Basic modeling techniques

1 Structured procedural / behavioral models, structured design

1.1 Basic structure elements / components

Sequence
Selection (alternative, test)
Repetition (iteration)

Block (e.g. then block, else block)
Partial process (modular substructure, subprogram)

1.2 Structuring by nesting: LIFO principle

Nested BEGIN-END components

Böhm Jacopini proof 1966 shows the sufficiency of sequence, selection (alternative / test) and repetition (iteration) for every mathematically describable process.

Böhm, Corrado; Jacopini, Giuseppe:
Flow diagrams, Turing machines and languages with only two formation rules. *Communications of the ACM* 9(1966) 5, 366-371.

1.2 Structuring by nesting: LIFO principle

1.2 Unstructured example (Scheer, Business Process Engineering, 1994: 404)

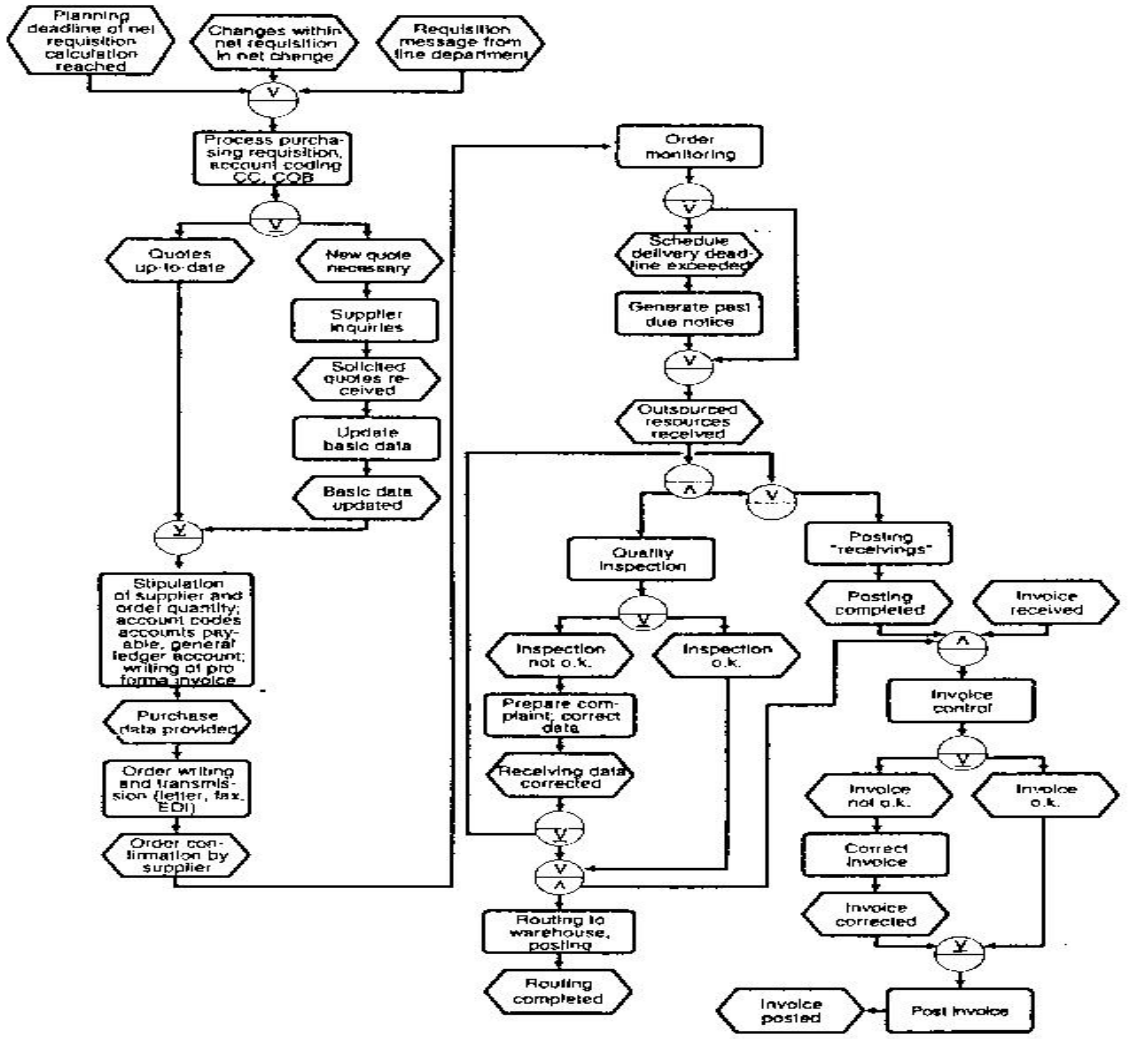
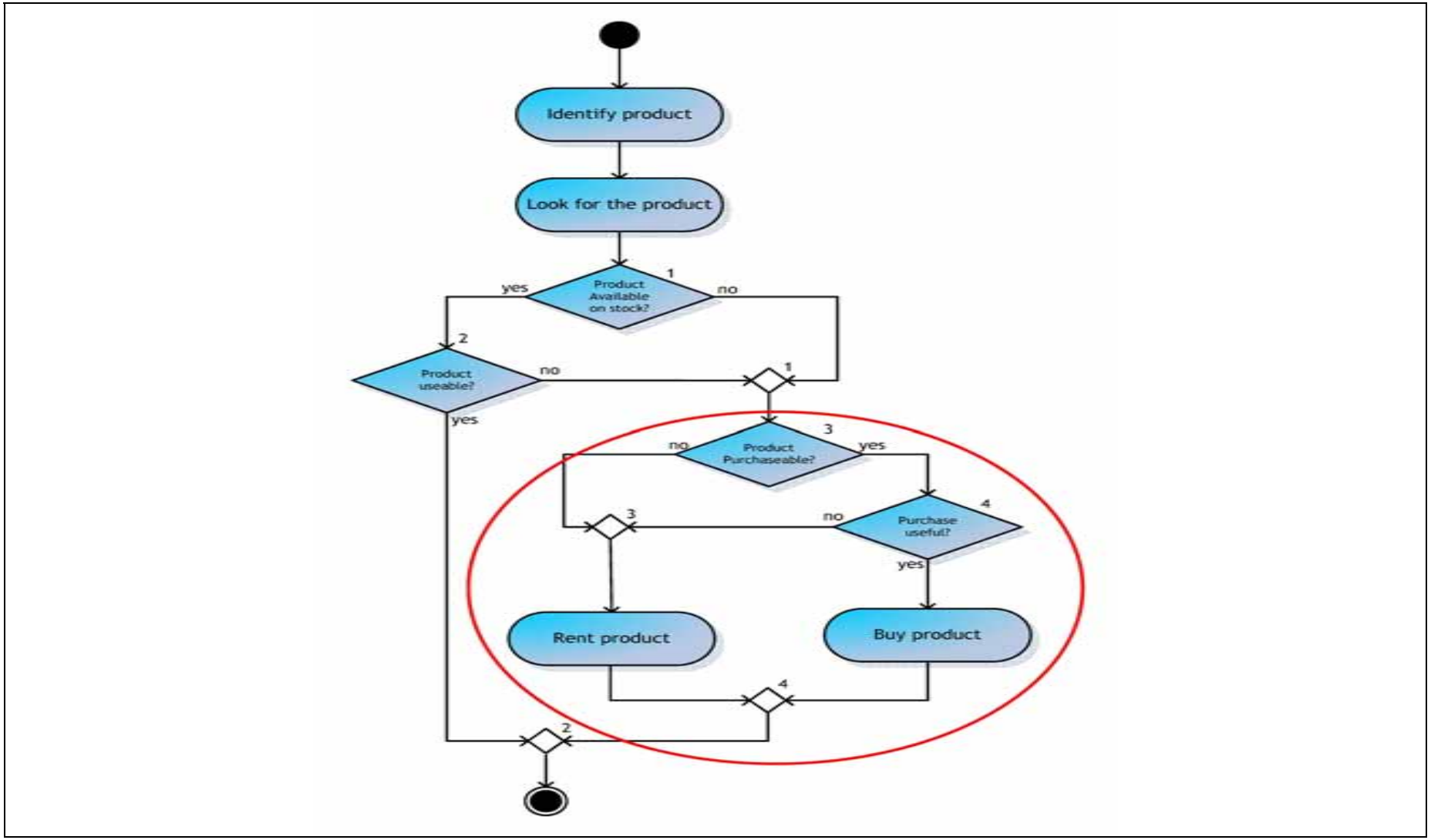
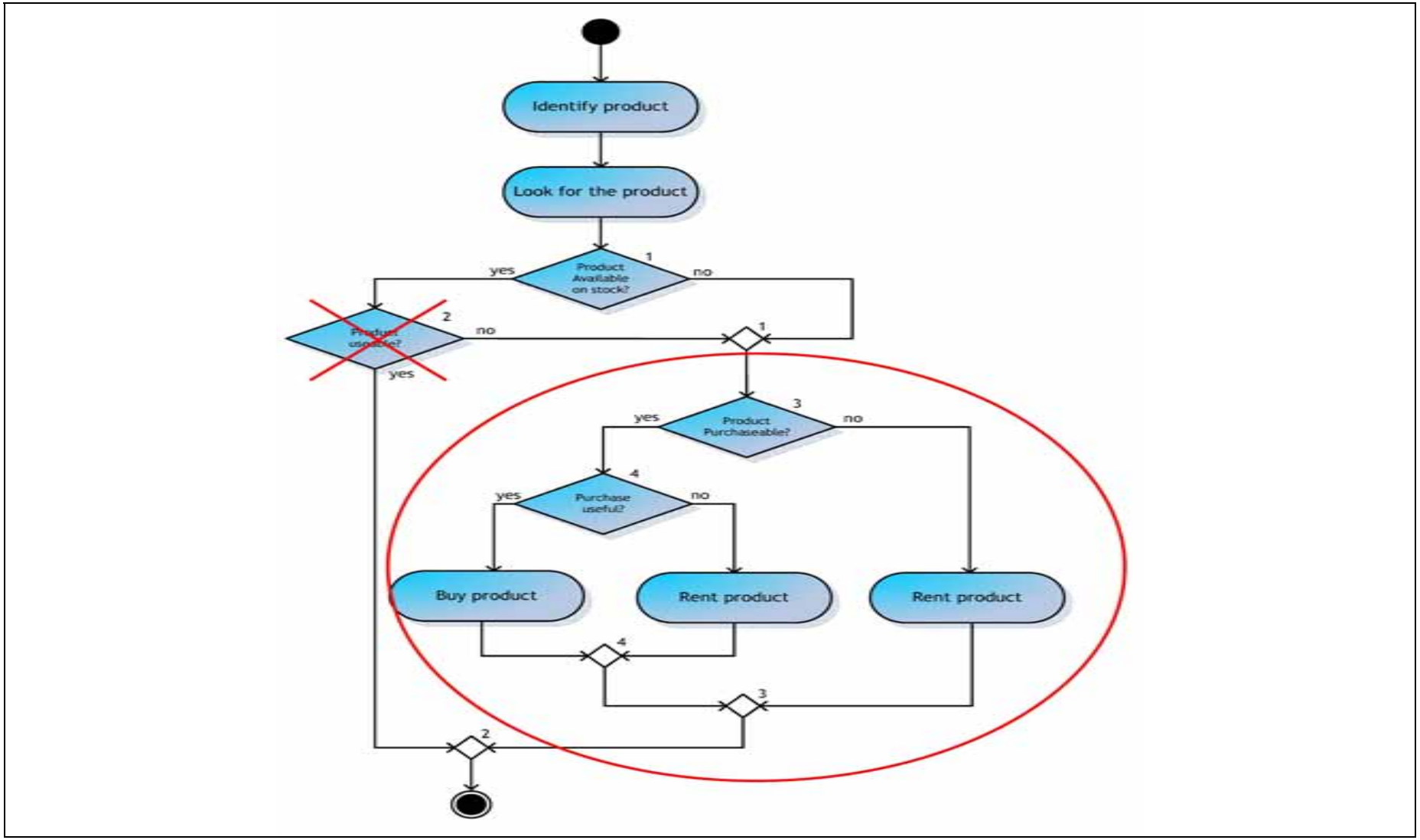


Fig. B.II.09: Event-driven process chain for inbound logistics

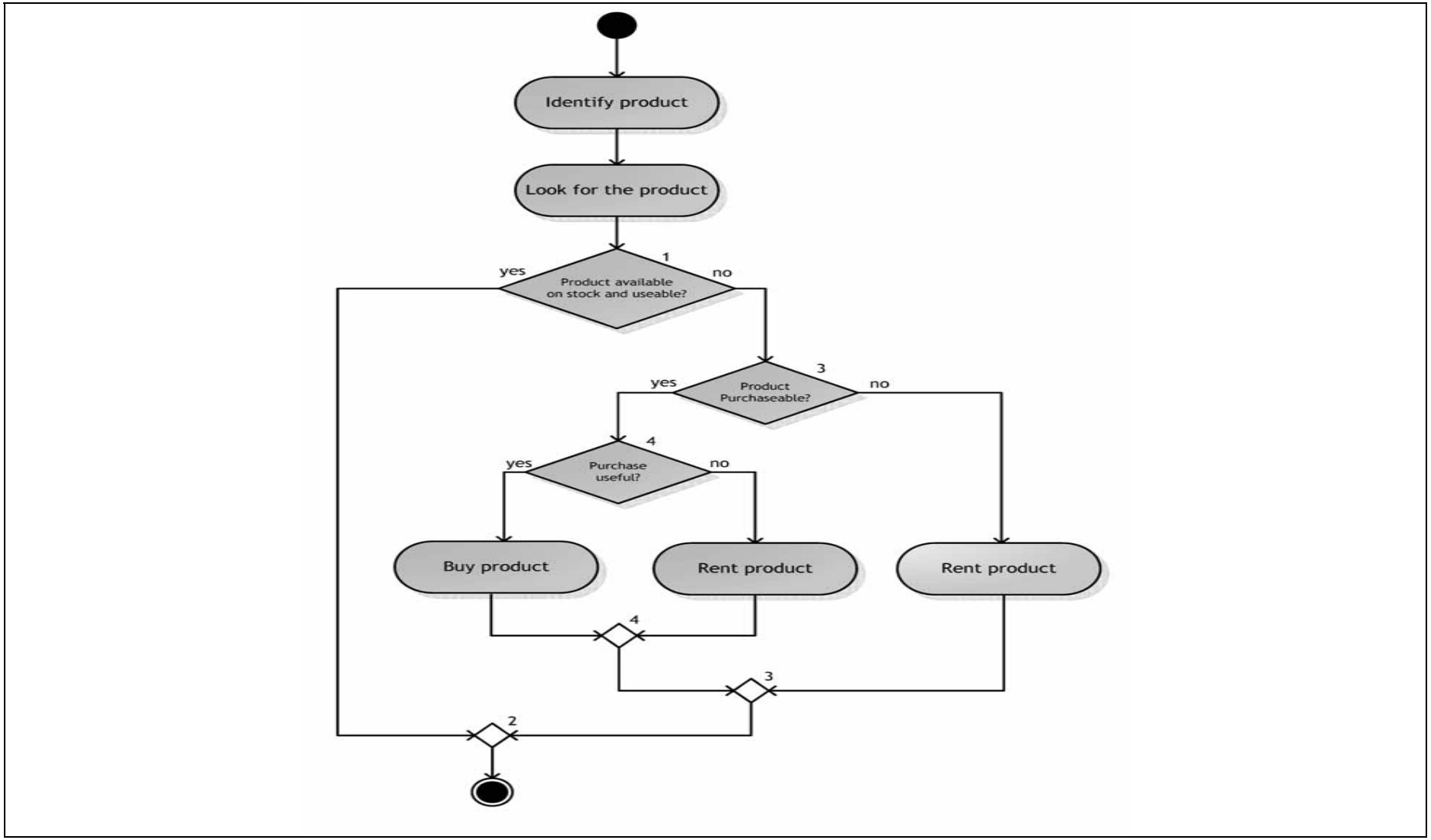
1.2 Unstructured example (Holl / Valentin 2004)



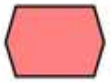
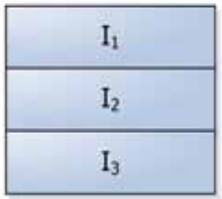
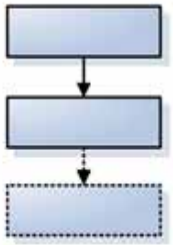
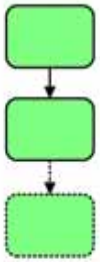
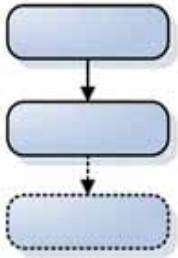
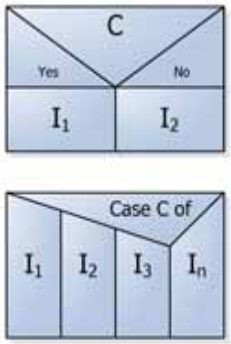
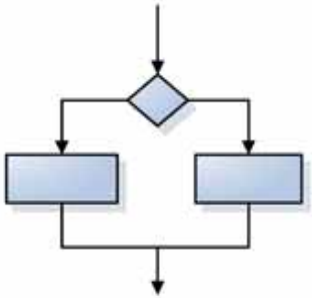
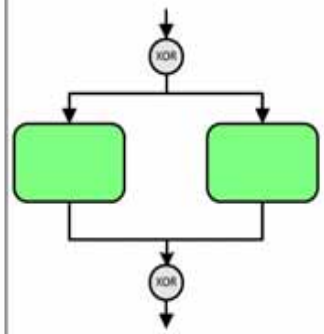
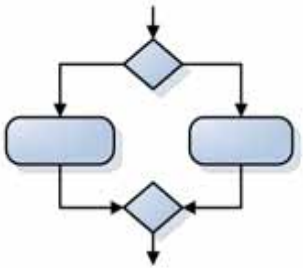
1.2 Structuring (Holl / Valentin 2004)



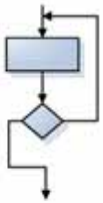
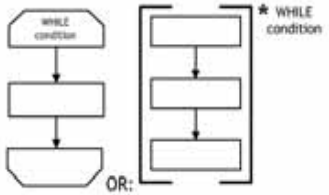
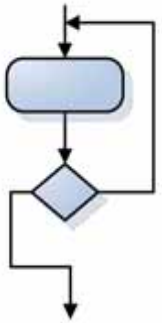
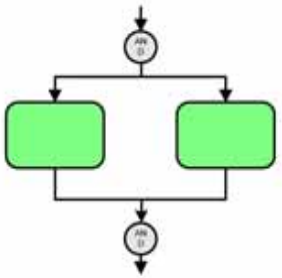
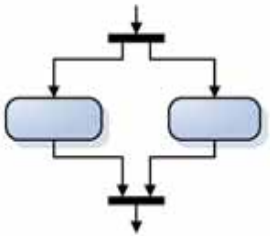
1.2 Structured example (Holl / Valentin 2004)



1.3 Notations (Grünauer 2008: 102 according to Holl / Valentin 2004)

Umbrella term	Structure diagram	Control flow chart	eEPC	UML activity diagram
Modular sub-structure				No symbol
Event	No symbol	No symbol		No symbol
Sequence				
Alternative/Decision				

1.3 Notations (Grünauer 2008: 102 according to Holl / Valentin 2004)

Iteration: DO-WHILE REPEAT- UNTIL, WHILE,		Old: unstructured  New: structured 	No symbol	
Parallelism	No symbol	No symbol		
Process unit				

1.4 Complex conditions: decision table (conditions and actions)

1.4 Complex conditions: decision table

Selection of shipment types

	1	2	3	4	5	6
Inland	J	J	J	J	N	N
Dringlich	J	J	N	N	J	N
Gewicht < 10 Kg	J	N	J	N	-	-
Normal			X			
Eilsendung	X					
Lkw-Transport				X		
Luftfracht		X			X	
Bahn-Transport						X

1.4 Complex conditions: decision table

CRM: selection of advertisement types depending on customer types

Interessensgrad	-	O	O	O	+	+	+
- keines O latent + gezielt							
Kenntnisstand	x	-	O	+	-	O	+
- ohne Vorkenntnisse O Überblickswissen + sehr genau							
KV legt Wert auf Beratung des Kunden durch Pre-Service?	x	J N	x	x	J N	x	x
Akquisemaßnahmen							
Kunden durch Pre-Service beraten		✓			✓		
Kunden durch KV beraten		✓			✓		
Infomaterial versenden (3.1.1)			✓			✓	
DATEVasp Angebot an Kunden versenden (3.1.2)				✓		✓	✓
Prozessabbruch	✓						

J= Ja, N= Nein, x= beliebig, ✓= zu wählende Aktion

2 Static object-oriented modeling: UML class diagram

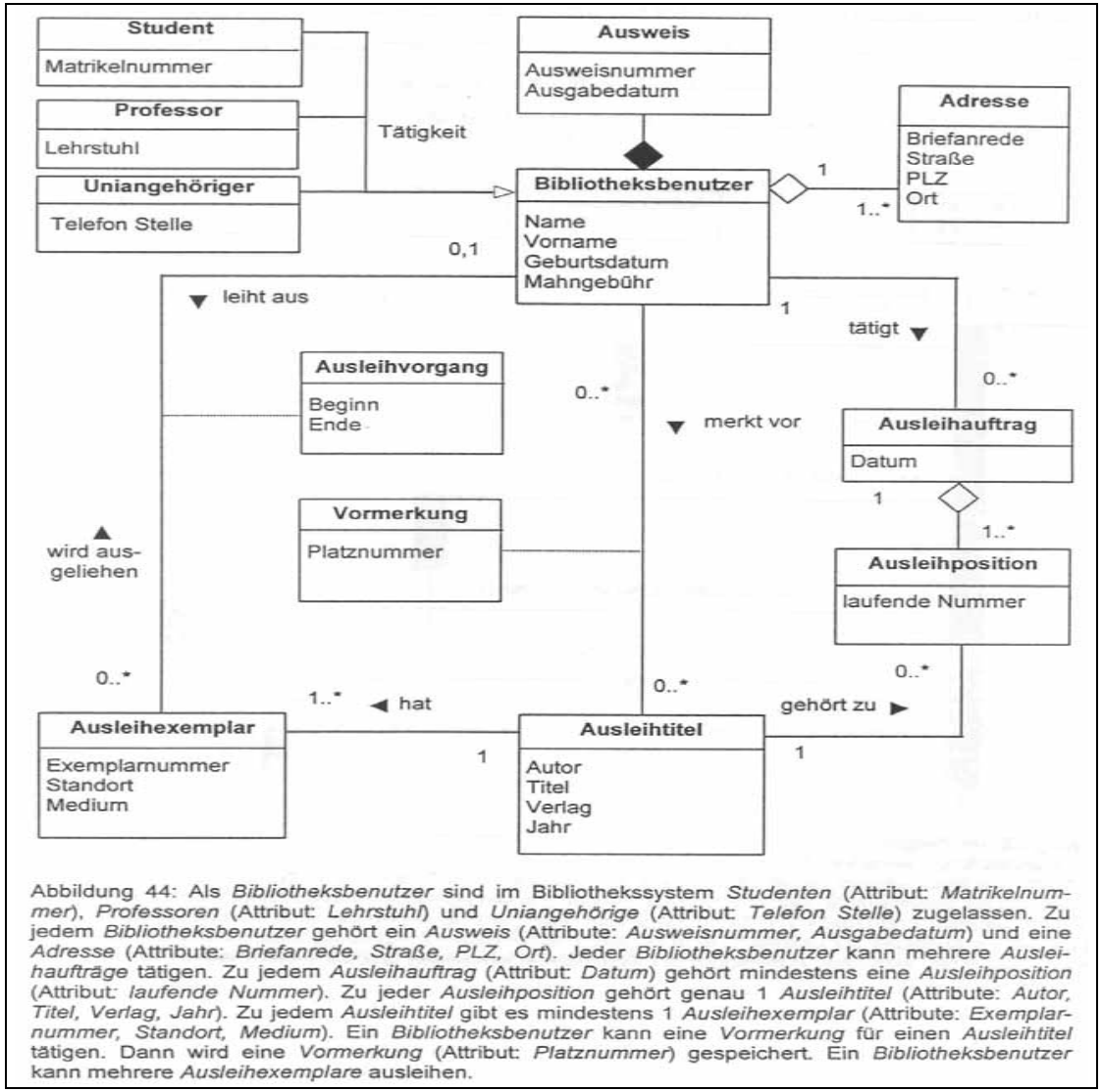


Abbildung 44: Als *Bibliotheksbenutzer* sind im Bibliothekssystem *Studenten* (Attribut: *Matrikelnummer*), *Professoren* (Attribut: *Lehrstuhl*) und *Uniangehörige* (Attribut: *Telefon Stelle*) zugelassen. Zu jedem *Bibliotheksbenutzer* gehört ein *Ausweis* (Attribute: *Ausweisnummer, Ausgabedatum*) und eine *Adresse* (Attribute: *Briefanrede, Straße, PLZ, Ort*). Jeder *Bibliotheksbenutzer* kann mehrere *Ausleihaufträge* tätigen. Zu jedem *Ausleihauftrag* (Attribut: *Datum*) gehört mindestens eine *Ausleihposition* (Attribut: *laufende Nummer*). Zu jeder *Ausleihposition* gehört genau 1 *Ausleihtitel* (Attribute: *Autor, Titel, Verlag, Jahr*). Zu jedem *Ausleihtitel* gibt es mindestens 1 *Ausleihexemplar* (Attribute: *Exemplarnummer, Standort, Medium*). Ein *Bibliotheksbenutzer* kann eine *Vormerkung* für einen *Ausleihtitel* tätigen. Dann wird eine *Vormerkung* (Attribut: *Platznummer*) gespeichert. Ein *Bibliotheksbenutzer* kann mehrere *Ausleihexemplare* ausleihen.

2 Static object-oriented modeling: UML class diagram

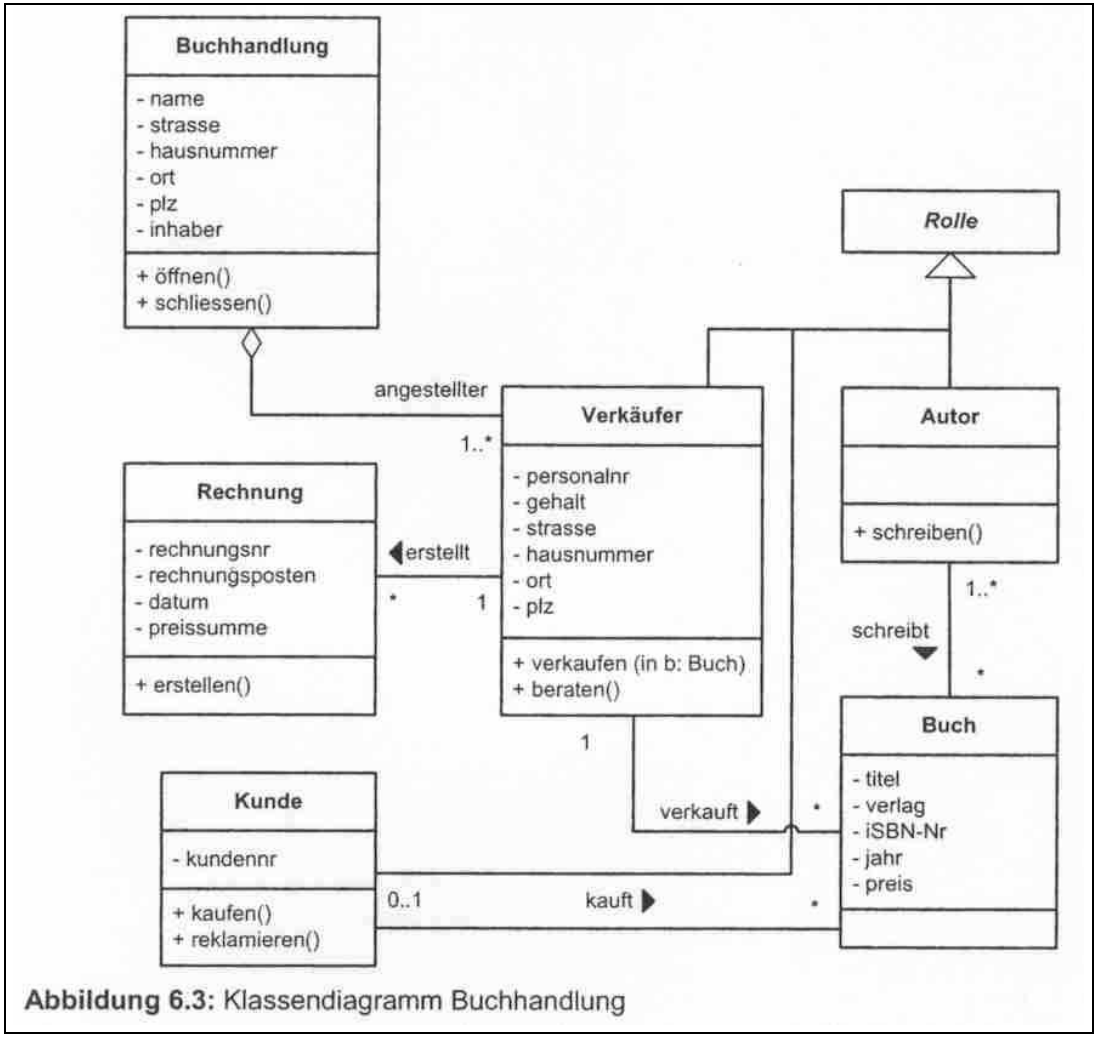


Abbildung 6.3: Klassendiagramm Buchhandlung

(Rupp, Hahn, Queins et al.: UML2 glasklar. München 2005, p. 100)

3 Dynamic object-oriented models: UML sequence diagram

Call: Return Class.Method(Parameter)