists.

An Act can have multiple participations of the same type, which indicates collaborative activities or group involvement. The notion of multiple performing Participations partially overlaps with sub-activities (Act components). Whenever multiple actors are involved in an act, each actor performs a different task (with the extremely rare exception of such symmetrical activities as two people pulling a rope from either end). Thus, the presence of multiple actors could be equally well represented as an act consisting of sub-acts where each act would have only one performing actor

For example, a record of a surgical service may include the actors of type: (a) consentor, (b) primary surgeon, and (c) anesthetist. These three actors really perform different tasks, which can be represented as three related acts: (a) the consent, (b) the surgery proper, and (c) the anesthesia act in parallel to the surgery. If we used the sub-acts, the consentor, surgeon and anesthetist could simply be of actor type "performer." Thus the more sub-acts we use, the fewer different actor types we need to distinguish; conversely, the fewer sub-acts we use, the more distinct actor types we need.

As a rule of thumb, sub-tasks should be considered instead of multiple actors when each sub-task requires special scheduling, or billing, or if overall responsibilities for the sub-tasks are different. In most cases, however, human resources are scheduled by teams (instead of individuals), billing tends to lump many sub-tasks together into one position, and overall responsibility often rests with one attending physician, chief nurse, or head of department. This model allows both the multi-actor and the multi-act approach to represent the business reality, with a slight bias towards "lumping" minor sub-activities into the overall act.



distributor, it is not necessary to use the Access role class, since the material attributes will usually suffice to describe and identify the product for the order. But the Access role is used to communicate about the maintenance, intake/outflow, and due replacement of tubes and drains.

**Access.approachSiteCode[CD]:** A coded specification of the anatomic site where the Access (cannula, line or drain) first enters the body and, if applicable, a routing from the first entrance to the target site.

Examples: For example an arteria pulmonalis catheter targets a pulmonary artery but the access approach site is typically the vena carotis interna at the neck, or the vena subclavia at the fossa subclavia.

Constraints: The coding system is the same as for Procedure.approachSiteCode; indeed the Access.approachSiteCode has been copied from the Procedure class into the Access role class. The value of the Access.approachSiteCode should be identical to the value of the Procedure.approachSiteCode of an associated access placement procedure.

Rationale: Since accesses are typically placed for a considerable period of time and since the access is used as a resource of many acts, the access approach site becomes an important identifying attribute of the access itself (as opposed to merely being an attribute of the placement procedure).

**Access.targetSiteCode[CD]:** A coded specification of the site or body compartment into which access is being provided, i.e., the compartment into which material is administered or from which it is collected.

Examples: For example, a pulmonary artery catheter will have the target site "arteria pulmonalis".

Constraints: The coding system is the same as for Procedure.targetSiteCode; indeed the Access.targetSiteCode has been copied from the Procedure class into the Access role class. The value of the Access.targetSiteCode should be identical to the value of the Procedure.targetSiteCode of an associated access placement procedure.

Rationale: Since accesses are typically placed for a considerable period of time and since the access is used as a resource of many acts, the target site becomes an important identifying attribute of the access itself (as opposed to merely being an attribute of the placement procedure). The target site is important information that determines what kinds of substances may or may not be administered (e.g., special care to avoid medication injections into an arterial access).

**Access.gaugeQuantity[PQ]:** A measure for the inner diameter of the Access (e.g. the lumen of the tube).

## SubstanceAdministration extends Act

The act of introducing or otherwise applying a substance to the subject.

Discussion: The effect of the substance is typically established on a biochemical basis, however, that is not a requirement. For example, radiotherapy can largely be described in the same way, especially if it is a systemic therapy such as radio-iodine. This class also includes the application of chemical treatments to an area.

Examples: Chemotherapy protocol; Drug prescription; Vaccination record

**SubstanceAdministration.routeCode[CE]:** The the physiological path or route for introducing the therapeutic material into or onto the subject.

Discussion: If the route requires further specification, both the site of administration (administrationSiteCode) and the method of administration (methodCode) may be used. For example, if the routeCode is intravenous or intra-muscular, it may be necessary to specify the precise site, with approachSiteCode, (e.g., right forearm or left deltoid muscle respectively) and the precise method of administration, with methodCode, (e.g., "slow bolus injection" or "Z-track injection" respectively).

Route, site of administration (administrationSiteCode), method of administration (methodCode) and the device used in administration are closely related. All four (if present) must be closely coordinated and in agreement. In some cases, the coding system used to specify one may pre-coordinate one or more of the others.

When the medication is delivered to an environmental site, or a location, the route code indicates a site on its "body".

Examples: per os (PO), sublingual (SL), rectal (PR), per inhalationem (IH), ophtalmic (OP), nasal (NS), otic (OT), vaginal (VG), intra-dermal (ID), subcutaneous (SC), intra-venous (IV), and intra-cardial (IC)

**SubstanceAdministration.approachSiteCode[SET<CD>]:** The detailed anatomical site where the medication enters or is applied to the subject.

Discussion: This attribute is only needed if the routeCode requires further specification. For example, if the routeCode is "by mouth", no further specification of approach site is needed. If, however, routeCode is intravenous or intra-muscular, the precise site may be specified in this attribute (e.g., right forearm or left deltoid muscle respectively).

Route, site of administration (approachSiteCode) method of administration (methodCode) and the device used in administration are closely related. All four (if present) must be closely coordinated and in agreement. In some cases, the coding system used to specify one may pre-coordinate one or more of the others.

**SubstanceAdministration.doseQuantity[IVL<PQ>]:** The amount of the therapeutic agent or other substance given at one administration event.

Discussion: The dose may be specified either as a physical quantity of active ingredient (e.g. 200 mg) or as the count of administration-units (e.g., tablets, capsules, "eaches"). Which approach is chosen depends upon the player of the 'consumable' participation (which identifies the drug being administered). If the consumable has a non-countable dosage form (e.g. measured in milligram or

litre) then the dose must be expressed in those units. If the consumable has a countable dosage form (tablets, capsules, "eaches"), then the dose must be expressed as a dimensionless count (i.e., with no other unit of measure specified).

The unit of measure is restricted to a measurable unit such as milliliters and milligrams. Non-measurable, but countable units such as tablets and capsules must not be specified using the unit component of the PQ data type, except as an annotation, marked by {xxx}. Refer to Data Types Part II Unabridged Specification, Appendix A :Unified Code for Units of Measure.

**SubstanceAdministration.rateQuantity**[IVL<PQ>]: Identifies the speed with which the substance is introduced into the subject. Expressed as a physical (extensive) quantity over elapsed time (e.g., examples are 100 mL/h, 1 g/d, 40 mmol/h, etc.)

Discussion: This is appropriate for continuously divisible dose forms (e.g., liquids, gases). If specified as an interval, the rate should be anywhere in the specified range. This attribute is specified as a extensive physical quantity over elapsed time, i.e., a quantity that could be used for the doseQuantity divided by a duration quantity.

**SubstanceAdministration.doseCheckQuantity**[SET<RTO>]: This attribute identifies the expected quantity to be consumed over a period of time. It is used as a verification check on the values specified for other values.

Discussion: This attribute should not generally be used; it is only provided for a special purpose. In some countries, especially Japan, there is a regulatory requirement to note the total daily dose on the prescription and associated documentation. The purpose of this requirement obviously is to encourage and facilitate reviewing the total dose prescribed to avoid over- (or under-) dosage.

Examples:

With Erythromycin 250 mg 1 tablet 3 times a day one can calculate the total daily dose as "doseCheckQuantity = doseQuantity (1) \* Ingredient.quantity (250 mg) \* effectiveTime (3 /d) = 750 mg/1d."

For an intravenous example, this term would be "doseCheckQuantity = doseQuantity (100 ml) \* Ingredient.quantity (5mg/L) / rateQuantity (1 h) = 0.5 mg/h" which can be calculated on a daily basis as "doseCheckQuantity = 0.5 mg/h \* 24 h/d = 12 mg/d."

Rationale: Rather than defining a "total daily dose" attribute as HL7 v2.3 did, we define this general purpose doseCheckQuantity attribute of the Ratio (RTO) data type.

Constraints: invariant(SubstanceAdministration med, RTO max) where med.doseCheckQuantity.contains(max)  
{max.numerator.compares(med.doseQuantity); max.denominator.compares(1 s);} Numerator must be in units comparable to doseQuantity and denominator must be a measurement of time.

**SubstanceAdministration.maxDoseQuantity**[SET<RTO>]: Identifies the maximum total quantity of a therapeutic substance that may be administered to a subject over the period of time.

occupation that doesn't necessarily correspond to any scheme for categorizing occupation. Trading partners that need a coded standard should be using Employee "occupation" attribute.

**Employee.jobClassCode**[CE]: A code qualifying the employment regarding frequency or periodicity, such as, full-time vs. part-time.

**Employee.occupationCode**[CE]: A code qualifying the classification of kind-of-work based upon a recognized industry or jurisdictional standard.

**Employee.salaryTypeCode**[CE]: A code specifying the method used by the employer to compute the employee's salary or wages. For example, hourly, annual, or commission.

**Employee.salaryQuantity**[MO]: The amount paid in salary or wages to the employee according to the computation method specified in salaryTypeCode. E.g., if the salaryTypeCode is "hourly" the salaryQuantity specifies the hourly wage.

**Employee.hazardExposureText**[ED]: The type of hazards associated with the work performed by the employee for the employer. For example, asbestos, infectious agents.

**Employee.protectiveEquipmentText**[ED]: Protective equipment needed for the job performed by the employee for the employer. For example, safety glasses, hardhat.

## LicensedEntity extends Role

A Role of an Entity (player) that is accredited with licenses or qualifications (diplomas) certifying that this Entity may properly perform specific functions.

Examples: 1.) A paramedical training diploma

2.) The certification of equipment

3.) A license to a Person or Organization to provide health services.

Constraints: The scoper is the Organization that issues the credential.

**LicensedEntity.recertificationTime**[TS]: The date recertification is required.

## Access extends Role

A role played by a device when the device is used to administer therapeutic agents (medication and vital elements) into the body, or to drain material (e.g., exudates, pus, urine, air, blood) out of the body.

Discussion: In general, Access is a Role of a ManufacturedMaterial or Device, something specifically manufactured or created to serve that purpose, such as a catheter or cannula inserted into a compartment of the body.

Devices in the role of an Access are typically used in intake/outflow observations, and in medication routing instructions. Microbiologic observations on the material itself or on fluids coming out of a drain, are also common.

Rationale: The Access role primarily exists in order to describe material actually deployed as an access, and not so much the fresh material as it comes from the manufacturer. For example, in supply ordering a box of catheters from a

4.) This package (scoper) contains 100 (numerator) pills (player).

Discussion: In composition-relationships (e.g., has-parts, has-ingredient, has-content) the Role.quantity attribute specifies that a numerator amount of the target entity is comprised by a denominator amount of the source entity of such composition-relationship. For example, if a box (source) has-content 10 eggs (target), the relationship quantity is 10:1; if 0.6 mL contain 75 mg of FeSO<sub>4</sub> the ingredient relationship quantity is 75 mg : 0.6 mL. Both numerator and denominator must be amount quantities (extensive quantities, i.e., a count number, mass, volume, amount of substance, amount of energy, etc.).

**Role.positionNumber**[LIST<INT>]: An integer specifying the position of the Entity playing the Role with respect to the Entity that scopes the Role.

Discussion: This attribute is primarily used with respect to containment roles. For example, some containers have discrete positions in which content may be located. Depending on the geometry of the container, the position may be referenced as a scalar ordinal number, or as a vector of ordinal numbers (coordinates). Coordinates always begin counting at 1.

Some containers may have customary ways of referring to the positions or no way at all. In the absence of any specific regulation for a specific container type, the rule of thumb is that the coordinate that is changed earlier is positioned first. For an automated blood chemistry analyzer with a square shaped tray, this means that the first coordinate is the one in which direction the tray moves at each step and the second coordinate is the one in which the tray moves only every 10 (or so) steps.

## Patient extends Role

A Role of a LivingSubject (player) as a recipient of health care services from a healthcare provider (scoper).

**Patient.veryImportantPersonCode**[CE]: A code specifying the Patient's special status granted by the scoper organization, often resulting in preferred treatment and special considerations. For example, board member, diplomat, etc.

## Employee extends Role

A role played by a person who is associated with an organization (the employer, scoper) to receive wages or salary.

Discussion: The purpose of the role is to identify the type of relationship the employee has to the employer rather than the nature of the work actually performed (contrast with AssignedEntity).

**Employee.jobCode**[CE]: A code specifying an employer-defined categorization of work, used primarily for payroll/remuneration purposes and not necessarily indicative of an employee's specific work assignments, responsibilities and privileges. Examples are accountant, programmer analyst, patient care associate, staff nurse, etc.

**Employee.jobTitleName**[SC]: The title of the job held, for example, Vice President, Senior Technical Analyst. This is a local name for the employee's

Discussion: This attribute is particularly useful where the allowed dosage is specified as a range or the timing is variable or PRN (as needed). It provides an overall limit on the quantity that may be administered in a period of time. Multiple occurrences of maxDoseQuantity may be used to indicate different limits over different time periods.

Examples: 500 mg/day; 1200mg/week.

Constraints: invariant(SubstanceAdministration med, RTO max) where med.maxDoseQuantity.contains(max)  
{max.numerator.compares(med.doseQuantity); max.denominator.compares(1 s);} Numerator must be in units comparable to doseQuantity and denominator must be a measurement of time.

**SubstanceAdministration.administrationUnitCode**[CE]: A code for the administered thing taken from a larger whole. Used if the consumable material is specified as a larger whole but the doseQuantity relates to a specific portion of it rather than the entire consumable material.

Example: The ordering system only has a code for "Budesonide Metered Dose Inhaler" but the dose is to be measured in "number of actuations".

Rationale: In the given example, without an administrationUnitCode the doseQty = 1 would mean that the entire inhaler bottle is to be emptied upon a single administration event. The administrationUnitCode signifying "actuation" (or "puff") specifies that the doseQty relates to this fraction of the medication rather than to the whole.

Constraints:

(1) This attribute should be used if and only if the material specified as the player of the Role attaching to the consumable participation is not in itself the finished dose form to be administered but a larger whole, pack, etc.

(2) IF the material so specified is the proper administered dose form, such as a tablet, capsule, etc. THEN this attribute should be valued NULL (not applicable).

(3) IF the material so specified is an amorphous substance (liquid, gas, powder, etc.) to be measured as a volume, mass, etc., THEN this attribute should remain NULL (not applicable).

(4) IF the material so specified is a container, and the content is to be measured as a volume, mass, etc., THEN this attribute should be specified as "measured portion".

**SubstanceAdministration.methodCode**[SET<CD>]: Identifies the means or technique used to perform the particular substance administration.

Discussion: This attribute is only needed if the routeCode requires further specification. For example, if the routeCode is "by mouth", no further information about the method may be required. If, however, routeCode is intravenous or intra-muscular, the precise method of administration may be specified in this attribute (e.g., "slow bolus injection" or "Z-track injection" respectively).

Route of administration (routeCode), site of administration (approachSiteCode) and the method of administration are closely related. All three (if present) must be closely coordinated and in agreement. In some cases,

the coding system used to specify one may pre-coordinate one or more of the others.

## Supply extends Act

An act that involves provision of a material by one entity to another.

Discussion: The product is associated with the Supply Act via Participation.typeCode="product". With general Supply Acts, the precise identification of the Material (manufacturer, serial numbers, etc.) is important. Most of the detailed information about the Supply should be represented using the Material class. If delivery needs to be scheduled, tracked, and billed separately, one can associate a Transportation Act with the Supply Act. Pharmacy dispense services are represented as Supply Acts, associated with a SubstanceAdministration Act. The SubstanceAdministration class represents the administration of medication, while dispensing is supply.

Examples: Ordering bed sheets; Dispensing of a drug; Issuing medical supplies from storage

**Supply.quantity[PQ]:** The amount that was or is to be supplied (depending on the moodCode)

Discussion: This attribute may be used as an alternative to expectedUseTime or both may be used. If both are specified, then the specified quantity is the amount expected to be consumed within the expectedUseTime.

The unit of measure is restricted to a measured unit such as milliliter and milligram. Non-measured, but countable units such as tablet and capsule must not be specified using the unit component of the PQ data type, except as an annotation, marked by {xxx}. Refer to Data Types Part II Unabridged Specification, Appendix A: Unified Code for Units of Measure. The type of 'countable' information is determined by information in the 'product' entity.

**Supply.expectedUseTime[IVL<TS>]:** Identifies the period time over which the supplied product is expected to be used, or the length of time the supply is expected to last.

In some situations, this attribute may be used instead of Supply.quantity to identify the amount supplied by how long it is expected to last, rather than the physical quantity issued. E.g. 90 days supply of medication (based on an ordered dosage), 10 hours of jet fuel, etc. NOTE: When possible, it is always better to specify Supply.quantity, as this tends to be more precise. Supply.expectedUseTime will always be an estimate that can be influenced by external factors.

## Diet extends Act.Supply

A supply act dealing specifically with the feeding or nourishment of a subject.

Discussion: The detail of the diet is given as a description of the Material associated via Participation.typeCode="product". Medically relevant diet types may be communicated in the Diet.code, however, the detail of the food supplied and the various combinations of dishes should be communicated as Material instances.

created in error.

**Role.effectiveTime[IVL<TS>]:** An interval of time specifying the period during which the Role is in effect, if such time limit is applicable and known.

**Role.certificateText[ED]:** A textual or multimedia depiction of a certificate issued by the scoping Entity of a Role certifying that this Role is indeed played by the player Entity.

Examples: The certificate can be represented in many different ways, either inline or by reference, according to the ED data type. Typical cases are:

1.) Paper-based certificate: the ED data type may refer to some document or file that can be retrieved through an electronic interface to a hardcopy archive.

2.) Electronic certificate: this attribute can represent virtually any electronic certification scheme, such as, an electronically (including digitally) signed electronic text document.

3.) Digital certificate (public key certificate): in particular, this attribute can represent digital certificates, as an inline data block or by reference to such data. The certificate data block would be constructed in accordance to a digital certificate standard, such as X509, SPKI, PGP, etc.

The certificate subject is the Entity that plays the Role. The certificate issuer is the Entity that scopes the Role.

**Role.confidentialityCode[SET<CE>]:** A code that controls the disclosure of information about this Role with respect to the playing Entity..

Discussion: It is important to note that the necessary confidentiality of the medical record cannot be achieved solely through confidentiality codes to mask individual record items from certain types of users. There are two important problems with per-item confidentiality: one is inference and the other is the danger of holding back information that may be critical in a certain care situation. Inference means that filtered sensitive information can still be assumed given the other information that was not filtered. The simplest form of inference is that even the existence of a test order for an HIV Western Blot test or a T4/T8 lymphocyte count is a strong indication for an existing HIV infection, even if the results are not known. Very often, diagnoses can be inferred from medication, such as Zidovudin for treatment of HIV infections. The problem of hiding individual items becomes especially difficult with current medications, since the continuing administration of the medication must be assured.

To mitigate some of the inference-risk, aggregations of data should assume the confidentiality level of the most confidential action in the aggregation.

**Role.quantity[RTO]:** A ratio (numerator : denominator) specifying the relative quantities of the Entity playing the Role in the Entity scoping the Role, used for Roles that represent composition relationships between the scoping and playing Entities.

Examples: 1.) This syrup's (scoper) ingredients include 160 mg (numerator) Acetaminophen (player) per tablespoon (denominator).

2.) This herd (scoper) consists of 500 (numerator) cattle (player).

3.) A VAX 6630 computer (scoper) has 3 (numerator) CPUs (player) as parts.

**Role.id**[SET<II>]: A unique identifier for the player Entity in this Role.

**Role.code**[CE]: A code further specifying the kind of Role.

Discussion: The Role.code must conceptually be a proper specialization of Role.classCode. Role.code does not modify Role.classCode. Rather, each is a complete concept or a Role-like relationship between two Entities, but Role.code may be more specific than Role.classCode.

The Role.code may not be coded if only an un-coded name for the type of role is commonly used.

**Role.negationInd**[BL]: An indicator specifying that the Role is a competency that is specifically not attributed to the Entity playing the Role.

- Examples: 1.) This Person is not our Employee  
2.) This Mouthwash does not have Alcohol as an ingredient.

Constraint

Normally all Roles are considered to be affirmative. (This attribute defaults to FALSE).

**Role.name**[BAG<EN>]: A non-unique textual identifier or moniker for the playing Entity intended for use principally when playing the Role.

Examples: Names used as an employee, as a licensed professional, etc.

Usage: In general, names are specified using Entity.name. Role.name is only used when the standard wishes to distinguish names that are appropriate for use when referring to the Entity in one Role as opposed to other Roles..

**Role.addr**[BAG<AD>]: An address for the Entity while in the Role.

**Role.telecom**[BAG<TEL>]: A telecommunication address for the Entity while in the Role.

**Role.statusCode**[CS]: A code specifying the state of this Role as defined in the state-transition model.

Design Advisory: This attribute was defined in the original RIM as repeating, owing to the presence of nested states in the state machines. In actual practice, however, there is never a need to communicate more than a single status value. therefore, committees are advised to constrain this attribute to a maximum cardinality of 1 in all message designs.

Code	Name	Definition
normal	normal	The 'typical' state. Excludes "nullified" which represents the termination state of a Role instance that was created in error.
active	active	The state representing the fact that the Entity is currently active in the Role.
cancelled	cancelled	The terminal state resulting from cancellation of the role prior to activation.
pending	pending	The state representing that fact that the role has not yet become active.
suspended	suspended	The state that represents a suspension of the Entity playing the Role. This state is arrived at from the "active" state.
terminated	terminated	The state representing the successful termination of the Role.
nullified	nullified	The state representing the termination of a Role instance that was

Examples: Gluten free; Low sodium

**Diet.energyQuantity**[PQ]: The supplied biologic energy (Calories) per day.

Discussion: This physical quantity should be convertible to 1 kcal/d (or 1 kJ/d). Note, avoid the existing confusion between "large Calorie" and a "small calorie." Nutrition labels on food products list "large Calories." It is more appropriate to use the small calorie, which is 1/1000 of a large Calorie. These are clearly distinguished in the HL7 units of measure tables.

**Diet.carbohydrateQuantity**[PQ]: The supplied amount of carbohydrates (g) per day.

Discussion: For a diabetes diet one typically restricts the amount of metabolized carbohydrates to a certain amount per day (e.g., 240 g/d). This restriction can be communicated in the carbohydrateQuantity.

## PatientEncounter extends Act

An interaction between a patient and care provider(s) for the purpose of providing healthcare-related service(s). Healthcare services include health assessment.

Examples: outpatient visit to multiple departments, home health support (including physical therapy), inpatient hospital stay, emergency room visit, field visit (e.g., traffic accident), office visit, occupational therapy, telephone call.

**PatientEncounter.admissionReferralSourceCode**[CE]: The source of the referral for a patient encounter.

**PatientEncounter.lengthOfStayQuantity**[PQ]: Identifies the total quantity of time when the subject is expected to be or was resident at a facility as part of an encounter.

Discussion: The actual days quantity cannot be simply calculated from the admission and discharge dates because of possible leaves of absence.

**PatientEncounter.dischargeDispositionCode**[CE]: A code depicting the disposition of the patient at the time of discharge (e.g., discharged to home, expired, against medical advice, etc.). While the encounter is still "active" (the encounter doesn't have an end date yet) this attribute should be interpreted as the expected discharge disposition. When the encounter is "completed" this field contains the actual discharge disposition.

**PatientEncounter.preAdmitTestInd**[BL]: An indication that pre-admission tests are required for this patient encounter.

**PatientEncounter.specialCourtesiesCode**[SET<CE>]: A code identifying special courtesies extended to the patient. For example, no courtesies, extended courtesies, professional courtesy, VIP courtesies.

**PatientEncounter.specialArrangementCode**[SET<CE>]: A code indicating the type of special arrangements provided for a patient encounter (e.g., wheelchair, stretcher, interpreter, attendant, seeing eye dog). For encounters in intention moods, this information can be used to identify special arrangements that will

need to be made for the incoming patient. This is not related to the AccommodationEvent.

## WorkingList extends Act

A dynamic list of individual instances of Act which reflect the needs of an individual worker, team of workers, or an organization to view groups of Acts for clinical or administrative reasons.

Discussion: The grouped Acts are related to the WorkingList via an ActRelationship of type 'COMP' (component).

Examples: Problem lists, goal lists, allergy lists, to-do lists, etc.

Design note: This physical class contains but a single attribute, other than those that it inherits from Act. Use of that attribute in the design of RIM-based static models has been DEPRECATED in HL7 RIM Harmonization, effective November 2005. This action was based on recommendations from the Patient Care Technical Committee.

As a consequence, this class will cease to be shown as a physical class in the RIM, once the attribute is retired. Nevertheless, use of this class via an Act.classCode value of "LIST" is entirely appropriate so long as only the attributes inherited from Act are used.

**WorkingList.ownershipLevelCode[CE]**: Indicates the category of representation for the personnel managing the list, whether person, team or organization.

Constraint: Use of this attribute in the design of RIM-based static models has been DEPRECATED in HL7 RIM Harmonization, effective November 2005. This action was based on recommendations from the Patient Care Technical Committee. The rationale for this action is that "ownership" of the list (i.e. identification whether the list is intended for nurses, physicians, pharmacists, etc.) can be communicated using Participations. No codes have ever been proposed for this attribute and there is no clear use for it.

## ControlAct extends Act

An act representing a change to the state of another class, a user event (e.g. query), or a system event (e.g. time-based occurrences).

Examples:

- Discharging a patient (Encounter from Active to Completed);
- Stopping a medication (SubstanceAdministration from Active to Aborted);
- Sending an end-of-day summary (time-based event).

Discussion: This class corresponds to the concept of 'Trigger Event', and as such, must be present as the focus of every messaging interaction (because of the 1..1 association between a trigger event and an interaction.) However, control acts can also appear within a message payload. For example, a set of control acts associated with a Lab Order identifying the events that have occurred against that order (first created, then revised, then suspended, then resumed, then completed.)

FLVR	flavor additive	A substance (player) added to a mixture (scoper) to make it taste a certain way. In food the use is obvious, in pharmaceuticals flavors can hide disgusting taste of the active ingredient (important in pediatric treatments).
PRSV	preservative	A substance (player) added to a mixture (scoper) to prevent microorganisms (fungi, bacteria) to spoil the mixture.
STBL	stabilizer	A stabilizer (player) added to a mixture (scoper) in order to prevent the molecular disintegration of the main substance.
ACTI	active ingredient	A therapeutically active ingredient (player) in a mixture (scoper), where the mixture is typically a manufactured pharmaceutical.
ACTM	active moiety	The molecule or ion that is responsible for the intended pharmacological action of the drug substance, excluding those appended or associated parts of the molecule that make the molecule an ester, salt (including a salt with hydrogen or coordination bonds), or other noncovalent derivative (such as a complex, chelate, or clathrate). Examples: heparin-sodium and heparin-potassium have the same active moiety, heparin; the active moiety of morphine-hydrochloride is morphine.
ADTV	additive	An ingredient (player) that is added to a base (scoper), that amounts to a minor part of the overall mixture.
BASE	base	A base ingredient (player) is what comprises the major part of a mixture (scoper). E.g., Water in most i.v. solutions, or Vaseline in salves. Among all ingredients of a material, there should be only one base. A base substance can, in turn, be a mixture.
LOCE	located entity	Relates an entity (player) to a location (scoper) at which it is present in some way. This presence may be limited in time.
STOR	stored entity	Relates an entity (player) (e.g. a device) to a location (scoper) at which it is normally found or stored when not used.
SPEC	specimen	A role played by a material entity that is a specimen for an act. It is scoped by the source of the specimen.
ALQT	aliquot	A portion (player) of an original or source specimen (scoper) used for testing or transportation.
ISLT	isolate	A microorganism that has been isolated from other microorganisms or a source matrix.
CONT	content	Corresponds to the class Container
MBR	member	A role played by an entity that is a member of a group. The group provides the scope for this role. Among other uses, groups as used in insurance (groups of covered individuals) and in scheduling where resources may be grouped for scheduling and logistical purposes.
PART	part	An association between two Entities where the playing Entity is considered in some way "part" of the scoping Entity, e.g., as a member, component, ingredient, or content. Being "part" in the broadest sense of the word can mean anything from being an integral structural component to a mere incidental temporary association of a playing Entity with a (generally larger) scoping Entity.

WRTE	warranted product	A role a product plays when a guarantee is given to the purchaser by the seller (scoping entity) stating that the product is reliable and free from known defects and that the seller will repair or replace defective parts within a given time limit and under certain conditions.
RoleClassOntological		A relationship in which the scoping Entity defines or specifies what the playing Entity is. Thus, the player's "being" (Greek: ontos) is specified.
GEN	has generalization	Relates a specialized material concept (player) to its generalization (scoper).
GRIC	has generic	A special link between pharmaceuticals indicating that the target (scoper) is a generic for the source (player).
INST	instance	An individual piece of material (player) instantiating a class of material (scoper).
SAME	same	The "same" roleclass asserts an identity between playing and scoping entities: that they are in fact instances of the same entity and, in the case of discrepancies (e.g. different DOB, gender), that one or both are in error. Usage: playing and scoping entities must have same classcode, but need not have identical attributes or values. Example: a provider registry maintains sets of conflicting demographic data for what is reported to be the same individual.
SUBY	subsumed by	Relates a prevailing record of an Entity (scoper) with another record (player) that it subsumes. Examples: Show a correct new Person object (scoper) that subsumes one or more duplicate Person objects that had accidentally been created for the same physical person. Constraints: Both the player and scoper must have the same classCode.
SUBS	subsumer	An entity that subsumes the identity of another. Used in the context of merging documented entity instances. Both the player and scoper must have the same classCode. The use of this code is deprecated in favor of the term SUBY which is its inverse and is more ontologically correct.
RoleClassPartitive		An association between two Entities where the playing Entity is considered in some way "part" of the scoping Entity, e.g., as a member, component, ingredient, or content. Being "part" in the broadest sense of the word can mean anything from being an integral structural component to a mere incidental temporary association of a playing Entity with a (generally larger) scoping Entity.
INGR	ingredient	Relates a component (player) to a mixture (scoper). E.g., Glucose and Water are ingredients of D5W, latex may be an ingredient in a tracheal tube.
IACT	inactive ingredient	
COLR	color additive	A substance (player) influencing the optical aspect of material (scoper).

## DeviceTask extends Act

An activity of an automated system.

Discussion: Such activities are invoked either by an outside command or are scheduled and executed spontaneously by the device (e.g., regular calibration or flushing). The command to execute the task has moodCode <= RQO; an executed task (including a task in progress) has moodCode <= EVN, an automatic task on the schedule has moodCode <= APT.

**DeviceTask.parameterValue**[LIST<ANY>]: The parameters of the task submitted to the device upon the issuance of a command (or configuring the schedule of spontaneously executed tasks).

Rationale: Some parameters for tasks are uniquely defined by a specific model of equipment. Most critical arguments of a task (e.g., container to operate on, positioning, timing, etc.) are specified in an HL7 standardized structure, and the parameter list would not be used for those. The parameter list is used only for those parameters that cannot be standardized because they are uniquely defined for a specific model of equipment. NOTE: This means that the semantics and interpretation of a parameterValue can only be made with an understanding of the specifications or documentation for the specific device being addressed. This information is not conveyed as part of the message.

Constraints: Parameters are only specified here if they are not included in a separate HL7 defined structure. The parameters are a list of any data values interpreted by the device. The parameters should be typed with an appropriate HL7 data type (e.g., codes for nominal settings, such as flags, REAL and INT for numbers, TS for points in time, PQ for dimensioned quantities, etc.). However, besides this HL7 data typing, the functioning of the parameters is opaque to the HL7 standardization.

## ContextStructure extends Act

A structure is a container within a document. Structures have captions which can be coded. Structures can nest, and structures can contain entries.

OpenIssue: The name of this class, and the allowable ActClass values, will be revised so as to be consistent with the ActContainer hierarchy, which is currently undergoing review. (November 2004)

**ContextStructure.setId**[II]: A report identifier that remains constant across all revisions that derive from a common original.

An original report is the first version of a report. It gets a new unique value for setId, and has the value of versionNumber set to equal "1".

An addendum is an appendage to an existing report that contains supplemental information. The appendage is itself an original report. The parent report being appended is referenced via an ActRelationship, with ActRelationship.typeCode set to equal "APND" (for "appends"). The parent report being appended remains in place and its content and status are unaltered.

A replacement report replaces an existing report. The replacement report uses the same value for setId as the parent report being replaced, and increments the value of versionNumber by 1. The state of the parent report being replaced

should become "superseded", but is still retained in the system for historical reference.

**ContextStructure.versionNumber**[INT]: Version number is an integer starting at '1' and incrementing by 1. The first instance or original report should always be valued as '1'. The version number value must be incremented by one when a report is replaced, but can also be incremented more often to meet local requirements.

### Document extends Act.ContextStructure

Specialization of Act to add the characteristics unique to document management services.

**Document.completionCode**[CE]: A code depicting the completion status of a report (e.g., incomplete, authenticated, legally authenticated).

**Document.storageCode**[CE]: A code depicting the storage status (e.g., active, archived, purged) of a report.

**Document.copyTime**[TS]: Time a document is released (i.e., copied or sent to a display device) from a document management system that maintains revision control over the document. Once valued, cannot be changed. Intent of this attribute is to give the viewer of the document some notion as to how long the document has been out of the safe context of its document management system.

**Document.bibliographicDesignationText**[SET<ED>]: Citation for a cataloged document that permits its identification, location and/or retrieval from common collections.

### Account extends Act

An Act representing a category of financial transactions that are tracked and reported together with a single balance.

Discussion: This can be used to represent the accumulated total of billable amounts for goods or services received, payments made for goods or services, and debit and credit accounts between which financial transactions flow.

Examples: Patient accounts; Encounter accounts; Cost centers; Accounts receivable

**Account.balanceAmt**[MO]: The total of the debit and credit transactions that have occurred against the account over its lifetime.

Discussion: The balance of an account will generally be communicated in the currency identified as the account's currencyCode. However, it is allowed to communicate the balance in alternative currencies.

**Account.currencyCode**[CE]: Indicates the currency that the account is managed in.

Discussion: Specific amounts might be reported in another currency however this represents the default currency for activity in this account.

SDLOC	service delivery location	A role played by a place at which services may be provided.
DSDLOC	dedicated service delivery location	A role of a place (player) that is intended to house the provision of services. Scoper is the Entity (typically Organization) that provides these services. This is not synonymous with "ownership."
ISDLOC	incidental service delivery location	A role played by a place at which health care services may be provided without prior designation or authorization.
ACCESS	access	Corresponds to the class Access
BIRTHPL	birthplace	Relates a place (playing Entity) as the location where a living subject (scoping Entity) was born.
EXPR	exposed entity	A role played by an entity that has been exposed to a person or animal suffering a contagious disease, or with a location from which a toxin has been distributed. The player of the role is normally a person or animal, but it is possible that other entity types could become exposed. The role is scoped by the source of the exposure, and it is quite possible for a person playing the role of exposed party to also become the scoper a role played by another person. That is to say, once a person has become infected, it is possible, perhaps likely, for that person to infect others. Management of exposures and tracking exposed parties is a key function within public health, and within most public health contexts - exposed parties are known as "contacts."
HLTHCHRT	health chart	The role of a material (player) that is the physical health chart belonging to an organization (scoper).
HLD	held entity	Entity that is currently in the possession of a holder (scoper), who holds, or uses it, usually based on some agreement with the owner.
IDENT	identified entity	Roles played by entities and scoped by entities that identify them for various purposes.
MNT	maintained entity	An entity (player) that is maintained by another entity (scoper). This is typical role held by durable equipment. The scoper assumes responsibility for proper operation, quality, and safety.
OWN	owned entity	An Entity (player) for which someone (scoper) is granted by law the right to call the material (player) his own. This entitles the scoper to make decisions about the disposition of that material.
DEATHPLC	place of death	Definition: Relates a place (playing Entity) as the location where a living subject (scoping Entity) died.
RGPR	regulated product	A product regulated by some governmental organization. The role is played by Material and scoped by Organization. Rationale: To support an entity clone used to identify the NDC number for a drug product.
TERR	territory of authority	Relates a place entity (player) as the region over which the scoper (typically an Organization) has certain authority (jurisdiction). For example, the Calgary Regional Health Authority (scoper) has authority over the territory "Region 4 of Alberta" (player) in matters of health.



POLHOLD	policy holder	A role played by a person or organization that holds an insurance policy. The underwriter of that policy is the scoping entity. Discussion: The identifier of the policy is captured in 'Role.id' when the Role is a policy holder. A particular policy may cover several individuals one of whom may be, but need not be, the policy holder. Thus the notion of covered party is a role that is distinct from that of the policy holder.
QUAL	qualified entity	Corresponds to the class QualifiedEntity
STD	student	A role played by an individual who is a student of a school, which is the scoping entity.
UNDWRT	underwriter	A role played by a person or an organization. It is the party that <ol style="list-style-type: none"> <li>1. accepts fiscal responsibility for insurance plans and the policies created under those plans;</li> <li>2. administers and accepts fiscal responsibility for a program that provides coverage for services to eligible individuals; and/or</li> <li>3. has the responsibility to assess the merits of each risk and decide a suitable premium for accepting all or part of the risk. If played by an organization, this role may be further specified by an appropriate RoleCode.</li> </ol> Example: <ol style="list-style-type: none"> <li>1. A health insurer;</li> <li>2. Medicaid Program;</li> <li>3. Lloyd's of London</li> </ol>
CAREGIVER	caregiver	A person responsible for the primary care of a patient at home.
PRS	personal relationship	Links two people in a personal relationship. The character of the relationship must be defined by a PersonalRelationshipRoleType code. The player and scoper are determined by PersonalRelationshipRoleType code as well.
RoleClassPassive		An association for a playing Entity that is used, known, treated, handled, built, or destroyed, etc. under the auspices of the scoping Entity. The playing Entity is passive in these roles (even though it may be active in other roles), in the sense that the kinds of things done to it in this role happen without an agreement from the playing Entity.
ADMM	Administerable Material	A material (player) that can be administered to an Entity (scoper).
DST	distributed material	A material (player) distributed by a distributor (scoper) who functions between a manufacturer and a buyer or retailer.
RET	retailed material	Material (player) sold by a retailer (scoper), who also give advice to prospective buyers.
MANU	manufactured product	Scoped by the manufacturer
THER	therapeutic agent	A manufactured material (player) that is used for its therapeutic properties. The manufacturer is the scoper.

**Account.interestRateQuantity**[RTO<MO,PQ>]: A ratio that indicates the rate of interest that the account balance is subject to, and the term over which the interest rate compounds.

Discussion: This may represent interest charged (e.g. for loans, overdue accounts, etc.) or credited (investments, etc.) depending on the type of account.

Examples: 0.10/1a (10%/year); 0.0005895/1d (.05895%/day)

Constraints: Unit of the denominator PQ data type must be comparable to seconds. (I.e. the denominator must be measured in time.)

**Account.allowedBalanceQuantity**[IVL<MO>]: An interval describing the minimum and maximum allowed balances for an account.

Discussion: These are not necessarily 'hard' limits (i.e. the account may go above or below the specified amounts), however, they represent the 'target' range for the account, and there may be consequences for going outside the specified boundaries. It is not necessary to specify both upper and lower limits (or either) for an account.

Examples: 'stop loss' limits; credit limits

## FinancialTransaction extends Act

An Act representing the movement of a monetary amount between two accounts.

Discussion: Financial transactions always occur between two accounts (debit and credit), but there may be circumstances where one or both accounts are implied or inherited from the containing model.

In the "order" mood, this represents a request for a transaction to be initiated.

In the "event" mood, this represents the posting of a transaction to an account.

Examples: Cost of a service; Charge for a service; Payment of an invoice

**FinancialTransaction.amt**[MO]: Indicates the monetary amount to be transferred from the debit to the credit account.

Discussion: If the denomination of the amt differs from the denomination of the debit or credit account, then the associated exchange rate should be specified.

**FinancialTransaction.creditExchangeRateQuantity**[REAL]: A decimal number indicating the rate of exchange in effect between the currency of the account being credited, and the currency of the transaction net amount.

Examples: For the purchase of services valued in Mexican pesos using U.S. dollars paid from a Canadian dollar account, the credit exchange ratio would be communicated as real number "r" such that "y (USD) \* r = x (CAD)".

Rationale: This allows a transaction to be expressed in a currency other than that of the credit and debit accounts. It also allows the credit and debit accounts to be based in different currencies.

**FinancialTransaction.debitExchangeRateQuantity**[REAL]: A decimal number indicating the rate of exchange in effect between the currency of the account being debited, and the currency of the transaction net amount.

Examples: For the purchase of services valued in Mexican pesos using U.S. dollars paid from a Canadian dollar account, the debit exchange ratio would be communicated as real number "r" such that "y (USD) \* r = x (MXP)".

Rationale: This allows a transaction to be expressed in a currency other than that of the credit and debit accounts. It also allows the credit and debit accounts to be based in different currencies.

## InvoiceElement extends Act

An Act representing a statement and justification of an "amount owed".

Discussion: This represents the 'justification' portion of an invoice. It is frequently combined with a financial transaction representing the amount requested to be paid, agreed to be paid, or actually paid.

A recursive relationship can be used to break a single InvoiceElement into constituent elements.

In definition mood, it represents "possible" justification for future billing. In request mood, it is a request to determine the amount owed. In event mood, this class represents the determination of a specific amount owed by a particular Entity.

**InvoiceElement.modifierCode**[SET<CE>]: Designates a modifier to the code attribute to provide additional information about the invoice element.

Examples: Isolation allowance; After-hours service

Rationale: This is not pre-coordinated into the CD attribute because the modifier code set may not be specifically designed for use with the Act.code code set. This violates the constraint for using the 'modifier' property that the modifier code set must be defined as part of, or specifically for the base code set.

**InvoiceElement.unitQuantity**[RTO<PQ,PQ>]: A description of the number of instances of a product or service that is being billed or charged for.

Examples: 4 hours, 4 mg, 4 boxes, and 15 each of a container of 1000 each, etc.

Discussion: Each InvoiceElement that is being charged or billed is identified by a charge or bill code (InvoiceElement.code). In some situations, this code is a pre-coordinated code set and represents a container (e.g. UPC code for a container of 1000 pills and another UPC code for a container of the same pills but in a container of 100). The UPC code is used in invoicing, but ratios are required to specify that only a portion of the container (e.g. bottle) is being billed or charged. If the InvoiceElement does not reference a container, then the denominator is not specified.

For example, 15 pills in a container size of 1000 pills. In this case, the numerator can be expressed as "15 {pill}" or simply "15" and the denominator can be expressed as "1000 {bottle}" or simply "1000" (see discussion following for rationale of using descriptive text for countable units).

Constraints:

The unit of measure is restricted to a measurable unit such as liters, milligrams and hours. Non-measurable, but countable units such as boxes, packages, visits, pills and containers must not be specified using the unit component of the PQ data type, except as an annotation, marked by {xxx}. Refer to Data Types Part II Unabridged Specification, Appendix A :Unified Code for Units of Measure.

Specification of countable units can be handled with the following techniques:

		<p>program. A sponsor is the party that is ultimately accountable for the coverage by employment contract or by law. A sponsor can be an employer, union, government agency, or association. Fully insured sponsors establish the terms of the plan and contract with health insurance plans to assume the risk and to administer the plan. Self-insured sponsors delegate coverage administration, but not risk, to third-party administrators. Program sponsors designate services to be covered in accordance with statute. Program sponsors may administer the coverage themselves, delegate coverage administration, but not risk, to third-party administrators, or contract with health insurance plans to assume the risk and administrator a program. Sponsors qualify individuals who may become</p> <ol style="list-style-type: none"> <li>1. a policy holder of the plan;</li> <li>2. where the sponsor is the policy holder, who may become a subscriber or a dependent to a policy under the plan; or</li> <li>3. where the sponsor is a government agency, who may become program eligibles under a program.</li> </ol> <p>The sponsor role may be further qualified by the SponsorRole.code. Entities playing the sponsor role may also play the role of a Coverage Administrator.</p> <p>Example: An employer, union, government agency, or association.</p>
COVPTY	covered party	<p>A role class played by a person who receives benefit coverage under the terms of a particular insurance policy. The underwriter of that policy is the scoping entity. The covered party receives coverage because of some contractual or other relationship with the holder of that policy.</p> <p>Discussion: This reason for coverage is captured in 'Role.code' and a relationship link with type code of indirect authority should be included using the policy holder role as the source, and the covered party role as the target.</p> <p>Note that a particular policy may cover several individuals one of whom may be, but need not be, the policy holder. Thus the notion of covered party is a role that is distinct from that of the policy holder.</p>
GUAR	guarantor	<p>A person or organization (player) that serves as a financial guarantor for another person or organization (scoper).</p>
PAYOR	invoice payor	<p>The role of an organization that undertakes to accept claims invoices, assess the coverage or payments due for those invoices and pay to the designated payees for those invoices. This role may be either the underwriter or a third-party organization authorized by the underwriter. The scoping entity is the organization that underwrites the claimed coverage.</p>
PAT	patient	<p>Corresponds to the class Patient</p>
PAYEE	payee	<p>The role of an organization or individual designated to receive payment for a claim against a particular coverage. The scoping entity is the organization that is the submitter of the invoice in question.</p>

		guarantor contact; employer contact.
ECON	emergency contact	An entity to be contacted in the event of an emergency.
NOK	next of kin	An individual designated for notification as the next of kin for a given entity.
COMPAR	commissioning party	An Entity that is authorized to issue or instantiate permissions, privileges, credentials or other formal/legal authorizations.
SGNOFF	signing authority or officer	The role of a person (player) who is the officer or signature authority for of a scoping entity, usually an organization (scoper).
GUARD	guardian	Guardian of a ward
EMP	employee	Corresponds to the class Employee
MIL	military person	A role played by a member of a military service. Scoper is the military service (e.g. Army, Navy, Air Force, etc.) or, more specifically, the unit (e.g. Company C, 3rd Battalion, 4th Division, etc.)
INVSBJ	Investigation Subject	An entity that is the subject of an investigation. This role is scoped by the party responsible for the investigation.
CASEBJ	Case Subject	A person, non-person living subject, or place that is the subject of an investigation related to a notifiable condition (health circumstance that is reportable within the applicable public health jurisdiction)
RESBJ	research subject	Definition: Specifies the administrative functionality within a formal experimental design for which the ResearchSubject role was established. Examples: Screening - role is used for pre-enrollment evaluation portion of the design; enrolled - role is used for subjects admitted to the experimental portion of the design.
AFFL	affiliate	Player of the Affiliate role has a business/professional relationship with scoper. Player and scoper may be persons or organization. The Affiliate relationship does not imply membership in a group, nor does it exist for resource scheduling purposes. Example: A healthcare provider is affiliated with another provider as a business associate.
CIT	citizen	Citizen of apolitical entity
CRINV	clinical research investigator	A role played by a provider, always a person, who has agency authority from a Clinical Research Sponsor to direct the conduct of a clinical research trial or study on behalf of the sponsor.
CRSPNSR	clinical research sponsor	A role played by an entity, usually an organization, that is the sponsor of a clinical research trial or study. The sponsor commissions the study, bears the expenses, is responsible for satisfying all legal requirements concerning subject safety and privacy, and is generally responsible for collection, storage and analysis of the data generated during the trial. No scoper is necessary, as a clinical research sponsor undertakes the role on its own authority and declaration. Clinical research sponsors are usually educational or other research organizations, government agencies or biopharmaceutical companies.
SPNSR	coverage sponsor	A role played by an entity, usually an organization that is the sponsor of an insurance plan or a health

(1) specify the countable unit in the InvoiceElement.code. That is, a specific InvoiceElement.code would indicate that the item referenced by the act represents a box of 20 items. There would be a different InvoiceElement.code for a box of 40 items, and so on.

For example, if the InvoiceElement.code represents a box of 20 items, and the InvoiceElement.unitQuantity = 2 (no units), then this represents 2 boxes of 20 items for a total of 40 items.

(2) If more detail is required (e.g. to describe the composition, packaging, manufacturer of a product), then use a participation (typeCode = "PRD"), and a combination of role and entity classes to describe the details of the packaging.

**InvoiceElement.unitPriceAmt**[RTO<MO,PQ>]: The monetary cost per unit being accounted.

Constraints: In constructing the ratio, the numerator must be of data type MO, and the denominator must be a PQ, specified in the same manner as the unitQuantity attribute.

Examples: \$0.20/mg; \$250/day; \$50

**InvoiceElement.netAmt**[MO]: Identifies the total monetary amount for the invoice element, including the sum of any component elements.

Discussion: For leaf-level amounts, this will be the value of the unitQuantity \* unitPriceAmt [ \* factorNumber] [ \* pointsNumber]. For grouping invoice elements, this will be the sum of the netAmt attributes of all contained InvoiceElements.

**InvoiceElement.factorNumber**[REAL]: Represents a multiplier used in determining the overall cost of services delivered and/or goods received.

Examples: this could be 10 (Number of Treatments as Units) \* \$3.00 (Cost per Unit) \* 1.5 (Factor) = \$45.00 (Amount).

Discussion: This concept is frequently used in Europe to adjust the charge between that used for the public system and that used for private insurers.

The simplest formula for deriving gross amounts is: unitQuantity \* unitPriceAmount = netAmt.

The concept of a Factor allows for a discount or surcharge multiplier to be applied to a monetary amount. For example, the formula, with a factor would be: unitQuantity \* unitPrice (Cost/Point) \* factorNumber = netAmt

See related note on Points. Formula, with Points and Factors becomes: unitQuantity \* unitPriceAmt \* pointsNumber \* factorNumber = netAmt

**InvoiceElement.pointsNumber**[REAL]: For charges whose quantity is expressed in 'points', this expresses the weighting (based on difficulty, cost and/or resource intensiveness) associated with the good or service delivered.

Examples: This could be 5 (Number of Treatments as Units) \* 3 (Number of Points per treatment as Points)\* \$20.00 (Cost per Point) = \$300.00 (Amount).

Discussion: This is commonly used in systems where services provided are assigned a relative 'cost or difficulty rating', and then a fixed price is assigned to a 'point'. Adjustments to all prices charged by an organization can then be handled by increasing or decreasing the cost per point to reflect changes in inflation, overhead, etc.

The simplest formula for deriving gross amounts is:  $\text{unitQuantity} * \text{unitPriceAmount} = \text{netAmt}$ .

The concept of Points allows for assignment of point values for services and/or goods, such that a dollar amount can be assigned to each point. For example, the formula, with points would be:  $\text{unitQuantity} * \text{pointsNumber} * \text{unitPriceAmt (Cost/Point)} = \text{netAmt}$ .

See related note on Factor. Formula, with Points and Factors becomes:  $\text{unitQuantity} * \text{unitPriceAmt} * \text{pointsNumber} * \text{factorNumber} = \text{netAmt}$ .

## FinancialContract extends Act

A contract whose value is measured in monetary terms.

Examples: Insurance; Purchase agreement

**FinancialContract.paymentTermsCode[CE]:** Establishes the payment terms for a contractual agreement or obligation.

Examples: "net 30"; "on receipt of invoice"; "upon completion of service"

## Entity

A physical thing, group of physical things or an organization capable of participating in Acts, while in a role.

Discussion: An entity is a physical object that has, had or will have existence. The only exception to this is Organization, which while not having a physical presence, fulfills the other characteristics of an Entity. The Entity hierarchy encompasses living subjects (including human beings), organizations, material, and places and their specializations. It does not indicate the roles played, or acts that these entities participate in.

Constraints: It does not include events/acts/actions, or the roles that things can play (e.g. patient, provider).

**Entity.classCode[CS,mandatory]:** An HL7 defined value representing the class or category that the Entity instance represents.

Examples: Person, Animal, Chemical Substance, Group, Organization

Rationale: Due to the extremely large number of potential values for a code set representing all physical things in the universe, the class code indicates both the subtype branch of the Entity hierarchy used as well as a high level classifier to represent the instance of Entity. This can be used to constrain the eligible value domains for the Entity.code attribute.

Code	Name	Definition
ENT	entity	Corresponds to the class Entity
LIV	living subject	Corresponds to the class LivingSubject
NLIV	non-person living subject	Corresponds to the class NonPersonLivingSubject
ANM	animal	A living subject from the animal kingdom.
MIC	microorganism	All single celled living organisms including protozoa, bacteria, yeast, viruses, etc.
PLNT	plant	A living subject from the order of plants.

## Role

A competency of the Entity playing the Role as identified, defined, guaranteed, or acknowledged by the Entity that scopes the Role.

Discussion: An Entity participates in an Act as in a particular Role. Note that a particular entity in a particular role can participate in an act in many ways. Thus, a Person in the role of a practitioner can participate in a patient encounter as a rounding physician or as an attending physician. The Role defines the competency of the Entity irrespective of any Act, as opposed to Participation, which are limited to the scope of an Act.

Each role is "played" by one Entity, called the "player" and is "scoped" by another Entity, called the "scoper". Thus the Role of "patient" may be played by a person and scoped by the provider organization from which the patient will receive services. Similarly, the employer scopes an "employee" role.

The identifier of the Role identifies the Entity playing the role in that role. This identifier is assigned by the scoping Entity to the player. The scoping Entity need not have issued the identifier, but it may have re-used an existing identifier for the Entity to also identify the Entity in the Role with the scoper.

Most attributes of Role are attributes of the playing entity while in the particular role.

**Role.classCode[CS,mandatory]:** A code specifying the major category of a Role as defined by HL7 vocabulary.

Code	Name	Definition
ROL	role	Corresponds to the class Role
RoleClassAssociative		A general association between two entities that is neither partitive nor ontological.
RoleClassMutualRelationship		A relationship that is based on mutual behavior of the two Entities as being related. The basis of such relationship may be agreements (e.g., spouses, contract parties) or they may be de facto behavior (e.g. friends) or may be an incidental involvement with each other (e.g. parties over a dispute, siblings, children).
RoleClassRelationshipFormal		A relationship between two entities that is formally recognized, frequently by a contract or similar agreement.
LIC	licensed entity	Corresponds to the class LicensedEntity
PROV	healthcare provider	An Entity (player) that is authorized to provide health care services by some authorizing agency (scoper).
NOT	notary public	
AGNT	agent	An entity (player) that acts or is authorized to act on behalf of another entity (scoper).
ASSIGNED	assigned entity	An agent role in which the agent is an Entity acting in the employ of an organization. The focus is on functional role on behalf of the organization, unlike the Employee role where the focus is on the 'Human Resources' relationship between the employee and the organization.
CON	contact	A person or an organization (player) which provides or receives information regarding another entity (scoper). Examples; patient NOK and emergency contacts;

**Container.bottomDeltaQuantity[PQ]:** The distance from the Point of Reference to the outside bottom of the container.

Rationale: Refer to Point of Reference in NCCLS standard AUTO5 Laboratory Automation: Electromechanical Interfaces.

### Device extends Entity.Material.ManufacturedMaterial

A subtype of ManufacturedMaterial used in an activity, without being substantially changed through that activity. The kind of device is identified by the code attribute inherited from Entity.

Usage: This includes durable (reusable) medical equipment as well as disposable equipment.

**Device.manufacturerModelName[SC]:** The human designated moniker for a device assigned by the manufacturer.

Examples: Perkin Elmer 400 Inductively Coupled Plasma Unit

**Device.softwareName[SC]:** The moniker, version and release of the software that operates the device as assigned by the software manufacturer or developer.

Examples: Agilent Technologies Chemstation A.08.xx

**Device.localRemoteControlStateCode[CE]:** A value representing the current state of control associated with the device.

Examples: A device can either work autonomously (localRemoteControlStateCode="Local") or it can be controlled by another system (localRemoteControlStateCode="Remote").

Rationale: The control status of a device must be communicated between devices prior to remote commands being transmitted. If the device is not in "Remote" status then external commands will be ignored.

**Device.alertLevelCode[CE]:** A value representing the current functional activity of an automated device.

Examples: Normal, Warning, Critical

Constraints: The value of the attribute is determined by the device.

**Device.lastCalibrationTime[TS]:** The date/time of the last calibration of the device.

Rationale: Devices are required to be recalibrated at specific intervals to ensure they are performing within specifications. The accepted interval between calibrations varies with protocols. Thus for results to be valid, the precise time/date of last calibration is a critical component.

PSN	person	Corresponds to the class Person
MAT	material	Corresponds to the class Material
MMAT	manufactured material	Corresponds to the class ManufacturedMaterial
CONT	container	Corresponds to the class Container
HOLD	holder	A type of container that can hold other containers or other holders.
DEV	device	Corresponds to the class Device
CER	certificate representation	A physical artifact that stores information about the granting of authorization.
MODDV	imaging modality	Class to contain unique attributes of diagnostic imaging equipment.
CHEM	chemical substance	A substance that is fully defined by an organic or inorganic chemical formula, includes mixtures of other chemical substances. Refine using, e.g., IUPAC codes.
FOOD	food	Naturally occurring, processed or manufactured entities that are primarily used as food for humans and animals.
ORG	organization	Corresponds to the class Organization
STATE	state	A politically organized body of people bonded by territory, culture, or ethnicity, having sovereignty (to a certain extent) granted by other states (enclosing or neighboring states). This includes countries (nations), provinces (e.g., one of the United States of America or a French departement), counties or municipalities. Refine using, e.g., ISO country codes, FIPS-PUB state codes, etc.
NAT	Nation	A politically organized body of people bonded by territory and known as a nation.
PUB	public institution	An agency of the people of a state often assuming some authority over a certain matter. Includes government, governmental agencies, associations.
PLC	place	Corresponds to the class Place
CITY	city or town	The territory of a city, town or other municipality.
COUNTRY	country	The territory of a sovereign nation.
COUNTY	county or parish	The territory of a county, parish or other division of a state or province.
PROVINCE	state or province	The territory of a state, province, department or other division of a sovereign country.
RGRP	group	A grouping of resources (personnel, material, or places) to be used for scheduling purposes. May be a pool of like-type resources, a team, or combination of personnel, material and places.
HCE	health chart entity	A health chart included to serve as a document receiving entity in the management of medical records.

**Entity.determinerCode[CS,mandatory]:** An HL7 defined value representing whether the Entity represents a kind-of or a specific instance.

Examples: 1 human being (an instance), 3 syringes (quantified kind) or the population of Indianapolis (kind of group)

Rationale: An Entity may at times represent information concerning a specific instance (the most common), a quantifiable group with common characteristics or a general type of Entity. This code distinguishes these different representations.

Code	Name	Definition
KIND	described	The described determiner is used to indicate that the given Entity is taken as a general description of a kind of thing that can be taken in whole, in part, or in multiples.
QUANTIFIED_KIND	described quantified	The described quantified determiner indicates that the given Entity is taken as a general description of a specific amount of a thing. For example, QUANTIFIED_KIND of syringe (quantity = 3,) stands for exactly three syringes.
INSTANCE	specific	The specific determiner indicates that the given Entity is taken as one specific thing instance. For example, a human INSTANCE (quantity = 1,) stands for exactly one human being.

**Entity.id[SET<II>]:** A unique identifier for the Entity.

**Rationale:** Successful communication only requires that an entity have a single identifier assigned to it. However, it is recognized that as different systems maintain different databases, there may be different instance identifiers assigned by different systems. Note that an instance identifier is a pure identifier and not a classifier. For Material, serial numbers assigned by specific manufacturers, catalog numbers of specific distributors, or inventory numbers issued by owners, may also be represented by the Role.id, which allows a more clear expression of the fact that such a code is assigned by a specific party associated with that material.

**Entity.code[CE]:** A value representing the specific kind of Entity the instance represents.

**Examples:** A medical building, a Doberman Pinscher, a blood collection tube, a tissue biopsy.

**Rationale:** For each Entity, the value for this attribute is drawn from one of several coding systems depending on the Entity.classCode, such as living subjects (animal and plant taxonomies), chemical substance (e.g., IUPAC code), organizations, insurance company, government agency, hospital, park, lake, syringe, etc. It is possible that Entity.code may be so fine grained that it represents a single instance. An example is the CDC vaccine manufacturer code, modeled as a concept vocabulary, when in fact each concept refers to a single instance.

**Entity.quantity[SET<PQ>]:** The number or quantity of the Entity, with appropriate units, congruent with the value of Entity.determinerCode.

**Examples:** With undetermined kinds, the quantity is but a reference quantity for the specification of the proportion of ingredients or components (e.g. through a has-part, has-ingredient, or has-content Role). For example, a kind of group with 60% females is Person(quantity = 100) has-part Person(quantity = 60; sex = female). Amoxicillin 500 mg per tablet is Material(Tablet, quantity = 1) has-ingredient Material(Amoxicillin, quantity = 500 mg). Glucose 5% (D5W) is Material(D5W, quantity = 1 kg) has-ingredient Material(Glucose, quantity = 50 g).

Material-specific quantity relations are expressed using the fact that the data type of this attribute is a set of physical quantity (SET<PQ>). If more than one

**Examples:** After opening a bottle of a liquid. The mixing of two chemicals for an analysis that must be mixed and used within two hours or their activity diminishes.

**Discussion:** If a kind of material is described (determinerCode = KIND) only the width of that interval can be known, i.e., the duration after opening the reagent container at which the reagent substance is considered useable for its normal testing purpose. For an actual instance of the reagent (e.g., a specific bottle), the stabilityTime.low TS marks the time at which the reagent bottle has been opened (or the reagent was otherwise activated). Together with the typical stability duration, this determines the stabilityTime.high TS beyond which the reagent is no longer considered useable for its normal testing purpose.

### Container extends Entity.Material.ManufacturedMaterial

A subtype of ManufacturedMaterial used to hold other Entities for purposes such as transportation or protection of contents from loss or damage.

**Rationale:** The specifications for this class arose from the collaboration between HL7 and the NCCLS. Many of the attribute definitions are drawn from or reference the NCCLS standard. With amorphous substances (liquids, gases) a container is required. However, the content of a container is always distinguishable and relatively easily separable from the container, unlike the content (ingredient) of a mixture.

**Usage:** A container is related to a content material through Role.classCode = CONT (content).

**Container.capacityQuantity[PQ]:** The functional capacity of the container.

**Container.heightQuantity[PQ]:** The height of the container.

**Container.diameterQuantity[PQ]:** The outside diameter of the container.

**Container.capTypeCode[CE]:** The type of container cap consistent with decapping, piercing or other automated manipulation.

**Container.separatorTypeCode[CE]:** A material added to a container to facilitate and create a physical separation of specimen components of differing density.

**Examples:** A gel material added to blood collection tubes that following centrifugation creates a physical barrier between the blood cells and the serum or plasma.

**Rationale:** The composition or nature of the separator material may have an effect on the analysis. Knowledge of the material aids interpretation of results.

**Container.barrierDeltaQuantity[PQ]:** The distance from the Point of Reference to the separator material (barrier) within a container.

**Rationale:** This distance may be provided by a laboratory automation system to an instrument and/or specimen processing/handling device to facilitate the insertion of a sampling probe into the specimen without touching the separator. See the Point of Reference definition or in NCCLS standard AUTO5 Laboratory Automation: Electromechanical Interfaces.

Examples: Pharmaceutical substances (including active vaccines containing retarded virus), disposable supplies, durable equipment, implantable devices, food items (including meat or plant products), waste, traded goods, etc.

Discussion: Manufactured or processed products are considered material, even if they originate as living matter. Materials come in a wide variety of physical forms and can pass through different states (ie. Gas, liquid, solid) while still retaining their physical composition and material characteristics.

Rationale: There are entities that have attributes in addition to the Entity class, yet cannot be classified as either LivingSubject or Place.

**Material.formCode[CE]:** A value representing the state (solid, liquid, gas) and nature of the material.

Examples: For therapeutic substances, the dose form, such as tablet, ointment, gel, etc.

### ManufacturedMaterial extends Entity.Material

A subtype of Material representing an Entity or combination of Entities transformed for a particular purpose by a non-natural or manufacturing process.

Examples: Processed food products, disposable syringes, chemistry analyzer, saline for infusion, etc.

Discussion: This class encompasses containers, devices, software modules and facilities.

Rationale: This class is used to further define the characteristics of Entities that are created out of other Entities. These entities are identified and tracked through associations and mechanisms unique to the class, such as lotName, stabilityTime and expirationTime.

**ManufacturedMaterial.lotNumberText[ST]:** An alphanumeric string used to identify a particular batch of manufactured material.

Discussion: The lot name is usually printed on the label attached to the container holding the substance and/or on the packaging which houses the container. Note that a lot number is not meant to be a unique identifier, but is meaningful only when the product kind and manufacturer are also identified.

**ManufacturedMaterial.expirationTime[IVL<TS>]:** The date and time the manufacturer no longer ensures the safety, quality, and/or proper functioning of the material.

Rationale: There is a need in many situations that the materials used are of a specific quality or potency or functional status. The ending date for this guarantee is specified by the manufacturer. After that date, while the material may still provide the same characteristics, the manufacturer no longer takes responsibility that the product will perform as specified and denies responsibility for failure of the material after that date.

**ManufacturedMaterial.stabilityTime[IVL<TS>]:** The time at which the material is considered useable after it is activated.

quantity value are specified in this set, each element in this set is considered to specify the same amount of the material. For example, for one liter of water one could use the set 1 L, 1 kg, 55.56 mol to specify the volume, mass, and amount of substance for the same amount of water, this is equivalent with specifying the mass density (volumic mass 1 kg/L) and the molar mass (18 g/mol). For Glucose one could specify 180 g, 1 mol according to the molar mass (180 g/mol).

Discussion: When the Entity instance is a portion of a substance, the quantity specifies the amount of that substance comprised by that portion. For an undetermined substance (kind) the quantity serves two purposes at the same time: (a) it provides a means of relations between quantities specific for that substance, and (b) it is a reference quantity for the specification of ingredients or components. In all cases, the quantity is an extensive "amount" kind of quantity (e.g., number, length, volume, mass, surface area, energy, etc.). Note that most relative or fractional quantities are not amounts, in particular, mass fraction, substance concentration, mass ratios, percentages, etc. are not extensive quantities and are prohibited values for this attribute.

Constraints: For Entities with determinerCode = INSTANCE, the quantity is 1. For an Entity with determinerCode = QUANTIFIED\_KIND, the quantity is the number of individual members in the group; for an Entity with a determinerCode = KIND, the value is undetermined.

**Entity.name[BAG<EN>]:** A non-unique textual identifier or moniker for the Entity.

Examples: Proper names, nicknames, legal names of persons, places or things.

Rationale: Most entities have a commonly used name that can be used to differentiate them from other Entities, but does not provide a unique identifier.

**Entity.desc[ED]:** A textual or multimedia depiction of the Entity.

Discussion: The content of the description is not considered part of the functional information communicated between systems. Descriptions are meant to be shown to interested human individuals. All information relevant for automated functions must be communicated using the proper attributes and associated objects.

Rationale: Names and descriptions of entities are typically more meaningful to human viewers than numeric, mnemonic or abbreviated code values. The description allows for additional context about the entity to be conveyed to human viewers without impacting the functional components of the message.

**Entity.statusCode[CS]:** A value representing whether the information associated with the Entity is currently active or inactive for the purpose of participation in acts.

Design Advisory: This attribute was defined in the original RIM as repeating, owing to the presence of nested states in the state machines. In actual practice, however, there is never a need to communicate more than a single status value. therefore, committees are advised to constrain this attribute to a maximum cardinality of 1 in all message designs.

Code	Name	Definition
normal	normal	The 'typical' state. Excludes "nullified" which represents the

		termination state of an Entity record instance that was created in error.
active	active	The state representing the fact that the Entity record is currently active.
terminated	terminated	The state representing the normal termination of an Entity record.
nullified	nullified	The state representing the termination of an Entity record instance that was created in error.

**Entity.existenceTime**[IVL<TS>]: An interval of time specifying the period in which the Entity physically existed.

Examples: ManufactureDate/DisposalDate

Constraints: This period may represent past, present or future time periods.

Rationale: Physical entities have specified periods in which they exist.

Equipment is manufactured, placed in service, retired and salvaged. The relevance of this attribute is in planning, availability and retrospective analysis.

**Entity.telecom**[BAG<TEL>]: A telecommunication address for the Entity.

**Entity.riskCode**[CE]: A value representing the type of hazard or threat associated with the Entity.

Examples: Petrochemical or organic chemicals are highly flammable agents that pose an increased risk of fire under certain conditions. Entities with either natural or introduced radioactive character pose a risk to those handling them. Entities comprising specimens from diseased individuals pose an increased risk of infection to those handling them. Persons or animals of irascible temperament may prove to be a risk to healthcare personnel.

Rationale: Some entities have characteristics that pose potential increased risk of injury or damage to other Entities. This attribute identifies the type of risk without specifying the level of risk.

**Entity.handlingCode**[CE]: A value representing special handling requirements for the Entity.

Examples: Keep at room temperature; Keep frozen below 0 C; Keep in a dry environment; Keep upright, do not turn upside down.

Rationale: This attribute is used to describe special handling required by the Entity to avoid damage to it or other entities.

## LivingSubject extends Entity

A subtype of Entity representing an organism or complex animal, alive or not.

Examples: A person, dog, microorganism or a plant of any taxonomic group.

Constraints: Instances of this class encompass mammals, birds, fishes, bacteria, parasites, fungi and viruses. Person is a specialization of this class.

Rationale: This class contains "static" or "administrative" attributes of interest to medicine that differentiate living organisms from other Entities.

**LivingSubject.administrativeGenderCode**[CE]: A value representing the gender (sex) of a Living subject.

Examples: female, male

## Place extends Entity

A subtype of Entity representing a bounded physical place or site with its contained structures, if any.

Examples: A field, lake, city, county, state, country, lot (land), building, pipeline, power line, playground, ship, truck.

Constraints: Place may be natural or man-made. The geographic position of a place may or may not be constant.

Discussion: Places may be work facilities (where relevant acts occur), homes (where people live) or offices (where people work). Places may contain sub-places (floor, room, booth, bed). Places may also be sites that are investigated in the context of health care, social work, public health administration (e.g., buildings, picnic grounds, day care centers, prisons, counties, states, and other focuses of epidemiological events).

**Place.mobileInd**[BL]: An Indication of whether the facility has the capability to move freely from one location to another.

Examples: Ships, aircraft and ambulances all have the capability to participate in healthcare acts.

**Place.addr**[AD]: The physical address of this place.

Constraints: Must be the address that allows the physical location of the place on a map.

**Place.directionsText**[ED]: A free text note that carries information related to a site that is useful for entities accessing that site.

Discussion: The attribute could include directions for finding the site when address information is inadequate, GPS information is not available, and/or the entity accessing the site cannot make direct use of the GPS information. It could also include information useful to people visiting the location. E.g., "Last house on the right", "If owner not present, check whereabouts with neighbor down the road".

ExtRef: PHCDM-02.01.04.01(Public Health Common Data Model)

**Place.positionText**[ED]: A set of codes that locates the site within a mapping scheme.

Examples: map coordinates for US Geological Survey maps.

**Place.gpsText**[ST]: The global positioning system coordinates of a place.

Discussion: The global positioning system values for this attribute should conform with the USGS Spatial Data Transmission Standards. Among other things this includes the nature of the latitude and longitude readings, the offset error, the projection.

Rationale: In some field conditions, there will be no physical address to identify a place of interest. As all locations on the surface of the earth have unique geographic coordinates, the GPS values allow for precise location information to be captured and transmitted.

## Material extends Entity

A subtype of Entity that is inanimate and locationally independent.



Discussion: Used for discharge planning, social service assessment, psychosocial evaluation.

**Person.religiousAffiliationCode[CE]:** The primary religious preference of a person (e.g. Hinduism, Islam, Roman Catholic Church).

**Person.raceCode[SET<CE>]:** A value representing the race of a person.

**Person.ethnicGroupCode[SET<CE>]:** The ethnic group of the person.

## NonPersonLivingSubject extends Entity.LivingSubject

A subtype of LivingSubject that includes all living things except the species homo sapiens.

Examples: Cattle, birds, bacteria, plants molds and fungi, etc.

Rationale: Living organisms other than human beings may require additional characterizing information such as genetic strain identification that cannot be conveyed in the Entity.code.

**NonPersonLivingSubject.strainText[ED]:** A text string representing a specific genotypic or phenotypic variant of a NonPersonLivingSubject.

Examples: Minnesota5 (swine strain), DXL (poultry strain), RB51 (vaccine strain of Brucella abortus)

Rationale: There is no universal guideline for the naming or cataloging of strains. Many strain designations are created and eliminated over time, while some become established in various industries for a variety of reasons (vaccine production, breeding stock popularity, etc). However, the ability for anyone who cares to designate an organism as a "new" strain, precludes this field from being a coded value. Descriptive text is required to capture these designations.

**NonPersonLivingSubject.genderStatusCode[CE]:** A value representing whether the primary reproductive organs of NonPersonLivingSubject are present.

## Organization extends Entity

An Entity representing a formalized group of entities with a common purpose (e.g. administrative, legal, political) and the infrastructure to carry out that purpose.

Examples: Companies and institutions, a government department, an incorporated body that is responsible for administering a facility, an insurance company.

**Organization.addr[BAG<AD>]:** The postal and/or residential address of an organization.

**Organization.standardIndustryClassCode[CE]:** A value representing the industrial category of an organization entity.

Examples: 11231-Chicken Egg Production, 6211- Offices of Physicians, 621511-Medical Laboratories, 524114-Direct Health and Medical Insurance Carriers

Discussion: This attribute does not include terms related to clinical gender. Gender is a complex physiological, genetic and sociological concept that requires multiple observations in order to be comprehensively described. The purpose of this attribute is to provide a high level classification that can additionally be used for the appropriate allocation of inpatient bed assignment.

Constraints: This code is used for administrative purposes.

ExtRef: This information is reported on UB FL 15.

**LivingSubject.birthTime[TS]:** The date and time of a living subject's birth or hatching.

**LivingSubject.deceasedInd[BL]:** An indication that the subject is dead.

**LivingSubject.deceasedTime[TS]:** The date and time that a living subject's death occurred.

**LivingSubject.multipleBirthInd[BL]:** An indication as to whether the living subject is part of a multiple birth.

**LivingSubject.multipleBirthOrderNumber[INT]:** The order in which this living subject was born if part of a multiple birth.

**LivingSubject.organDonorInd[BL]:** An indication that the living subject is a candidate to serve as an organ donor.

Discussion: This attribute specifies whether an individual living subject has donated or is willing to donate an organ.

## Person extends Entity.LivingSubject

A subtype of LivingSubject representing a human being.

Constraints: This class can be used to represent either a single individual or a group of individuals based on the value of Entity.determinerCode and Entity.quantity.

**Person.addr[BAG<AD>]:** The postal and/or residential address of a Person.

**Person.maritalStatusCode[CE]:** A value representing the domestic partnership status of a person.

Examples: Married, separated, divorced, widowed, common-law marriage.

Rationale: This information is reported on UB FL 16

**Person.educationLevelCode[CE]:** The highest level of education a person achieved (e.g. elementary school, high school or secondary school degree complete, college or baccalaureate degree complete).

**Person.disabilityCode[SET<CE>]:** A value identifying a person's disability.

Examples: vision impaired, hearing impaired.

**Person.livingArrangementCode[CE]:** A value specifying the housing situation of a person.

Examples: Independent household, institution, nursing home, extended care facility, retirement community, etc.).

# HL7 Reference Information Model

