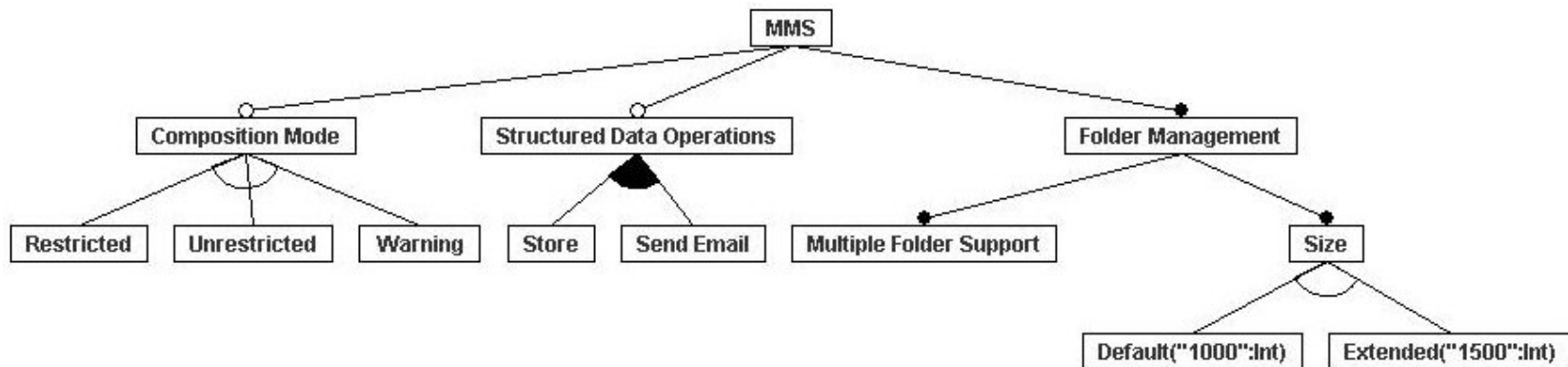


# Especificando Variações em Requisitos

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# MMS Product Line



- SPL usada em estudos de caso do grupo SPG
- Exemplos da aula extraídos dessa linha
- Características:
  - Número reduzido de features e cenários
  - Representativa quanto às variações

# Motivação

Antes de começarmos:

Por que representar variações nos requisitos?

# Motivação

Antes de começarmos:

Por que representar variações nos requisitos?

- Guiar as atividades de design, codificação e testes (que podem incluir pontos de variação)
- Identificar variações não percebidas na análise de domínio
- Auxiliar na seleção dos mecanismos de variação em código fonte, por exemplo

# Terminologia

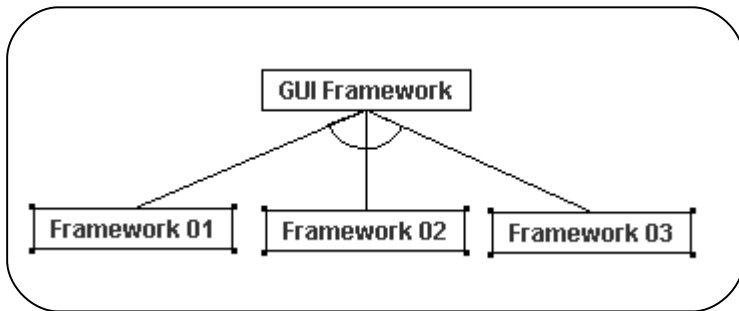
- Requisitos funcionais x Não funcionais (NFR)
- Diferentes níveis de abstração
  - ✓ Necessidades dos usuários e interessados
  - ✓ Recursos oferecidos pelos produtos (histórias do XP)
  - ✓ Características do produto
  - ✓ Casos de uso e cenários
- Diferentes formas de representar os requisitos
  - ✓ especificação textual x especificação visual

# Variações em NFR

- Mecanismos aplicados:
  - ✓ Seleção de requisitos opcionais
  - ✓ Parametrização dos requisitos

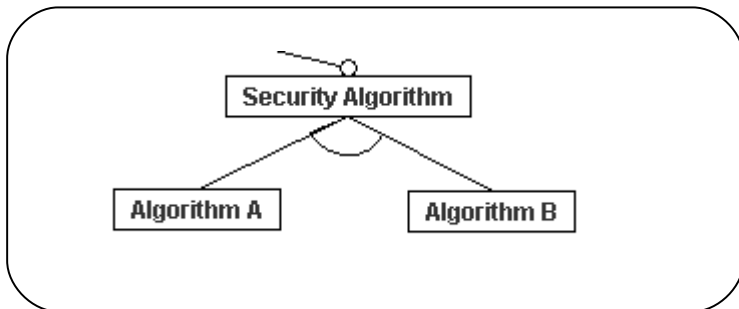
# Variações em NFR

## Exemplos



### Req 73

The message application shall be developed using the <GUI\_FRAMEWORK> framework as base platform UI.



### Req 123

The message content shall be encrypted using the <SEC\_ALG> algorithm, when the user selects the send message in security mode option.

# Variações em Cenários

- **Scenario:** Concrete description of system usage which provides a clear benefit for the actor of the system. (Klaus Pohl)
- Abordagens para representar variações em cenários:
  - ✓ PLUC
  - ✓ PLUSS
  - ✓ Variability Management (VM) as Crosscutting
  - ✓ AMPLE



# PLUC

- Novas tags para representar variações nas especificações de cenários
  - Tag alternativa
  - Tag opcional
  - Tag parametrizada
- Forte acoplamento entre o espaço de variações e as especificações de cenários
  - Difícil de evoluir a linha de produtos!

# PLUC

## PL Use Case: Create and Send a Message.

Goal: Create and send a multimedia message

Primary actor: Subscriber

Main success scenario - The message box has not reached [VP2] messages. (FM)

1. The subscriber starts the message center application
2. The message center application is started
3. The subscriber selects Create New MMS option
4. The create a new MMS form is displayed
5. The subscriber fills in the message body
6. The message body is filled in
7. The subscriber selects the send message option
8. The recipient form is displayed
9. The subscriber fills in the recipient field and select the confirm option.
10. The message is sent to the recipient and saved in the sent folder
11. The send message transient is displayed
12. The application returns to message center

Extensions

5 Include a multimedia content

- 5a.1. The subscriber selects the include a [VP3] content option (CT)
- 5a.2. The list of all [VP3] available resources is displayed (CT)
- 5a.3. The subscriber selects one specific resource
- 5a.4. The selected resource is attached to the multimedia message
- 5a.5. The application returns to step 5

5 Include a DRM restricted content in Restricted Mode

- 5a.1. The subscriber selects the include a [VP3] content option (CT)
- 5a.2. The list of all [VP3] available resources is displayed (CT)
- 5a.3. The subscriber selects one DRM restricted resource (CM)
- 5a.4. The system reports the DRM restriction: the subscriber can not attach the resource (CM)
- 5a.5. The application returns to step 5

### Variations

VP1: Alternative

- 0 P1
- 1 P2
- 2 P3

VP2: Parametric

Case VP1

- 0: 1000
- 1: 1000
- 2: 1500

VP3: Parametric

Case VP1

- 0: {Image}
- 1: {Image, Audio, Video}
- 2: {Image, Audio, Video}

# PLUC

...

- 9 Store embedded phone number **[requires vp3 = true]**
  - 9a.1. The subscriber scrolls to a phone number embedded in the message (SDO)
  - 9a.2. The phone number selected is highlighted (SDO)
  - 9a.3. The subscriber selects the add to a contact option (SDO)
  - 9a.4. The address book application is started to add the selected number to a contact
  - 9a.5. The message application returns to step 9

VP1: Alternative

0 P1

1 P2

2 P3

VP2: Parametric

Case VP1

0: {Image}

1: {Image, Audio, Video}

2: {Image, Audio, Video}

VP3: Parametric

Case VP1

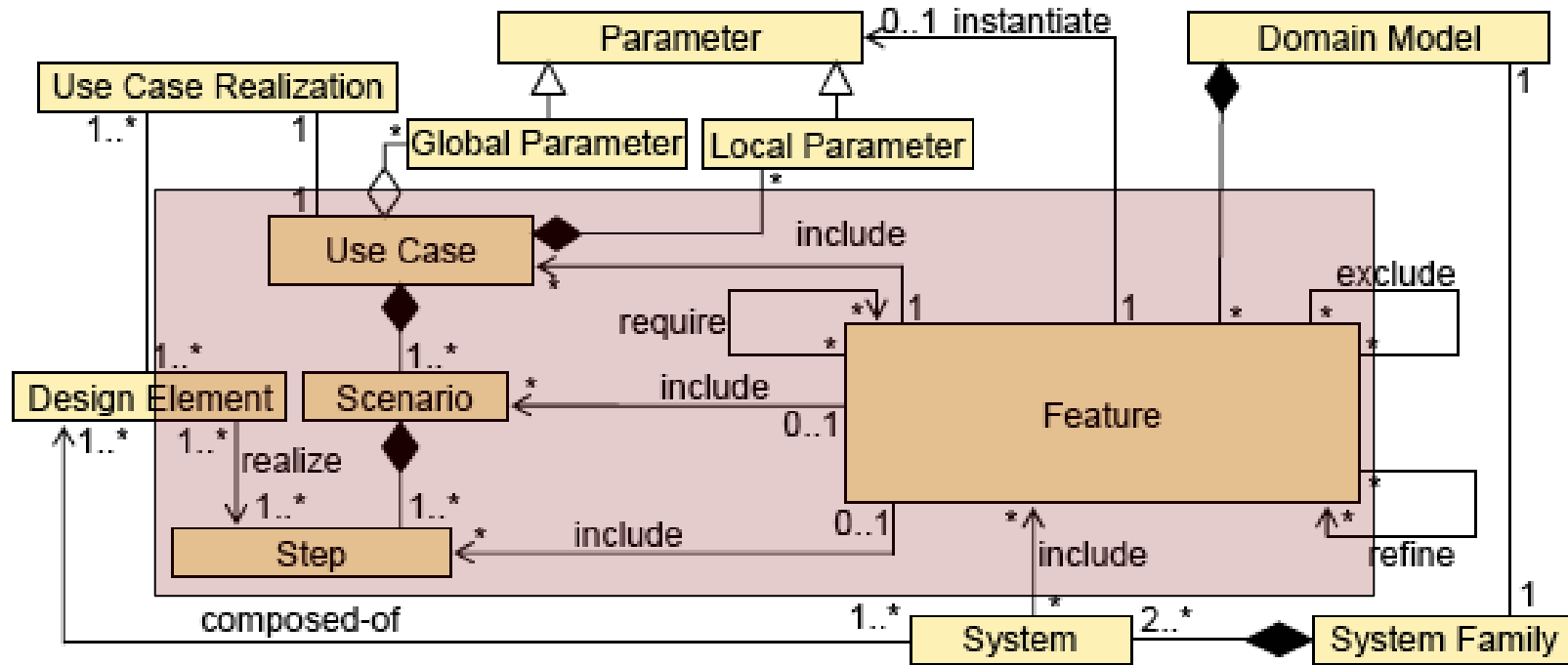
2: TRUE

default: FALSE

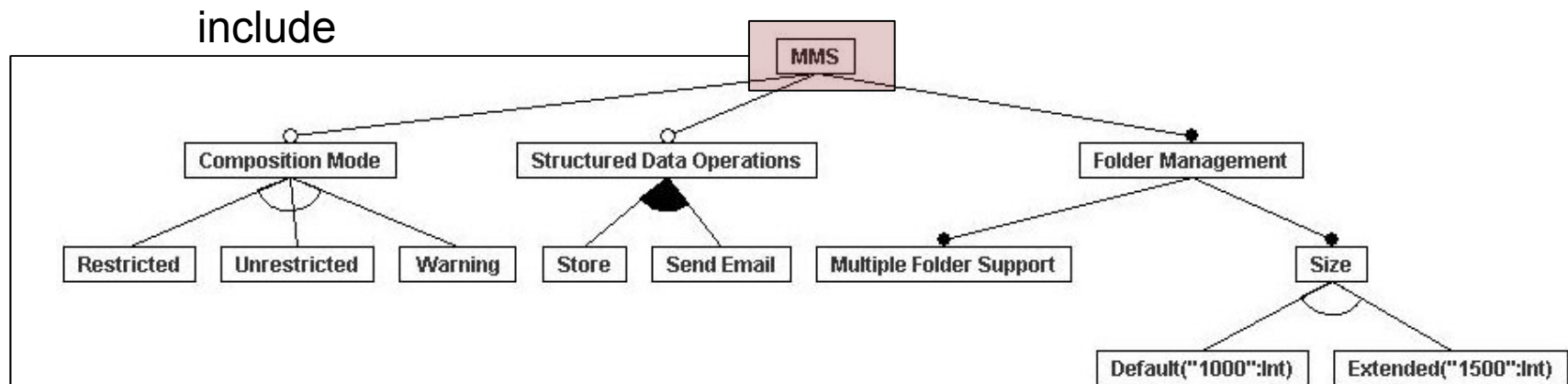
# PLUSS

- Modelagem de features usada na definição do espaço de variações
- Suporte a diferentes tipos de variação:
  - Parametrização,
  - Casos de uso, cenários e passos opcionais
- Features diretamente relacionadas aos artefatos

# PLUSS

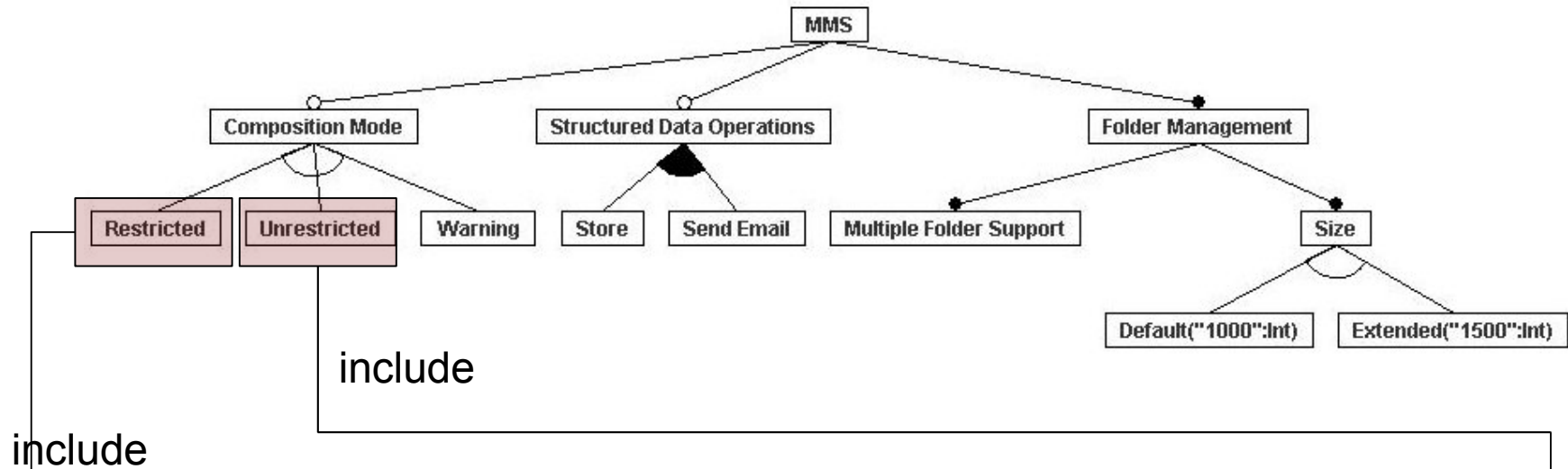


# PLUSS



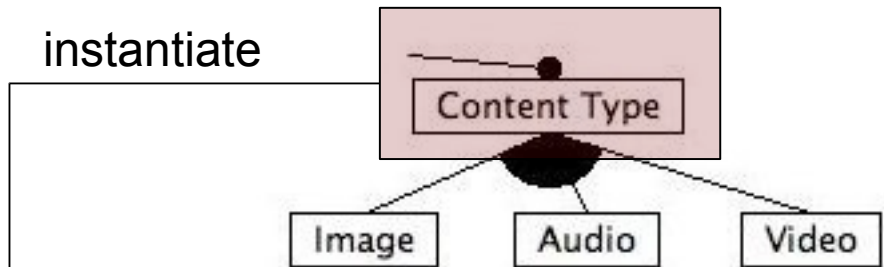
Step	Actor Action	Black Box System Response
1	Starts the message center application	Message center application is started
2	Selects create a new MMS option	The create a new MMS form is displayed
3	Fills in the message body	The message body is filled in
4	Selects the send message option	The recipient form is displayed
5	Fills in the recipient field	The recipient field is filled in
6	Selects the confirm option	The message is sent do the recipient and saved in the sent folder. The send message transient is displayed
7	Wait for the transient	The application returns to the message center

# PLUSS



Step	Actor Action	Black Box System Response
3.1	Selects include a <u>\$ContentType\$</u> content option	The list of all <u>\$ContentType\$</u> available resources is displayed
3.2(a)	Selects one DRM restricted resource	The system reports the DRM restriction: the subscriber can not attach the resource
3.2(b)	Selects one DRM restricted resource	The system asks the subscriber if he (she) wants to send a DRM restricted content
3.3	Confirms the attachment operation	The selected resource is attached to the multimedia message

# PLUSS



Step	Actor Action	Black Box System Response
3.1	Selects include a <u>\$ContentType\$</u> content option	The list of all <u>\$ContentType\$</u> available resources is displayed
3.2(a)	Selects one DRM restricted resource	The system reports the DRM restriction: the subscriber can not attach the resource
3.2(b)	Selects one DRM restricted resource	The system asks the subscriber if he (she) wants to send a DRM restricted content
3.3	Confirms the attachment operation	The selected resource is attached to the multimedia message

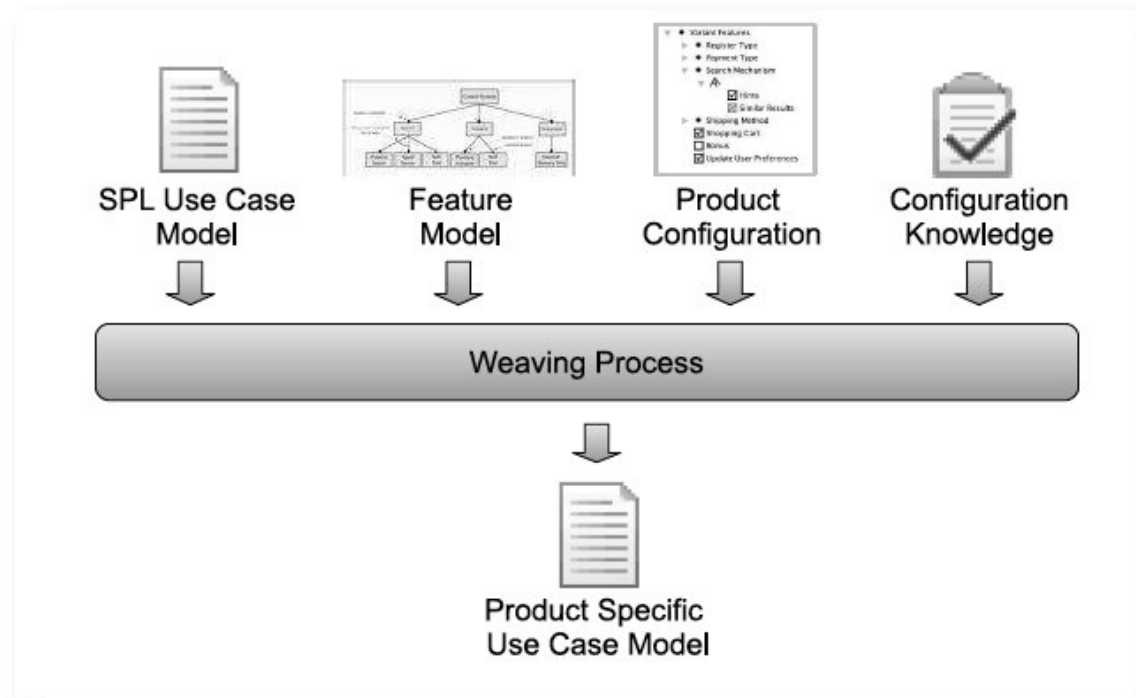


# Scenario Variability as Crosscutting Mechanisms

- Clara separação entre gerência de variações e casos de uso
- Suporte a diferentes tipos de variação
  - Casos de uso e cenários opcionais
  - Composição (quantificada) de cenários
  - Parametrização

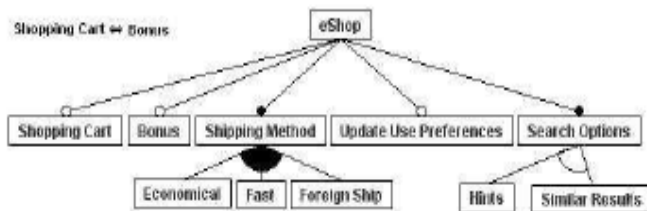
# SVCM

- Abordagem como um mecanismo crosscutting

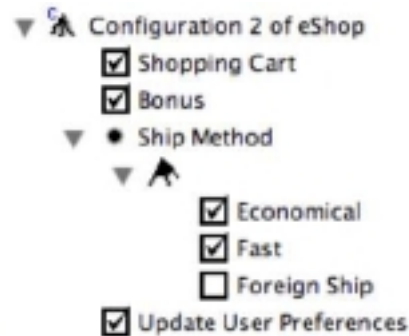


# SVCM

## Feature Model



## Product Configuration



## Configuration Knowledge

Feature Expression	Tasks
eShop	select scenario SC01 select scenario SC02
not (Shopping Cart and Bonus)	evaluate advice ADV01
(Shopping Cart and Bonus)	evaluate advice ADV02
Update User Preferences	evaluate advice ADV03
Shipping Method	bind parameter SM

## Scenarios

Id: SC01

Description: Proceed to purchase

Id	User Action	System Response
P1	Fill in the requested information and select the proceed option.	Request the shipping method and address.
P2	Select one of the available ship methods (<SM>), fill in the destination address and proceed.	Calculate the shipping costs.
P3	Confirm the purchase.	Execute the order and send a request to the Delivery System to dispatch the products. [RegisterPreference]

Id: ADV01

Description: Buy a specific product

Before: P1

Id	User Action	System Response
B1	Select the buy product option.	Present the selected product. The user can change the quantity of items he wants to buy. Calculate and show the amount to be paid.
B2	Select the confirm option.	Request payment information.

# SVCM

## Parametrized Scenario

Id: SC01

Description: Proceed to purchase

Id	User Action	System Response
P1	Fill in the requested information and select the proceed option.	Request the shipping method and address.
P2	Select one of the available ship methods (<SH>), fill in the destination address and proceed.	Calculate the shipping costs.
P3	Confirm the purchase.	Execute the order and send a request to the Delivery System to dispatch the products. [RegisterPreference]

# SVCM

## Extension Flows (advices)

Id: ADV01

Description: Buy a specific product

Before: P1

Id	User Action	System Response
B1	Select the buy product option.	Present the selected product. The user can change the quantity of items he wants to buy. Calculate and show the amount to be paid.
B2	Select the confirm option.	Request payment information.

# SVCM

## Extension Flows (advices)

Id: ADV03

Description: Register user preferences.

After: [RegisterPreference]

Id	User Action	System Response
R1	-	Update the preferences based on the search results or purchased items.

# SVCM

## Configuration Knowledge

Feature Expression	Tasks
eShop	select scenario <b>SC01</b> select scenario <b>SC02</b>
<b>not</b> (Shopping Cart <b>and</b> Bonus)	evaluate advice <b>ADV01</b>
(Shopping Cart <b>and</b> Bonus)	evaluate advice <b>ADV02</b>
Update User Preferences	evaluate advice <b>ADV03</b>
Shipping Method	bind parameter <b>SM</b>

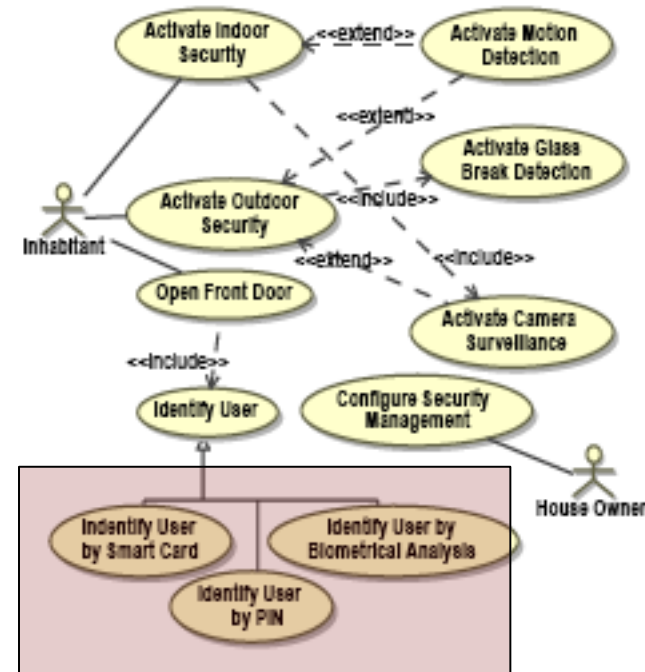
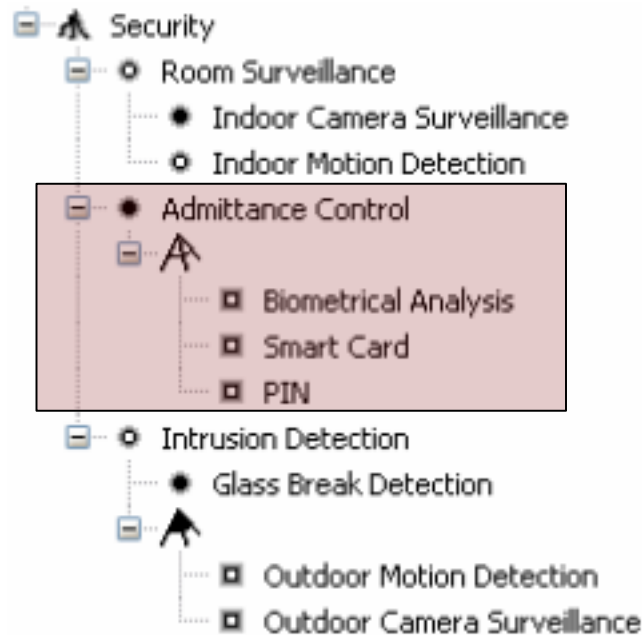
# AMPLE Approach

- Abordagem centrada em modelos
- Foco principal em rastreabilidade
- Suporte a diferentes tipos de variação
  - Casos de uso opcionais
  - Composição de cenários (representados em diagramas de atividades)



# AMPLE Approach

- Features e Casos de Uso



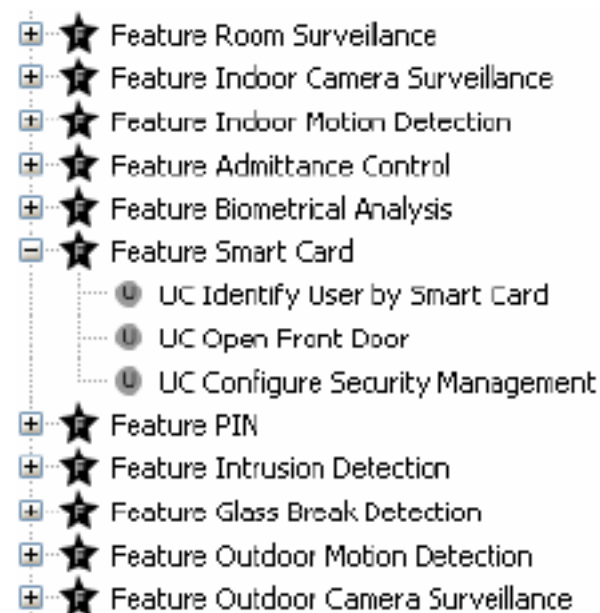
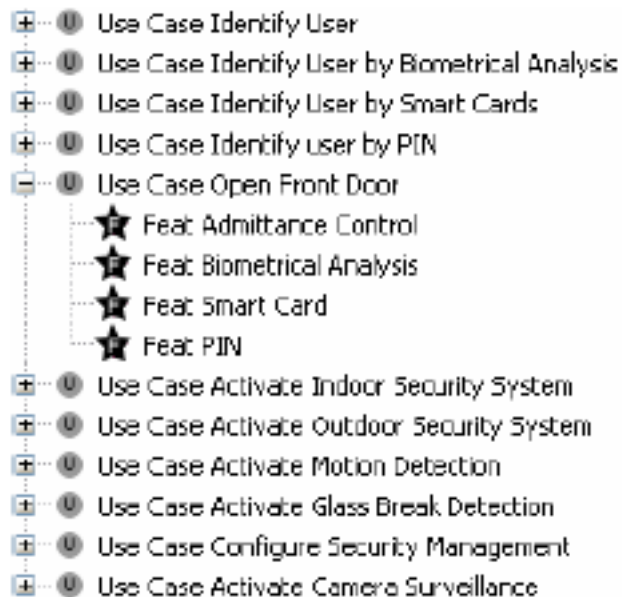
# AMPLE Approach

- Modelo de configuração

Use Cases Features	Identify User	Identify User by Biometrical Analysis	Identify User by Smart Card	Identify User by PIN	Open Front Door	Activate Indoor Security	Activate Outdoor Security	Activate Motion Detection	Activate Glass Break Detection	Activate Camera Surveillance	Configure Security Management
Room Surveillance						x		x		x	x
Indoor Camera Surveillance						x				x	x
Indoor Motion Detection						x		x			x
Admittance Control	x				x						x
Biometrical Analysis		x			x						x
Smart Card			x		x						x
PIN				x	x						x
Intrusion Detection							x				x
Glass break detection							x		x		x
Outdoor Motion Detection							x	x			x
Outdoor Camera Surveillance							x			x	x

# AMPLE Approach

- Visões de rastreabilidade



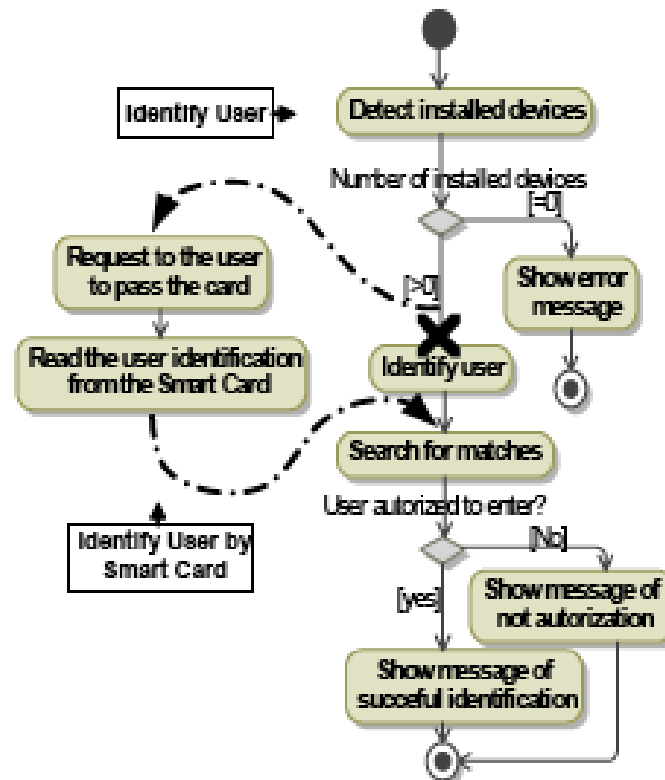
# AMPLE Approach

- Regras de composição
  - Replace with
  - Insert before / after
- Semântica ainda não bem definida

# Replace with

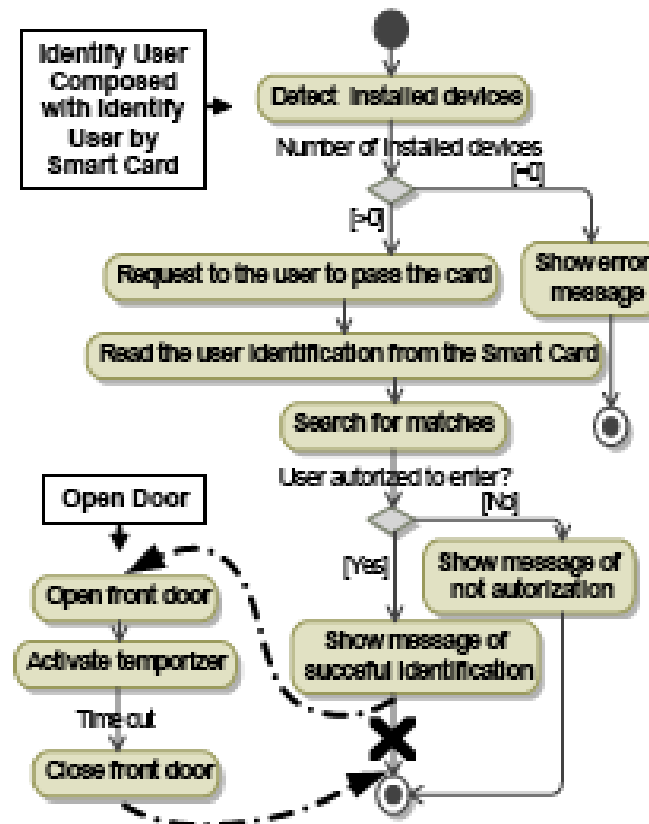
**Compose** Identify User **with** Identify User by Smart Card

**Replace** Identify User **with** Identify User by Smart Card



# Insert Before / After

**Compose** Identify user **with** Open front door  
**Insert** Open front door **after**  
Show message of successful identification  
**Insert** Close front door **before** FinalState



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