UI Design Pattern Selection for the Development of Adaptive Apps

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Resume

Amani Braham

Education

2017 ~ present
PhD student in computer sciences under a cooperation agreement
Sousse University, Tunisia - Universitat Politècnica de Valencia, Spain.
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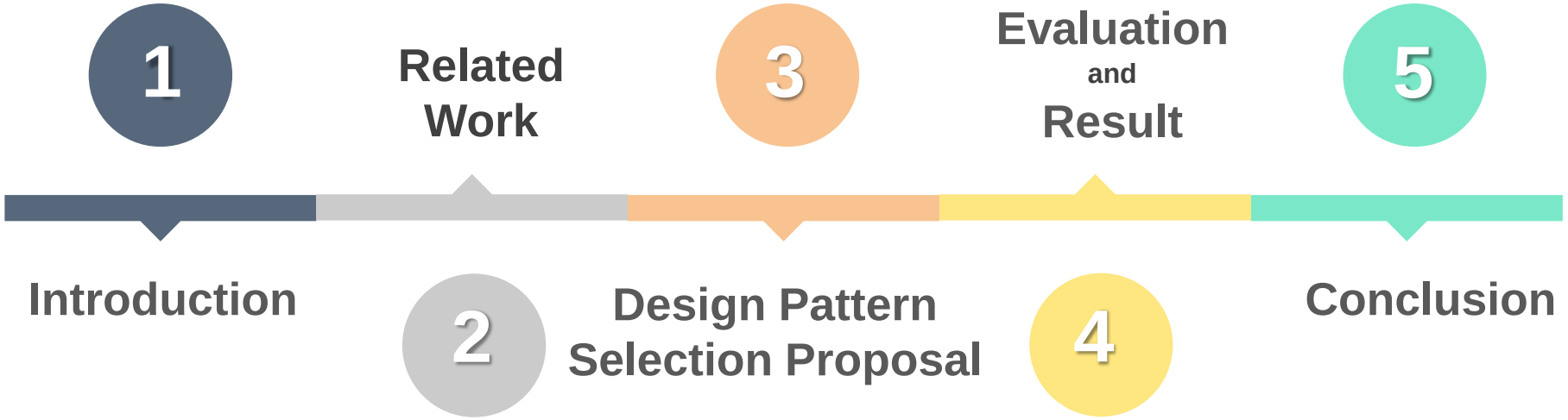
National degree of Engineer in Applied Sciences and Technology
Higher Institute of Applied Sciences and Technology of Sousse, Tunisia.

Interest

Research interest

Various computer science topics: User Interface specification and generation, pervasive systems, design patterns, and expert knowledge.

Plan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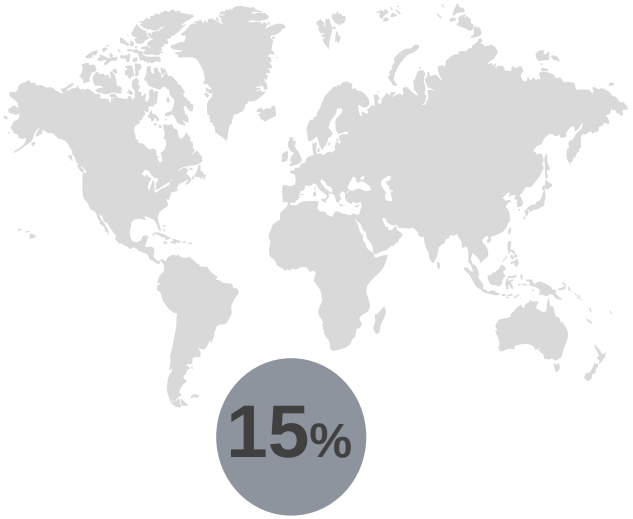
Introduction (1)

- Currently, mobile applications are in the process of an ever-increasing development.

→ Developers face a major challenge related to user interface development.

50% Time required for developing user interfaces.

48% Time required for developing source code.



→ The great variety of disabilities that users may be affected by, has led to the emergence of adaptive interactive systems.

→These systems open up new challenges, as users need adaptive user interfaces that fit their disabilities and requirements.

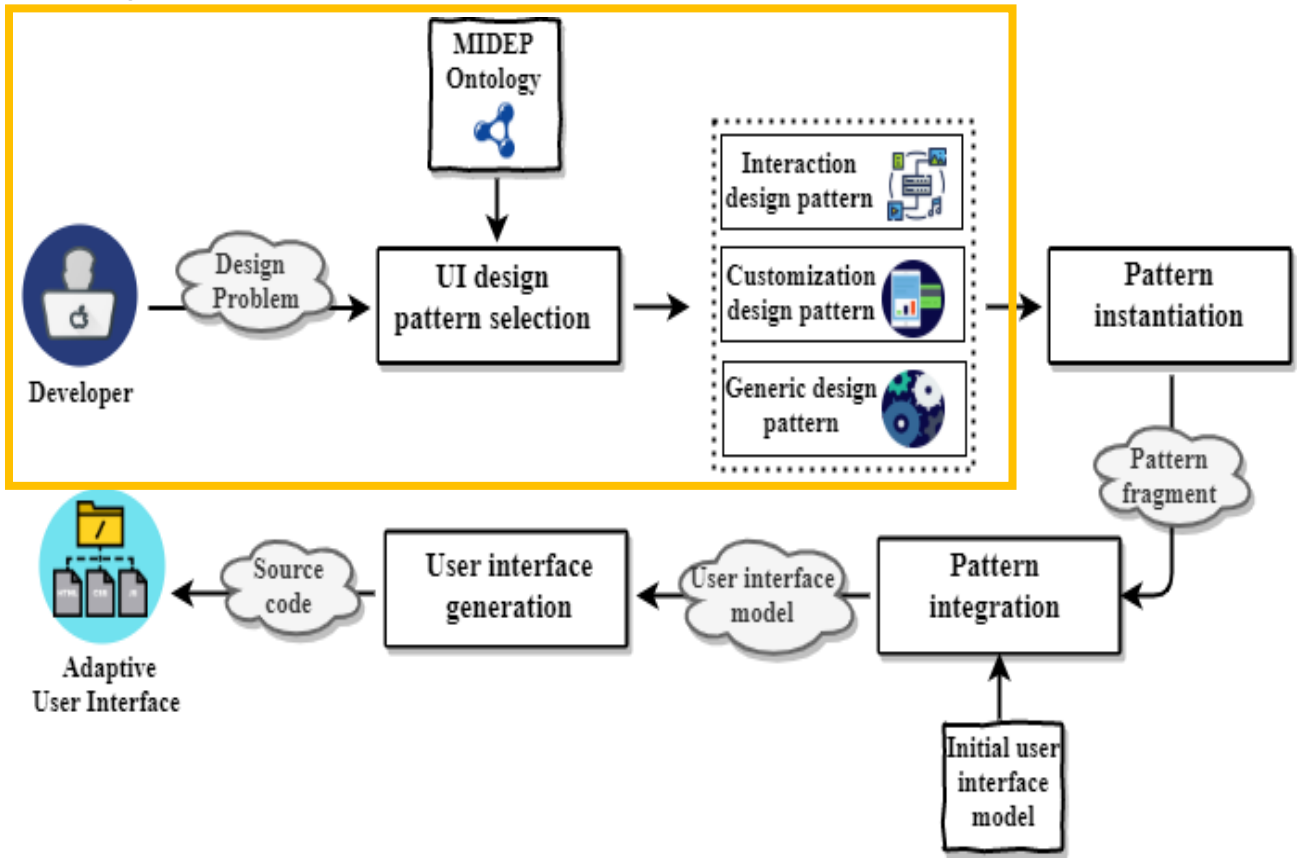
Introduction (2)

- The development of adaptive user interface:
  - Presents a high complexity and takes a long time in such a way that developers often cannot fully cover disabled user’s needs and preferences .
  - Requires a multidisciplinary team with a deep experience in :
    - Using design knowledge.
    - Resolving design problems.
    - Choosing the relevant design solutions.

Introduction (3)

Adaptive **U**ser **I**nterface **D**esign **P**attern (**AUIDP**) Framework

AUIDP Framework



Challenge

- Provide a Formal specification of UI design patterns.
- Ensure Applicability reuse of design patterns in the development of adaptive user interfaces.
- Propose a method for selecting relevant patterns without developer interventions.

Related Work (1)

- Recently, design patterns are introduced to support the design of adaptive user interfaces. They have been exploited in software development, since they allow multidisciplinary team to reuse existing design solutions.

01 **Cremonesi et al.**

- Reuse pattern-based design solutions for developing a software application based on a set of UI design patterns, instead of building new solutions from scratch.

02 **Wetchakorn et al.**

- Introduce a method for creating mobile user interface design patterns. These defined patterns are then exploited in the development of a mobile application.

03 **Cortes-Camarillo et al.**

- Offer a method for designing an educational application using a list of UI design patterns.

Related Work (2)

❑ Limitation

- Design Patterns are manually identified and analyzed.
- Developers may face ambiguity in choosing the relevant design patterns, since applying patterns requires a deep comprehension in the context of use of each design pattern.
- Design patterns are textually represented. This barrier makes accessing patterns more difficult for developers.

→ A formal representation of design patterns is required.

→ Tools and techniques are then needed to retrieve relevant design patterns and apply them to support the user interface development process

DP Selection Proposal (1)

Modular **U**ser **I**nterface **DE**sign **P**attern (**MIDEP**) ontology

- The main purpose of the MIDEP ontology is to provide:
  - ✓ A modeling solution to tackle recurring design problems related to user interfaces.
  - ✓ A modular conception of design patterns.

❑ Neon methodology

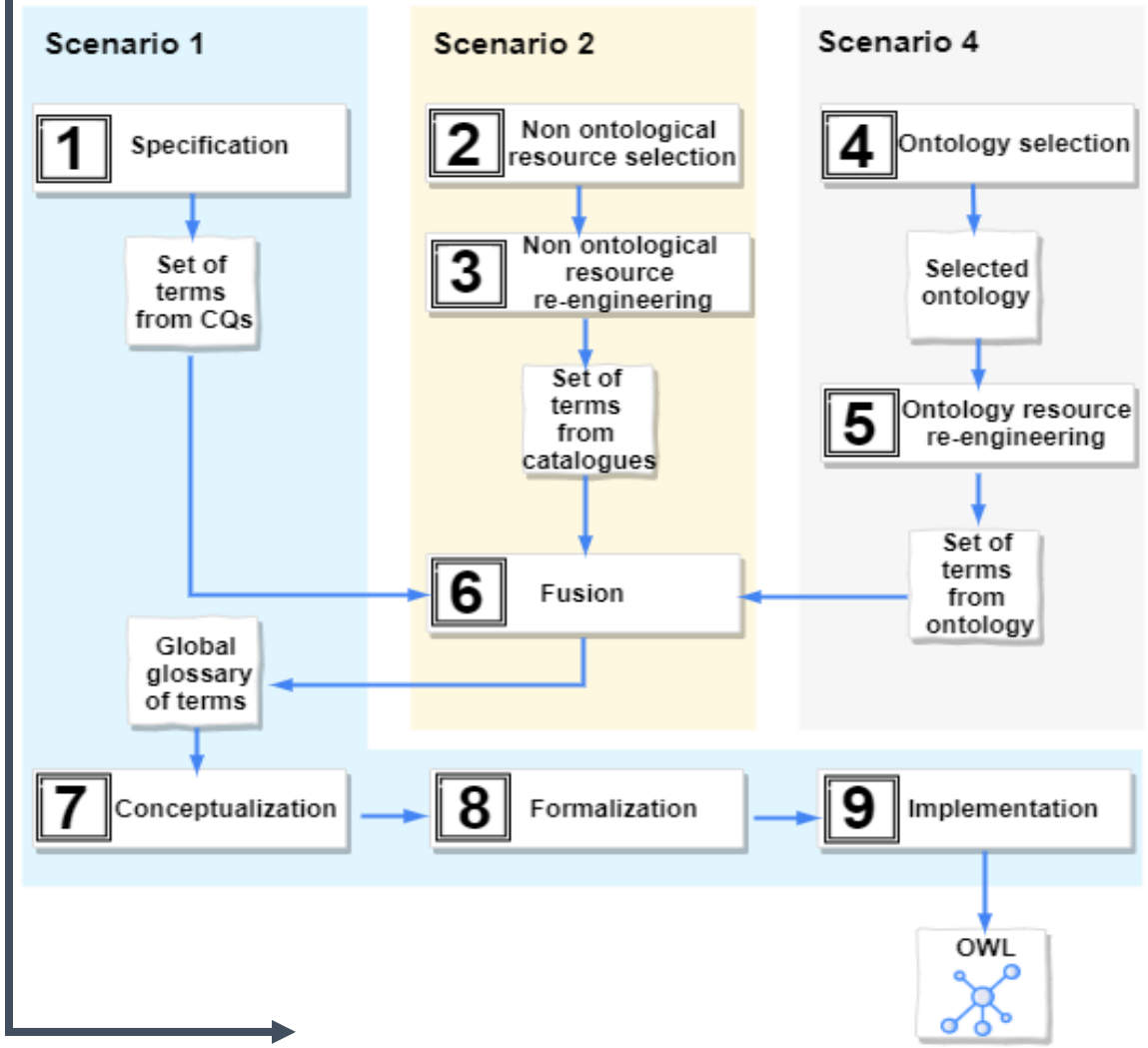
- Re-enginer non ontological resource into ontologies.
- Reuse existing ontologies.

❑ Scenarios

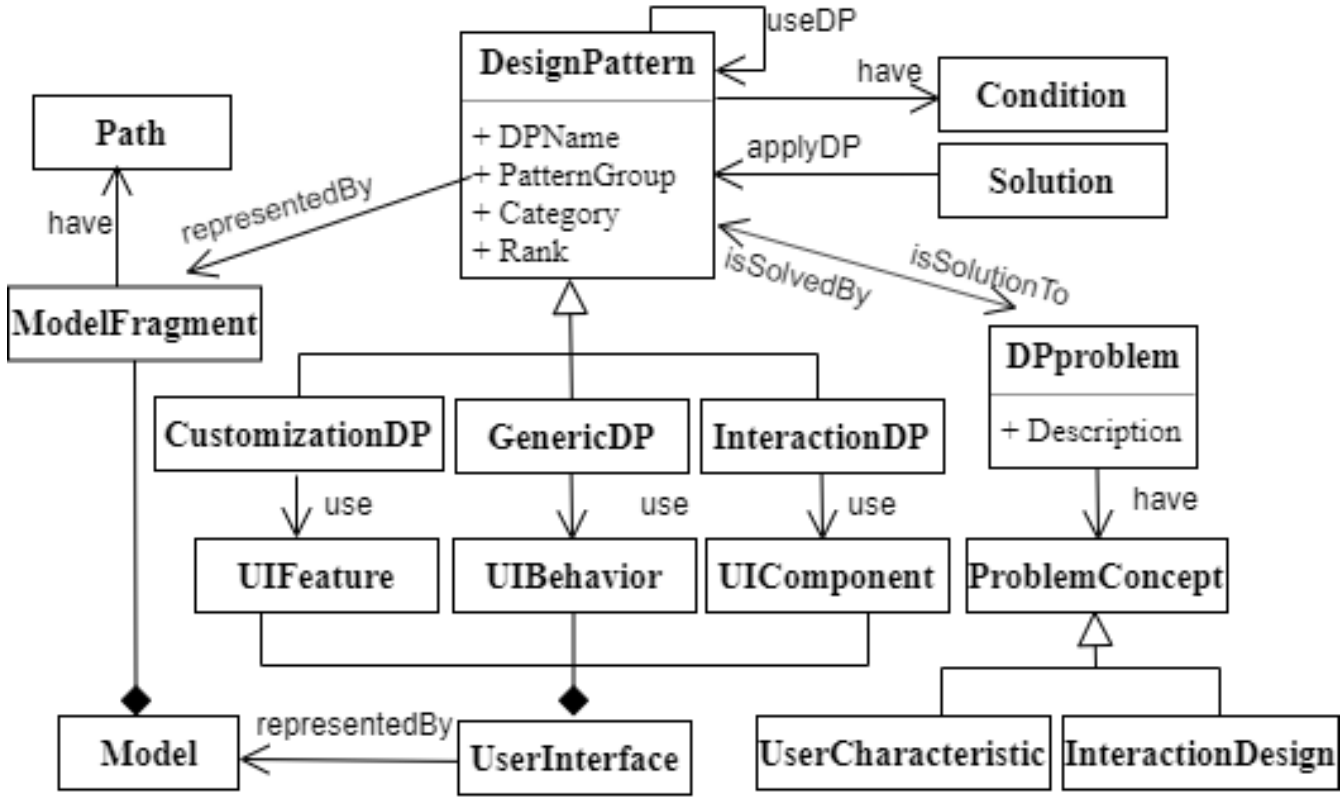
- **Scenario 1:** From specification to implementation**.**
- **Scenario 2:** Reusing and re-engineering non-ontological resource.
- **Scenario 4:** Reusing and re-engineering ontological resource.

DP Selection Proposal (2)

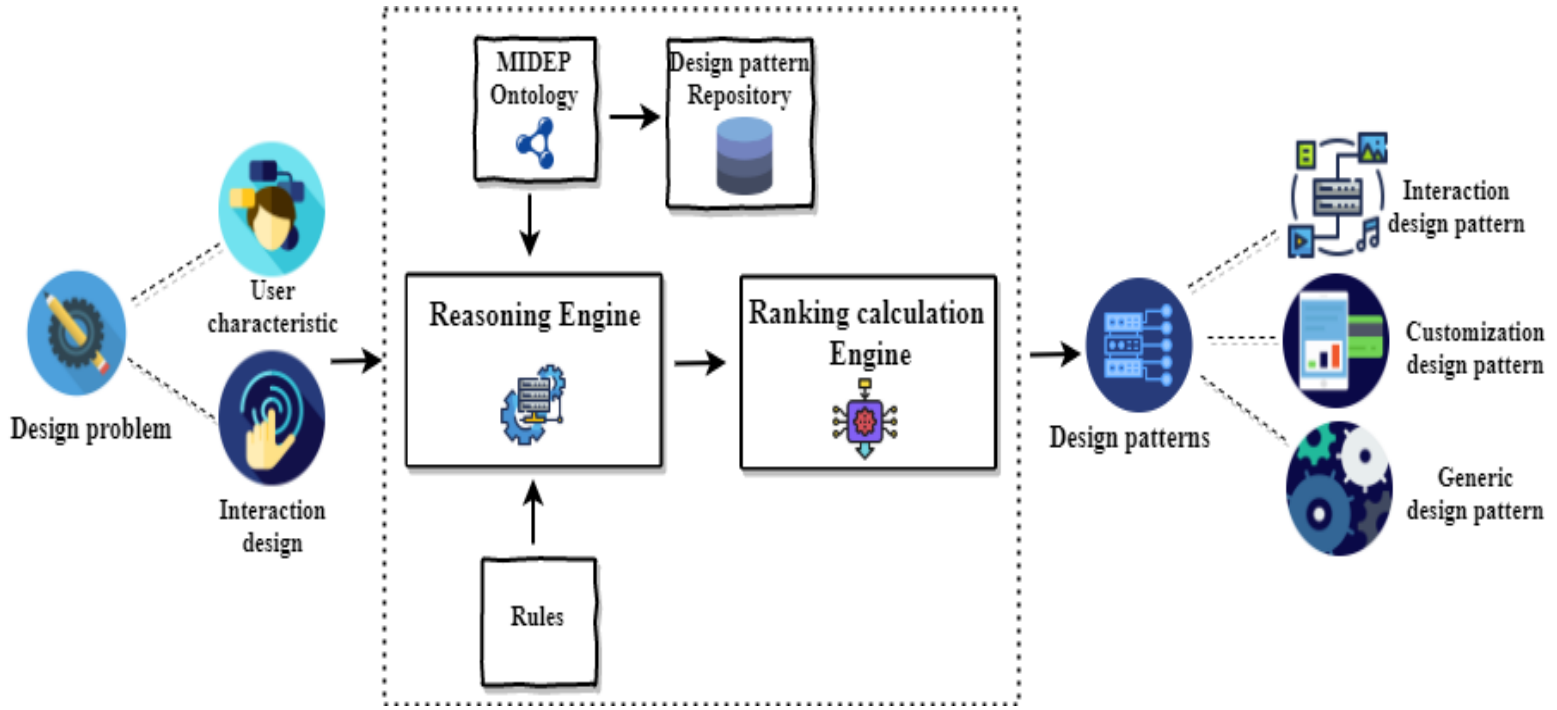
Building Process



Ontology Model



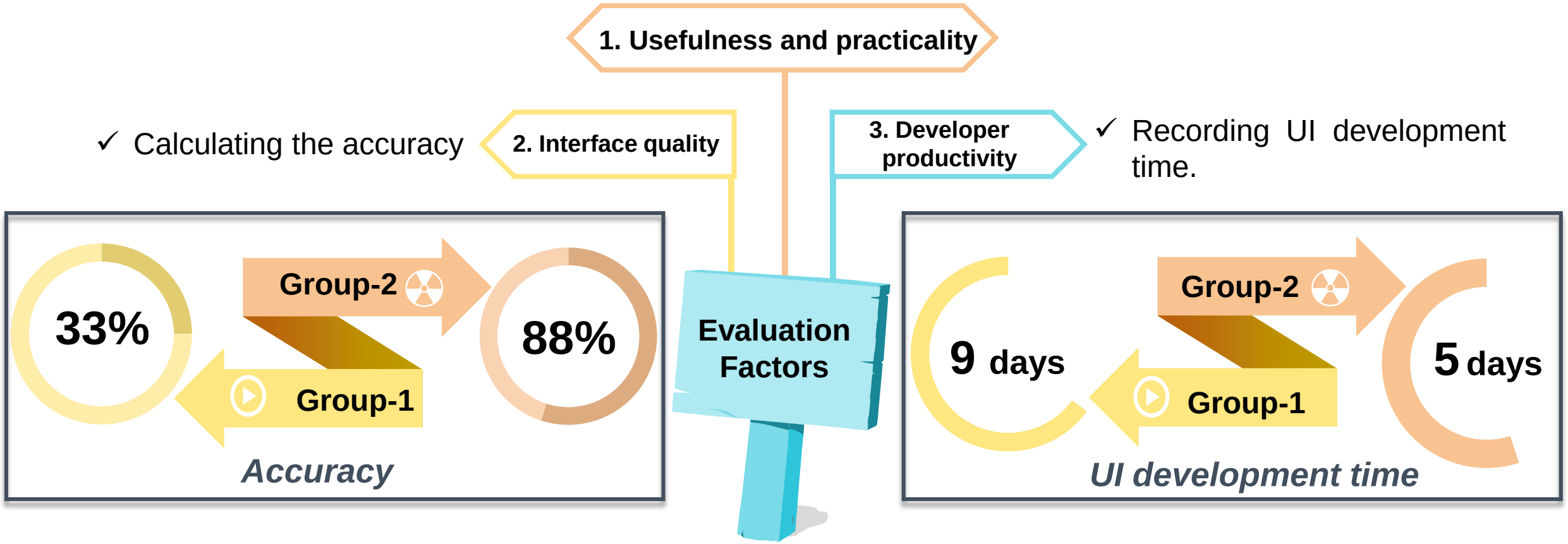
DP Selection Proposal (3)



- ***Reasoning Engine:*** Provides a real time reasoning and uses the MIDEP ontology in combination with a set of rules to decide on the UI design patterns that should be retrieved.
- ***Ranking Calculation Engine:*** Refines the design patterns resulted from the reasoning engine by computing the similarity between the inputted design problem and the problem definition corresponding to design patterns.

Evaluation and result

✓ Developing an application that covers functionalities to allow multidisciplinary team to view and extract relevant design patterns.



Conclusion

- The MIDEP ontology for representing knowledge about UI design patterns.
- Design pattern selection component for recommending relevant design patterns.
- Some experiments and results, which consolidate the efficiency of the design pattern selection proposal in terms of enhancing developer's accuracy in selecting relevant patterns and in terms of increasing developer productivity.
  - The design pattern selection component considers only atomic design problems and do not take into account composite design problems.

✓ Future work

- Develop the generation phase that follows the selection phase within the AUIDP framework.
- Improve the representation of design problems.

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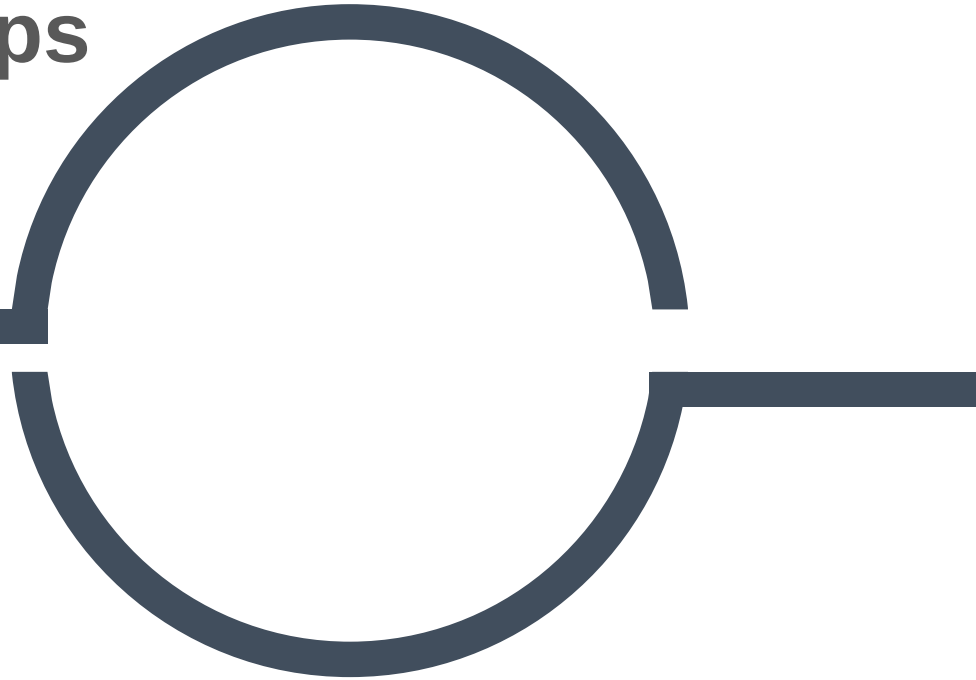

Thank you
Any questions?