

Knowledge in Processes: Decision-Aware Business Processes

Knut Hinkelmann

The Business Process Viewpoint on Companies

A Business Process is ...

... not only a logical flow of activities, which are executed by people and Systems in order to achieve a specific goal ...

... but...

... the *Know-How Platform* of the enterprise ...

... because...

... knowledge is generated and used in business processes

...



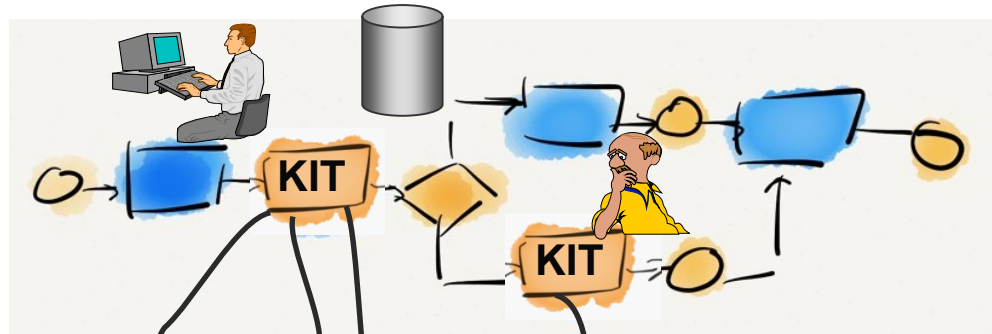
knowledge is relevant, if it is needed in business processes

© adapted from, Prof. D. Karagiannis, Uni Wien

Knowledge Tasks in Business Processes

Process Logic

Business Logic



knowledge *about* processes:

- process flow
- roles
- resources

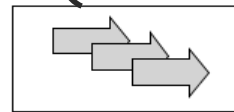
→ process logic



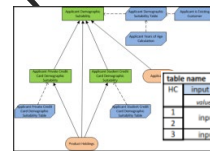
human experts



text



rules



decision model

HC	input expression 1	input expression 2	Output name
1	value 1a, value 1b	value 2a, value 2b	value 1a, value 1b
2	input entry 1a	input entry 2a	output entry 1a
3	input entry 1b	input entry 2b	output entry 1b

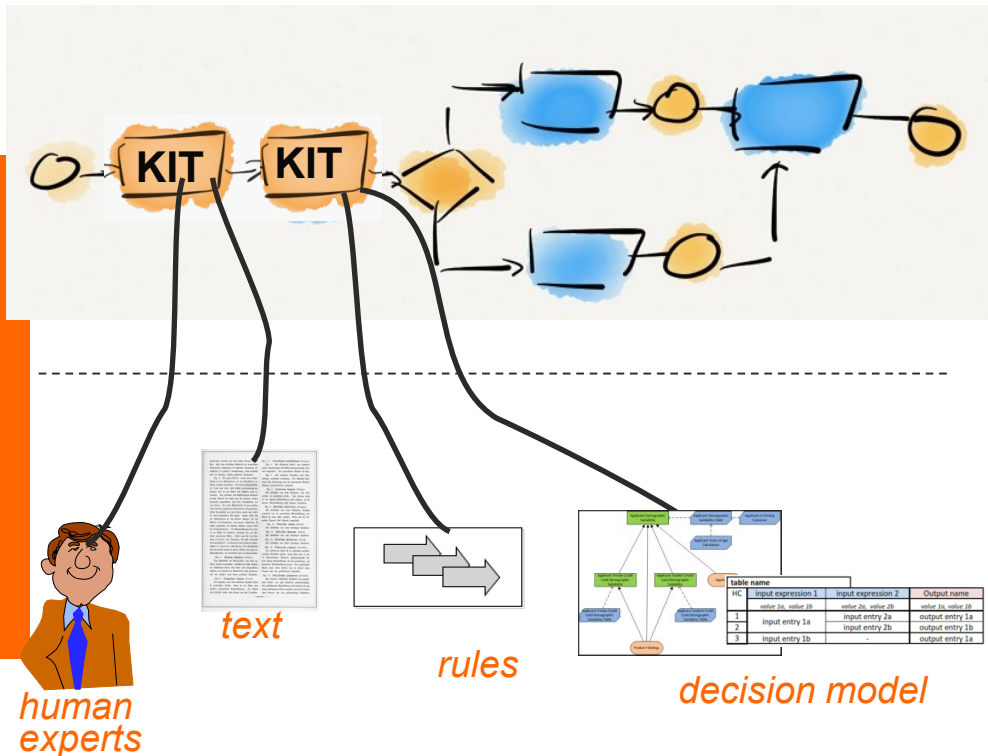
knowledge *in* processes:

- supports practice
- skills, experiences
- know how

→ business logic
(domain knowledge)

Distinguishing Process Logic and Business Logic

Process Logic



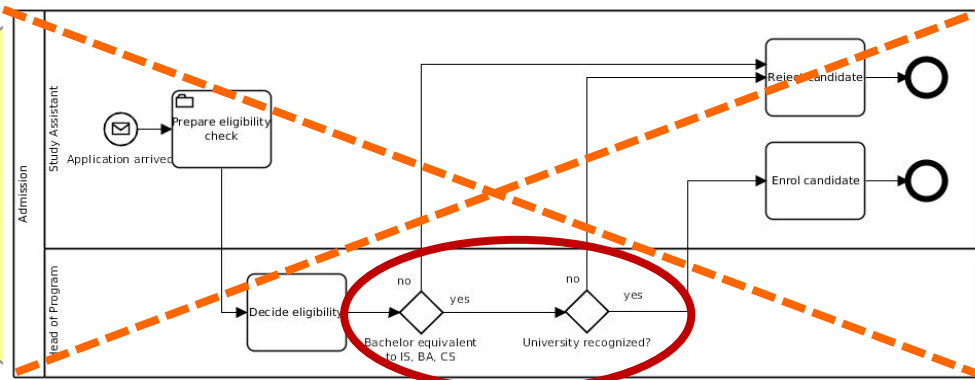
- Process model contain the process logic
- Business logic is knowledge used in tasks of a process: Knowledge-intensive Tasks (KIT)
 - ◆ Decision making
 - ◆ Planning
 - ◆ Diagnosis
 - ◆ Problem solving
- The business logic can occur in different forms
 - ◆ implicit in head of people
 - ◆ as text (e.g. guidelines)
 - ◆ as business rules
 - ◆ as decision model
 - ◆ coded in an application

Business Logic

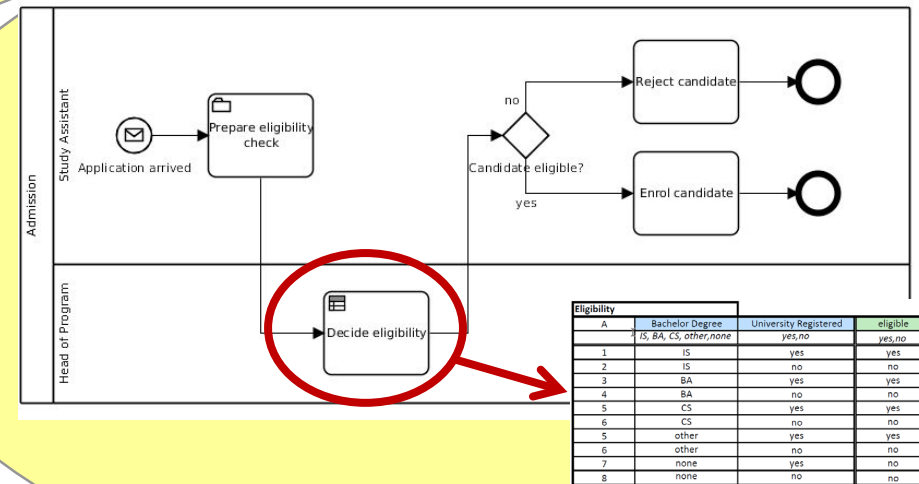


DECISIONS IN BUSINESS PROCESSES

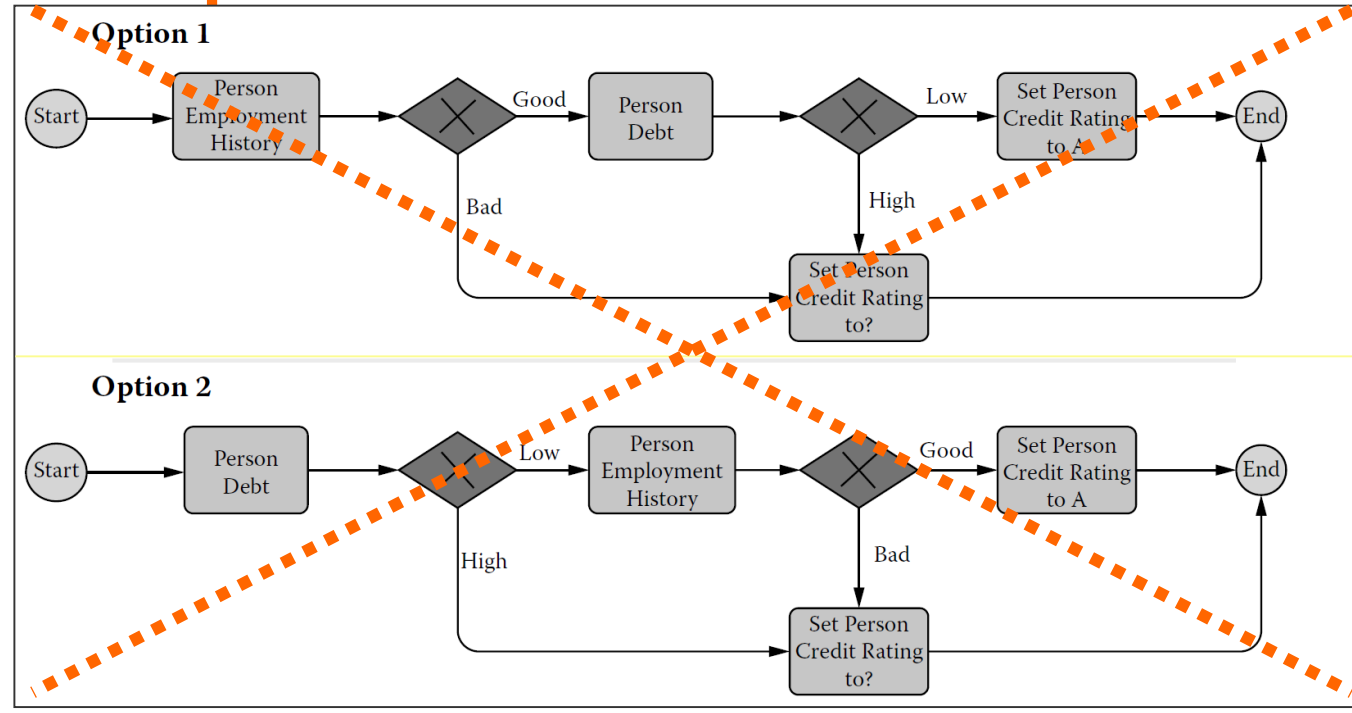
Decision-Aware Business Process Model



- Manage Decision Logic and Process Logic in separate models

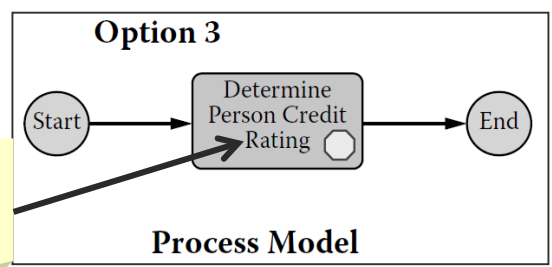


Example 1: Declarative vs. Procedural Solutions



Procedural

Decision Task



Process Model

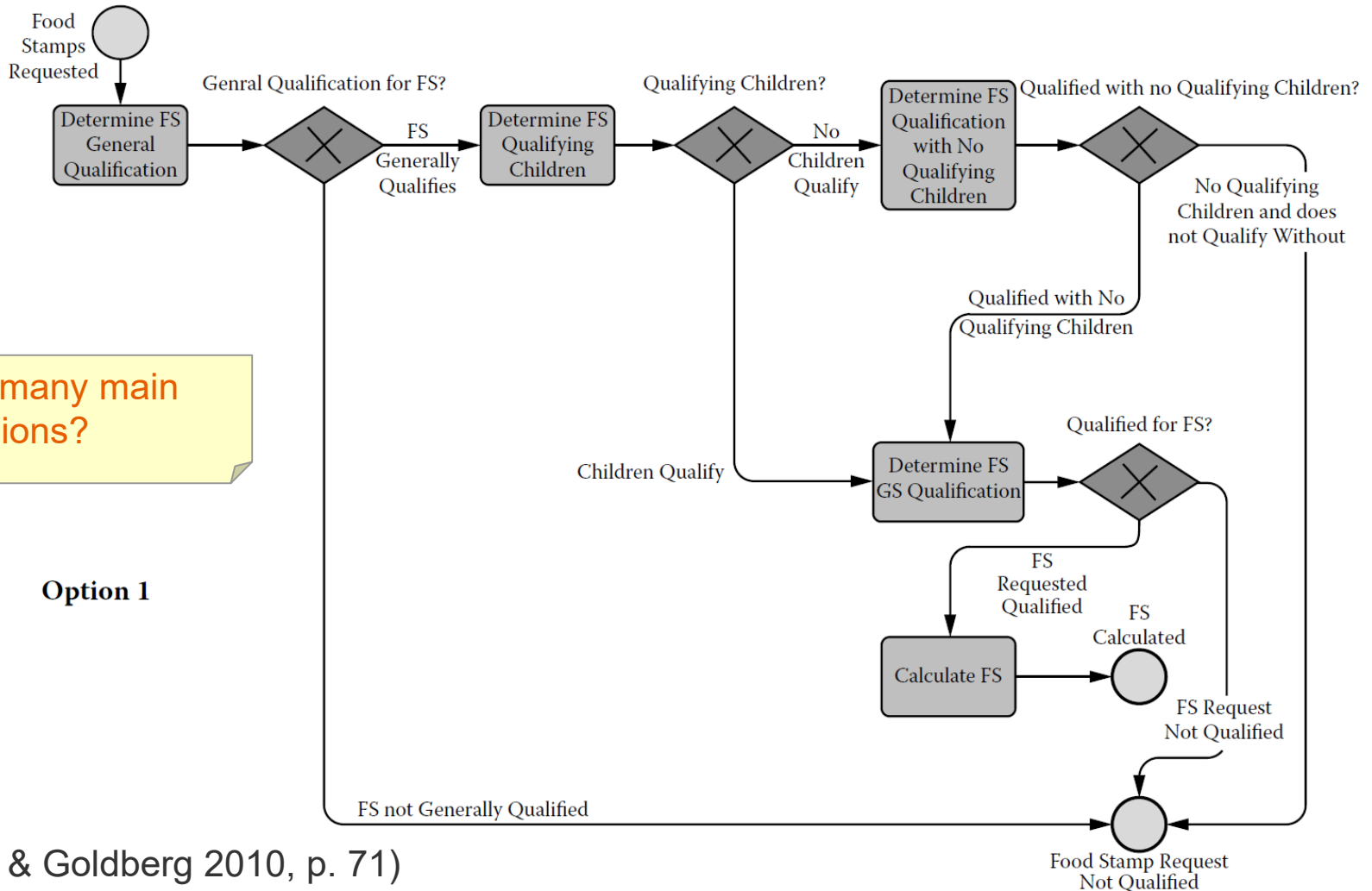
Credit Rating	Person Debt	Person Employment History	Person Credit Rating
	<i>low, high</i>	<i>good bad</i>	<i>A,B,C</i>
1	low	good	A
2	low	bad	B
3	high	good	B
4	high	bad	C

Decision

Decision Logic

Declarative

Example 2: Business Logic contained in a Process Model

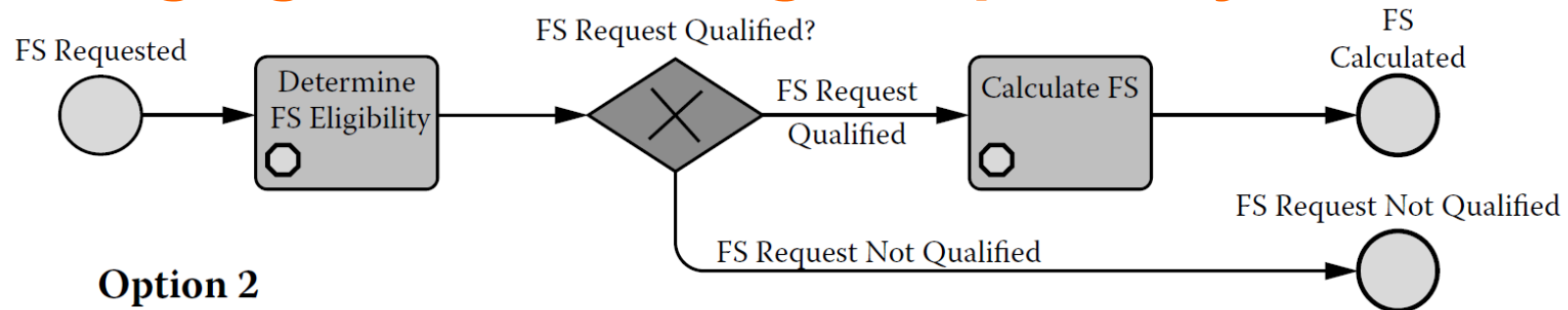


How many main decisions?

Option 1

(von Halle & Goldberg 2010, p. 71)

Managing Business Logic separately

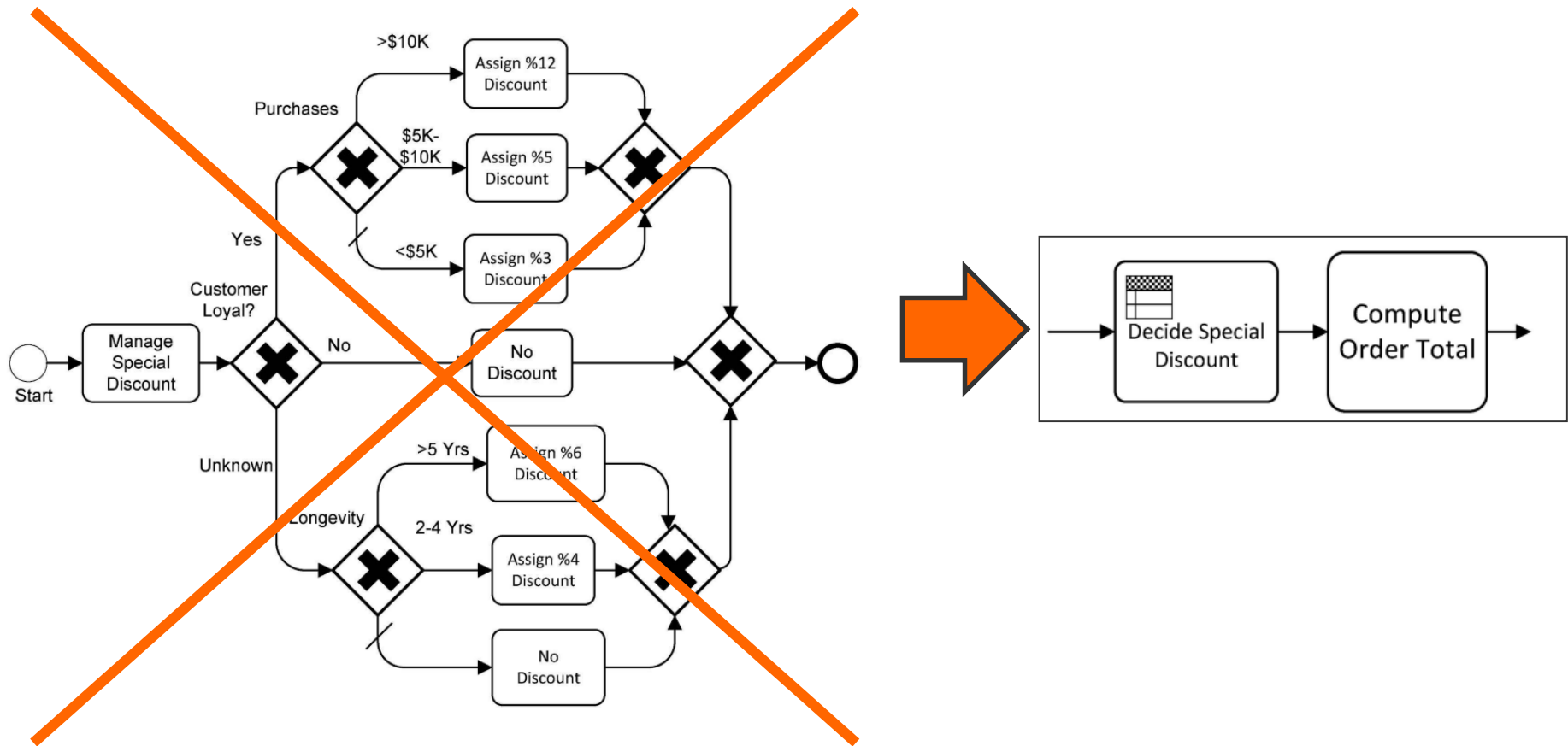


Option 2

- This solution has two tasks with their Decision Models.
- The Decision Models can be viewed, managed, and executed as one whole set of business logic
- The process model is simplified. The decision logic is a black box evaluating conditions and reaching a conclusion.
- Business Logic can be reused
 - ◆ the whole decision model
 - ◆ Individual decision tables/rules

(von Halle & Goldberg 2010, p. 71f)

Example 3: Collapsing gateways for a complex discount decision into a decision



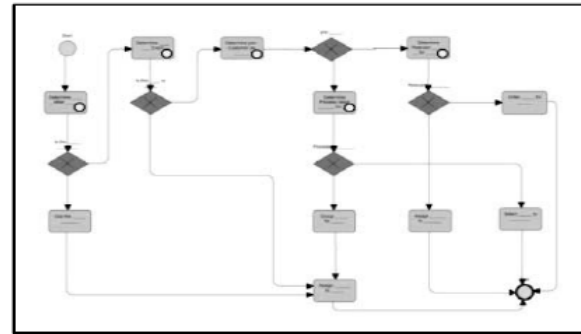
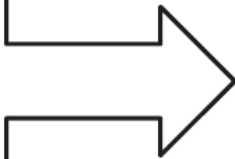
Distinguishing a Procedural Task from a Declarative Decision

- A **procedural** solution specifies **how**, in a **step-by-step** manner, something is to be done.
 - ◆ A business process model is procedural:
it prescribes a set of tasks and the control flow.
- A **declarative** solution only specifies **what** needs to be done, with no details as to how, in a step-by-step manner, it is to be carried out.
 - ◆ A Decision Table and Decision Rules are declarative:
They prescribe decision criteria (conditions) and not tasks;
no order in which conditions are tested

(von Halle & Goldberg 2010, p. 67)

Procedural versus Declarative

A procedural solution specifies how, in a step by step manner, something is to be done

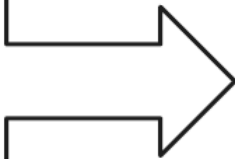


HOW

process logic

Business process is a procedural solution of tasks to be performed in precise sequential order. The “How” of a unit of work.

A declarative solution is what needs to be done, with no details as to the methods to be used (no sequential information).



Conditions				Conclusion	
Person Debt	Person Employment History	Person Credit Rating			
is	Low	is	Good	=	"A"
is	Low	is	Bad	=	"B"
is	High	is	Good	=	"B"
is	High	is	Bad	=	"C"

WHAT

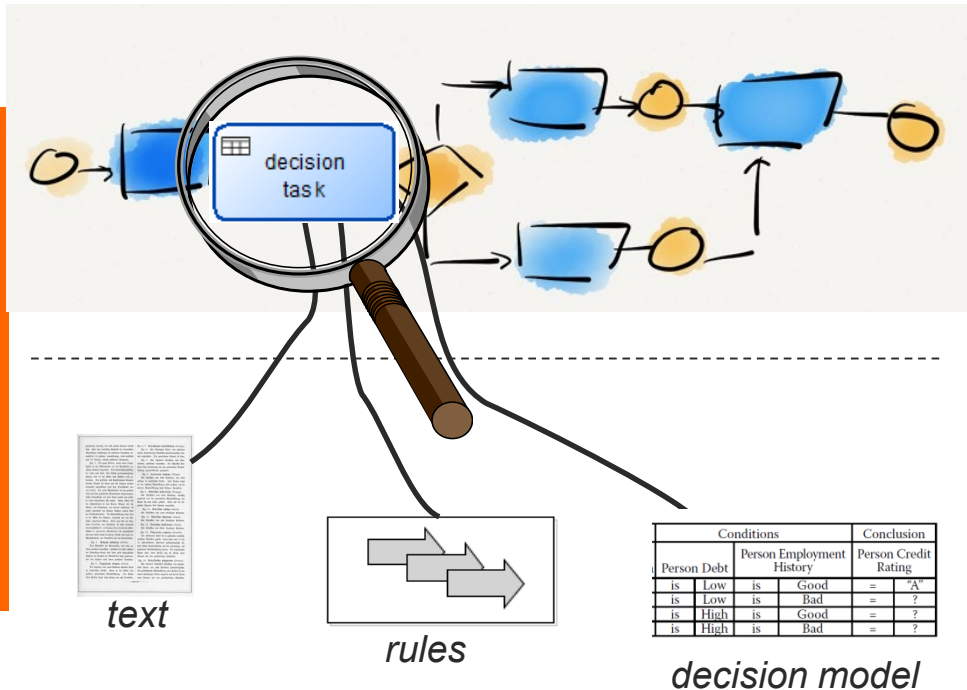
business logic

A declarative solution occurs when sequence is irrelevant to the result. The “What” of a unit of work.

(von Halle & Goldberg 2010, p. 67)

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

Process Logic

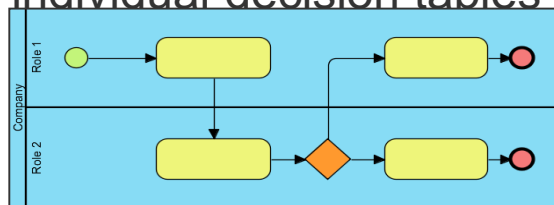


- The process model contains the process logic
→ **procedural**
- Decision logic is externalized from decision tasks and represented in a different kind of model
→ **declarative**

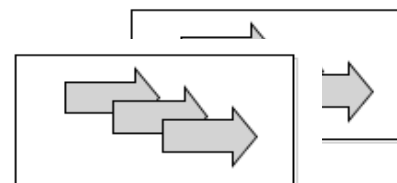
Business Logic / Decision Logic

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
- Business Logic can be automated
 - ◆ Rule-based systems, fuzzy logic, ...
- Business Logic can be reused in several processes
 - ◆ the whole decision model
 - ◆ individual decision tables and rules

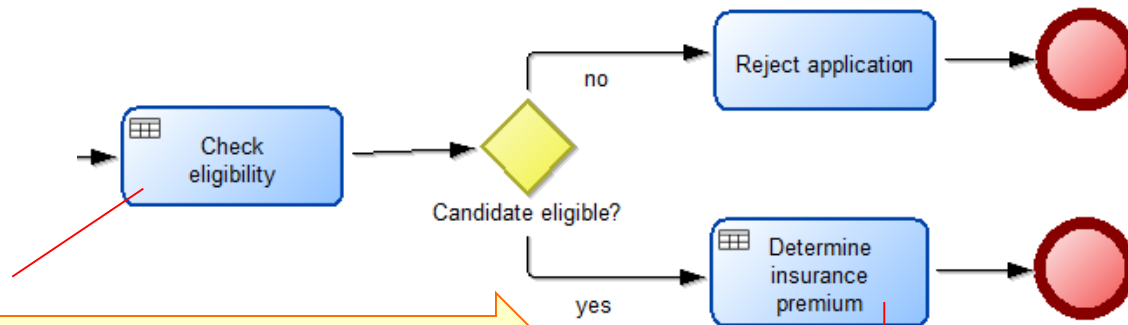


+



Decision Tasks in Business Processes

- A **decision task** is a task in which some decision is made
- The business logic that is used for decision making is called *decision logic*
- Two kinds of decision tasks:
 - ◆ Decision tasks deriving values for data
 - ◆ Decision tasks providing data for gateways
 - At the gateway only the result of the decision should be tested (for the selection of the path) not the criteria for the decision



Decision providing data for gateway:
Is the applicant eligible?

Decision deriving value for data: What is
the amount of the insurance premium?

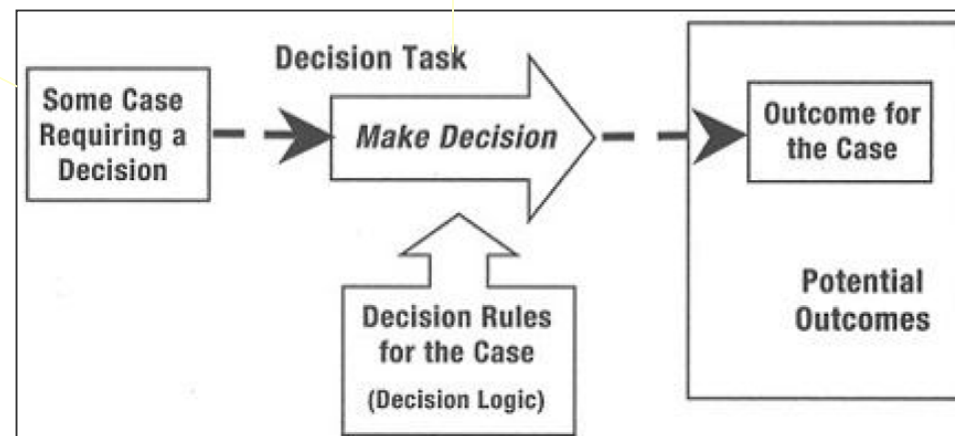
Example for a Business Decision (1): Data for Gateway

- Process: Handling auto insurance applications
- Decision Task: Check Eligibility of Applicant
- Potential outcomes: "yes" and "no" (i.e. eligible/non-eligible)
- Decision Logic: Terms of insurance

Case: John Smith applies for an auto insurance

Decision Task:
Check Eligibility

Outcome: *John Smith is eligible for auto insurance*



(Ross 2011, p. 152f; Ross 2013, p. 7)

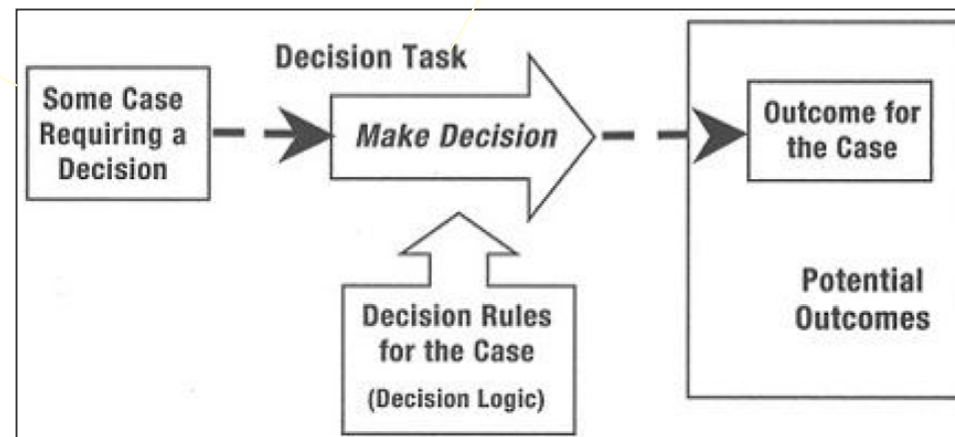
Example for a Business Decision (2)

- Process: Handling auto insurance applications
- Decision Task: Determine insurance premium
- Potential outcomes: amount of premium (i.e. amount)
- Decision Logic: Calculations for premiums

Case: John Smith applies for an auto insurance

Decision Task:
Determine insurance premium

Outcome: *John Smith has to pay CHF 700 per year*



(Ross 2011, p. 152f; Ross 2013, p. 7)

Representation of Decision Logic

- There are a variety of ways to represent decision logic, e.g.
 - ◆ Semi-formal description (text-based)

The insurance application can be accepted, if the car model is insurable and the risk score is less or equal to 70

- ◆ IF ... THEN rules

IF car model insurable = yes AND risk score <= 70 THEN acceptance = yes

- ◆ Decision Table

Insurance acceptance			
	Car model insurable	Risk score	Acceptance
1	yes	> 70	no
2	yes	<= 70	yes
3	no	> 70	no
4	no	<= 70	no