Analyzing Model Element Labels of Business Process Model Examples Provided on the Web

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Resume

- I am working in the department of Applied Informatics at University of Klagenfurt

- My Current research interests are:
  - Conceptual Modeling in general,
  - Business Process Modeling,
  - Modeling Voice User Interfaces,
  - Natural Language Processing

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Motivation

BPMN (Business Process Model and Notation)

- It is defined by the Object Management Group (OMG)

- It is a standardized and graphical modelling language for the specification of business processes and workflows

- Some of the aims of this modelling language are:
  - a means of communication for both IT specialists and experts of business departments
  - IT specialists use this as a basis for more technical workflow specifications
  - experts of business departments have a documentation of their processes and tasks within an organization
  - it is used as a basis for continuous improvement of business processes and workflows.

Motivation

Modelling Elements of BPMN

- To achieve the aims, BPMN consists of five categories of modelling elements.

Categories	Modelling Element
Flow Objects	e.g., Activities, Events, Gateways
Data	e.g., Data Object, Input Object etc.
Connecting Objects	e.g., Sequence Flows, Message Flows, Associations
Swimlanes	e.g., Pools, Lanes
Artifacts	e.g., Group, Text Annotation

Motivation

Issue

- Since BPMN is a semi formalized language, the power of the meaning of a BPMN model strongly depends on the words and phrases, which are used in the labels of the modelling elements.

- If the right words are chosen for the labels, the meaning can be easily understood. If not, it is hard to understand such models.

- Therefore, not only the defined modelling elements of this language are important but also the quality of the modelling element labels.

Motivation

BPMN Examples on the Web

- The Web also has an enormous pool of BPMN examples.

- These examples on the Web are provided by
  - BPMN experts and consultants
  - Enterprises that want to sell BPMN modelling and process management tools

- They often provide these examples as introductory examples.

Research Questions

- In literature, suggestions for the quality of modelling element labels were already defined.

- But, are the suggestions of label qualities as stated in literature, are also considered in these Web examples?

- Particularly,
  - do the introductory examples of BPMN models on the Web follow the label quality guidelines of literature (i.e., the labelling styles preferred in literature)?
  - do the labels have at least wordings that are adequate in a certain context?

Related Work

- The suggestions for the quality of modelling element labels that exist in literature are based on a categorization of the wording used in labels into specific labelling styles.

- Such categorizations (labelling styles) exist for the modelling elements
  - Activities,
  - Gateways,
  - Events

- Furthermore, the quality of non canonical labelling patterns were examined.

Related Work

- Labelling styles for Activities
  - Verb Object Style (e.g., *create document*) → recommended style!
  - Action Noun Style (e.g., *creation*)
  - Descriptive (e.g., *author writes book*)
  - Noun only (e.g., *error*) → should not be used according to literature
- Labelling styles for Gateways
  - Question with Noun and Verb in Past Participle (e.g., *document created?*) → recommended style
  - Infinitive verb question (e.g., *approve contract?*)
  - Object with adjective question (e.g., *parts available?*)
  - Equation question (e.g., *amount is greater than $ 200*)
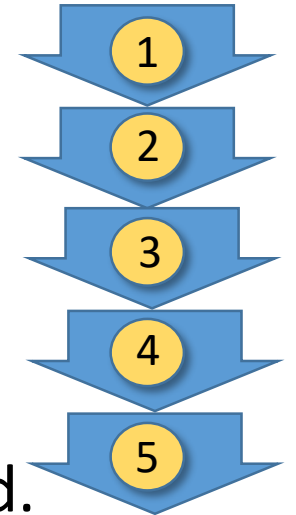 - Noun only (e.g., *result?*) → should not be used according to literature

Related Work

- Labelling styles for Events
  - Verb in Past Participle Style (e.g., *document created*) → recommended style!
  - Predicative Adjective Style (e.g., *document correct*)
  - Categorization Style (e.g., *person is author*)
  - Noun only (e.g., *inquiry*) → should not be used according to literature!
- Non canonical label patterns (should not be used according to literature)
  - Complex control flow label (e.g., *create document and send document*)
  - Extra specification of data resources and time (e.g., *clear differences (inventory management)*)
  - Implicit actions and decisions (e.g., *order received* instead of *receive order* for describing an activity)
  - → In general, it is recommended to avoid non canonical label patterns

Preparatory work

For analyzing the labels in the examples on the Web, the following preparatory work was done:

(1) A picture search for "BPMN" with a Search Engine was done.

(2) Each picture was checked, if it really contains a BPMN diagram.

(3) The URLs of these pictures were stored in a file.

(4) The Web domains from these URLs were automatically extracted.

(5) These Web domains were further examined for more BPMN diagrams.

    a) All BPMN diagrams were manually examined and the labels were extracted.

    b) The labels were stored with a reference to the modelling element, the original diagram and domain in a database.

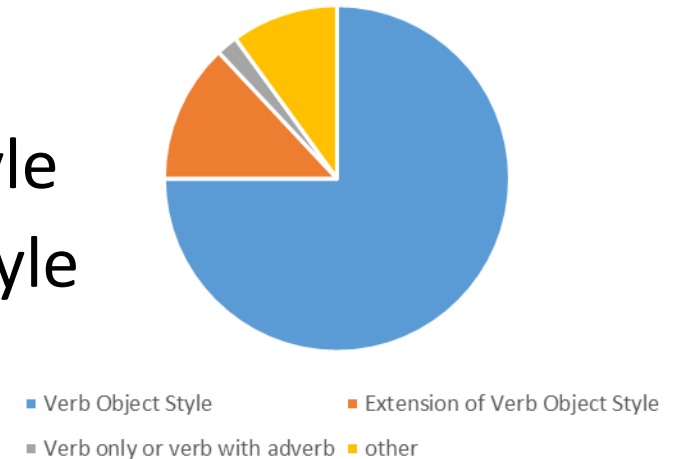   c) Finally, the labels were analyzed.

Results and Discussion (Activity)

Labels of Tasks (kind of Activity)

- ~ 75 % have the recommended Verb Object Style

- ~ 13 % have an extension of the Verb Object Style

- ~ 2 % have a verb only or verb with adverb

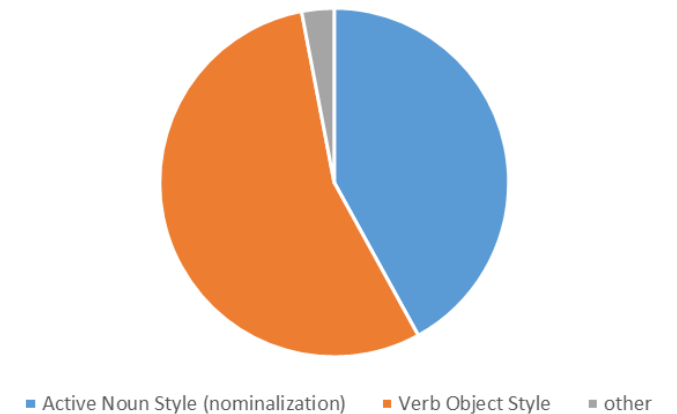- ~ 10 % have other labelling styles

Labels of normal Sub Processes (kind of Activity)

- ~ 42 % have a Active Noun Style (nominalization)

- ~ 55 % follow the Verb Object Style

- ~ the rest follows several other labelling styles

Label styles of Tasks

- Verb Object Style
- Extension of Verb Object Style
- Verb only or verb with adverb
- other

Label styles of normal Subprocesses

- Active Noun Style (nominalization)
- Verb Object Style
- other

Results and Discussion (Activity)

Discussions

- For tasks, the majority follows the preferred Verb Object Style.

- It turned out, that there is no difference regarding the words used in a manual task and a user task, although the latter has the semantic that the system supports the user.

- Specific Send Tasks tend to have a specific wording (i.e., verbs that express the distribution of something – e.g., *send*, *inform*, *notify*, …)

- No definite preferences can be found for the labelling styles of normal Sub processes.

Results and Discussion (Event)

Events with no labels

- ~ 46 % of Start Events do not have a label at all. The majority of these are untyped Events.

- Only ~ 14 % of Intermediate Events do not have a label at all.

- ~ 38 % of all Boundary Events do not have a label

- ~ 56 % of all End Events do not have a label. The majority of these End events are untyped.

- Hence, it seems: Whereas Activities are labelled, modellers do not see the necessity to label Events.

Labels of Events

- In general, Events have a greater variety for the labelling style

Results and Discussion (Event)

Typical labels of Timer Event

• wait until next business day • 24h; 10 min; 60 minutes; one week; 2 weeks; 24 hours; 14 days; 48-hours • september year n-1 • wait 6 days; wait some time; wait until thursday, 9am • 1st day of month; 20th of each month • 3 business days • friday at 6 pm pacific time; friday, 6 pm pacific time	• timeout; time out (1 week); order timed out • content expired (5 days) • delay 6 days; delay 6 days from announcement • < 60 min; > 60 min • expires at set deadline • auction over • 10 min wait • 12 o'clock • start time; finish time • on next Wednesday • start on Friday • every 10 minuts; every 24 hours

Results and Discussion (Event)

Message Events

- Here it has to be distinguished between Catching and Throwing Message Events.

- From the sample it could be seen, that

  - Catching Message Events have a wider label variety (e.g., noun phrase, verb in past participle, noun with an adjective, a complete sentence).

  - Throwing Message Events follow the Verb Object Style which is usual for Activities.

Results and Discussion (Gateway)

Exclusive and Inclusive Gateways

- The preferred labelling style "Question with Noun and Verb in Past Participle" is not the only one.

- The wording in the labels has also many variations.

- What is common to many labels is the question mark "?" at the end of the label.

- Many Gateways even do not have a label.

Summary

- For Tasks, there is a broad agreement, to follow the recommended Verb Object Style.

- For normal Sub processes two styles are in use (Active Noun Style and Verb Object Style).

- For Events many variations of the wording exist. It strongly depends on the type of Event.

- Although, the labels of Events do not strongly follow the preferred style suggested in literature, the way Events are labelled still make sense in their contexts (e.g., labels of Timer Events or Message Events).

- If a label for an Inclusive or Exclusive Gateway exists, it is well understood, that a question mark at the end should appear. But the wording of the rest of the label varies.