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# Case Management Model and Notation - CMMN

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#### **Case Management and Case Modeling**

- Any individual Case may be resolved in a completely ad-hoc manner
- But as experience grows in resolving similar Cases over time, a set of common practices can be defined for Cases.
- This becomes the practice of Case Management.
- Case management requires modeling which can express the essential flexibility that human Case workers require for
  - run-time planning for the selection of Tasks for a Case,
  - run-time ordering of the sequence in which the Tasks are executed
  - ad-hoc collaboration with other knowledge workers on the Tasks

## Ad hoc Processes in BPMN



- Adhoc (sub)processes marked with a tilde (~) are a way to represent cases in BPMN.
- There is no specific ordering or obvious decisions. The activities in an ad hoc process can occur
  - in any order
  - In any frequency
- Typically, the activities in an ad hoc process involve human performers to make decisions as to what activities to perform, at which time and how many time
- It is possible, however, to use occasional sequence flow between some activities, but sequence flow does not imply that there are explicit start and end events.

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#### **Example of an Ad hoc Process**





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#### **CMMN - Case Management Model and Notation**

- OMG defined a Modeling Standard for Case Modeling
  - Case Management Model and Notation (CMMN)
- In January 2013 OMG published the first beta version
  - http://www.omg.org/spec/CMMN/1.0/Beta1/PDF/
  - It is referenced in this presentation as (*CMMN Beta 1*)
- CMMN is specialized notation to model cases. It is independent from BPMN

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### Design Time vs Run Time = Modeling vs Planning

- A Case has two distinct phases: design-time and run-time
  - During the *design-time* phase, *business analysts* engage in modeling, which includes defining
    - Tasks that are always part of pre-defined segments in the Case model, and
    - "discretionary" Tasks that are available to the Case worker, to be applied in addition, to his/her discretion.
  - In the *run-time* phase, *Case workers* execute the plan, particularly by
    - performing Tasks as planned,
    - adding discretionary Tasks to the Case plan instance in run-time.



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#### A Case Model in CMMN

A Case consists of a case Plan Model, a Case File Model, and a set of case Roles



#### Information Model representing Case Files



- The information model of a Case comprises of classes for the management of the information (data) aspects of a Case.
- All information, or references to information, that is required as context for managing a Case, is defined by a Case File.
- A Case File consists of Case File Items.
- A Case File Item is depicted by a "Document" shape
- A Case File Item may represent a piece of information of any nature, ranging from unstructured to structured, and from simple to complex.
- A Case File Item can be anything from a folder or document, an entire folder hierarchy referring or containing other Case File Items or simply an XML document.
  (CMMN Beta1, p. 25, 55)



#### **Case Plan Models**

- The complete behavior model of a Case is captured in a case Plan Model
- For a particular Case model, a case Plan model comprises
  - all elements that represent the initial plan of the case, and
  - all elements that support the further evolution of the plan through run-time planning by case workers. PlantemDefinition
- There are four types of Plan Items:
- Tasks
   Plan Fragments / Stages
   Event Listeners
   Milestones
   (CMMN Beta1, p. 27)

+name : String



#### **Example of a Case Plan Model**





- A case Plan Model is depicted using a "Folder" shape
- The name of the Case can be enclosed into the upper left rectangle.
- The various elements of a case Plan Model are depicted within the boundary of the case Plan Model shape.
- The diagram shows an example of a case Plan Model.
   (CMMN Beta1, p. 54)

# Tasks



- A Task is a unit of work. There are three types of tasks
  - Human Task a Task that is performed by a Case worker, they can be
  - Blocking: Task is waiting until the work associated with the Task is 2 completed



- Non-Blocking: the Task is not waiting for the work to complete and completes immediately, upon instantiation.
- **Process Task** can be used in the Case to call a Business Process
- Case Tasks can be used to call another Case
- Task Items are depicted by rectangle shape with rounded corners (cf. tasks/activities in BPMN),





#### **Discretionary Tasks**



- Tasks are always part of pre-defined segments in the Case model
- In addition to tasks there are Discretionary Tasks which are available to the Case worker, to be applied in addition, to his/her discretion
- A discretionary Task is depicted by a rectangle shape with dashed lines and rounded corners
- Any task type can be discretionary





#### **Event Listeners**



- An event is something that "happens" during the course of a Case. CMMN predefines many events, and their causes:
  - Anything that can happen to information in the CaseFile.
  - Anything that can happen to Stages, Tasks and Milestones.
- Event Listeners are used to model events that do not happen to plan items.
- An EventListener is depicted by a double line circle shape
- Event Listeners are specialized to

V Timer Event Listener



(CMMN Beta1, p. 28f, 60f)

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#### Sentries - Entry and Exit Criterion

- Plan Items may have associated Sentries.
- Sentries define the criteria according to which the Plan Items are enabled (or entered) and terminated (or exited)
- A Sentry "watches out" for important situations to occur which influence the further proceedings of a Case.



- a Sentry used as an entry criterion is depicted by a shallow "Diamond"
- a Sentry used as an exit criterion it is depicted by a solid "Diamond"



(CMMN Beta1, p. 56f)

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# Sentry

- A Sentry is a combination of an event and/or a condition.
  - An On-Part specifies the event that serves as trigger.
  - The If-Part specifies a condition, as expression that evaluates over the Case File.
- When the event is received, the condition might be applied to evaluate whether the event has effect or not.
  - If all On-Parts of a Sentry have occurred, and its If-Part (if existent) evaluates to "true", the Sentry is "satisfied".
- A Sentry that is satisfied triggers the Plan Item that refers to it:
  - When the Sentry is referenced by one of the Plan Item's entry Criteria: a Task or Stage will be enabled, and a Milestone will be achieved.
  - When the Sentry is referenced by one of the Plan Item's exit Criteria: a Task or Stage will be terminated (exited).

#### **Sentries and Rules**

- An Sentry and the task correspond to an ECA (Event-Condition-Action) rule.
- Sentries may take one of the following forms:
  - 1. An event part and a condition part in the form on <event> if <condition>
  - 2. An event part in the form on <event>
  - 3. Just a condition part <sup>1</sup>) in the form if <condition>

1) There is a contradiction in the CMMN specification: According to page 32 a condition can occur without On-Part (i.e. without event) while on page 33 at least one On-Part is required

(CMMN Beta1, p. 32)

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#### **Connectors**

- Connectors can be used to visualize dependencies between Plan Items
  - One such depicted dependency is the On-Part of a Sentry
  - The other type of dependency is between a Human Task and Discretionary Items in its Planning Table (see later)
- The shape of the connector object is a dotted line.





#### **Connector Usage**

- Connectors that represent Sentry On-Parts can be used to visualize dependencies between Plan Items.
- The following pictures illustrates situations where Task C can be activated only
  - (1) if Task A is complete
  - (2) if Task A and Task B are complete
  - (3) if Task A or Task B are complete



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#### Plan Fragment

- A Plan Fragment is a container of Plan Items and the Sentries
- Simple examples of Plan Fragments are:
  - A combination of two Tasks, whereby, the completion of one Task satisfies the Sentry that enables the start of the other (sequence flow)



A combination of an Event Listener and a Task, whereby the occurrence of the event satisfies the Sentry that enables the start of the Task.



(CMMN Beta1, p. 39)

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# Stage



- Stages are Plan Fragments that can be tracked.
- Stages maybe considered "episodes" of a Case- They can be regarded as sub-cases (cf. sub-processes in BPMN)
- A Stage is depicted by a rectangle shape with angled corners and a marker in the form of a "+" or "-" sign in a small box at its bottom center ("+" or "-" designate expanded or collapsed stages).



#### **Milestones**



- A Milestone is a Plan Item Definition that represents an achievable target, defined to enable evaluation of progress of the Case.
- No work is directly associated with a Milestone, but completion of set of tasks or the availability of key deliverables (information in the CaseFile) typically leads to achieving a Milestone.
- A Milestone is depicted by a rectangle shape with halfrounded ends.
- A Milestone may have zero or more entry criteria, which define, when a milestone is reached



(CMMN Beta1, p. 29,60)

#### Planning at Run Time



- Users (Case workers) are said to "plan" (at run-time), when they select Discretionary Items
- With planning tables it is possible to make Discretionary Items dynamically applicable for planning
  - Applicability Rules are used to specify, whether a Table Item is "applicable" ("eligible", "available") for planning, based on conditions that are evaluated over information in the Case File.
  - If the condition of the ApplicabilityRule evaluates to "true", then the TableItem is applicable for planning,
  - During planning only Discretionary Items, for which the ApplicabilityRule evaluates to "true", must be shown to the Case Worker



## **Planning Table**



- A Planning Table defines the scope of planning.
- PlanningTables can be assigned to a Stage or a HumanTask.



 Stages: The Planning Table can be used to plan instances of Tasks and Stages into that Stage instance.



- Human Tasks: The Planning Table can be used to plan instances of Tasks and Stages into the Stage that contains the Human Task.
- A Planning Table is depicted by a "Table" shape.
- A Planning Table can have several Table Items (i.e. Discretionary Items).
   Planning Table and Table Items can have applicability rules.

(CMMN Beta1, p. 39, 64)



#### **Planning Tables**



- The maker at the center bottom cell of the Planning Table indicates if the Discretionary Items are visualized (+) or not (-).
  - When a user "expands" a Planning Table, its contained Discretionary Items become visible within the Stage





 When the PlanningTable of a HumanTask is expanded, its contained Discretionary Items are visualized outside the HumanTask shape



#### What is the meaning of this model?



(Gagne 2013) at http://www.cmmnwebmodeler.com/



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#### What is the meaning of this model?





