

# ***Business Rules***

*Knut Hinkelmann*

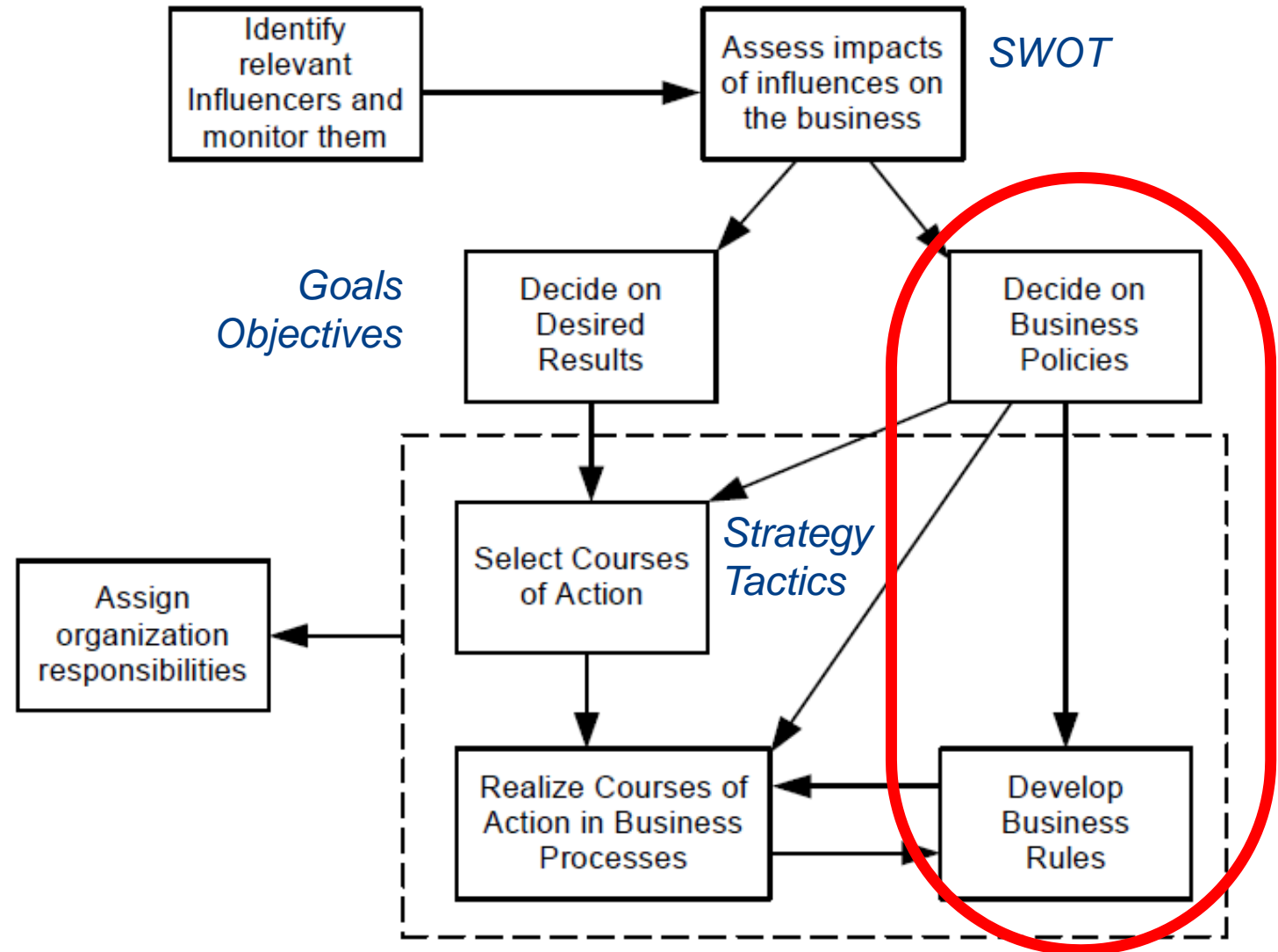


## *Literature*

This chapter is mainly based on the following literature:

- Bridgeland David M.; Zahavi, Ron (2009): Business Modeling - A Practical Guide to Realizing Business Value. Morgan Kaufman Publishers. Chapter 6
- OMG Semantics for Business Vocabulary and Business Rules – SBVR, <http://www.omg.org/spec/SBVR/1.0/PDF>

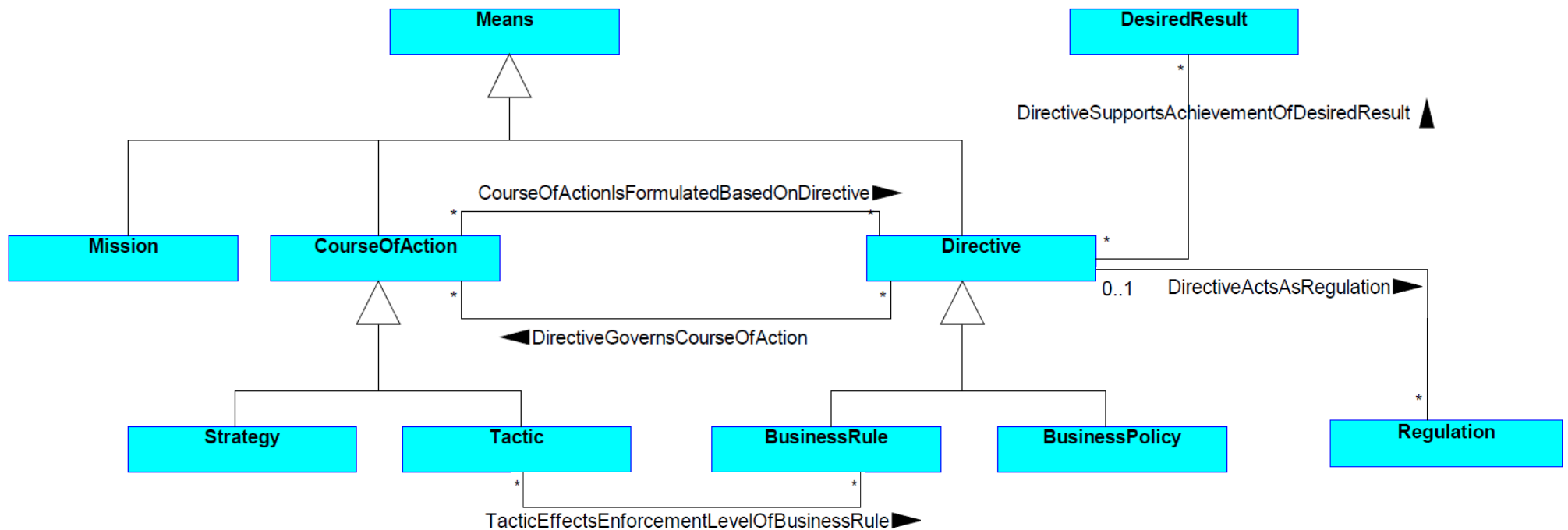
# Logical Progression Through the Business Motivation Model



(OMG-BMM 2010, p. 17)

# Directives

- Directives indicate how the Courses of Action should, or should not, be carried out —they *govern* Courses of Action.
- Example: the Business Rule “Pizzas may not be delivered beyond a radius of 30 miles” governs the Strategy “Deliver pizzas to the location of the customer's choice.”
- Directive includes two concepts: Business Policy and Business Rule



## ***Business Rules - Definitions***

**A Business Rule** is a directive, intended to influence or guide business behavior, in support of Business Policy that has been formulated in response to an Opportunity, Threat, Strength, or Weakness.

([www.brportal.org](http://www.brportal.org))

**A business rule** is a statement that defines or constrains some aspect of the business. It is intended to assert business structure or to control or influence the behavior of the business.

([www.businessrulesgroup.org](http://www.businessrulesgroup.org))

## *Examples of Business Rules*

**Charging for Orders:** It is obligatory that a party is charged for a menu item if the party orders the menu item and the menu item is served to the party

**Splitting Bills:** It is permitted that a server may split a bill only if the party agrees to bill splitting and the bill is split equally.

**Greenback Only:** It is obligatory that each cash payment employ US currency

**No Checks:** It is prohibited that a payment employ a personal check

**VISA Only:** It is permitted that a payment employ a credit card only if the credit card is backed by VISA™.

## ***Structural and Operative Business Rules***

- A first distinction is between
  - ◆ ***Operative*** Business Rules
  - ◆ ***Structural*** Business Rules
- **Operative** Business Rules describe *what should be*
  - ◆ Operative Rules can be violated and must be enforced
- **Structural** Business Rules are definitional, they describe *what is*
  - ◆ Structural Business Rules cannot be violated, they are always true

## Kinds of Structural and Operative Business Rules

There are three ways to phrase each of the the two kinds of Business Rules

- Operative Business Rules describe *what should be*
  - ◆ Obligation Statements
  - ◆ Prohibitive statements
  - ◆ Restrictive Permissive Statements
- Structural Business Rules are definitional, they describe *what is*
  - ◆ Necessity Statements
  - ◆ Impossibility Statements
  - ◆ Restricted Possibility Statement

Operative	Structure
Obligation	Necessity
Prohibition	Impossibility
Restrictive Permission	Restricted Possibility



## Obligation Statements

- Many business rules oblige people (or software applications) to ensure that something is true. This is expressed by obligation statements.
- Structure of a simple obligation statement:

*It is obligatory that* mandatory situation

- Example of an obligation statement:

**Greenback Only:** It is obligatory that each cash payment employ US currency

- The obligation rules says that the persons (or software applications) have the obligation to make the mandatory situation come true.
  - ◆ An obligation statement implicitly acknowledges the possibility that a person (or software application) might attempt not to follow the rule.

## Obligation Statements

- In general, obligation statements can include a condition

*It is obligatory that* mandatory situation *if* condition

- The condition is the scope of when the mandatory situation actually applies
- Example:

**Greenback Only B:** It is obligatory that each cash payment employ US currency if the payment amount of the cash payment is at least 20 dollars

## Prohibitive Statements

- Prohibitive statements are meant to prevent a specific situation.

*It is prohibited that* banned situation

- Prohibitive statements can have conditions, too.

*It is prohibited that* banned situation *if* condition

- Examples:

**No Checks:** It is prohibited that a payment employ a personal check

**No Loonies:** It is prohibited that a cash payment employ Canadian currency

**No Loonies B:** It is prohibited that a cash payment employ Canadian currency if the cash payment is applied to a bill and the amount of the bill is at least 20 US dollars

## Restricted Permissive Statements

- A restricted permissive statement allows something but restricts the condition under which it is allowed

*It is permitted that* permitted situation *only if* restriction

- Example:

**Euros Allowed:** It is permitted that a cash payment employ European Union currency only if the cash payment is applied to a bill and the amount of the bill is at most 100 US dollars

- In contrast to the conditions in obligation and prohibitive statement, which are optional, the restriction in the permissive statement is required (because otherwise the whole rule would be unnecessary)

## ***Categories of Operative Business Rules***

- The distinction between Obligation, Prohibitive and restrictive Permissive Statement is because of the form
- Another classification can be made because of what the rules express. A common classification distinguishes 3 categories of rules
  - ◆ Constraints
    - Rules making assertions that have to be true, they reject any event that would cause a violation to occur
  - ◆ Inference Rules
    - Rules deriving new information from existing information
  - ◆ Process Rules
    - Rules enabling, enforcing or preventing actions

## Structural Rules: Necessity Statements

- A necessity statement represents a definition, it is something that remains true.

*It is necessary that* assured situation

*It is necessary that* assured situation *if* condition

- Necessity statements express structural business rules that express
  - ◆ truth about the world or
  - ◆ truth about the way the organisation defines the world
- Examples:

**Single Payment Network:** It is necessary that a credit card is backed by exactly one payment network

**Large Party:** It is necessary that a party is large if the size of the party is at least 8.

A necessity statement looks similar to an obligation statement, but in contrast to an obligation statement it cannot be violated and need not be enforced.

## Structural Rules: Impossibility Statements

- Impossibility statements are structural rules. They state what is always false

*It is impossible that* incorrect situation

- Impossibility statements can have conditions.

*It is impossible that* incorrect situation *if* condition

- Examples:

**Single Payment Network B:** It is impossible that a credit card is backed by two payment networks.

**Vegetarian Menu Items:** It is impossible that a vegetarian menu includes an ingredient if the ingredient is meat or the ingredient is fish

## Restricted Possibility Statements

- A restricted possibility statement is a structural statement describes what can be true under certain conditions

*It is possible that* suitable situation *only if* restriction

- Example:

**Vegetarian Menu Items B:** It is possible that a vegetarian menu includes an ingredient only if the ingredient is not meat or the ingredient is not fish



# The Six Business Rules Forms

Operative Rule Form	Operative Rule Example	Structural Rule Form	Structural Rule Example
Obligation statement	<i>It is obligatory that each cash payment employ US currency if the cash payment is applied to a bill and the amount of the bill is at least 20 dollars.</i>	Necessity statement	<i>It is necessary that a party is large if the size of the party is at least 8.</i>
Prohibitive statement	<i>It is prohibited that a cash payment employ Canadian currency if the cash payment is applied to a bill and the amount of the bill is at least 20 dollars.</i>	Impossibility statement	<i>It is impossible that a vegetarian menu item includes an ingredient if the ingredient is meat or the ingredient is fish.</i>
Restricted permissive statement	<i>It is permitted that a cash payment employ European Union currency only if the cash payment is applied to a bill and the amount of the bill is at most 100 dollars.</i>	Restricted possibility statement	<i>It possible that a vegetarian menu item includes an ingredient only if the ingredient is not meat and the ingredient is not fish.</i>

should be true but can be violated and must be enforced

always true by definition, cannot be violated

what should not be by policy

something that cannot be true by definition

what is permitted

what is possible



## What should a Rule say?

- Business Rules should be concerned only with the conditions that must apply in a defined state
- In particular, a business Rule should define what should be the case and should **not** prescribe
  - ◆ *Who* invokes the rule
    - This is usually described in a use case or a process description
  - ◆ *When* the rule is executed
    - This is usually described in a business event, use case or a process description
  - ◆ *Where* the rule executes
    - This will be defined in the design
  - ◆ *How* the rule is implemented
    - This will be defined in the design
  - ◆ *How* the rule is enforced
    - This will be defined by the enforcement level

## *Places, People and Time in Business Rules*

- Consider the rule

**Bonus rule:** It is obligatory that during the final quarter, all managers based in Texas receive a bonus.

What does it say about the who, when and where?

## ***Rule Violations***

- A business rule is said to be violated, when an event or state occurs that should not, according to the rule.
- An operative rule can be violated – a structural rule can not
- Examples:
  - No Checks:** It is prohibited that a payment employ a personal check
  - Vegetarian Menu Items B:** It is possible that a vegetarian menu includes an ingredient only if the ingredient is not meat or the ingredient is not fish
- How to react on rule violations is defined by rule enforcement

## ***Rule Enforcement***

- An operative business rule has an enforcement level, which indicates the severity of action imposed to put or keep a rule in force
- Example:

**Greenback Only:** It is obligatory that each cash payment emply US currency

- ◆ The rule can be strictly enforced with severe penalties (strict constraint) or be merely a recommendation (guideline)
- ◆ It can be enforced by the servant or by the restaurant manager

## ***Examples of Enforcement Levels***

The following tables from the Business Motivation Model shows possible ranges of enforcement levels from “strictly enforced” to “guideline”

<b>Value</b>	<b>Meaning</b>
<b>strictly enforced</b>	If the rule is violated, the penalty is always applied..
<b>deferred enforcement</b>	Strictly enforced, but enforcement may be delayed — e.g., waiting for resource with required skills.
<b>pre-authorized override</b>	Enforced, but exceptions are allowed, if the exception is authorized before the rule is violated.
<b>post-justified override</b>	An exception is allowed to the rule if the exception is approved after the violation. If the rule is violated and an exception is not later approved, the violator may be subject to sanction or other consequences.
<b>override with explanation</b>	The rule may be violated as long as the violator provides an explanation
<b>guideline</b>	The rule is a suggestion, but not enforced.

## Separating Enforcement Levels from Rule Statements (1)

- An operative itself rule does not specify
  - ◆ how strict it has to be followed
  - ◆ who enforces the rule
  - ◆ what happens when it is violated
- The level of enforcement is separated from the rule statement itself
- Negative Example:

**Nonrule 3:** It is obligatory that each menu include at least two vegetarian entrees, unless an exception is authorized in advance by Mykonos Headquarters

- Positive Example:

**2 Vegetarian Entrees:** It is obligatory that each menu include at least two vegetarian entrees

*Enforcement level:* pre-authorized

## Separating Enforcement Levels from Rule Statements (2)

- Advantages of separating enforcement levels from rule statements:
  - ◆ enforcement level of a rule usually changes more often than the rule itself
  - ◆ a rule can have different enforcement levels for different parts of the organisation
    - Example: As there are more vegetarians in California than in Texas, the Mykonos management might decide to set the enforcement level for the "2 Vegetarian Entrees" to *strict* for California restaurants and to *override* for restaurants in Texas.
- Enforcement levels influence behaviour rather than control it
  - ◆ A strictly enforced constraint that is violated means "Error"
  - ◆ A guideline that is violated means "Warning"



## ***Usage of Business Rules***

### ■ Part of the ***Business Motivation***

- ◆ derived from Business Policies
- ◆ governing Strategies
- ◆ ...

### ■ Part of ***Business Processes***

- ◆ constraining behaviour in activities
- ◆ guiding decision making

### ■ Part of ***Software Systems***

- ◆ Integrity constraints
- ◆ Automating decision making

## *Distinguishing Business Policy and Business Rule*

- Compared to a Business Rule, a **Business Policy** tends to be
  - ◆ less structured, less discrete, and not focused on a single aspect of governance or guidance.
  - ◆ less compliant with standard business vocabulary, and less formally articulated.
- In contrast to a Business Policy, a **Business Rule**
  - ◆ is highly structured and is carefully expressed in terms of standard vocabulary.
  - ◆ should be discrete and atomic; that is, represent only a single aspect of governance or guidance .
- Some Business Rules could be automated in software; some are actionable only by people.
- An operative Business Rules must be directly enforceable, Business Policies in general are not directly enforceable.

## *Directly Enforceable Rules*

- A rule is directly enforceable if someone who sees some behavior can decide whether the rule is violated

- Example:

- ◆ This rule is not directly enforceable

**Nonrule 1:** It is obligatory that the gratuity is at least 15% if the gratuity is applied to a bill and the bill is incurred by a party and the party is large.

- ◆ This rule is directly enforceable

**Large party gratuity:** It is obligatory that the gratuity is at least 15% if the gratuity is applied to a bill and the bill is incurred by a party and the party is greater than 7 people.

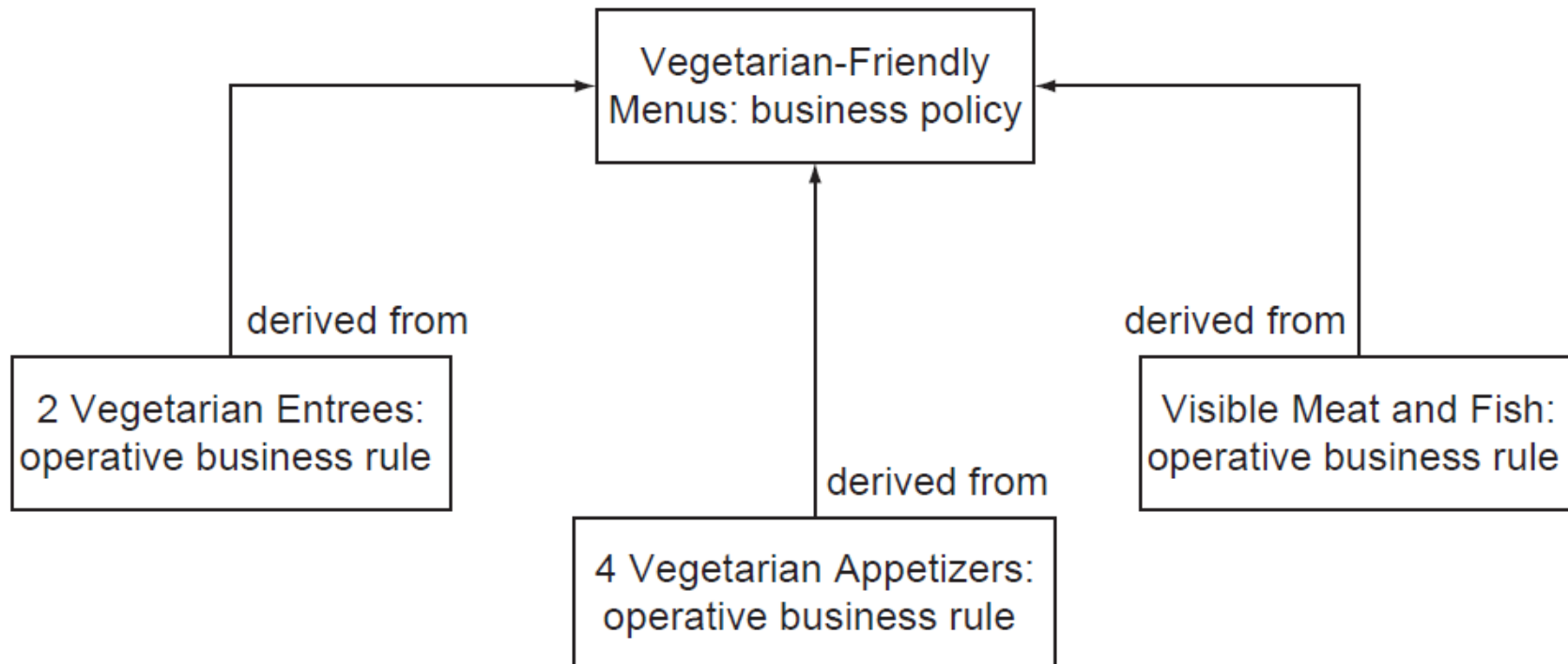
Alternatively, the noun concept large party could be defined as a party with 7 or more people

## Examples of Business Policy (and Rules)

Source	Business Policy
EU-Rent	<p>Depreciation of rental cars must be minimized.</p> <p>Compare the (non-actionable) Business Policy with related (actionable) Business Rules:</p> <ul style="list-style-type: none"> <li>• <i>The Car assigned to a Rental must be: at the time of assignment, of the available Cars in the requested Car Group, the one with the lowest mileage.</i></li> <li>• <i>A Rental cannot be extended by phone if the Car's odometer reading is greater than (next service mileage – 500).</i></li> </ul>
EU-Rent	<p>Rental payments must be guaranteed in advance.</p> <p>Compare with Business Rule based on this policy:</p> <ul style="list-style-type: none"> <li>• <i>A provisional charge for the estimated cost of the Rental must be made against a valid credit card held by the Renter before the Car is handed over.</i></li> </ul>
EU-Rent	Rentals must comply with relevant laws and regulations of all countries to be visited.
Pizza Company	Safety in the kitchen, and in the streets, comes first.
e-Business Company	A business representative will personally contact each customer who makes a complaint.

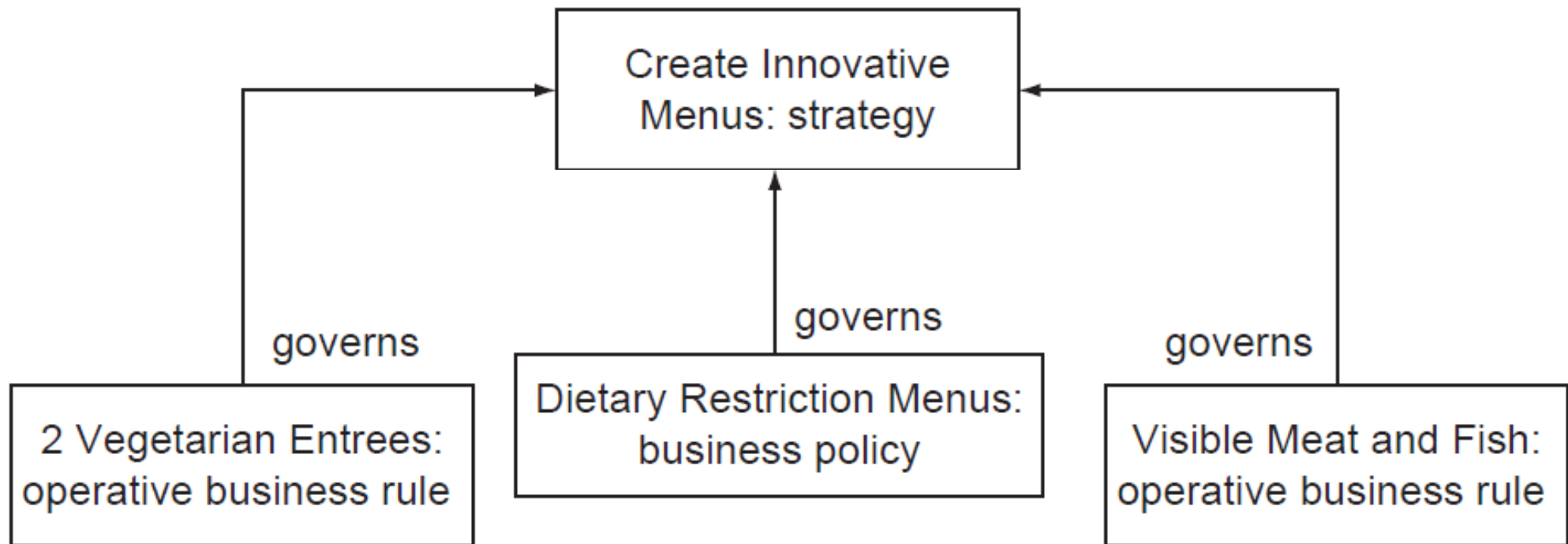
## Business Policies and Business Rules

- A Business Policy is less precise than a Business Rule and more subject to interpretation.
- A Business Policy can be the reason why a Business Rule exists.



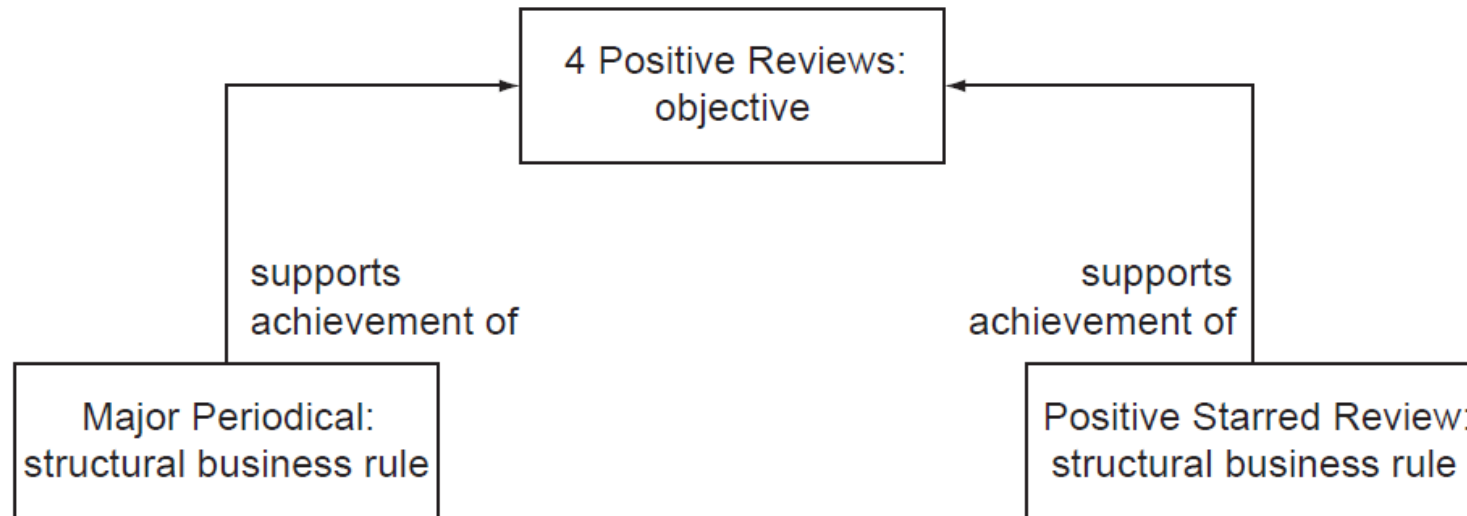
## Directives and Courses of Action

- Business Policies and Business Rules can govern Strategies



## Directives and Desired Results

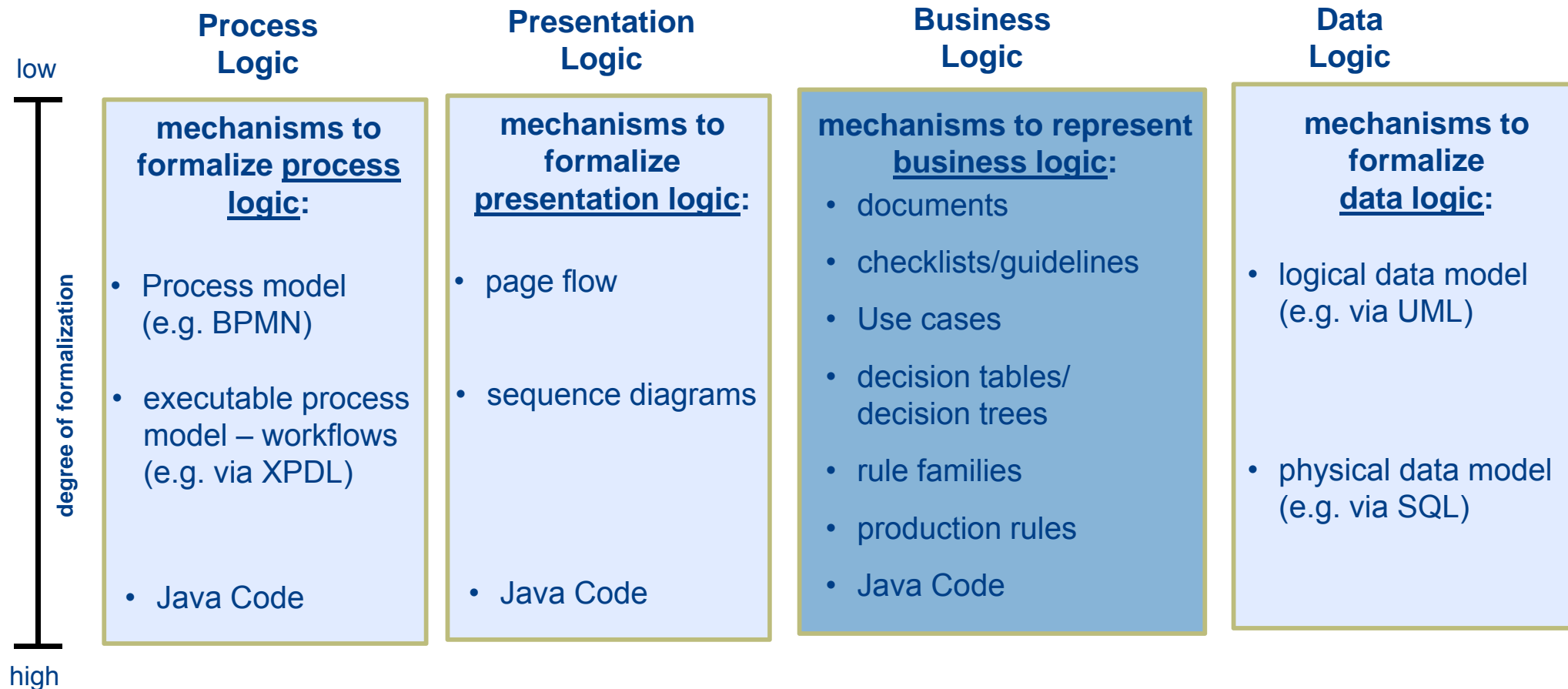
- An objective is too vague to measure if the terms it uses are not precisely defined. Structural rules can help define the terms



**Major Periodical:** It is necessary that a periodical is major if the periodical has a circulation and the circulation is at least 50,000.

**Positive Starred Review:** It is impossible that a review is positive if the review uses a five-star scale and the review has fewer than three stars.

# Representations of Process, Business and Data Logic

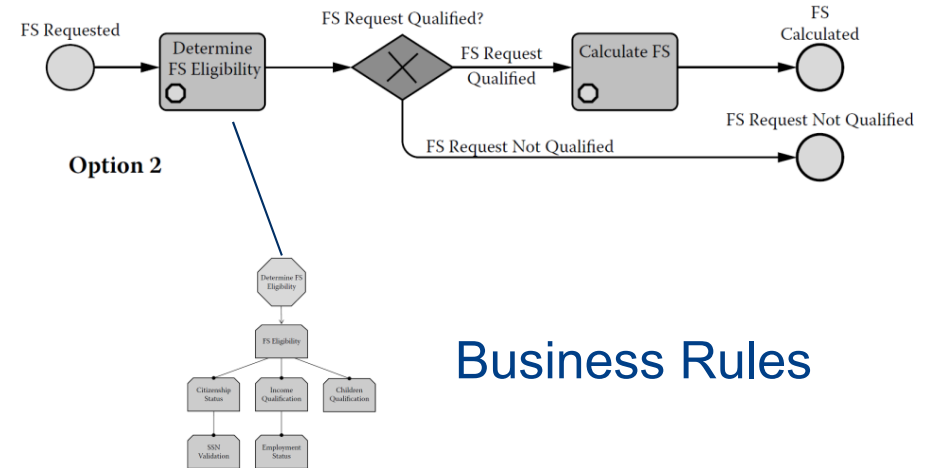
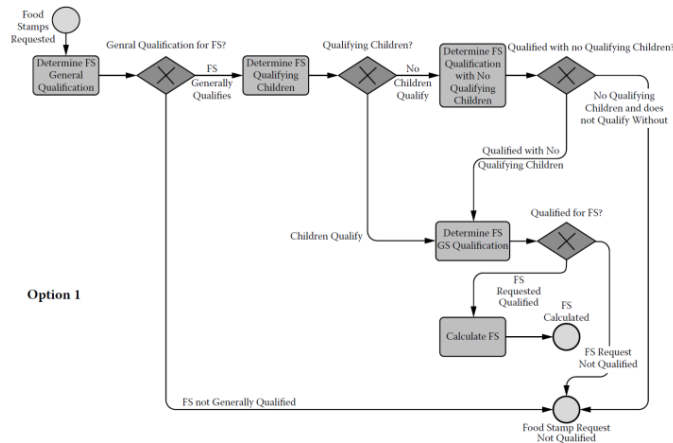


adapted from (Küng 2010)



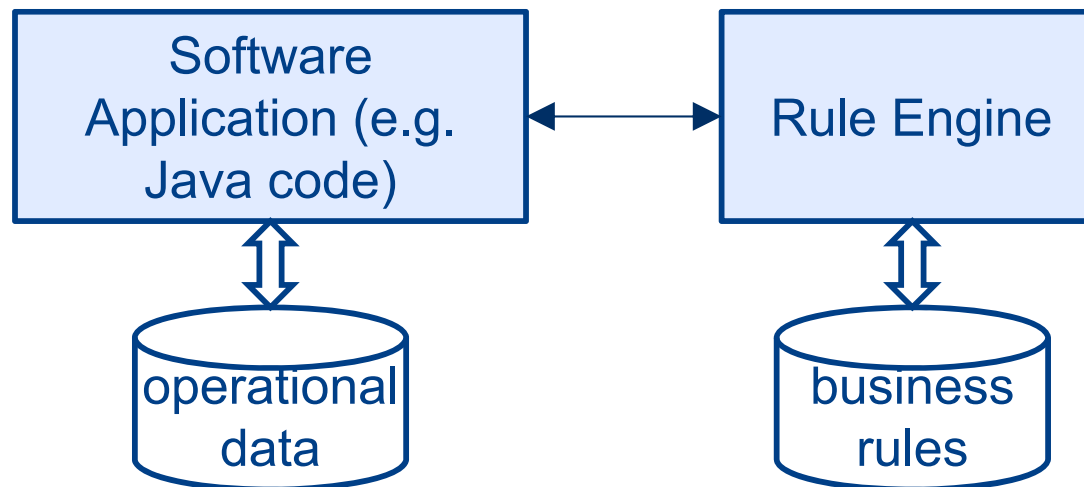


# Separating Business Rules from Process Models and Software Systems



Business Rules

(von Halle & Goldberg 2010, p. 71)



## *Where are the Business Rules today?*

- Head of people
- Intranet
- Word and Excel
- Business process models
- IT systems
  - ▶ Business Rules are coded in PL/1, Java, PLSQL, code tables, parameter files, database schema, ...

### Goals:

- Visibility of Business Logic (Business Rules)
- Maintainability of Business Logic (Business Rules)

## ***Why Business Rules (1)***

- Software Requirements
  - ◆ Capture constraints on behaviour of a system
    - *Business Rules allow for structured representation of constraints which are less ambiguous than text*
  
- Agility
  - ◆ Changes in business often demand flexible adaptation of business processes and IT systems
    - *Business Rules represent small entities of knowledge and are easier to change than software systems business process models*

## Why Business Rules (2)

- Regulatory Compliance
  - ◆ More and more enterprises have to ensure that they observe the laws and regulations
    - *Regulations and laws have an impact on the business rules – which represent guidance for people and requirements for software systems*
- Knowledge Management
  - ◆ Capturing and preserving knowledge
    - *Business rules are a good form to capture much of the implicit knowledge that organisations want to preserve*
- Communication, Training and Learning
  - ◆ Guiding employees on what to do and what not to do
    - *When rules are unaccessible or unknown, people (including business developers) make assumptions that might be incorrect. This can lead to inconsistent behaviour that is not effectively focused on common objectives*