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Using NFR and Context-Awareness to Configure Business Process Models

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Outline

- Context & motivation
- Question/problem
- Principal idea
- Contribution/results

Context & motivation

- Business Process modeling involves capturing an ordered sequence of activities and supporting information [White and Miers 2008]

- Business processes models
  - To document and discuss
  - Analyze performance
  - Specify and configure information systems

Context & motivation

- These activities can be performed in several ways
  - even for different organizations performing similar business
- Highly dynamic environments
  - Frequent Process changes
  - Process can be aware of its environment
- Configuration of Business Process Models
  - Systematic reuse of process models
  - Derive process models for a specific setting

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Context & motivation

- Current BP configuration methods support
  - Elicitation of variability
  - Representation of variability
- Shortcomings
  - Little Guidance on model configuration
  - Non-functional requirements X business process models
  - Run-time adaptability

Question/problem

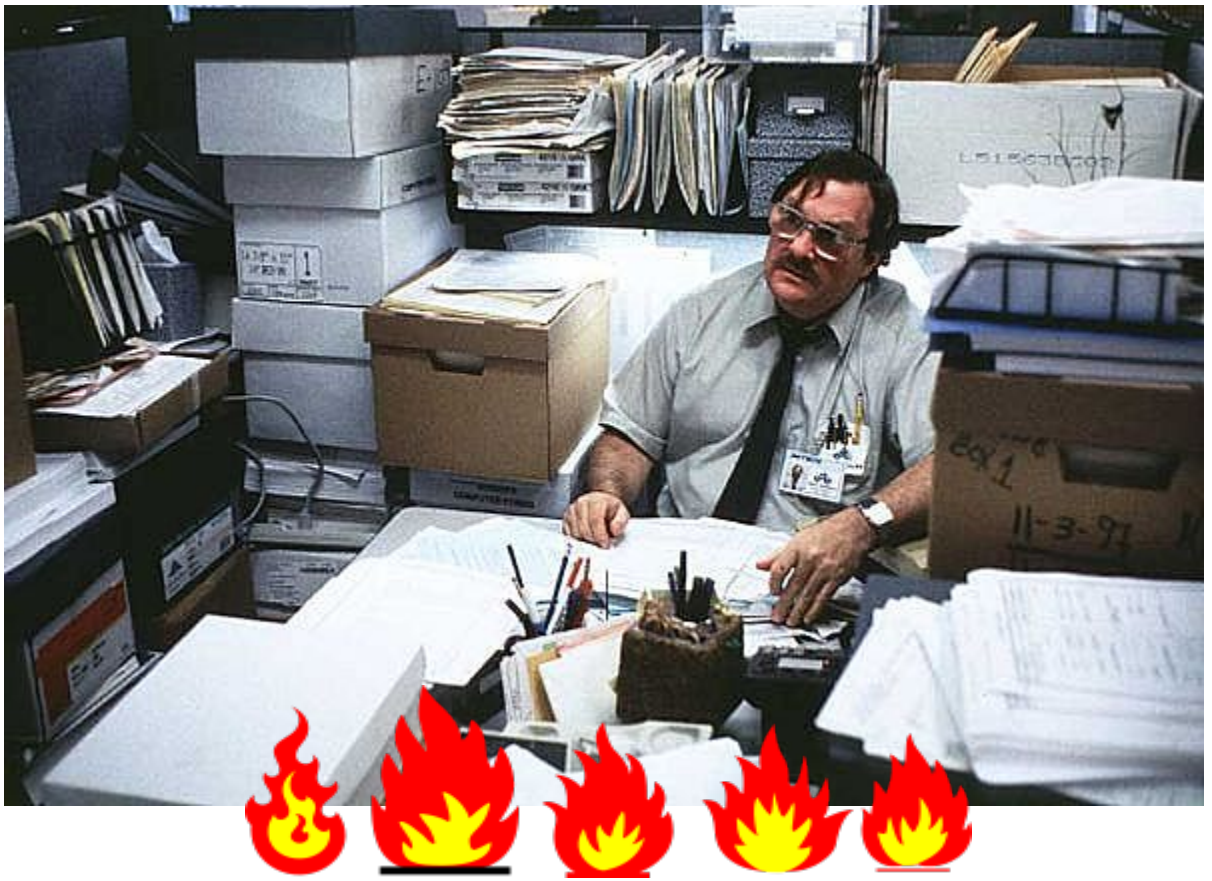
- How to represent the business processes models variability?
- How to provide the business analyst with a proper criteria for configure the business process models?
- What mechanisms can be used to allow the adaptation of BP models at run-time?

Main Idea

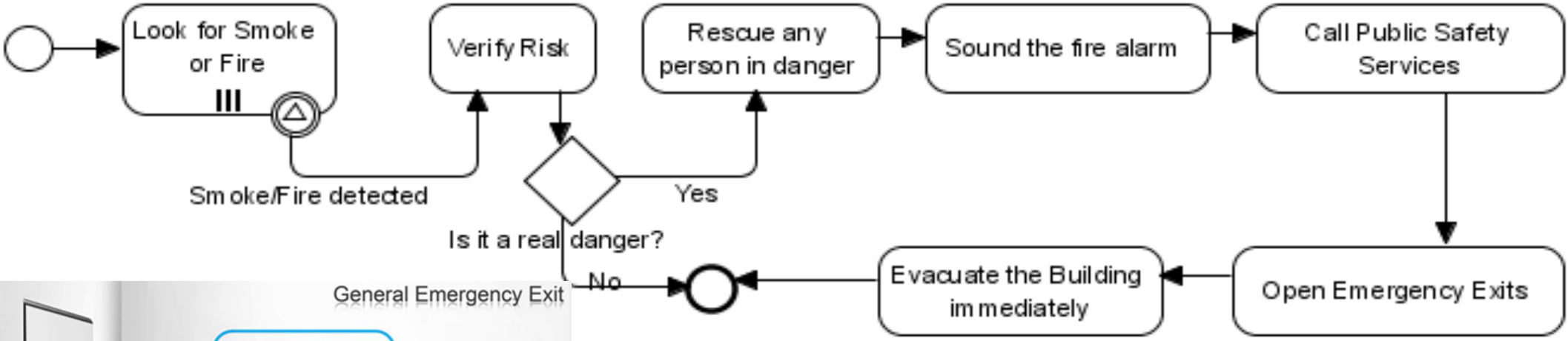
- How to represent the business processes models variability?
  - External models to represent Business Process variability
- How to provide the business analyst with a proper criteria for configure the business process models?
  - NFR Analysis used to drive BP configuration
- What mechanisms can be used to allow the adaptation of BP models at run-time?
  - Context-awareness

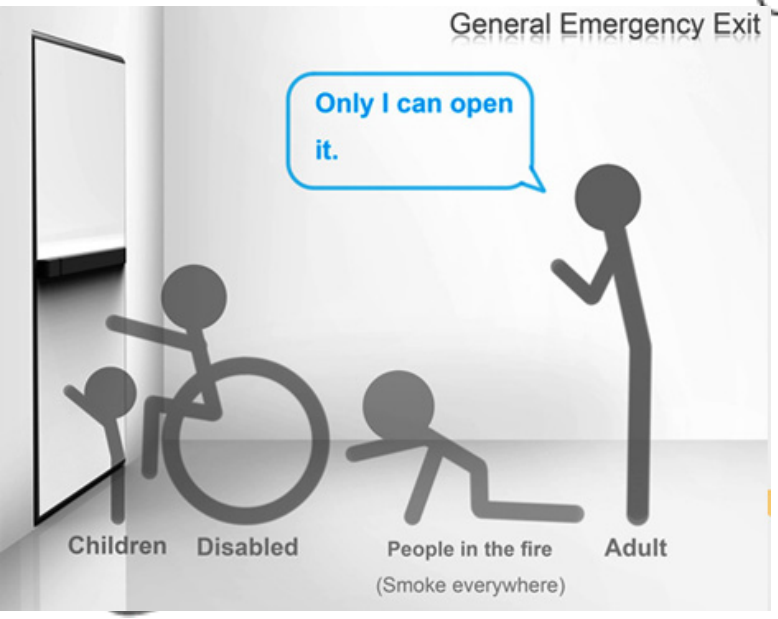
Running Example

- Fire Event
  - Predefined process
  - Environmental Changes
  - Priority changes

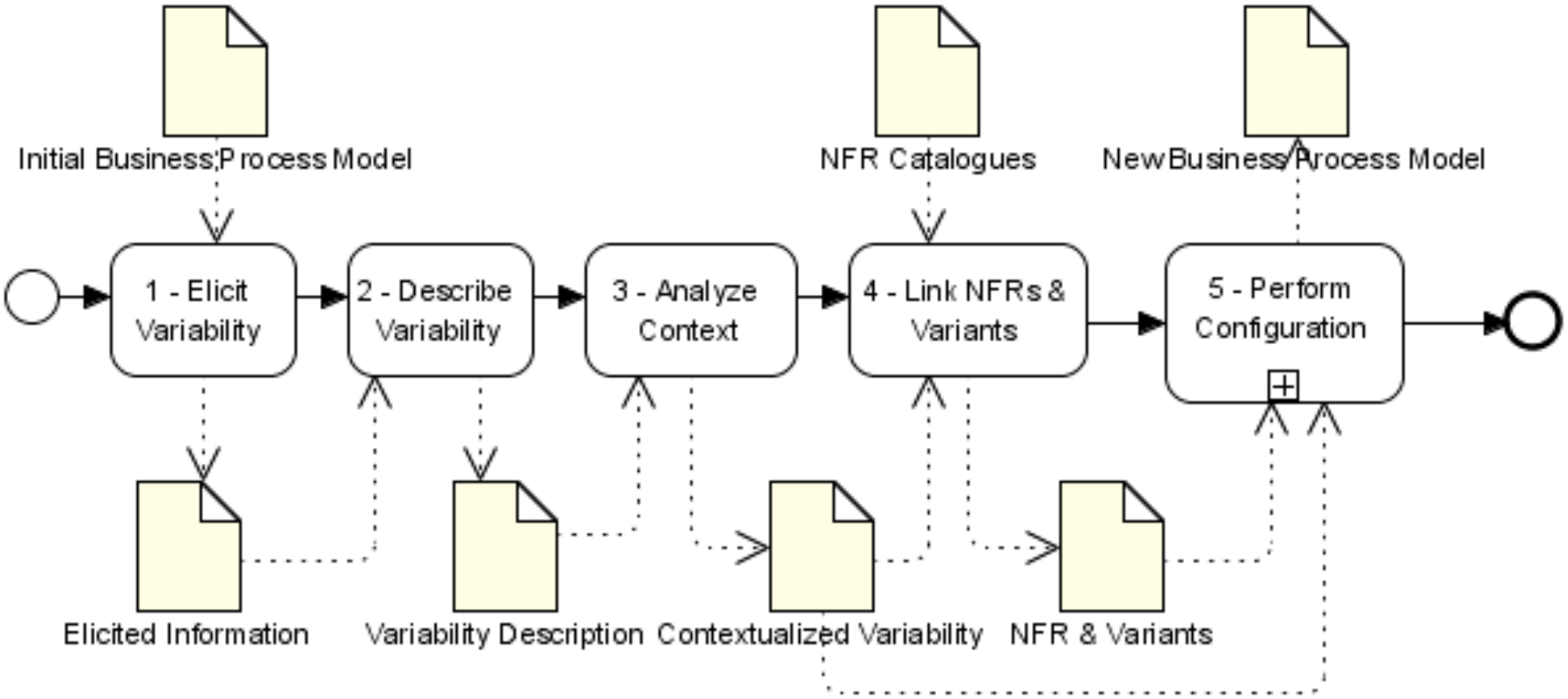


Running Example



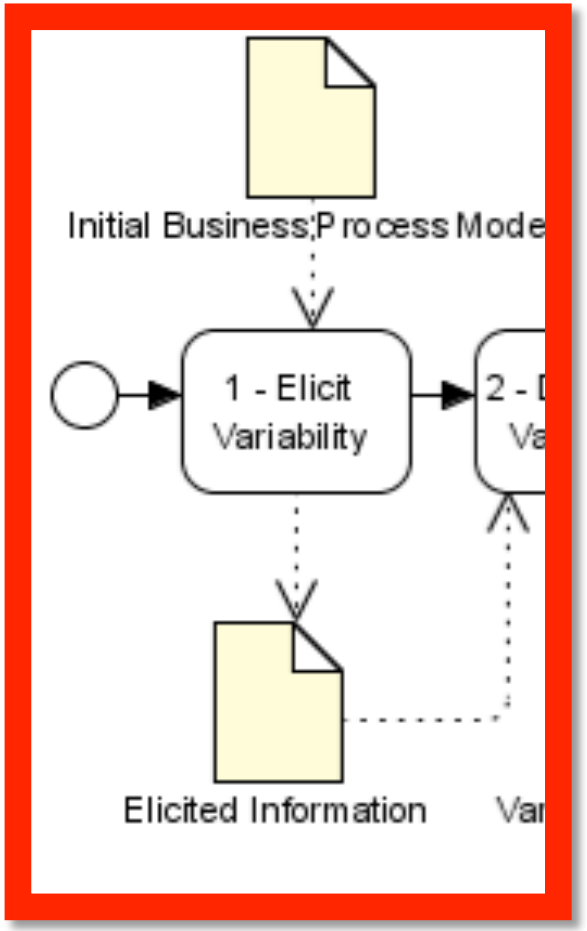


The Approach



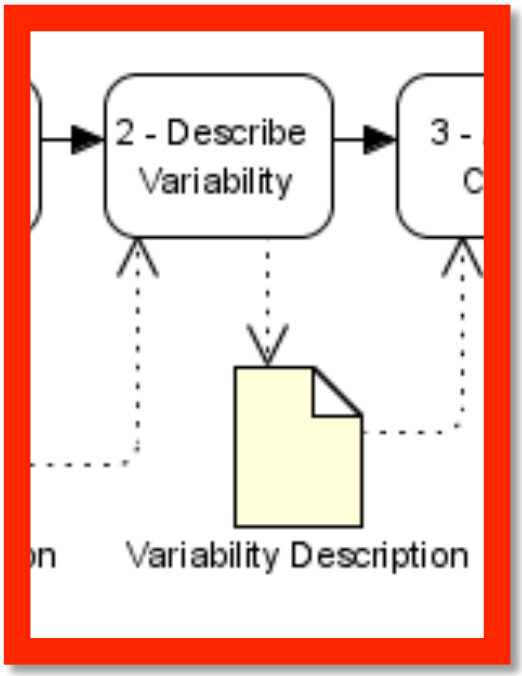
Elicit Variability

- Based on Facets of Information [Liaskos 2006]
  - Reduced Number of Questions
- Instantiated to BP activities



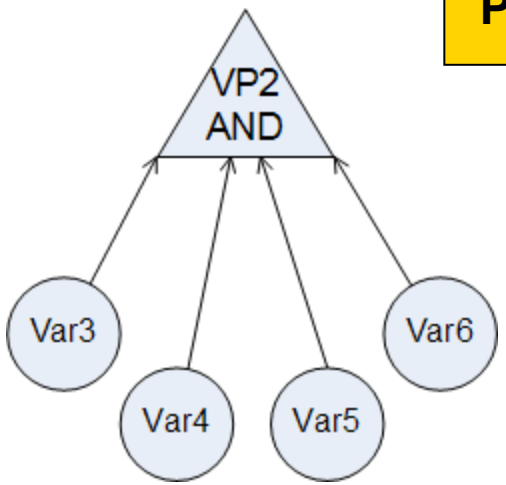
Defining Variation Points and Variants

- Variation points
  - Points in the process model that can be modified
  - Relate the points where elements of BP can be included, removed or substituted

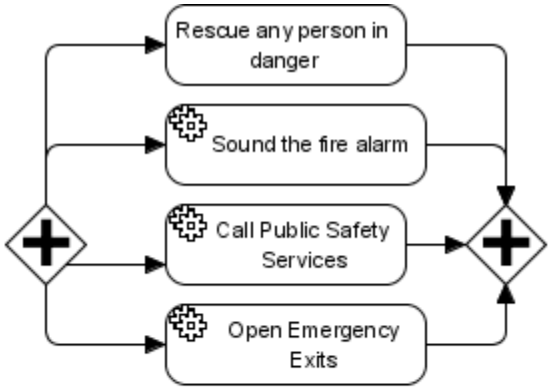


- Variants
  - Part of BP that are object of modification
  - Adopt workflow pattern to describe how the BP will be modified

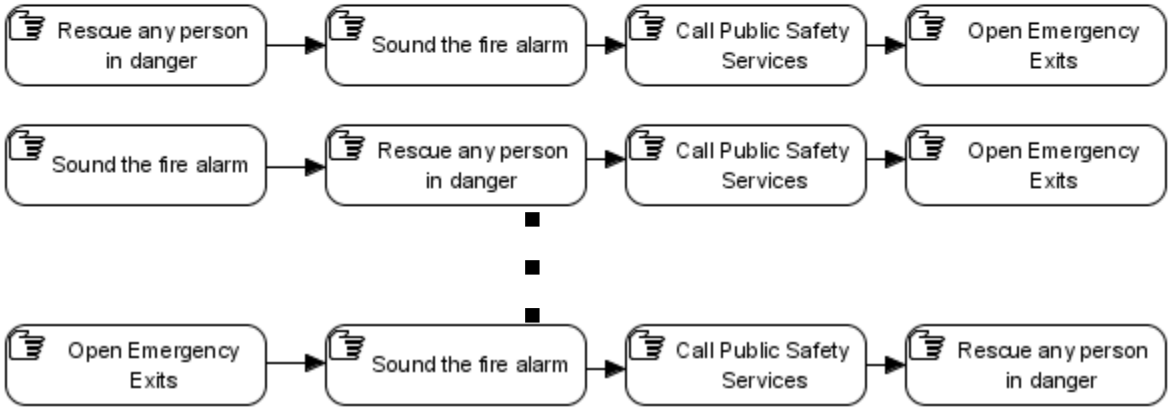
Variants and Variation Points with workflow patterns



Parallel Pattern



Sequence Pattern



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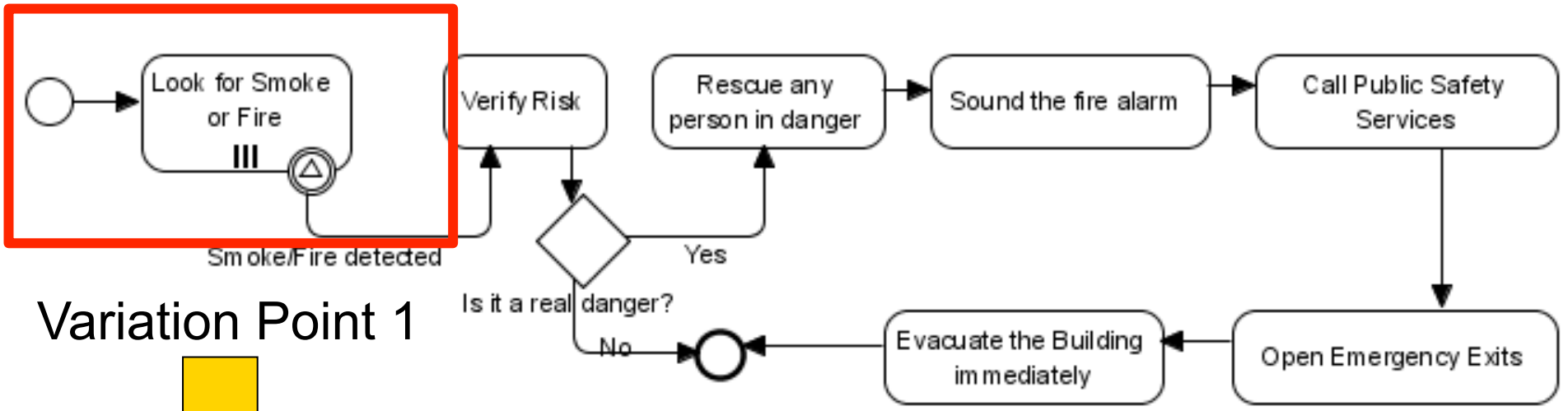
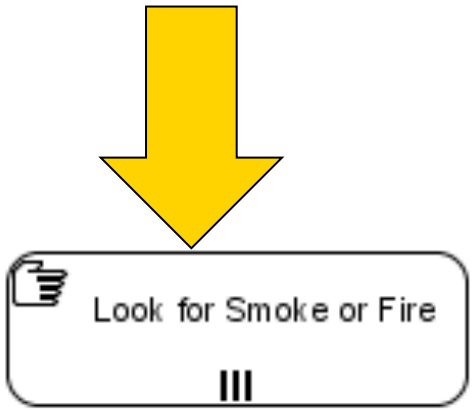
Running Example of BPMN



Variation Point 1

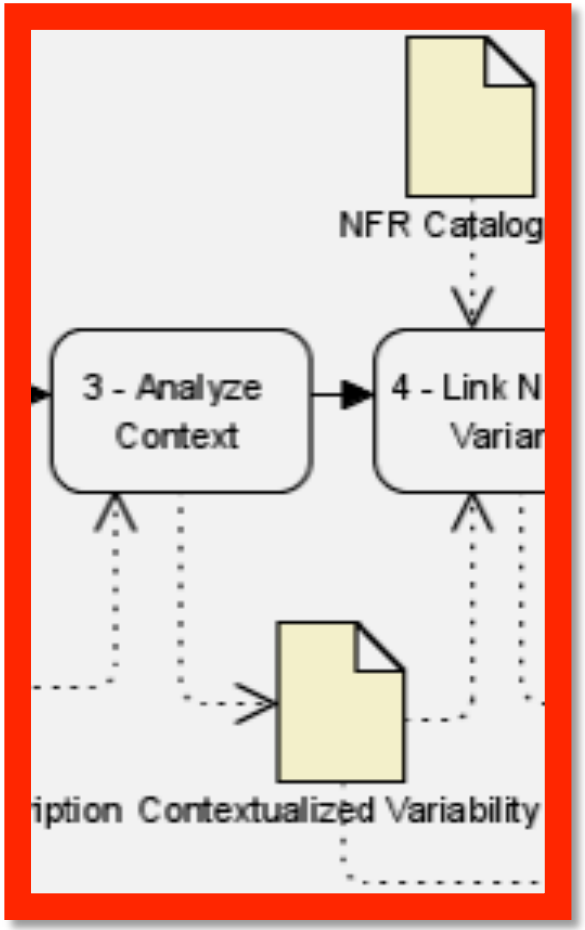


Manually **Variant 1**

Automatically **Variant 2**

Analyze Contexts

- Identify contexts
  - Relevant information
  - Stimulus for change
- Define context variables
  - Sensors
- Define Context Expressions
- Associate them to Variants
  - Enable or disable variants

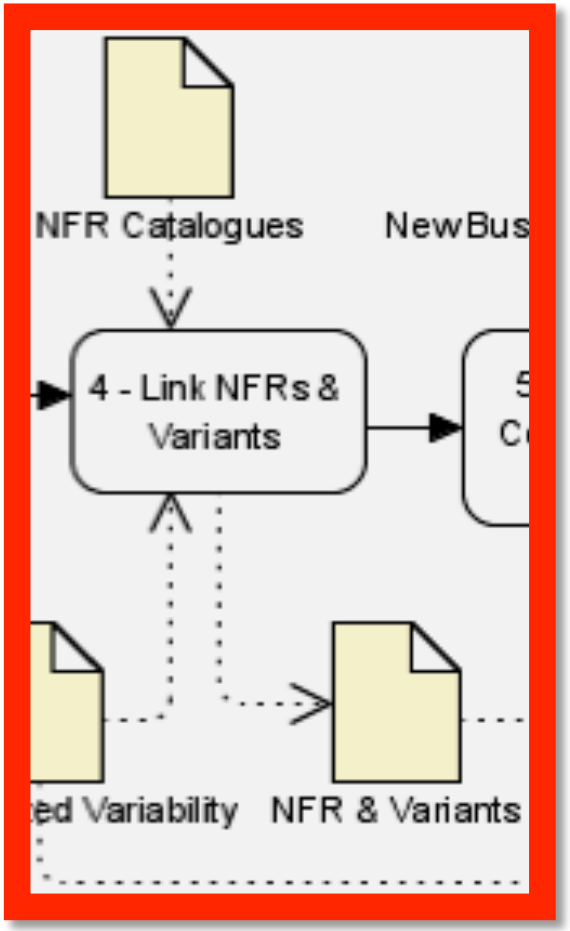


Defining Context

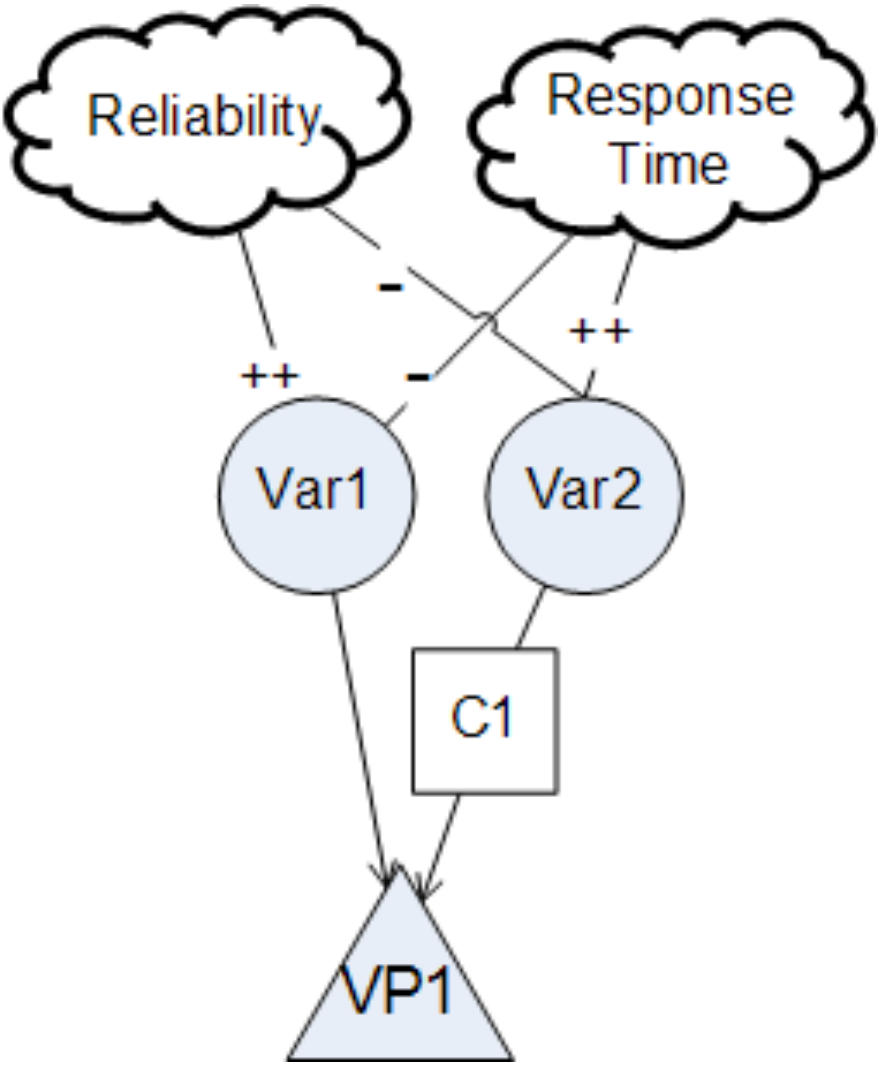
Context	Context Expression	Variant
FireAlarmIsOn	SmokeSensorIsOn=true and FireConfirmed=true	VAR05 and VAR06
FirefightersCalledAutomatically	FireAlarmIsOn=true and NetworkIsUp = true	VAR07
EvacuateImmediately	FireAlarmIsOn=true and EmergencyExitsOpen=true and (RiskLevel = Medium or RiskLevel = High)	VAR12

Identify NFR

- Analyze Models to select NFR that are critical in the given domain
  - Quality attributes
  - Constraints
- Build a new model or reuse (catalogues)
- Perform contribution analysis with the variants of NFR

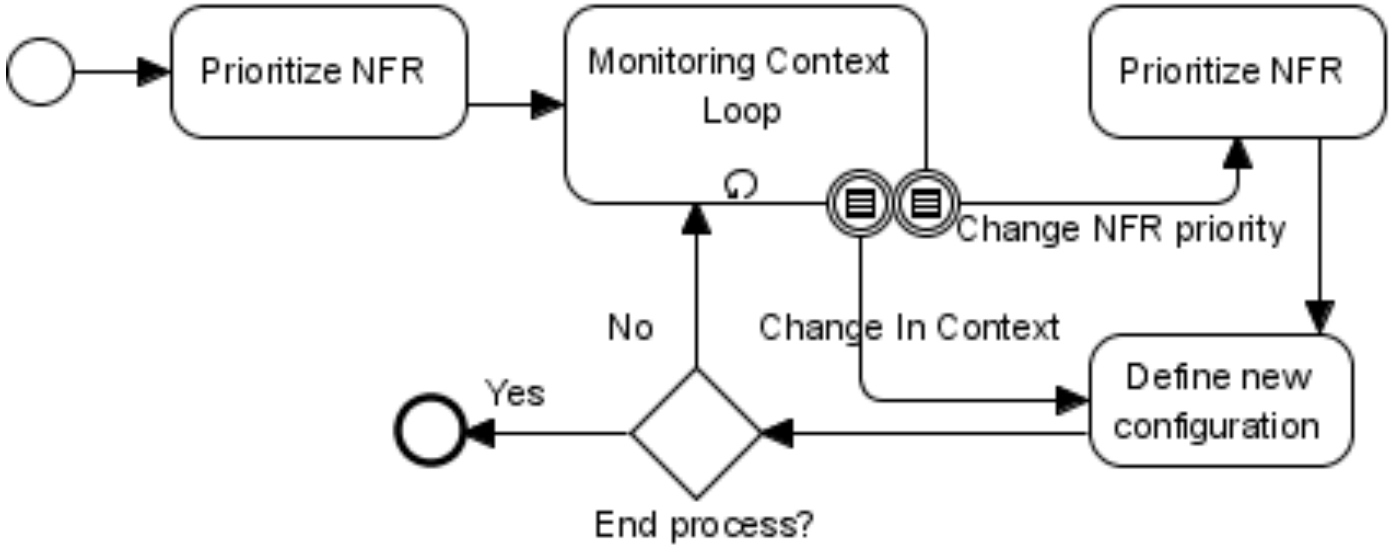


Running Example



- NFR
  - Reliability
  - Response Time
- Variation Point
  - Look for Fire or Smoke
- Variants
  - By person (Var1)
  - Automatically (Var2)
- Context (C1)
  - Fire alarm sensors are on

Configuration of Business Process

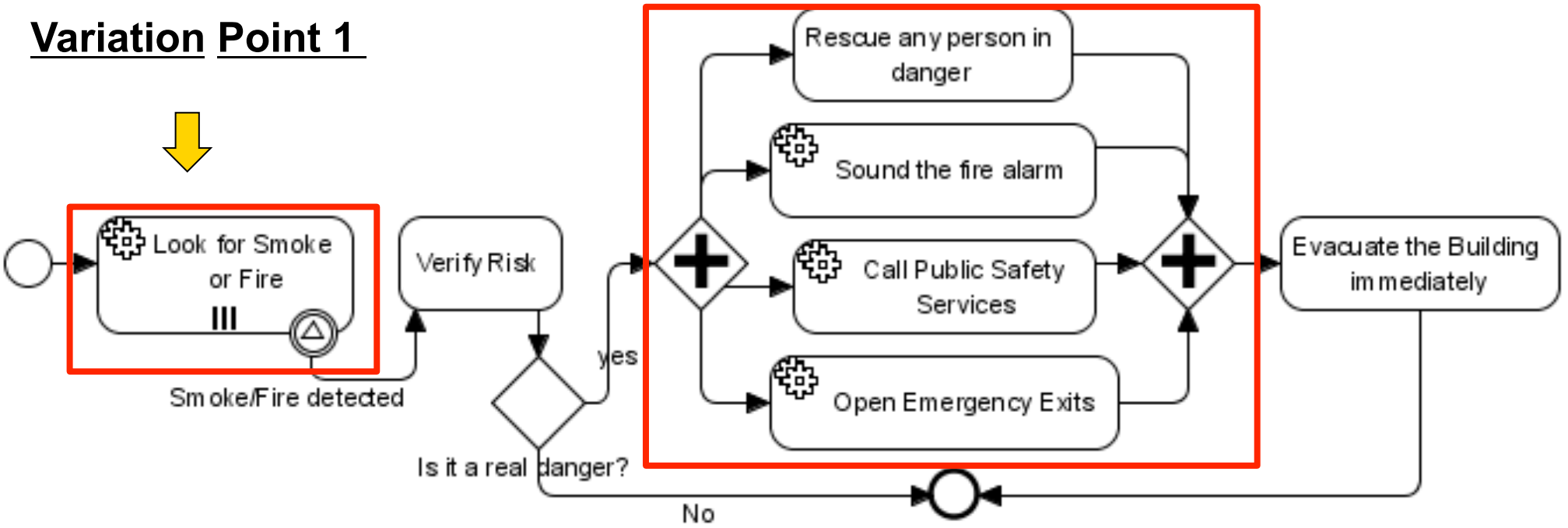


- High priority to <u>Response Time</u> NFR
  - Automatic and parallel solutions are preferred
- Monitoring loop
  - Identify changing opportunities
- Generate process instance

Example: new process

Variant: Look for Smoke or Fire (Automatically)

Variation Point 1



- **Dynamic configuration of variability in BPMN**
- **Requirements-Driven: using NFR**
- **Uses contexts to support evaluation and support**

Conclusions

- Status
  - Definition of process for configuration
    - From elicitation to configuration
  - Linking among Variability representation and other models (NFR and Contexts)
- Limitations
  - Design is time consuming
    - Several types of analysis (Variability, NFR, context, etc.)
  - Depends on knowledge elicited from experienced business analysts
  - Workflow diagrams

Future Works

- Document the use of workflow patterns for variability
- Implement the selection mechanism
- Performance evaluation
  - Identify limitations (e.g., max number of variants)
- Case studies

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