

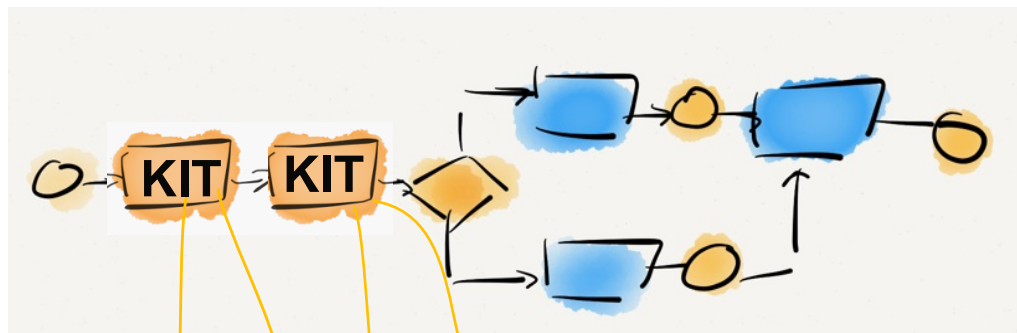


Decision-aware Business Processes

Barbara Re

Distinguishing Process Logic and Business Logic

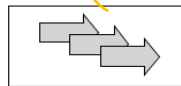
Process Logic



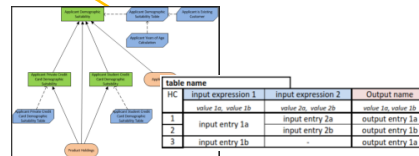
human experts



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

- The process model contains the process logic
- Business logic can be assigned to tasks in the process model:
 - knowledge-intensive tasks
- 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

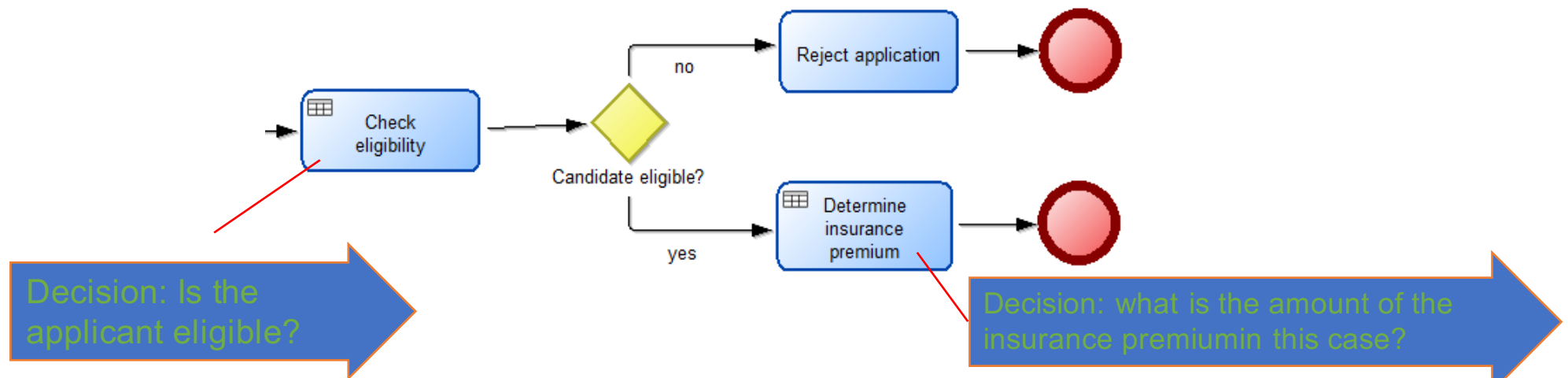
Perspectives on Process Modeling

- A new perspective on process modeling is reflected in the combination of three ideas
 - **Process:** an organized, coordinated flow of activities, conducted by participants, acting on and deciding with data and knowledge, to achieve a business goal.
 - **Decision:** decisions are made by applying business knowledge in the form of business rules or other decision logic to process data. A decision model likewise reflects how a decision is made.
 - **Event:** A process can also be considered a connected sequence of events that respond to states, causes, and conditions. In an event-based view, the process is a linkage of the transitions from one processing state to another.

(Debevoise & Taylor 2014)

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



Basic Elements of Operational Business Decisions

- A decision is characterized by a *question*, for example:
 - Should the insurance claim be accepted, rejected or examined for fraud?
 - Which resource should be assigned to this task?
 - Which service should be used to ship this package?
- A *potential outcome* is some result, conclusion, or answer that might be deemed appropriate for a case. Examples:
 - some form of yes/no (e.g. eligible/non-eligible)
 - some quantities (e.g. dollar amounts)
 - some categories (e.g. silver, gold, or platinum customer)
 - some real-world instances (e.g. software product to be purchased)
 - some course of action (e.g. on-site visit, teleconference, email)
- A *case* is some particular matter or situation arising in a day-to-day business activity and requiring consideration
- The *outcome* is the result, conclusion, or answer for a *given* case
- The business logic that is used for decision making is called *decision logic* (the set of all decision rules selecting a decision outcome)

(Ross 2011, p. 152f)

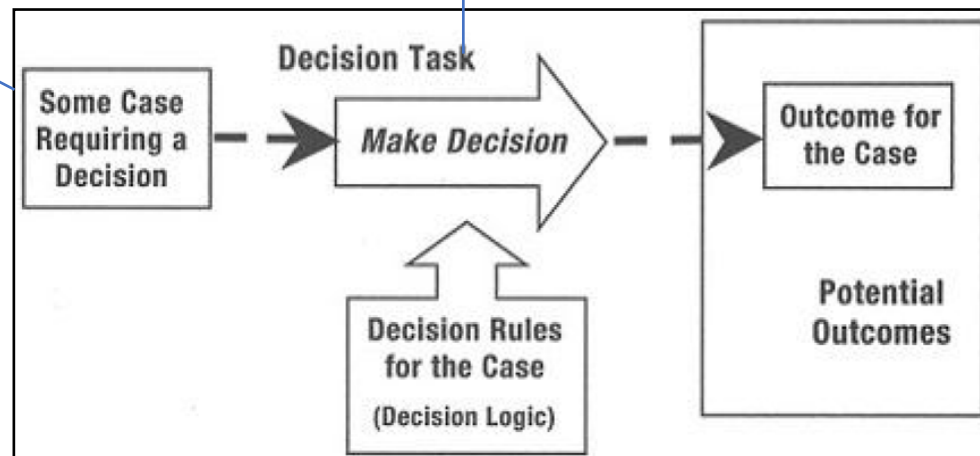
Example for a Business Decision: Data for Gateway

- 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



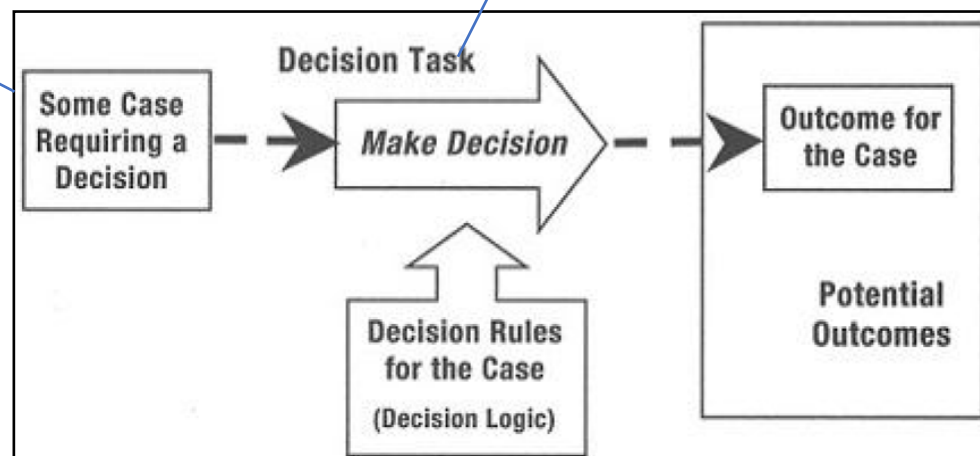
Example for a Business Decision:

- 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



Representation of Decision Rules

- There are a variety of ways to represent decision rules, e.g.
 - Semi-formal description
 - *The reimbursement is 90% if the patient visited a doctor's office and the physician was present*
 - Decision Table

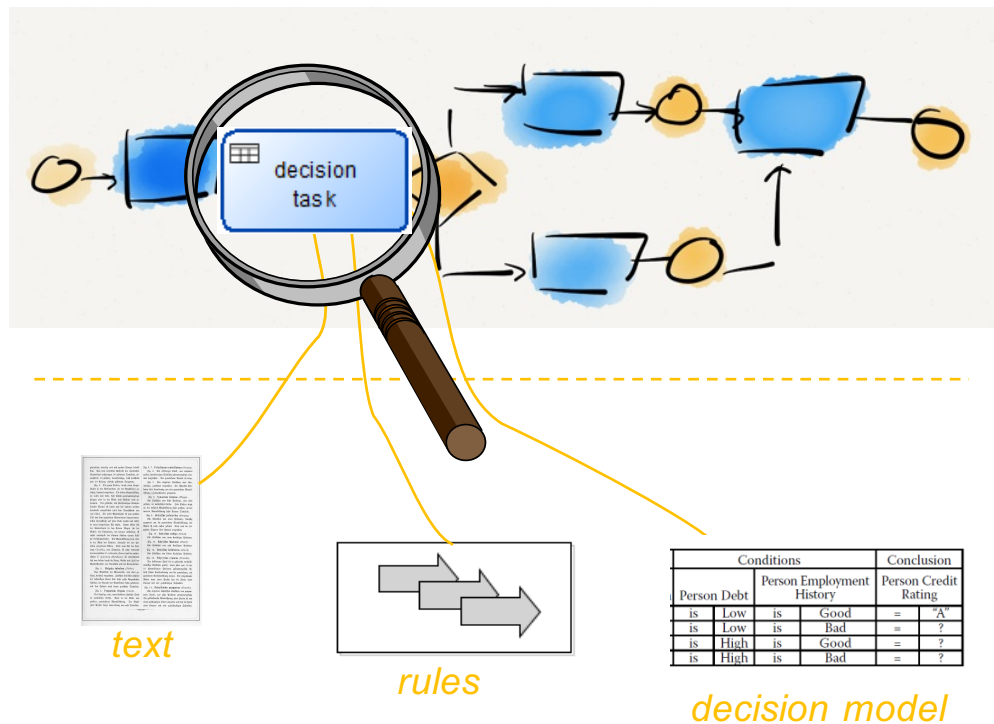
Conditions	1	2	3	4	5	6
1. Type of visit	D	D	H	H	L	L
2. Participating Physician?	Y	N	Y	N	Y	N
Effects						
1. Reimburse 50%		X				
2. Reimburse 70%				X		X
3. Reimburse 90%	X					
4. Impossible or no reimbursement			X		X	

Reimbursement depends on whether the patient visited the doctor's office (D), a hospital (H) or a lab (L) and whether the Doctor is a Participating Physician

Each column represents a rule.

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**
- Separating business decisions from business process tasks
 - simplifies the business process model
 - allows to manage business logic in a declarative form

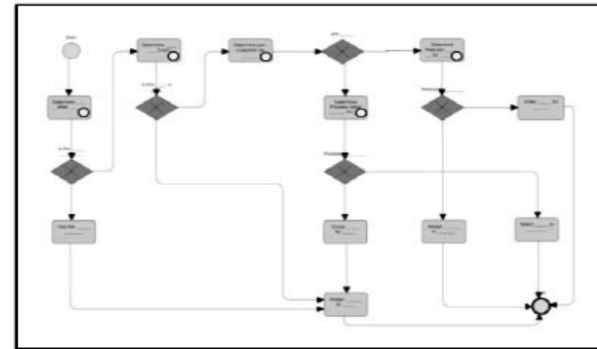
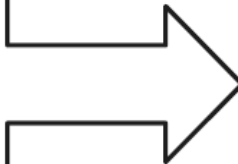
Business Logic / Decision Logic

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 a procedural solution because it prescribes a set of tasks that are carried out in a particular sequence
- 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, because sequence is irrelevant to arriving at the correct result
 - A Decision Table is a declarative solution because it is a set of unordered business logic, not a set of ordered tasks.

Procedural versus Declarative

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

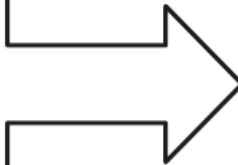


HOW

*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"

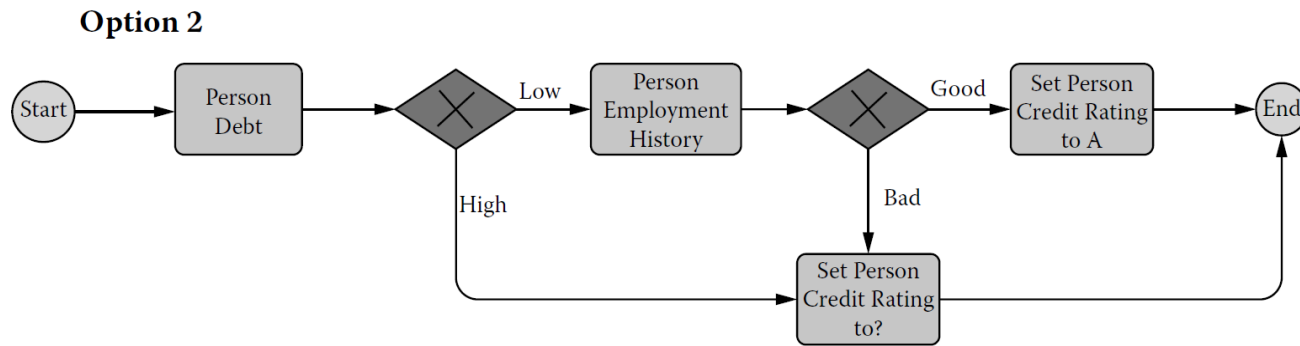
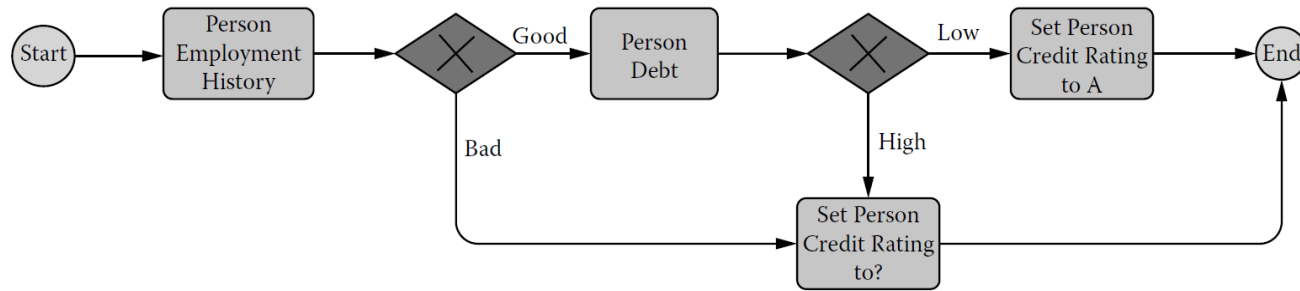
WHAT

*business
logic*

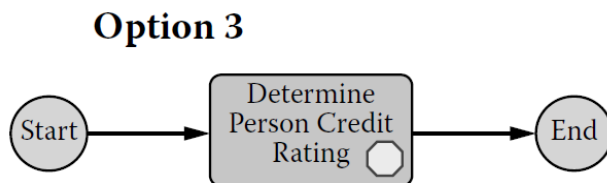
A declarative solution occurs when sequence is irrelevant to the result. The “What” of a unit of work.

(von Halle & Goldberg 2010, p. 67)

Example 1: Declarative vs. Procedural Solutions



Procedural



Declarative

Process Model

Rule Pattern	Conditions				Conclusion	
	Person Debt	Person Employment History		Person Credit Rating		
1	is	Low	is	Good	=	"A"
1	is	Low	is	Bad	=	?
1	is	High	is	Good	=	?
1	is	High	is	Bad	=	?

Decision Table

(von Halle & Goldberg 2010, p. 69)

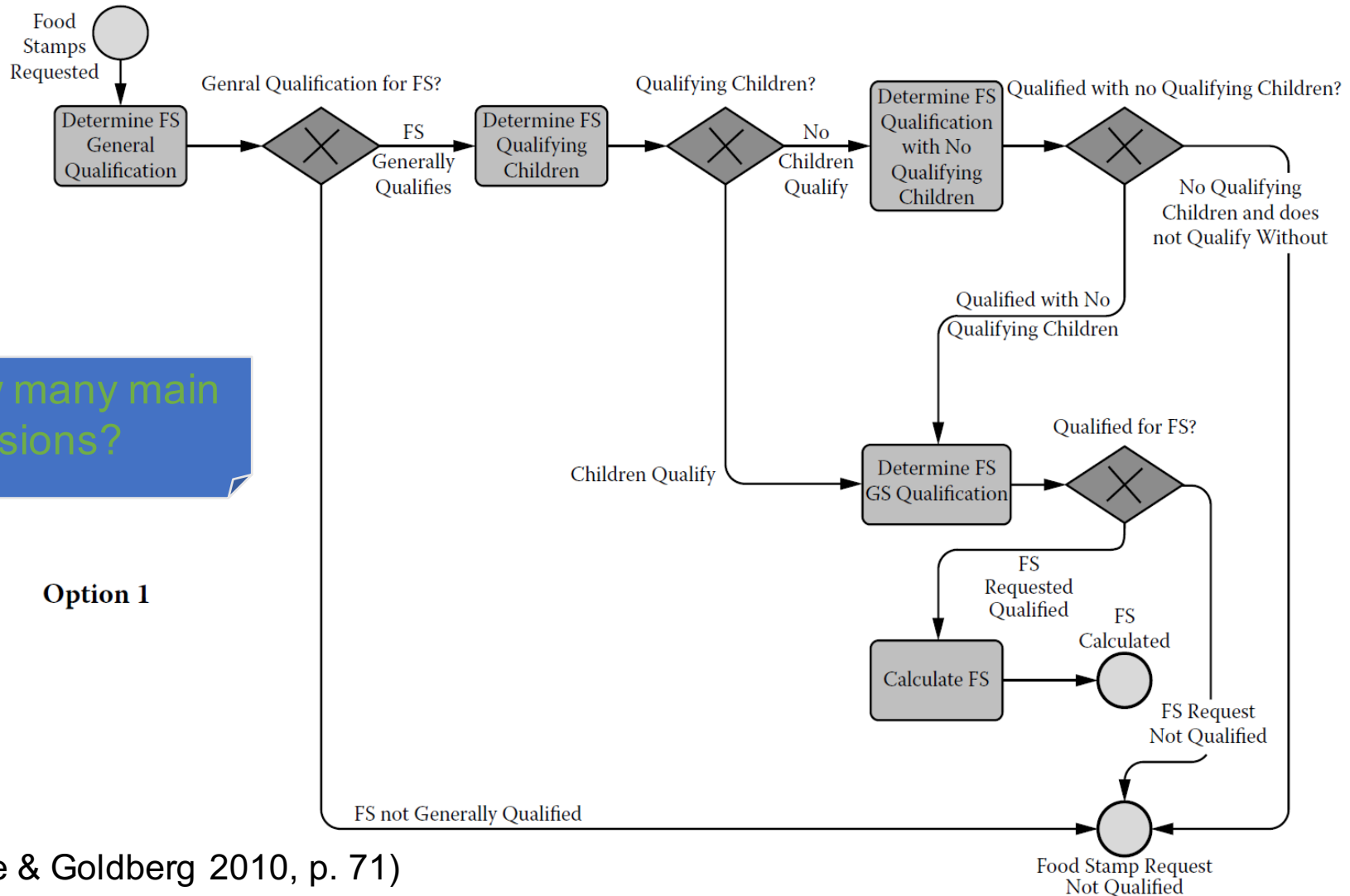
Advantages of Separating Business Processes and Business Logic in Option 3

- The Decision Table implies no particular sequence among the conditions to be tested
- The Decision Table easily highlights all possible combinations of conditions
- To change or add conditions in a business process model is much more cumbersome than doing so in a Decision table
 - If other conditions are needed, additional columns can be added to a decision table

Example 2: Business Logic contained in a Process Model

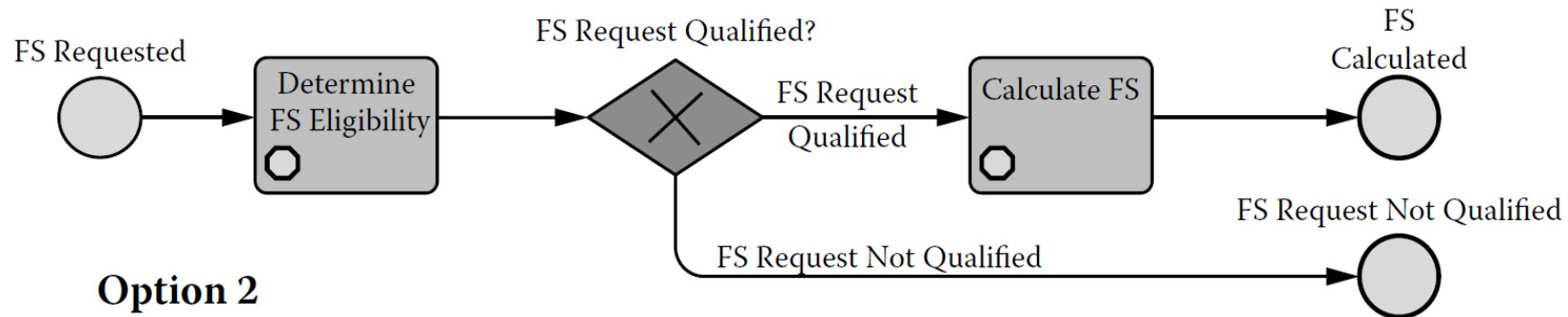
How many main decisions?

Option 1



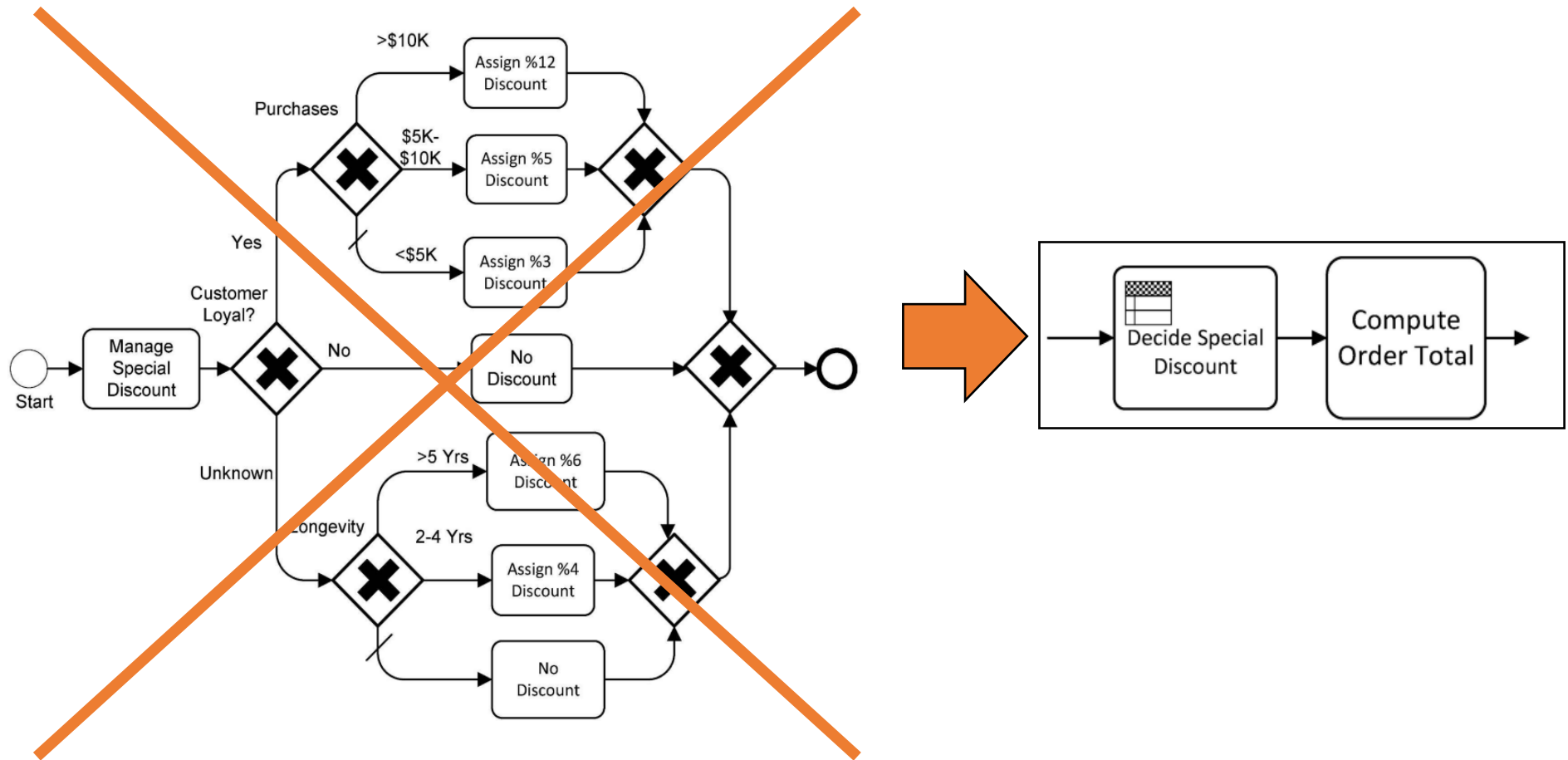
(von Halle & Goldberg 2010, p. 71)

Managing Business Logic separately



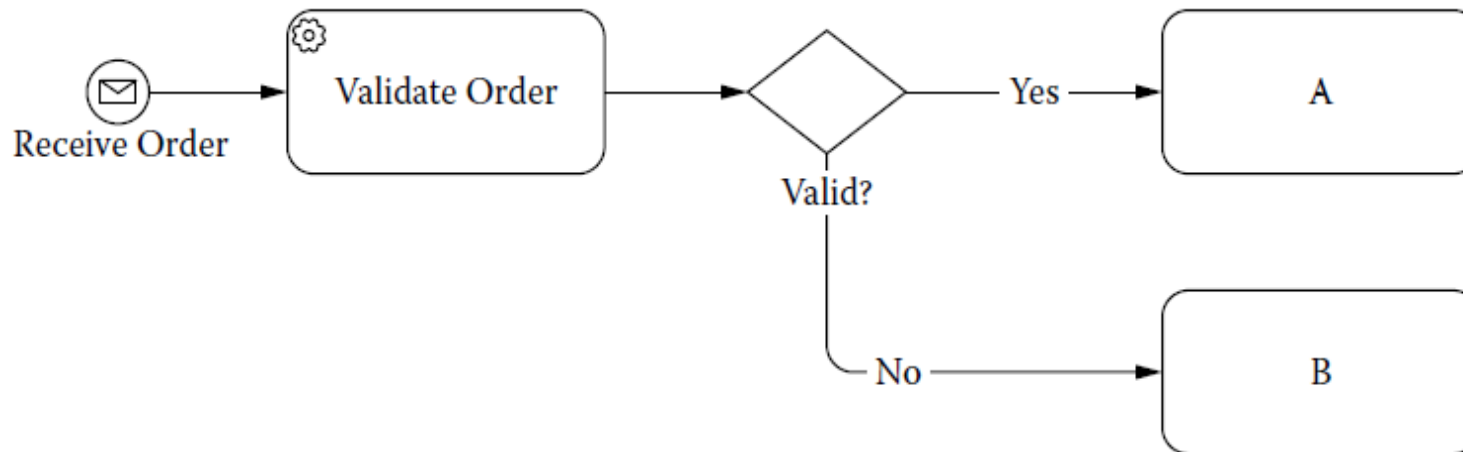
- This solution has two tasks with their Decision Models.
- The Decision Models can be viewed, managed, and executed as one whole set of business logic
- The process model is simplified. The decision logic is a black box evaluating conditions and reaching a conclusion.
- Business Logic can be reused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

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



Integrating the Decision Model with BPMN

- Execution of a decision described by a Decision Model is a particular type of task in BPMN
- In BPMN 2.0 the corresponding task type is called a business rule task
- In the figure below, Validate Order is the decision task. Its logic is described by a Decision Model. The gateway simply tests the output of the decision and routes the flow either to A or B based on the result



(Von Halle & Goldberg 2010, p. 425)

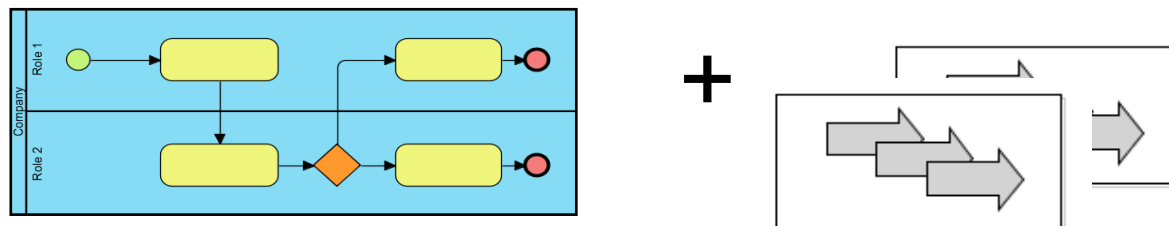
Distinctions between Business Process and Business Decision

<i>Business Process</i>	<i>Business Decision</i>
<ul style="list-style-type: none"> • Procedural in nature 	<ul style="list-style-type: none"> • Declarative in nature
<ul style="list-style-type: none"> • Consists of tasks connected by sequence 	<ul style="list-style-type: none"> • Consists of Rule Families connected by inferential relationships (all independent of sequence)
<ul style="list-style-type: none"> • Is all about how (step-by-step sequence to carry out work) 	<ul style="list-style-type: none"> • Is all about what is to be concluded (the logic leading from conditions to conclusion)
<ul style="list-style-type: none"> • Improvements in business process aim for increased work efficiency 	<ul style="list-style-type: none"> • Improvements in a business decision aim for smarter business logic
<ul style="list-style-type: none"> • Represented best in a procedural business process model 	<ul style="list-style-type: none"> • Represented best in a declarative Decision Model

(von Halle & Goldberg 2010, p.70)

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



Decision-Aware Business Processes

Achieving Business Excellence by Managing Decision Logic Separately

- von Halle and Goldberg argue that operational excellence alone is insufficient for sustainable competitive advantage.
- Key business processes must not only be efficient and consumer-friendly but also smart and agile
 - Business processes become agile when declarative business decisions are separated from procedural business process tasks
 - Business processes become smart when the business decisions are governed appropriately by business leaders
- When the business leadership clearly understands the business logic behind the business decisions, the impact of those decisions can be ascertained, and the business can quickly and easily make adjustments.

Literatur

- Von Halle, B., & Goldberg, L. (2010). *The Decision Model: A Business Logic Framework Linking Business and Technology*. CRC Press Auerbach Publications.
- Tom Debevoise and James Taylor (2014) *The Microguide to Process and Decision Modeling in BPMN/DMN*.