

# 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

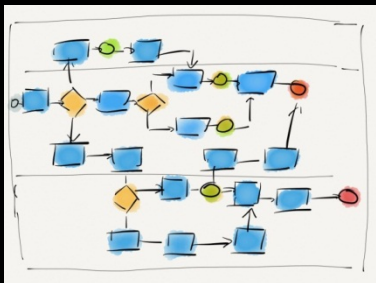


- Head of MSc in Business Information Systems
- Research Associate at University of Pretoria
- Adjunct Professor at University of Camerino
- Topics:
  - ◆ Enterprise Modelling
  - ◆ Business Processes and Knowledge Work
  - ◆ Alignment of Business and IT

# Motivation



Knowledge Work

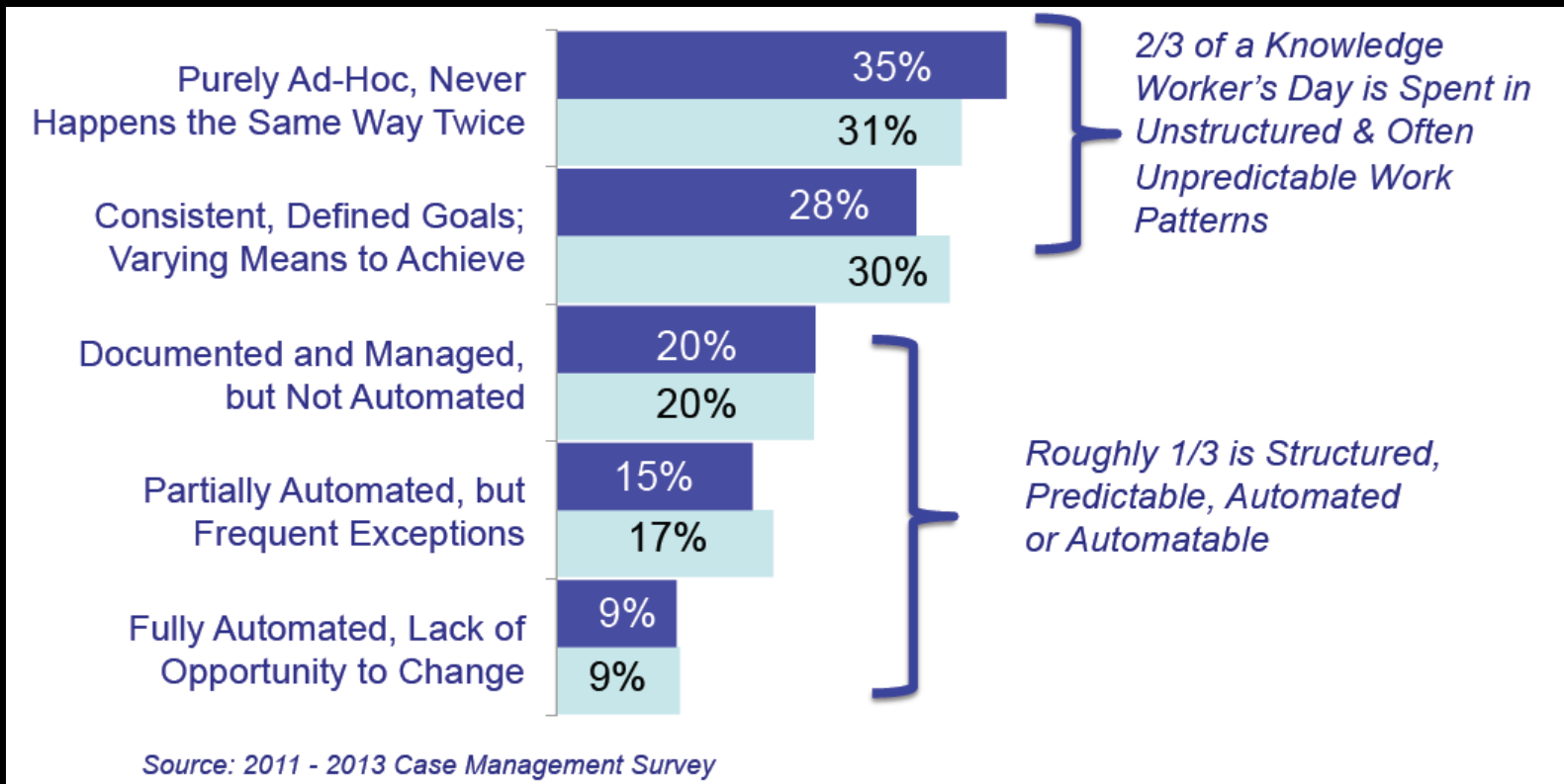


Processes

- 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



# Agility of a Sports Team



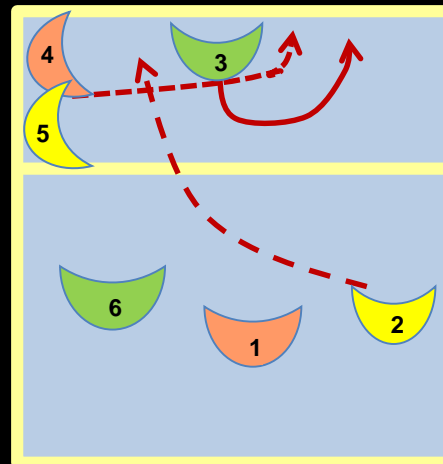
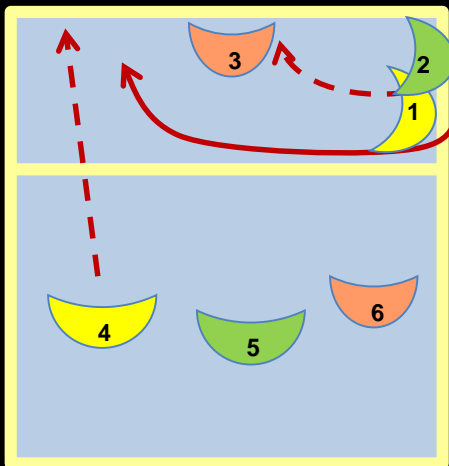
based on an idea from (Cauley 2010)



# Agility in Sports

## Training

- Playbook (moves)
- **Improve** moves
- Train **variants**



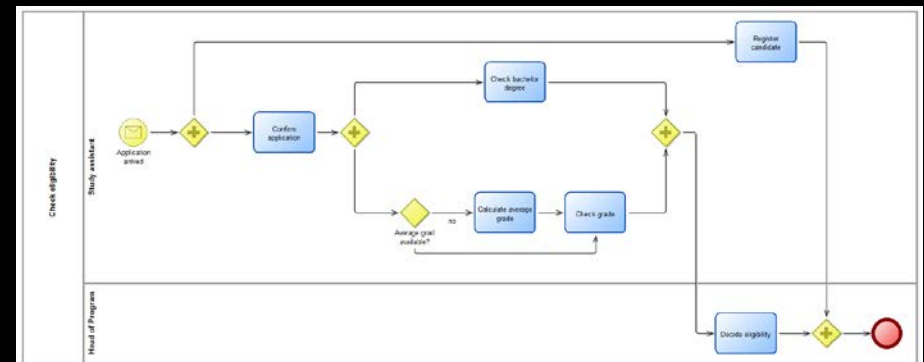
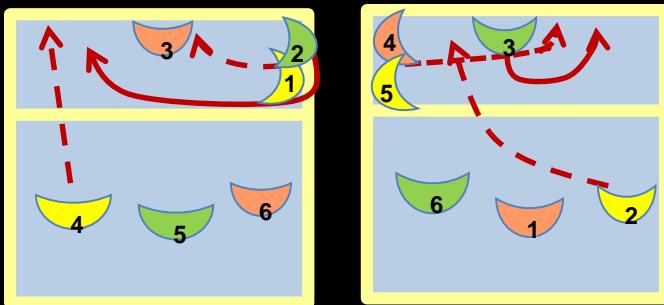
## Match

- Apply the moves
  - ◆ **sense** what is happening
  - ◆ **prioritize** best next action
  - ◆ **act** effectively
- Flexibly **adapt moves** on the fly

based on an idea from (Cauley 2010)

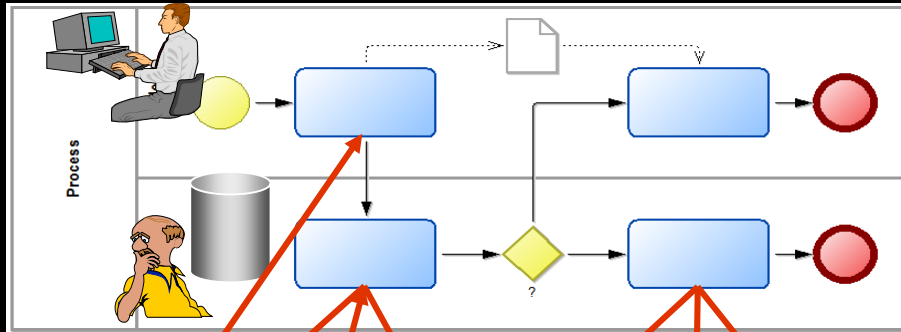
# Analogy: Sports Team

- Playbook/moves = Business Processes
- Improve moves = Process Re-Engineering / Improvement
- Sense/prioritize/act = Decision making
- Flexibly adapt moves = Case Management



# Process Logic and Business Logic

Process Logic

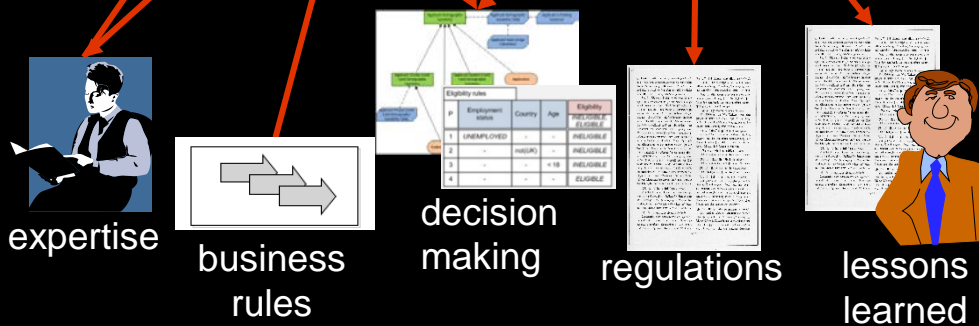


knowledge *about* processes:

- process flow
- roles
- resources

→ process logic

Business Logic



knowledge *in* processes:

- supports practice
- skills, experiences
- know how

→ business logic

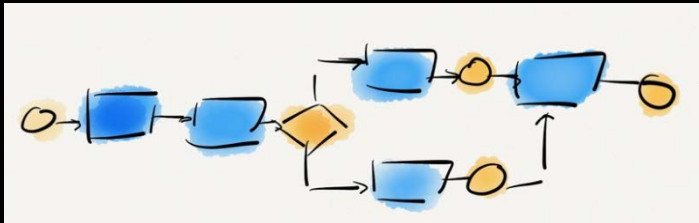


# Modelling Process Logic

## - Structured and Unstructured -

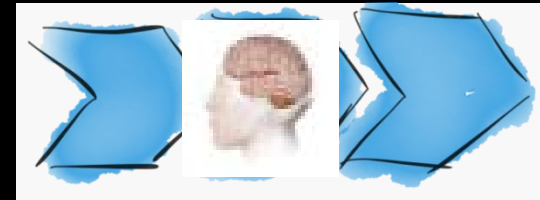
# Structured Processes vs. Adhoc Processes

## Structured Processes



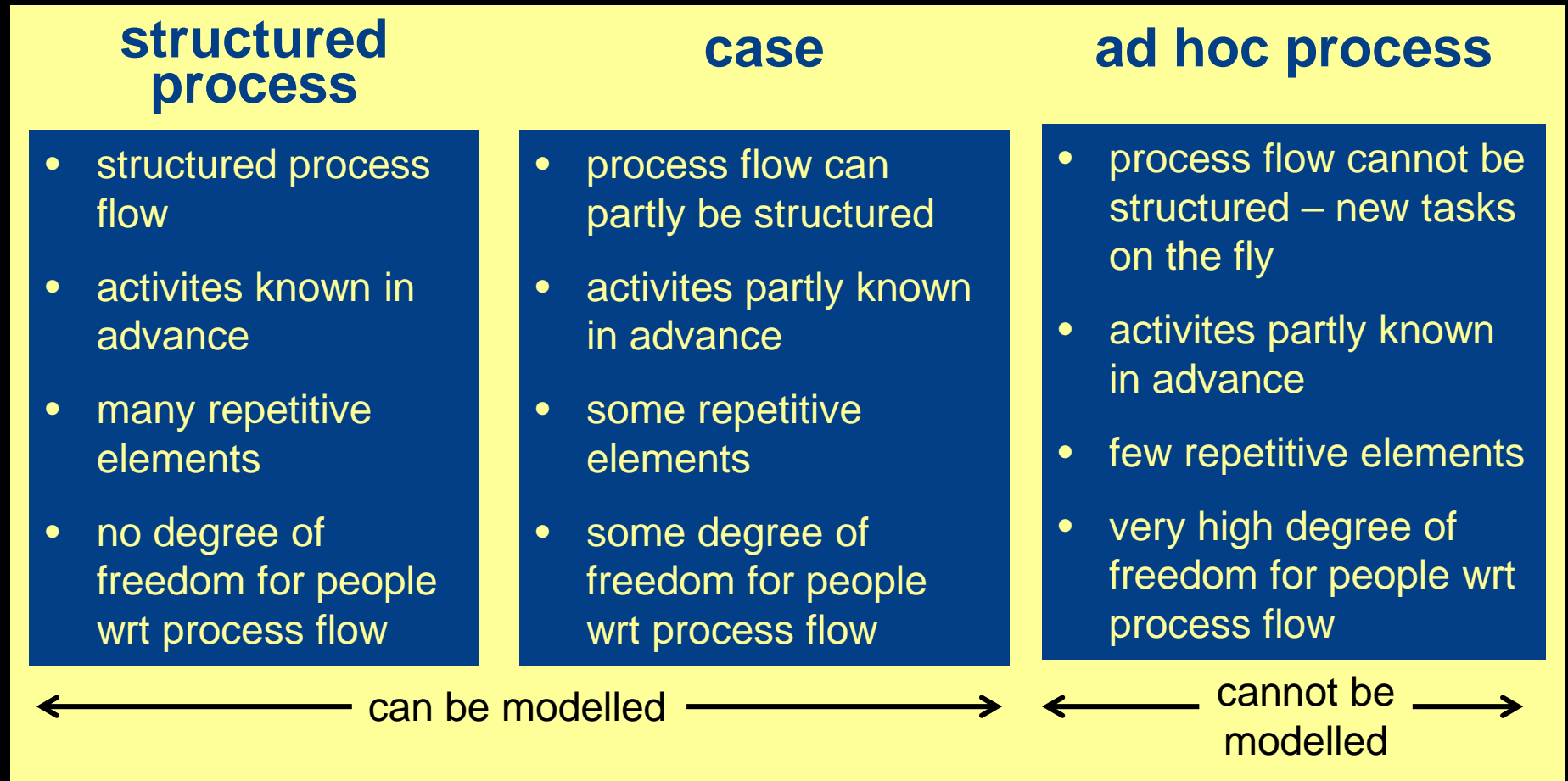
- Characteristics
  - ◆ **Prescribed** process flow
- Typical objectives of BPM
  - ◆ Efficiency, productivity
  - ◆ Traceability,
  - ◆ Uniformity
  - ◆ Automation
- Process flow defined at **design time**

## Adhoc Processes/Projects



- Characteristics
  - ◆ **Ad hoc** process flow
  - ◆ Unforeseeable events
  - ◆ High variability
  - ◆ Complex tasks
- Typical objectives of BPM
  - ◆ Flexibility
  - ◆ Autonomy of the workers
- Tasks and process flow is determined using knowledge at **run time**

# Classification of Processes



partly translated from (Gadatsch 2005, S. 44)



# Case Management

Case management is the management of [...] **processes** that require **coordination of knowledge, content, correspondence, and resources** to achieve an objective or goal. The **path of execution cannot be predefined**. **Human judgment** is required in determining how to proceed, and the state of a case can be affected by **external events**.

(McCauley 2010)

# Case Management Processes: Examples

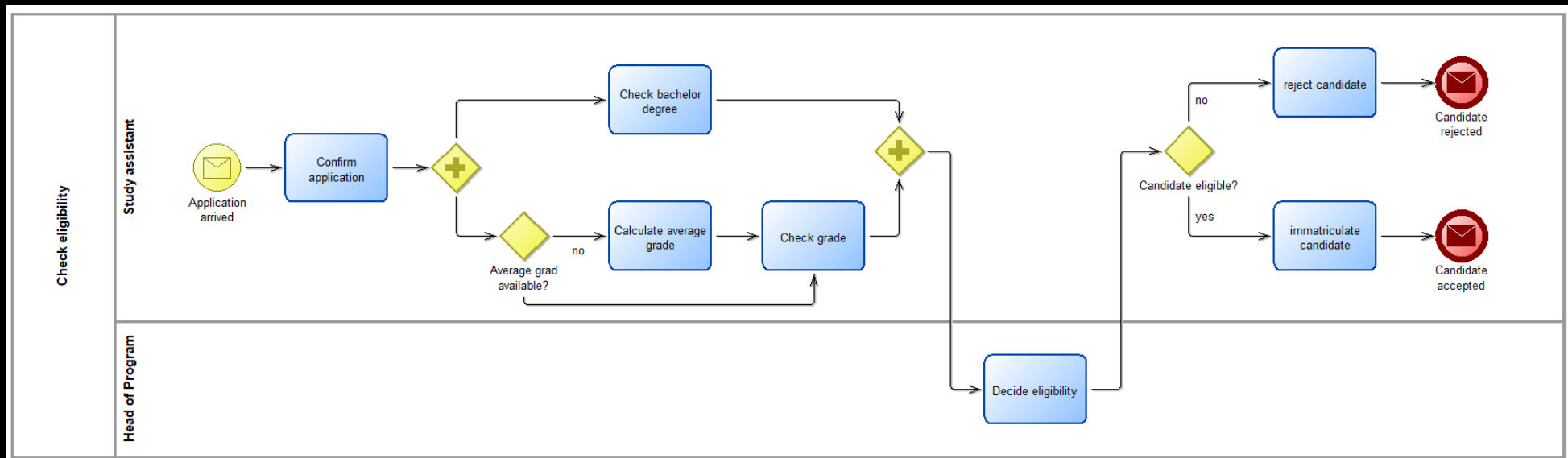
Case management processes: common in many industry segments, where activities and content required depend on the circumstances of each case

- ◆ **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)

# Example: Check Eligibility of MSc Candidates

- *First, the study assistant confirms that the application has arrived.*
- *The study assistant checks whether the bachelor degree is valid.*
- *He/she checks whether the average grade is at least “good”. If the average grade is not in the transcript, it is calculated.*
- *The head of program decides, whether the candidate is eligible.*
- *Depending on the decision, the candidate is rejected or immatriculated.*



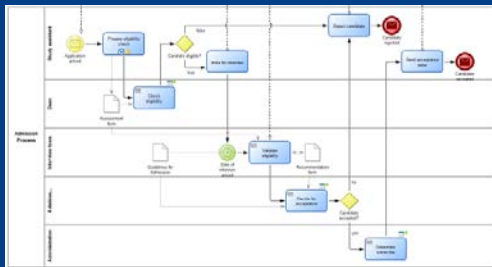
# Adding Unstructured Parts

- *While checking the bachelor degree:  
The If the degree is unknown to the study assistant, she **can** look in a degree database or ask public authorities.*
- *The study assistant can discuss with HoP at any time*
- The execution of these tasks depends on experience, preference or judgment of human worker

# Modelling Standards from BPMN

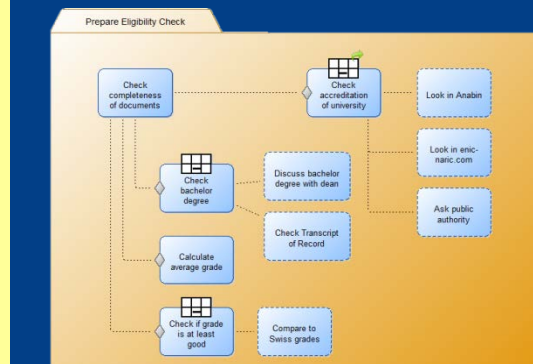
## structured process

### BPMN



## case

### CMMN



## ad hoc process

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

← can be modelled →

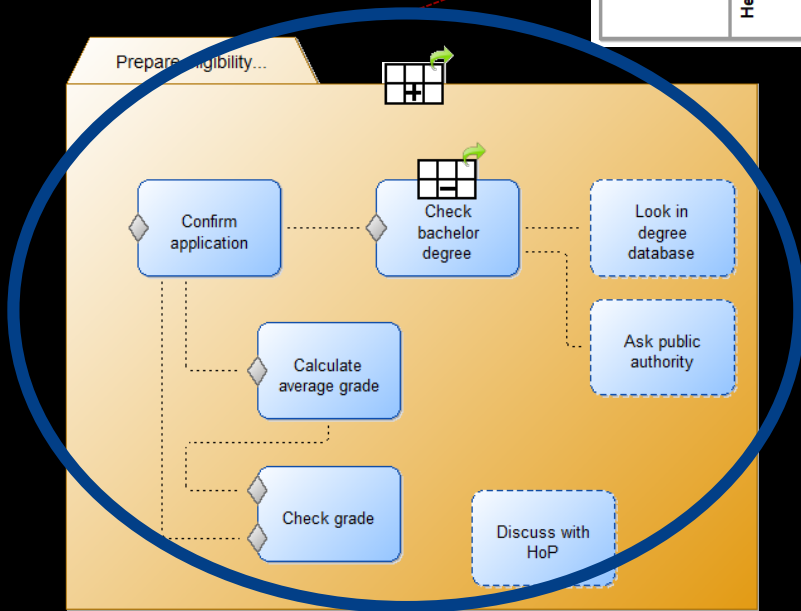
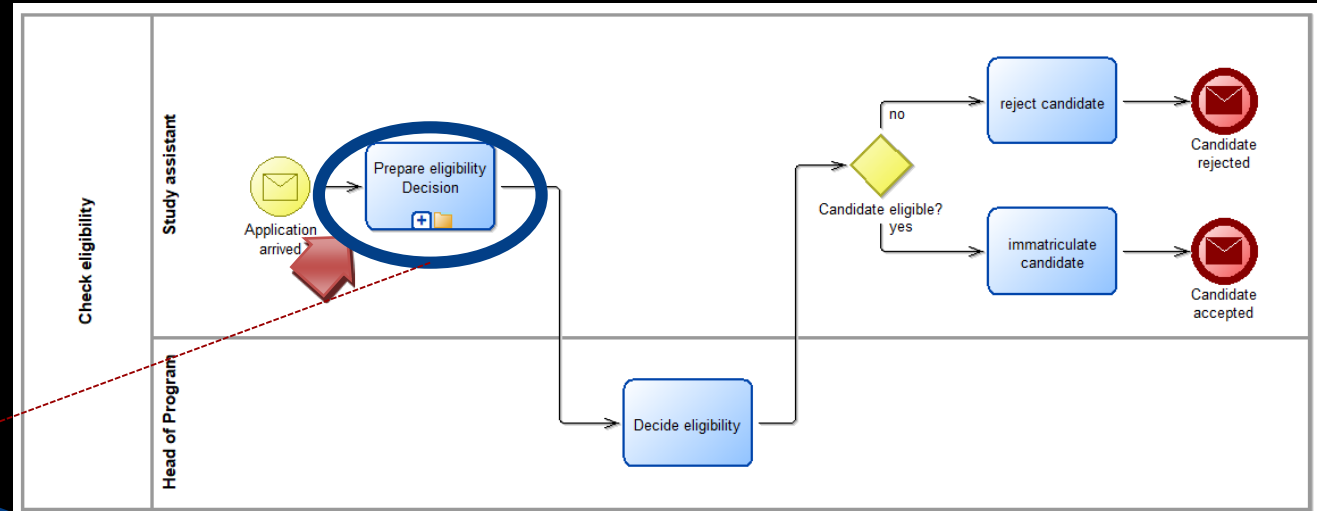
← cannot be modelled →

partly translated from (Gadatsch 2005, S. 44)





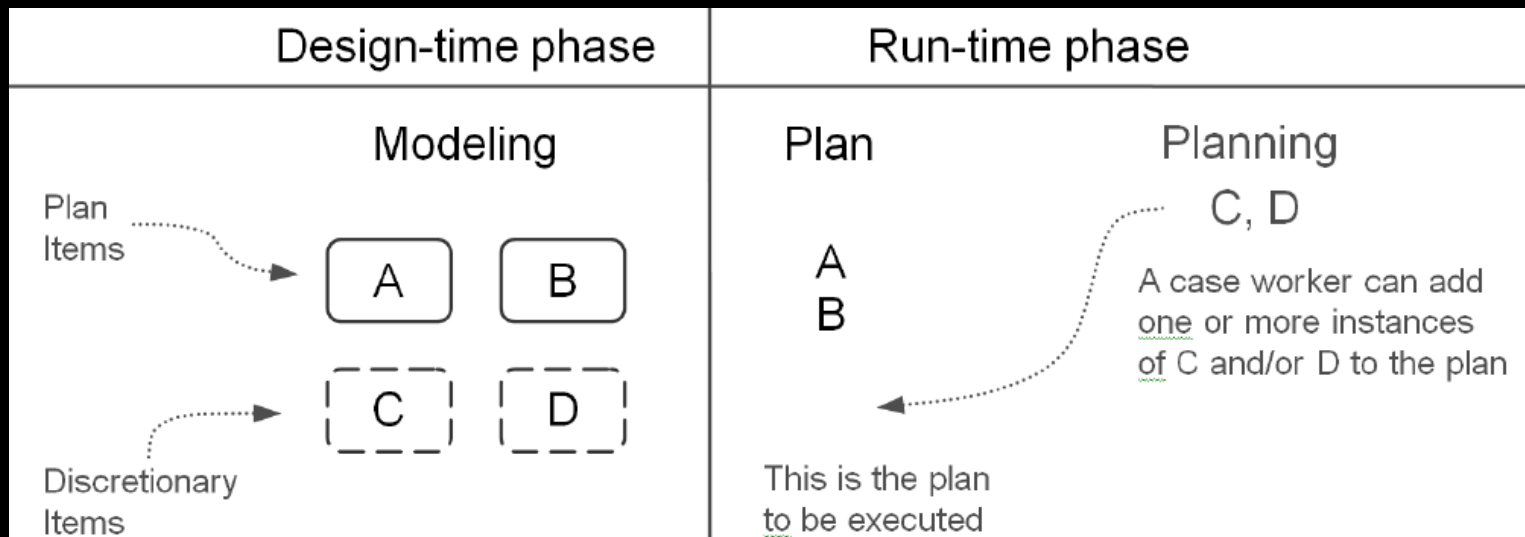
# Solution Using OMG Standards



- *While checking the bachelor degree:  
The If the degree is unknown to the study assistant, she **can** look in a degree database or ask public authorities.*
- *The study assistant can discuss with HoP at any time*

# Design Time vs Run Time = Modeling vs Planning

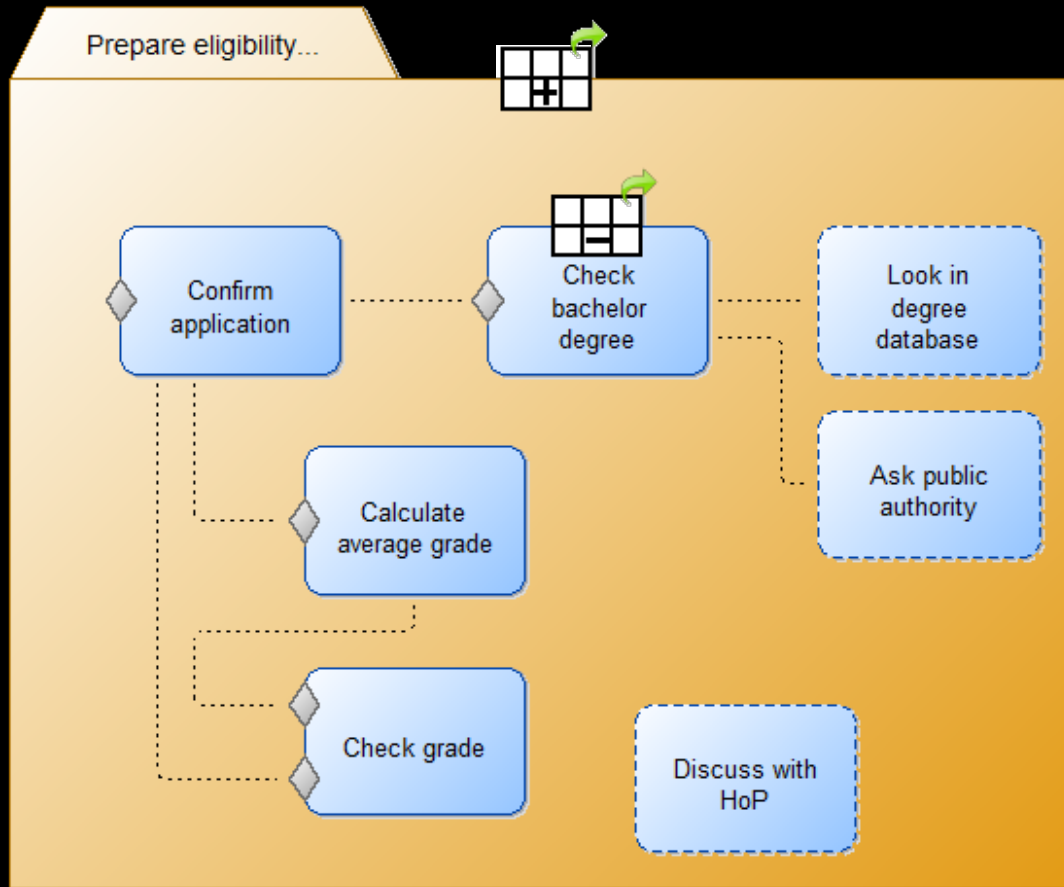
- A Case has two distinct phases: design-time and run-time
  - ◆ **Design-time: Business analysts** define
    - Tasks of pre-defined segments
    - “discretionary” Tasks that are additionally available to the Case worker
  - ◆ **Run-time: Case workers** execute the plan
    - performing Tasks based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



(CMMN 1.0, p. 5f)

# CMMN Case Plan Modelling in the Knowledge Work Designer

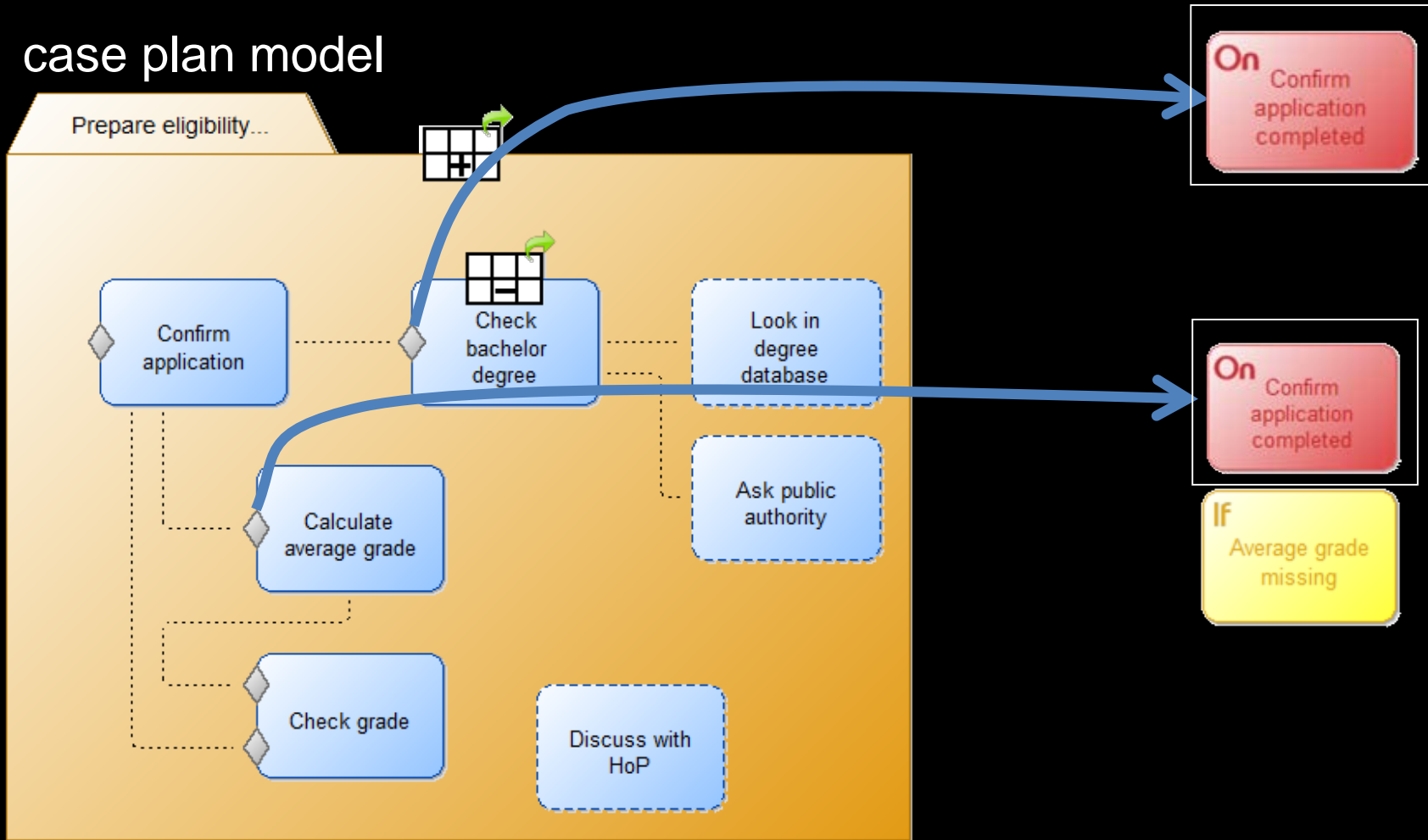
case plan model



# CMMN Case Plan Modelling in the Knowledge Work Designer

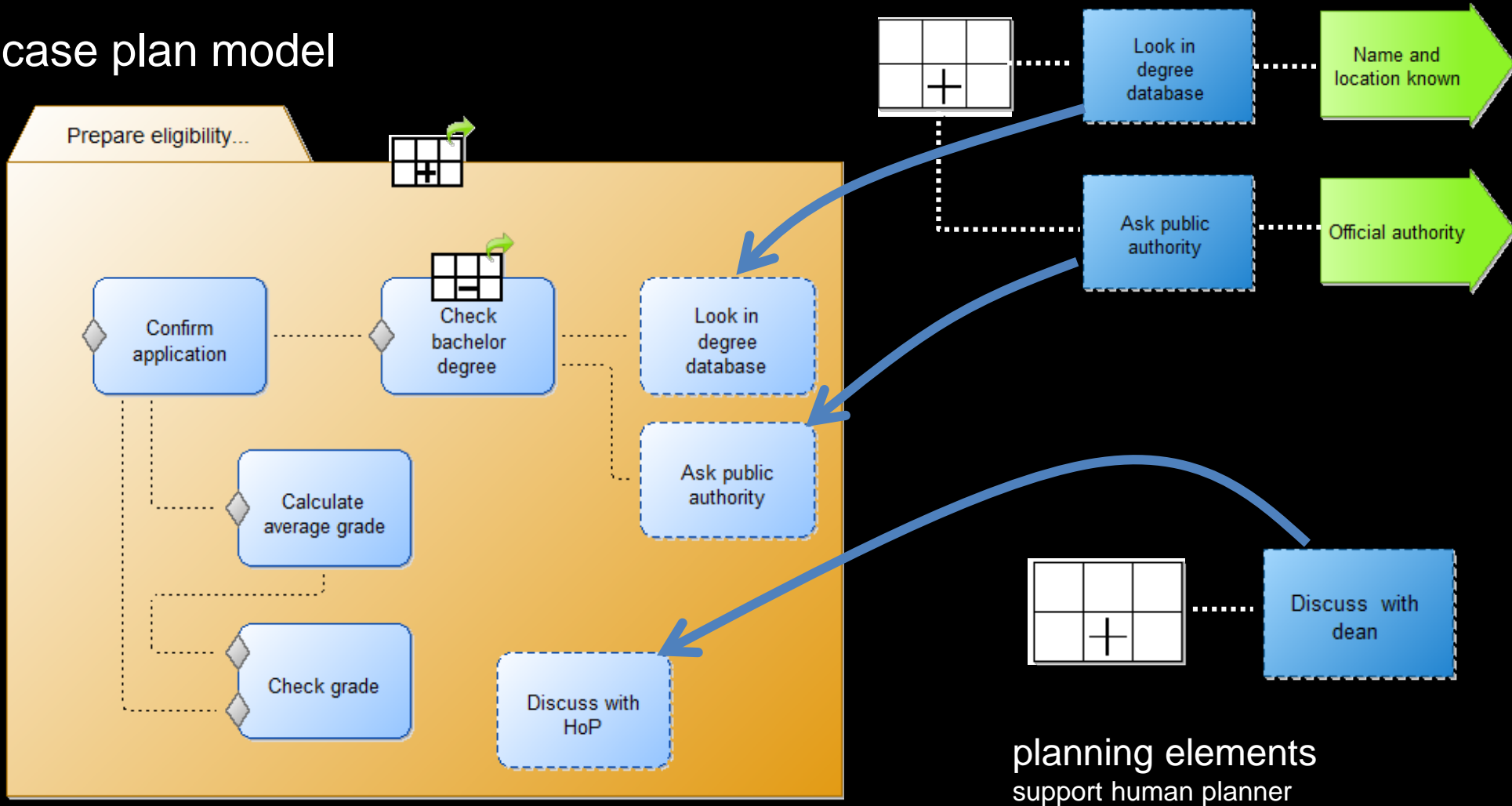
control elements:  
determine task execution

case plan model



# CMMN Case Plan Modelling in the Knowledge Work Designer

case plan model



planning elements  
support human planner

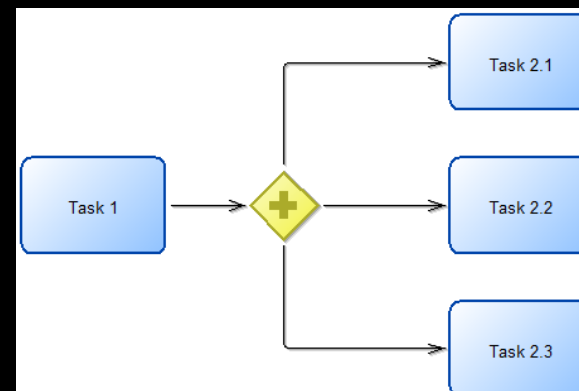
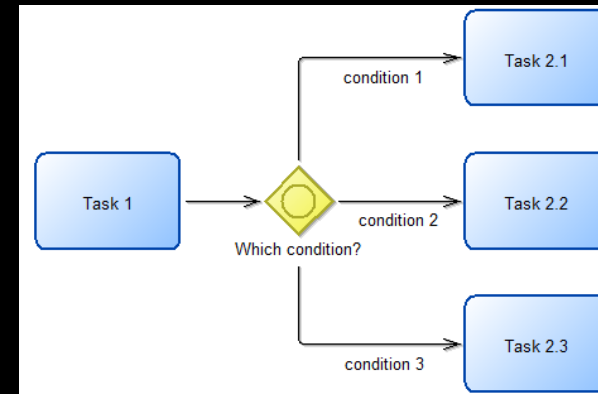
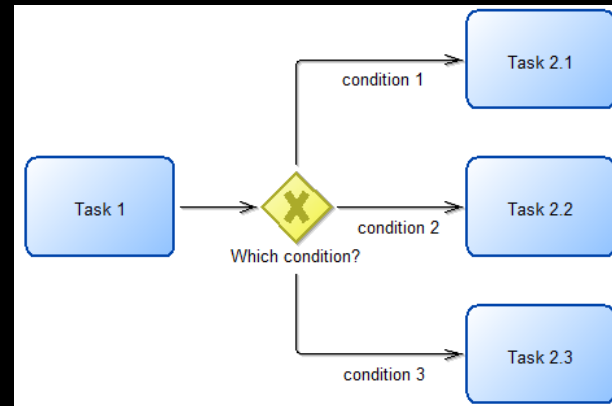
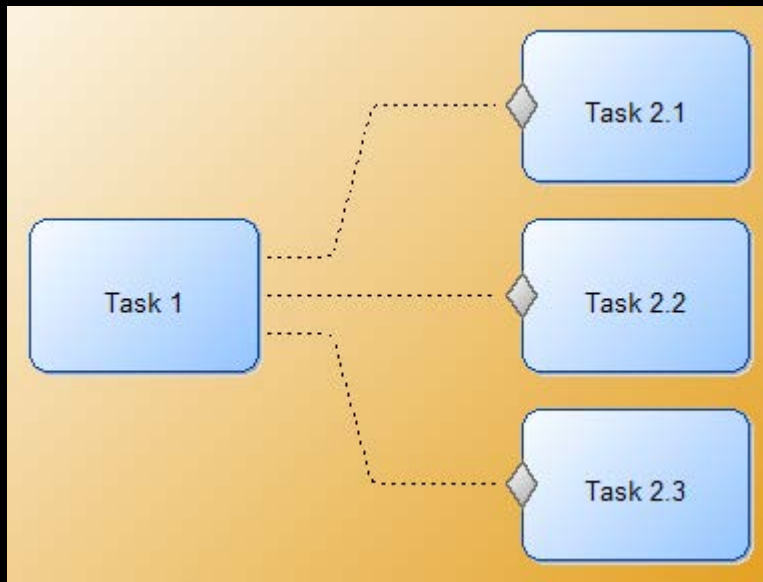


## Issues

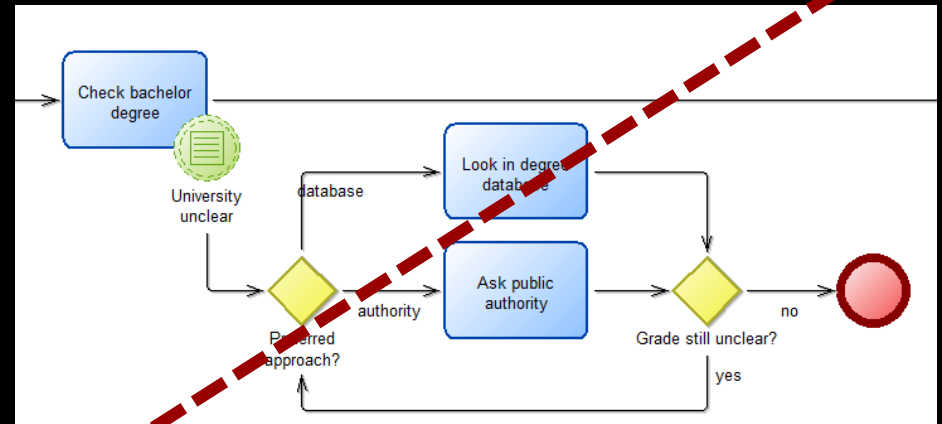
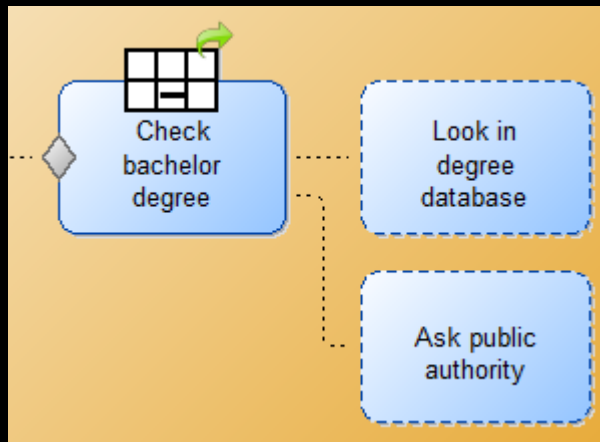
- Can we strictly separate case from process?
- Can we decide in advance which model type is appropriate?
- Is there no process flow in cases?

# Explicit Control Flow in BPMN

What does it mean?



# Discretionary Tasks



not adequate



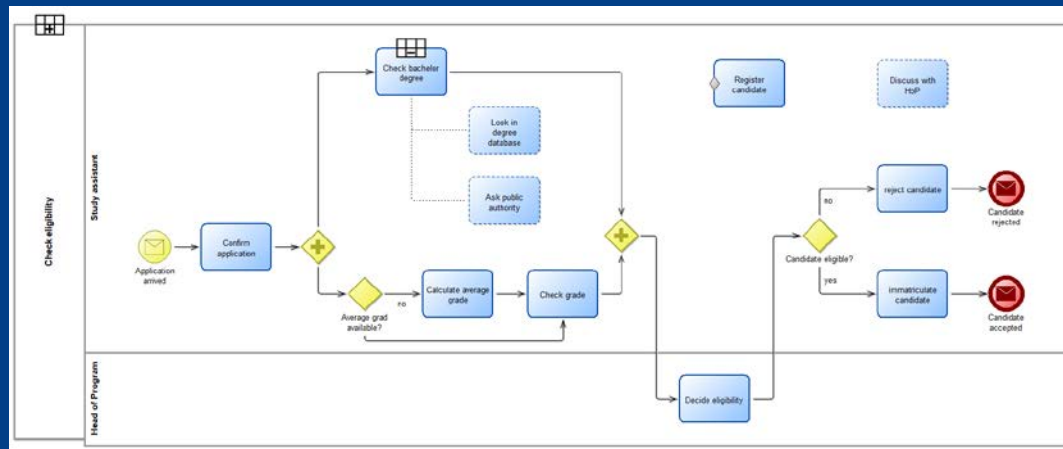
# BPCMN: Integrating Business Process and Case Management

structured  
process

case

ad hoc process

## BPCMN



can be modelled

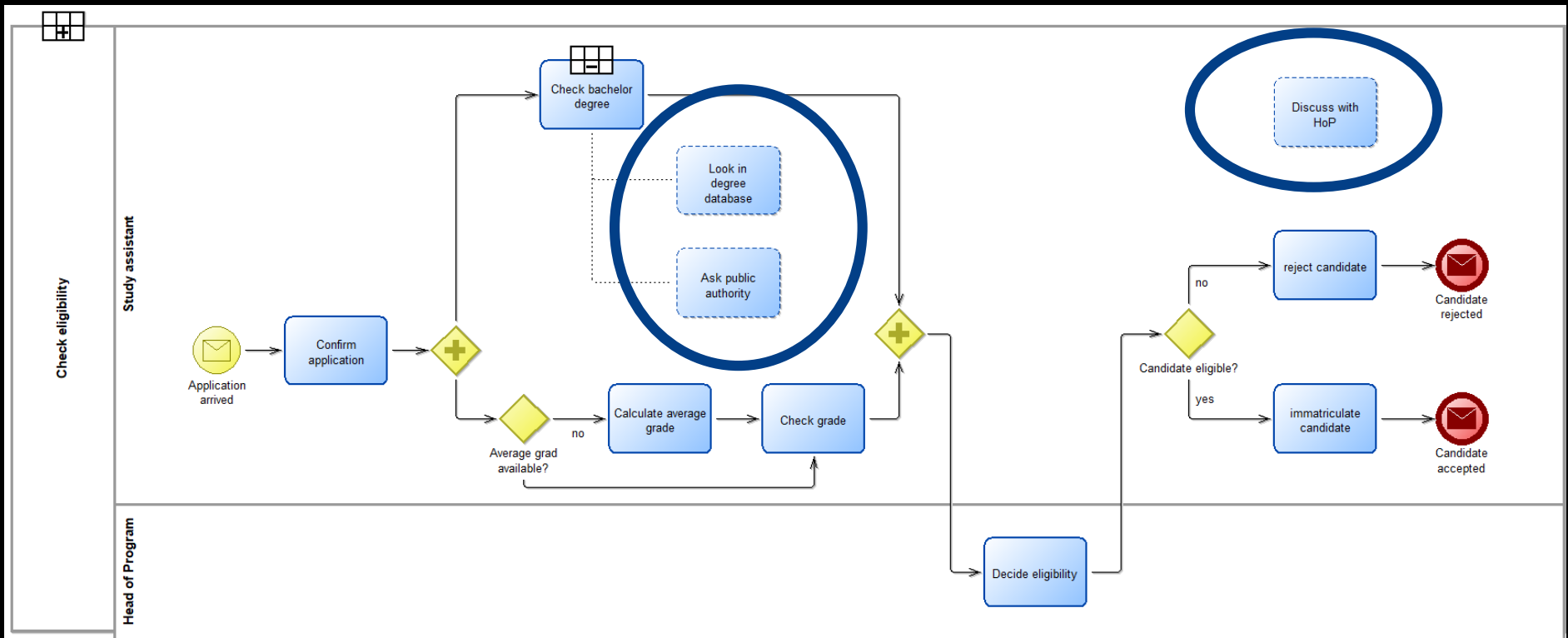
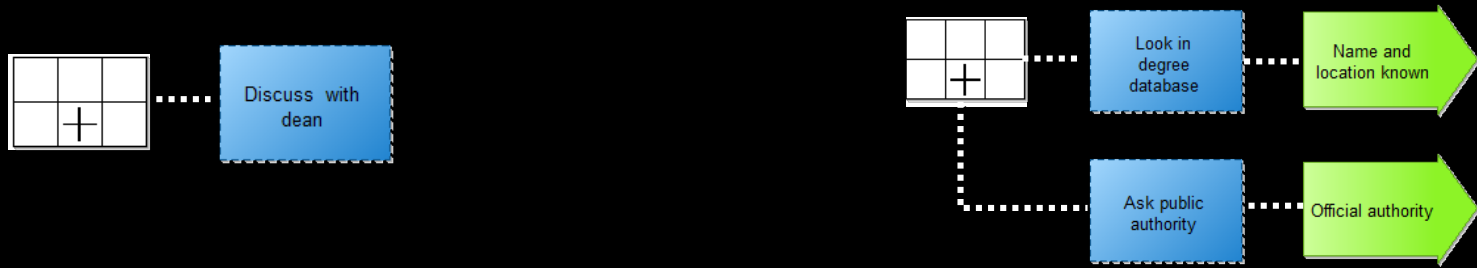
cannot be  
modelled

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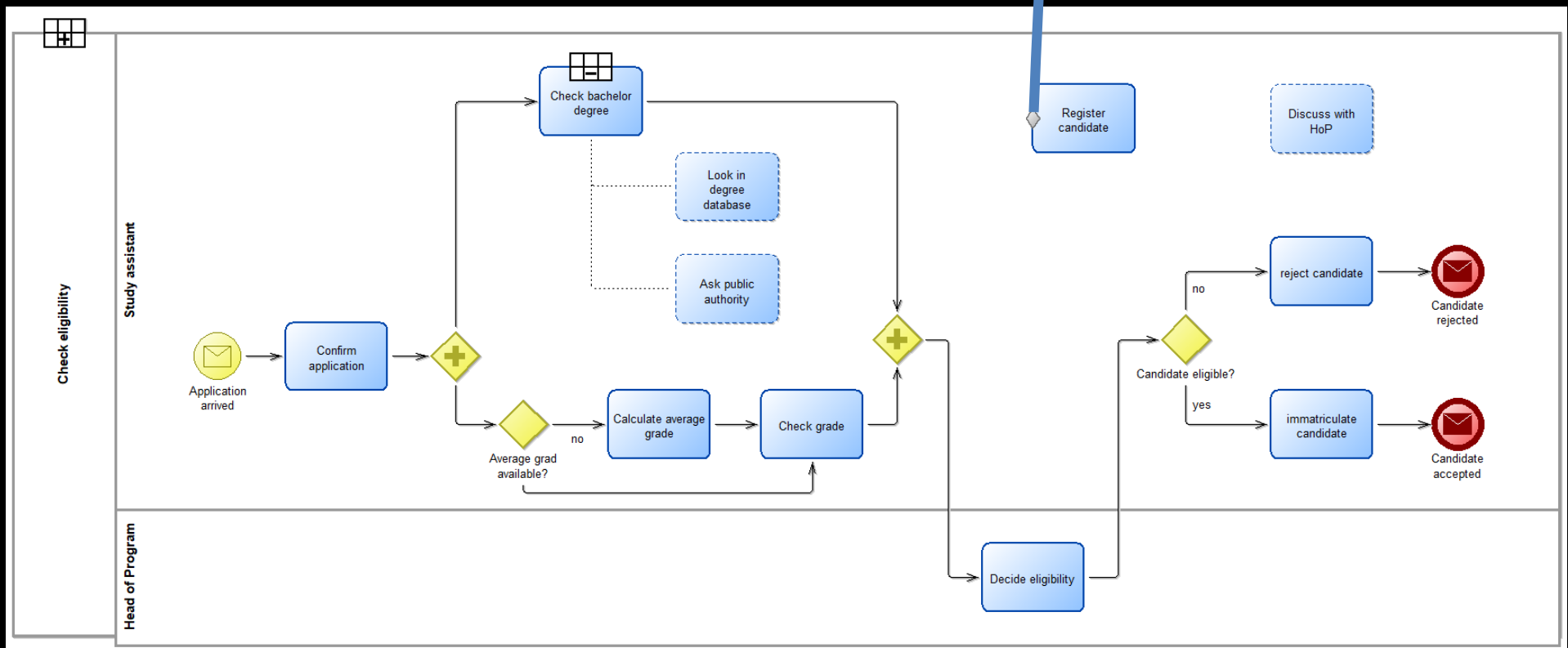


# BPCMN: Adding Discretionary Tasks to BPMN



# BPCMN: Adding Event-Conditions to Tasks

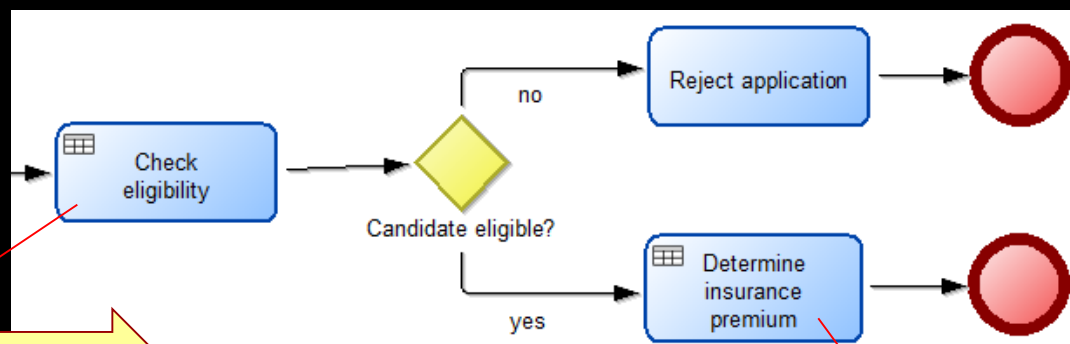
- The study assistant has to register the student, after the application is confirmed and when the information is complete.



# 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

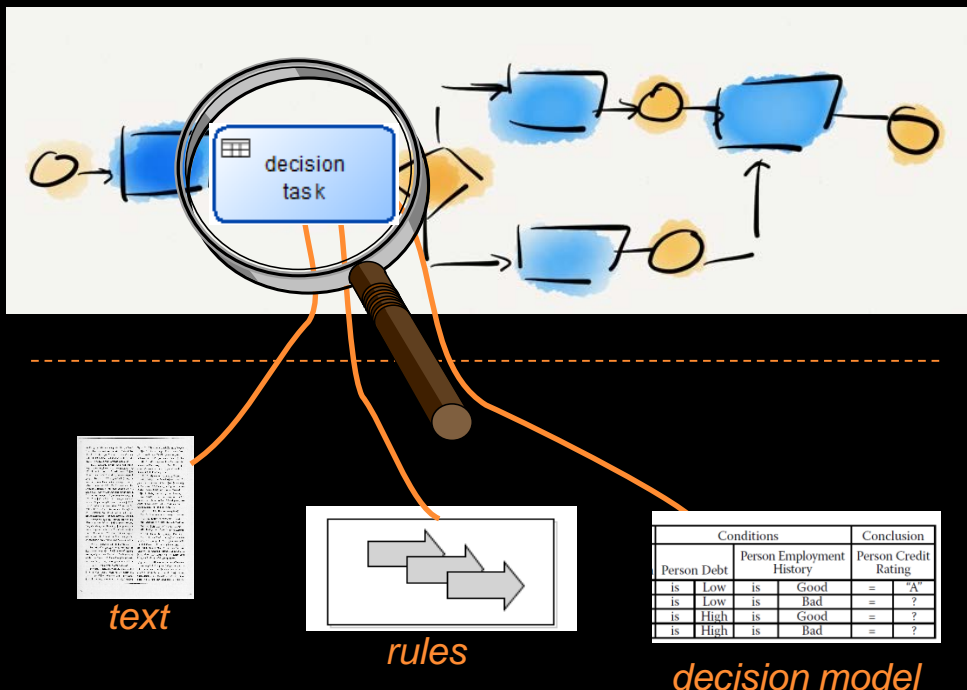


Decision: Is the applicant eligible?

Decision: what is the amount of the insurance premium in this case?

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

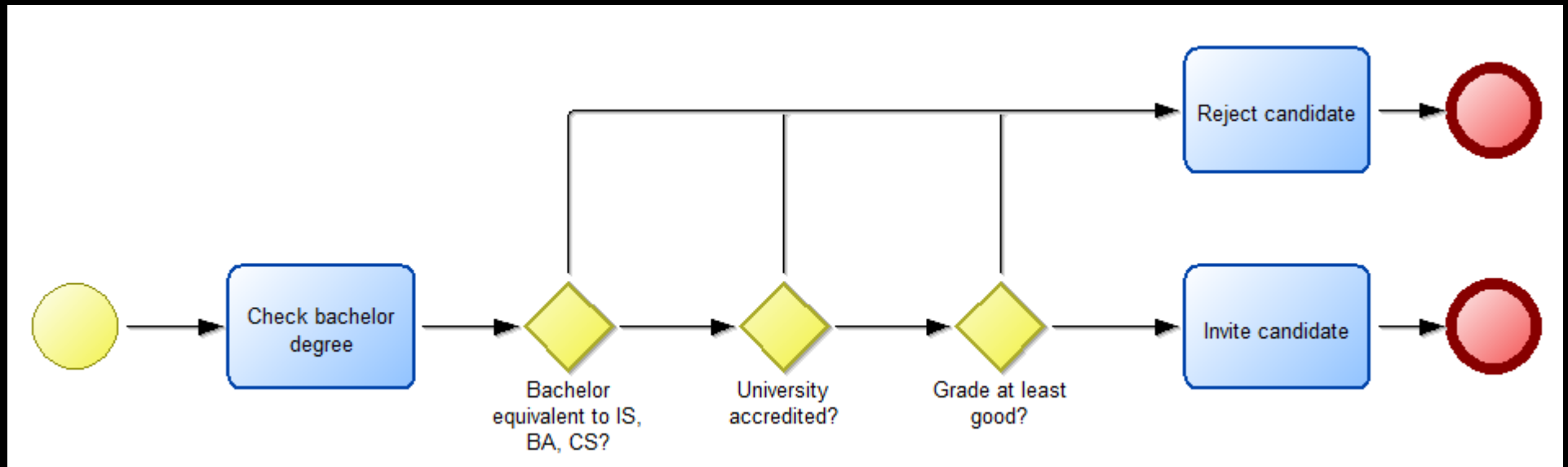
## Process Logic



- Decision task is part of the process logic → **procedural**
- Decision logic modeled separately → **declarative**

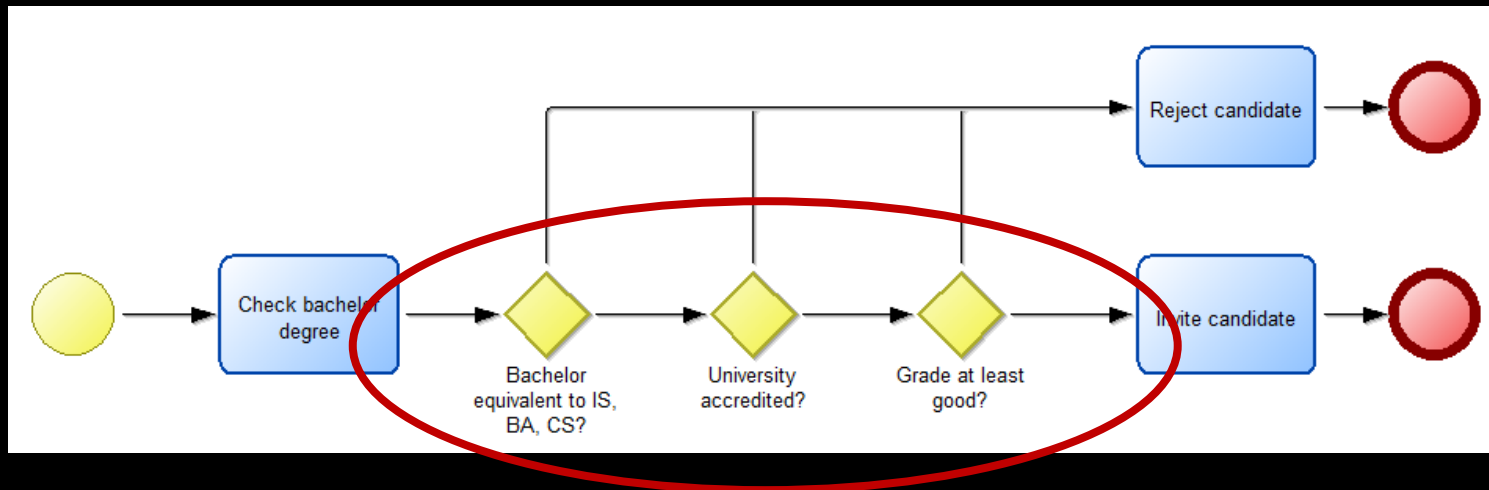
## Business Logic / Decision Logic

## Example: Decisions in Processes (1)



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

## Example: Decisions in Processes (2)

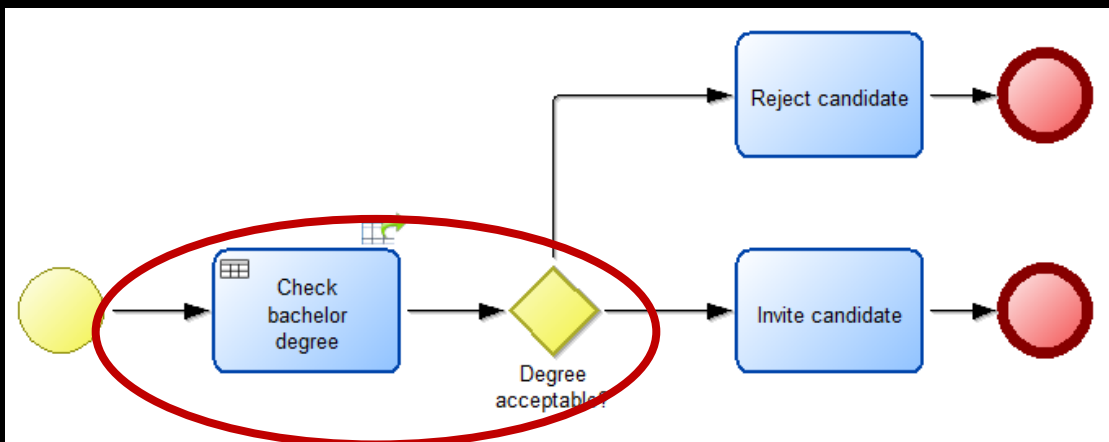


- This process only contains **one** decision wrt. process logic:
  - ◆ Execute «Reject candidate» or execute «Invite candidate»
- Gateways represent decision criteria – not the decision itself
- Decision criteria are decision logic and not process process logic
  - ◆ Change in the criteria should not affect the process model.
  - ◆ The order of the criteria is not compulsory. There is an unnecessary sequentialisation.

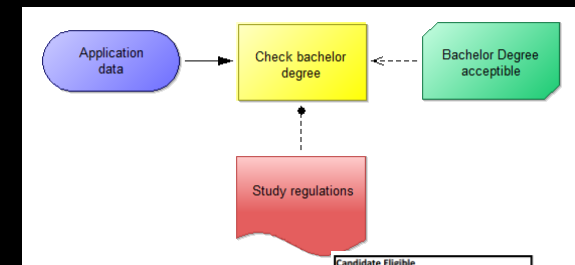


# Example: Decisions in Processes (3)

Process logic:



Business logic:



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

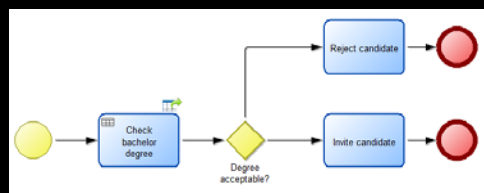
FC	Bachelor Degree in	Bachelor Degree
1	Information Systems, Business Administration, Information Technology, other, none	yes, no
2	Information Systems	yes
3	Business Administration	yes
4	Information Technology	yes
5	other	yes
5	none	no

■ This model is more appropriate

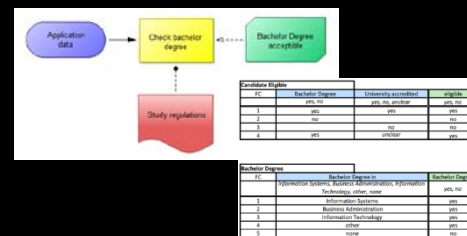
- ◆ Process is simplified
- ◆ Decision logic is modeled separately
- ◆ Change of decision logic does not affect process model

# Advantages of separating Decision Logic from Business Process Model

- Allows a much simpler business process model
- Makes changes to process logic and decision logic easier
- Makes governance of business processes easier to manage
- Decision Models can be reused in several processes



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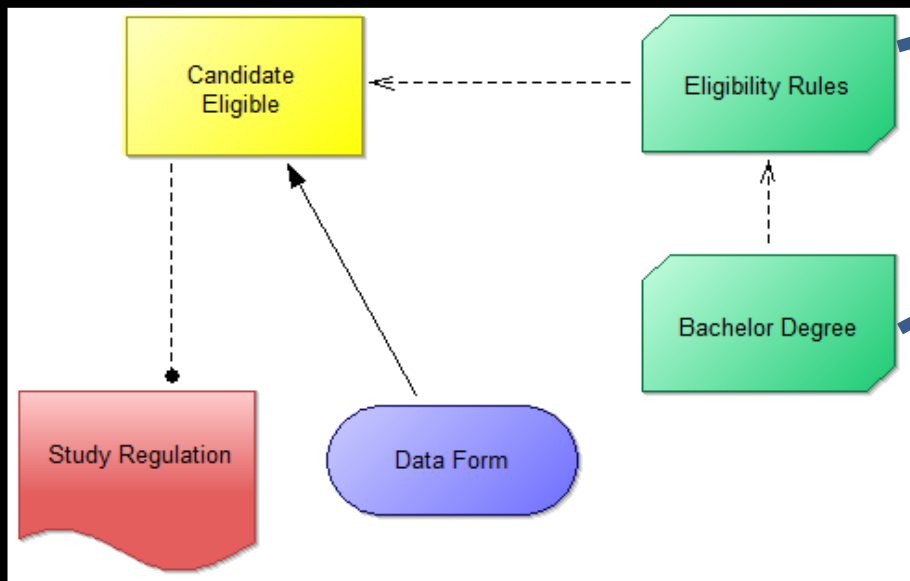


# Modelling Decision Logic

## - Structured and Unstructured -

# DMN - Decision Model and Notation

## Decision Requirements Diagram



## Decision Tables

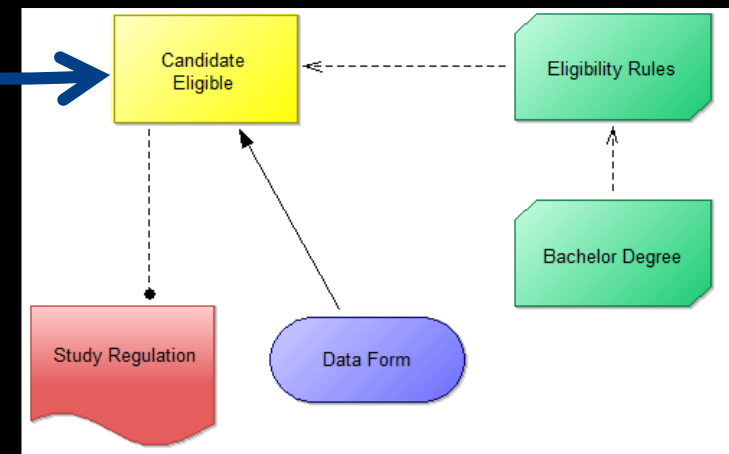
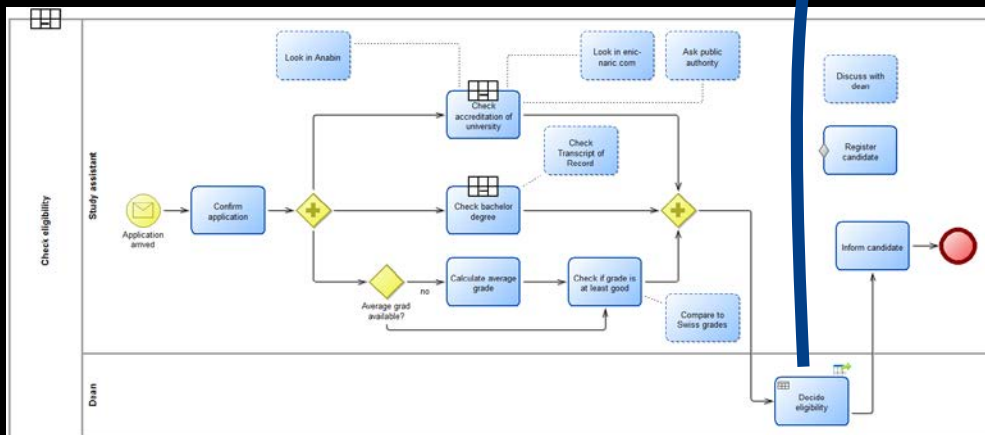
Candidate Eligible			
FC	Bachelor Degree	University accredited	eligible
	<i>yes, no</i>	<i>yes, no, unclear</i>	<i>yes, no</i>
1	yes	yes	yes
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3		no	no
4	yes	unclear	yes

Bachelor Degree		
FC	Bachelor Degree in	Bachelor Degree
	<i>Information Systems, Business Administration, Information Technology, other, none</i>	<i>yes, no</i>
1	Information Systems	yes
2	Business Administration	yes
3	Information Technology	yes
4	other	yes
5	none	no

# References to Decision Models

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



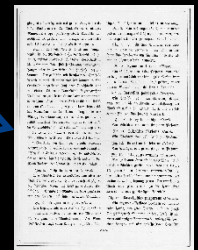
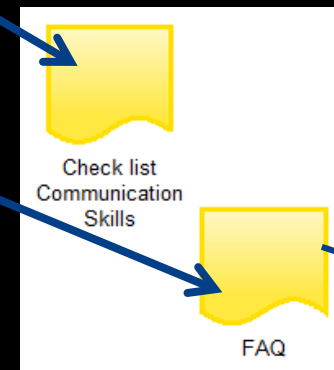
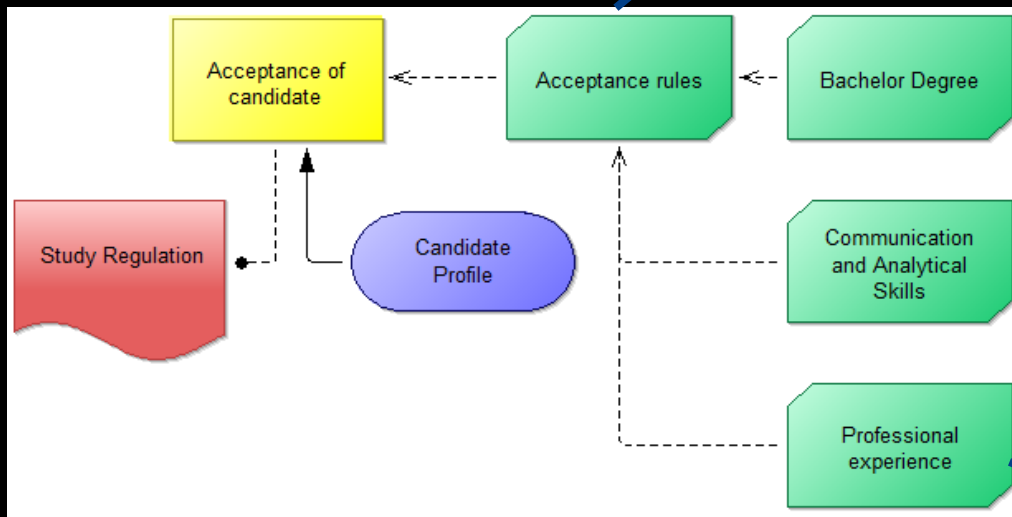
# Decisions requiring Human Judgment

- 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

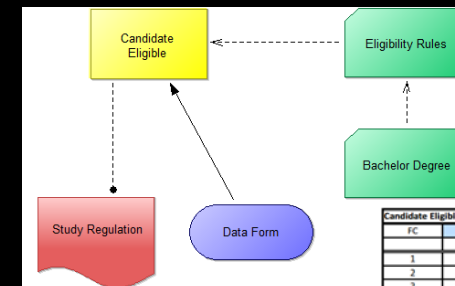
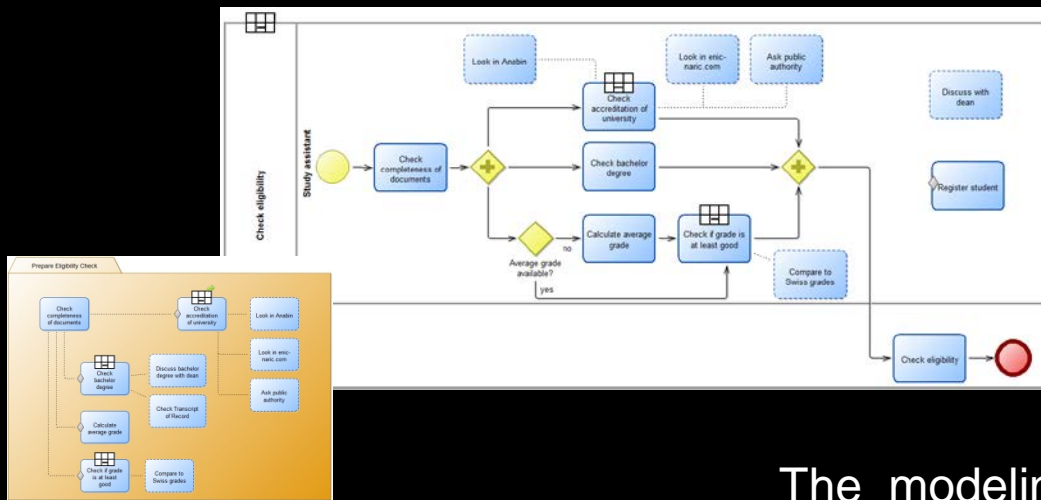
Bachelor Degree		
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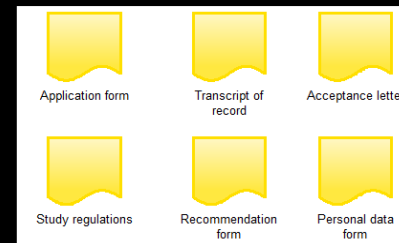
# Conclusion

- Modeling of Knowledge Work includes
  - ◆ process logic and business Logic
  - ◆ on different degrees of structure in an integrated environment



Candidate Eligible			
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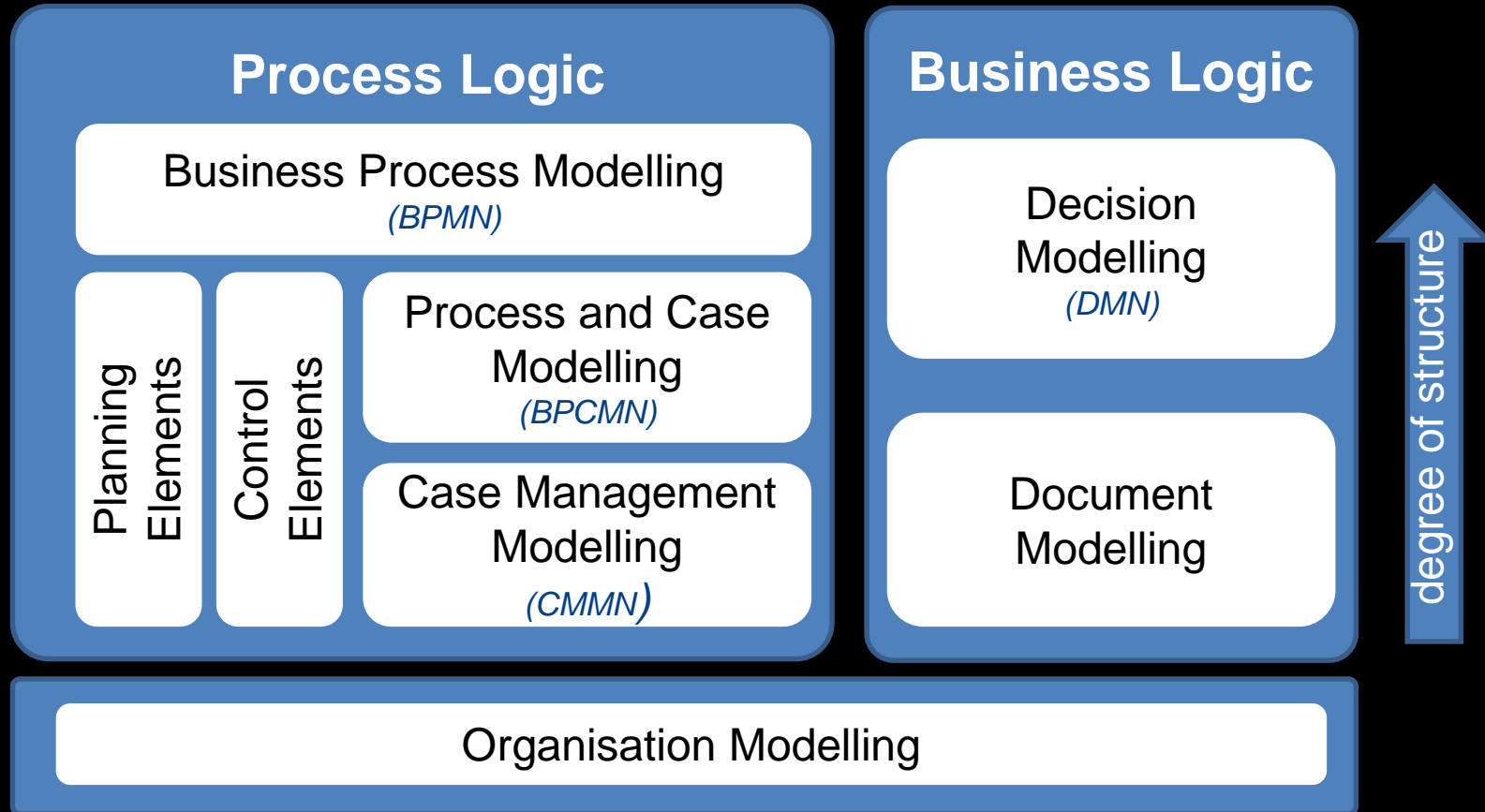


The modeling language was developed in adox.org





# Model types of the Knowledge Work Designer




- For the latest material see:

<http://knut.hinkelmann.ch/lectures/nemo2018/>



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