

Case Management Modeling and Notation (CMMN): An emerging OMG standard

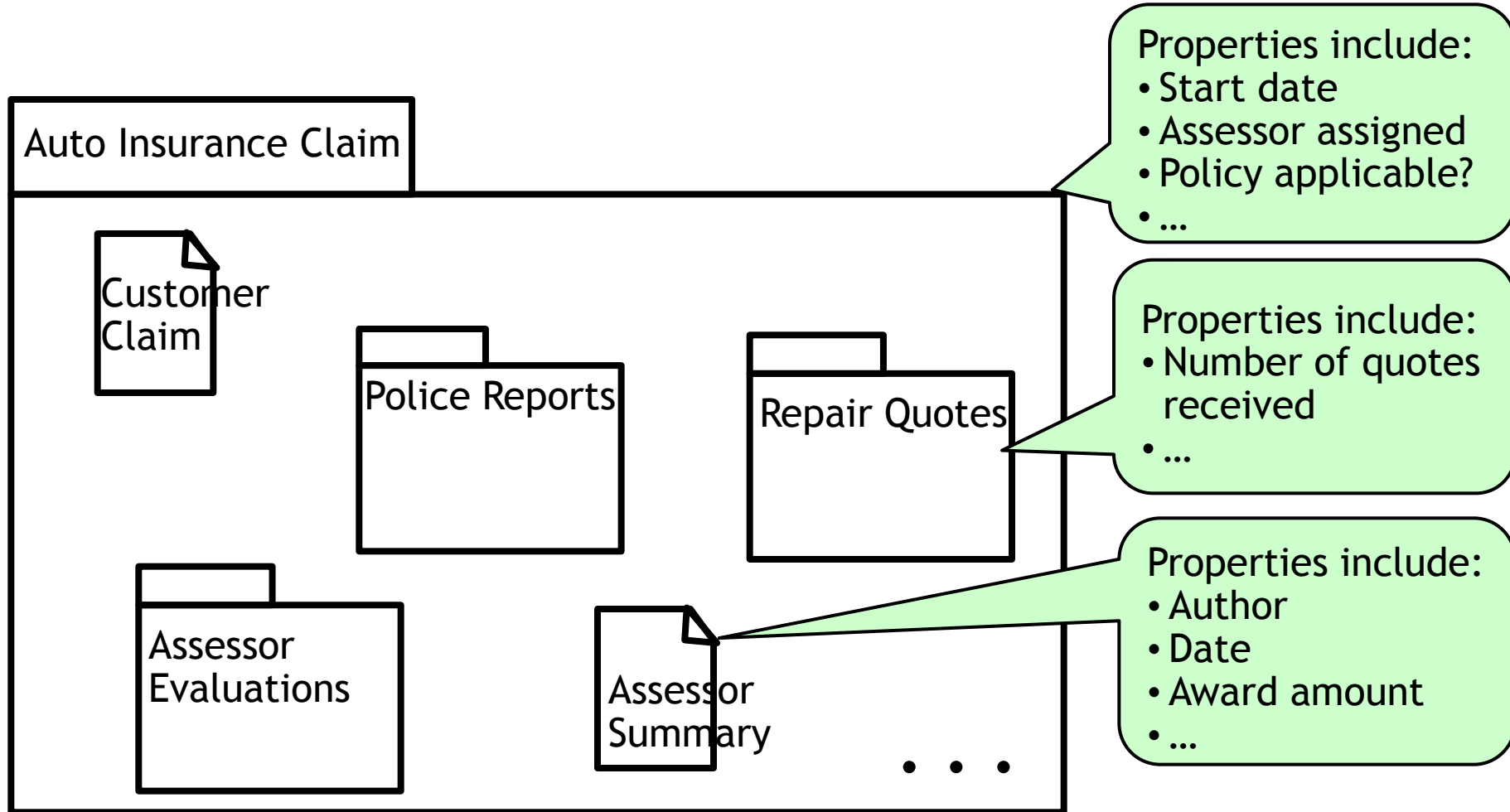
- Responding to 2009 OMG call for proposals
 - ▶ Revised submission planned for November, 2012
- 10 company consortium
 - ▶ Submitters: BizAgi, Cordys, IBM, Oracle, SAP, Singularity
 - ▶ Co-Authors: Agile Enterprise Design, SINTEF, TIBCO, Trisotech
- Proposal enables flexible, data-centric approach to BPM
 - ▶ Focus on case folder as top-level structural mechanism
 - ▶ Permits multiple inter-related case types to model a business process
 - ▶ Behavioral model is declarative, not procedural
- Draws on several influences
 - ▶ Case Management literature, including [van der Aalst et. al. 2005]
 - ▶ Business Artifacts: a data-centric approach to BPM [Nigam+Caswell 2003]
 - ▶ Guard-Stage-Milestone (GSM): a hierarchical, declarative model for Business Artifacts with formal operational semantics [Hull et. al. 2011]
 - ▶ Dynamic planning for Case Mgmt [de Man 2009]

Agenda

- Overview of CMMN
- Key influences on CMMN

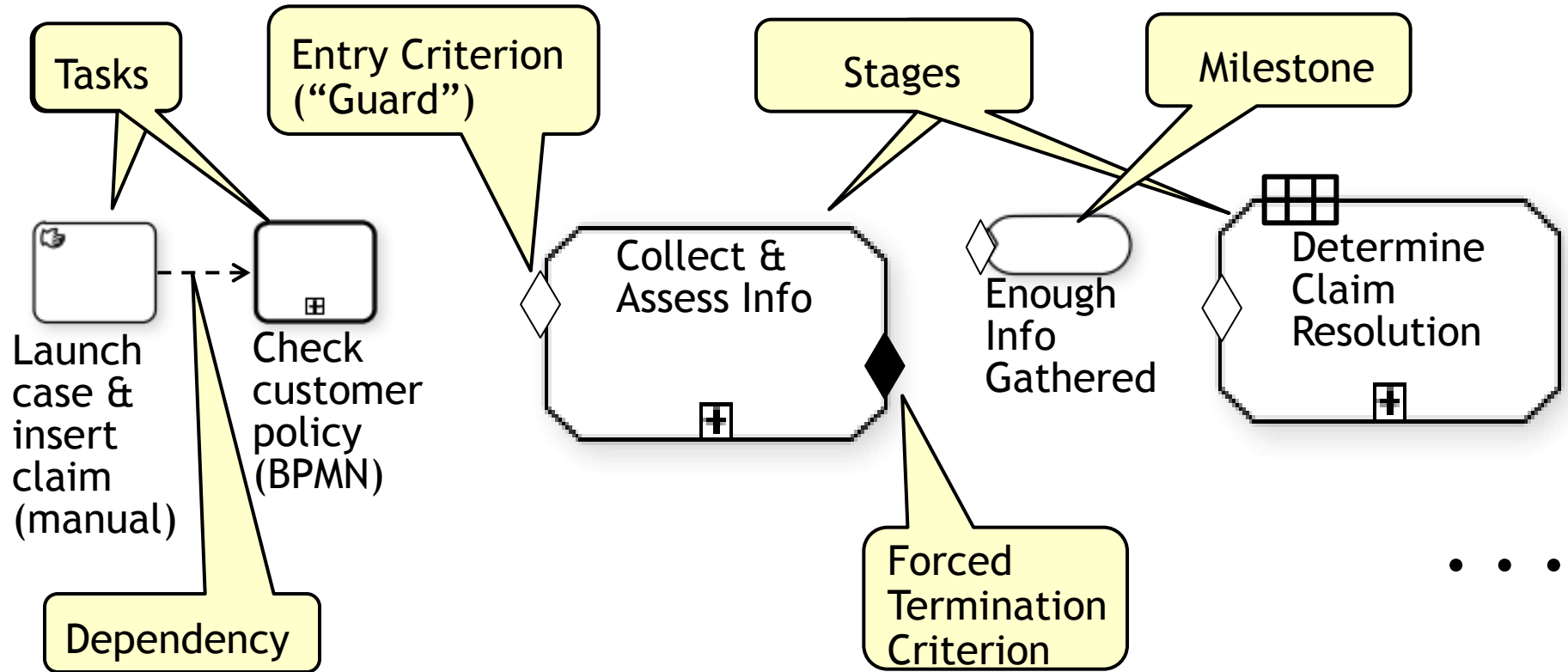
Case Folders in CMMN: Based on CMIS

- Folders, Documents, and Properties for both



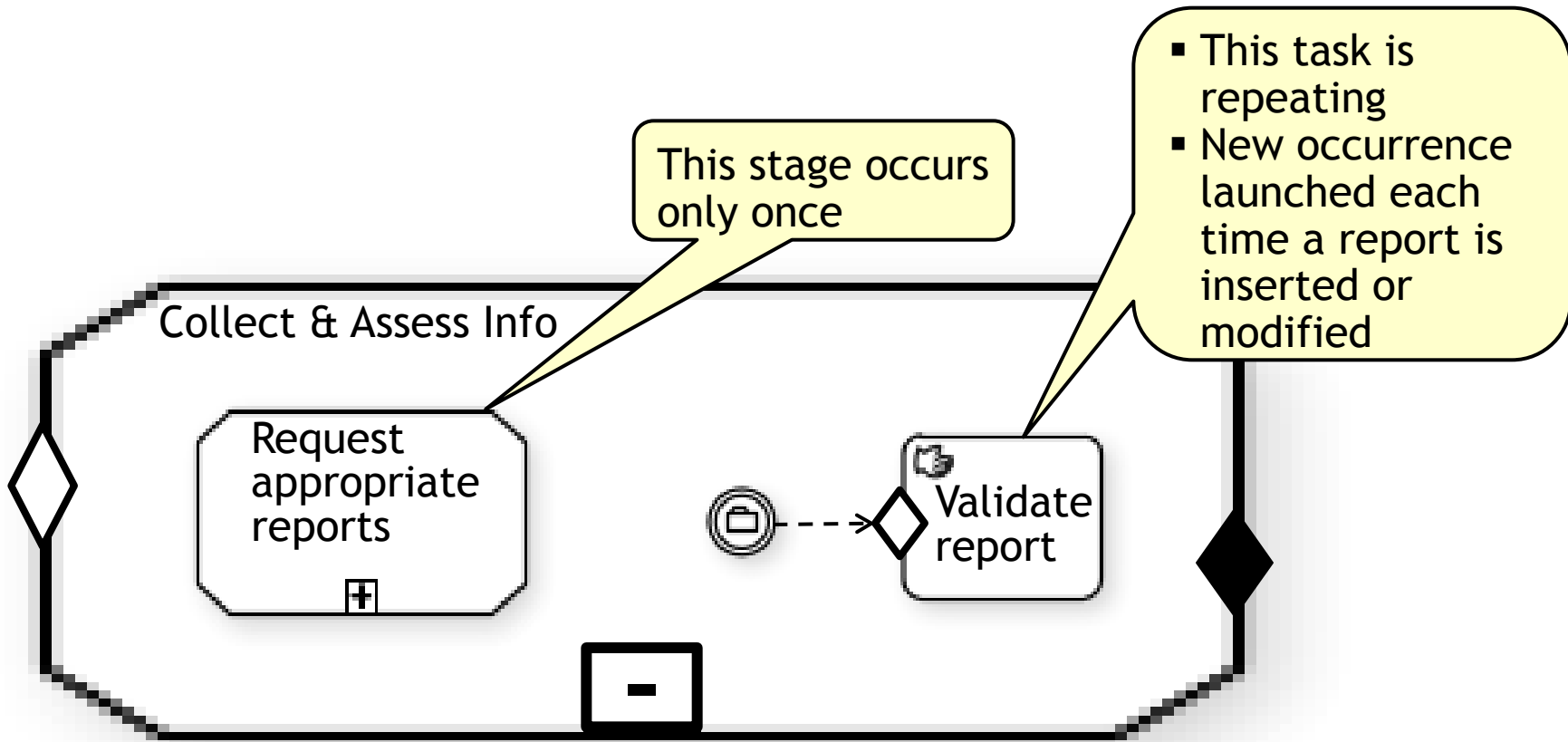
Note: All graphical representations are taken from current draft of CMMN proposal, and subject to change

Top-level Behavioral Model: Tasks, Stages, Milestones



- **Task:** where actual work is performed
 - ▶ Can be manual, process (e.g., BPMN), invoke other case
- **Stage:** enables hierarchical clustering of work
- **Milestone:** Business-relevant operational objective
- Progression controlled by case worker requests, and by *sentries*
 - ▶ Sentry has form “on <event> if <condition>” (event or cond. may be omitted)f

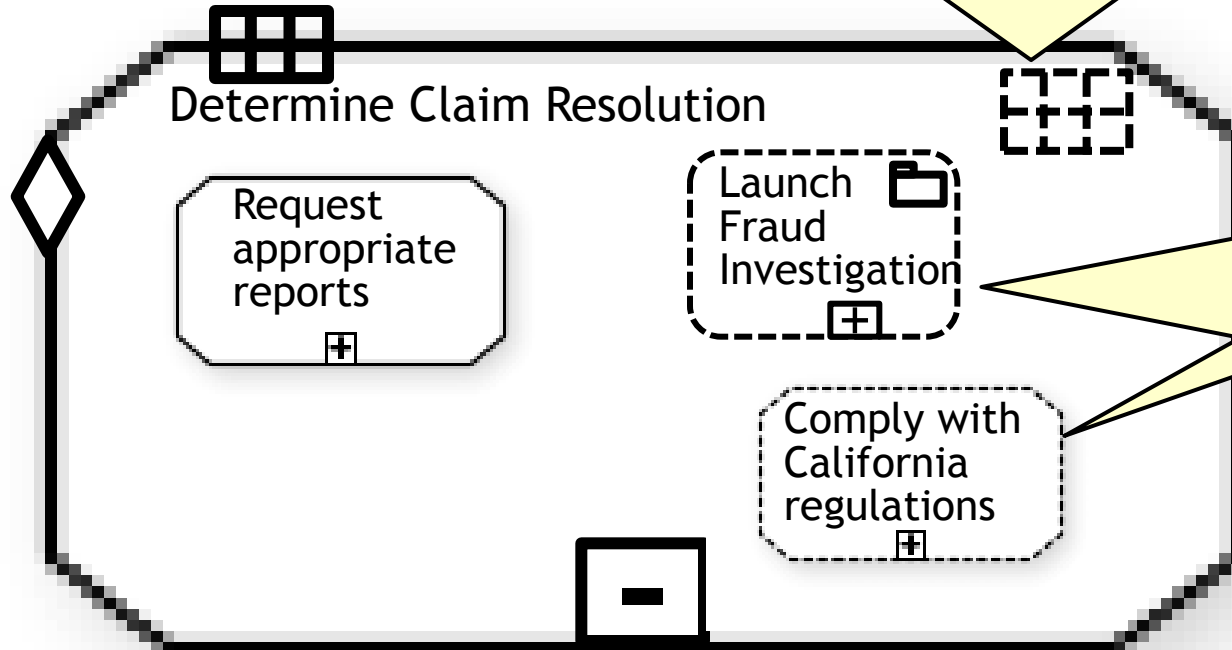
Stages and tasks may be “repeating”



Two styles of dynamic “planning” at case instance level

Planning Scope List. Contains *discretionary tasks* in stage, that may be *planned*

Whenever the parent stage is active, the Case Worker can visit the scope list and include *applicable tasks* and stages into the *plan*



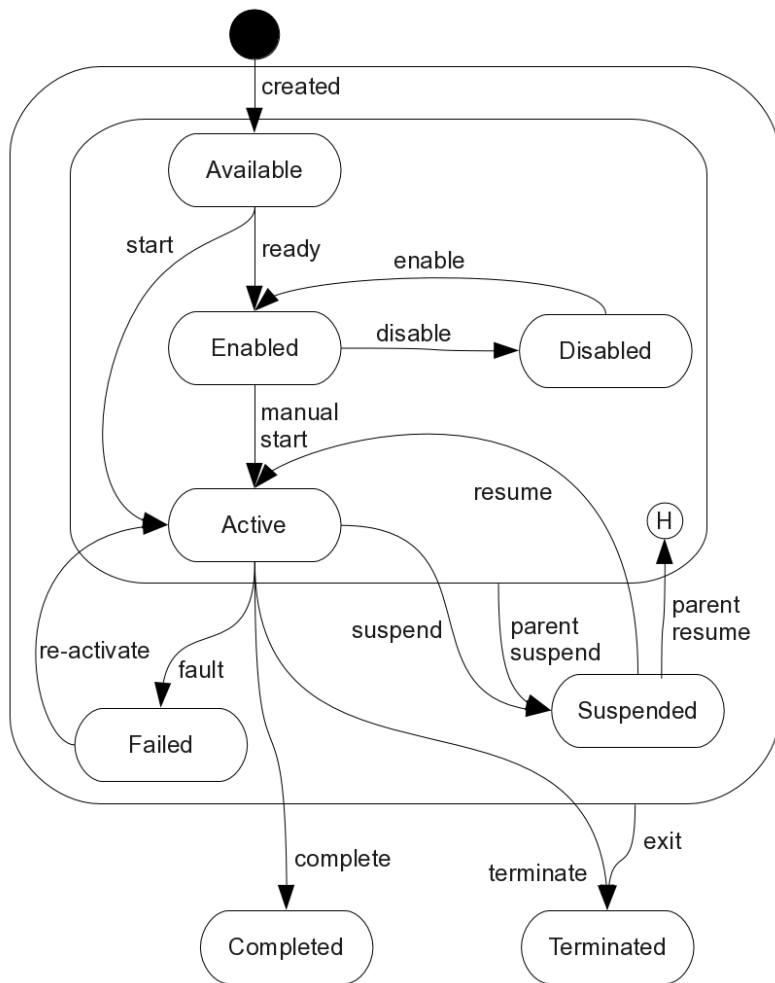
These are *discretionary*, and can be included into the plan if the condition governing its applicability is true

Start Exception Handling

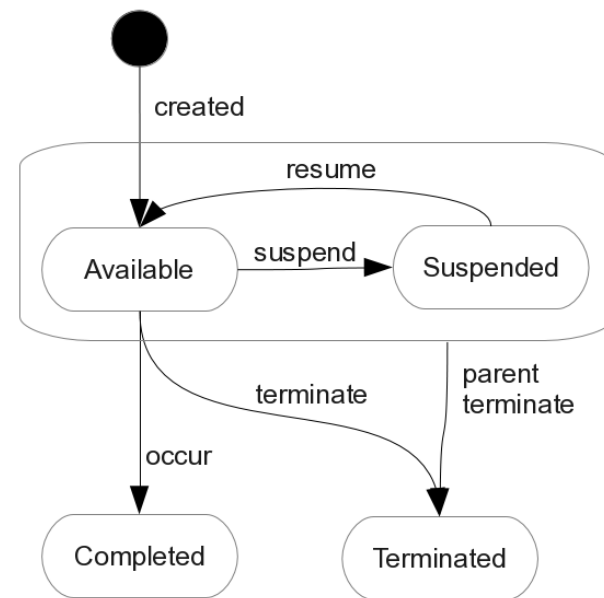
- This *planning task* includes a scope list
- When invoked, Case Worker can include applicable elements of scope list into plan

Tasks, Stages, Milestones, Event Listeners have finite-state machine based lifecycles

Lifecycle for Tasks and Stages



Lifecycle for Milestones and Event Listeners



8 ■ Reminiscent of [van der Aalst et al 2005]

Operational Semantics for CMMN

- Progress of a Case Instance is governed by
 - ▶ Explicit Case Worker requests to transition a Task, Stage, or Milestone; and to modify Case Folder
 - ▶ Task Completions
 - ▶ Sentries: Entry criteria, Forced Termination criteria, Milestone Achieving criteria
 - Triggered by incoming events, change-of-state events, and conditions
- For the operational semantics, all of these are translated into Event-Condition-Action (ECA) rules
- Structure of ECA rules firing
 - ▶ Adapted from Guard-Stage-Milestone (GSM) model for Business Artifacts [Hull et. al. 2011, Demaggio et. al. 2011]
 - ▶ Incorporate one incoming event, and then fire ECA rules until a fixpoint is reached
- Behavior Property Rules (e.g., repeatability of stage, required for stage completion) also present

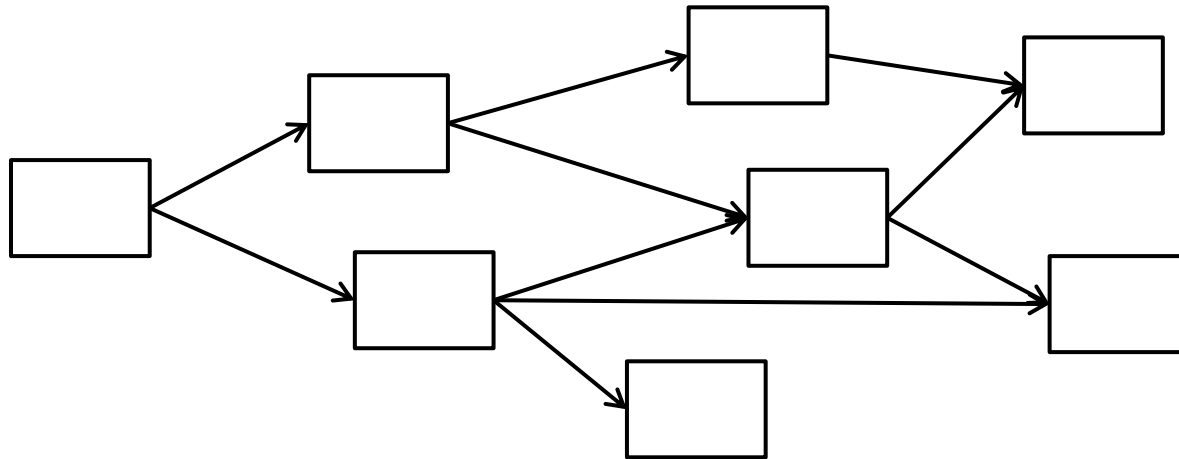
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Case Handling paper [van der Aalst et. al. 2005]

- Arguably the first academic publication about case management, including strong motivations
- Describes the Case Management meta-model of FLOWer product of Pallas Athena
- Activities arranged into a Directed Acyclic Graph

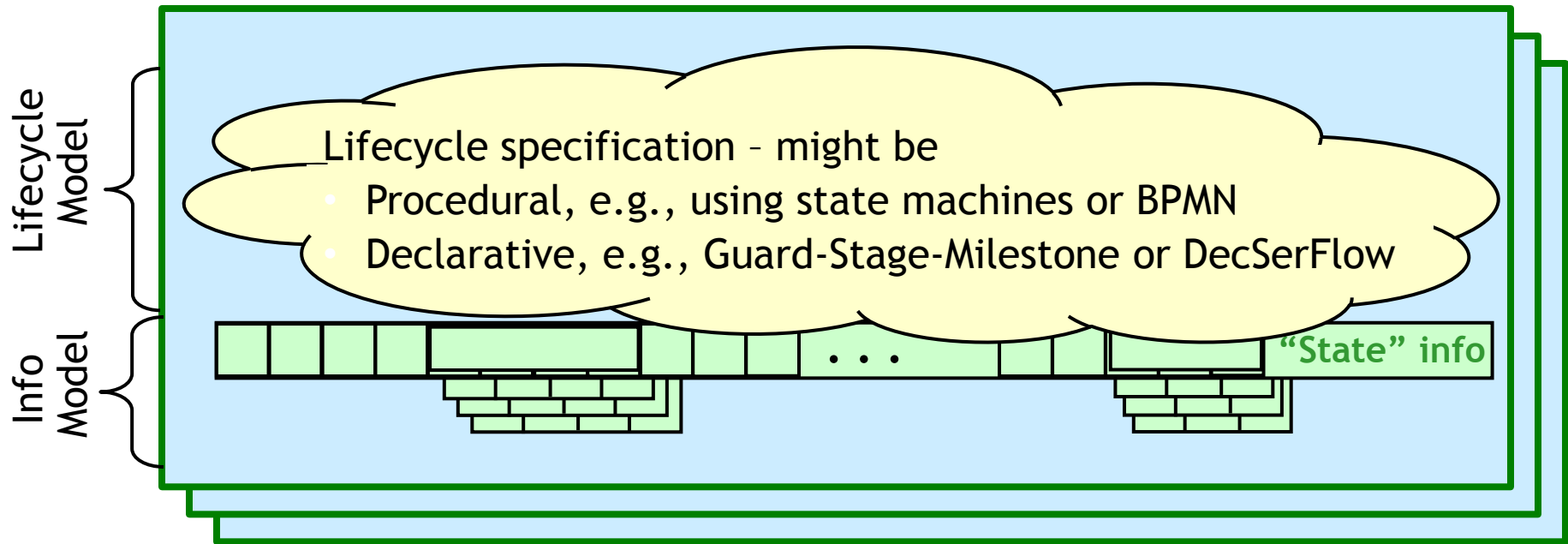


- Activities have finite-state machine lifecycles
 - Activity transitions controlled by ECA rules & position in DAG
- Specialized roll-back: If an activity must be re-done, automatic re-do of descendant activities

Business Artifacts: introduced by IBM in 2003

[Nigam+Caswell 2003, Kumaren+Nandi+Heath+Bhaskaran 2003]

A holistic marriage of data and process



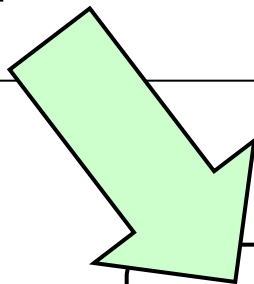
- Focus on key conceptual business entities that progress through the business
 - ▶ Typically cut across organizations and silos
 - ▶ Info model provides integrated view of biz-relevant info about entity
 - ▶ Lifecycle model describes different ways the entity can evolve
- 12 ■ Artifacts interact by messages and/or data exchange

Case Management

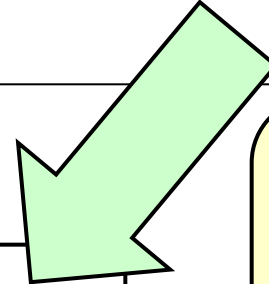
- Emerged in 90's from Content Mgmt
- Growing industrial usage
- Traditionally focused on few application areas (social work, legal, ...)
- Typically focus on a single case type
- Handful of academic papers
- Recent: "Adaptive Case Mgmt"

Business Artifacts

- Emerged in late 90's from BPM researchers at IBM Research
- Growing industrial usage
- Applied in broad variety of application areas (finance, supply chain, procurement, ...)
- Typically 3-7 artifact types for a business scope
- ~70 academic papers, & growing
- Recent: Guard-Stage-Milestone (GSM)



Emerging CMMN
Standard



- Core CMMN meta-model is based on GSM constructs
- GSM operational semantics adapted to CMMN

Selected Case Management Products

- FLOWer, by Pallas Athena (see [van der Aalst et. al. 2005])
 - ▶ See above
- IBM Case Manager (see [Zhu et. al. 2011])
 - ▶ Uses a Content Mgmt Repository for case folders
 - ▶ Behavior model based on GSM
 - ▶ Several kinds of events supported, including inserting, deleting, modifying documents
- Cordys Case Management (see [de Man 2009])
 - ▶ Top-level process organized as finite state machine
 - ▶ Declarative style incorporated via *applicability rules*
 - Govern which activities within a state/phase are relevant
 - ▶ In *dynamic planning* steps, case workers decide that additional activities should be included in case instance

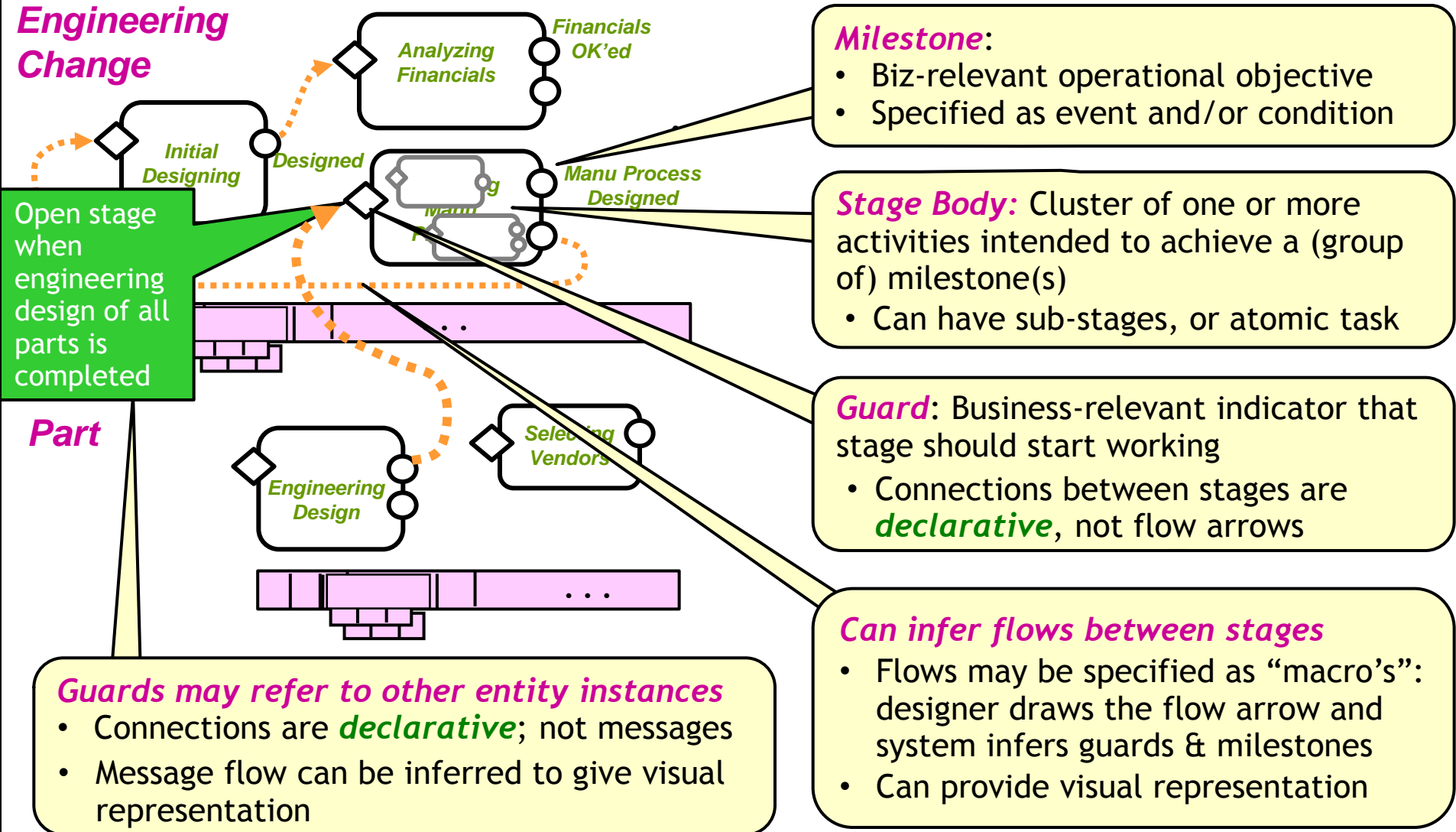
Conclusions

- CMMN draft proposal unifies concepts from
 - ▶ Academic literature
 - ▶ Key Case Management products
- CMMN draft proposal provides constructs that can support Adaptive Case Management
 - ▶ Tasks, (Hierarchical) Stages, and Milestones
 - ▶ Declarative/Rules-based behavior specifications
 - ▶ Rich planning during execution of a case instance
- Next revision of CMMN proposal will be submitted to OMG in November 2012
- We look forward to the public comment and further enhancements of the proposal

Back up materials

Guard-Stage-Milestone in a nutshell

Declarative approach to artifact lifecycles that supports natural modularization and associative “glue-ing”



Overview of GSM operational semantics

- Business stakeholders view model using *local behaviors - at the level of a stage and its guards/milestones*
 - ▶ There may be lots of inter-dependencies “under the hood”
 - ▶ The theory provides unambiguous description of how things work
 - ▶ Also, the semantics helps to ensure that non-intuitive things won’t happen, e.g., race conditions; “hidden” changes; changes that aren’t “justified”; ...
- A “Business Step (B-step)” is the effect of incorporating one external event and firing all relevant ECA rules
- Theory provides 3 equivalent characterizations of semantics
 - ▶ *Incremental*: applying one “ECA” rule at a time
 - Provides natural approach for direct implementation
 - ▶ *Fixpoint*: precise “top-down” description
 - Useful to develop optimizations and alternative implementations, e.g., distributed, scalable
 - ▶ *First-order logic*: formula describing possible begin/end of macro-steps
 - Enables use of previously developed verification/reasoning techniques
 - Helps with checking that a GSM model has expected behavior