NEXT GENERATION ENTERPRISE MODELLING IN THE AGE OF INTERNET OF THINGS

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Modeling Knowledge Work: Case Management and Decision-aware Business Processes

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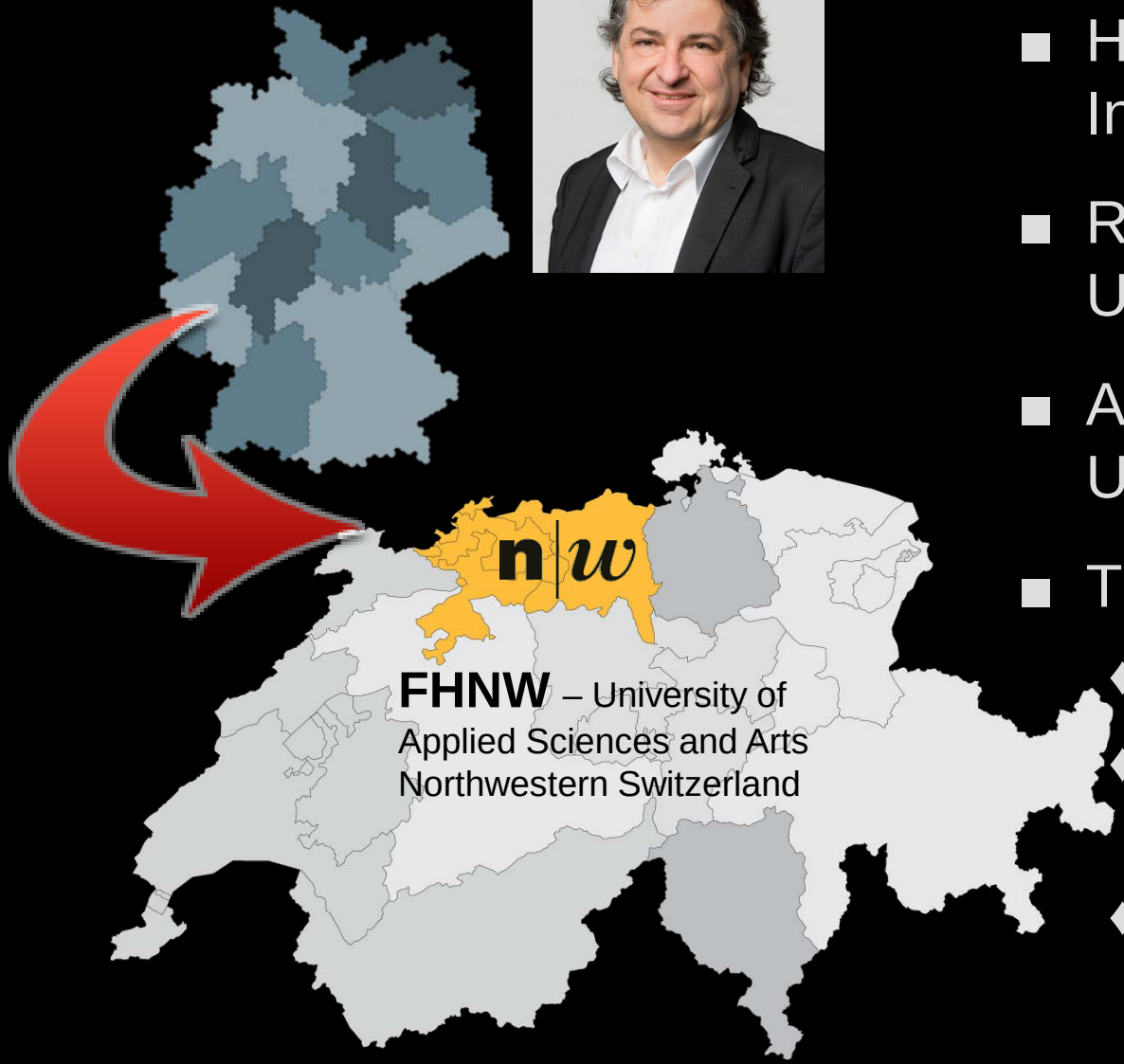
About Me

Well-known things from Switzerland

The Ultimate Swiss Armee Knife

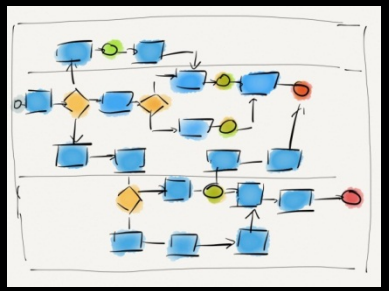
About Me



- Head of MSc in Business Information Systems
- Research Associate at University of Pretoria
- Adjunct Professor at University Camerino
- Topics:
  - Enterpise Modelling
  - Business Processes and Knowledge Work
  - Alignment of Business and IT

Motivation

Knowledge Work

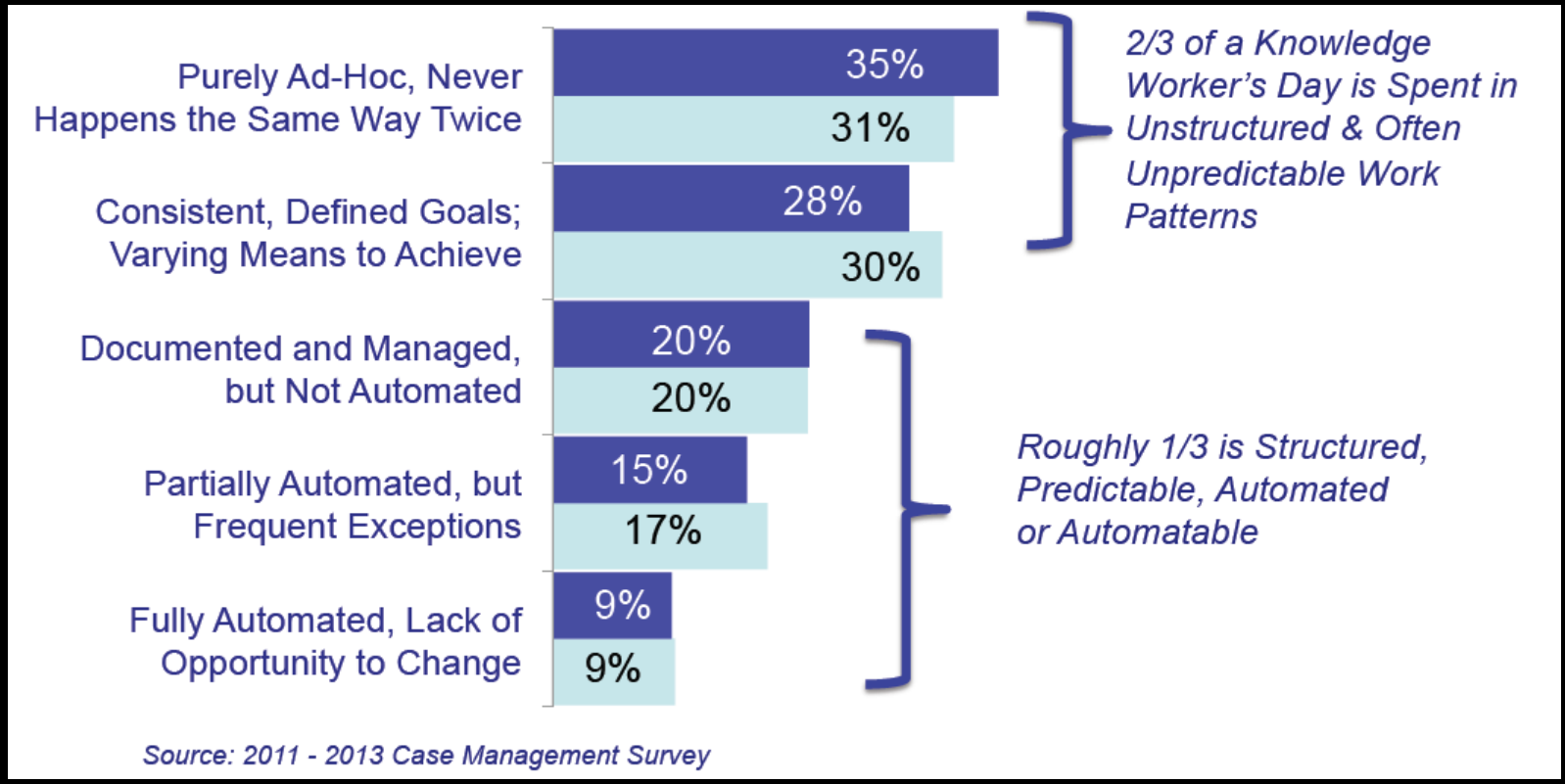


Processes

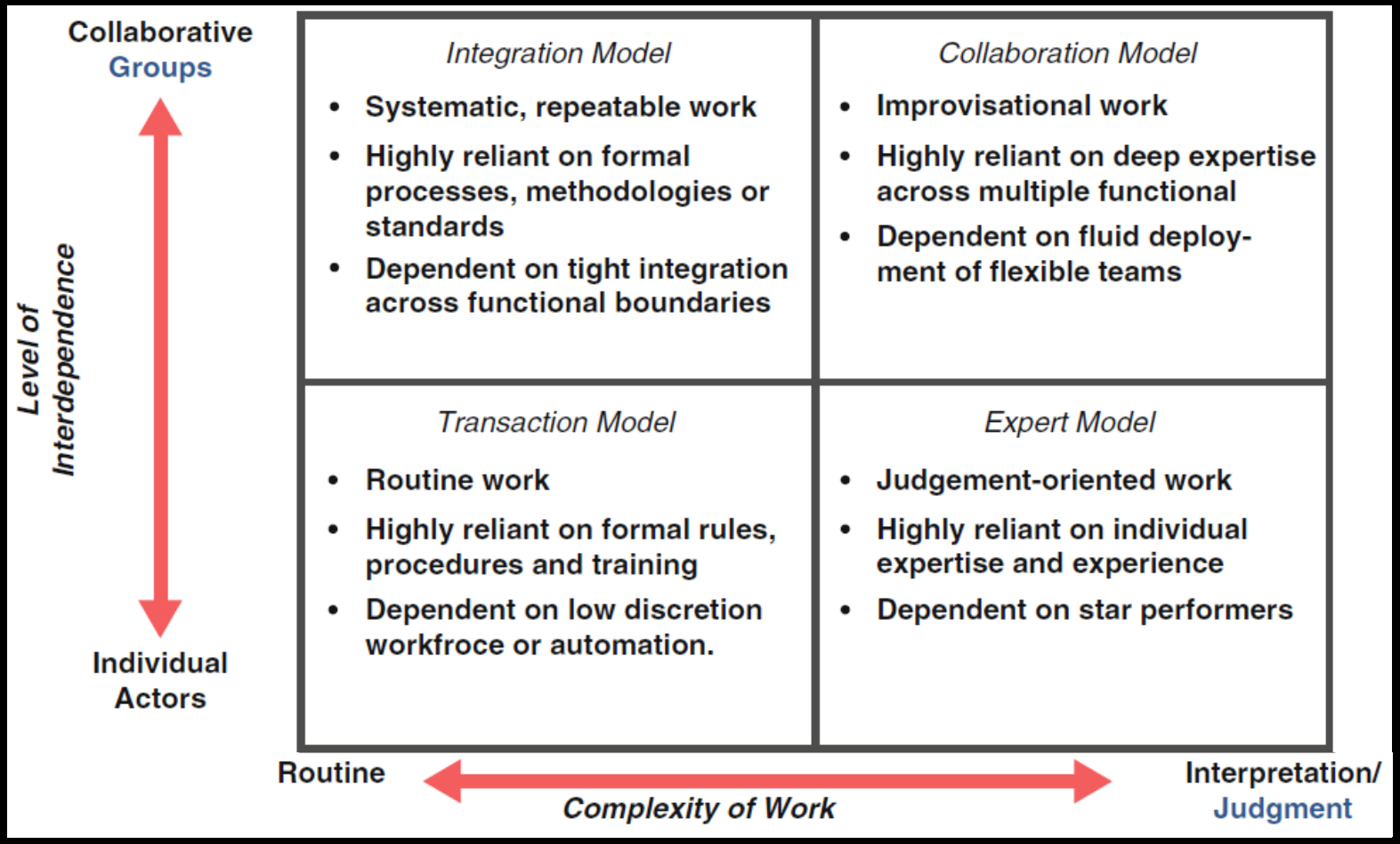
- Knowledge work is key to the success of many enterprises
  - ♦ differentiate physical goods
  - ♦ offer smart services
- One way to manage knowledge work is to treat it as a process.
- Business Process Management, however, is often regarded as incompatible with the autonomy and work approaches of knowledge workers.

Work Patterns of Knowledge Workers

Most of a knowledge worker's day is spent in unstructured work



Types of Knowledge Work



(Davenport 2010)

Modeling Business Processes

Classification of Processes

structured process	case	ad hoc process
• structured process flow • activites known in advance • many repetitive elements • no degree of freedom for people wrt process flow	• process flow can partly be structured • activites partly known in advance • some repetitive elements • some degree of freedom for people wrt process flow	• process flow cannot be structured – new tasks on the fly • activites partly known in advance • few repetitive elements • very high degree of freedom for people wrt process flow

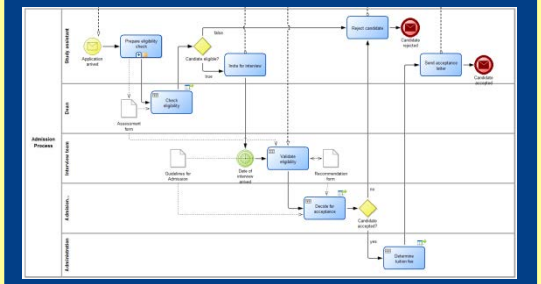
← can be modelled → ← cannot be modelled →

partly translated from (Gadatsch 2005, S. 44)

Structure of Processes

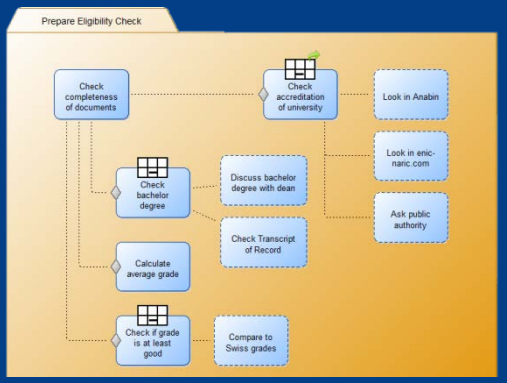
structured process

BPMN



case

CMMN



ad hoc process

- process flow cannot be structured – new tasks on the fly
- activites partly known in advance
- few repetitive elements
- very high degree of freedom for people wrt process flow

can be modelled

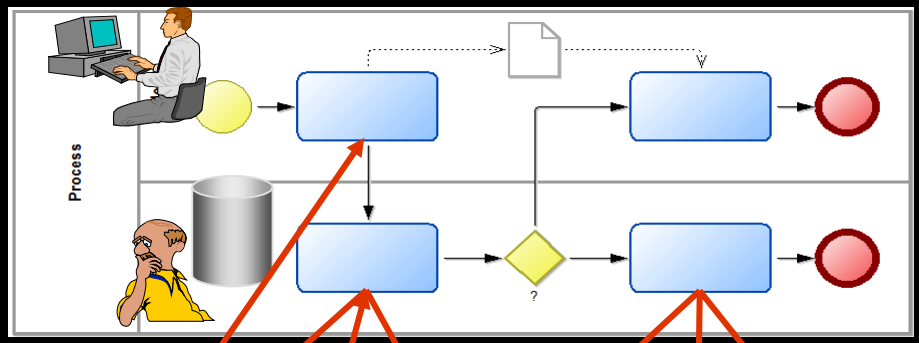
cannot be modelled

partly translated from (Gadatsch 2005, S. 44)

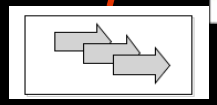
Process Logic and Business Logic

Process Logic

Business Logic



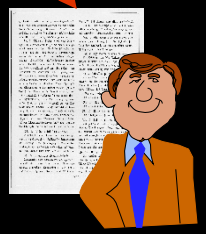
expertise



business rules

decision making

regulations



lessons learned

knowledge *about* processes:

- process flow
- roles
- resources

→ **process logic**

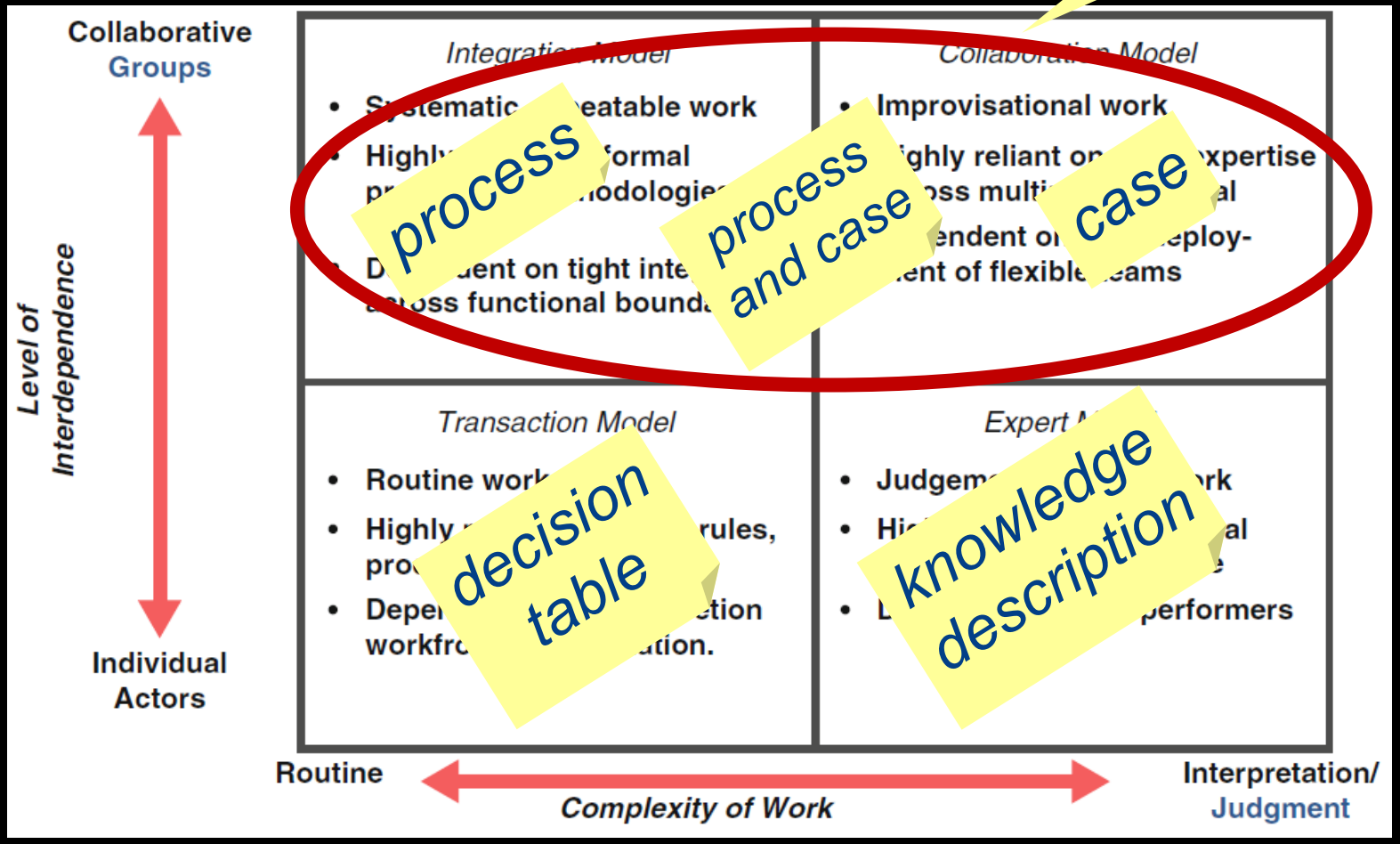
knowledge *in* processes:

- supports practice
- skills, experiences
- know how

→ **business logic**

Types of Knoweldge Work

Objective: Integration

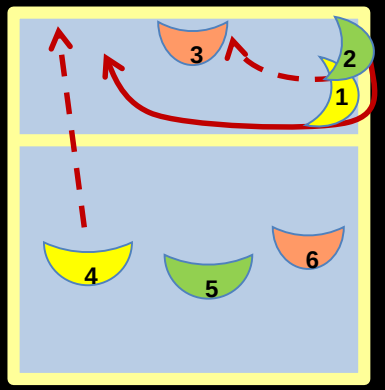


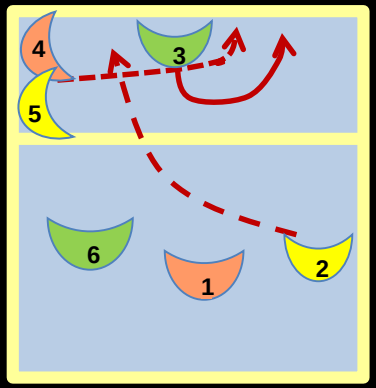
process logic

business logic

(Davenport 2010)

Agility of a Sports Team





- A good player must
  - **sense** what is happening
  - **prioritize** best next action
  - **act** effectively
- A playbook defines moves
- But: moves depend on the opponent
- Playbook corresponds to
  - Business process model (process logic)
  - decision model (business logic)

but must allow for **flexibility**

based on an idea from (Cauley 2010)

Analogy: Sports Team

Agility in different levels:

- (Re-)Define moves/processes
  - procress/decision logic
  - design time
- Adapt moves/processes
  - process logic
  - run time
- flexibly react on opportunity or threat
  - decision logic
  - run time

adapted from (Cauley 2010)

Example:
Check Eligibility of MSc Candidates

Exercise: Check Eligibility of MSc Candidates

- First, the study assistant confirms that the application has arrived.
- The study assistant determines whether the bachelor degree is ok. The If the degree is unknown to the study assistant, she can look in the degree database or ask public authorities.
- It is checked whether the average grade is at least “good”.
- The average grade is calculated, if it is not in the transcript.
- The study assistant has to register the student.
- The study assistant can discuss with the head of program at any time.
- The head of program decides, whether the candidate is eligible.

What is the base process?
- *Which tasks are executed in every case?*
- *Which tasks are executed for specific cases?*

Exercise: Check Eligibility of MSc Candidates

- First, the study assistant **confirms that the application** has arrived.
- **The study assistant determines whether the bachelor degree** is ok.
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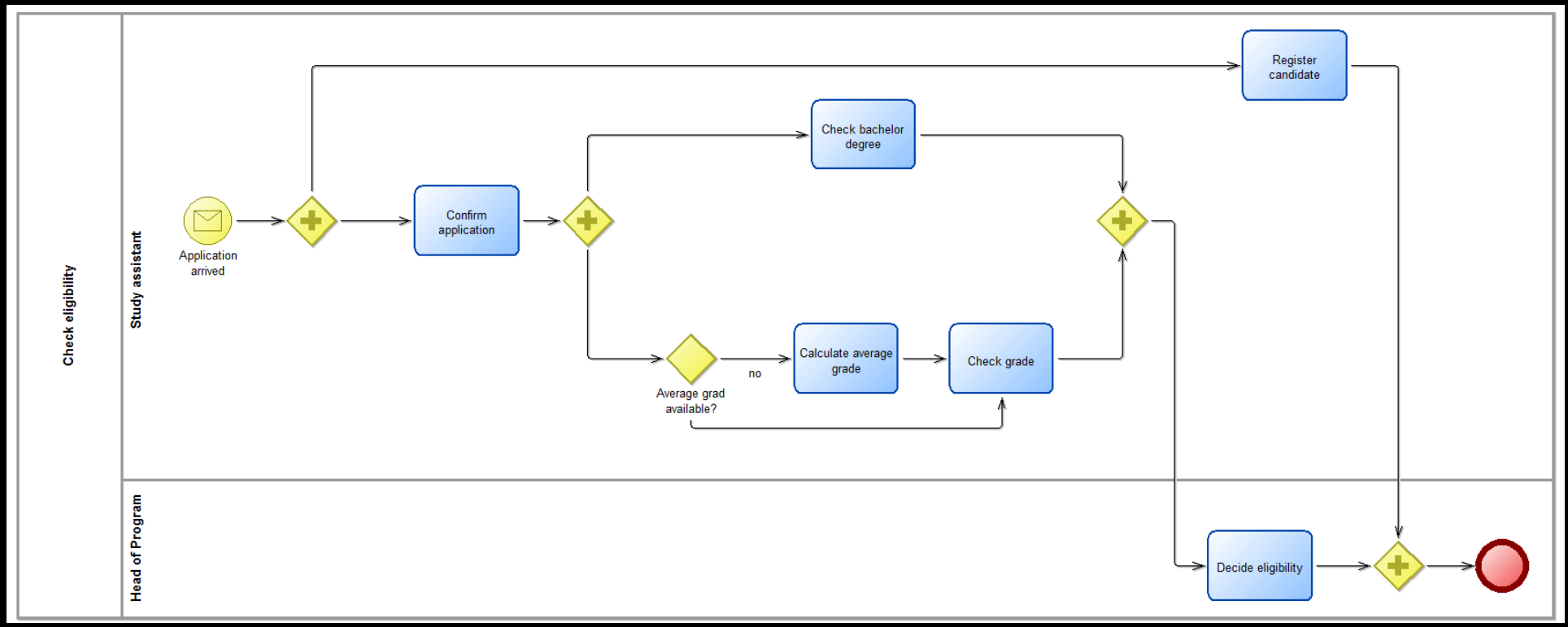
- The head of program **decides**, whether the candidate is eligible.

The tasks in bold are the basic process:
- *Tasks executed in every case*
- *Tasks executed for specific cases*

Basic Process in BPMN



Exercise: Check Eligibility of MSc Candidates

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Which tasks depend on experience, preference or judgment of human worker?

Exercise: Check Eligibility of MSc Candidates

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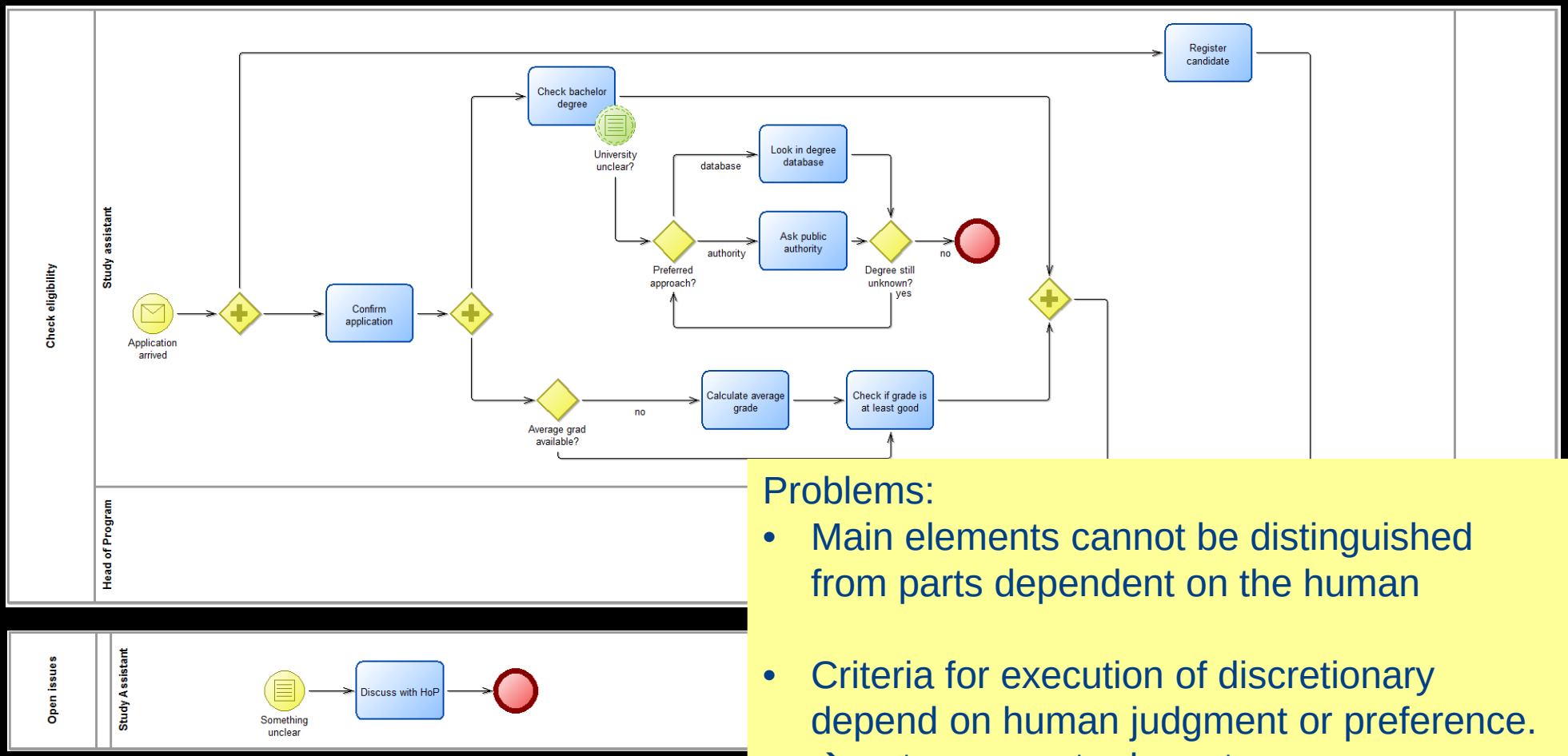
Tasks in bold depend on experience, preference or judgment of human worker

Process as BPMN including Discretionary Items



Problems:

- Main elements cannot be distinguished from parts dependent on the human
- Criteria for execution of discretionary depend on human judgment or preference.
  → gateways not adequate

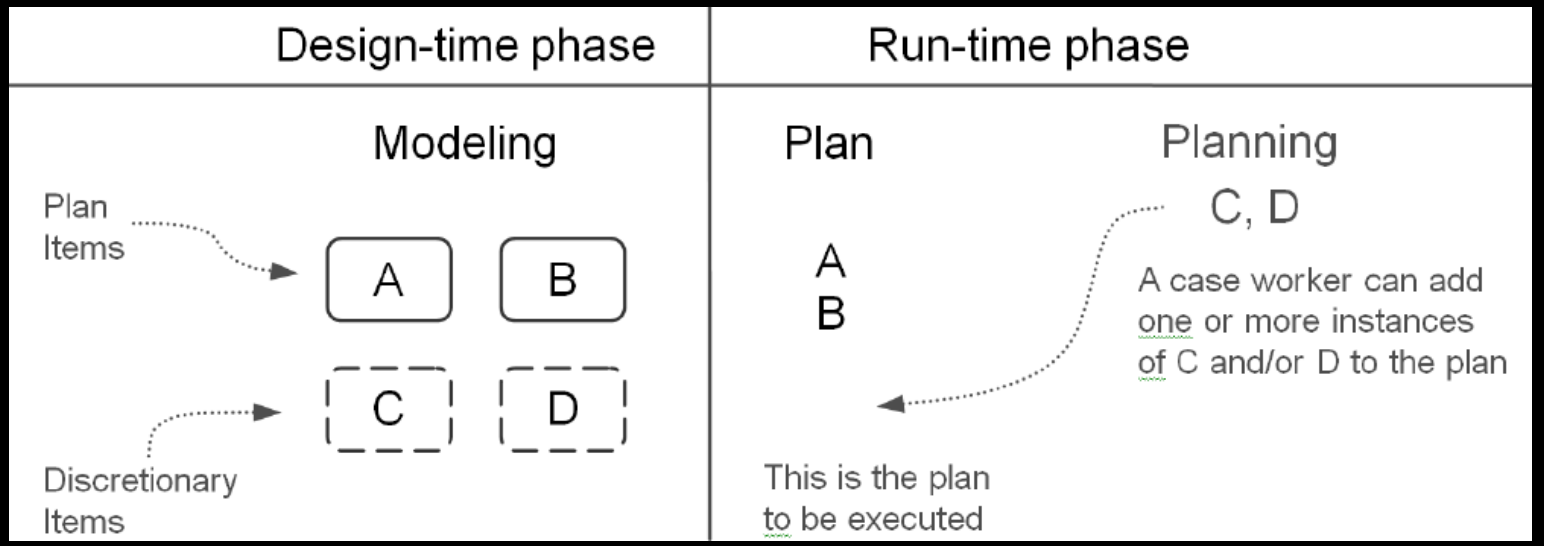
Modelling with CMMN

CMMN - Case Management Model and Notation

- OMG defined a Modeling Standard for Case Modeling
  - Case Management Model and Notation (CMMN)
- Version 1.1 is from December 2016
  - http://www.omg.org/spec/CMMN/1.1/PDF/
- CMMN is specialized notation to model cases. It is independent from BPMN

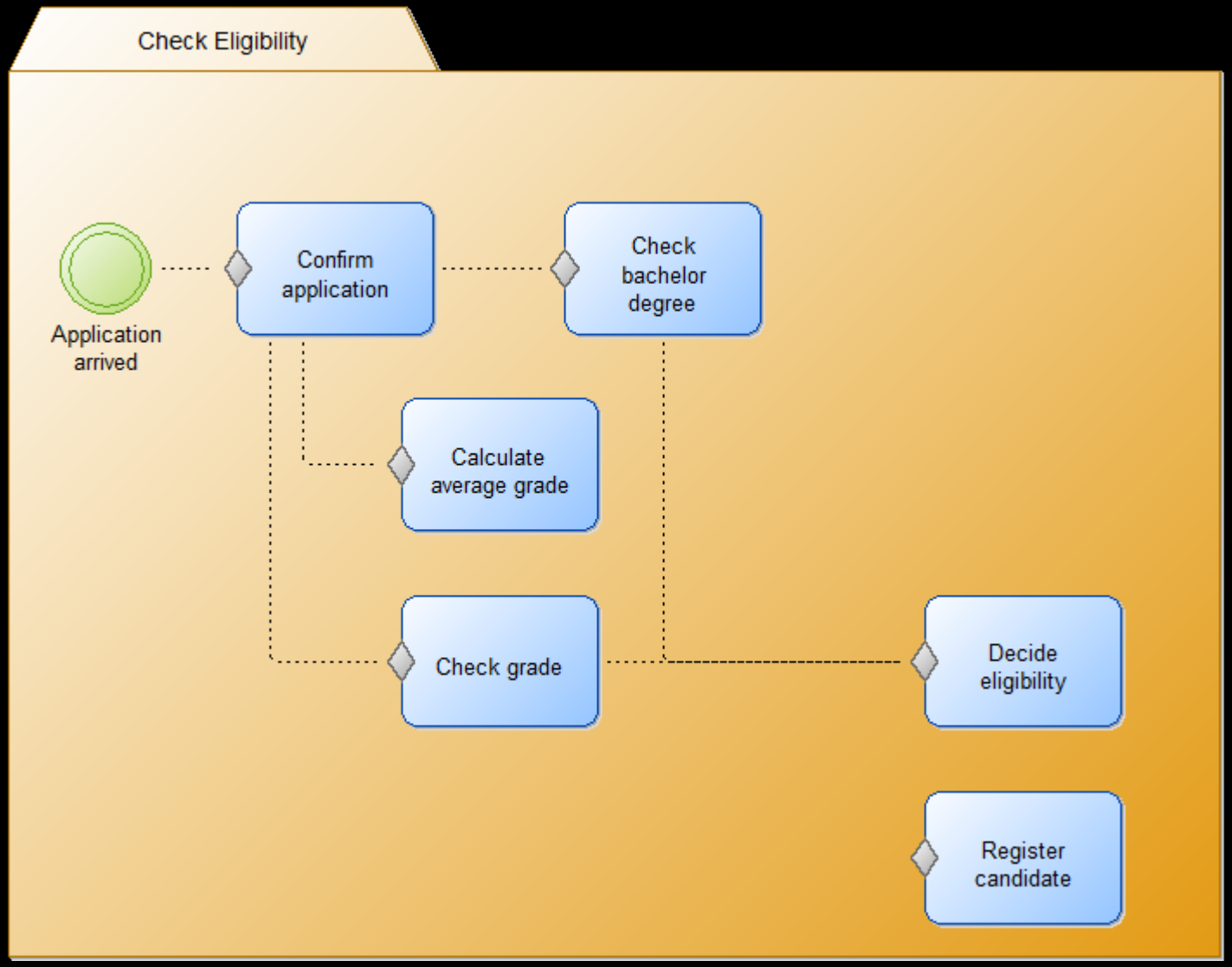
Design Time vs Run Time = Modeling vs Planning

- A Case has two distinct phases: design-time and run-time
  - ***Design-time: Business analysts*** define
    - Tasks of pre-defined segments
    - "discretionary" Tasks that are additionally available to the Case worker
  - ***Run-time: Case workers*** execute the plan
    - performing Tasks based on control flow criteria,
    - adding discretionary Tasks if needed.



(CMMN 1.0, p. 5f)

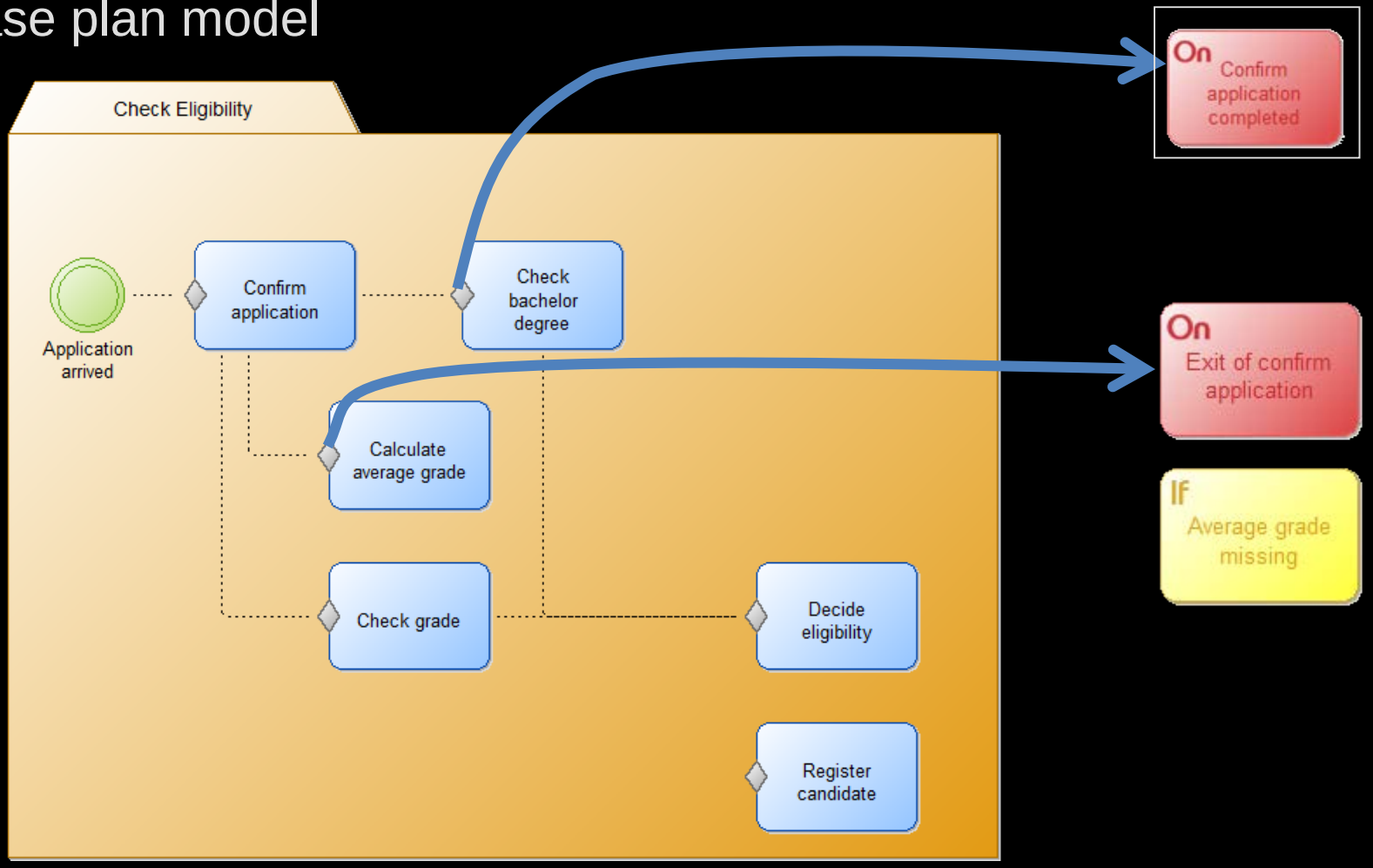
Basic Process in CMMN



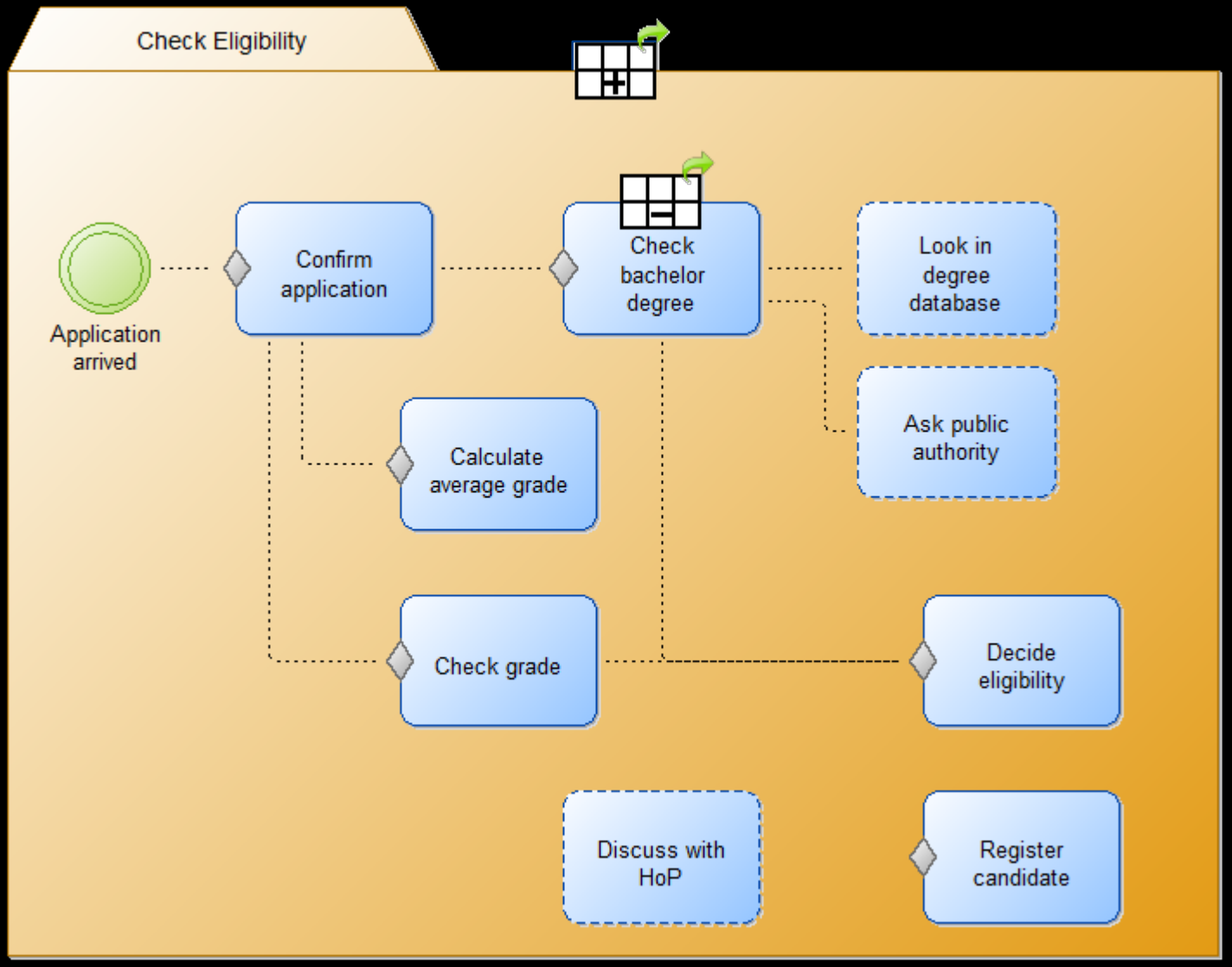
CMMN Case Plan Modelling in the Knowledge Work Designer

control elements:
determine task execution

case plan model

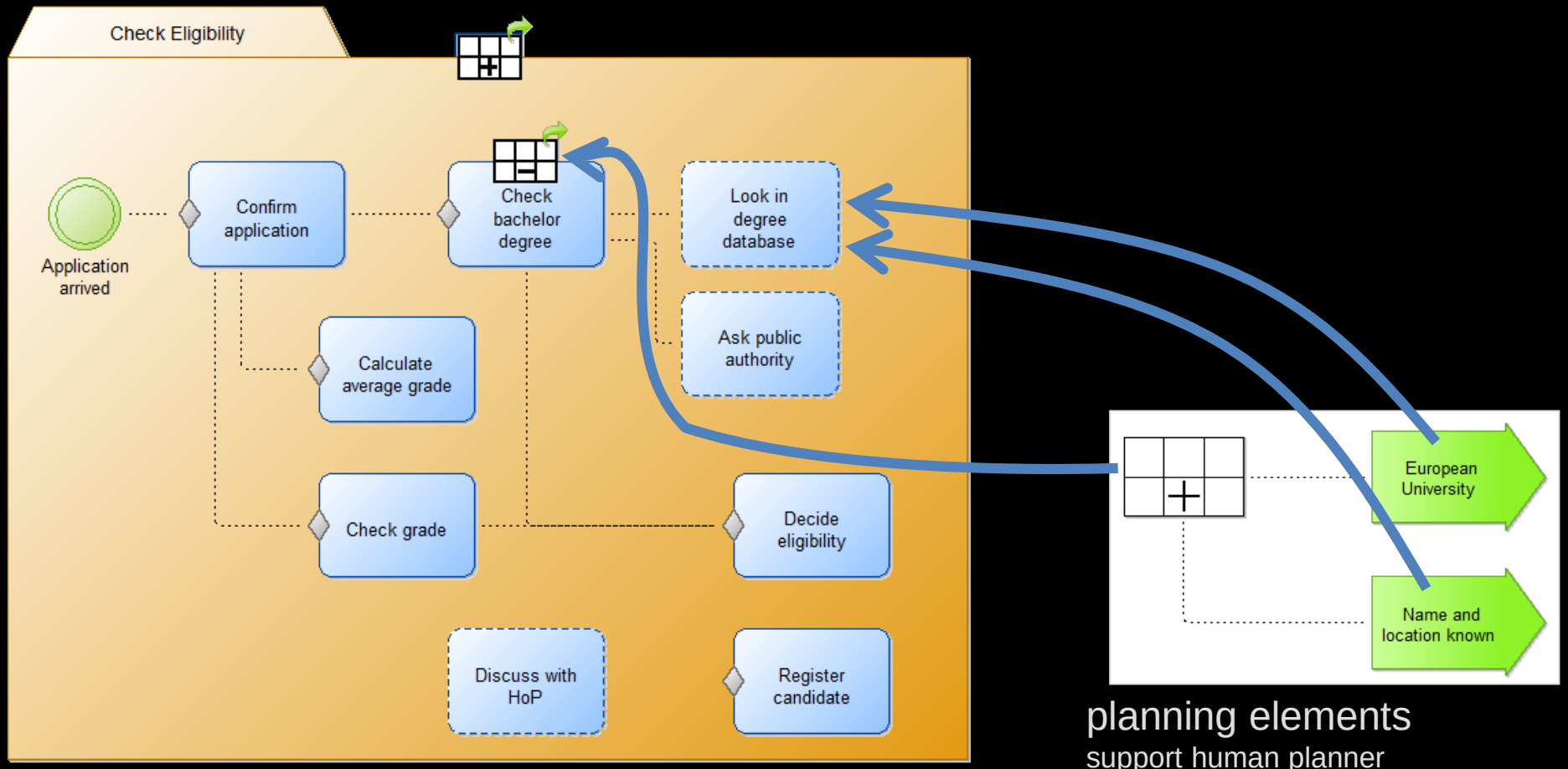


Discretionary Tasks: Freedom for Worker



CMMN Case Plan Modelling in the Knowledge Work Designer

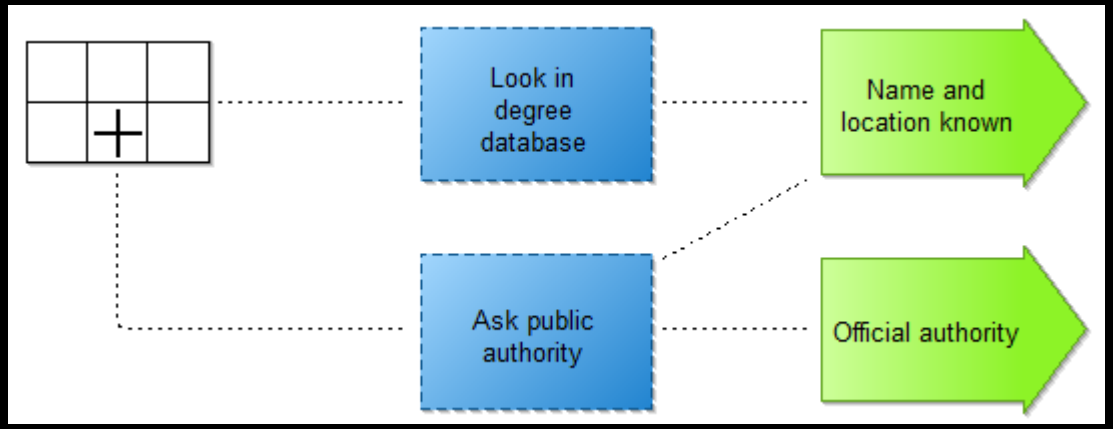
case plan model

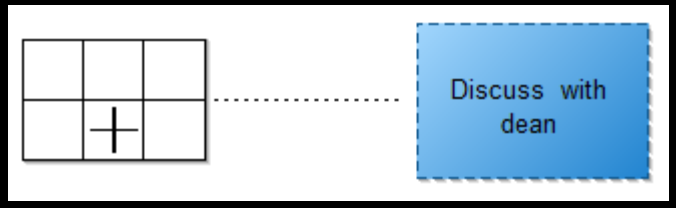


planning elements
support human planner

Planning Table and Applicability Rules

- Relation of Planning Table, Discretionary Item and Applicability Rules in the Knowledge Model Designer





Case Management Processes: Examples

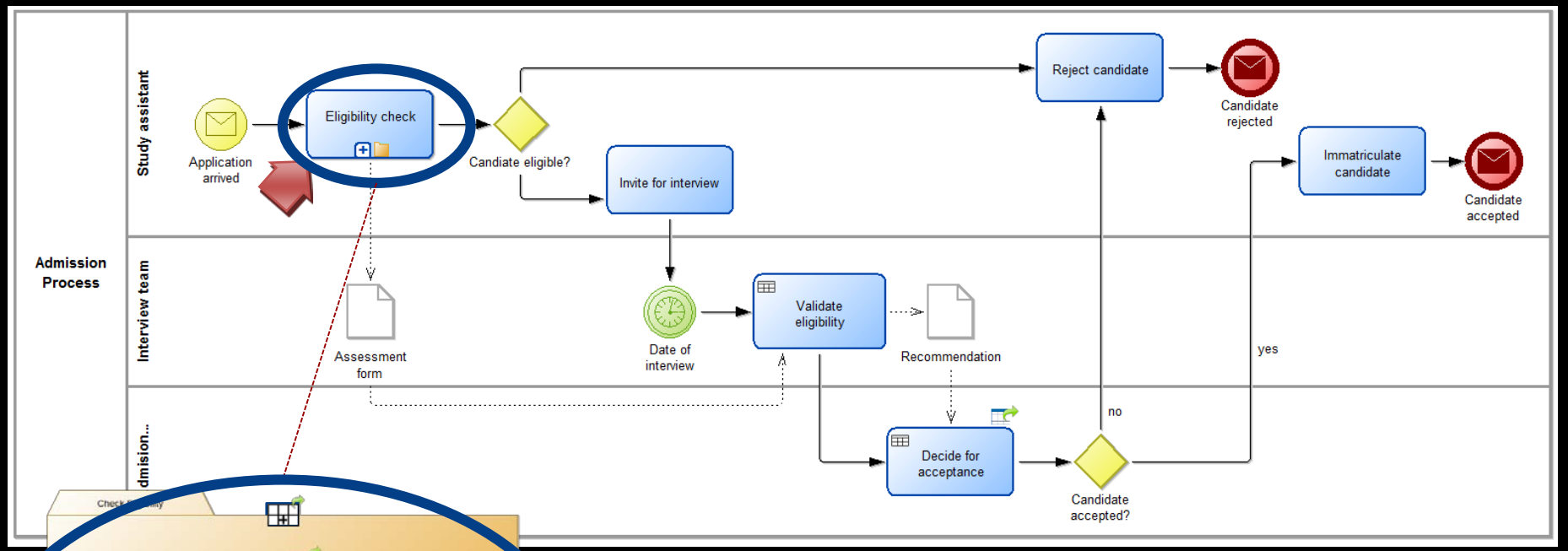
Case management processes: common in many industry segments, where activities and documents required depend on the circumstances of each case

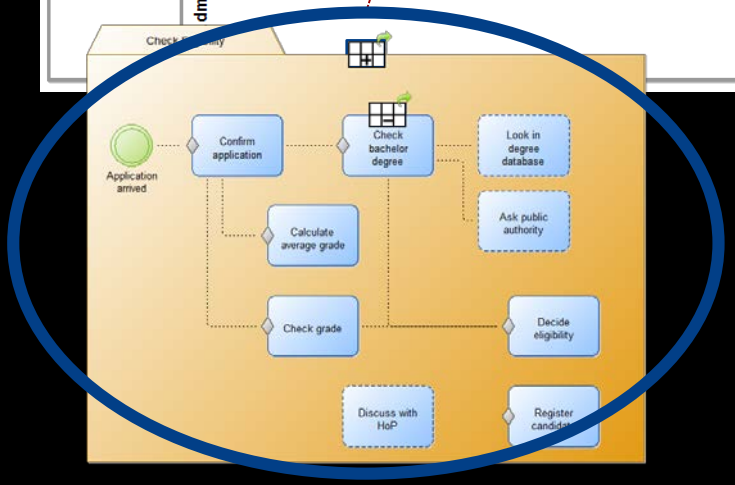
- Benefits Administration
  - Examples: welfare assistance, student financial aid, grants programs, disability benefits
- Underwriting
  - Examples: commercial lending, life and disability insurance.
- Project Management
  - Examples: launch of a new product/service, major IT system upgrade
- Dispute Resolution
  - Example: customer demands a refund

(Silver 2011, p. 88f)

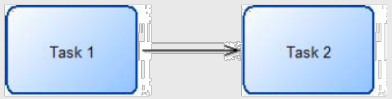
BPMN and CMMN

CMMN for Subprocesses in BPMN





Comparing Elements of BPMN and CMMN

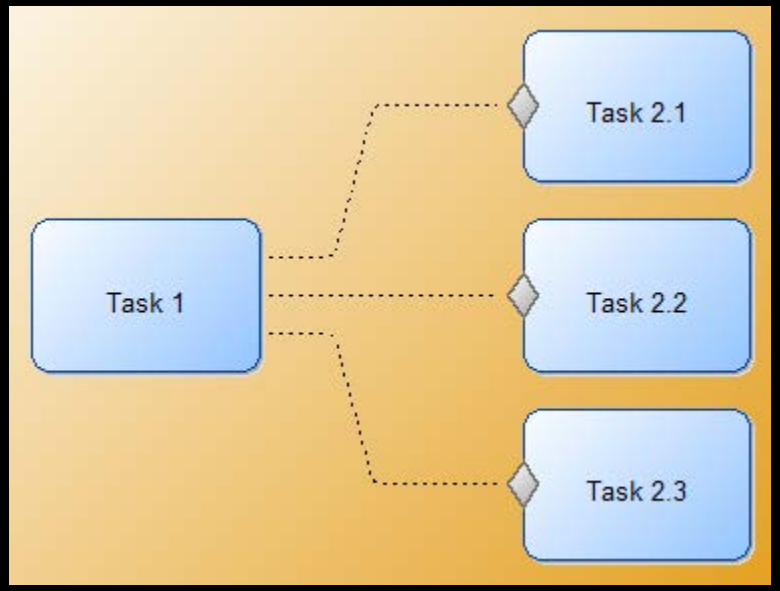
	BPMN	CMMN
Tasks	Tasks	Tasks
Process hierarchy	Subprocesses, Call Activities	Process Tasks, Case Tasks
Events	Events: start – intermediate – end catching – throwing	Event Listeners, implicit Events, Milestones
Control Flow	Gateways/Events	Sentries
	Sequence Flow 	Sentry with empty condition 
Planning	--	Discretionary Tasks
Responsibilities	Lanes	Role attribute
Process Container	Pool 	Folder 

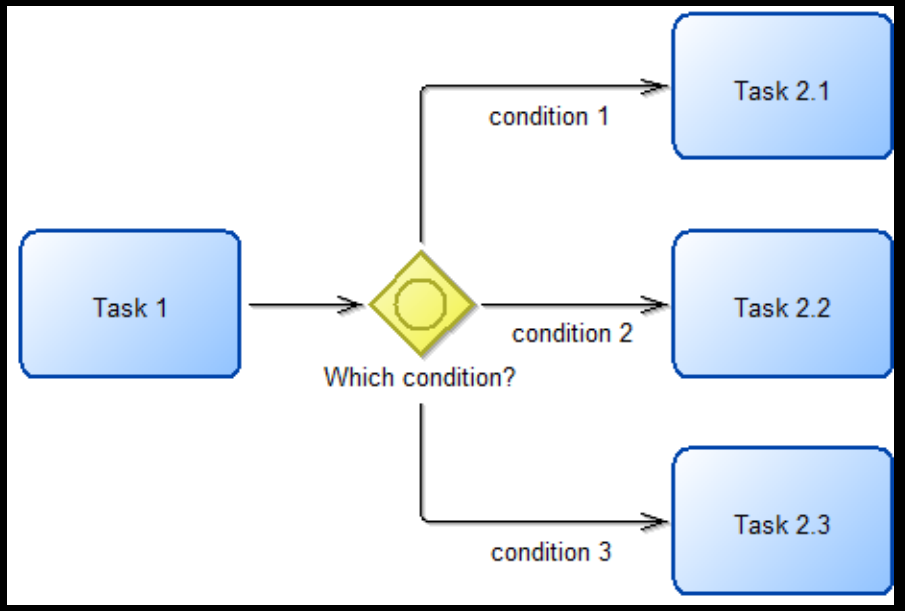
Rules in BPMN and CMMN

BPMN	CMMN
Events/gateways	Sentries
---	Applicability rules (planning tables)
Business rules (task)	Decision (task)

Implicit Control Flow in CMMN

What does it mean?

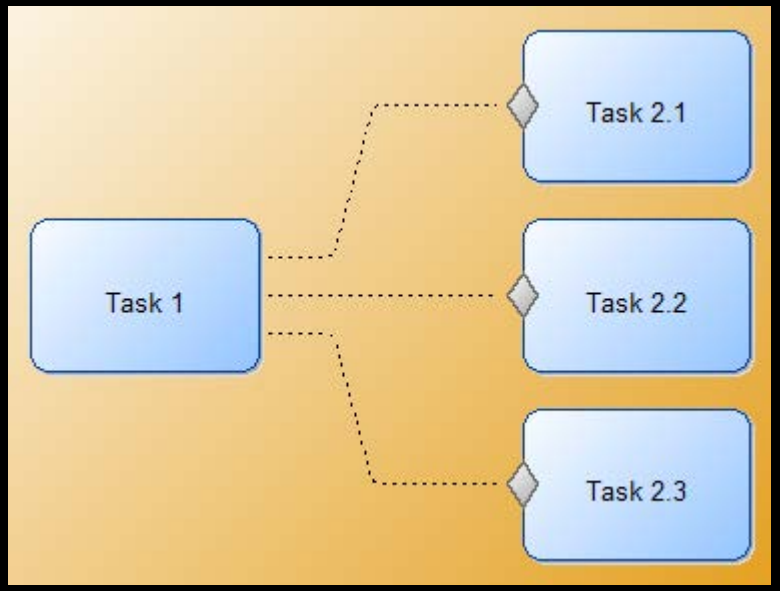


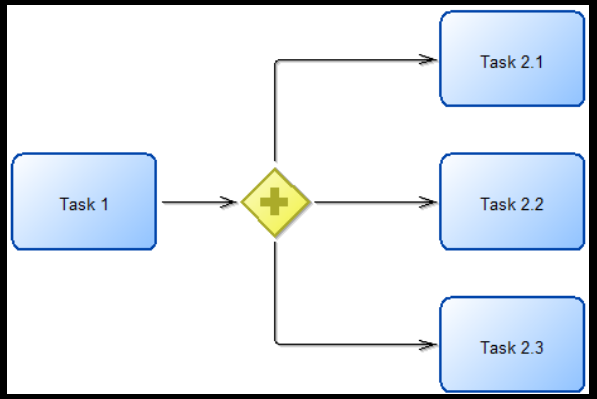


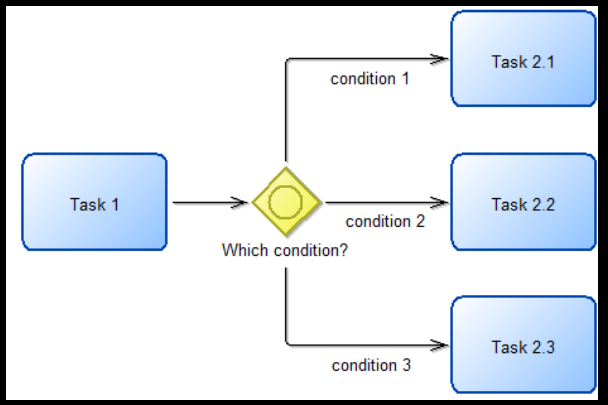
Visible conditions are better for understanding

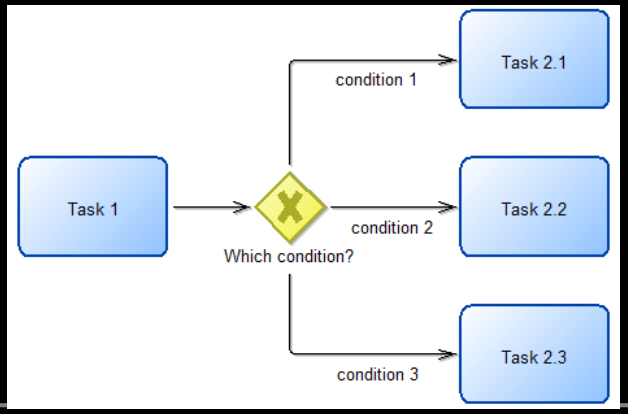
Explicit Control Flow in BPMN

What does it mean?







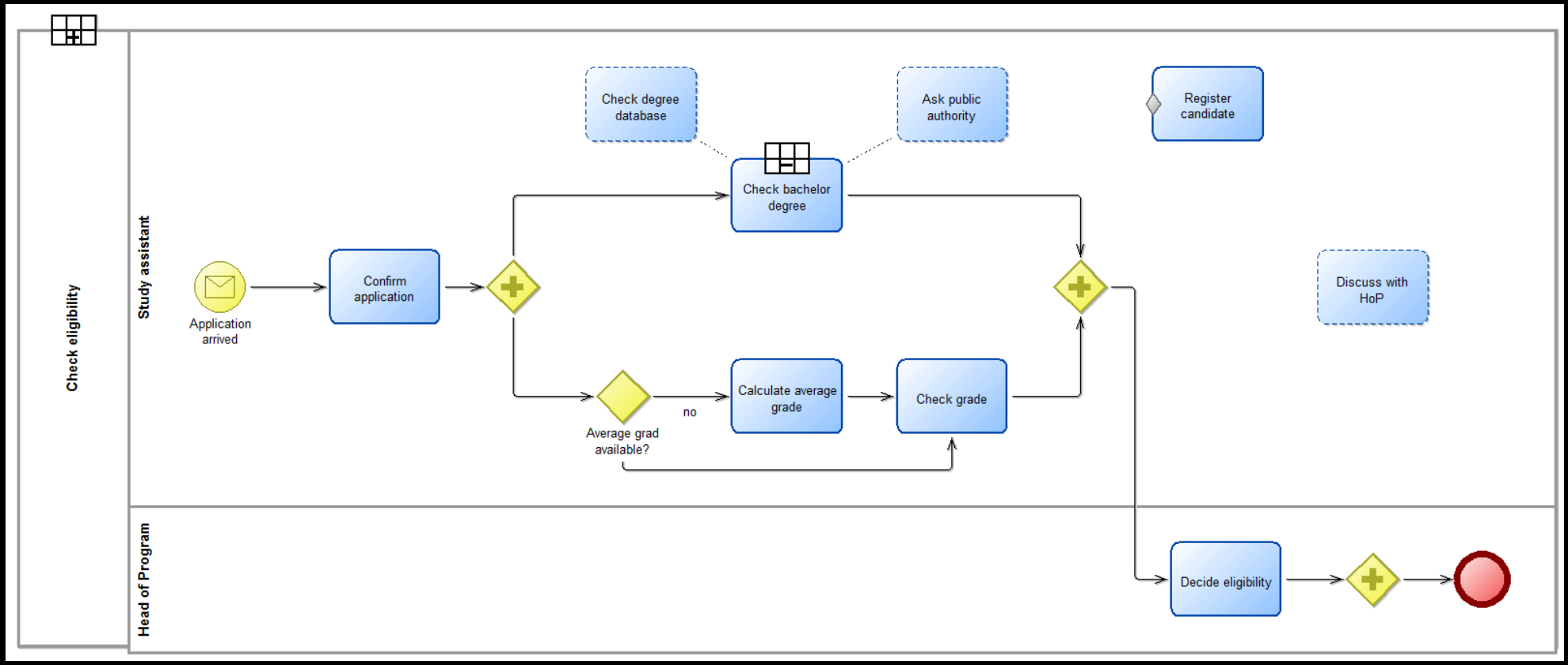


BPCMN: A combined Process and Case Modeling Language

A combination of
control flow elements of BPMN
and discretionary tasks
and planning elements of CMMN

a suitable language
to deal with any kind of process.

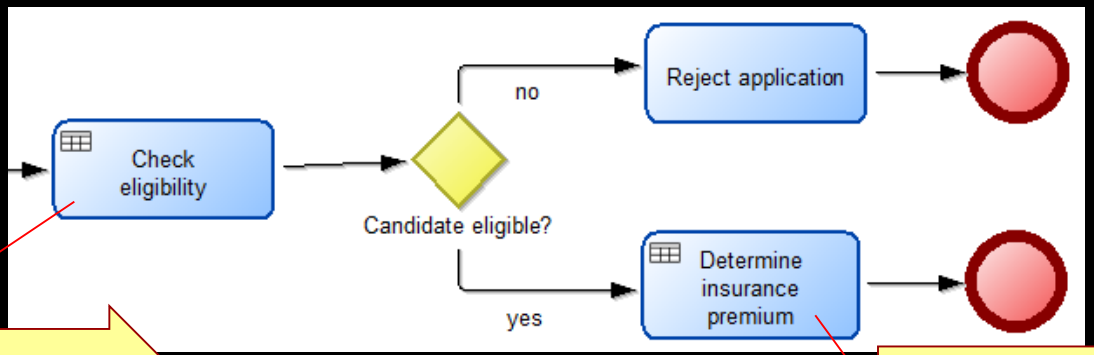
BPCMN – Combining BPMN and CMMN



Decision-aware Business Processes

Decision Tasks in Business Processes

- A **decision task** is a task in which some decision is made
- Two kinds of decision tasks:
  - Decision tasks deriving values for data
  - Decision tasks providing data for gateways

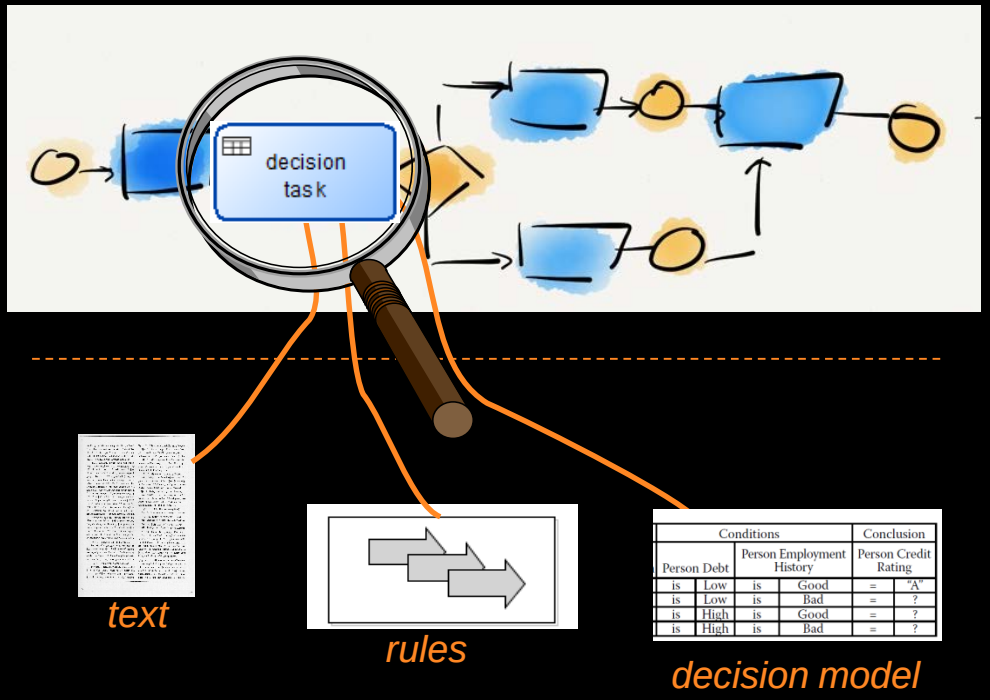


Decision: Is the applicant eligible?

Decision: what is the amount of the insurance premiumin this case?

Decision-Aware Process Models: Managing Process Logic and Decision Logic Separately

Process Logic

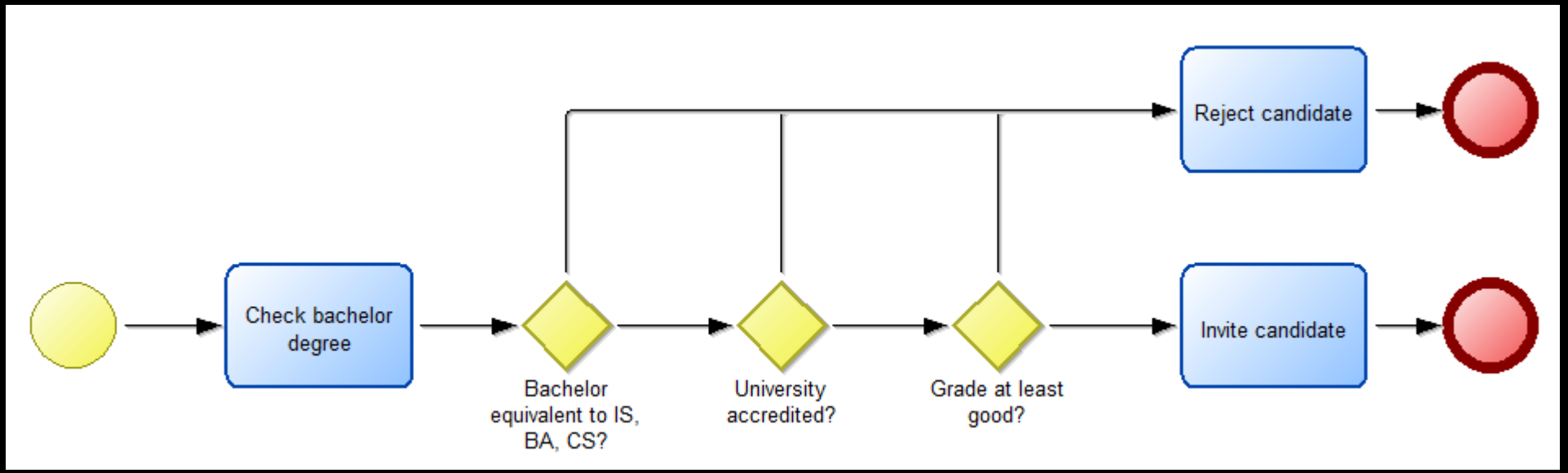


Business Logic / Decision Logic

- The process model contains the process logic → **procedural**
- Decision logic represented in a different kind of model → **declarative**
- Separating business decisions from business process tasks
  - simplifies the business process model
  - allows to manage business logic in a declarative form

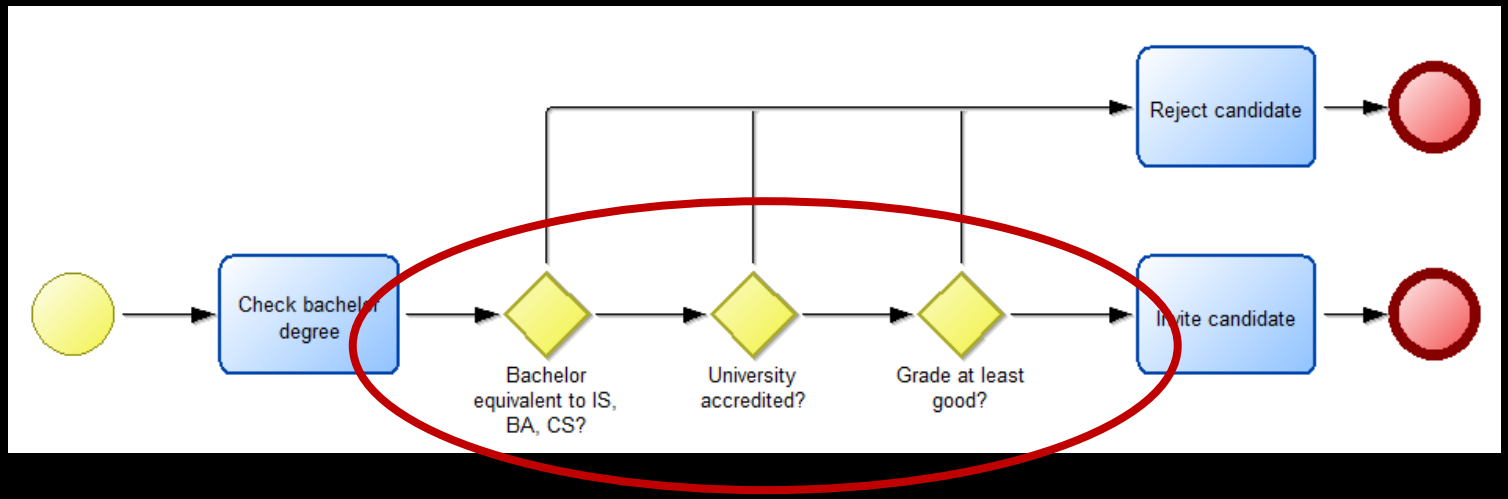
Example:
Decision-aware Process

Exercise: Decisions in Processes (1)
Process Logic vs Business Logic



- How many decisions are made in this process?
- Which business logic can you identify?
- What would you improve?

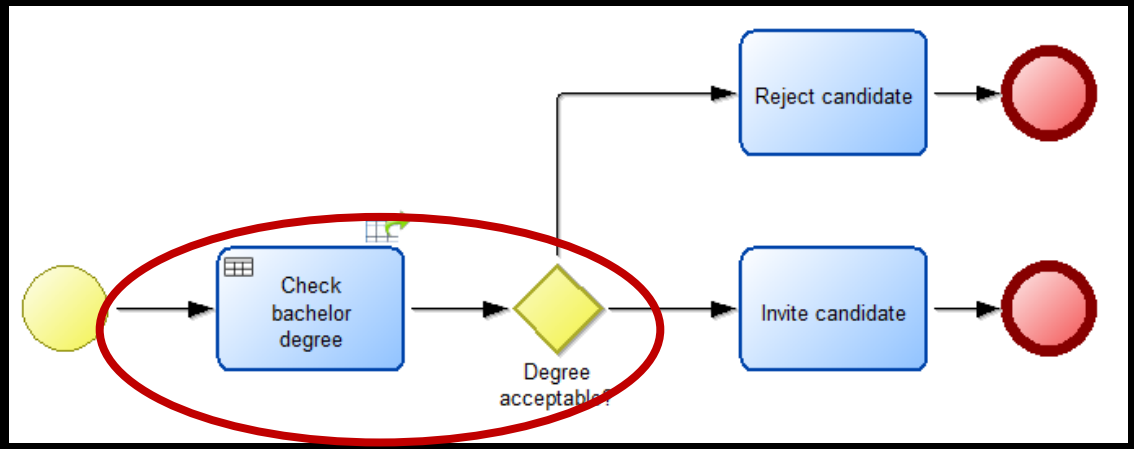
Exercise: Decisions in Processes (2)
Process Logic vs Business Logic



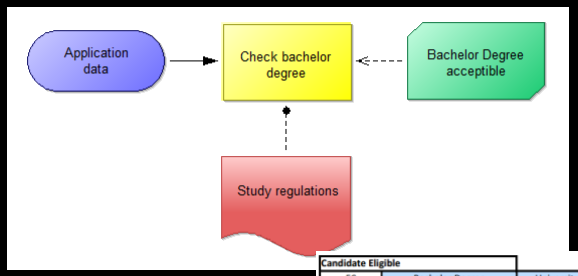
- A process model contains **process logic**
- This process only contains **one** decision wrt. process logic:
  - Execute «Reject candidate» or execute «Invite candidate»
- The criteria for the decision are written on the gateways. This is business logic and not process logic. It should not be part of process model.
  - Change in the criteria should not affect the process model.
  - The order of the criteria is not compulsory. There is an unnecessary sequentialisation.

Exercise: Decisions in Processes (3)
Process Logic vs Business Logic

Process logic:



Busness logic:



Candidate Eligible

FC	Bachelor Degree	University accredited	eligible
	yes, no	*yes, no, unclear*	*yes, no*
1	yes	yes	yes
2	no		no
3		no	no
4	yes	unclear	yes

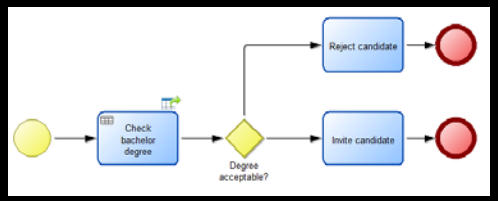
Bachelor Degree

FC	Bachelor Degree in *Information Systems, Business Administration, Information Technology, other, none*	Bachelor Degree *yes, no*
1	Information Systems	yes
2	Business Administration	yes
3	Information Technology	yes
4	other	yes
5	none	no

- This model is more appropriate
  - Process is simplified
  - Decision logic is modeled separately
  - Change of business (decision) logic does not affect process model

Advantages of separating Business Logic from Business Process Model

- Allows a much simpler business process model
  - If a business process is too complicated, a reason might be that business rules are embedded in the flow
- Makes changes to business process and business logic easier
  - Permits changes in the Decision Model without changing the business process model and vice versa
- Makes governance of business processes and business logic easier to manage
- Decision Model can be reused in several processes
  - the whole decision model
  - individual decision tables and rules



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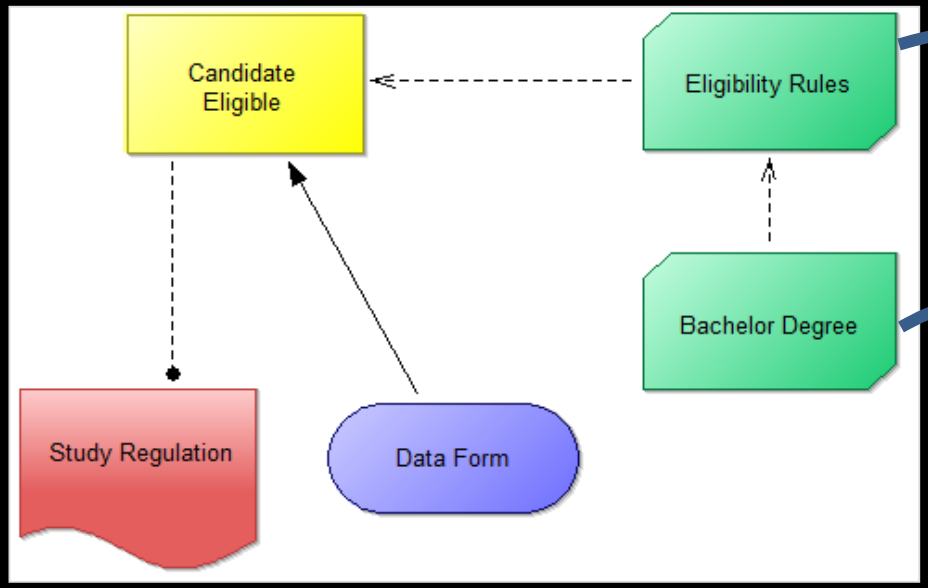
Modelling Decision Logic

Decision Model and Notation

Decision Requirements Diagram



Decision Tables

Candidate Eligible

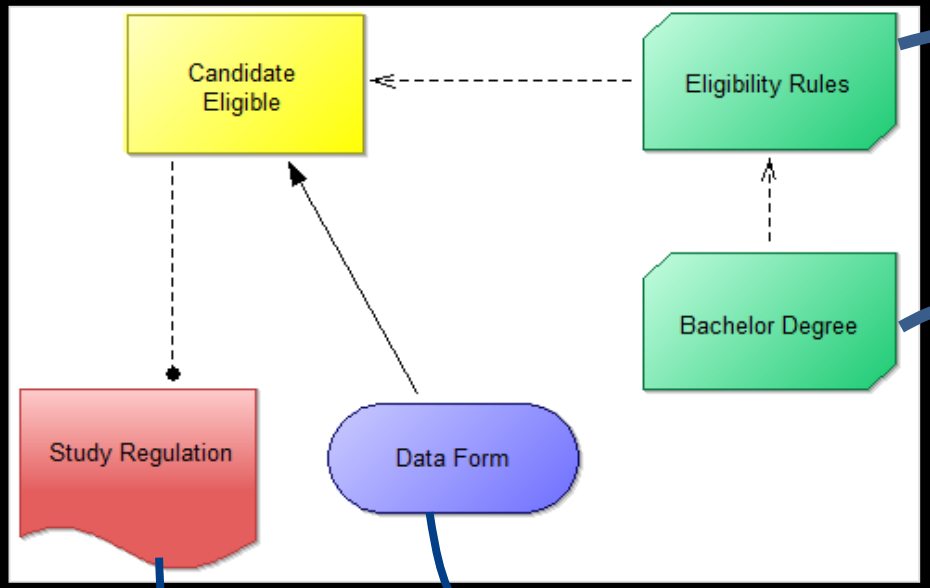
FC	Bachelor Degree	University accredited	eligible
	yes, no	*yes, no, unclear*	*yes, no*
1	yes	yes	yes
2	no		no
3		no	no
4	yes	unclear	yes

Bachelor Degree

FC	Bachelor Degree in	Bachelor Degree
	Information Systems, Business Administration, Information Technology, other, none	*yes, no*
1	Information Systems	yes
2	Business Administration	yes
3	Information Technology	yes
4	other	yes
5	none	no

Decision Model and Notation

Decision Requirements Diagram



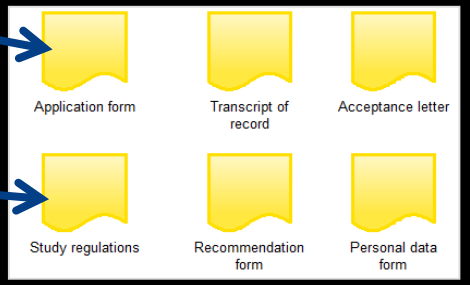
Decision Tables

Candidate Eligible

FC	Bachelor Degree	University accredited	eligible
	yes, no	*yes, no, unclear*	*yes, no*
1	yes	yes	yes
2	no		no
3		no	no
4	yes	unclear	yes

Bachelor Degree

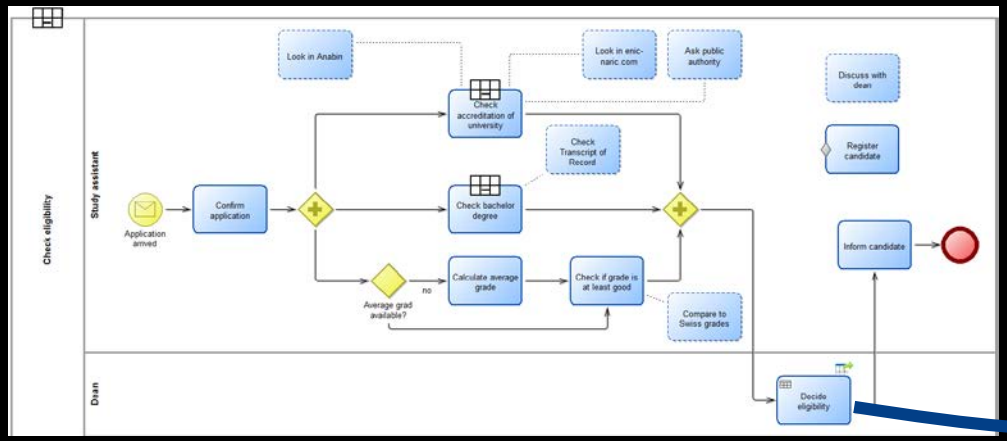
FC	Bachelor Degree in	Bachelor Degree
	Information Systems, Business Administration, Information Technology, other, none	*yes, no*
1	Information Systems	yes
2	Business Administration	yes
3	Information Technology	yes
4	other	yes
5	none	no

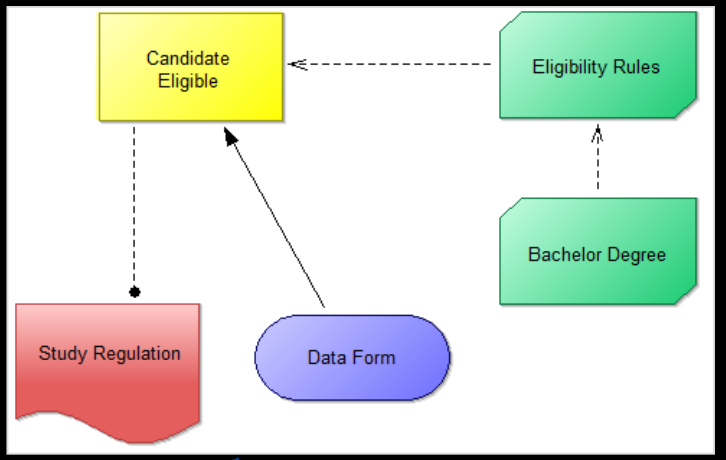


Documents in Case File

References to Decision Models

- Decision models can be referenced from
  - Process models
  - Case plan models
  - BPCMN models





Decisions requiring Human Judgment

- Some decisions require human judgment
  - Example: Communication and analytical skills
- Can be supported by …
  - Checklists
  - Best practices
  - Lessons learned
- Modelled as **documents**

Decisions requiring Human Judgment

Bachelor Degree		
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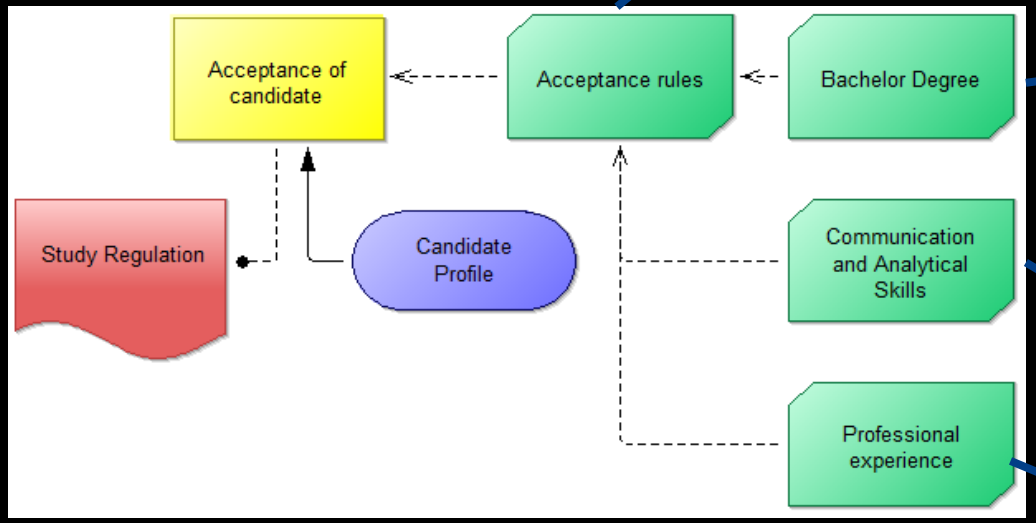

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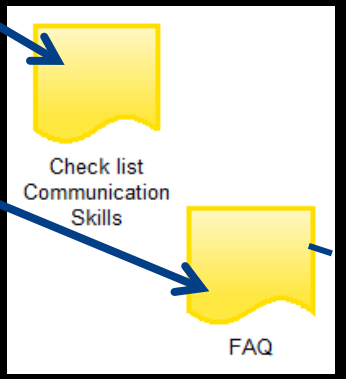
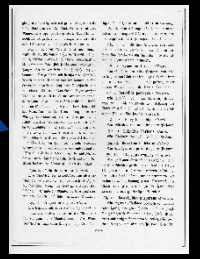
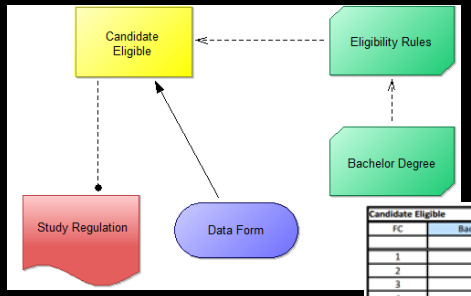




Conclusion

- Modeling of Knoweldge Work includes
  - ♦ process logic and business Logic
  - ♦ on different degrees of structure

  in an integrated environment



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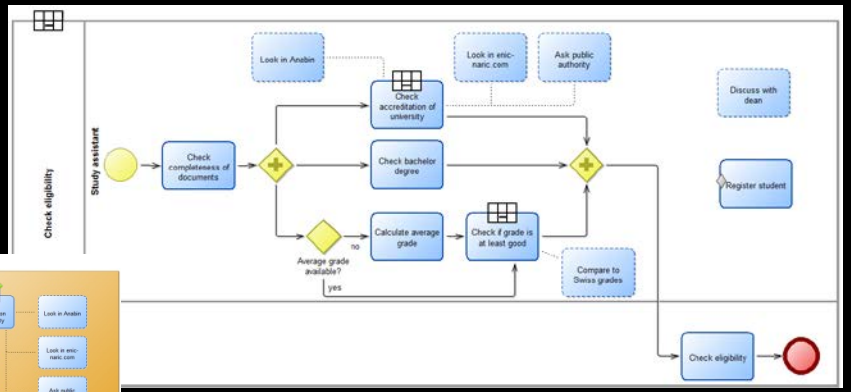
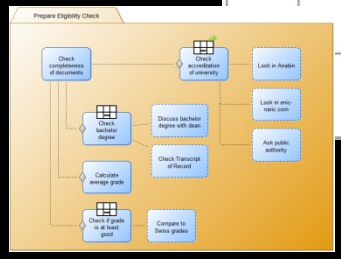
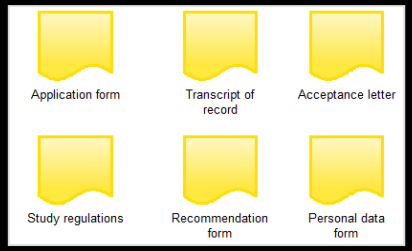
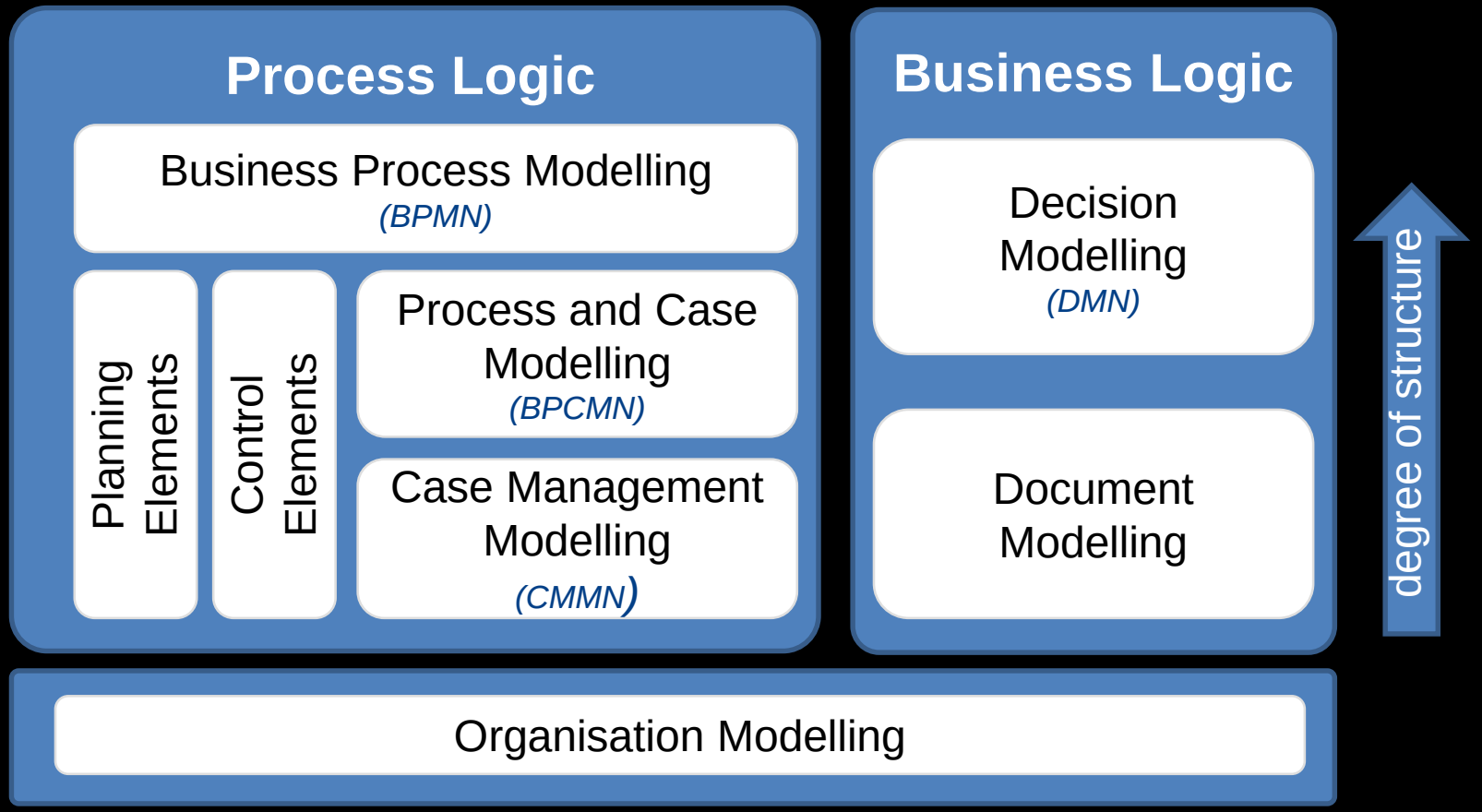






The modeling language was developed in adoxx.org

Model types of the Knowledge Work Designer



- For the latest material see:

http://knut.hinkelmann.ch/lectures/nemo2017/

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