

GUI application meta-models: a state of the art

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Abstract— **In this context...** When a developer wants to analyse an application, and this application includes an user interface. He could want an abstraction of the application. Often, this abstraction level correspond to models, and their meta-models, of the piece of software. **We consider this problem P...** There are indeed many elements to represent and to link. **P is a problem because...** Currently there are many meta-models of GUI application that can be used to represent the interface and some links between the different windows. But none of them express complex behavior, such as loop or condition, nor data structure information. **We propose this solution...** We defined four meta-models. The first one represent the Graphical User Interface, the second one the layout to apply to the GUI, the third one the data structure implies in the GUI, the last one the behavior associate to an event fired by an element of the GUI. **Our solution solves P in such and such way.** Our meta-models can express the different elements of a GUI application. So can represent the graphical user interface and the logic of the application.

Index Terms—Graphical User Interfaces, Model-Driven Engineering

I. INTRODUCTION

Contexte use case In the context of the analysis of an application. It happens that the developers want to create tools on top of his analysis. These tools could be useful in cases like: analysis, tests generation, migration, *etc.*

introduction model A way to create those software is the usage of model of the source code of the application. The developers create or use a meta-model of the language of the application source code. Then they instantiate this meta-model from the application to analysed.

Problème intro gui In the case of GUI application, it happens that the abstraction level doesn't provide enough information. Indeed, the generated model contains the methods, classes, *etc.* of the source application, but no information about how the GUI is shaped. The developers must do another analysis on the model to extract these information and so making his tool.

intro simple gui decomposition A solution to create tool specialized for GUI application is to create GUI model. A GUI application is divided into different elements. The aim of this paper is to define those components and meta-models to represent all the specificities linked to a GUI application.

Know tracks We did not find any other papers which defines a solution to represent graphical application. Nevertheless, the

KDM model designed by the OMG proposed a *Resource Layer* which can used to define an GUI application. Their solution is discussed section X.

What is our solution We defined four meta-models to represent the GUI software. The meta-models represent the different main GUI's specificities we extracted from our analysis and other research papers.

Contrib of the paper The main contributions of our work are:

- Description of GUI application structure
- Meta-Models to represent a GUI application
- Discussion about GUI Meta-Models

Paper structure In Section II, we present the different GUI elements Section III exposes our solution. Then, In Section IV, we describe and categorized the solution proposed by others authors. Finally, we conclude in Section VI.

II. GUI APPLICATION STRUCTURE

III. PROPOSED META-MODELS

A. Model View Controller

IV. EXISTING SOLUTIONS

intro expliquand ce que l'on va faire (analyse des modèles) Many authors have tried to represent a GUI application. They created meta-models that define the entities they need for their analysis. Those models help us define meta-models to represent any GUI applications. We analysed and grouped the meta-models of 14 relevant papers in the GUI application representation field.

A. GUI

TABLE I
GUI ELEMENTS

SubWidgets	[4, 6, 11]
Events	[1, 2, 3, 4, 5, 6, 9, 10, 13]
Properties	[1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]

presenter en quelques lignes tout les modèles proposés Gotti and Mbarki [4] proposed a meta-model inspired by KDM model (see section IV-E).

- B. Navigation
- C. State flow
- D. Layout
- E. KDM

V. DISCUSSION

Critères d'évaluation

- Certains auteurs n'ont pas présenté le schéma mais l'on seulement décrit

VI. CONCLUSION

In this paper, we defined four meta-models to represent a GUI applications.

The **GUI model** represents the different *pages* of the applications and their contents. It includes the properties of the widgets and the link from the widgets and their events.

The **layout model** expresses the positioning relation between the widgets of the GUI models.

The **behavior model** defines the behavior to execute when an event is fired. The events are fired by using an action on a widget of the GUI model or automatically by the application.

The **data model** includes information about the data manipulated by the GUI application. Those data can be used by the behavior model and transmit to the GUI model.

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