A GUI Modeling Language for Mobile Applications

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Agenda

- Introduction
- Related Works
- The Mobile Interface Modeling (MIM) Language
- Evaluation of MIM
- Conclusions and Further Work

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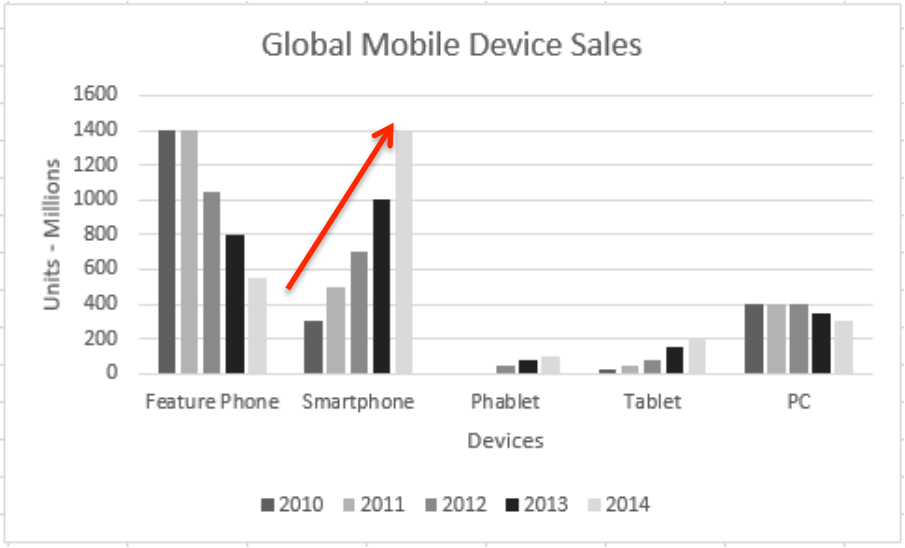
Introduction

- The sales of mobile devices has exponentially increased, and the development of mobile applications has also increased in an amazing way.



Mobile devices sales, based on Insight Media - 2014

Introduction

- The user interface takes special relevance in mobile applications: it must be simple.
  - (i) average users do not want to spend much time using the applications
  - (ii) there are a wide variety of available mobile applications in the market.

The GUI of a mobile application can make the difference among applications that perform similar tasks.

Introduction

- The development of a user interface for mobile applications requires the use of a small set of patterns with proven efficacy.

- The use of patterns for modeling and code-generation is one of the main principles of MDD.

Introduction

- Contribution: A modeling language for designing user interfaces for mobile applications.
  - It provides a formal documentation
  - It helps to better express and validate the clients' requirements
  - MDD strategies could fully automate the generation of mobile applications

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Related Works

- The main goal of software engineering is to obtain high quality software products.

Usability is a key aspect for **mobile** applications

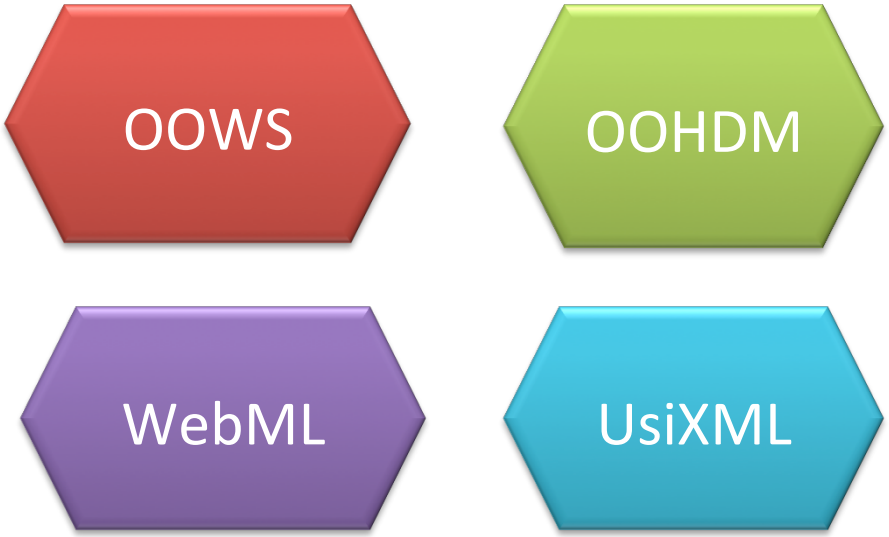
Related Works

- To evaluate the usability of mobile applications, three challenges must be faced:
  - (i) the limited screen size of mobile devices
  - (ii) the lack of specific software tools
  - (iii) additional difficulties arising from a mobile context

Related Works

- Industry provides guidelines to ensure that the applications meet the minimum and necessary usability criteria before being released.

Related Works



None of the above GUI modeling languages is specifically targeted on mobile applications

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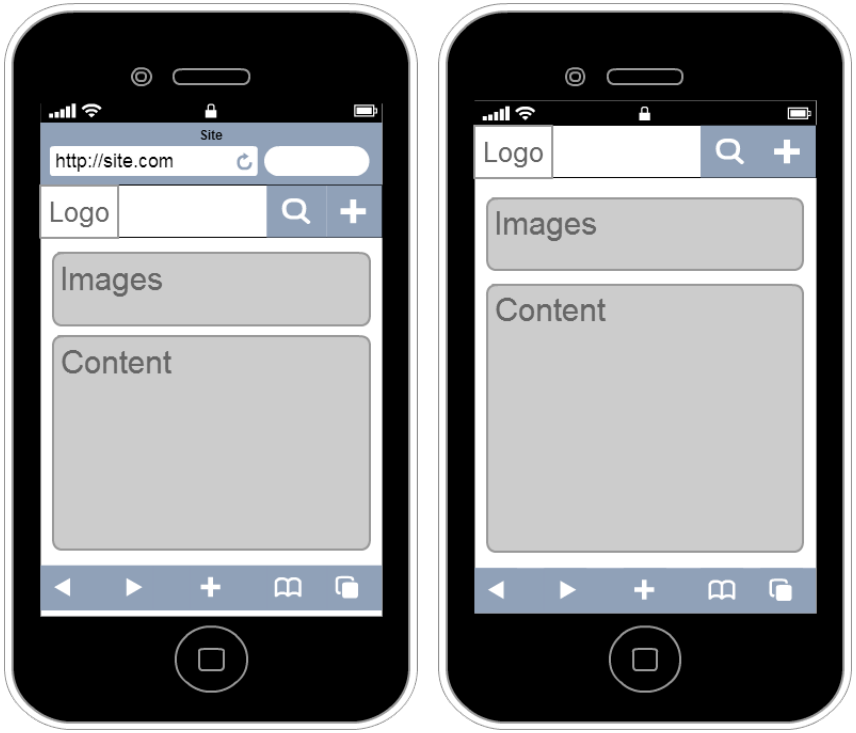
The MIM Language - Principles

- Different interfaces for different devices.

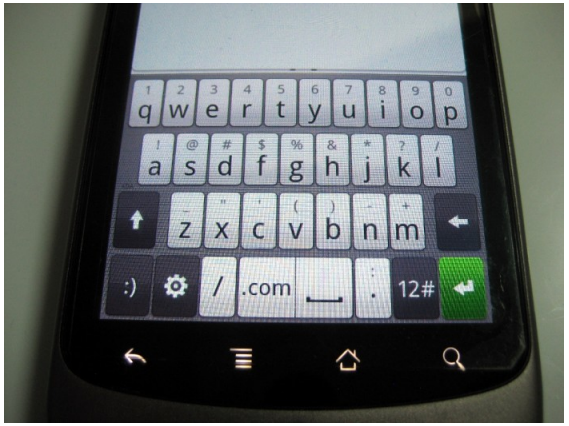


The MIM Language - Principles

- Take advantage of the upper section of an application.
- Omit splash screens, automatic sliders or carousels in mobile GUIs.
- Contrast the text and the background

The MIM Language - Principles

- Place controls near the content they affect

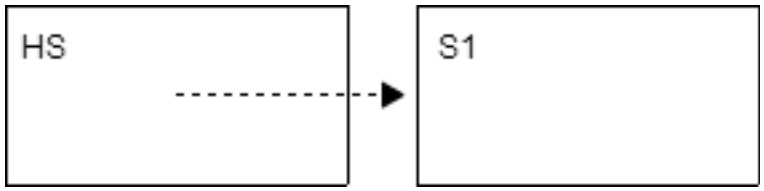


The MIM Language - Principles

- Place images and text in different lines

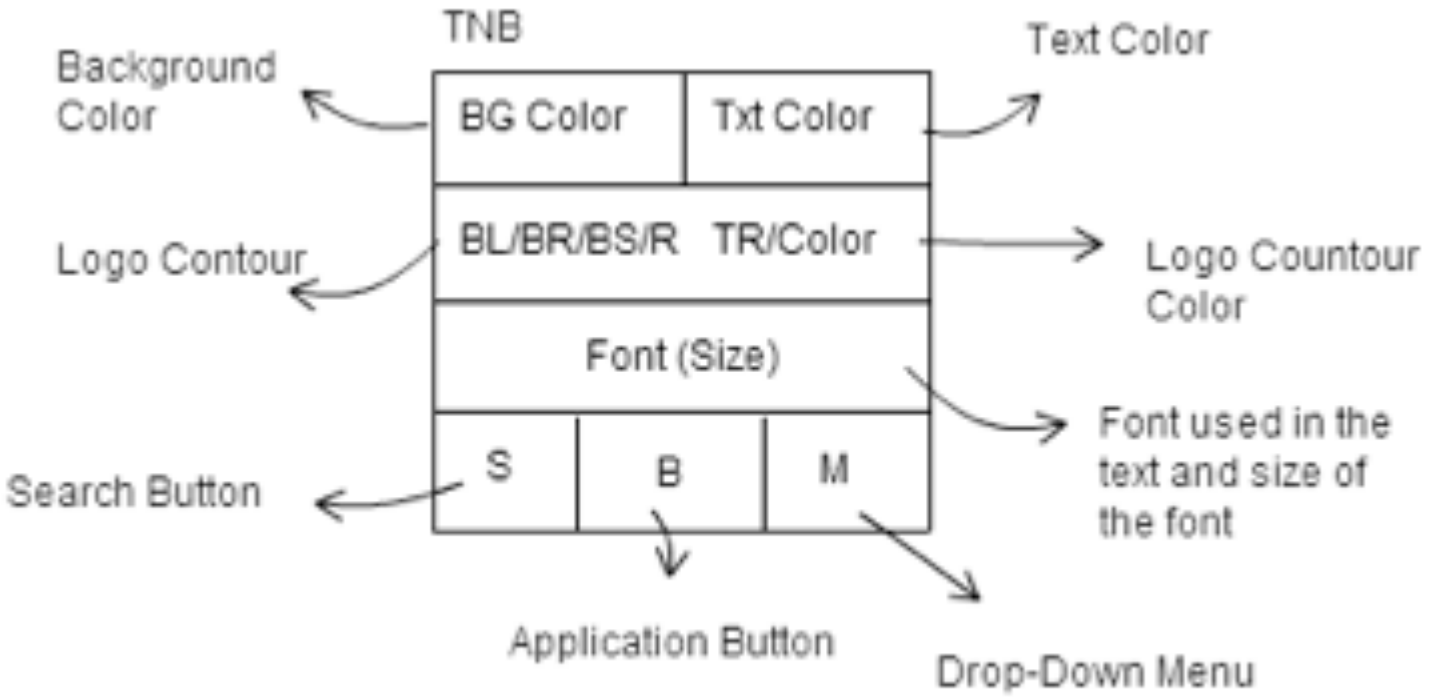
The MIM Language - Constructs

- Screens and Navigation



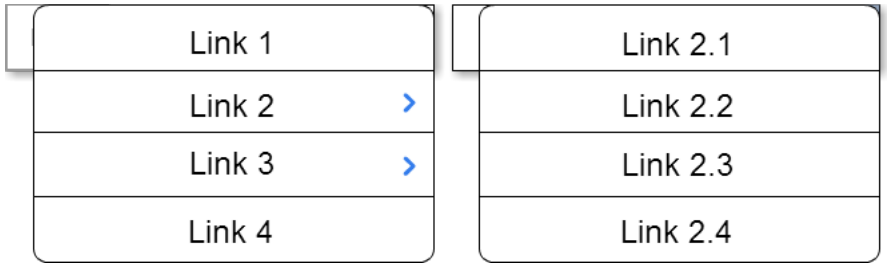
The MIM Language - Constructs

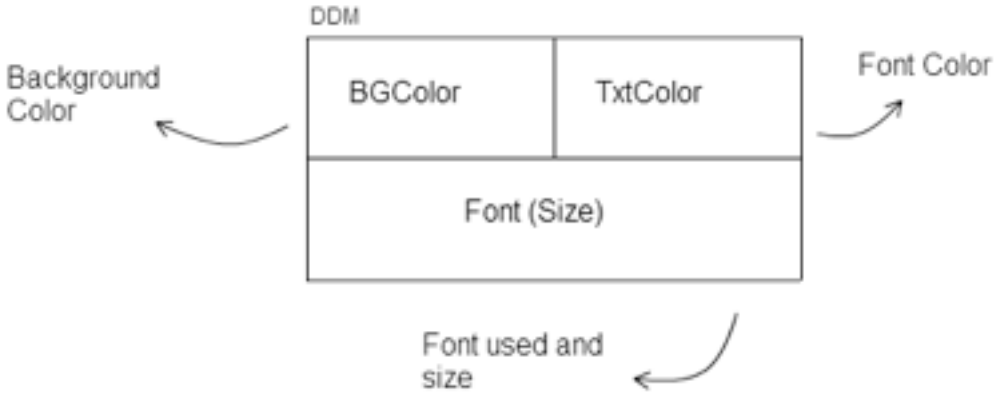
- Top Navigation Bar



The MIM Language - Constructs

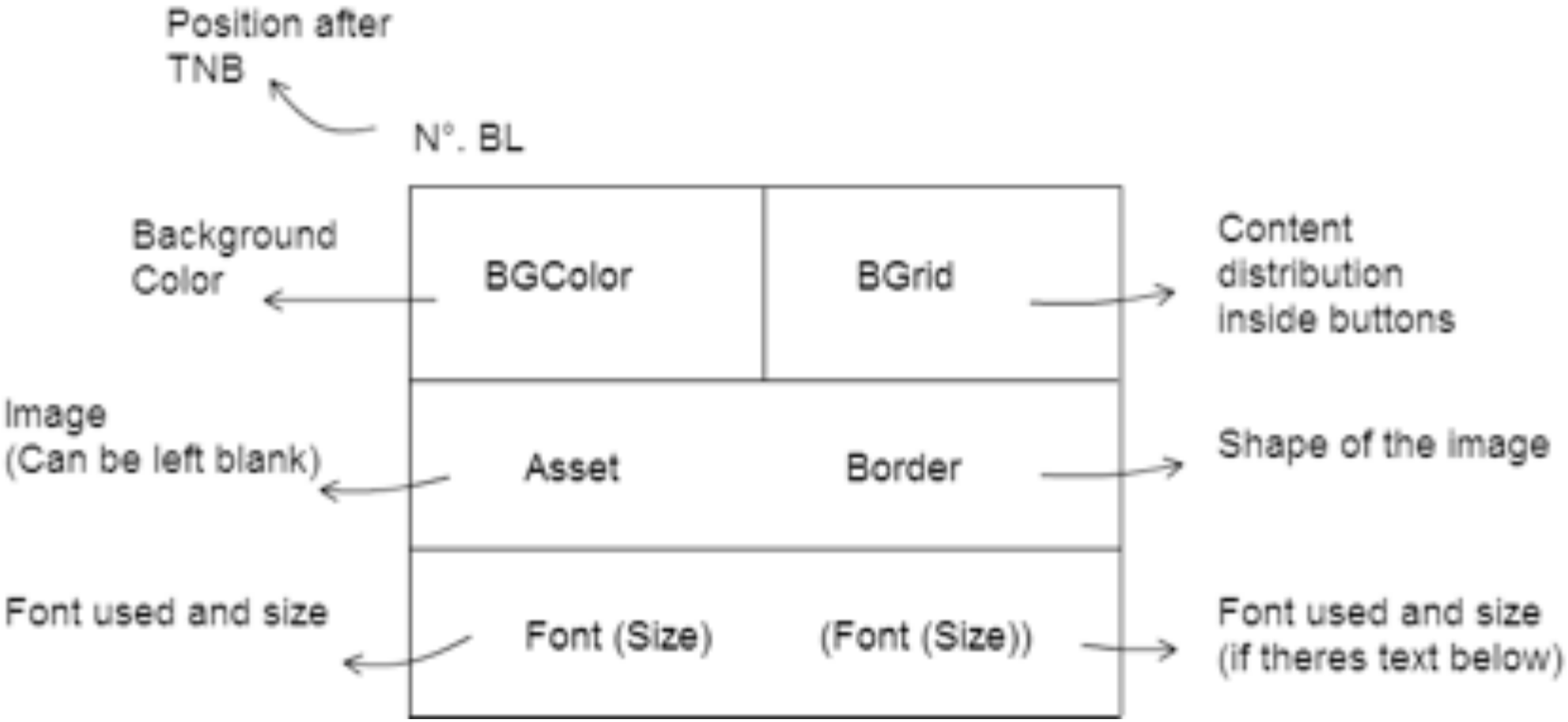
- Drop Down Menu





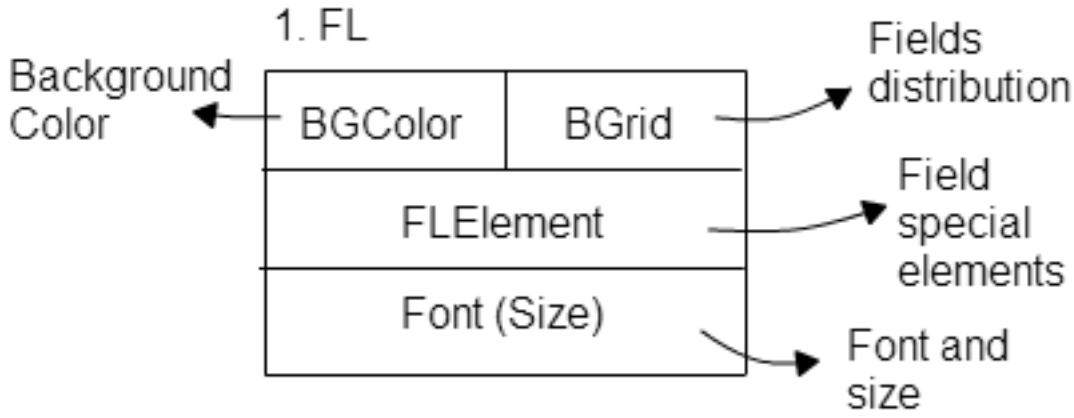
The MIM Language - Constructs

- Button List



The MIM Language - Constructs

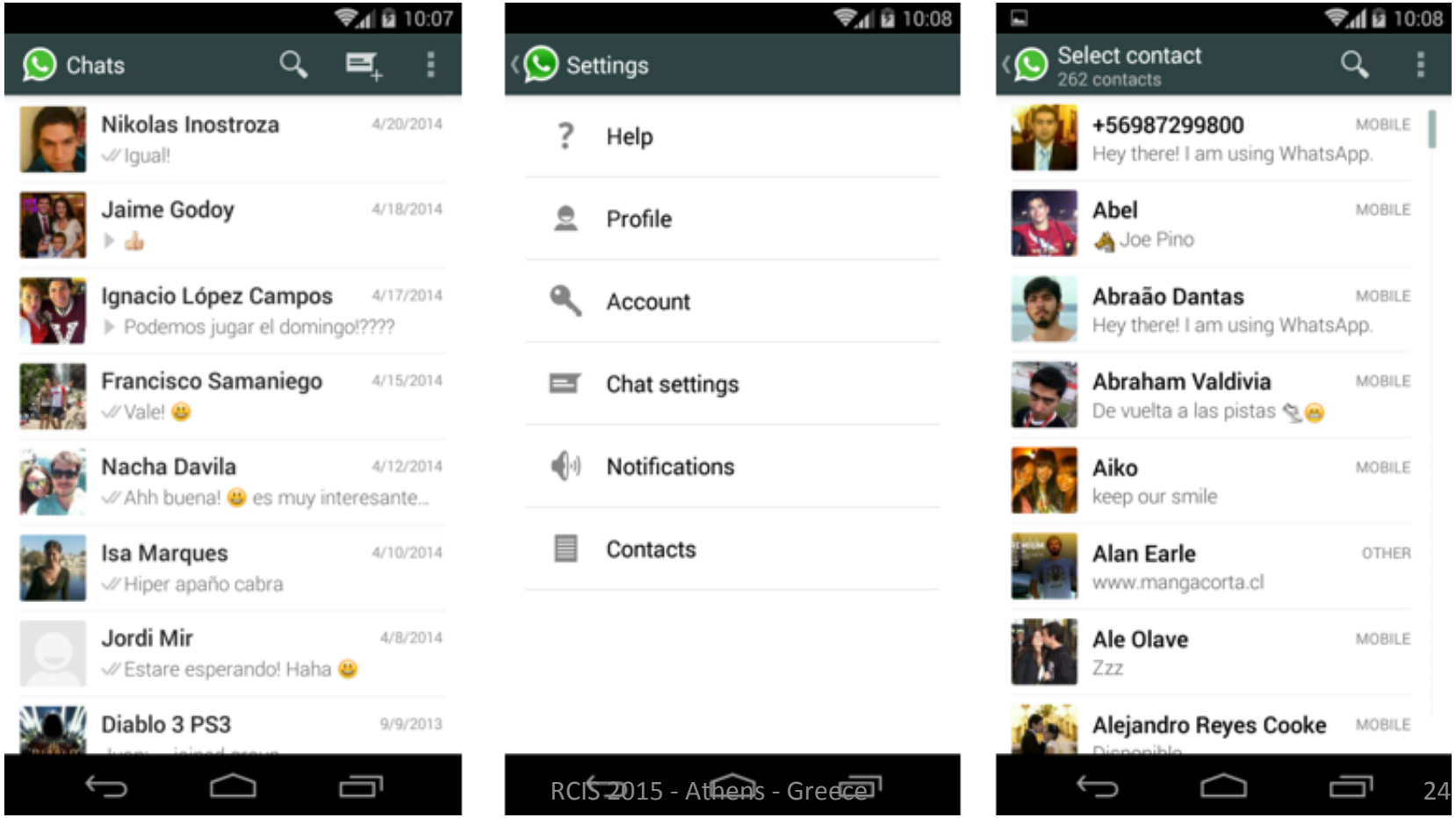
- Field List



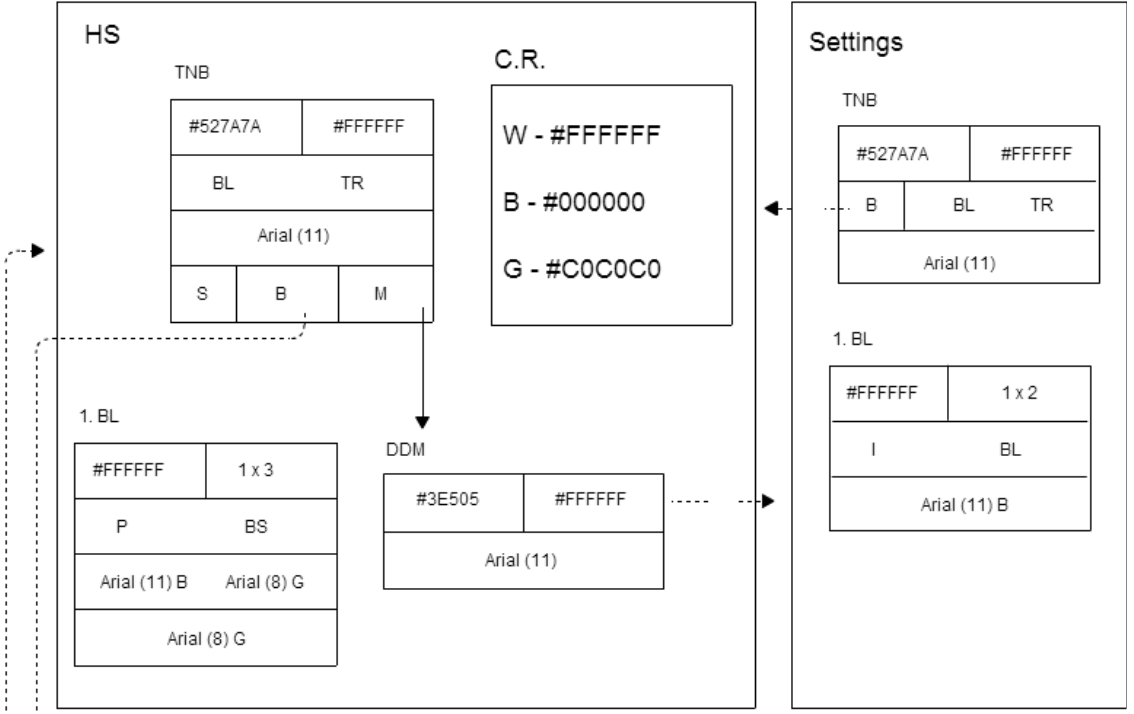
HTML Color Code

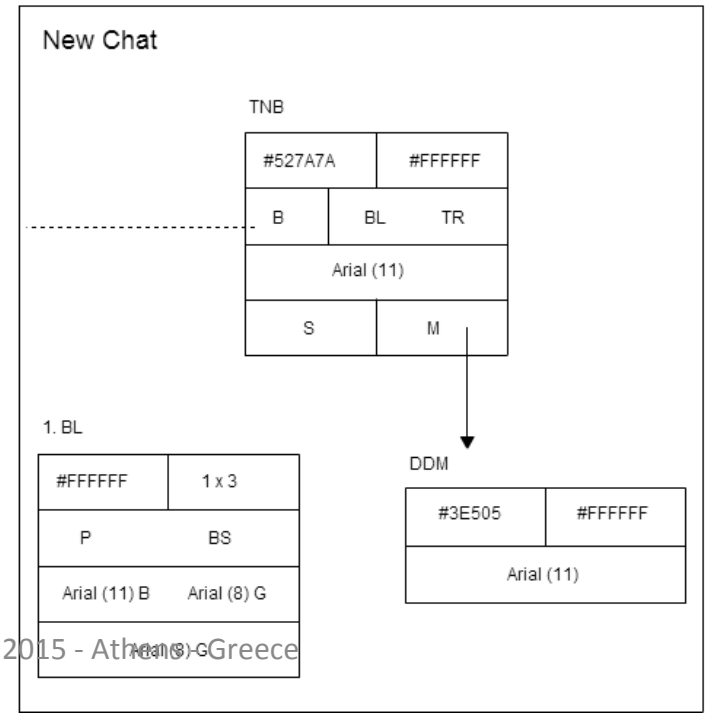
The MIM Language

- Feasibility study (WhatsApp)



- WhatsApp


HS
TNB
#527A7A
#FFFFFF
BL
TR
Arial (11)
S
B
M
C.R.
W - #FFFFFF
B - #000000
G - #C0C0C0
Settings
TNB
#527A7A
#FFFFFF
B
BL
TR
Arial (11)
1. BL
#FFFFFF
1 x 2
I
BL
Arial (11) B
1. BL
#FFFFFF
1 x 3
P
BS
Arial (11) B
Arial (8) G
Arial (8) G
DDM
#3E505
#FFFFFF
Arial (11)


New Chat
TNB
#527A7A
#FFFFFF
B
BL
TR
Arial (11)
S
M
1. BL
#FFFFFF
1 x 3
P
BS
Arial (11) B
Arial (8) G
Arial (8) G
DDM
#3E505
#FFFFFF
Arial (11)

The MIM Language - Limitations

- Lack of conceptual constructs for applications of different domains.
- Lack of an MDD tool that supports the MIM language.
- Lack of a mechanism that allows the interoperability with other MDD approaches.

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Evaluation of MIM Language

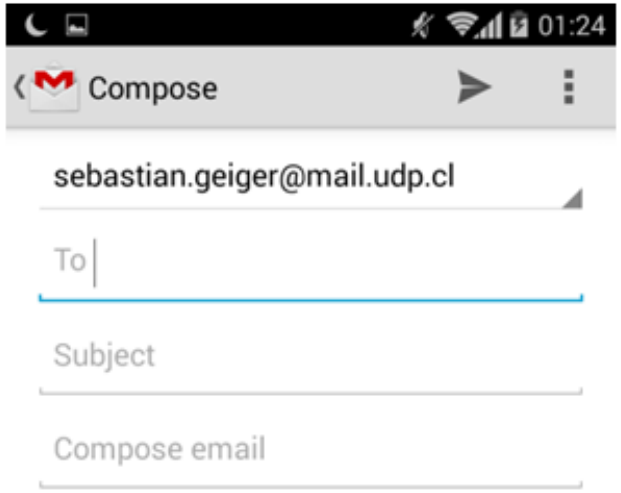
- Exploratory study at Universidad Diego Portales
  - Presentation of the MIM language to a group of students during 20 minutes.
  - Application of MIM to a case by the students during 20 minutes.
  - The students respond a survey.

Evaluation of MIM Language

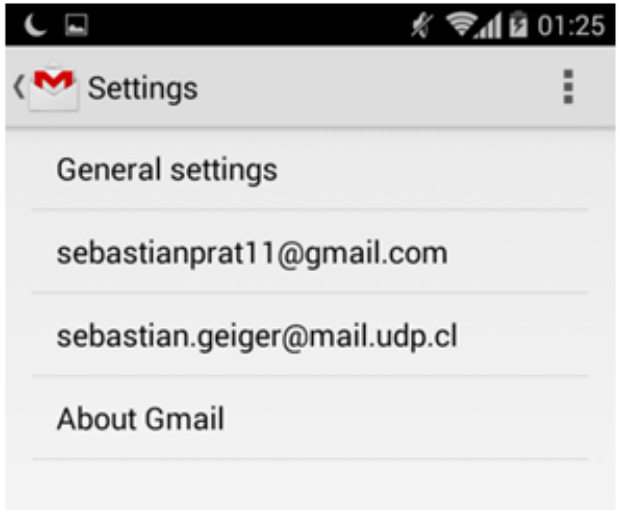
- Gmail Application

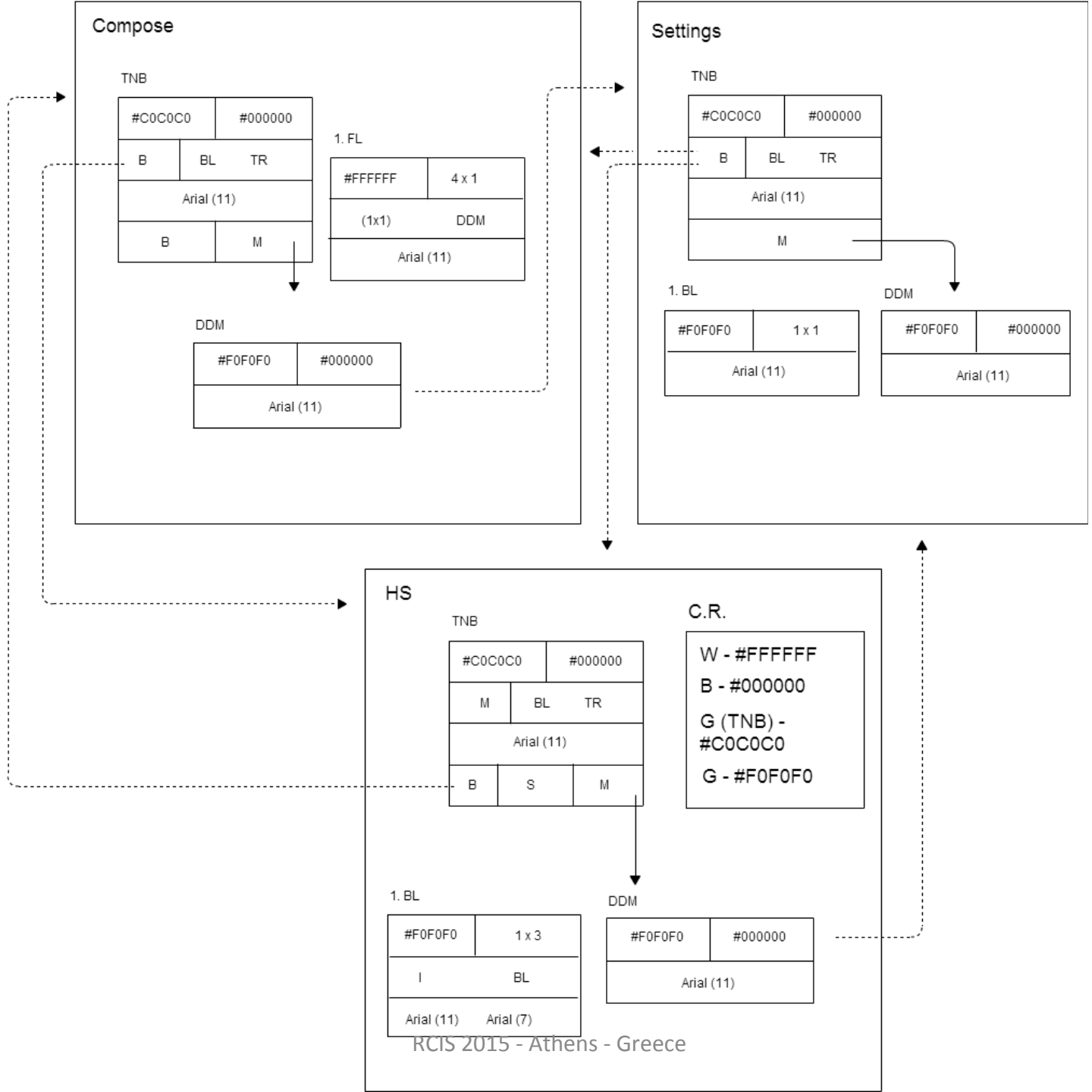
A

B



C




Compose
TNB
#C0C0C0
#000000
B
BL
TR
Arial (11)
B
M
1. FL
#FFFFFF
4 x 1
(1x1)
DDM
Arial (11)
DDM
#F0F0F0
#000000
Arial (11)
Settings
TNB
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#000000
Arial (11)
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W - #FFFFFF
B - #000000
G (TNB) - #C0C0C0
G - #F0F0F0
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#F0F0F0
1 x 3
I
BL
Arial (11)
Arial (7)
DDM
#F0F0F0
#000000
Arial (11)

Evaluation of MIM Language

- The Method Evaluation Model (MEM)
  - Actual Efficiency
  - Actual Effectiveness
  - Perceived Ease of Use
  - Perceived Usefulness
  - Intention to Use
  - Actual Usage

Evaluation of MIM Language

- Survey
  - –16 questions (PEoU, PU, ItU)
  - – Each questions was answered by using a 5 point Likert scale

Evaluation of MIM Language - PU

2. I believe that this method would reduce the effort required to develop mobile applications.
3. Mobile applications developed using MIM are easy to understand and modify by other developers.
5. This method would make it easier for developers to correct failures In the mobile application.
8. Overall, interface modeling is useful to implement the necessities of the mobile application users.
12. Overall, I think this method provides an effective solution to mobile applications development.
13. Using this method would make it easier to develop large mobile applications in an efficient way

Evaluation of MIM Language

- We collect **21** responses:
- Small for statistical analysis → inter-item correlation analysis for reliability of responses.

Category	Chronbach alpha
PEoU	0.824
PU	0.856
ItU	0.678

This means that over 67% of the variation is systematic and not due to measurement errors

Evaluation of MIM Language

- Sample statistics:

	N	Mean	Std. Deviation	Std. Mean Error
PEoU	21	3.7143	0.69949	0.15264
PU	21	4.0296	0.59148	0.12907
ItU	21	3.7143	0.78376	0.17103

PEoU and ItU represents a 74% approval, which corresponds to a category between Neutral and Agree within the Likert scale

PU corresponds to 80% approval (between Agree and Strongly Agree)

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Conclusions

- Interface development can benefit from the patterns for model-based development.

- This paper has presented MIM, a mobile interface modeling language.

- The specification of MIM language is the first step to achieve a language that efficiently allows modeling the GUI of mobile applications.

Conclusions

- Limitations:
  - (i) the evaluation of the completeness of the GUI specified by using MIM
  - (ii) the construction of a tool that support the MIM language
  - (iii) the development of mechanisms that allow the integration of MIM with MDD approaches.

- Further work includes empirical studies that evaluate the efficiency of the MIM language integrated in an MDD approach.

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