University of Applied Sciences and Arts Northwestern Switzerland
School of Business

Case Management Modeling and Notation

Knut Hinkelmann

Case Management and Case Modeling

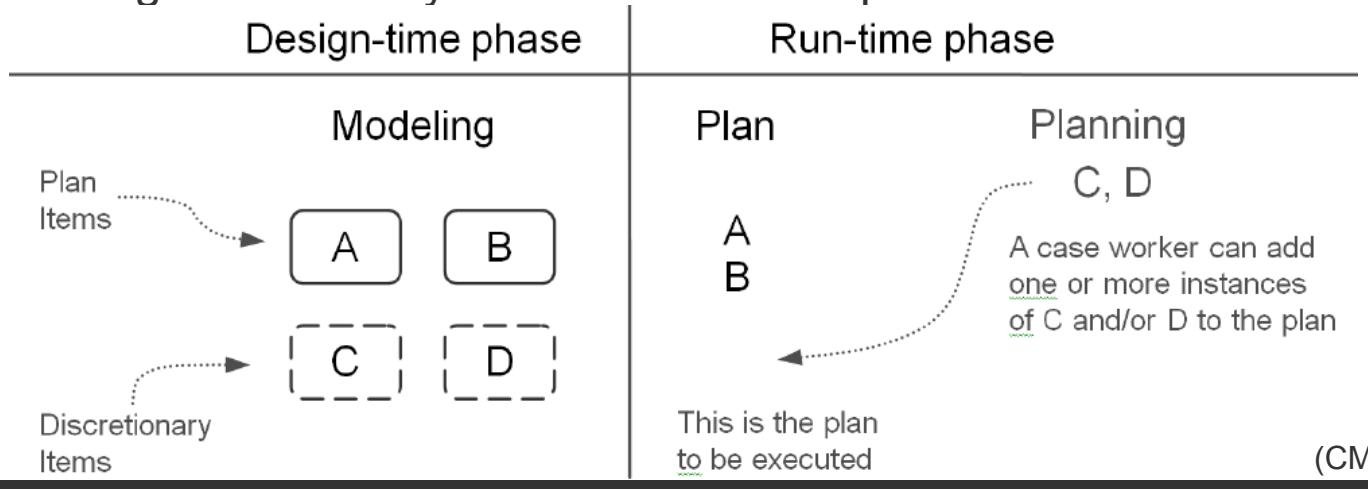
- Any individual Case may be resolved in a completely ad-hoc manner
- But as experience grows in resolving similar Cases over time, *a set of common practices* can be defined for Cases.
- This becomes the practice of Case Management.
- Case management requires modeling which can express the essential 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

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*)

Design Time vs Run Time = Modeling vs Planning

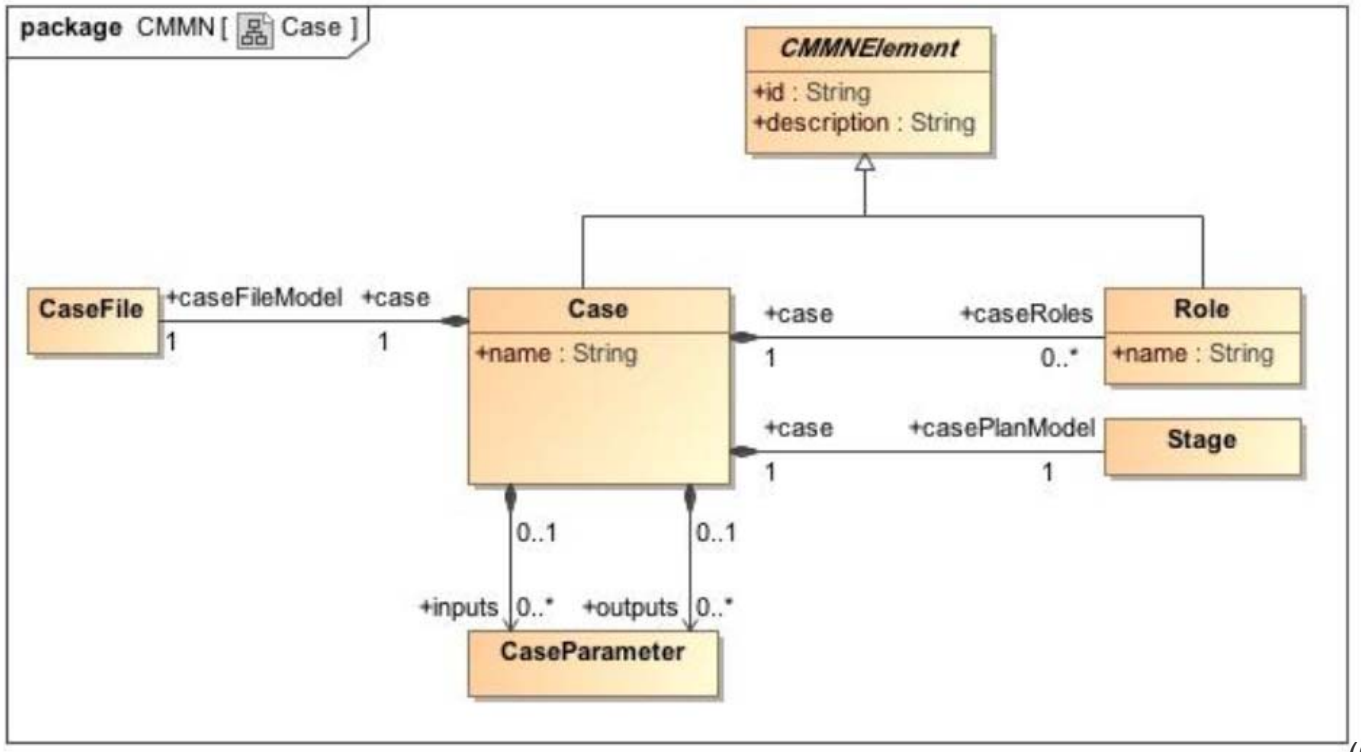
- A Case has two distinct phases: design-time and run-time
  - During the ***design-time*** phase, ***business analysts*** engage in modeling, which includes defining
    - Tasks that are always part of pre-defined segments in the Case model, and
    - "discretionary" Tasks that are available to the 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.



(CMMN Beta1, p. 14f)

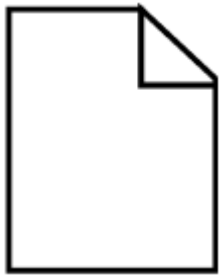
Metamodel of the Case and its Associated Classes

- Case is a top-level concept that combines all elements that constitute a Case model
- A Case consists of
  - a *case Plan Model*,
  - a *Case File Model*, and
  - a set of *case Roles*



(CMMN Beta1, p. 23)

Information Model representing Case Files



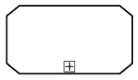
- The information model of a Case comprises of classes for the management of the information (data) aspects of a Case.
- All information, or references to information, that is required as context for managing a Case, is defined by a Case File.
- A Case File consists of Case File Items.
- A Case File 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

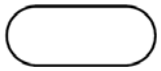
- The complete behavior model of a Case is captured in a case Plan Model
- For a particular Case model, a case Plan model comprises
  - all elements that represent the initial plan of the case, and
  - all elements that support the further evolution of the plan through run-time planning by case workers.
- There are four types of Plan Items:

- ***Tasks***

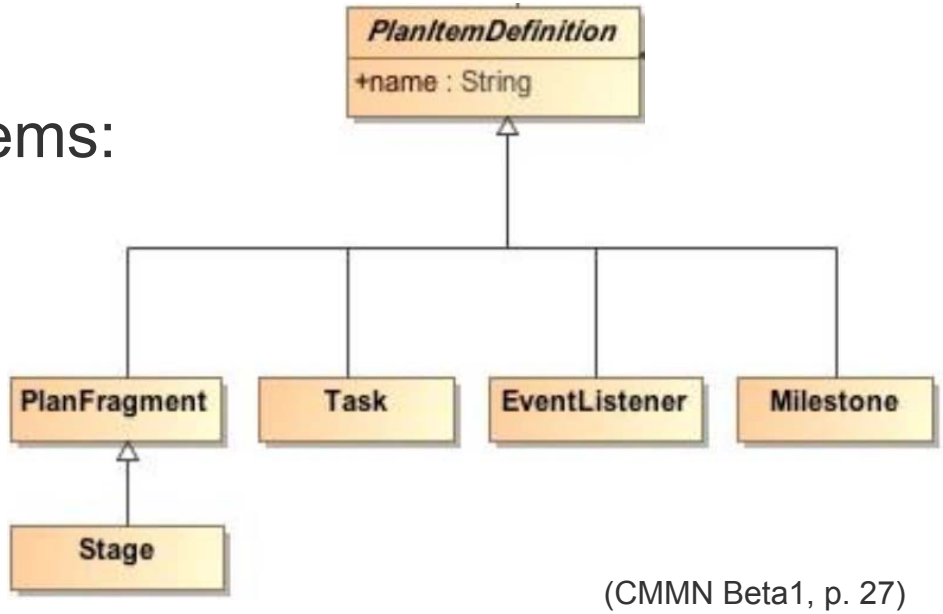


- ***Plan Fragments / Stages***

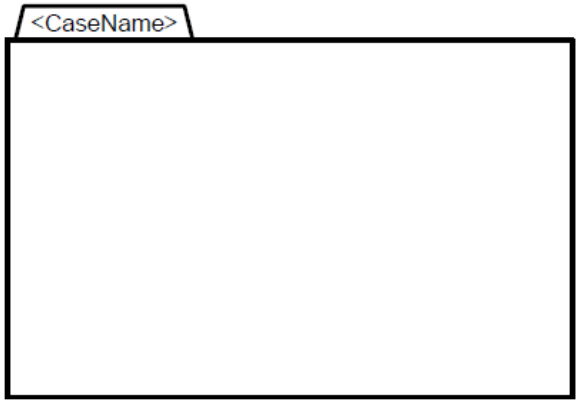
- ***Event Listeners***



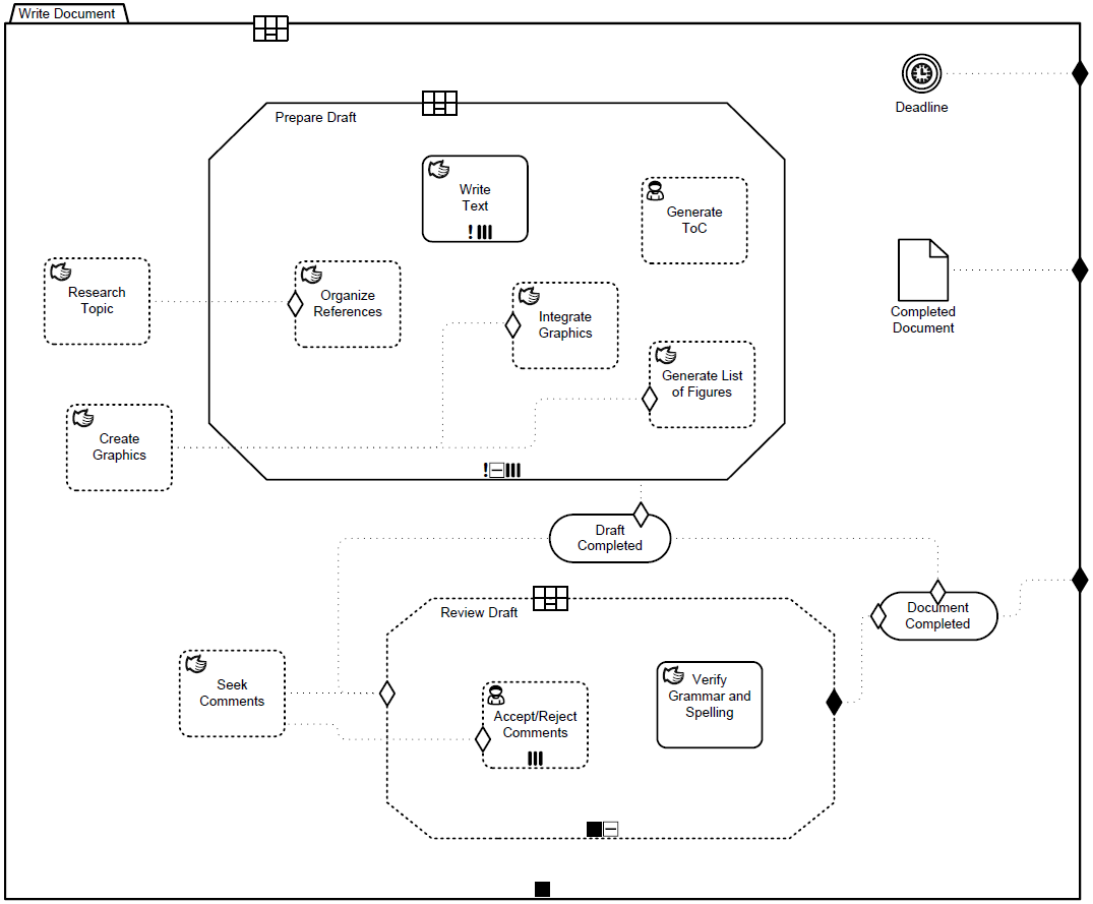
- ***Milestones***



(CMMN Beta1, p. 27)



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


Task Shape


Discretionary Task

- 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 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 are depicted with dashed lines

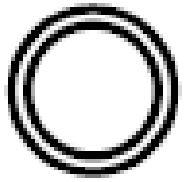
(CMMN Beta1, p.57ff)

Task Symbols

- The type of tasks can be depicted with symbols in the upper-left corner
  - A HumanTask has two possible depictions.
    - Non-blocking are depicted with a “Hand” symbol
    - Blocking are depicted with a “User” symbol.
  - Process Task are depicted with a “Chevron” symbol
  - Case Tasks are depicted with a “Folder” symbol

Non-Blocking Human Task | Blocking Human Task | Process Task | CaseTask

(CMMN Beta1, p. 58f)



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


Timer Event Listener


User Event Listener

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

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.

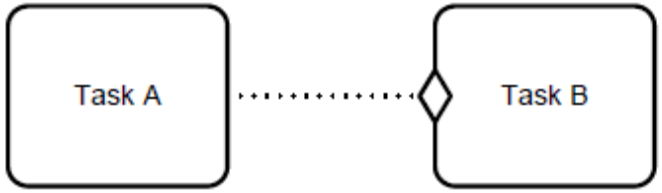
a Sentry used as an entry criterion is depicted by a shallow “Diamond”

a Sentry used as an exit criterion it is depicted by a solid “Diamond”

(CMMN Beta1, p. 56f)

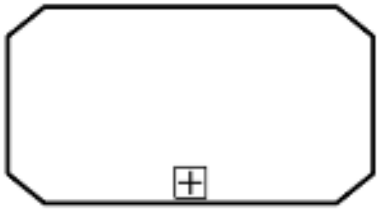
Plan Fragment

- 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.



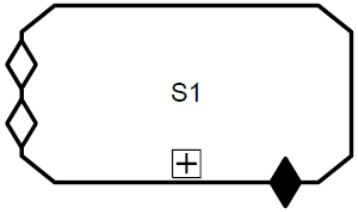
  - A combination of an Event Listener and a Task, whereby the occurrence of the event satisfies the Sentry that enables the start of the Task.

(CMMN Beta1, p. 39)

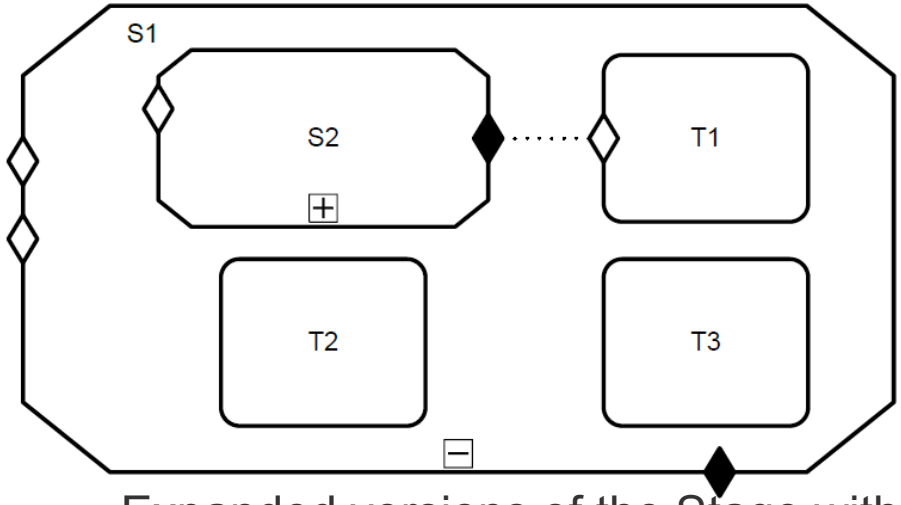


Stage

- 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).



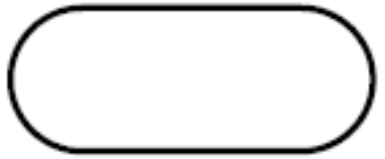
collapsed stage with two entry and one exit criterion



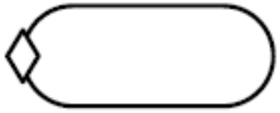
Expanded versions of the Stage with one sub Stage and three Tasks

(CMMN Beta1, p. 55, 57)

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 half-rounded ends.
- A Milestone may have zero or more entry criteria, which define, when a milestone is reached



(CMMN Beta1, p. 29,60)

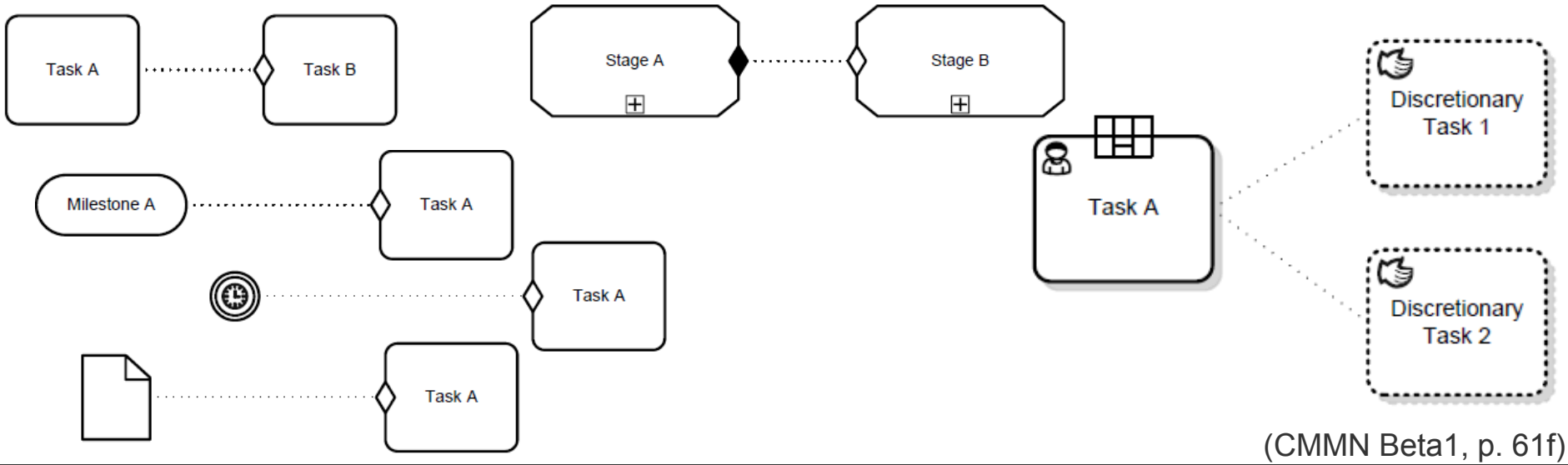
Sentry

- An 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).

(CMMN Beta1, p. 33)

Connectors

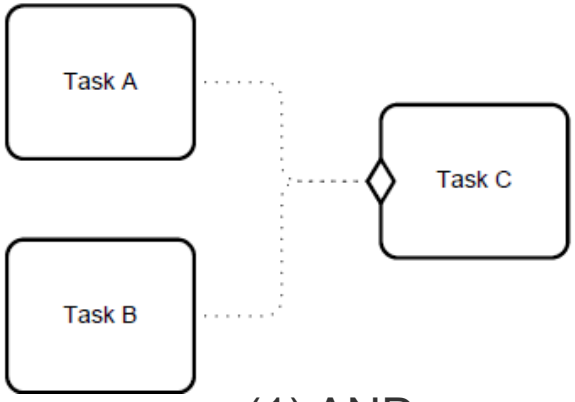
- Certain dependencies between elements inside Plan Fragments are depicted using connectors.
  - One such depicted dependency is the On-Part of a Sentry
  - The other type of dependency is between a Human Task and Discretionary Items in its Planning Table
- The shape of the connector object is a dotted line.



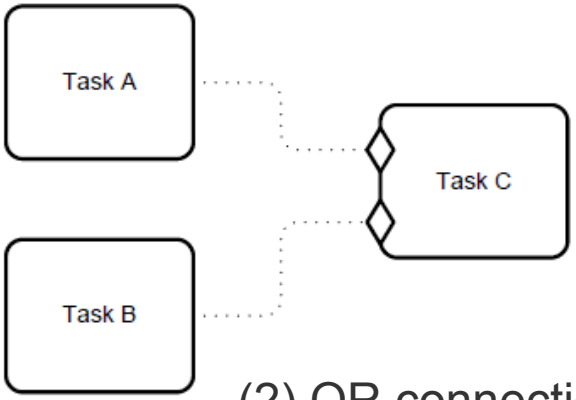
(CMMN Beta1, p. 61f)

Connector Usage

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



(1) AND connection



(2) OR connection

(CMMN Beta1, p. 62)

Sentries and Rules

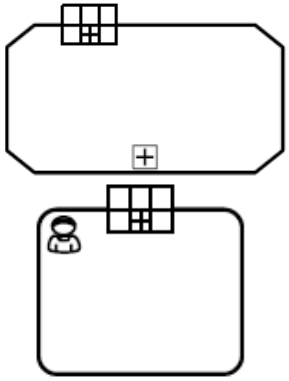
- An Sentry corresponds the an ECA (Event-Condition-Action) rule.
- Sentries may take one of the following forms:
  1. An event part and a condition part in the form `on <event> if <condition>`
  2. An event part in the form `on <event>`
  3. Just a condition part [1)] in the form `if <condition>`

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)

Planning Table

- Planning is a run-time effort. A Planning Table defines the scope of planning.
- A Stage or a HumanTask can have a PlanningTable.

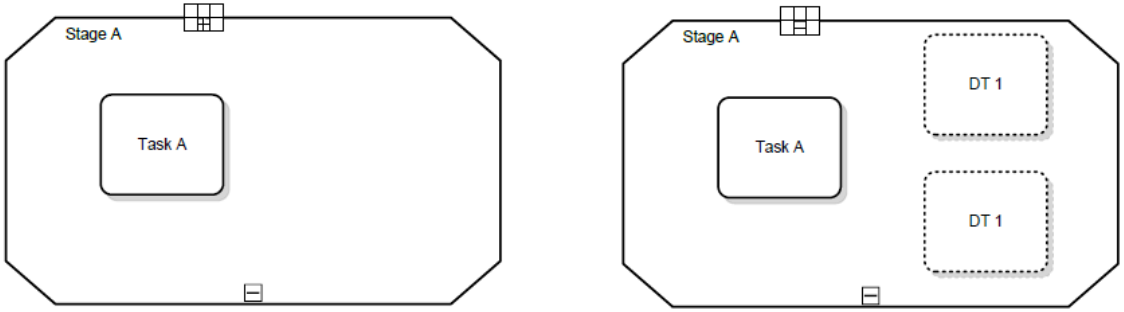


  - Stages: The Planning Table can be used to plan instances of Tasks and Stages into that Stage instance.
  - Human Tasks: The Planning Table can be used to plan instances of Tasks and Stages into the Stage that contains the Human Task.
- A Planning Table is depicted by a “Table” shape.
- A Planning Table can have several Table Items. Planning Table and Table Items can have applicability rules.

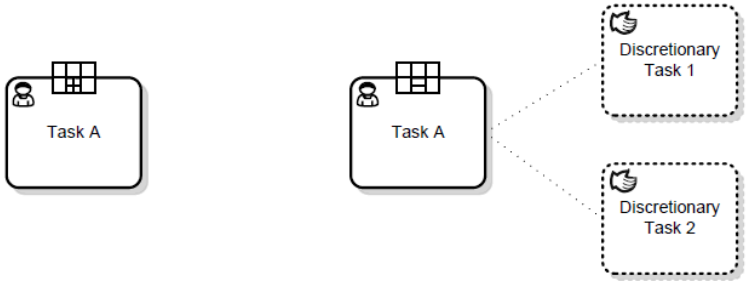
(CMMN Beta1, p. 39, 64)

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 HumanTask is expanded, its contained Discretionary Items are visualized outside the HumanTask shape



(CMMN Beta1, p. 64f)

Planning at Run Time

- Users (Case workers) are said to “plan” (in run-time), when they select Discretionary Items from a Planning Table
- 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 object 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

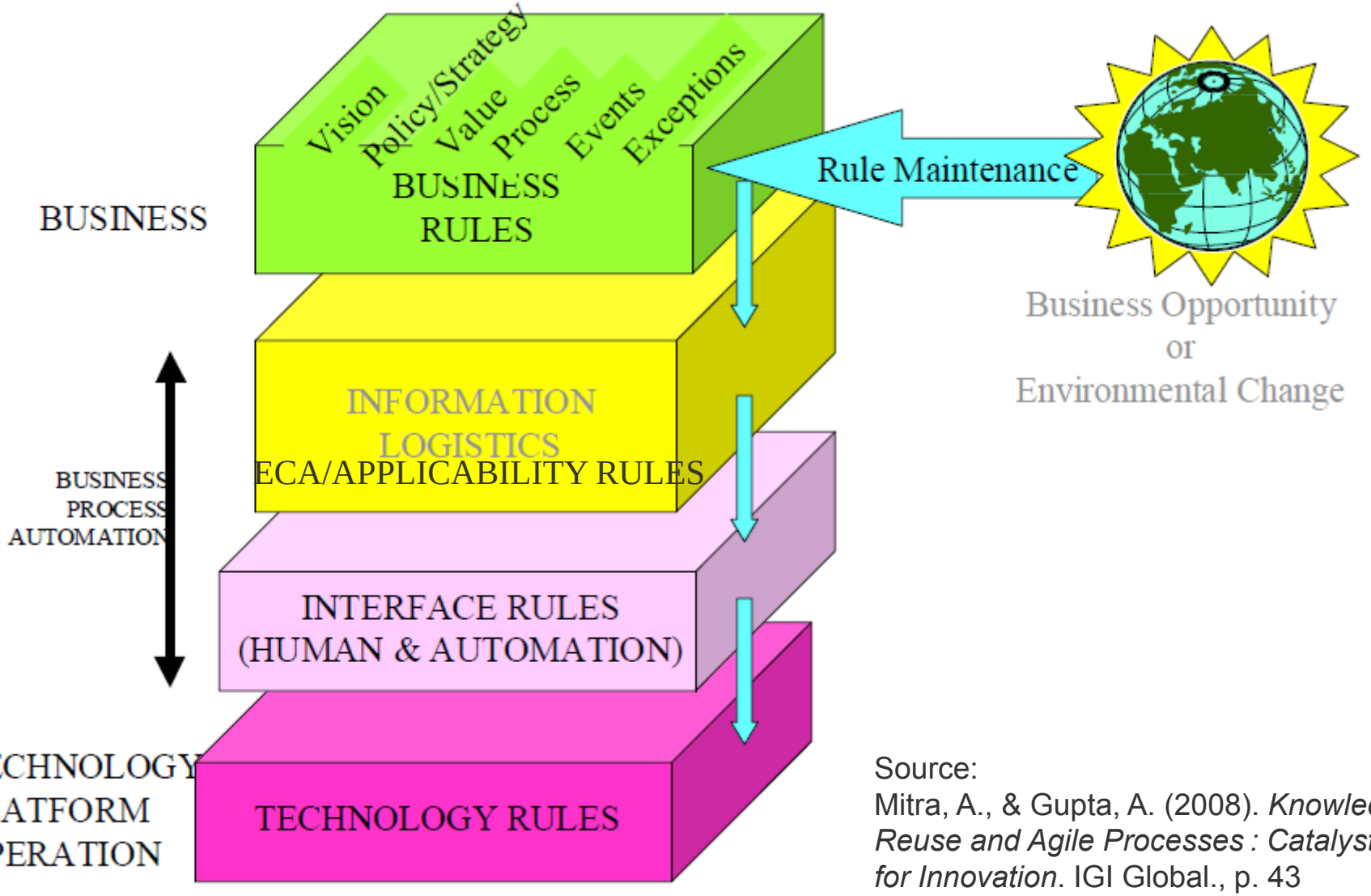
(CMMN Beta1, p. 43, 87)

Business Rules and Sentries/Applicability Rules

- Business Logic as well as Sentries can be represented as rules
- Business Rules and ECA/Applicability rules have different purposes and are on different levels in an enterprise architecture
  - Business Rules represent business logic at the business layer1)
    - They support business decision
  - ECA rules and Applicability Rules represent rules for process/case execution on the application layer

1) keep in mind that decision models correspond to business rules which represent of decision logic – special kind of decision logic

Architecture or Knowledge



Source:
Mitra, A., & Gupta, A. (2008). *Knowledge Reuse and Agile Processes : Catalysts for Innovation*. IGI Global., p. 43