From text to model for the SBD History

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This document is an attachment to the paper “Methodical conversion of documents to models; MuDForM Method Definition and Case Study, Robert Deckers and Patricia Lago, June 2022, under submission”. It contains a full log of the modeling steps described by the paper applied to the case. It is a subset of the real case study, which, for intellectual property reasons, is not allowed to be fully published.

Contents

1 Introduction

The case study covers the part of MuDForM that covers the phase from text to an initial model, i.e., until Model engineering (see Figure 1). It refers to the metamodel and guidelines from the definition of MuDForM, published on https://github.com/robertdeckers/MuDForM.

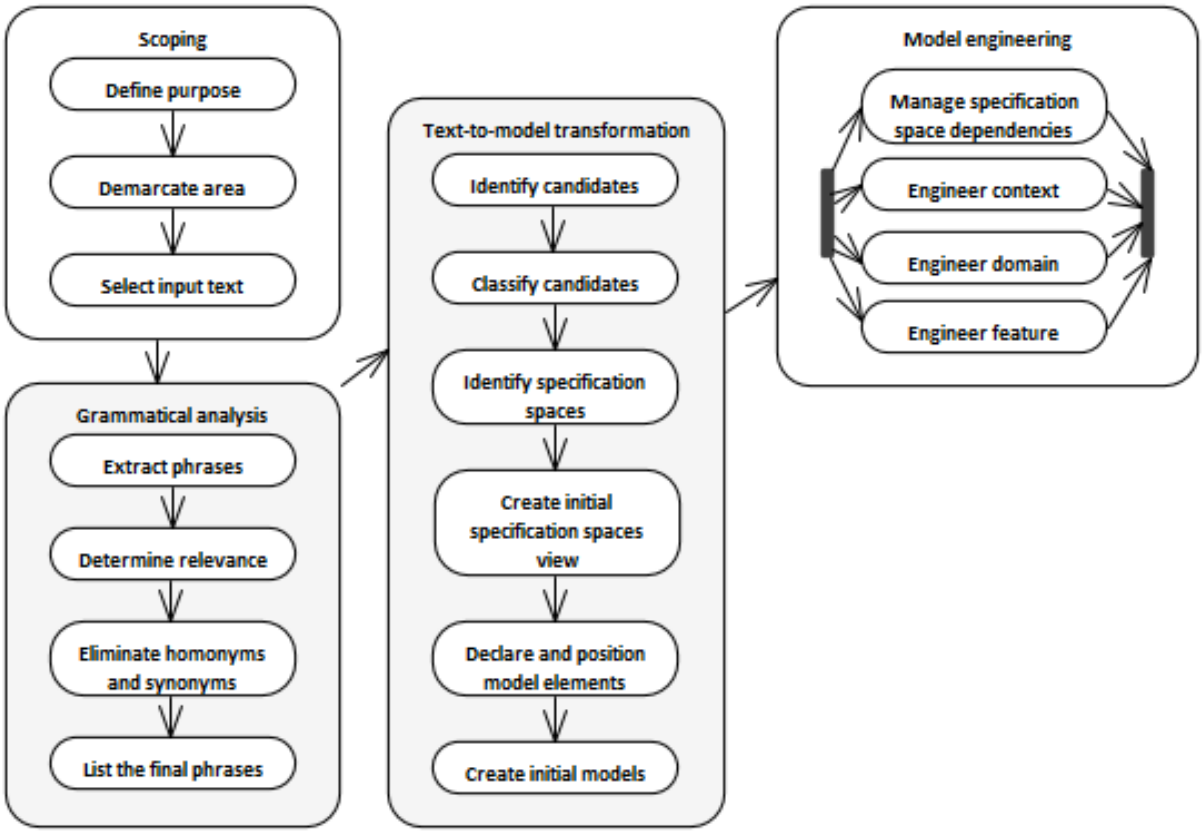


Figure 1 MuDForM method flow.

2 Scoping

Following the steps of Scoping:

- Purpose: The purpose of the model is to define constraints for the printer controller software. In the actual case, also some of the constraints are extracted from the text. We have omitted these here because for intellectual property reasons and for understandability of the paper.
- Demarcation: We expect concepts like: history, job, clean up. Not concepts like job specification, to define job, and to print job. Also user interaction is out of scope.
- Text selection: The selected sentences are presented in the first column of the table. The actual case contains 3 time more sentences. These are omitted for intellectual property reasons.

3 Grammatical analysis of (a part of) SBD History

This section shows the results of the steps of grammatical analysis.

3.1 Extract phrases and determine relevance

Thew table below contains the origin sentences form the input test, the extracted phrases, and the remark, questions, and answers from domain experts.

Input sentence	Extracted phrase	Issues/decisions
When a print job is completed, it will be archived in the so-called "*History*".	TO complete job TO archive job in history	To archive and to move are synonyms. Chosen: to Move.
The History is a job store that will be used as a local temporary job store and is not intended for long-term archiving purposes.	History ISA job store TO use local temporary job store TO intend History for purpose	To intend and to use are ignored because of guideline "Ignore intention phrases".
The history is a separate job store.	History ISA job store	Following the guideline "Detect type of adjectives and adverbs": Are there also non-separate job stores? NO
Only jobs that have been completed will end up in the History.	TO complete job Job TO end up in history	To end up is not a domain activity. "job is in History" is a state after "to archive". Chosen: to move/copy job from job store to job store
Proof prints initiated from the waiting room and system jobs will not end up in the history when completed.	TO initiate proof print from waiting room System job ISA job	To initiate is considered out of scope, but add the phrase "proof print ISA job".
Also jobs that have been aborted or deleted will not end up in the History.	To abort job To delete job	
The Noname Controller has a History	Noname controller ISA controller Controller has History	
The Settings editor provides functionality to clean up the History at specified time periods. The following time periods can be specified: One day, One week, One month, Forever	To clean up history at time period. TO specify time period. One day, one week, one month, forever ISA time period.	Use retain period instead of time period. Furthermore, it is the retain period of the History which is specified, giving: TO specify retain period of history. One day, one week, one month, forever are possible values of retain period.
When the history is not limited in some way, it would grow infinitely.	TO limit history History TO grow	To Grow is not a domain activity. To limit is out of scope, because there are no

		requirements about preventing out-of-memory.
Therefore, jobs that are too old will automatically be removed from the history.	TO remove job from history Job IS too old	To Remove and to Delete are synonyms. Chosen: to Delete. Following the guideline: "Detect type of adjectives and adverbs", we asked what kind of thing "too old" is. We did not get a clear answer. So, we kept it as is.
Jobs that have been longer in the History than the specified time period for the automatic cleanup are removed from the History	History HAS jobs To specify time period	
Completed jobs will be moved to the history if the history is enabled.	TO enable history	History enabled is property of controller.
If the history is disabled new completed jobs will be removed from the system, so they will not end-up in the history.	TO disable history TO complete job TO remove job from system Job TO end up in history	System and controller are synonyms. Chosen: controller.
Disabling the history only prevents that completed jobs are added to the history.	TO prevent "jobs added to history"	To prevent is ignored because of guideline "ignore intention phrases". What does "only" mean? "Only" tries to say that the history is not emptied, and other history functions still work.
When the History is disabled completed jobs will no longer be moved to the History on completion.	TO disable history TO move job to history	No longer is superfluous
The moment the history is disabled the following is true: Jobs that are present in the history will remain there. Jobs will disappear from the history as a result of the next automatic cleanup.	History has Jobs Job TO disappear from history TO delete job from history TO move job from history to waiting room	Remain does not express a change. Disabled is a state, not a moment. So probably "From the moment…." Disappear from history is the effect of to delete.
The following scheme defines how jobs can be moved and copied from one location to the other.	TO move job from location to location. TO copy job from location to location.	Location and job store are synonyms. Chosen: job store
Jobs that have been finished in the print queue will be moved to the history if history is enabled in the Settings editor	TO finish job in print queue TO enable history	Assumption: it doesn't matter where the history is enabled, i.e., "in the settings editor" can be omitted. Settings editor is

		about user interaction and thus out of scope. Assumption: Sentence is incorrectly phrased. You don't finish jobs in the print queue. To finish and to complete are synonyms.
A job is moved automatically from the print queue to the history at the moment the job has been completed; the last moment is defined in [SBD_LIFECYCLE].	TO move job from print queue to history	What does "the last moment" refer to? Answer: The moment the job has been completed.
System jobs (i.e. service jobs and configuration report) will not appear in the history	Service job ISA system job System job ISA job Configuration report ISA system job	
Deleted or aborted jobs will not appear in the history	TO abort a job TO delete a job Job TO appear in History	Appear is not an action but the result of move or copy.
From streaming jobs, only the meta-data of successfully completed jobs ends up in the history, if the history is enabled.	Streaming job ISA job Job has metadata TO enable history	Assumption: to successfully complete is synonym for to complete. What properties are metadata? Metadata is defined elsewhere. Ignore for now. (There is also no requirement for it.)
A job can be reprinted from the History by copying them from history to waiting room.	TO reprint job from history TO copy job from job store to job store Waiting room ISA job store	Is "reprint" the activity or "copy"? Answer: To copy. Reprint is the intention/effect. To copy is already defined on job store. So, what is a waiting room? Answer: It is a type of job store.
A job can be reprinted from the history by sending the job to the scheduled queue via the print button	TO reprint job from history TO send job from history to scheduled queue via print button	Scheduled queue or schedule queue? Chosen: print queue Print button is about user interaction, and is out of scope. To send is synonym for to copy

3.2 Eliminate homonyms and synonyms

In the table we detected and concluded the following regarding synonyms and homonyms:

- To archive, to send, to end up, to appear, to disappear all expresses forms of to copy or to move.
- To finish and to complete are synonyms. Chosen: to complete.
- Controller and system are synonyms. Chosen: controller.
- Location and job store are synonyms. Chosen: job store

- To remove and to delete are synonyms. Chosen: to delete.
- Time period was to generic. Chosen: retain period

Notice that we did not find any homonyms here.

3.3 List final phrases

We derived the following final phrases:

Configuration report is a system job
Controller has History
Forever IS retain period
History HAS jobs
History ISA job store
Job has metadata
Job IS too old
Noname controller ISA controller
One day IS retain period
One month IS retain period
One week IS retain period
Service job isa system job
Streaming job ISA job
System job ISA job
TO abort job
TO clean up history at retain period.
TO complete job
TO complete job in print queue
TO copy job from job store to job store
TO delete job
TO delete job from controller
TO delete job from history
TO disable history
TO enable history
TO move job from history to print queue
TO move job from history to waiting room
TO move job from job store to job store
TO move job to history
TO specify retain period of history
Waiting room ISA job store

4 Text to model transformation

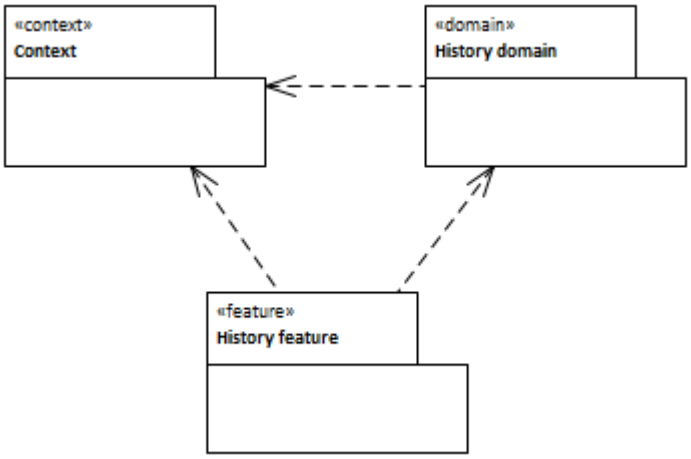
4.1 Identify and classify candidates

Except for Retain period and its possible value, we have positioned all terms in the History domain by following the guideline “In case of doubt, put a candidate in the domain”. “Too old” is probably not a domain class because it is not a noun (phrase), and thus probably indicates a possible value.

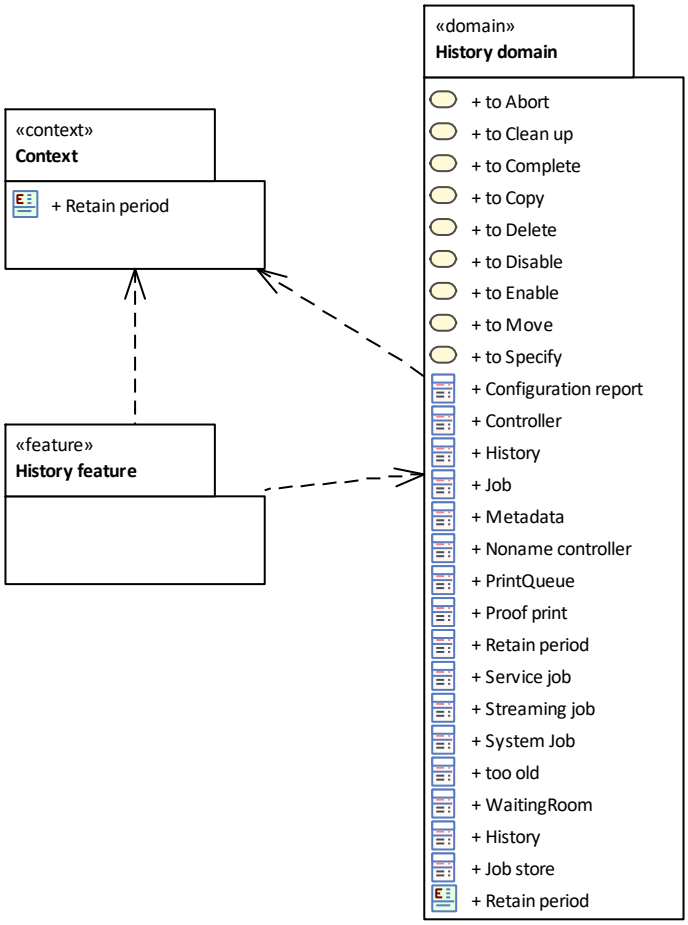
Term	**Type**
Configuration report	Domain class
Controller	Domain class
Forever	Possible value of Retain period
History	Domain class
Job	Domain class
Job store	Domain class
Metadata	Domain class
Noname controller	Domain class
One day	Possible value of Retain period
One month	Possible value of Retain period
One week	Possible value of Retain period
Retain period	Context class
Service job	Domain class
Streaming job	Domain class
System job	Domain class
Waiting room	Domain class
Too old	Context Class (but probably a possible value)
To abort job	Domain activity
To clean up history at retain period.	Domain activity
To complete job	Domain activity
To complete job in print queue	Domain activity
To copy job from job store to job store	Domain activity
To delete job	Domain activity
To delete job from controller	Domain activity
To delete job from history	Domain activity
To disable history	Domain activity
To enable history	Domain activity
To move job from history to print queue	Domain activity
To move job from history to waiting room	Domain activity
To move job from job store to job store	Domain activity
To move job to history	Domain activity
To specify retain period of Job	Domain activity

4.2 Identify specification spaces and initial specification spaces view

For this case we used the guideline: “Begin with one context, one domain, and one feature”.



4.3 Declare and position model elements



4.4 Create initial models

4.4.1 Domain model

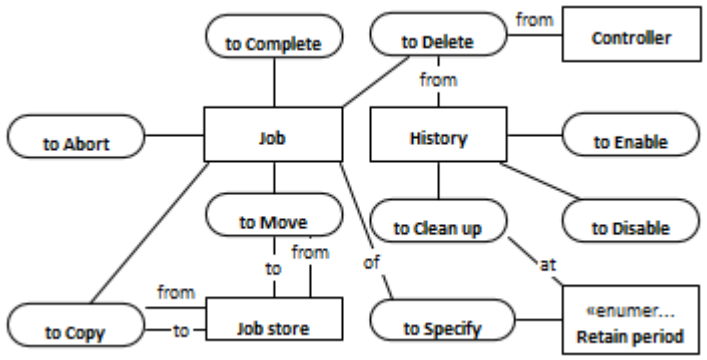


Figure 2 Interaction view of SBD History domain

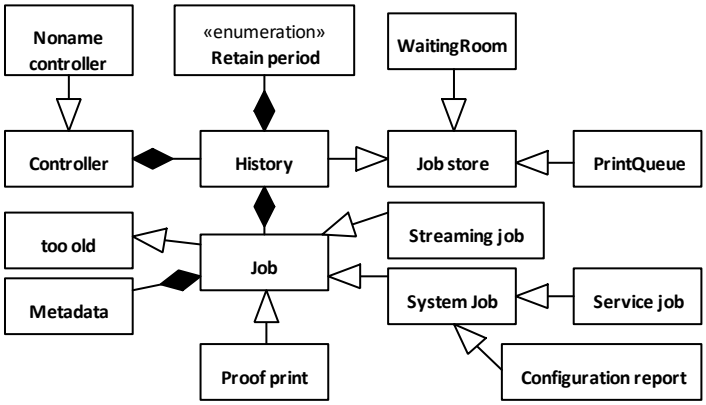


Figure 3 static view of SBD History domain

4.4.2 Context model

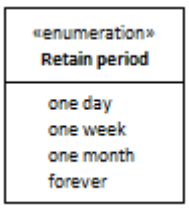


Figure 4 The context model

4.4.3 Feature model

The feature model is initially empty. But, it can be expected that “to Clean up” will be a function. Furthermore, there will probably be functions manually moving and copying jobs from history to another job store. However, this is speculation, so we do not model these elements yet.