From Business Process Models to Use Case Models:
A systematic approach

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From Business Process Models to Use Case Models

Agenda:

- **Contextualization**

- **Motivation**

- **Approach**

    - **From BPMN model to use case diagram**

    - **Use case descriptions**

- **Conclusion**

- **Future work**

Contextualization

Business Process

- a set of interrelated activities that are executed by one, or several, organizations working together to achieve a common business purpose [L. Ko, 2009];

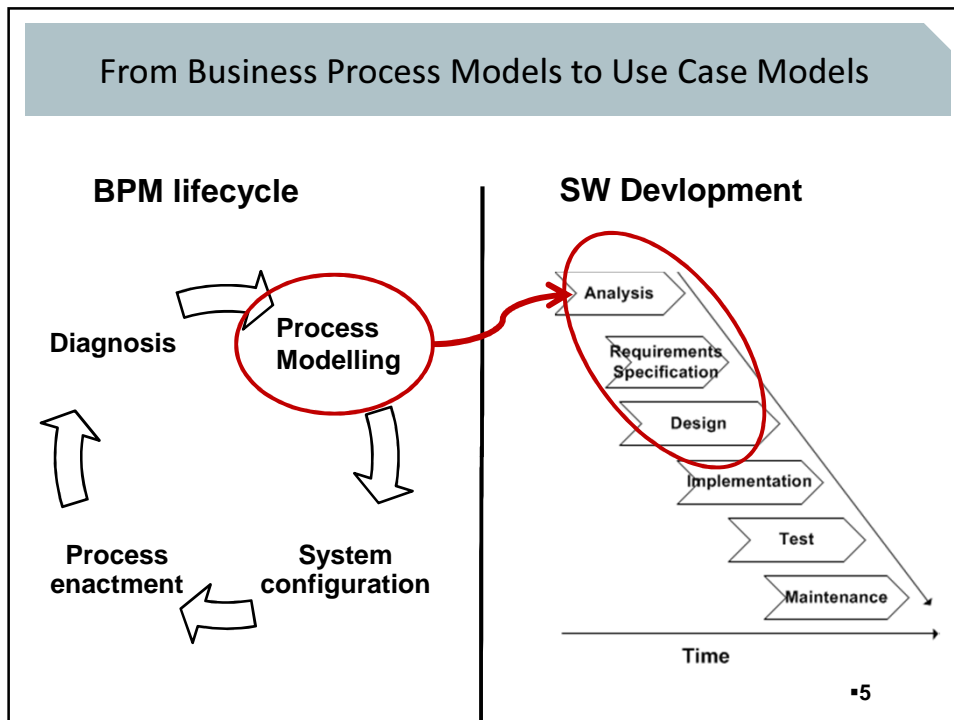**Business Process Management (BPM)**

- is a systematic approach to analyze, improve, control, and manage processes with the aim of improving the quality of products and services [Elzinga et al,1995].

Motivation

- The BPM is being increasingly used;

- Difficulties in identifying the requirements for the software that supports the business processes;

- Software requirements and models misaligned with business processes;

- Basing requirements elicitation in the business process models would assure the alignment between business process and software models.

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BPM lifecycle

SW Devlopment

- Diagnosis
- Process Modelling
- System configuration
- Process enactment

- Analysis
- Requirements Specification
- Design
- Implementation
- Test
- Maintenance

Time

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BPMN - Business Process Model and Notation

- OMG Standard

- Easy to understand and to use

- Widespread and actually used in organizations

- Complete language allowing to create business process models highly detailed.

Approach

→ Extract information from a **private business process model** and generate a use case model.

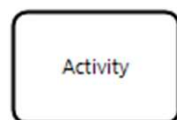## From Business Process Models to Use Case Models

Approach

- Set of rules to obtain the **use case diagram**:

    - Actors

    - Use cases

    - Actors hierarchies.

    - Relations between the actors and the use cases

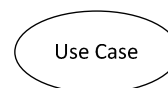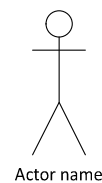- To each identified use case create the corresponding description;

Actor name

Use Case

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BPMN   **Use case diagram**

Participant

Activity

Actor name
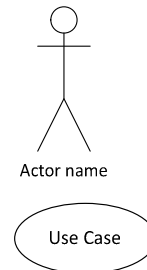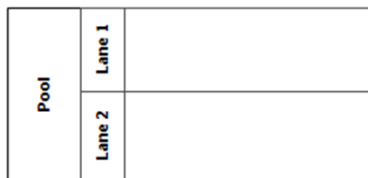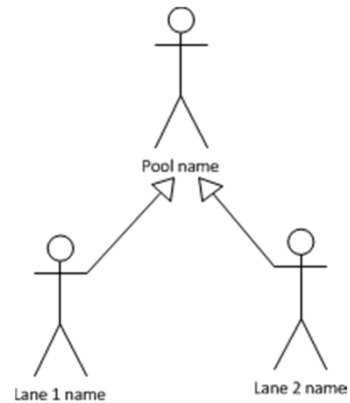
Use Case

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BPMN   **Use case diagram**
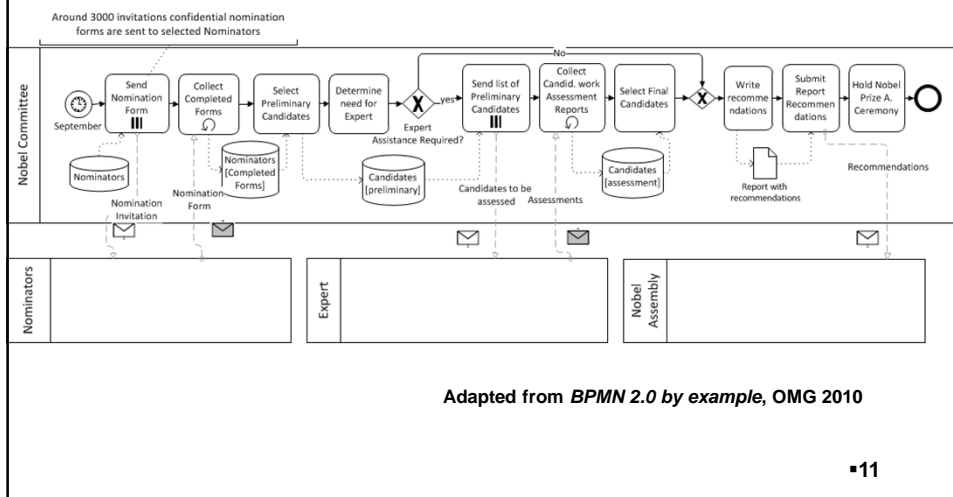

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**Relations between the actors and the use cases:**

- An actor that represents a pool (or a lane) is related with all use cases representing the activities that belong to the pool (or lane).

- The actor that represents the participant that sends (or receives) a message to an activity is related to the use case that represents that activity.

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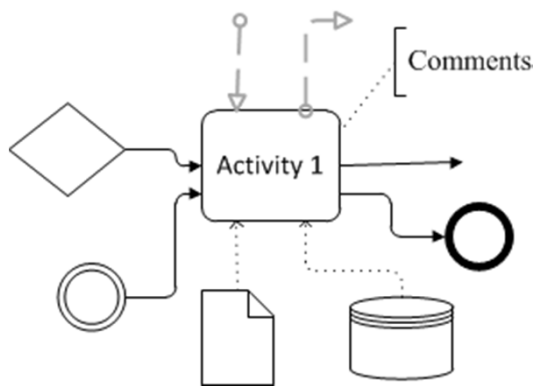
Nobel Prize Example

Adapted from *BPMN 2.0 by example*, OMG 2010

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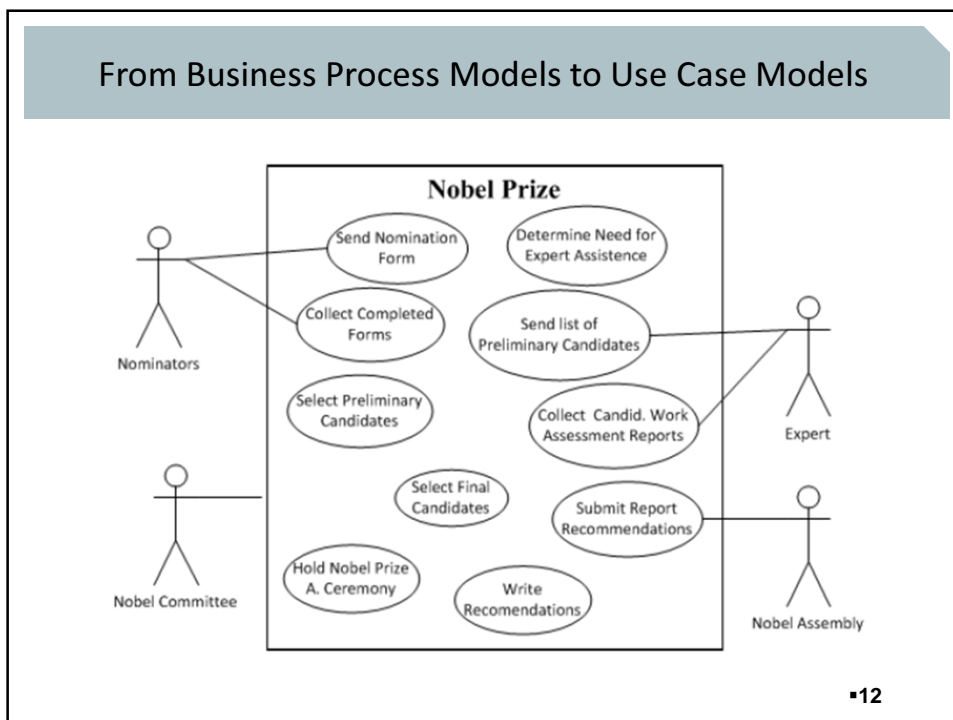
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How to obtain the use cases description?

Connecting objects:

- Messages flows
- Associations
- Data associations
- Sequence flow:
  - Activity
  - Events
  - Gateways

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Use case description Template

Use Case name	The use case name identifies the goal as a short active verb phrase.
Actors	List of actors involved in the use case
Pre-Conditions	Conditions that must hold or represent things that happened before the use case starts.
Post-Conditions	Conditions that must hold at the conclusion of the use case.
Trigger	Event that starts the use case.
Scenario	Sequence of interactions describing what the system must do to move the process forward.

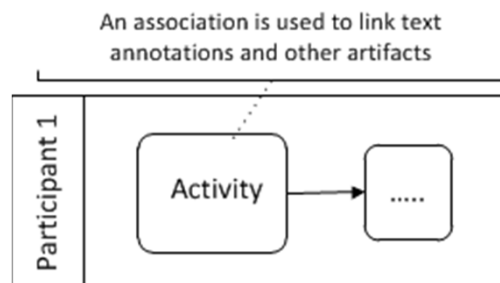## From Business Process Models to Use Case Models

Message flow: originates the next sentence on the **scenario** of the use case that represents the activity:

- Message input - ***Receives the <message> from <participant name>***

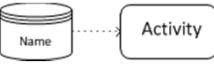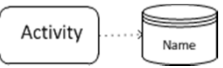- Message output - ***Sends the <message> to <participant name>***
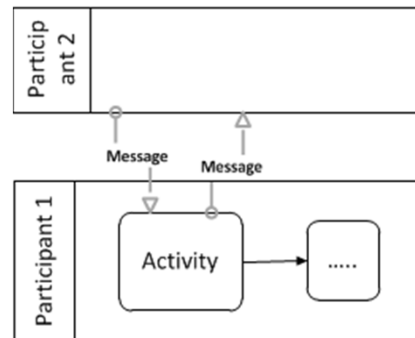
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Association: The text is transcribed to the scenario of the use case that represents the activity.
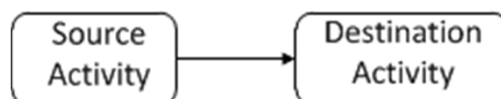
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Data Association: Data associations are used to move data between data objects (or data stores) and activities.

Graphical representation	Originated sentence in use case **scenario**
	Receives <data object name>
	Sends <data object name>
	Reads information from <data store name>
	Writes information about <data store name>

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Sequence flow: connect activities, events and gateways.

- When a sequence flow connects two activities, it originates the next **pre-condition** in the description of the use case that represents the "Destination Activity":

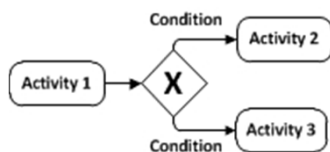→ *The <source activity name> has been completed.*

Sequence flow: connecting **Gateways** and activities.

All gateways originate a **pre-condition** in the use case(s) that represent the destination activity (or activities).
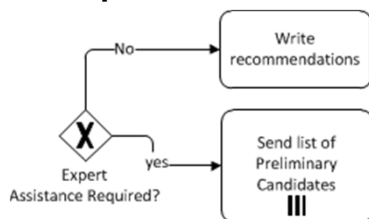
Sequence flow: connecting **Exclusive Decision** and activities

Originated **Pre-condition in each target activity**:

▪The <gateway condition> is <sequence flow condition>
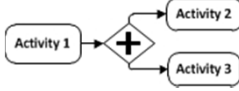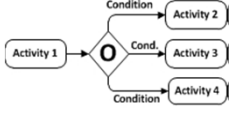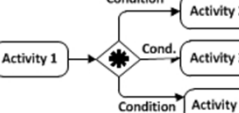
Example:

Originated **Pre-condition:**

▪The <Expert Assistance Required?> is <No>

▪The <Expert Assistance Required?> is <Yes>

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Sequence flow: connecting splitting gateways and activities.

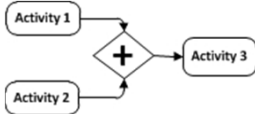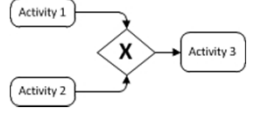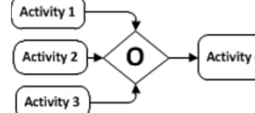| Name	Graphical representation	Originated **Pre-condition** in each target activity.
Parallel splitting		The <activity 1> has been completed.
Inclusive Splitting		The <sequence flow condition> is true.
Complex Splitting		The <sequence flow condition> is true.

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Sequence flow: connecting merging gateways and activities.

Name	Graphical representation	Originated **Pre-condition** in each target activity.
Parallel join		The <source name> [**and** < source2 name>] has been completed.
Exclusive merging		The <source name> [**exclusive or** <source2 name>] has been completed.
Inclusive merging		The <source name> [**or** <source2 name>] has been completed.

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Sequence flow: connecting **Events** and activities.

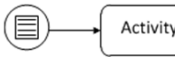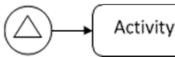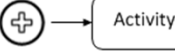| Event type category	Generic sentence originated in use case template
Start	**Trigger:** The <event name - event definition> occurred.
Intermediate Catching	**Trigger:** The <event name - event definition> is received.
Intermediate Boundary Interrupting	**Scenario:** If the <event name - event definition> occurs, the <activity name> is interrupted.
Intermediate Boundary Non-Interrupting	**Scenario:** The <event name - event definition> occurred.
Intermediate Throwing	**Post-condition:** The <event name - event definition> is created.
End	**Post-condition:** The <event name - event definition> is created. The process ends.

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Sequence flow: Connecting events and activities.

Name	Graphical	Originated **Trigger**
None		The event <event definition> occurs
Message		The message <event definition> arrives from <participant name>
Timer		The time-date <event definition> is reached
Conditional		The condition <expression> becomes true
Signal		The signal <event definition> arrives
Multiple		The <event definition> [**or** <event definition>] occurs
Parallel Multiple		The <event definition> [**and** <event definition>] occurs

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Nobel Prize Example

Adapted from *BPMN 2.0 by example*, OMG 2010

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Nobel Prize Example

Use Case name	Send Nomination Form.
Actors	Nobel Committee, Nominators
Trigger	The time-date September is reached.
Scenario	Around 3000 invitations confidential nomination forms are sent to selected Nominators. Reads information from Nominators. Sends the Nomination Invitation to Nominators.

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Nobel Prize Example

Around 3000 invitations confidential nomination forms are sent to selected Nominators

Use Case name	Send List of Preliminary Candidates.
Actors	Nobel Committee, Expert
Pre-condition	The Expert Assistance Required? is Yes.
Scenario	Reads information from Preliminary Candidates. Sends the List of Candidates to be Assessed to Ex

Adapted from *BPMN 2.0 by example*, OMG 2010

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Conclusion

- The approach presented herein allows to **generation of a use case model, including descriptions,** from a private BPMN process diagram.

- The presented approach benefits from a detailed business process model, as **greater business process detail yields a more complete use case model**.

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Future Work

- Treat a sup-process without losing information.

- Aggregate/merge all business processes being supported by the SW under development in one use case model.

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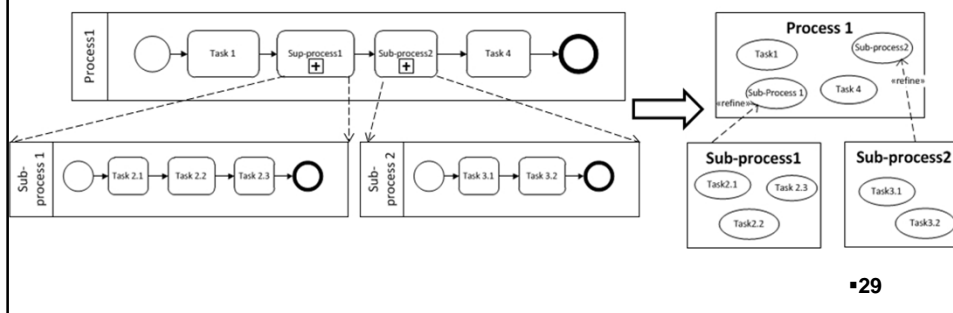
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Thanks!

Obrigada!