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Care Plan Domain Analysis Model, Release 1

Pre-publication Draft, November 2015

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HL7 Informative Ballot

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Release Number	Date	Author	Changes
1.0	August 4, 2013	Laura Heermann Langford, PhD, RN Stephen Chu, PhD, MD Enrique Meneses	Initial Release
1.1	March 15, 2014	Laura Heermann Langford, PhD, RN Stephen Chu, PhD, MD Enrique Meneses	Changes made based on comments received from Sept 2013 ballot.
1.2	October 2014 - June 2015	Laura Heermann Langford PhD, RN Stephen Chu, PhD, MD Russ Leftwich, MD Enrique Meneses Lenel James Susan Campbell, PhD, RN	Changes made based on the comments received from the May 2014 ballot.
1.3	November 2015	Laura Heermann Langford PhD, RN Stephen Chu, PhD, MD Russ Leftwich, MD Enrique Meneses Emma Jones, RN Lenel James	Changes based on review comments post May 2014 ballot

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1.4 Care Plan DAM Specification – Status Note

95 NOTE:

As of November 4, 2015, this is a pre-publication draft of the Care Plan DAM specification. The document is still undergoing review and revision by the core project team members.

There are likely to be structural changes to this document resulting from the review and revision processes. One of the changes will be moving all storyboards to the Appendix section. This change is based on the rationale that storyboards are intended to provide readers background and context information that underpin the design of the care plan models. They are not considered core materials of the care plan DAM specification.

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It is anticipated that the final version will be ready for publication before end of December 2015.

105

2 CARE PLAN MODELS

The Care Plan project team has developed a number of care plan model artifacts. A layered modeling approach was used which allows for separation of concerns by business requirements, information requirements and technical interoperability requirements, and to support forward and backward

110 traceability through these layers. The model semantics are grounded on the clinical scenarios described in the care plan project storyboards and also review comments received from the care plan model team and the ONC LCC HL7 Tiger Team.

The first layer, the conceptual model level, identifies the business domain concepts and concept relationships necessary to define the scope of the domain semantics covered by the subsequent levels.

115 The second layer, the logical information model, elaborates the conceptual model by adding attributes necessary to capture the data elements resulting from dynamic care planning interactions and required for capturing static point in time snapshots of the care plan. At the logical information level the model retains a one to one mapping of all the domain concepts except abstract data types such as String, Boolean and Code start to surface. The logical information model contributes intrinsic data properties

120 necessary to specify a class model with sufficient detail to support interoperability information requirements.

In the third layer, the platform implementation model will be realized through independent technical specifications such as CCDA specification of the care plan and its exchange, dynamic care plan management system implementation, and SOA specifications for coordination of care. The logical model

125 will be transformed into a technical specification to support message exchange and service interoperability.

The platform implementation model does not necessarily map one to one with the logical information model as engineering constraints may result in denser, terser and more optimal data structures and abstractions. To be meaningful and have utility to the business domain users the platform implementation

130 model is still traceable to the logical information model via explicit mapping.

The layers provide different perspectives starting with the business domain semantics and ending with the technical interoperability (engineering concern) models with traceability to the storyboards and technical use cases.

The conceptual and logical information model levels will be described in the following subsections.

135 • Care Plan Conceptual Model

• Care Plan Logical Information Model

The Care Plan model captures the necessary details for describing and supporting a broad set of use cases encompassing dynamic use of care plans within the context of care planning and execution applications and also the exchange of point in time care plan snapshots via messages and documents.

140 The Care Plan structure is designed to support the implementation of different types of plans including comprehensive multidisciplinary plans as well as discipline- or treatment- specific plans.. The generic "*Plan*" structure which together with a number of supporting components describe health concerns, health goals, interventions (plan activities), preferences, health risks, acceptance review, outcome review, care team roles, participations and their relationships.

145 The care plan model provides the structure to support the differentiation of these (and other) types of plan through vocabulary driven attributes and the display name attribute of the Plan class.

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Information requirements and care processes discerned from the rich set of care plan storyboards have been used to validate the adequacy of the generic *Plan* structure and its components in supporting the implementation of the three types of Plans as defined by the LCC project.

150 Some important aspects of the model to keep in mind:

1. The models do not specify governance, policy and business rules but support their use by capturing the necessary content and relationships to enable many policies and governance models.

2. The model defines domain level semantics for future technical service, message and document standard specifications. Technical platform binding to services, messages and documents is out of
155 the scope of the Care Plan DAM. Technical specifications will obtain their semantics from the Care Plan DAM.

3. The Care Plan DAM does not provide vocabulary binding but specifies coded properties which would be constrained via specific terminology bindings. Terminology bindings will be developed for downstream implementable artifacts. Coded properties within the Care Plan DAM may specify root
160 concept hierarchies from an ontology, taxonomy or simple value set. The Care Plan DAM identifies those properties with coded representation at the information level and provides examples as enumerated values to inform analysis for terminology binding.

The Care Plan DAM is an unconstrained model of the domain information which describes the semantics necessary to support various organizational use cases and international realm perspectives. It is
165 expected that derived models will add constraints to determine which aspects or slices of the model are sufficient for their use case; for example, Clinical Document Architecture (CDA) representation of a care plan instance does not represent dynamic care team participations as it is a point in time snapshot of the information and interactions only.

The model captures the features resulting from process interactions but does not specify or dictate what
170 the process is; it is a domain information model. The model is agnostic to policy and business rules decisions. The model simply describes the features necessary to support diverse processes which naturally occur across continuum of care, organization and geographical boundaries. External definitions of process, policy, business rules and governance will determine what subset of features is sufficient for their implementation based on one of the technical specifications derived from the Care Plan DAM. As a
175 principle, organizations will provide their own policies, rules and decisions and the Care Plan model will provide a vessel for holding the data necessary to support the process interactions.

A key aspect of the story boards which inform the Care Plan DAM is that the *Care Plan* exists in the continuum of care and changes in time and space through the interactions of a care team which includes the patient, his or her family, providers, care givers and social support structure. As such the plan
180 emphasizes the involvement of care team members in a given role participating in documenting, managing, tracking, communicating and giving care to the patient.

In order to support future standards based coordination of care processes the interactions or participations of the care team are as important as the resulting information elements necessary for static snapshots. The Care Plan DAM captures data resulting from care team interactions in order to support
185 dynamic and collaborative coordination of care interactions. Knowing who, when and how an individual care team member was involved in an activity helps to answer why something was done and facilitates awareness and harmonization of one shared and consistent care plan across the continuum of care.

2.1 UML Notation Used in the Models

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190   The Care Plan model is expressed as a single UML (Unified Modeling Language) model with various class diagrams that emphasize different features and aspects of the model.

UML classes represent concepts from the domain and may and may not always map one to one to an implementable class.

The model makes use of the following UML capabilities:

195   - UML Class – Expresses a domain concept.

- UML Property – Represent intrinsic attributes of the concept.

- UML Association – Specifies a relation between concepts.

- UML Association Class - An association class can be seen as an association with data properties. For example, the *Participation* association class used in the Care Plan model specifies
200   attributes which identify where, when and how an individual care team was involved in an occurrence of the plan, goals, concerns, interventions, etc. These attributes are part of the associative type of *Participation*.
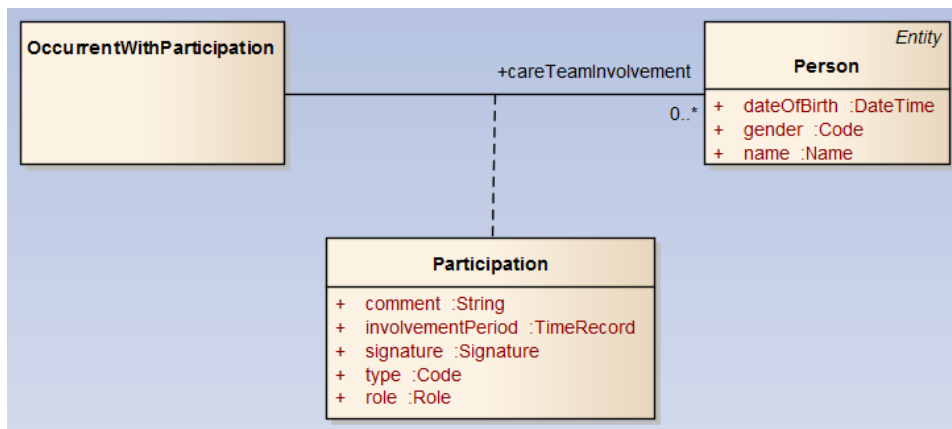

Figure 3 Participation Association Class Example

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- UML Templates - are model elements with unbound formal parameters that you can use to define families of classifiers. In the model, these are used to represent unconstrained place holders for clinical object references. For example, the reason for a Health Concern may be a Condition, an Allergy, a Medication, etc. The unbound place holder parameter allows specifying a Health
210   Concern pertaining to any of these disjoint concepts.

- UML Stereotype – Used to extend UML at the meta-level. This model uses a "<<Temporal Awareness>>"stereotype for UML associations. The "<<Temporal Awareness>>"stereotype indicates the association requires special temporal awareness by the care team (awareness of before and after values). For example, a priority attribute may be changed and the awareness of
215   the change can be of special importance to care team decision making. The use of the stereotype in the model explicitly informs downstream artifacts that they should consider the capability to support awareness of the change through time.

2.2 Care Plan Conceptual Model

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220   The conceptual model is designed to capture high level business requirements and delineates the scope of the domain necessary to support definition of the logical information model and derived technical interoperability standards. Its focus is to identify the necessary concepts and relationships only. The model does not specify data properties; the data properties are elaborated in the logical information model. The conceptual model establishes common semantics for concepts and relationships required to

225   establish the scope of electronic care plan interoperability for point-in-time care plan exchanges and dynamic, shared and collaborative care plan interactions.

The conceptual model classes/concepts are directly traceable to the business requirements captured in the various storyboards included in this document.

2.2.1.1 Model Descriptions

230   The model consists of an abstract *Plan* which captures the shared components of collaborative, patient centered and holistic *care*. The Plan has associations to concepts for *Health Concern*, *Health Goal*, *Health Risk*, *Care Barrier*, *Care Preference*, *Conversation*, plan *Activity* (including interventions), *Acceptance Review*, *Plan Review* and key care team participations through time and space between the *Patient*, *Provider(s)*, *Care Giver(s)* and other *Supporting Member(s)*. Each is listed equally but it is the

235   health concern, and the plan Activity that are directly driving the anticipated Health Goal (whether or not it is realistic). The Health Outcome(s) are tied to the health concern, goal and activity allowing evaluation of the progress of care towards the health goal(s).

The figure below from the *HL7 CDA R2 IG: Consolidated CDA Templates for Clinical Note (US Realm),*

240   *DSTU R2—Vol. 1: Intro* shows key components of a care plan: health concern, health goal, intervention, evaluation/outcome, and the flow between them.
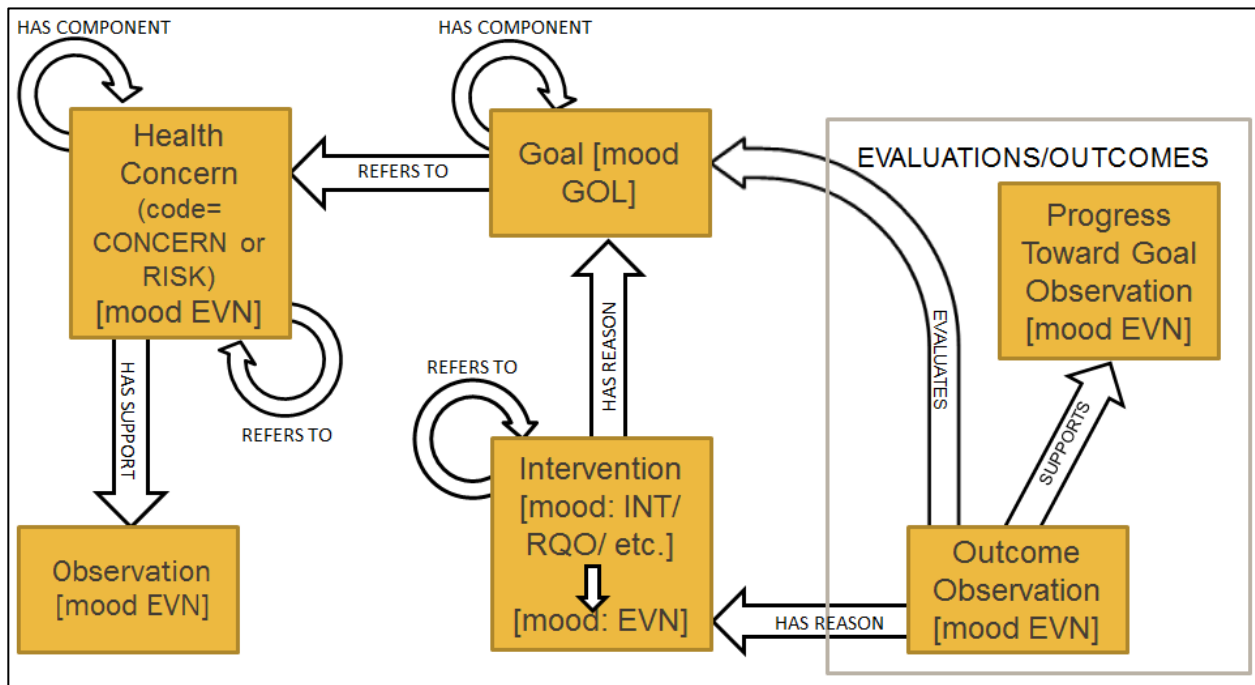

Figure 4 Care Plan Relationship Diagram

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The *Plan* and many of its associated classes support dynamic care team involvement as defined by the shared characteristics inherited from the *OccurrentWithParticipation* primitive concept. Many yet unspecified process models and realm specific policies and rules will specify how *Participation* occurs. The important point is that the Care Plan DAM has the capability to capture information about these

250 participations. As an example, dynamic care planning interactions spread through time and space and directed towards harmonization of the *Plan* will result in specific involvement of multiple care team members. Capturing the details of participations enables awareness necessary to support coordinated care via standards based applications. In the *Plan* class the careTeamInvolvement association is further specialized to indicate key constituents consisting of the *Patient*, *Providers*, *Care Givers* and other

255 *Supporting Members*.

The details of the *Plan* result from the interactions of the *Care Team* which consists of the *Patient* and at least optional *Providers*, *Care Givers* or *Supporting Members*. A *Plan* is not intended to be static but continuously changing based on continual chatter, negotiation and interactions between the various care team members. When the *Plan* becomes static, cross care teams communications and care coordination

260 will need to be managed by mechanisms outside the care plan system to prevent communication and care coordination breakdowns, information gaps and risks to care. The *Care Plan* by design is a collaborative, shared and dynamic structure with controlled *Care Team* involvement or participation.

The *Care Team* is in many places, interactions span the continuum of care and time. Resolution of differences in opinion, correction of discrepancies and overall harmonization of the care plan requires

265 raising awareness and visibility of care team *Participations* so that they are visible to all care team members (within the constraints of the circle of care which needs to know).

A *Plan* may come into being as a result of one or more patient *Health Concerns* or simply as a result of a patient *Health Goal*. For example, in the stay healthy use case, a health care consumer may not have a specific concern but simply a desire (i.e. goal) to improve some aspect of their health. In this case the

270 patient may have a *Plan* entirely driven by *Health Goals*. The *Plan* is created with simply a goal in mind. For patients with some health condition whether simple, chronic or complex the *Plan* will reference one or more *Health Concerns*. The *Health Concern* specifies the reason for creating the Plan. In this case the *Health Concern* reason eventually leads to the definition of *Health Goals* as a result of conversations between the patient and his or her providers, care givers and supporting care team.

275 Certain individual may have predisposition to certain *Health Risk*, which may or may not become health concern(s) over time. The model supports representation of these *Health Risks* to enable the care team to monitor them and have the awareness to implement mitigating actions if the need arises. An intervention, plan *Activity*, in turn may present certain *Health Risks* to the patient which must be closely monitored to prevent the manifestation of additional health concerns (e.g. the risk of administration of an

280 immunosuppressant, surgery, etc.)

Please note that the various diagrams present partial views of the underlying model to improve clarity in the presentation. Review of all the models and how they relate to each other is expected for a comprehensive understanding of the Care Plan DAM.

The following diagram illustrates the high level associations of the core domain concepts directly

285 associated with the abstract *Plan*; subsequent diagrams will introduce additional features and associations of these domain concepts.
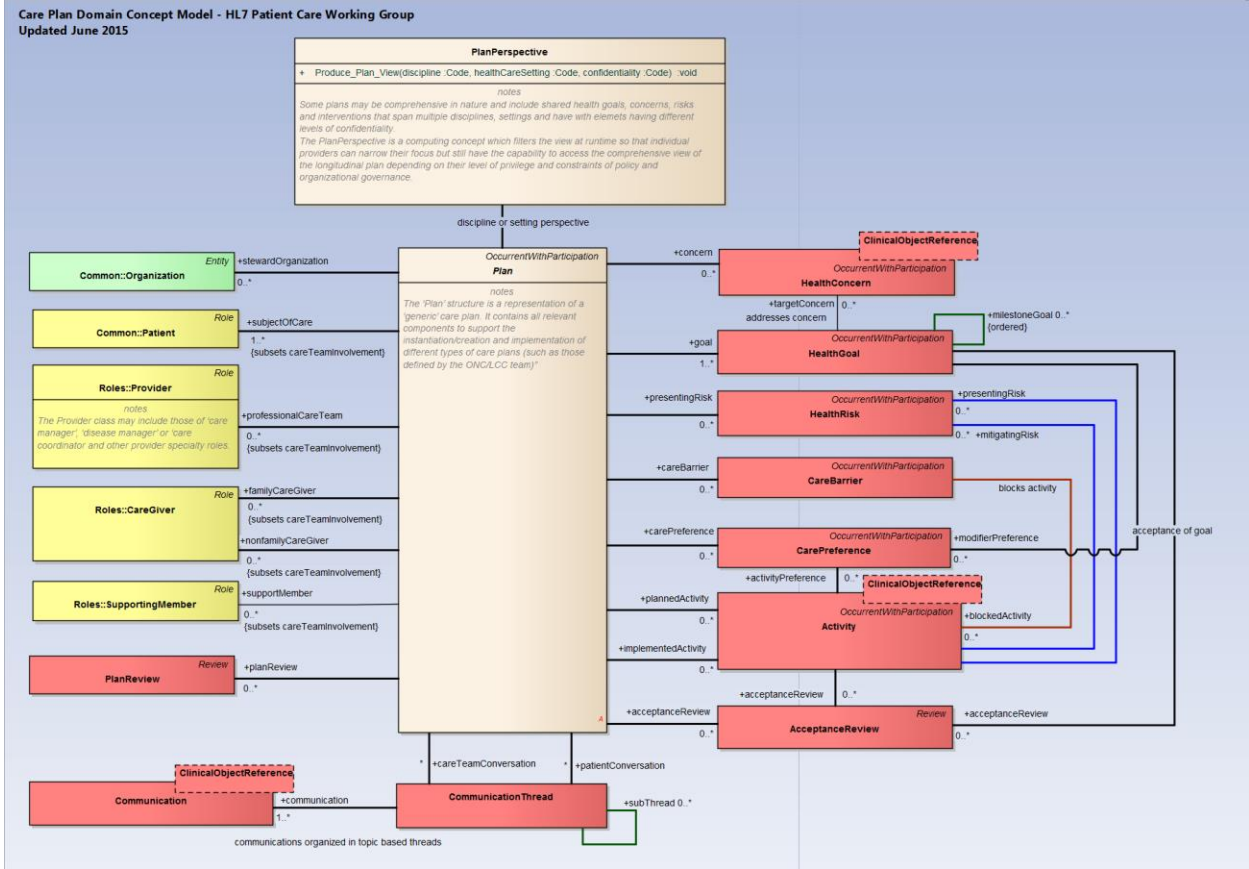
Figure 5 Plan Concept Model

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2.2.1.2 Plan Class - Summary of Associations

Associations represent relationships between classes/ concepts. The following are a set of associations depicted in the Care Plan conceptual model.
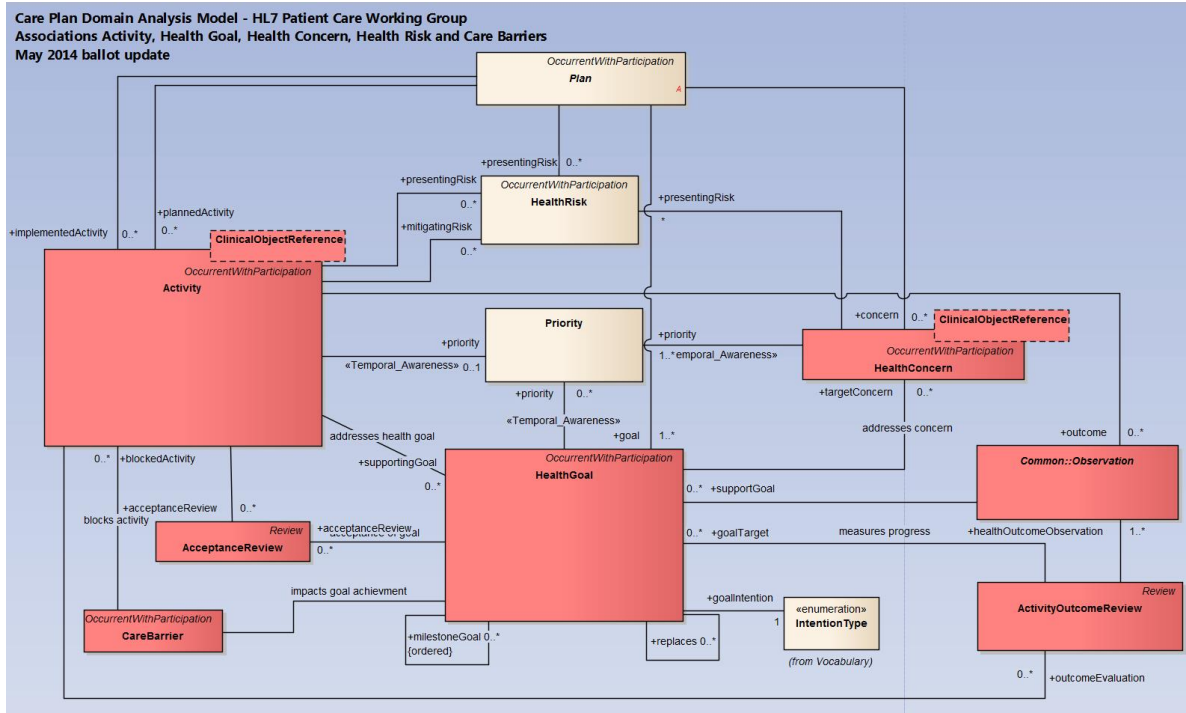
Focus Concept	Associated Class	Cardinality	Description
Plan	Organization	0..*	Stewardship of the plans is shared between the patient and zero or more organizations in which the patient is receiving care.
Plan	Patient	1..*	There is at least one patient who is the subject of care. Group therapy scenarios include more than one patient and as a result the cardinality is one or more.
Plan	Provider	0..*	The plan might have any combination of Providers, Care Givers or other Supporting Members forming the care team along with the Patient. These associations are different subsets of care team involvement or participation.
Plan	CareGiver	0..*	
Plan	Supporting Member	0..*	

Plan	HealthConcern	0..*	Health concerns specify the condition oriented reasons for creating the plan.
Plan	HealthGoal	1..*	A plan has at least one health goal which may either directly address a Health Concern or be the result of an internal patient motivation.
Plan	HealthRisk	0..*	A plan may capture a patient's inherent health risks or risks that may be associated with certain interventions, so that there can be awareness among the care team as they monitor any impact on the patient's health which may introduce new health concerns based on the risk.
Plan	CareBarrier	0..*	A care barrier presents a situation which impacts progression of the identified health goals by blocking specific interventions or activities. Interventions and other plan activities may be modified in order to remove the block.
Plan	CarePreference	0..*	A care preference is a statement expressed by the patient, custodian or caretaker responsible for the patient in order to influence how their care is delivered. A preference expresses a personal choice and may be driven by cultural, religious and moral principles. As such it is a principal component of patient centered care and autonomy. Care preferences serve as modifiers of the care plan which influence how the plan is personalized for the individual. A care preference may be specified prospectively to influence future care planning and treatment or it may be expressed and recorded at arbitrary decision points during interventions. A preference expresses a request to fulfill a patient's choice or desire. The choice may be a strong and absolute statement such as an end of life directive. The request could also be a desire to be fulfilled if possible given care team capabilities and resources.

Plan	Activity	0..*	Activities include interventions and other ancillary supporting activities necessary to carry out the plan. The plan references plan activities as well as implemented activities in order to support the planning and execution aspects of coordination of care workflows.
Plan	AcceptanceReview	0..*	An AcceptanceReview captures the patient's acceptance of the plan upon discussion with his or her care team and weighting the pros and cons of treatment. The AcceptanceReview may also capture general agreement or disagreement about the plan among care team members.
Plan	PlanReview	0..*	Plan reviews are performed at periodic intervals to assess the overall consistency, appropriateness, completeness and effectiveness of the plan. The plan review includes comprehensive review of all the goals.
Plan	CommunicationThread	*	A thread organizes individual plan related communications in a meaningful manner for the benefit and understanding of care team.
Communication-Thread	Communication	1..*	Communication is ongoing during care coordination. Care team communications is what causes the unfolding of the plan as new participants join, propose actions, change goals, record interventions, review outcomes and assess effectiveness of individual actions and of the overall plan. A communication may pertain to any element of the care plan or the care record and reference the specific semantic context.

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Figure 6 Associations Activity, Health Goal, Health Concern, Health Risk and Care Barriers

2.2.1.3 Health Goal Class - Summary of Associations

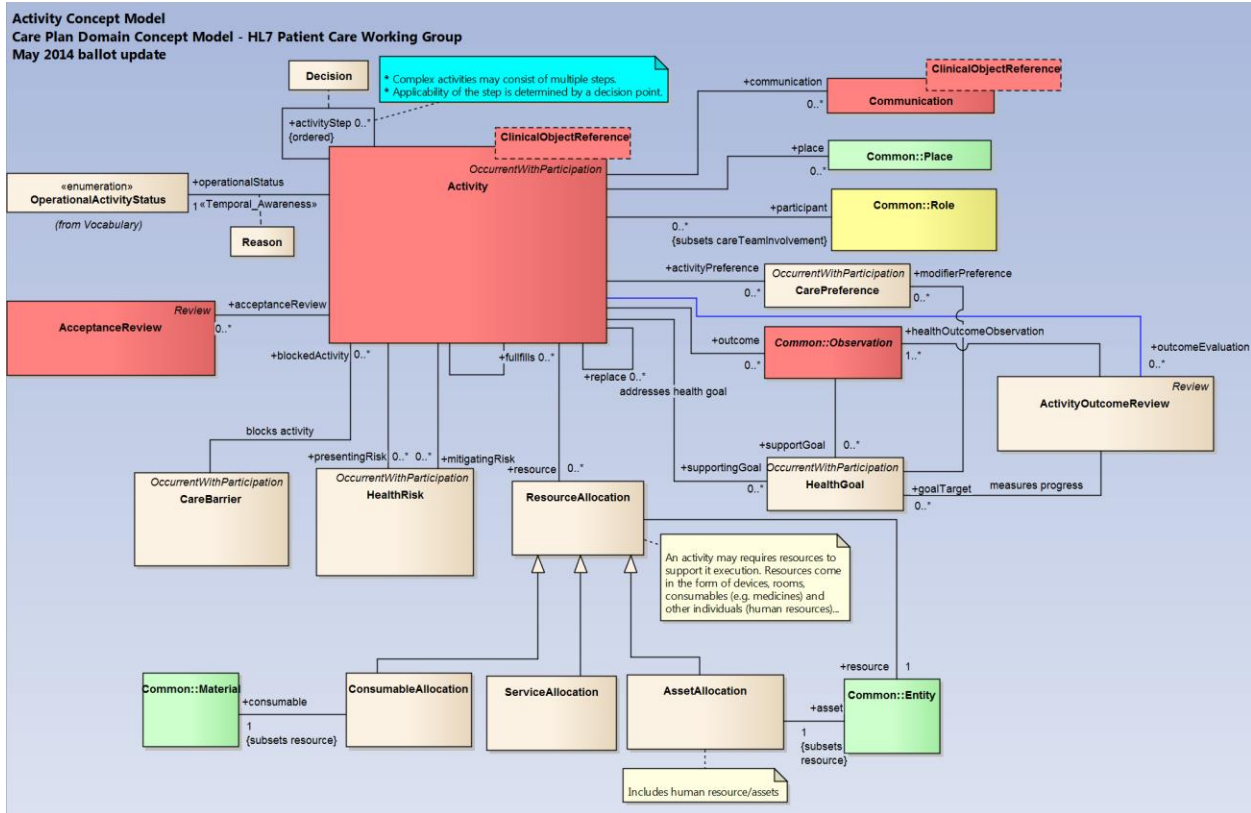Associations for the health goal class are summarized below:

Focus Concept	Associated Class	Cardinality	Description
HealthGoal	AcceptanceReview	0..*	An AcceptanceReview captures the care team's (including patient) agreement with the health goals of the plan. It may also capture disagreement or compromises between care team members regarding what the goal should be. Capturing varying perspectives facilitates harmonization of the health goals in dynamic care plan applications.
HealthGoal	Priority	0..*	A goal may have priority specified by the care team members including the patient. Differing priorities help care team members focus on their areas but at the same time it aids with global team awareness of differences which may be important for care plan harmonization.
HealthGoal	HealthGoal (milestone)	0..*	A Health Goal may be composed of finer grained intermediary milestones.

HealthGoal	HealthGoal (replacement goal)	0..*	A Health Goal may be replaced by an alternative at any point during the life span of the plan. This association captures replacement context in order to maintain awareness of a decentralized care team.
HealthGoal	HealthConcern	0..*	The Health Goal may address zero or more health concerns. This association links the goal to an underlying condition oriented reason for setting the goal.
HealthGoal	CareBarrier	0..*	A care barrier impacts goal achievement by blocking specific activities or interventions. This association raises awareness of blocks so that they can be addressed by the care team in collaboration with the patient.
HealthGoal	Activity	0..*	A Health Goal supports an activity or intervention.
HealthGoal	Observation	0..*	Outcome observations resulting from activities and interventions are linked to the supporting goal.
HealthGoal	ActivityOutcomeReview	0..*	A health goal determines a target which is evaluated when performing an Activity Outcome Review.

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Activities in the context of planning express what is to be done, by whom, where it is to take place, and required resources necessary for execution. The following diagram elaborates on the concept of Activity and necessary associations.

305

Figure 17 Activity Associations

2.2.1.4 Activity Class - Summary of Associations

Associations for the activity class are summarized below:

Focus Concept	Associated Class	Cardinality	Description
Activity	Activity	0..*	An *Activity* may consist of multiple steps which are activities themselves. The applicability of the step is determined by a decision point which determines conditional execution.
Activity	OperationalActivityStatus	1	An *Activity* has a participant driven operational status as it is proposed, started, suspended and cancelled. There is just one status at any given time but the model supports capturing overtime snapshots to facilitate coordinated activities and reference point awareness by the care team.
Activity	AcceptanceReview	0..*	An *AcceptanceReview* captures the patient's acceptance of an activity or intervention upon discussion with his or her care team

			and weighting the pros and cons of treatment.
			The *AcceptanceReview* may also capture general agreement or disagreement about the activity among care team members.
Activity	Place	0..*	An *Activity* takes place somewhere along the continuum of care.
Activity	Role	0..*	An *Activity* has many types of care team involvement over time. A care team member may propose, reject, comment, modify, implement, etc. Awareness of who participated, why and what they did helps coordinate care team actions as they span time and space.
Activity	HealthGoal	0..*	An *Activity* is planned and implemented in support of specific care plan goals.
Activity	HealthRisk - presentingRisk - mitigatingRisk	0..*	An *Activity* may present Health Risks to the patient. In this case, the activity is linked to the Health Risk to be avoided in order to raise awareness within the care team. An *Activity* may also be implemented to mitigate a Health Risk introduced by either current patient health concerns, conditions or other planned activities.
Activity	CarePreference	0..*	An *Activity* may be modified by a patient *Care Preference*. The preference is linked in order to raise care team awareness so they can maintain a respect any personalization done in support of the preference.
Activity	CareBarrier	0..*	An *Activity* may be blocked by a *Care Barrier*. Linking the barrier to the activity supports raised care team awareness of the obstacle which must be removed
Activity	Observation	0..*	An *Activity* may link to any outcome observations resulting from its execution.
Activity	Communication	0..*	An *Activity* may involve any series of communication exchanges between care team participants.
Activity	ConsumableAllocation	0..*	An *Activity* may require consumable materials as part of its planning. The allocated materials are used during the

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|			activity's implementation.
Activity	ServiceAllocation	0..*	An *Activity* may require any number of services to be scheduled as part of its planning. The services may be a requirement before the activity can be implemented.
Activity	AssetAllocation	0..*	An *Activity* may require any number of assets such as rooms, equipment or human resources to support successful planning. The rooms, equipment or human assets are required before the activity can take occur.

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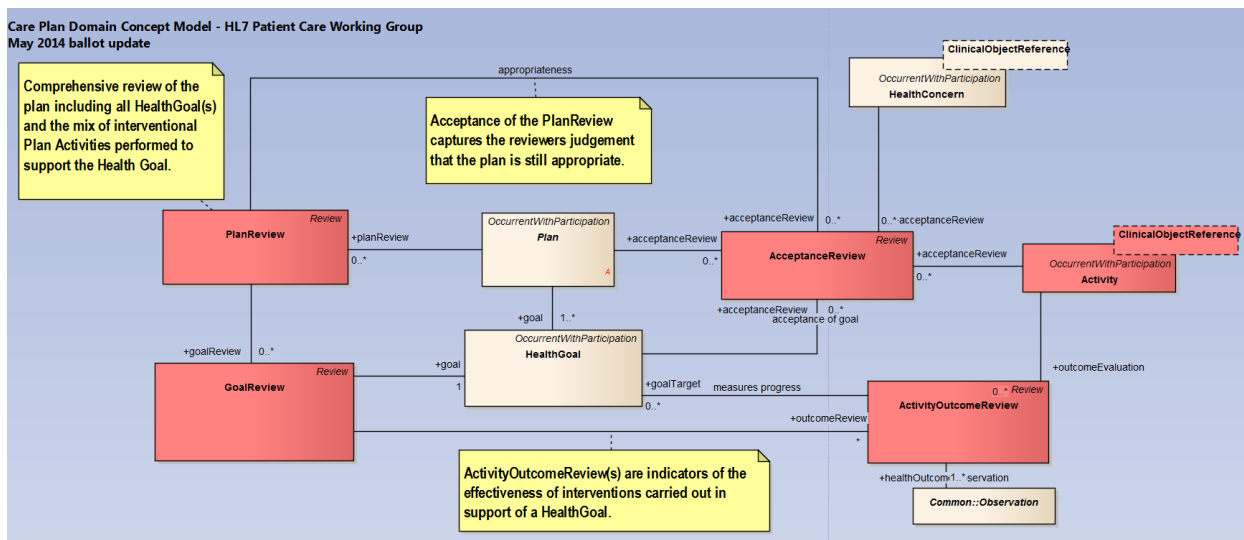
Figure 28 Types of Reviews

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2.2.1.5 Review Classes - Summary of Associations

Associations representing for the review classes are summarized below:

(Note – descriptions of these associations are similarly expressed in previous tables and will not be repeated here)

Focus Concept	Associated Class	Cardinality	Description
AcceptanceReview	Plan	0..*	
AcceptanceReview	HealthGoal	0..*	
AcceptanceReview	Activity	0..*	
AcceptanceReview	HealthConcern	0..*	

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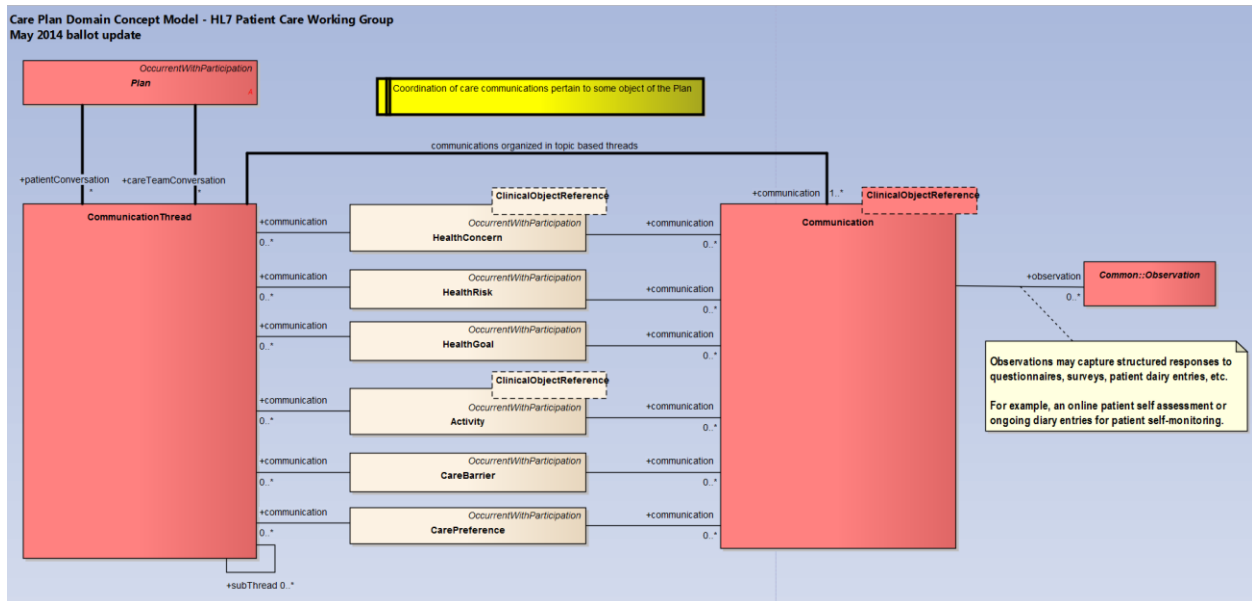|		
ActivityOutcomeReview	Activity	0..*
ActivityOutcomeReview	GoalReview	0..*
GoalReview	ActivityOutcomeReview	0..*
GoalReview	HealthGoal	0..*
PlanReview	Plan	0..*
PlanReview	GoalReview	0..*
PlanReview	AcceptanceReview	0..*

320

Figure 39 Care Team Conversations

2.2.1.6 Communication Classes - Summary of Associations

325   Associations representing for the communication classes are summarized below:

Focus Concept	Associated Class	Cardinality	Description
Plan	Conversation	0..*	A Plan may reference multiple conversation threads which group related communications for the benefit of the care team.
CommunicationThread	Communication	0..*	A conversation consist of multiple discrete communication exchanges between two or more care team members.
Communication/Thread	HealthConcern	0..*	Care team communications or communication threads may relate to any
Communication/Thread	HealthRisk	0..*	

Communication/Thread	HealthGoal	0..*	part of the plan.
Communication/Thread	Activity	0..*	These associations capture possible subjects of communications for *Health Concerns*, *Health Risks*, *Health Goals*, *Activities*, *Care Barrier*, *Patient Preferences* and *Observations*.
Communication/Thread	CareBarrier	0..*	
Communication/Thread	Observation	0..*	
Communication/Thread	PatientPreference	0..*	

2.2.1.7 Externalizing Business Rules and Decision Points

As mentioned in earlier sections the Care Plan model is agnostic to organizational policies and business rules. The model makes use of *Decision* and *Criterion* concepts to represent functional logic based on
330 policies, organization decisions and business rules. For example, activities of the Plan may be conditionally executed based on decision points and they may also declare pre-conditions which use the care planning Context to determine applicability of an action and modify behavior.


From Care Plan Domain Concept Model - HL7 Patient Care Working Group
September 2013
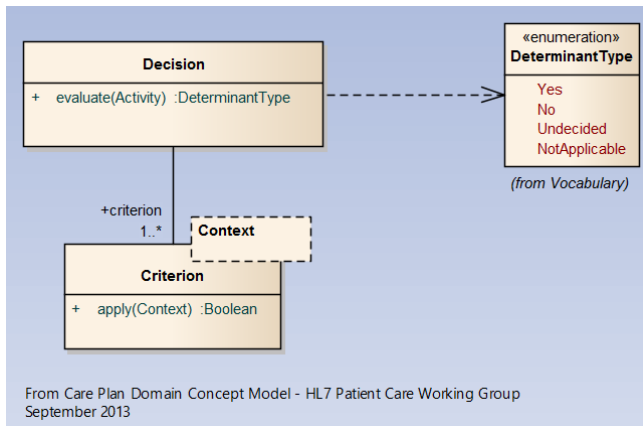
335 **Figure ~~4~~10 Decision Points and Criteria in Care Plan**

2.3 Care Plan Logical Information Model

The logical information model augments the "primitive" concepts defined in the conceptual model with data properties necessary to capture information for point in time data exchange and dynamic coordination of care interactions. At the logical information level, the model includes the level of detail
340 required for supporting IT systems but it is still not an implementation model. The model is open and unconstrained in order to support multiple use cases/specifications with varying viewpoints but shared information semantics.

The logical information model classes map one to one with the conceptual model and are directly traceable to the Care Plan project's collection of storyboards included in this document and incorporates
345 review comments received from the ONC LCC HL7 Tiger Team. It is intended to support technological/platform specific implementable models including HL7 Care Plan R-MIMs, Consolidated Clinical Document Architecture (C-CDA) Care Plan documents and clinical statements (entries) within the C-CDA Plan of Treatment Section, and HL7/OMG Coordination of Care Services specification.

350   All concepts and associations from the concept model are preserved and necessary data properties are included. This section will focus on description of the attributes. Please refer to the conceptual model section for a comprehensive understanding of the concept relationships. They complete the conceptual model attribute details which we now describe.
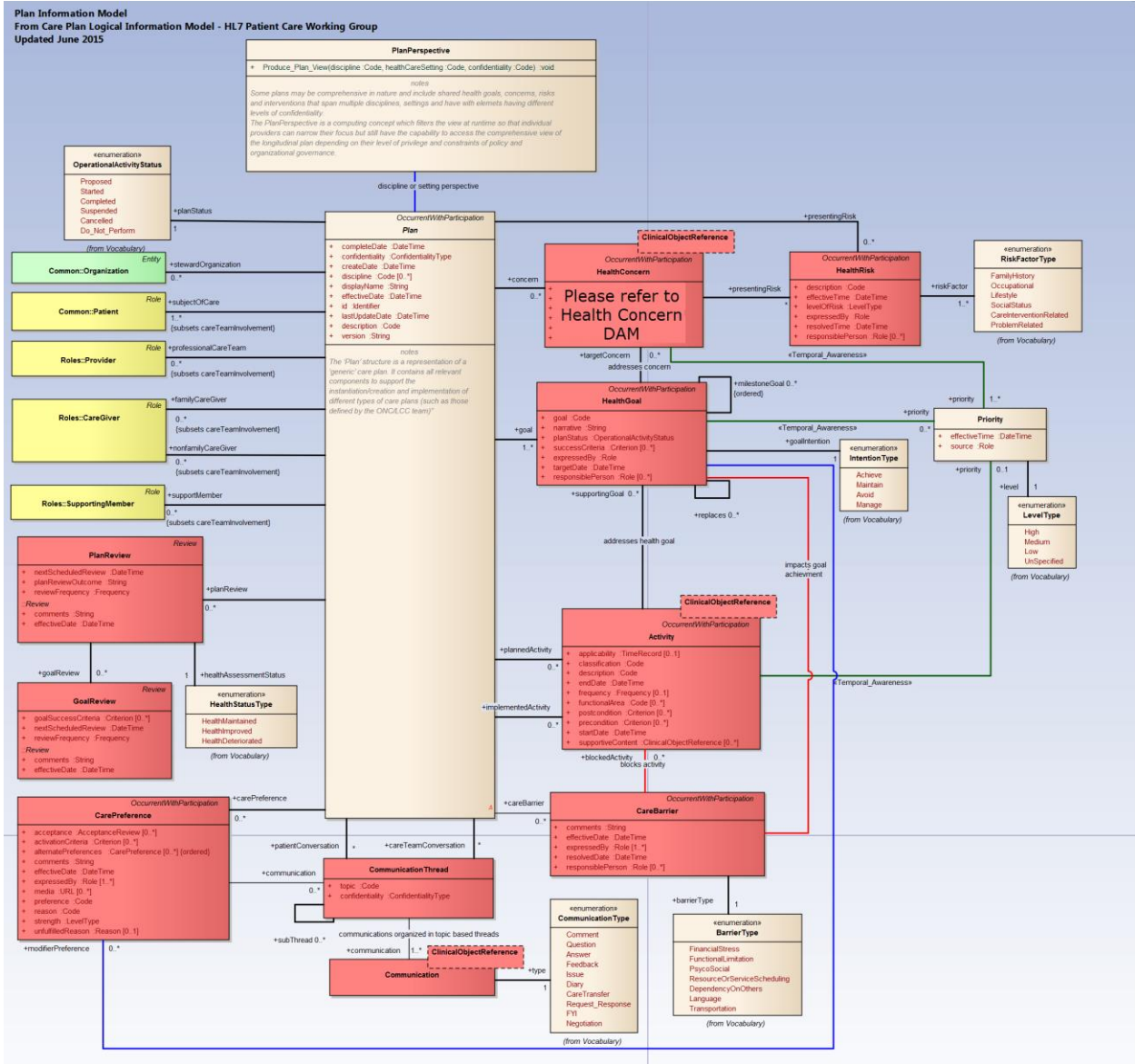
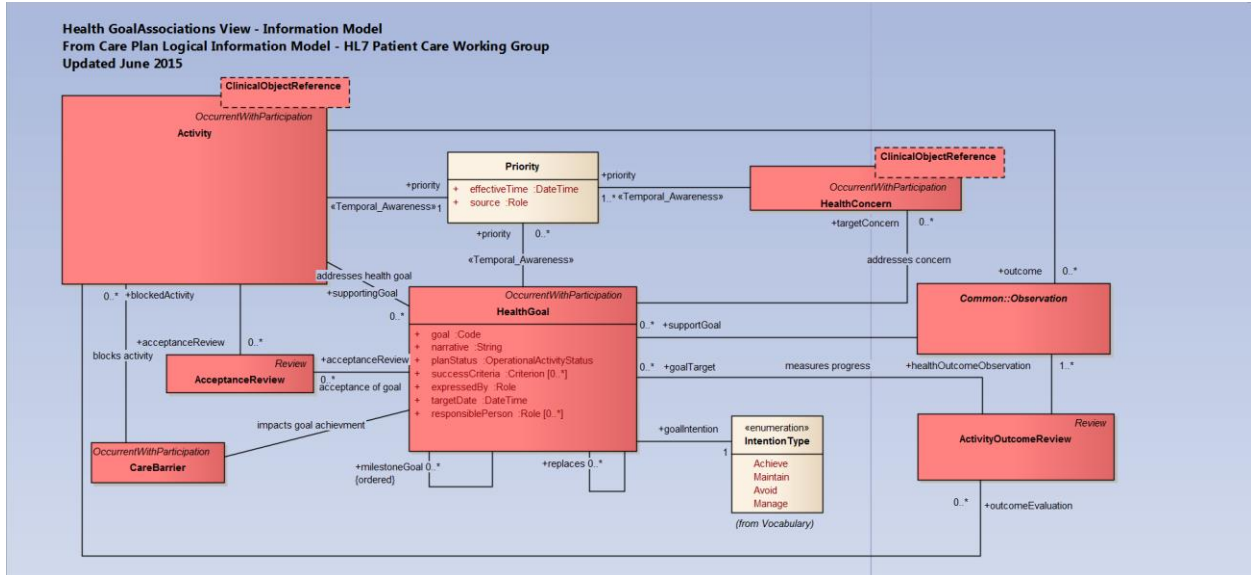355   **Figure 11 Care Plan Logical Information Model**

Figure 5~~12~~ Health Goal Associations View

2.3.1.1 OperationalStatusType Description

360   The operational status type applies to the Plan, individual Activity instances and to Health Goals. The status type is user determined; there is no deterministic state transition. The type specifies when the concept status is proposed, started, completed, suspended or cancelled.

2.3.1.2 Plan Attributes

365   The *Plan* captures the shared attributes for *Care Plan*, *Plan of Care* and *Treatment Plan*.

Attribute Name	Data Type	Description
completeDate	DateTime	Specifies when the plan status is changed to complete (e.g. when all goals are achieved, health concerns resolved)
confidentiality	ConfidentialityType	Specifies the plan's confidentiality level
createDate	DateTime	Specifies when the plan was created
discipline	Code[0..*]	Specifies zero or more discipline or clinical specialties viewpoints represented in the plan
displayName	String	Descriptive display name for the plan
effectiveDate	DateTime	Specifies the start of the plan implementation
id	Identifier	A unique identifier for the plan
lastUpdateDate	DateTime	Specifies the last date/time the plan was changed
description	Code	Indicates a descriptive coded type for the plan
version	String	A value indicating some changes (e.g. concern, goal, risk, proposed actions) in a plan and denoting that it is different

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from the previously published form.

2.3.1.3 Health Concern Attributes

370 Please reference the Health Concern domain analysis model for details

2.3.1.4 Health Goal Attributes

375 *A health goal* specifies a future target or achievement towards which the effort of care planning and execution is directed. Goals represent concrete targets to reduce or eliminate concerns or risks. A Goal may exist in the absence of concerns or risks. For example, a patient may have a goal to improve their fitness level. The plan always has at least one goal.

Attribute Name	Data Type	Description
goal	Code	Names or describes the goal
goalIntention	IntentionType	The goal intent is a modifier of the goal purpose and indicates whether the goal target is something to achieve, maintain, manage or avoid. For example, in late stage diabetes the only path may be to simply manage or control the condition.
narrative	String	Captures comments or notes about the goal
priority	Priority[0..*]	Indicates the preference order to use for care planning purposes. The goal supports multiple priorities in order to support multiple care team perspectives and eventual harmonization.
expressedBy		The individual noting the goal
planStatus	OperationalActivityStatus	Indicates the implementation stage for the goal and related plan components.
successCriteria	Criterion[0..*]	Defines criteria which must be met to determine goal achievement.
targetDate	DateTime	Desired target date for meeting the goal

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2.3.1.5 Health Risk Attributes

Risks may represent clinically significant potential concerns to the patient's health. They are captured in order to monitor and mitigate the manifestation of a future concern. Risks may be raised based on clinical evidences or they may capture a provider's judgment.

385

Attribute Name	Data Type	Description
description	Code [1]	Names or describes the risk
riskFactor	RiskFactorType [1]	Category for the risk
effectiveTime	DateTime [1]	Date/time at which the risk is identified
levelOfRisk	LevelType [1]	A risk is clinically significant but the level may be low, medium or high depending on care team judgment.
expressedBy	Role [1]	The individual who identified the risk. A Health Risk can be identified by a patient, family or provider.
responsiblePerson	Role[0..*]	Captures care team member(s) who is/are accountable for a specific aspect of the patient's health risk.
resolvedTime	DateTime	The date the risk is no longer a threat to the health of the patient.

2.3.1.6 Care Barrier Attributes

A barrier impacts specific interventions or other plan activities and may necessitate their modification. Barriers are situations outside the health care system which nonetheless reduce or block quality of care
390 and also increase cost. Barrier may also impact on goals achievement if modifications to interventions cannot effectively overcome identified barriers.

Attribute Name	Data Type	Description
barrierType	BarrierType	Names or describes what the barrier is
comment	String	Free form comments related to the barrier
effectiveDate	DateTime	The date/time the barrier was identified
expressedBy	Role	Individual who identified the barrier
resolvedDate	DateTime	The date/time when the barrier is either resolved or an acceptable alternative is found.

2.3.1.7 Care Preference Attributes

395   A care preference is a statement expressed by the patient, custodian or caretaker responsible for the patient in order to influence how their care is delivered.

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A preference expresses a personal choice and may be driven by cultural, religious and moral principles. As such it is a principal component of patient centered care and autonomy. Care preferences serve as modifiers of the care plan which influence how the plan is personalized for the individual.

400   A care preference may be specified prospectively to influence future care planning and treatment or it may be expressed and recorded at arbitrary decision points during interventions.

A preference expresses a request to fulfill a patient's choice or desire. The choice may be a strong and absolute statement such as an end of life directive. The request could also be a desire to be fulfilled if possible given care team capabilities and resources.

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Attribute Name	Data Type	Description
preference	Code	Descriptive code which specifies the type of the patient preference
reason	Code[0..*]	Captures a reason indicator for the preference. The reason may be classified as cultural, religious, moral/ethical. The reason is a factor which should already be included in considering the strength of the preference. It is explicitly indicated in the model in order to provide context for handling with sensibility.
effectiveDate	DateTime	The date/time the preference becomes effective for consideration when providing care
expressedBy	Role	The individual who expressed the preference. This is typically the patient but it may also be the patient's caretaker (e.g. in the case of a patient who is not able to decide for himself/herself such as a child or individual with some form of incapacitation).
strength	LevelType	The strength indicates flexibility in the interpretation of the patient's choice by the care team participants. The strength may be High and indicate an absolute choice driven by moral principles, cultural or religious principles. Or it may indicate an important desire which the patient has but for which the patient has flexibility. The strength may have a value of either High (absolute choice) or Low (desired choice).
notes	Note[0..*]	Optional notes about the preference. The note captures a text narrative, date of the note and the individual making the note.
media	URL[0..*]	Optional link to external documentation supporting the preference (e.g. scanned advance directive or legal documents on file).
activationCriteria	Criterion[0..*]	Specifies how the preference is matched to an Intervention and the conditions under which it is activated.
alternatePreference	CarePreference[0..*]	A list of ordered alternate preferences acceptable to the patient or caretaker in case the primary preference cannot be fulfilled. The ordering indicates the next best alternative for the patient.
acceptance	AcceptanceReview	Captures acceptance or acknowledgement of the preference by one or more care team members. Acceptance represents alignment

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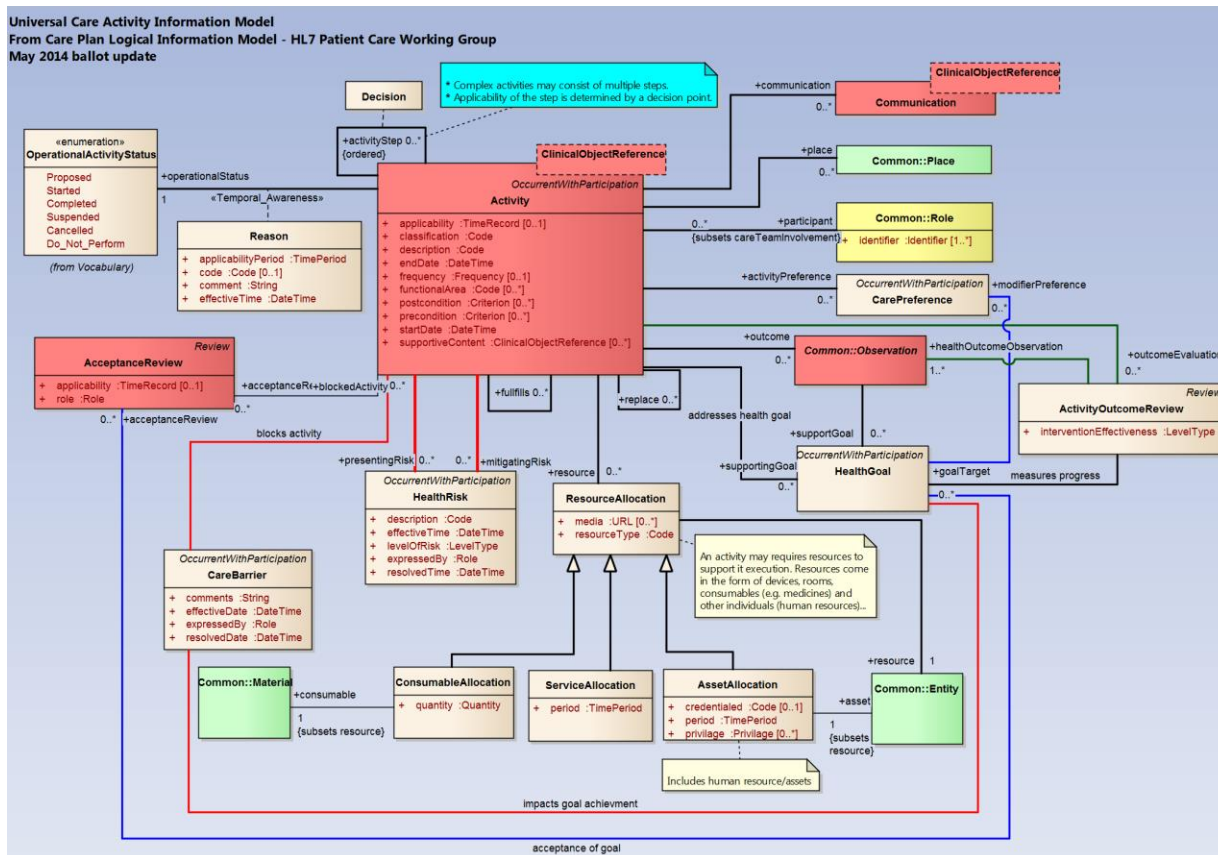|	
[0..*]	of the patient and providers understanding.
unfullfilledReason[0.. 1]	Captures the reason why a preference cannot be applied during an intervention in which the preference should apply. This property can only be set for preferences associated with a Health Activity

Figure 6~~13~~ Plan Activity Logical Information Model

410

2.3.1.8 Activity Attributes

The activity is a general concept which represents the common attributes required for planning and execution. The activity has a timeframe, actual start and end dates and it may repeat over time at a given frequency.

Attribute Name	Data Type	Description
applicability	TimeRecord[0..*]	Applicability time point or time frame in which the activity may be carried out.
classification	Code	A classification of the activity such as "patient instruction", "medication administration", "self blood

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		glucose monitoring", etc.
description	Code[0..1]	A sub-classification of an activity such as "wound care" which modifies the "patient instruction" classification.
startDate	DateTime	The actual start instant of the activity.
endDate	DateTime	The end date/time of the activity.
frequency	Frequency[0..*]	Specification of repeating frequency of an activity.
functionalArea	Code[0..*]	A discipline categorization code for the activity.
preCondition	Criterion[0..*]	Any required preconditions which must be before the activity can be carried out.
postCondition	Criterion[0..*]	Any conditions expected to be true after the activity is carried out.
supportiveContent	ClinicalObjectReference[0..*]	Associated content to support the activity.

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2.3.1.9 Resource Allocation Attributes

Successful execution of any plan requires resources. Plan activities indicate resources which must be allocated in preparation for implementation of the activity which uses the resources.

The achievement of plan activities requires allocation of human, asset, consumable and service
420 resources.

The Care Plan model captures three types of resource allocations which represent allocations for consumable/materials., services and assets.

Attribute Name	Data Type	Description
media	URL[0..*]	Specifies supporting media content for the resource.
resourceType	Code	Specifies the resource type.

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2.3.1.10   Consumable Allocation Attributes

Attribute Name	Data Type	Description
quantity	Quantity	Specifies the quantity of material or consumable.

2.3.1.11   Service Allocation Attributes

Attribute Name	Data Type	Description
period	TimePeriod	Specifies the time period for which the service needs to be

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available or scheduled.	

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2.3.1.12   Asset Allocation Attributes

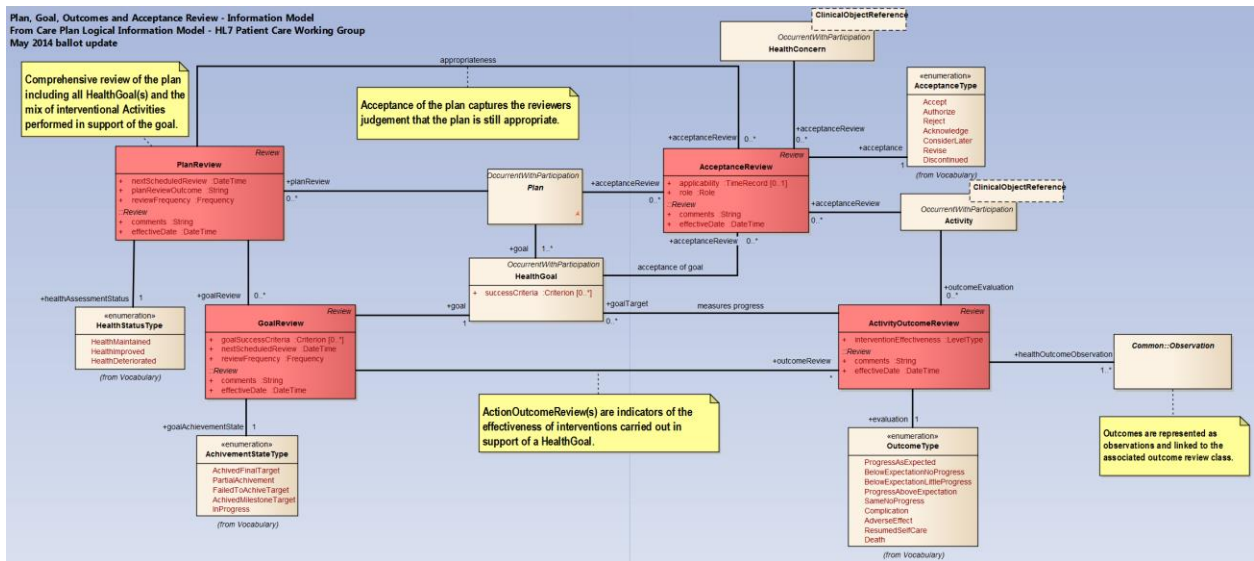| Attribute Name	Data Type	Description
period	TimePeriod	Specifies the time period for which the asset needs to be available.
credentialed	Code[0..*]	Specifies any credentials required by the resource.
privilege	Privilege[0..*]	Indicates required or held privileges for a human resource

Figure 7~~14~~ Plan Reviews Logical Information Model

435

2.3.1.13   Review Type

Attribute Name	Data Type	Description
role	Role	Specifies the individual providing the review
comments	String[0..*]	Specifies optional comments for the review
effectiveDate	DateTime	Specifies the date/time of the review

2.3.1.14   Acceptance Review Attributes

440   Acceptance reviews capture understanding and agreement to adopt a proposal for health goals, interventional actions or the plan itself. E.g. Upon review of the goals and actions a care manager (e.g.

nurse case manager, social worker, physical therapist, pharmacist), PCP, nurse and patient will indicate understanding and acceptance of the care plan. Acceptance reviews may be used to indicate a provider's authorization to perform an intervention and another's provider acknowledgement.

445

Attribute Name	Data Type	Description
acceptance	AcceptanceType	Indicates the type of acceptance expressed by the care team member and/or patient.
applicability	TimeRecord[0..1]	Indicted if there is an applicable time period for the acceptance. The acceptance is invalid when outside the specified time period.

2.3.1.15   Activity Outcome Review Attributes

450   An activity outcome review measures the result of individual implemented action (observational or interventional) against goal success criteria. The action outcome review might address only a subset of goal success criteria.

Attribute Name	Data Type	Description
evaluation	OutcomeType	Specifies the type of outcome determined based on the review
interventionEffectiveness	LevelType	Indicates a judgment evaluation regarding the intervention effectiveness

2.3.1.16   Goal Review Attributes

455   Goal reviews reference multiple action outcomes reviews which support overall assessment of a HealthGoal.

| Attribute Name	Data Type	Description
goalAchievementState	AchievementStateType	Specifies a judgment on the goal achievement state
goalSuccessCriteria	Criterion[0..*]	Indicates criteria for assessment goal achievement
nextScheduledReview	DateTime	Specifies the date/time of the next review
reviewFrequency	Frequency	Specifies a periodic frequency for future reviews

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2.3.1.17   Plan Review Attributes

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Plan reviews are performed at periodic intervals to assess the overall consistency, appropriateness, completeness and effectiveness of the plan. The plan review includes comprehensive review of all the goals.

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Attribute Name	Data Type	Description
healthAssessmentStatus	HealthStatusType	Indicates assessment of the health of the patient
nextScheduledReview	DateTime	Indicates the next scheduled review date
planReviewOutcome	String	Captures a text comment of the outcome review
reviewFrequency	Frequency	Specifies a periodic frequency for future reviews
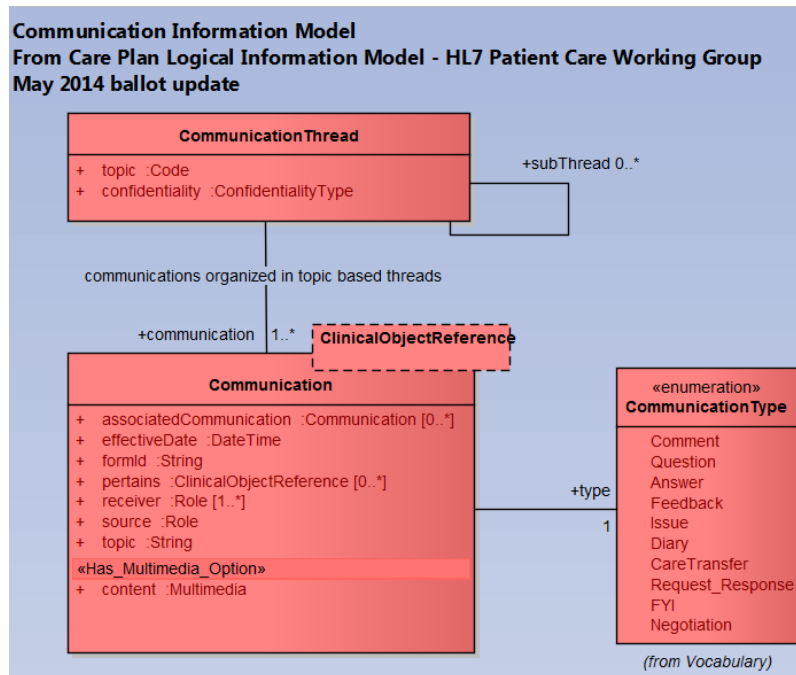
470 Figure 815 Plan Communications Logical Information Model

2.3.1.18 Conversation Attributes

A conversation organizes individual communications in a meaningful manner for the benefit and understanding of care plan stakeholders.

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Attribute Name	Data Type	Description
topic	Code	Indicates the topic of the conversation

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confidentiality	ConfidentialityType	Indicates whether the conversation is visible to all care team members or to a specific subset of care team members.

2.3.1.19   Communication Attributes

Communication is ongoing during care coordination. Care team communications is what causes the unfolding of the plan as new participants join, propose actions, change goals, record interventions, review outcomes and assess effectiveness of individual actions and of the overall plan.

A communication may pertain to an element of the care plan or the care record and reference the specific semantic context.

Attribute Name	Data Type	Description
associatedCommunication	Communication[0..*]	Specifies past associated communications
effectiveDate	DateTime	Specifies the date/time of the communication
formId	String	Specifies a formId if the communication is a response to a structured form
pertainsTo	ClinicalObjectReference	Links the communication to some clinical object which is the target of the communication
receiver	Role[1..*]	Specifies the receiver of the communication
source	Role	Specifies the source or sender of the communication
topic	String	Specifies the subject of the communication
content	String	Specifies the content of the communication

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