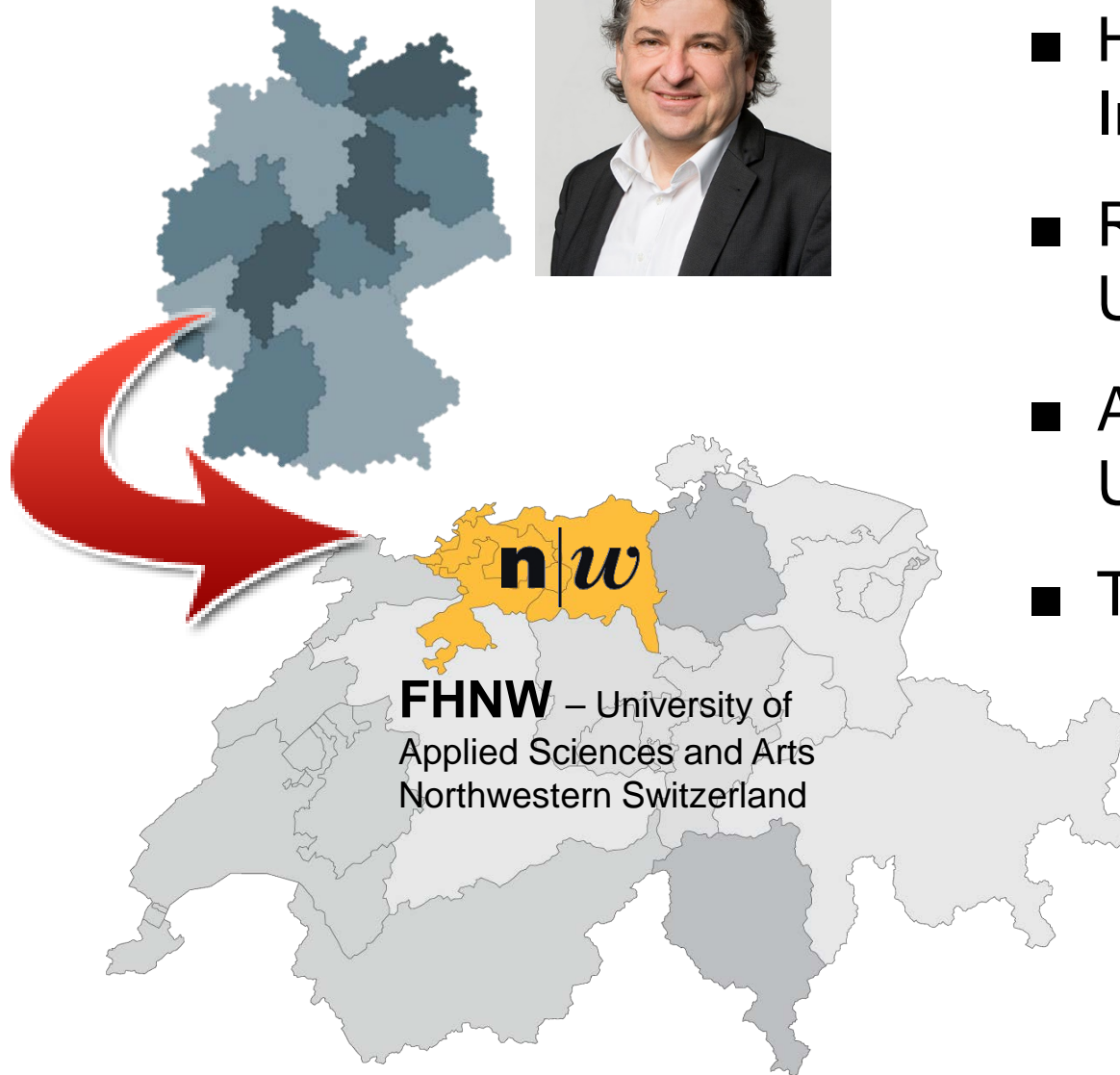# *Modeling Knowledge Work: Case Management and Decision-aware Business Processes*

Knut Hinkelmann

FHNW University of Applied Sciences and Arts Northwestern Switzerland
knut.hinkelmann@fhnw.ch

About Me

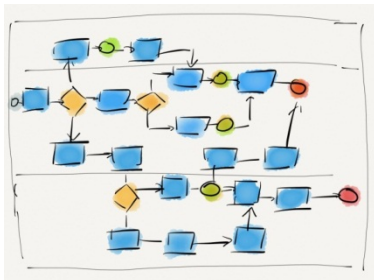**FHNW** – University of Applied Sciences and Arts Northwestern Switzerland

- 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
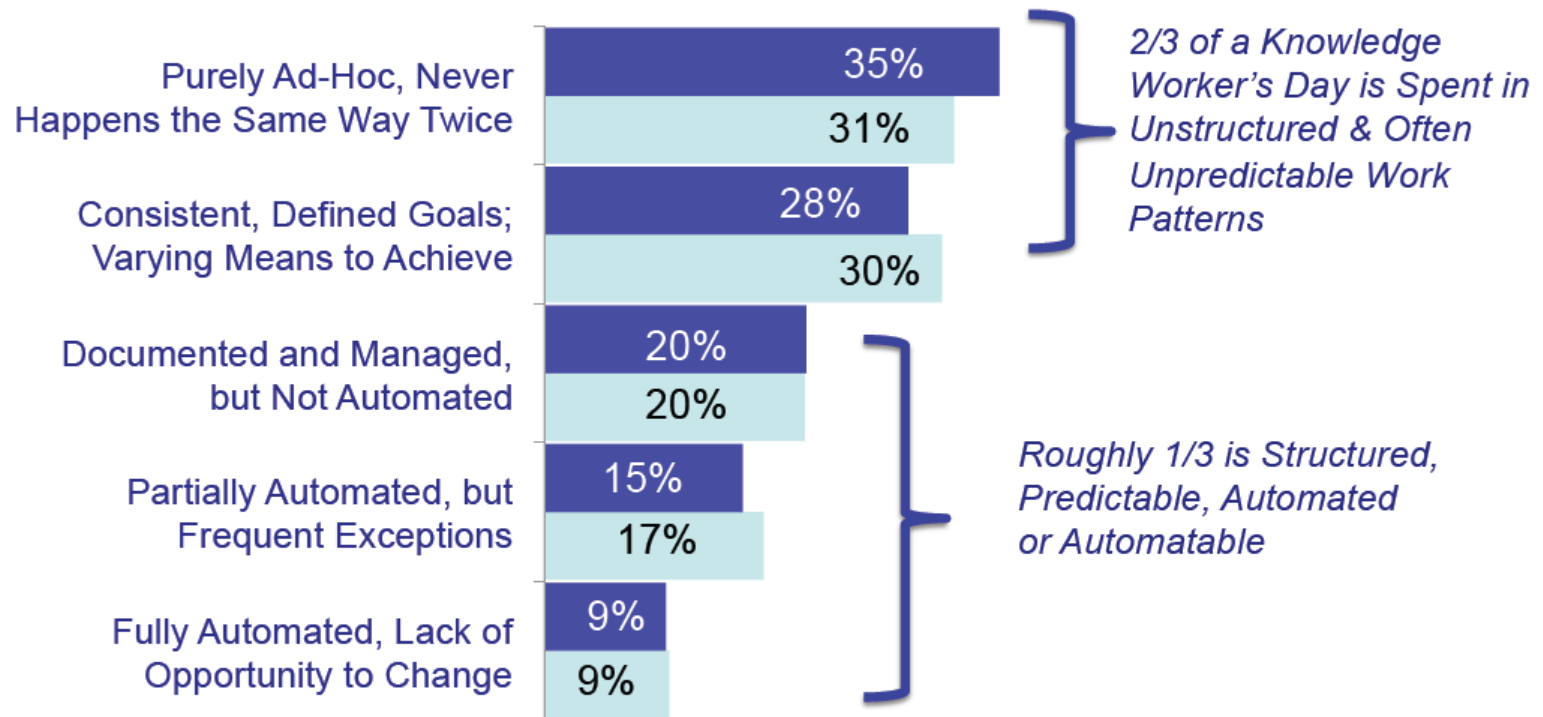
Motivation

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

Purely Ad-Hoc, Never Happens the Same Way Twice — 35% / 31%

Consistent, Defined Goals; Varying Means to Achieve — 28% / 30%

Documented and Managed, but Not Automated — 20% / 20%

Partially Automated, but Frequent Exceptions — 15% / 17%

Fully Automated, Lack of Opportunity to Change — 9% / 9%

2/3 of a Knowledge Worker's Day is Spent in Unstructured & Often Unpredictable Work Patterns

Roughly 1/3 is Structured, Predictable, Automated or Automatable

Source: 2011 - 2013 Case Management Survey
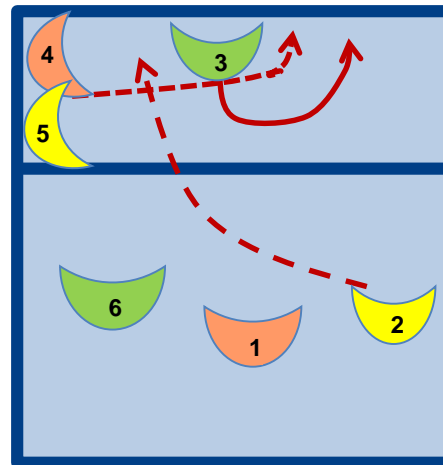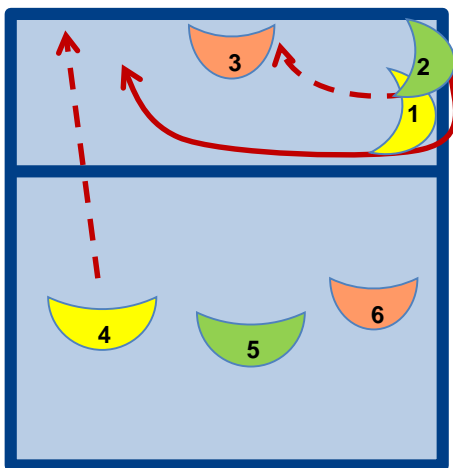
Agility of a Sports Team

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)
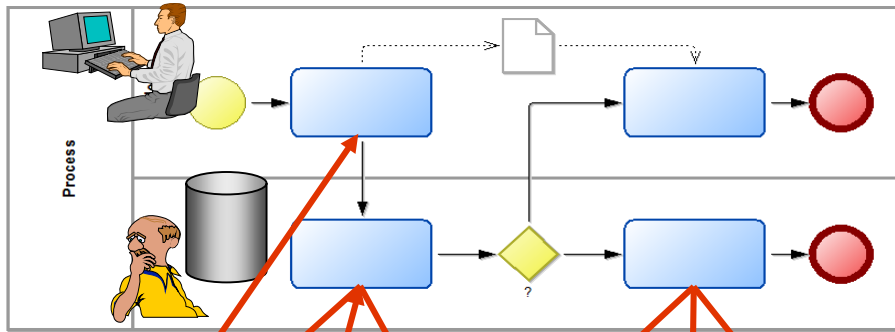
Analogy: Sports Team

- Playbook/moves = Business Processes

- Improve moves = Process Re-Enginnering / Improvement

- Sense/prioritize/act = Decision making

- Flexibly adapt moves = Case Management
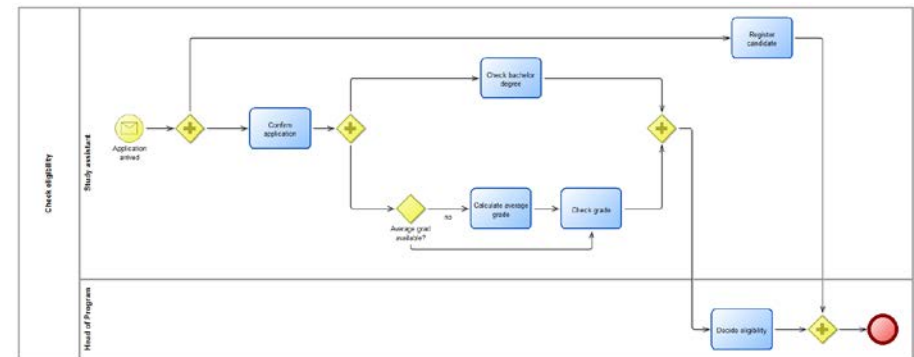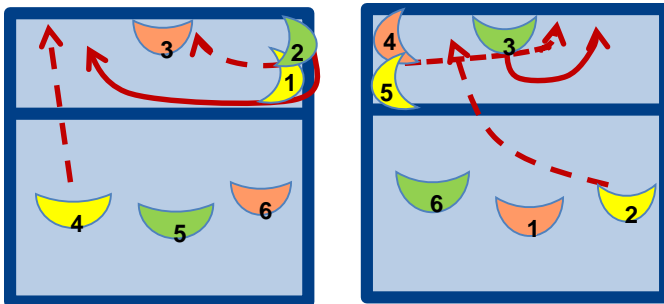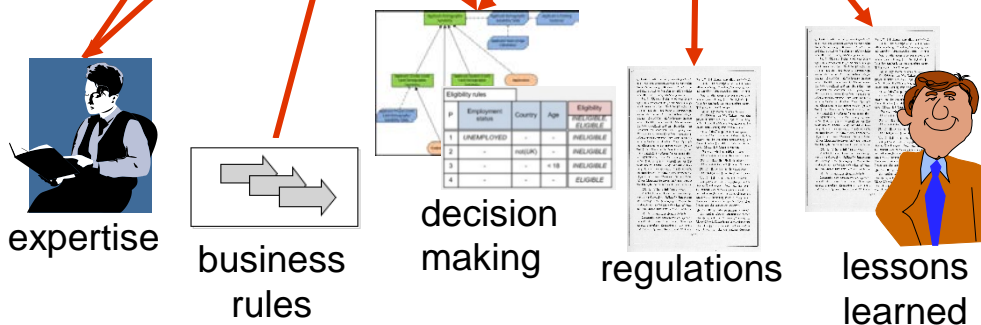
Process Logic and Business Logic

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
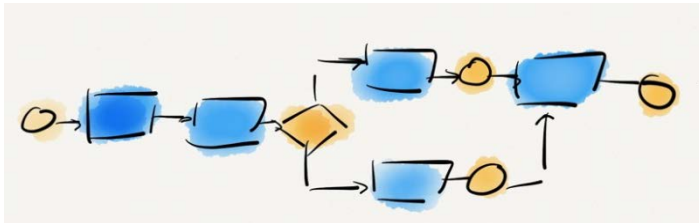- know how

→ **business logic**

Modelling Process Logic
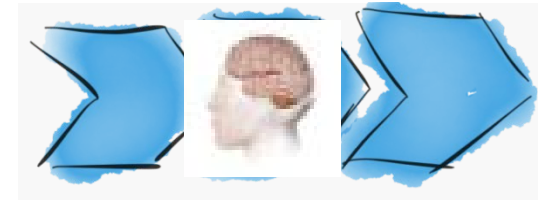## - Structured and Unstructured -

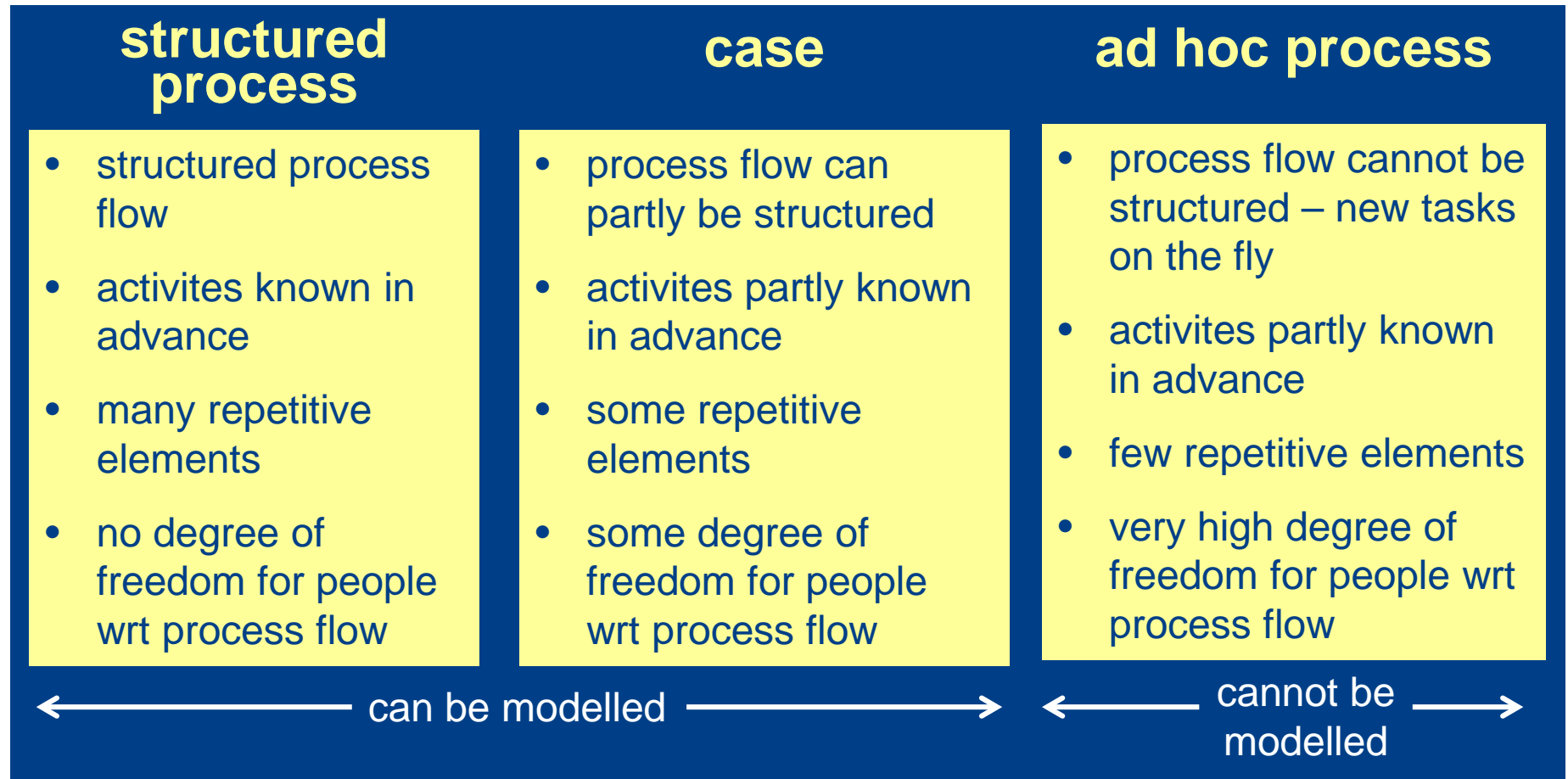# Structured Processes vs. Adhoc Processes

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

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

← ———————— can be modelled ————————→   ← cannot be modelled →

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 predefine*d. **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.*
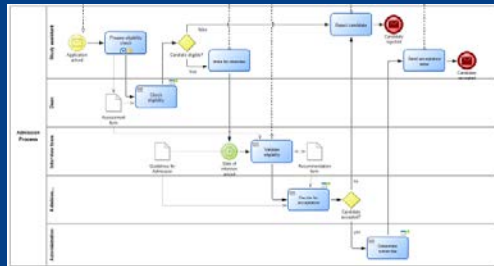- *Depending on the decision, the candidate is rejected or immatriculated.*
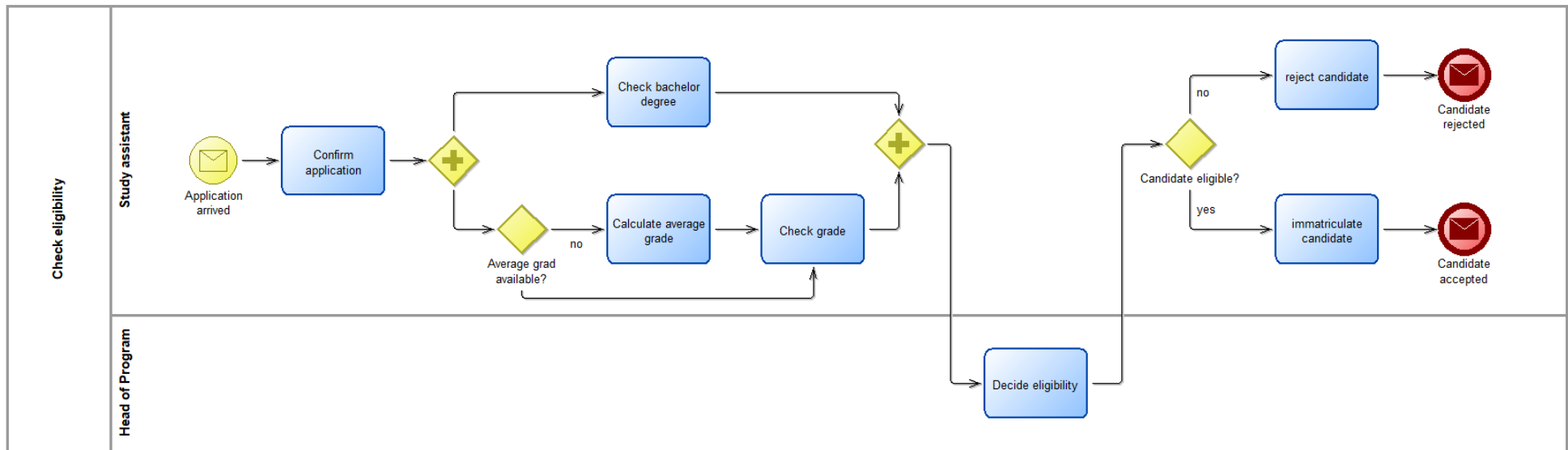
Adding Unstructured Parts

- *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
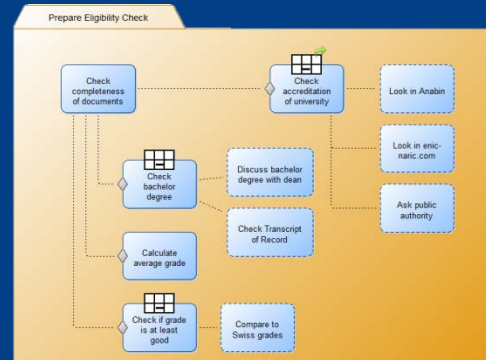
Modelling Standards from BPMN
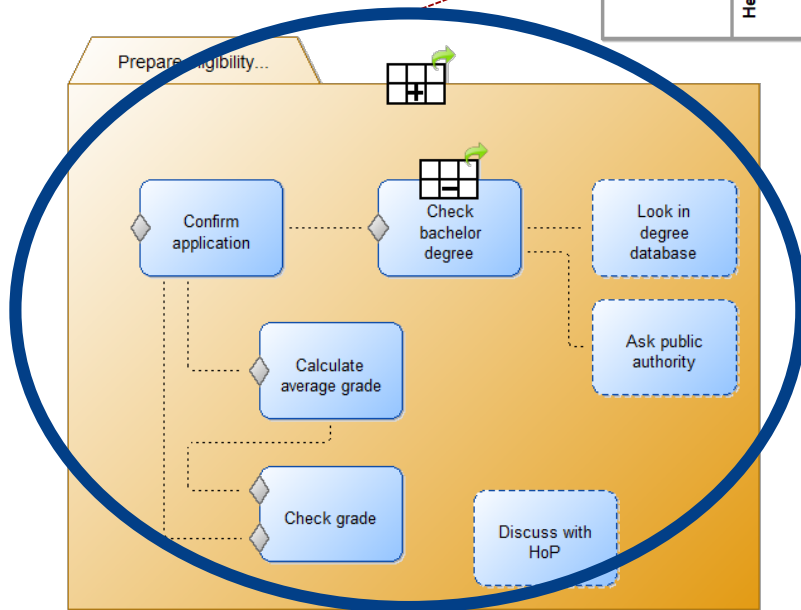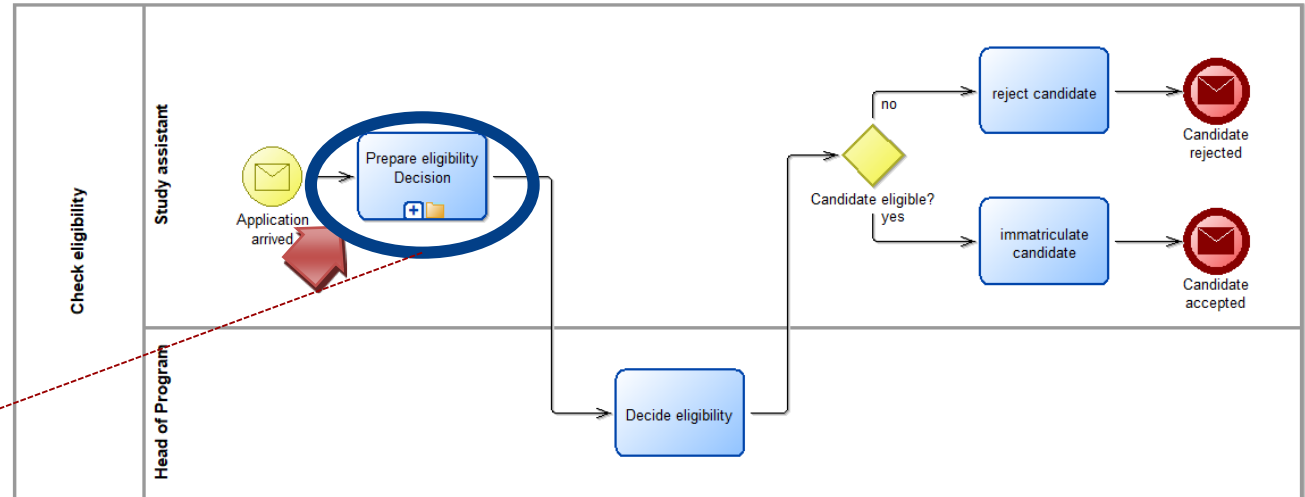
structured process	case	ad hoc process
		• process flow cannot be structured – new tasks on the fly • activites partly known in advance • few repetitive elements • very high degree of freedom for people wrt process flow

← ——————— can be modelled ——————— → ← cannot be modelled →

partly translated from (Gadatsch 2005, S. 44)

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.
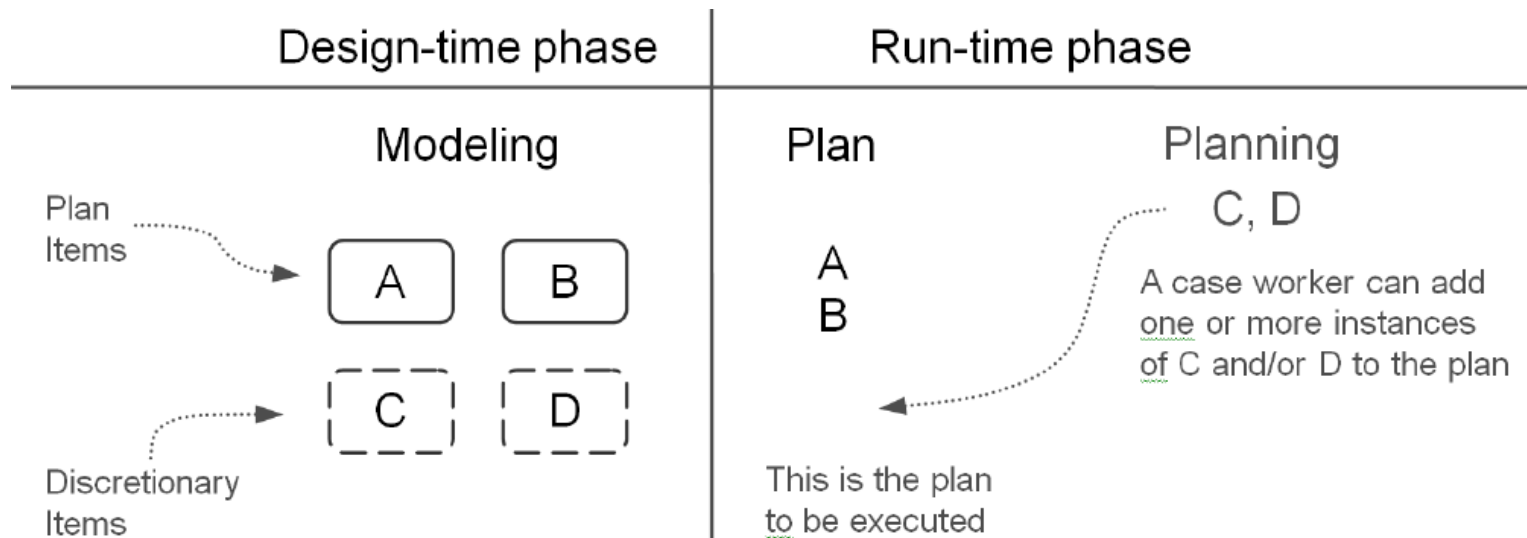
(CMMN 1.0, p. 5f)

CMMN Case Plan Modelling in the Knowledge Work Designer
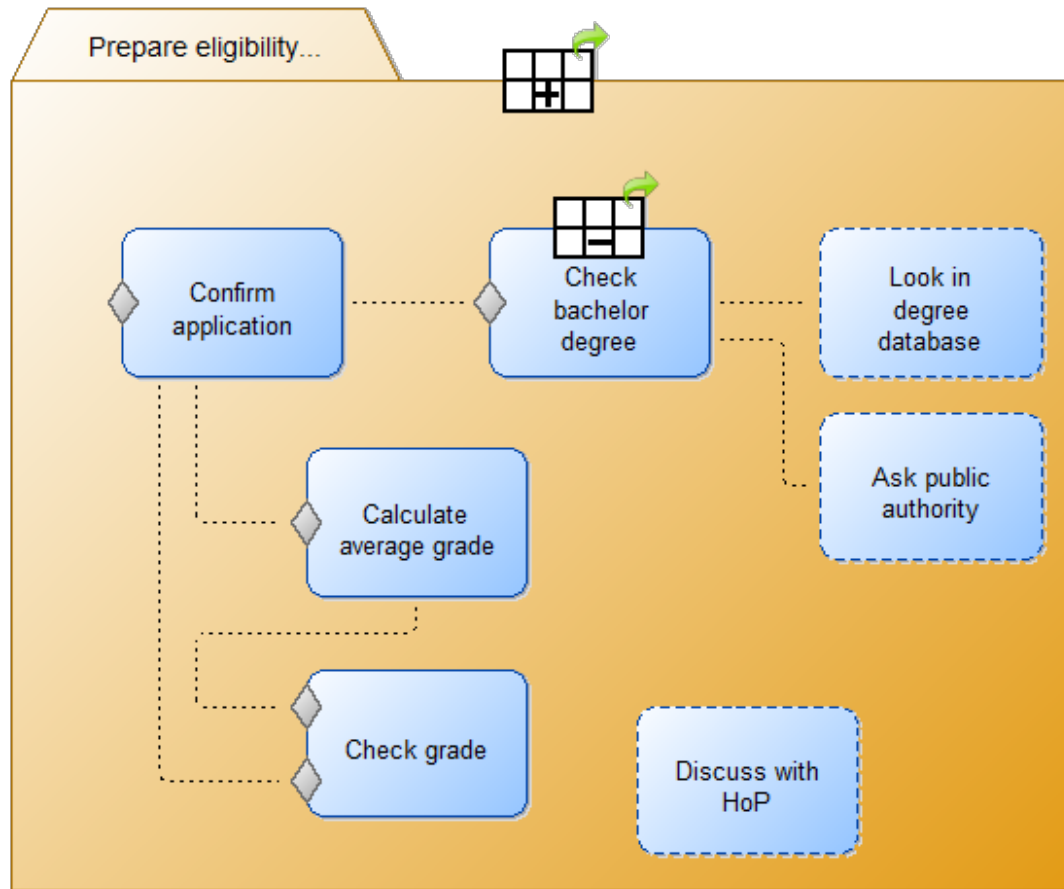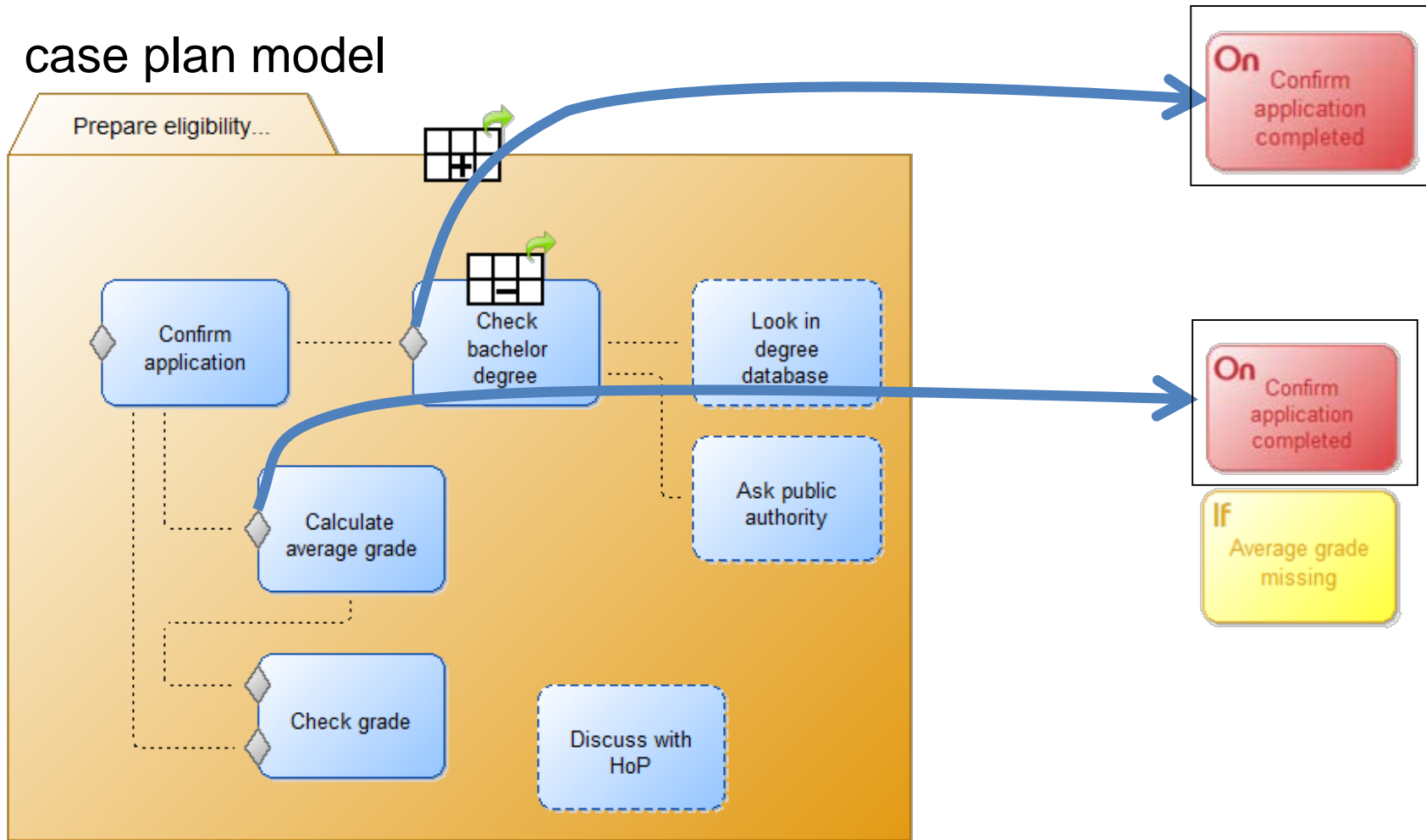
case plan model

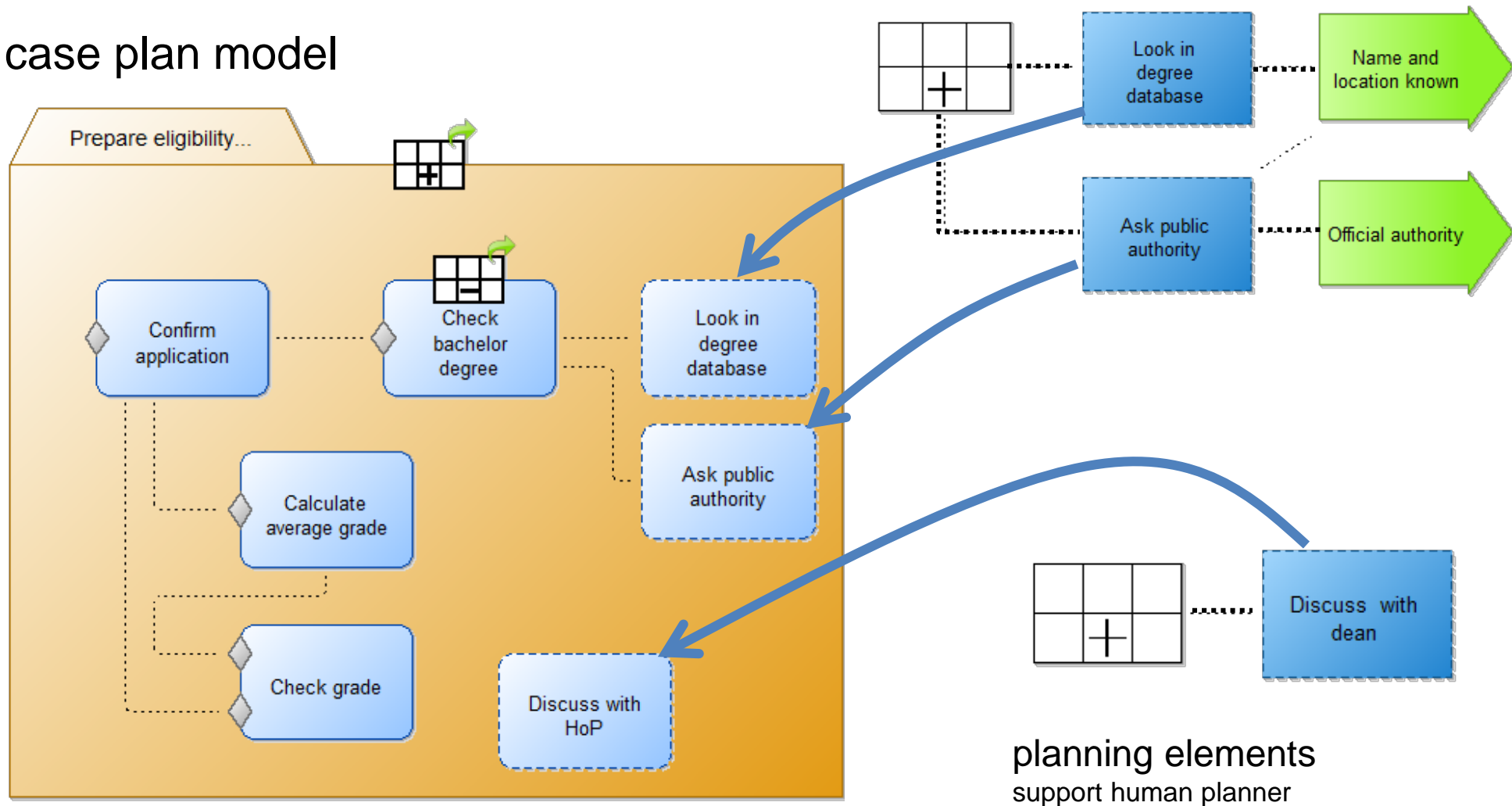# CMMN Case Plan Modelling in the Knowledge Work Designer

control elements:
determine task execution

case plan model

CMMN Case Plan Modelling in the Knowledge Work Designer

case plan model

Prepare eligibility...

Confirm application

Check bachelor degree

Look in degree database

Ask public authority

Calculate average grade

Check grade

Discuss with HoP

Look in degree database

Name and location known

Ask public authority

Official authority

Discuss with dean

planning elements
support human planner

University of Applied Sciences and Arts Northwestern Switzerland
School of Business

Issues

- Can we strictly separate case from process?

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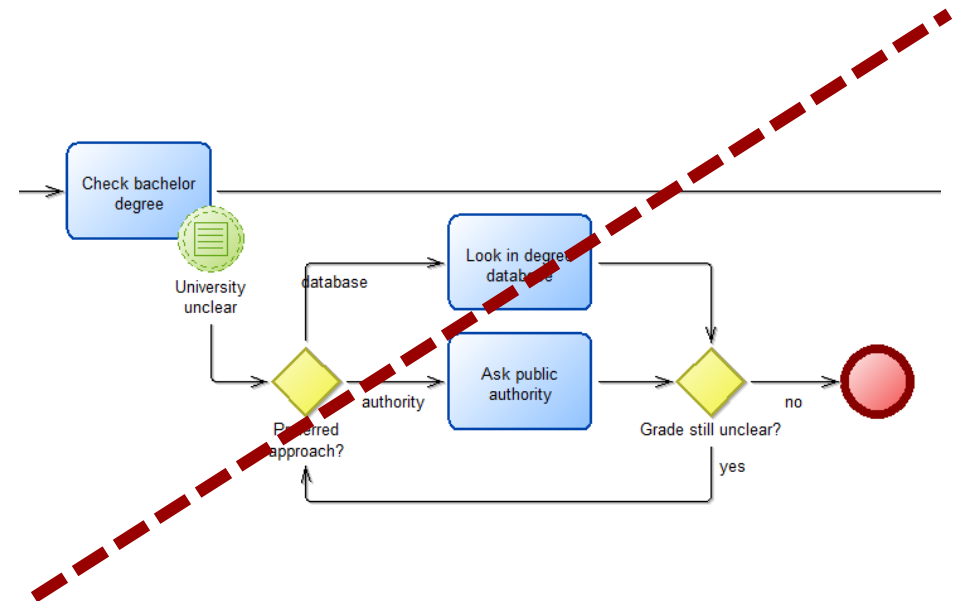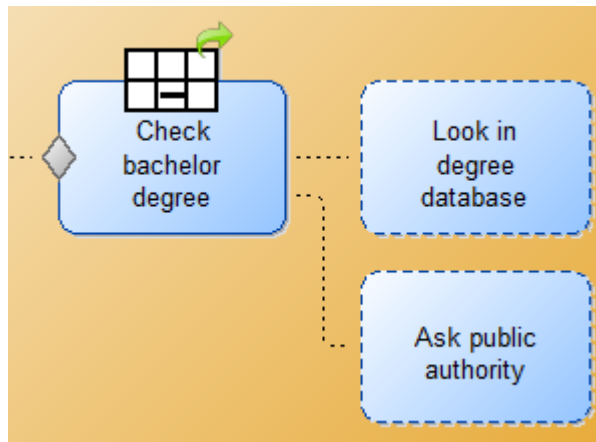
- Is there no process flow in cases?

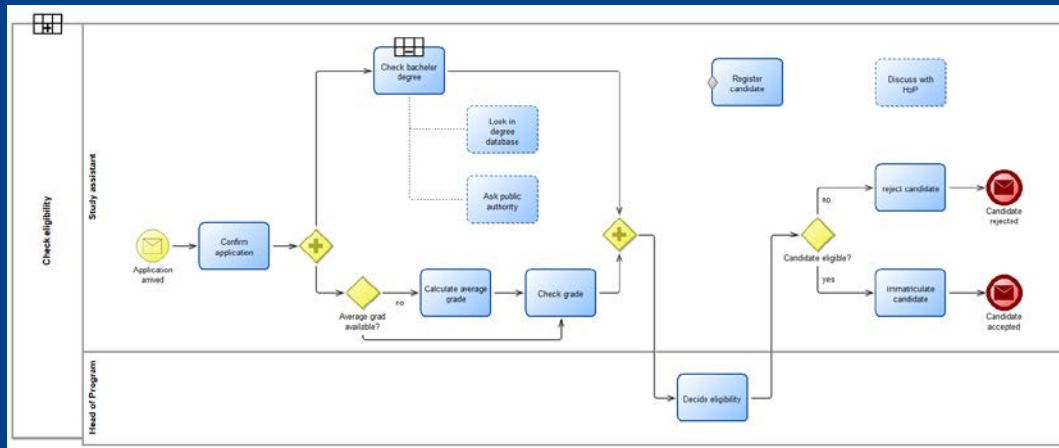# Explicit Control Flow in BPMN

What does it mean?
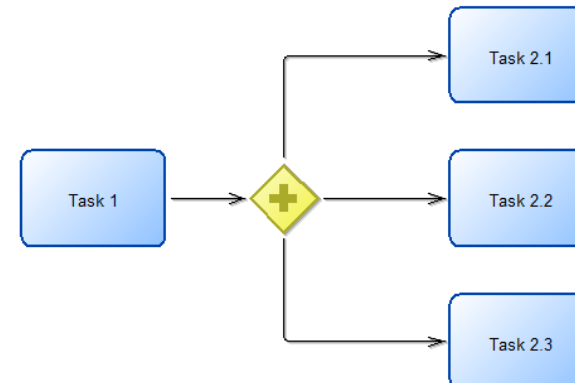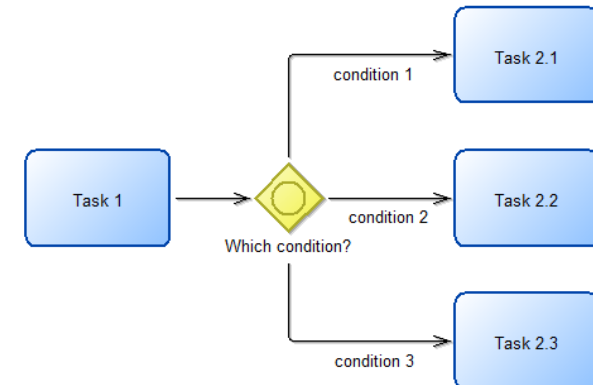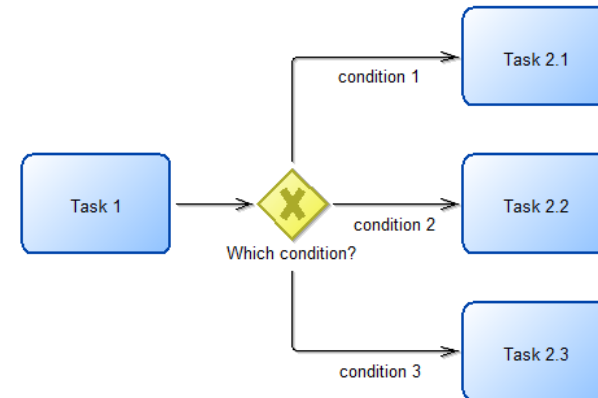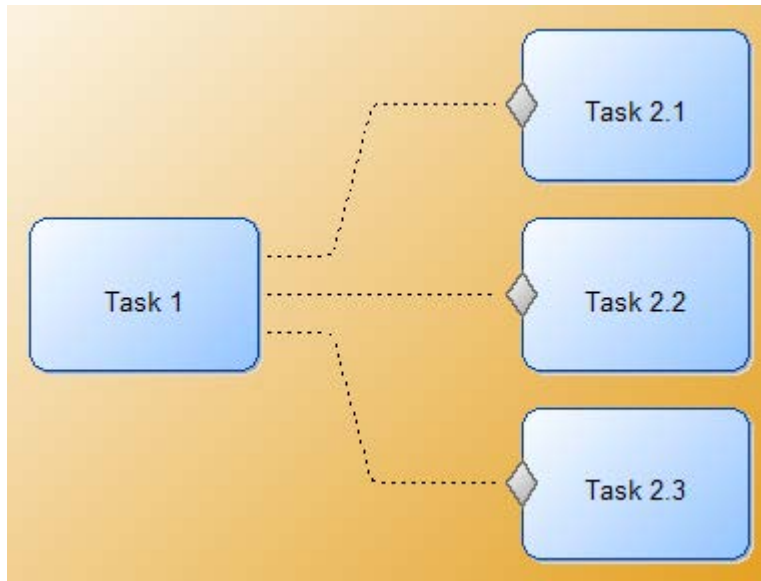
Discretionary Tasks

not adequate

BPCMN: Integrating Business Process and Case Management

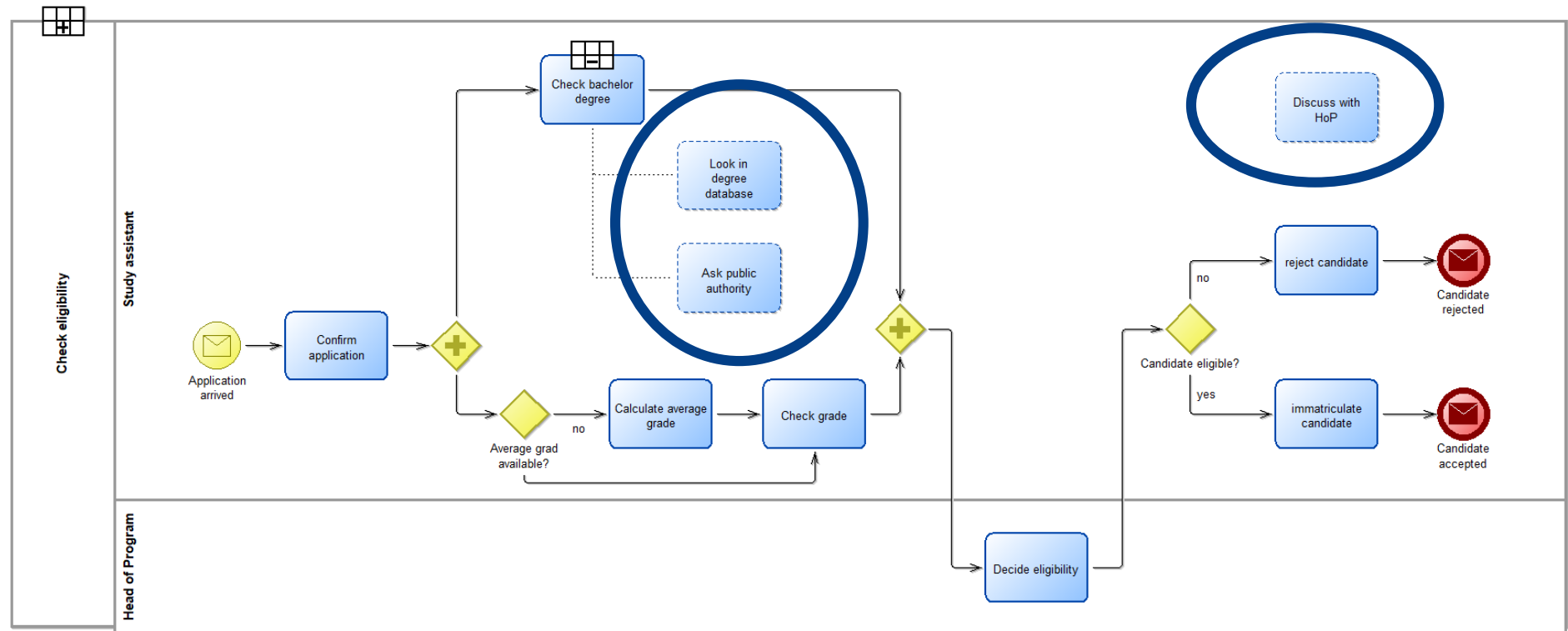| structured process	case	ad hoc process
		• process flow cannot be structured – new tasks on the fly • activites partly known in advance • few repetitive elements • very high degree of freedom for people wrt process flow

← can be modelled → ← cannot be modelled →

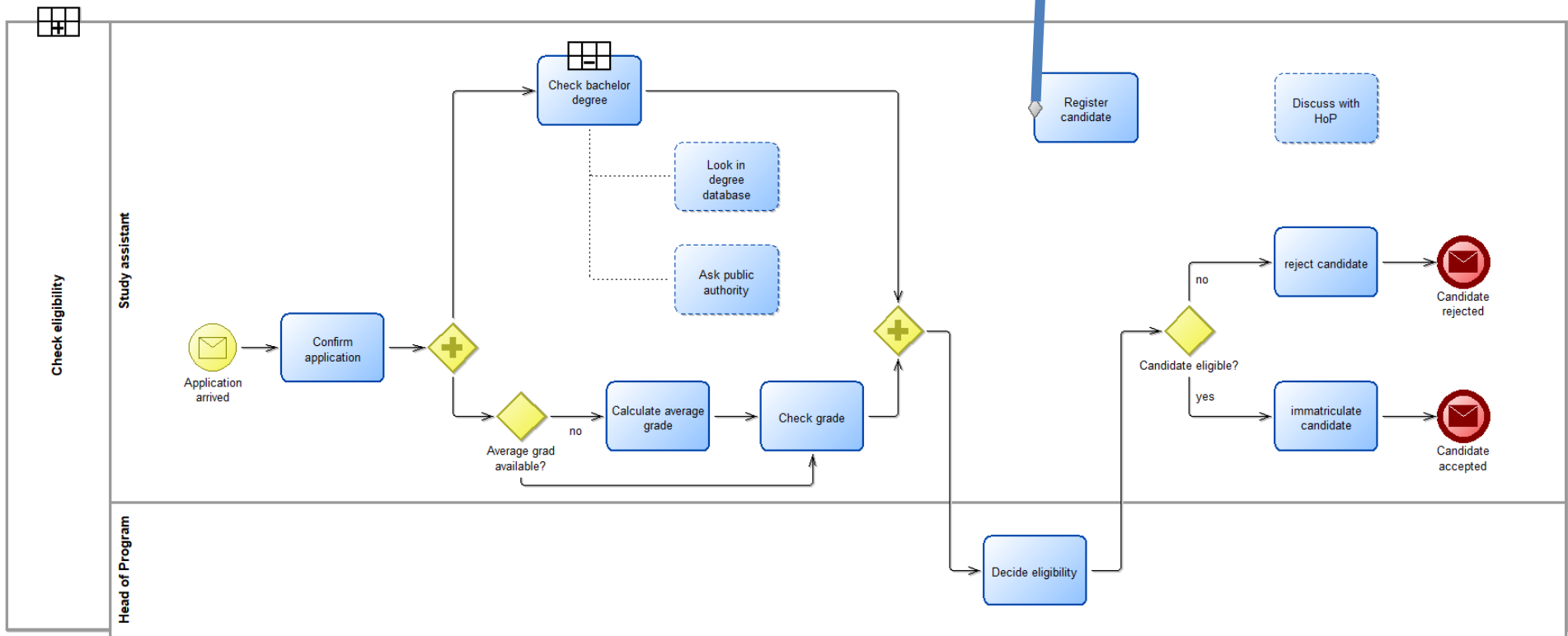partly translated from (Gadatsch 2005, S. 44)

BPCMN: Adding Discretionary Tasks to BPMN
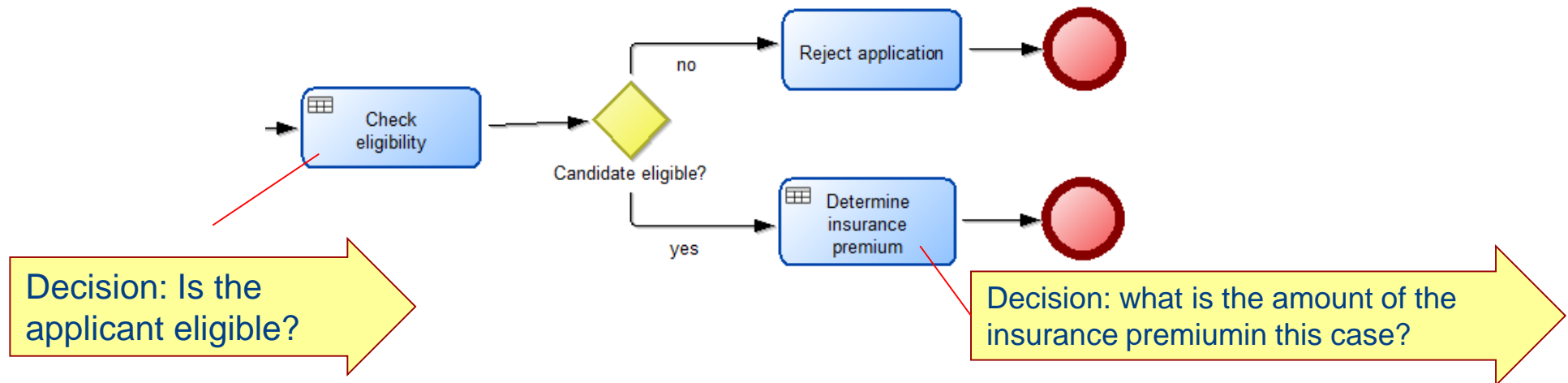
BPCMN: Adding Event-Conditions to Tasks

■ *The study assistant has to register the student, after the application is confirmed and whn the informationis complete.*

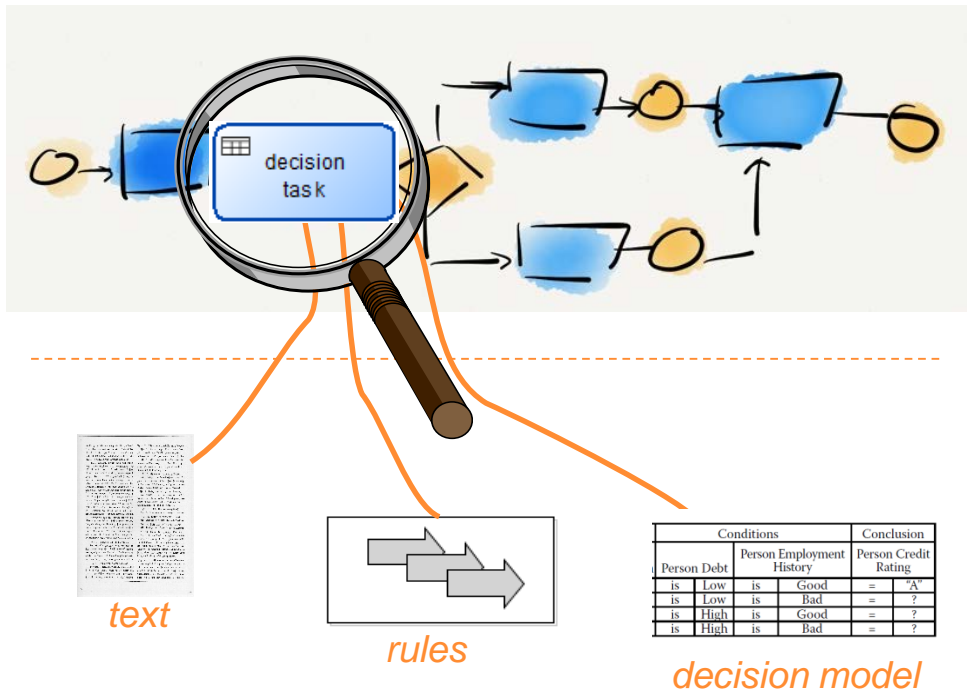# Decision-aware Business Processes

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 premiumin this case?

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

Process Logic

text

rules

decision model
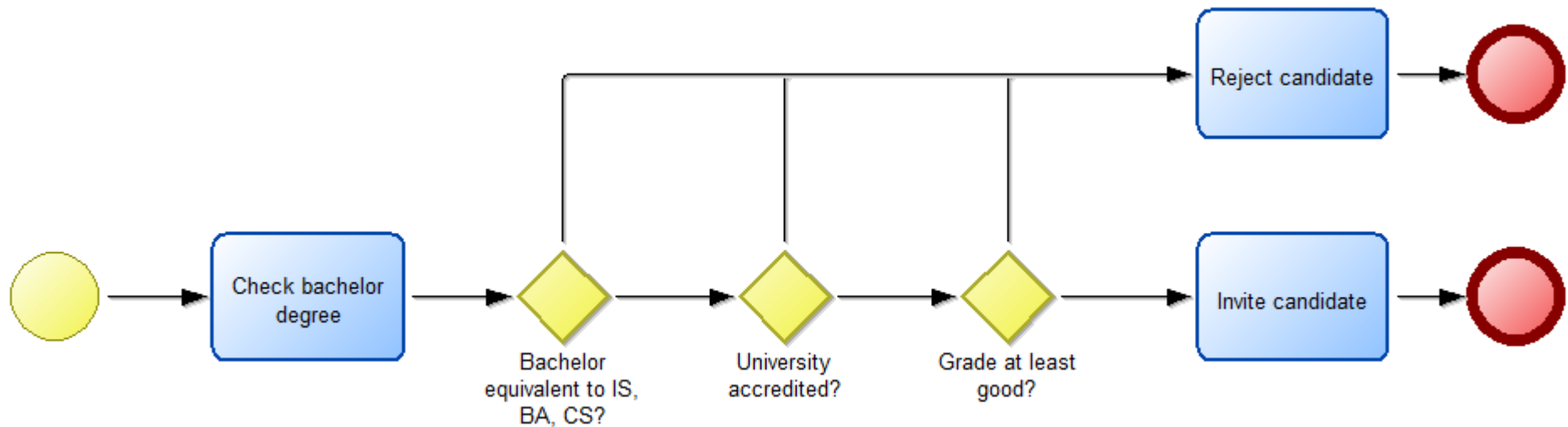
- Decision task is part of the process logic → **procedural**

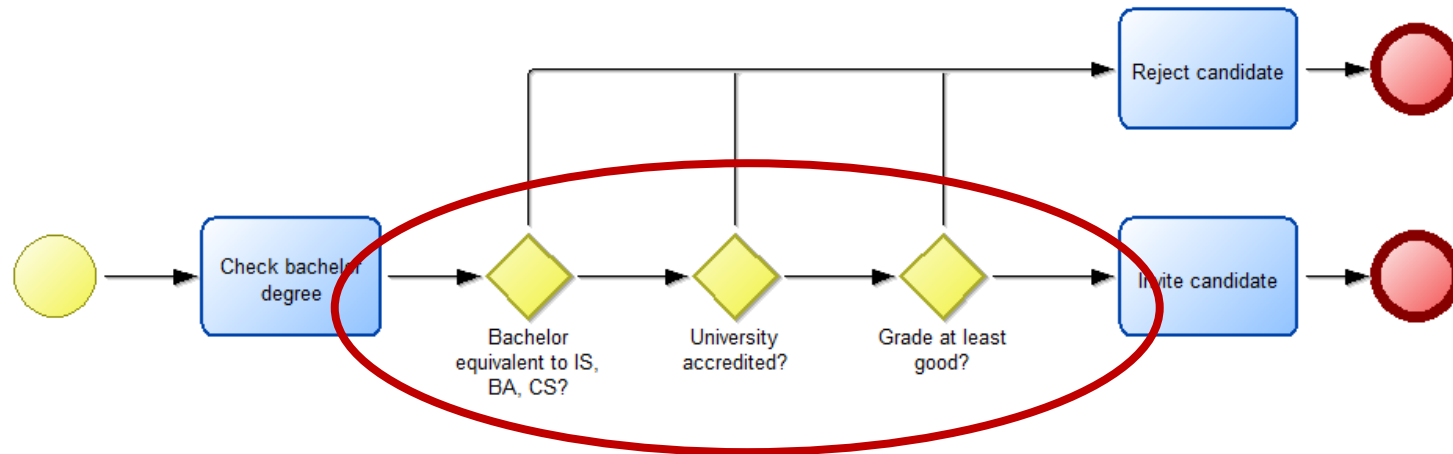- Decision logic modeled separately → **declarative**

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:
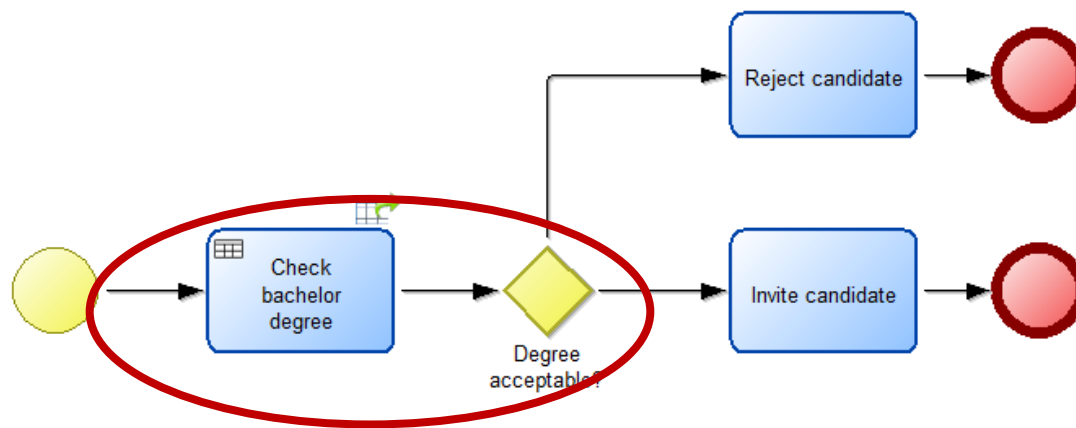
Business logic:
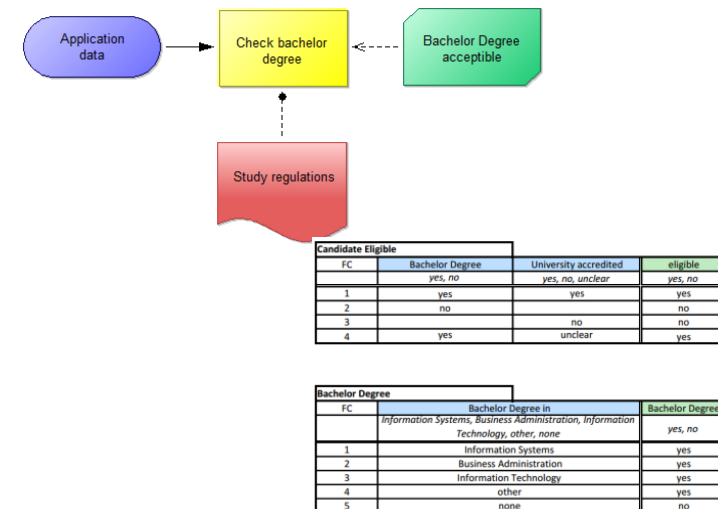
- ■ This model is more appropriate

  - ♦ 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 grocesses easier to manage

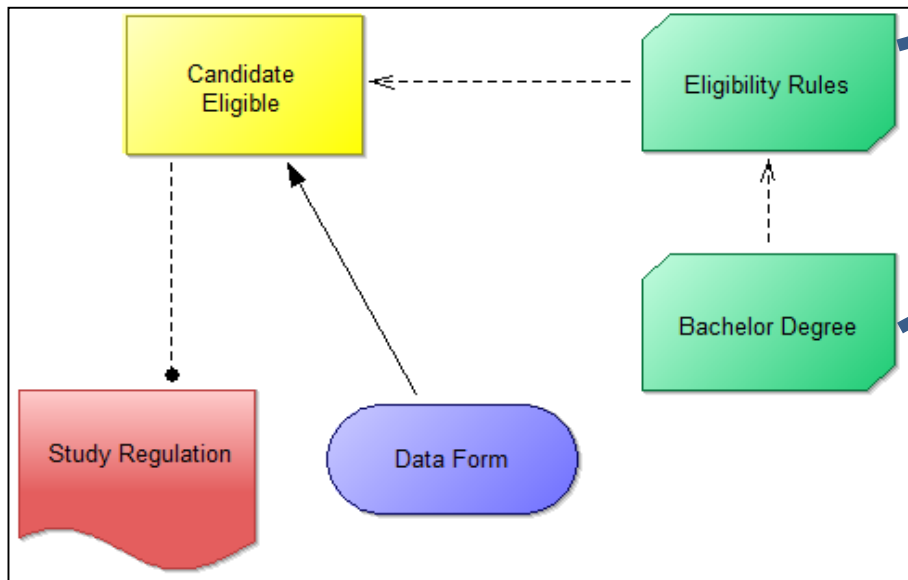- Decision Models can be reused in several processes
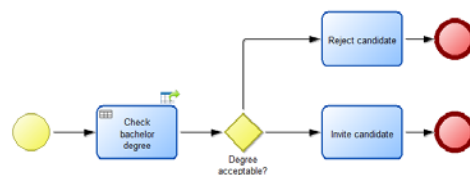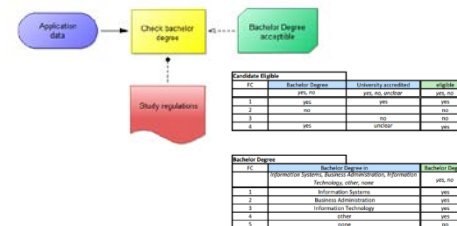
Modelling Decision Logic
- Structured and Unstructured -

DMN - 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

References to Decision Models

■ Decision models can be referenced from

♦ Process models

♦ Case plan models

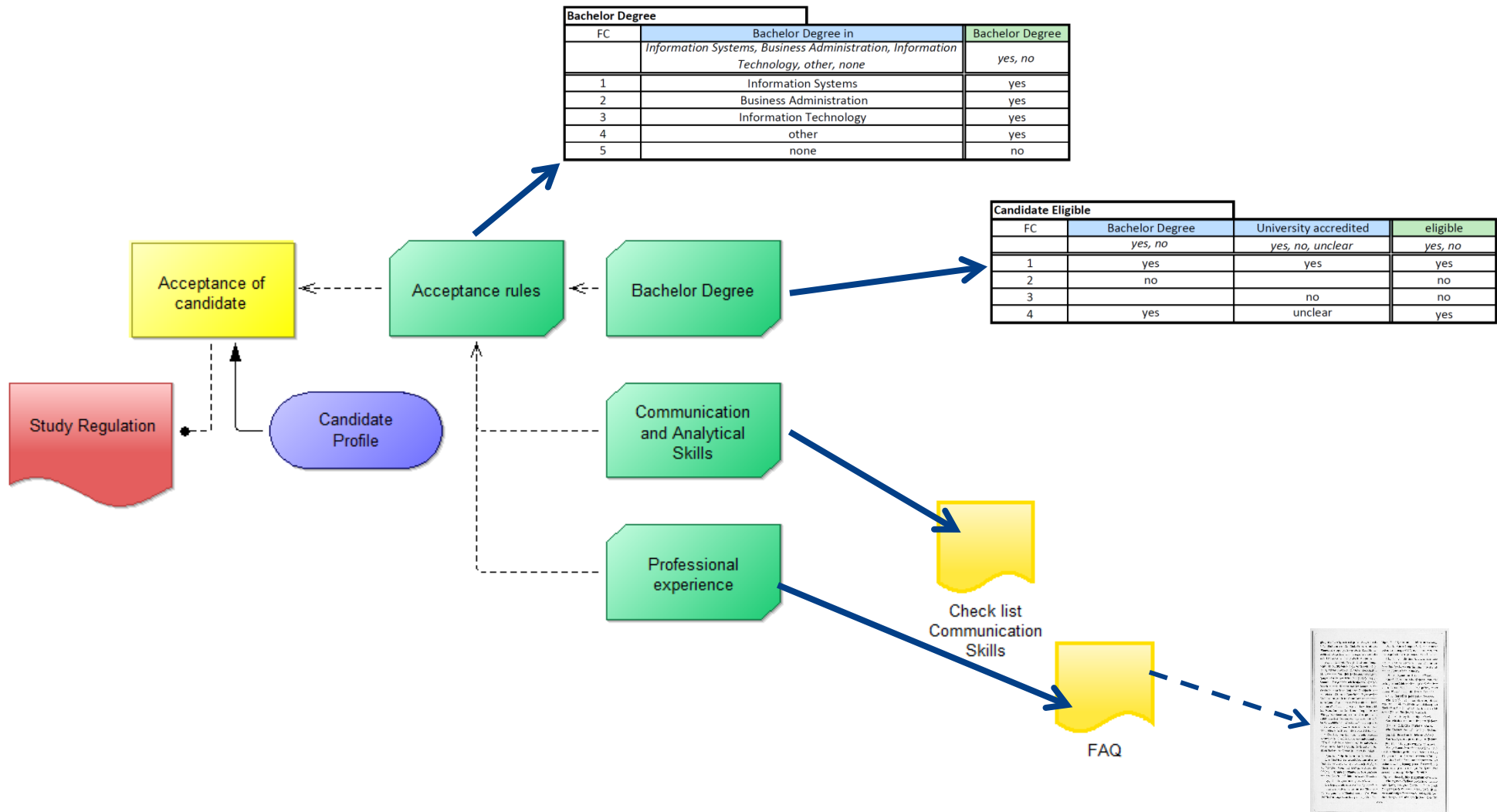♦ BPCMN models
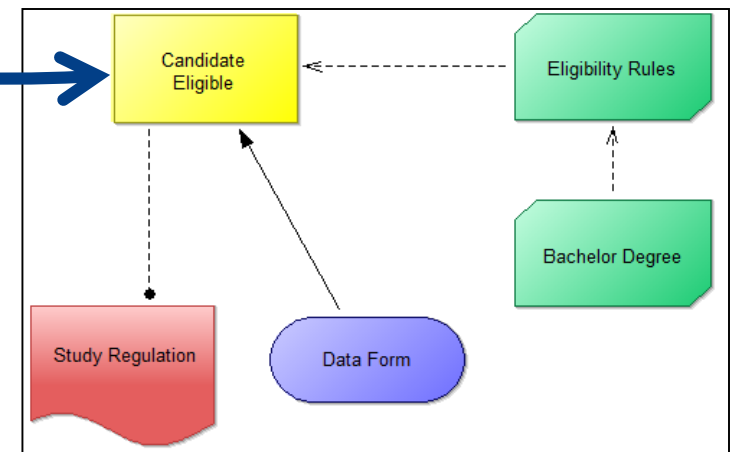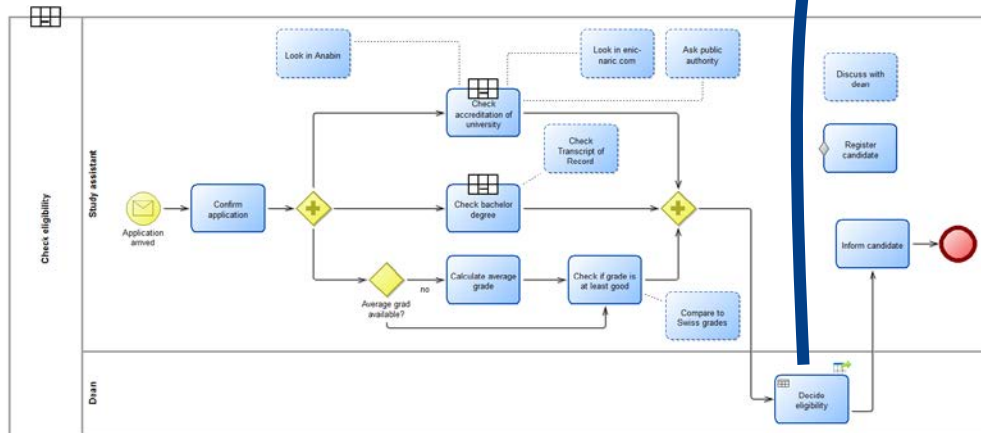
Decisions requiring Human Judgment

- Some decisions require human judgment
  - ♦ Example: Communication and analytical skills

- Can be supported by …
  - ♦ Checklists
  - ♦ Best practices
  - ♦ Lessons learned

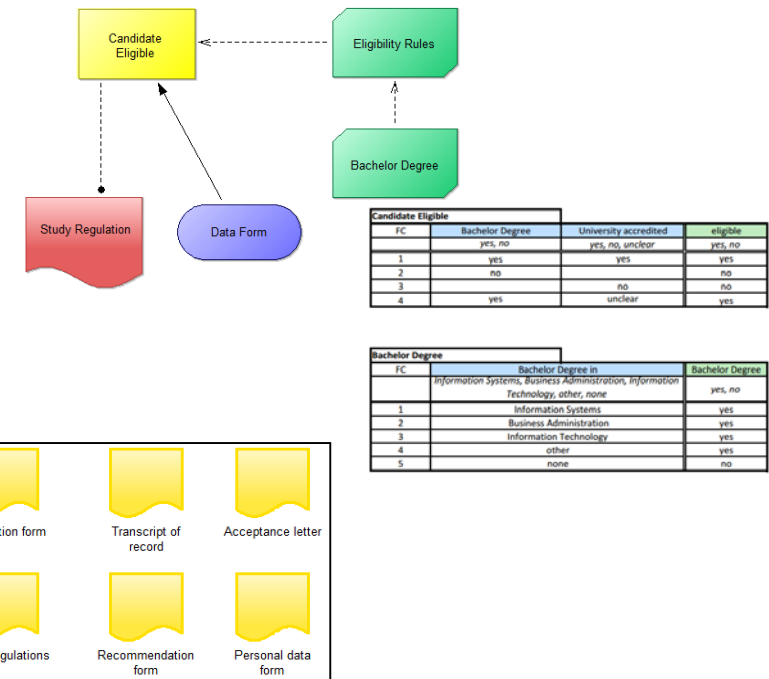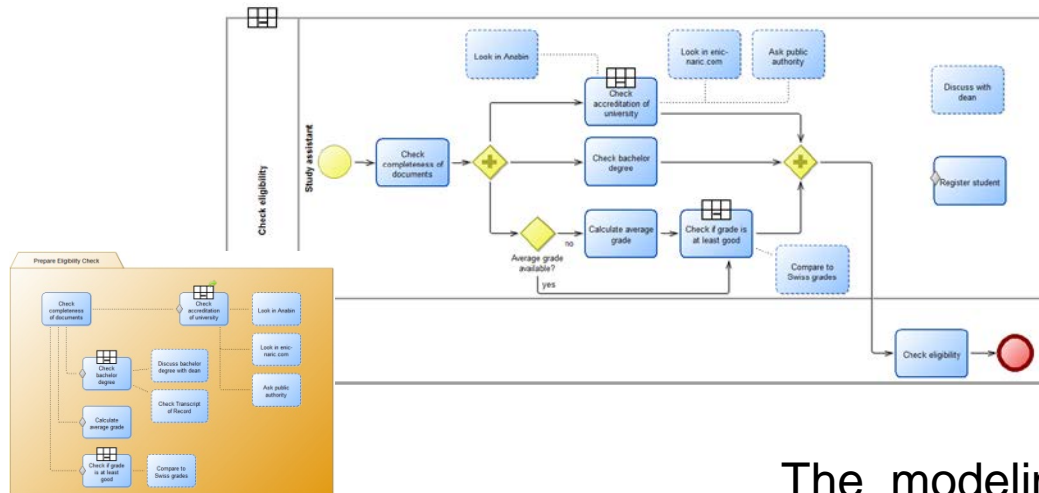- Modelled as **documents**

Decisions requiring Human Judgment

Bachelor Degree		
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

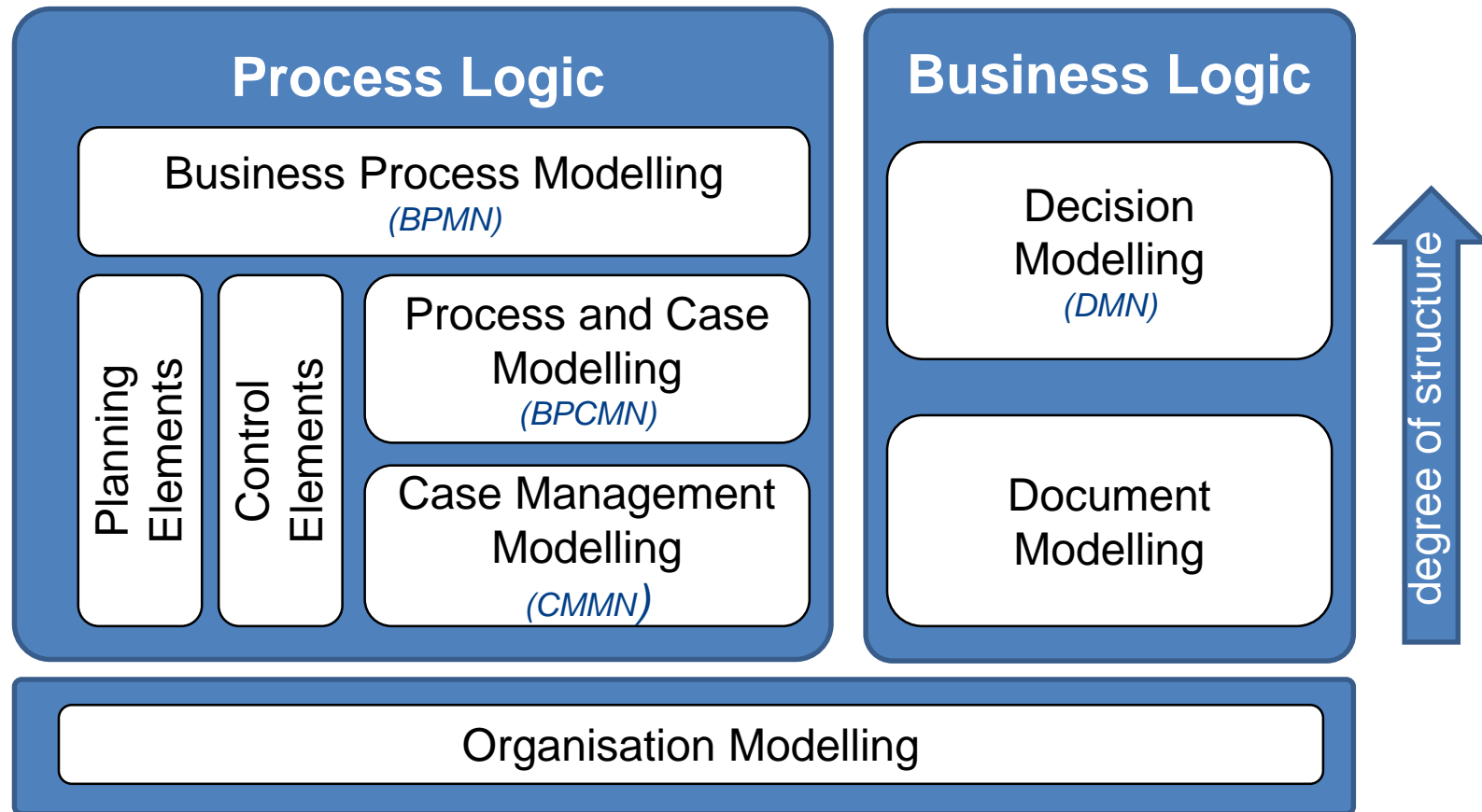| Candidate Eligible			
FC	Bachelor Degree	University accredited	eligible
	yes, no	*yes, no, unclear*	*yes, no*
1	yes	yes	yes
2	no		no
3		no	no
4	yes	unclear	yes

Conclusion

■ Modeling of Knowledge Work includes

 ♦ process logic and business Logic

 ♦ on different degrees of structure

 in an integrated environment

The modeling language was developed in adoxx.org

Model types of the Knowledge Work Designer

Process Logic

Business Process Modelling
(BPMN)

Planning Elements

Control Elements

Process and Case Modelling
(BPCMN)

Case Management Modelling
(CMMN)

Business Logic

Decision Modelling
(DMN)

Document Modelling

degree of structure

Organisation Modelling

■ For the latest material see:

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

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