

Ignacio Marin, Francisco Ortin, German Pedrosa, Javier Rodriguez, 2015. Generating native user interfaces for multiple devices by means of model transformation. *Frontiers of Information Technology & Electronic Engineering*, **16**(12):995-1017. [doi:10.1631/FITEE.1500083]

Generating native user interfaces for multiple devices by means of model transformation

Key words: Model-to-model transformation, Native UIs, Model-based UIs, Model-driven engineering

Contact: Francisco Ortin

E-mail: ortin@uniovi.es

 ORCID: <http://orcid.org/0000-0003-1199-8649>

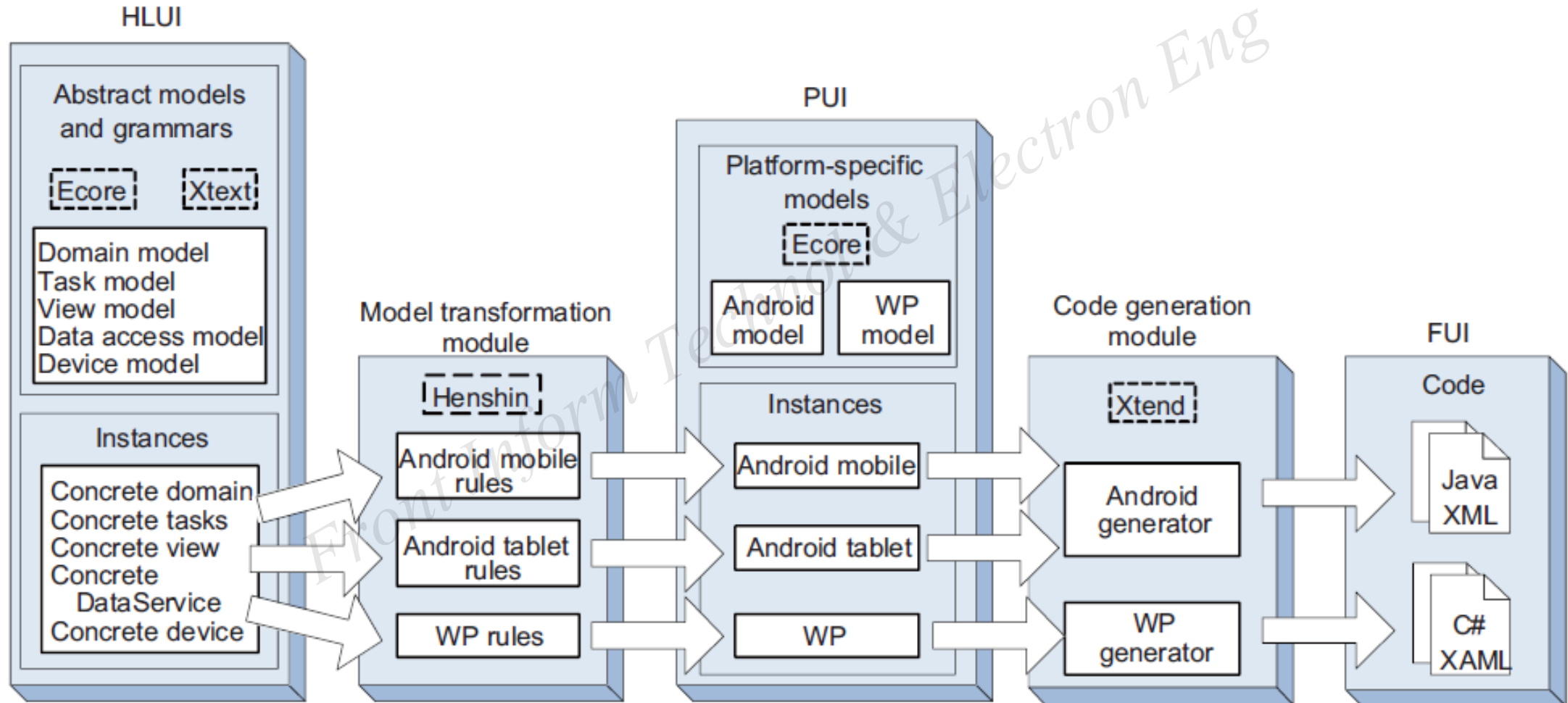
Motivation

- Users utilize different types of devices (PCs, mobile phones and tablets) to access information systems
- Different existing systems facilitate the creation of software for multiple devices
- Some of them follow the Model-Based User Interface (MBUI) approach
- Existing MBUI systems do not cover the transformation to final UIs that follow the design guidelines defined by each operating system and device manufacturer

Contribution

- A set of **meta-models** to guide the generation of final UIs from concrete UIs
- A **software tool**, called LIZARD, to support the creation of those meta-models and their transformation
- LIZARD generates **native mobile service front-end applications**
- Currently, LIZARD supports Windows Phone and two types of Android devices (smartphones and tablets)
- Our proposal is a **simplification** of the **CAMELEON** reference framework

Architecture



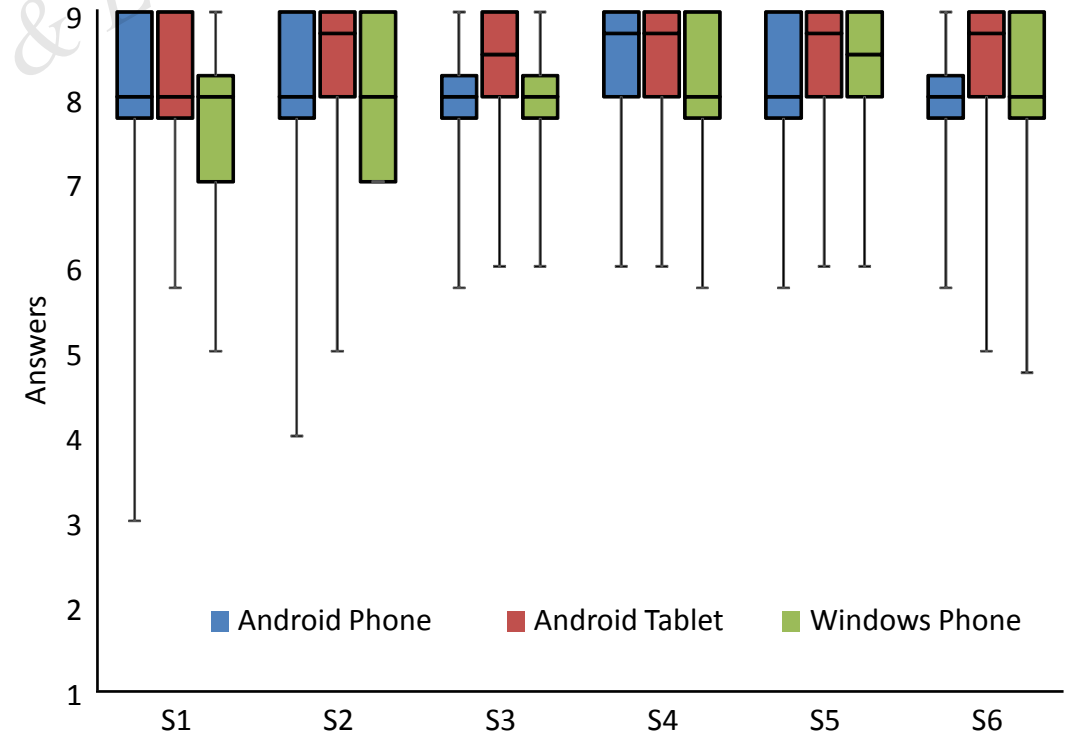
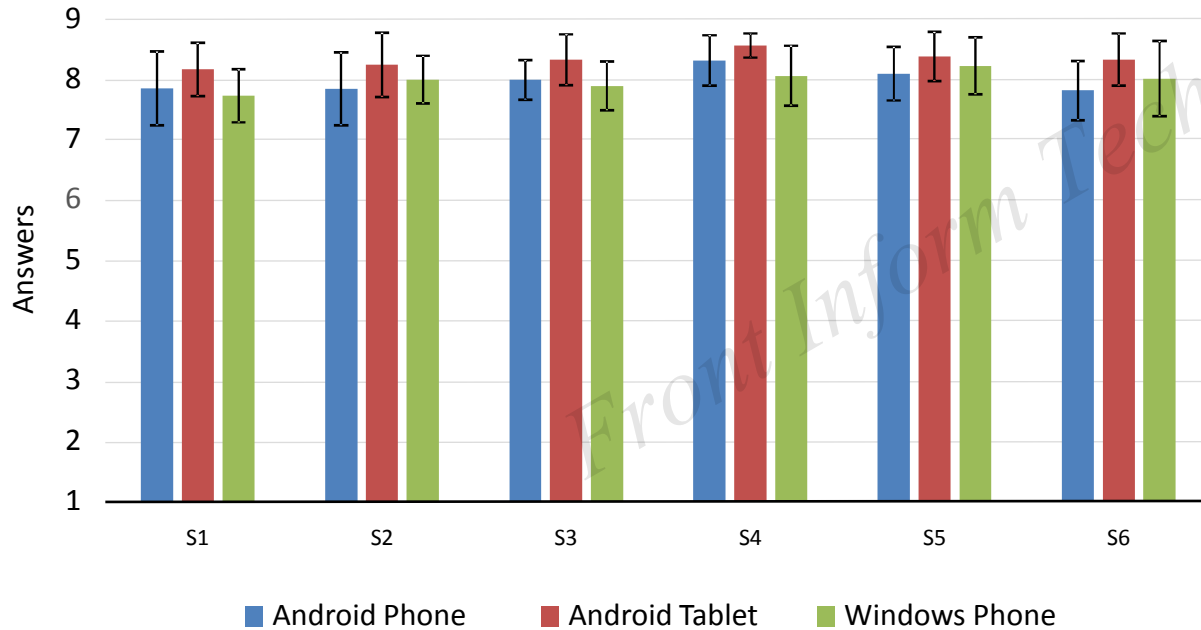
Evaluation

- An example application was developed by defining its Domain, Task, View and Data models; 3 target applications were generated by LIZARD

Parameter	Android phone	Android tablet	Windows Phone
Number of rules applied	5	5	6
Number of transformation units applied	5	4	6
LOC (per model)			
Domain	27	27	27
Tasks	138	138	138
View	253	253	253
Data	10	10	10
Device	12	12	12
LOC of the generated code	1547	1694	4597
LOC of the additional code (fixed)	3375	2373	3856
LOC of the code added by the programmer	122	122	136
Number of files generated	53	62	60
Number of additional files	131	52	66

Evaluation

- The Questionnaire for User Interaction Satisfaction (QUIS) was used to evaluate the satisfaction of 15 users



Conclusions

- The proposed high-level **Domain, Task, View and Data meta-models** can be used to generate **final native UI** applications
- The generated UIs follow the **specific guidelines** for each platform and device
- **Transformations** are applied following the **MBUI** approach
- The **evaluation** of an example application showed an average user satisfaction of **at least 7.7 over 9**, for all the scales and devices measured
- We plan to extend LIZARD to support iOS and desktop systems