MiDAS

A Model-Driven Approach for Context-Aware Software

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1

South America / Colombia

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Pontificia Universidad Javeriana

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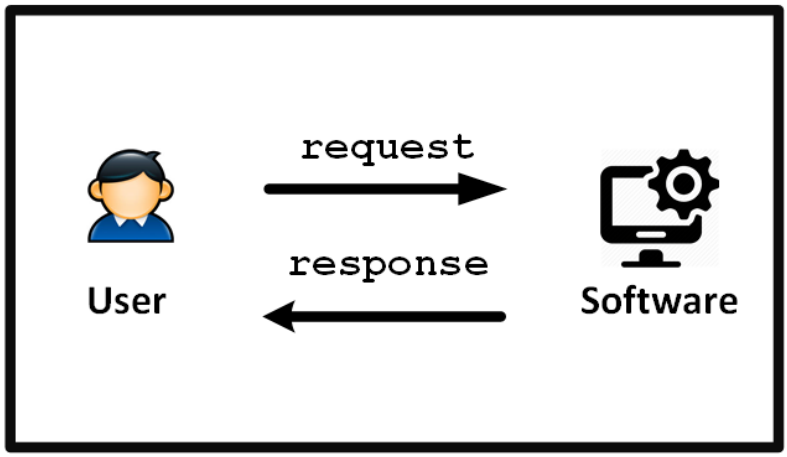
Traditional software



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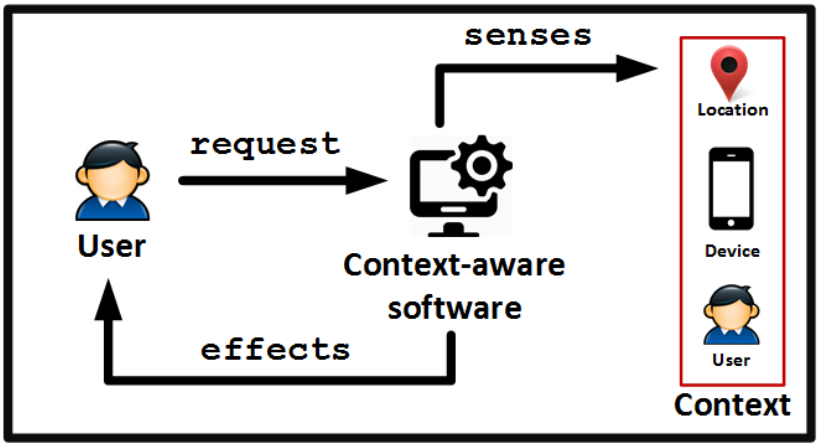
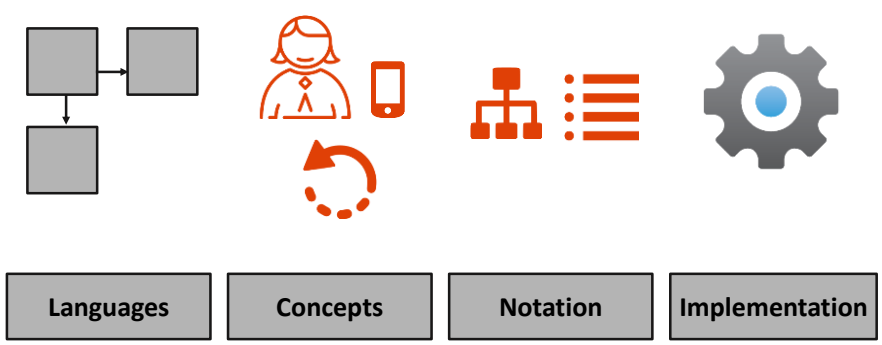
Context-Aware Software



"A system is context-aware if it uses context to provide relevant information and/or services to the user". *Dey, A. Understanding and Using Context*.

5

Problems



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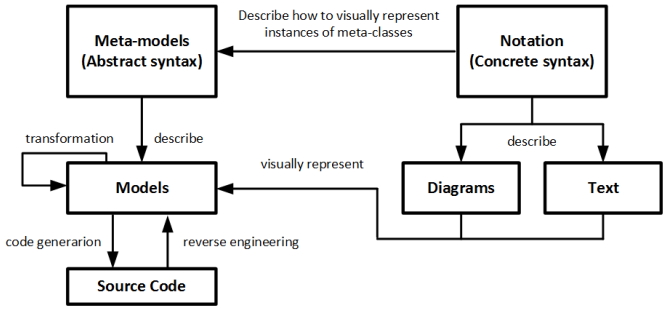
MDE

- Models are the central artifact for software development
- Modeling languages to formalize structure, behavior and requirements of specific domains
- Transformers that convert Models into Code or into other Models

7

MDE



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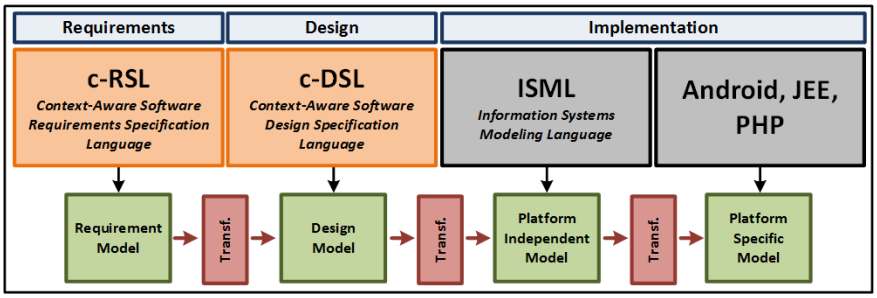
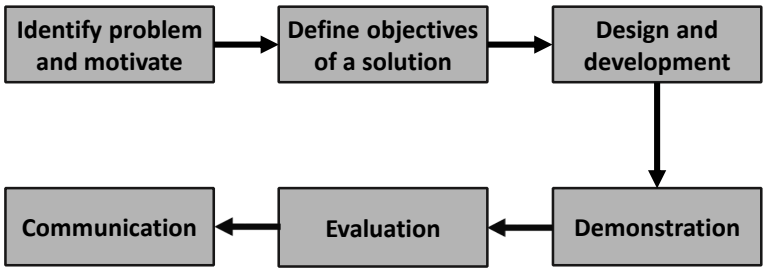
Solution: MiDAS



9

General Methodology

Design Science Research (DSR)



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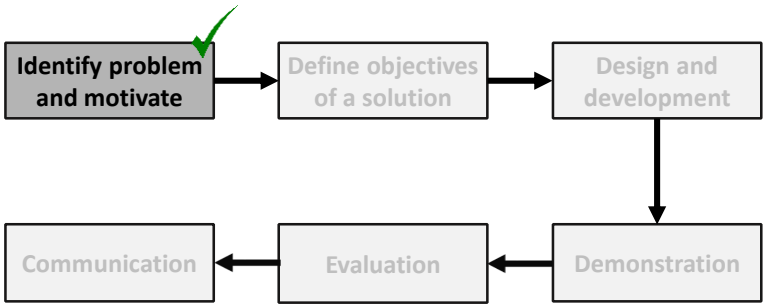

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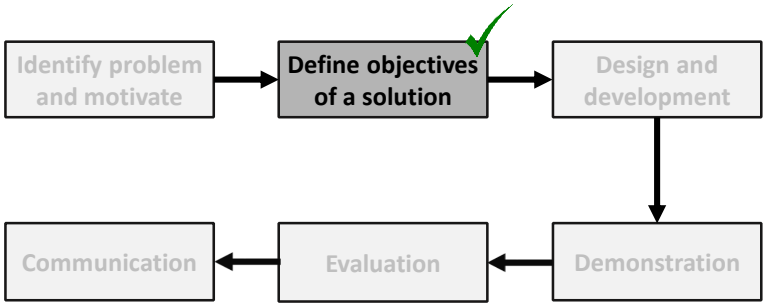
Design Science Research (DSR)



12

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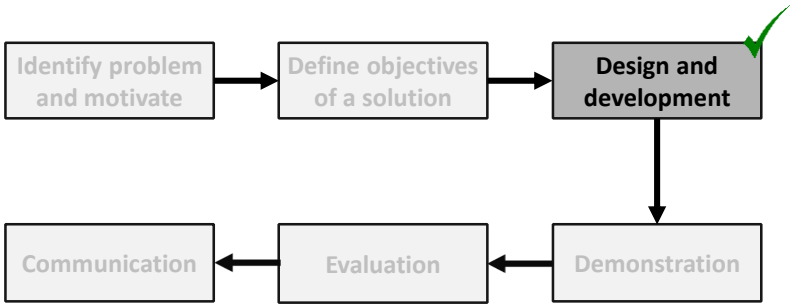
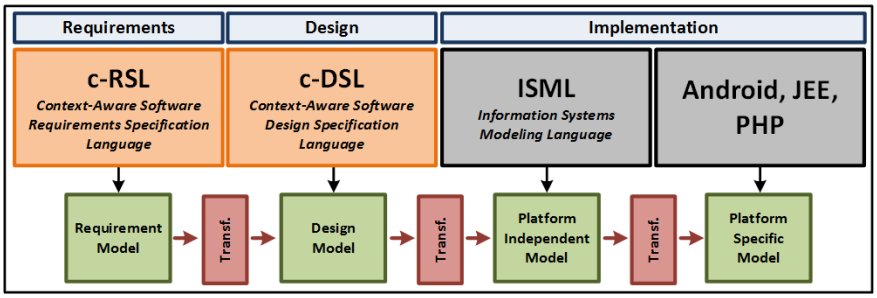
Design Science Research (DSR)



13

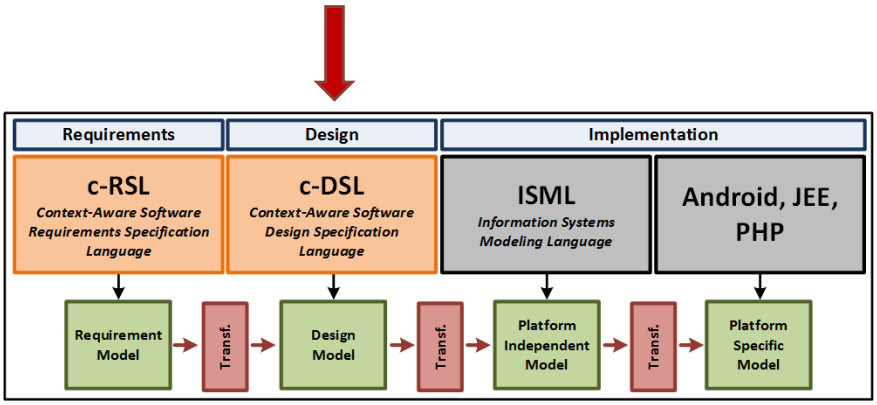
MiDAS



Bocanegra, J., Pavlich-Mariscal, J., Carrillo-Ramos. A. MiDAS: A Model-Driven Approach for Adaptive Software. Webist, 2015

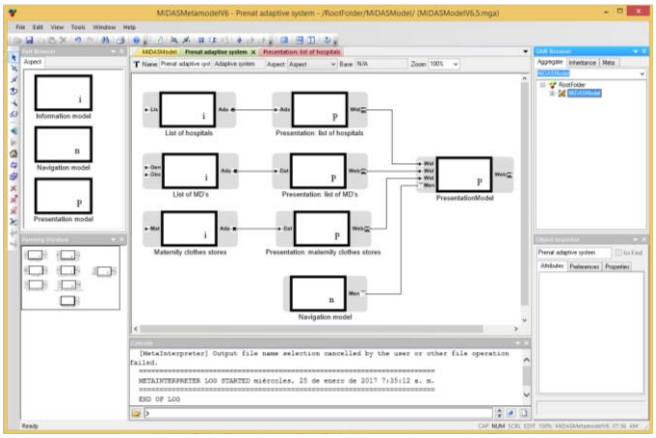
14

MiDAS



15

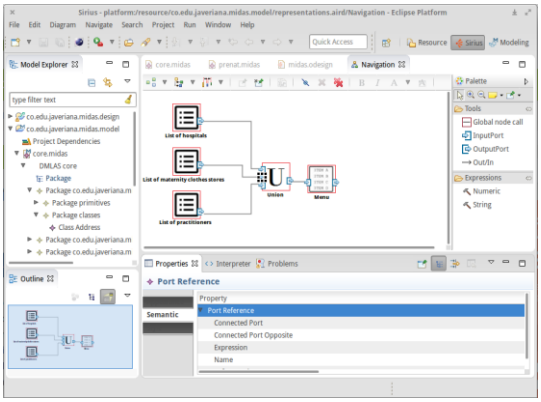
c-DSL – Preliminary Version

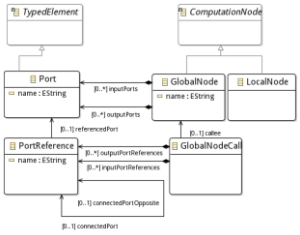


Bocanegra, J., Pavlich-Mariscal, J., Carrillo-Ramos. A. DMLAS: A Design-Specific Language for Designing Adaptive Systems. 10 Colombian Computing Congress, 2015

16

c-DSL – Refined Version

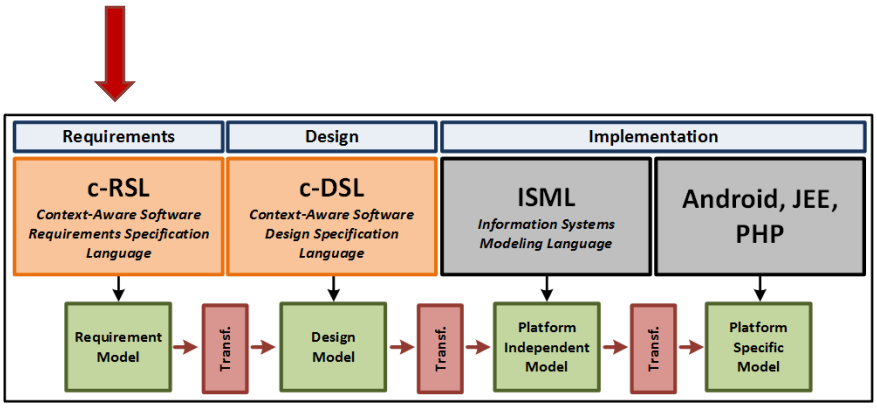




Bocanegra, J., Pavlich-Mariscal, J., Carrillo-Ramos. A. Towards a Domain-Specific Language to Design Adaptive Software: the DMLAS Approach. Ingeniería y Universidad, 2016

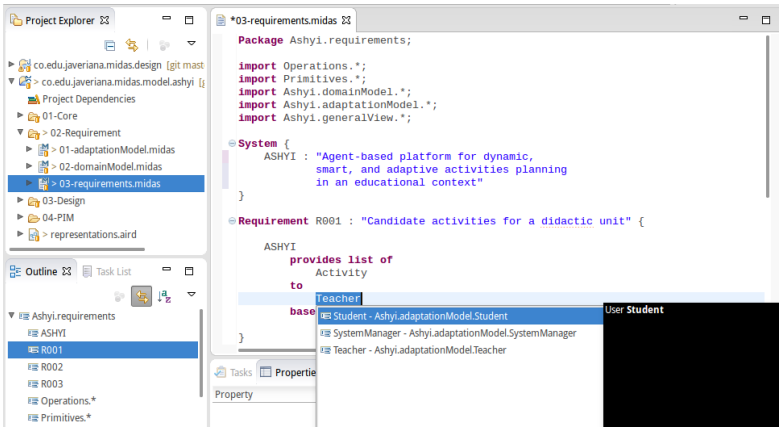
17

MiDAS



18

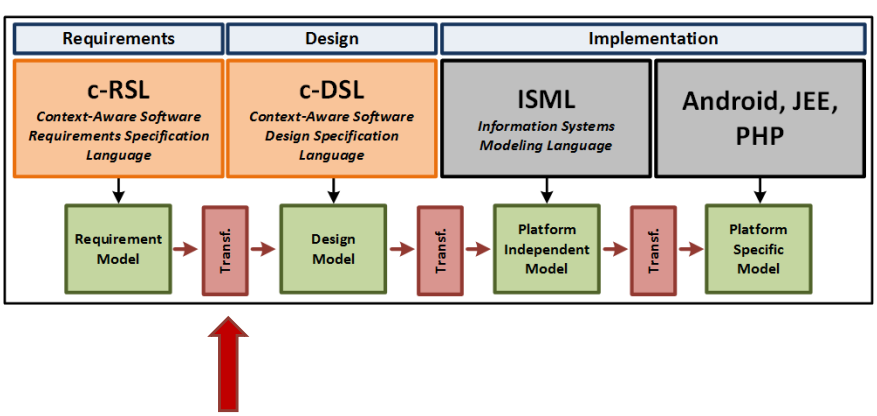
c-RSL– Preliminary Version



Bocanegra, J., Pavlich-Mariscal, J., Carrillo-Ramos. c-RSL: A Context-Aware Software Requirement Specification Language. Submitted to SEAA, 2017

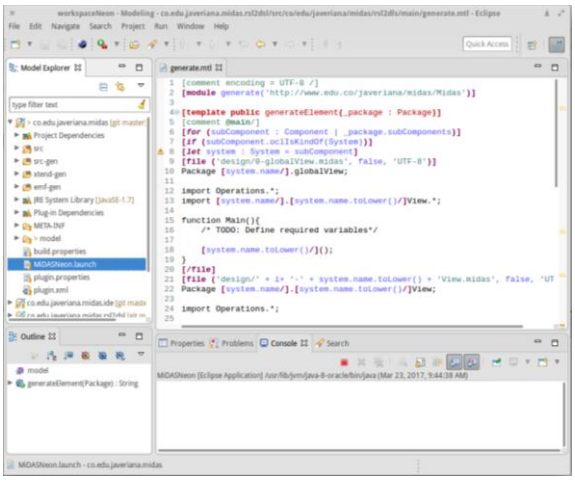
19

MiDAS



20

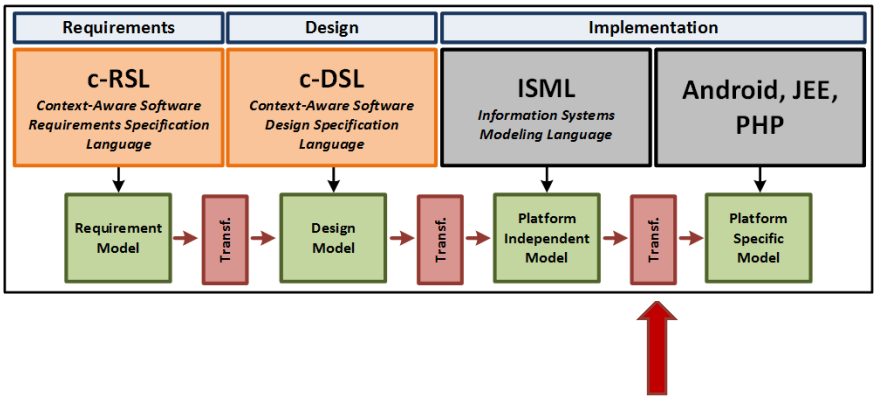
M2T Transformation



Bocanegra, J., Pavlich-Mariscal, J., Carrillo-Ramos. Generating Design Models from Requirements Specifications in Context-Aware Software. Submitted to Models, 2017

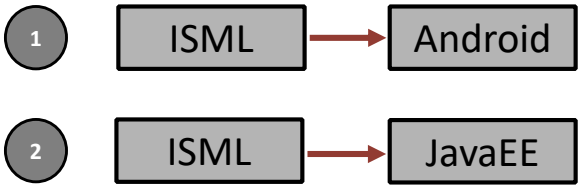
21

MiDAS



22

Code generation

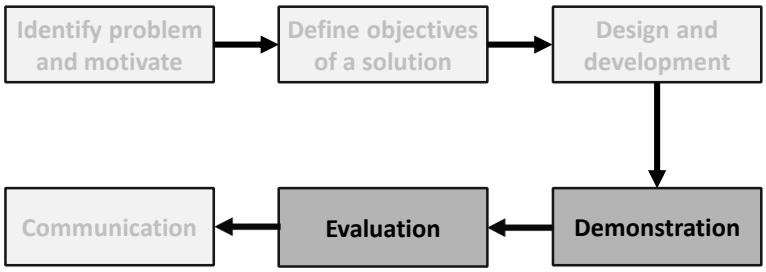


1. *Andrade, J. Transformador para generar aplicaciones móviles con componentes adaptativos a partir de un modelo independiente de plataforma. MSc Thesis. Pontificia Universidad Javeriana, 2017*

2. *Olarte, J. ZOE-GEN: A transformer to facilitate the generation of model-based applications. MSc Thesis. Pontificia Universidad Javeriana, 2017*

General Methodology

Design Science Research (DSR)



Evaluation and Validation

MiDAS

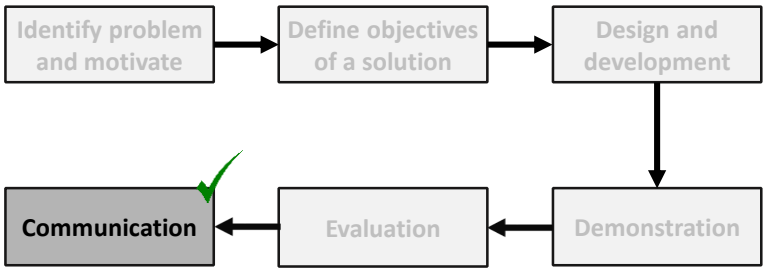
Universitat de Girona

UFRGS
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL

25

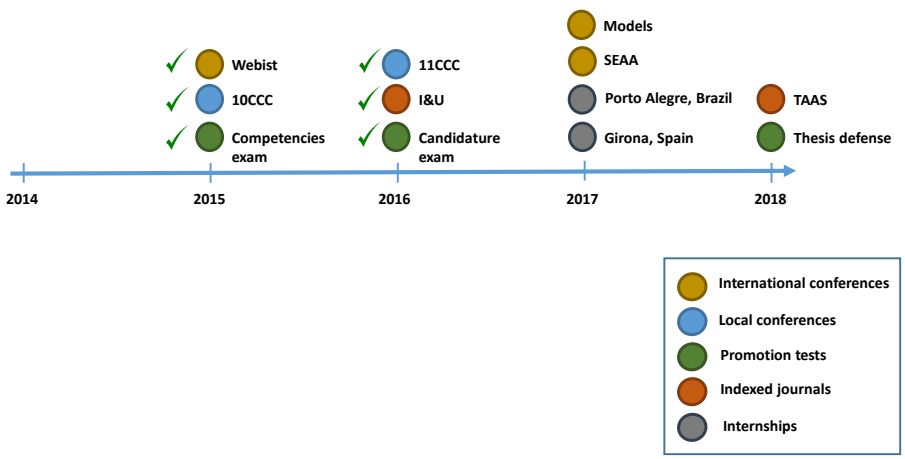
General Methodology

Design Science Research (DSR)



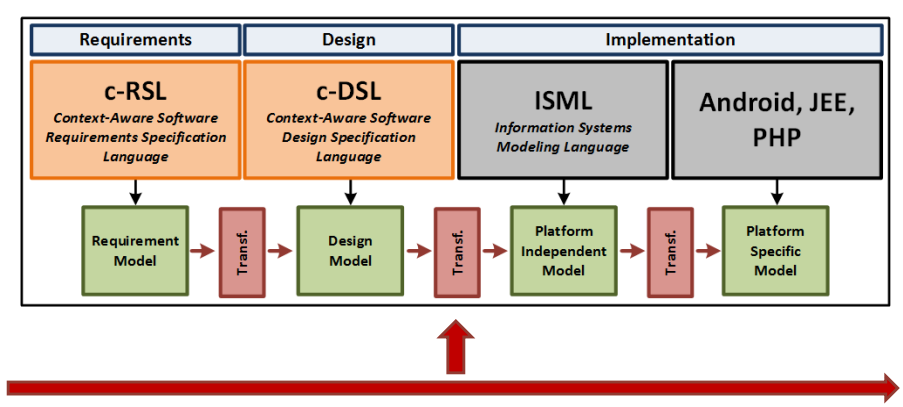
26

Milestones



27

Future Work



28

Thank you!

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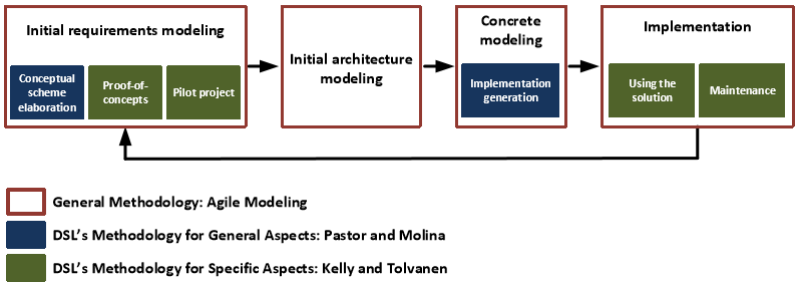
29

Appendices

30

Design and Development Methodology

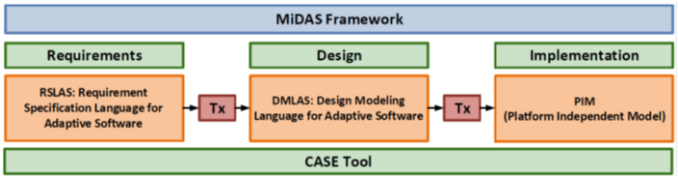


31

Advances

11th International Conference on Web Information Systems and Technologies – 2015

MiDAS: A Model-Driven Approach for Adaptive Software



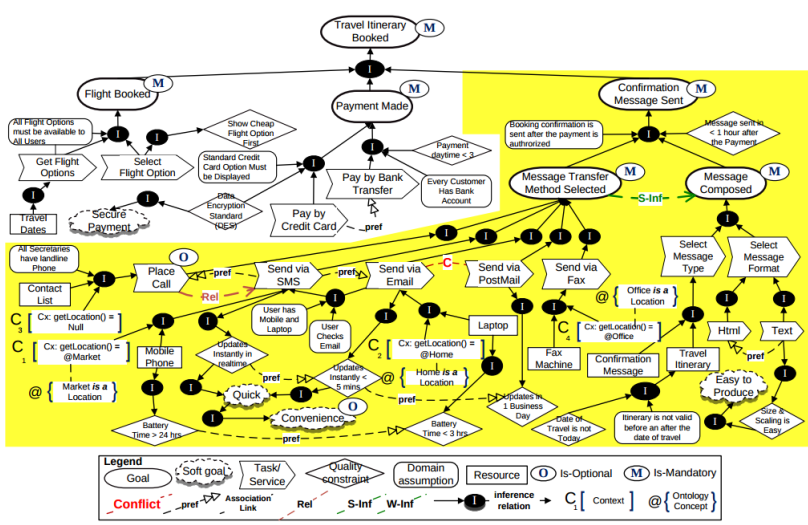
32

Requirements and design

1. Current languages are insufficient to specify requirements and design in an adaptive system
2. These languages do not cover all concepts related to adaptation (*e.g.,* user's profiles, contextual information and the dynamic aspects)
3. Moody's principles
4. Graphical and textual notation

33

RML



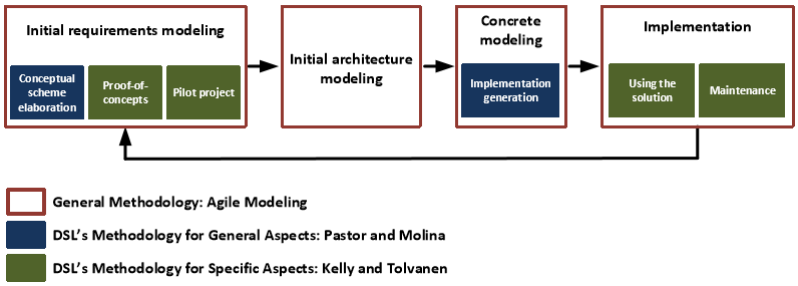
34

Validation criteria

Criterion	Description
Usability (van Amstel et al., 2009)	The level of learning, understanding, and memorizing of different concepts, relations, and when and why to use each one of the concepts. It implies that the language contains uniform notation, terminology, and its features are easy to learn, understand, and remember. This criterion is also suitable not only for single elements in the language but for models
Reusability (Barišic et al., 2014)	The ability to reuse existing specifications
Suitability (Kahraman and Bilgen, 2015)	The degree to which a DSL is suitable with the domain
Compatibility (Kahraman and Bilgen, 2015)	The degree to which a DSL is compatible to the development process
Orthogonality (Khedker, 1997)	The language should be based on few simple features which can be combined to produce predictable results
Scalability (Paige et al., 2000)	It should be useful for modeling systems with a few components and interrelations, and systems with thousands of components and inter-relations

35

Design and Development Methodology



36

Conclusions

- MiDAS provides a MDE approach for context-aware software
- MiDAS addresses challenges in software engineering for context-aware software