

Do Multi-Fidelity Levels improve Mockup-Driven Development?

Kickoff Presentation Master's Thesis

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SIEMENS

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- 2. Problem Statement**
- 3. Related Work**
- 4. Research Questions**
- 5. Proposed Solution**
- 6. Timeline**



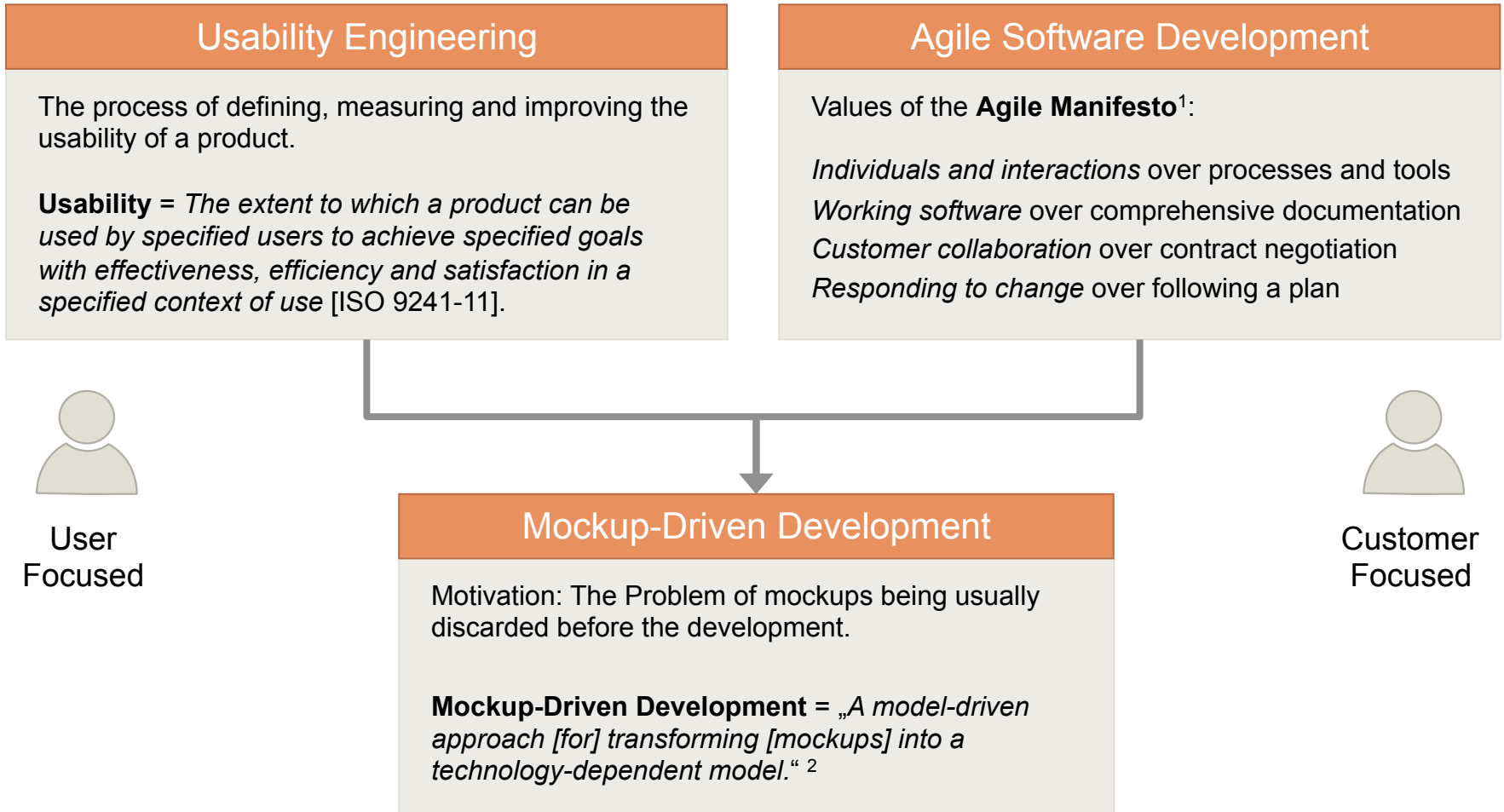
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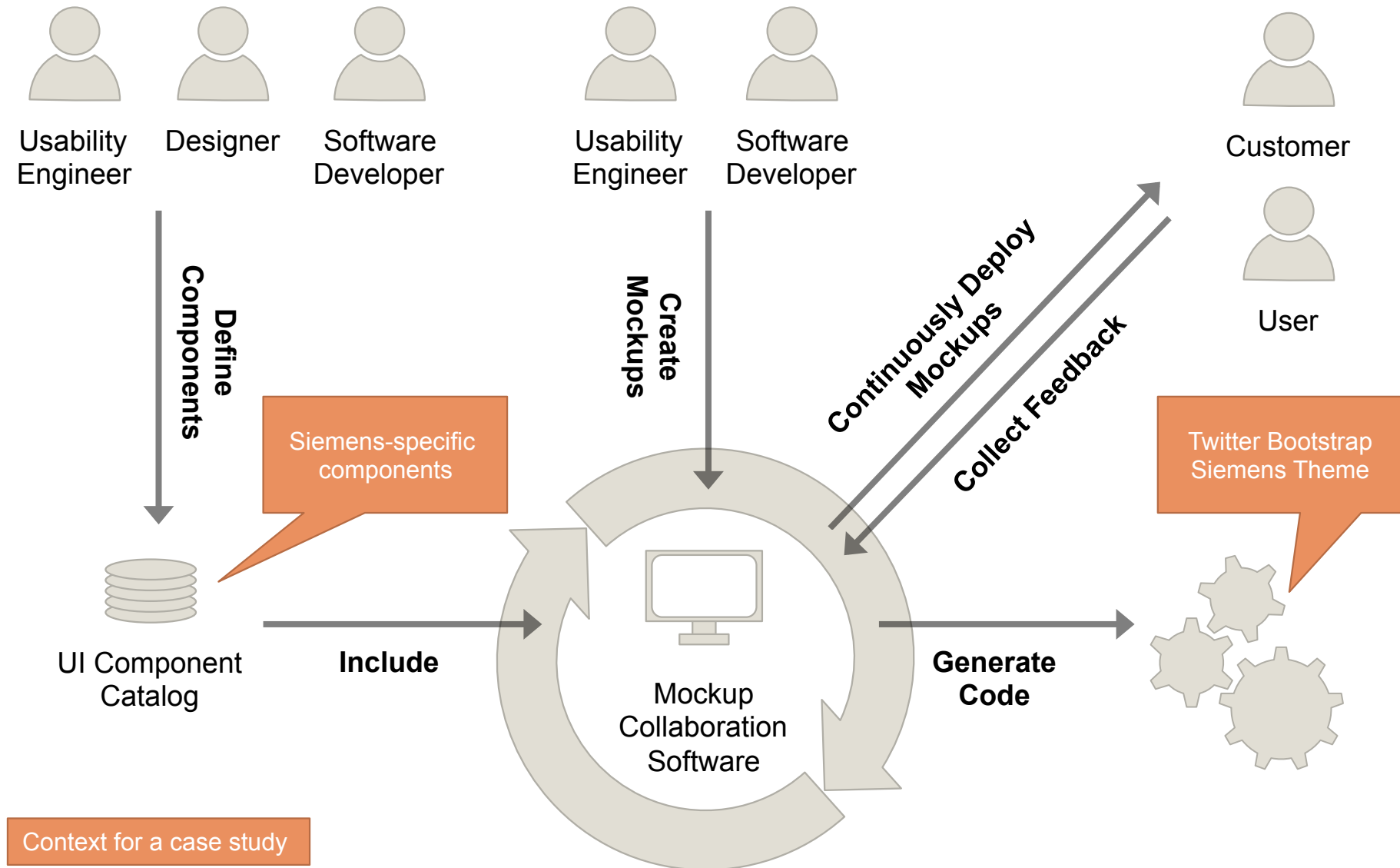
1) Website: <http://www.agilemanifesto.org/>

2) Rivero, J. M., Rossi, G., Grigera, J., Burella, J., Luna, E. R., & Gordillo, S. (2010). From mockups to user interface models: An extensible model driven approach. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 6385 LNCS, pp. 13–24). doi:10.1007/978-3-642-16985-4_2

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Problem Statement

Vision for a Mockup-Driven Development Process



Problem Statement

Requirements and Existing Solutions

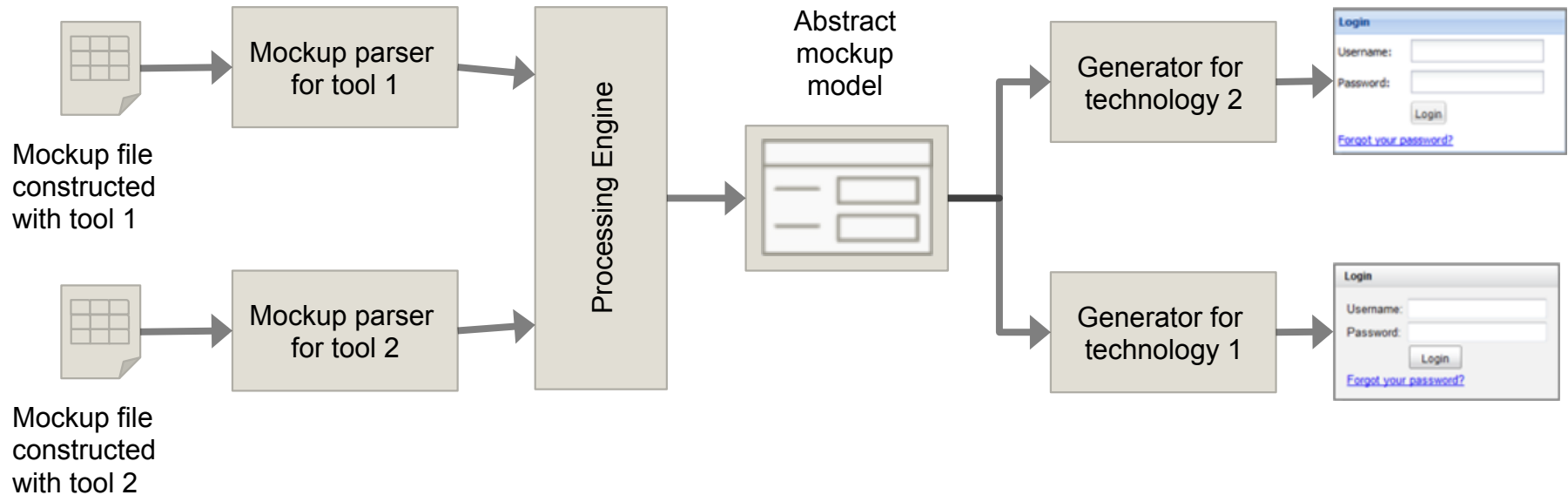
Academic Research Gap

	Justinmind	iRise Studio	Balsamiq	Pixate Studio Beta	Visual Paradigm
Multi-Fidelity Mockups (support transitions between fidelity levels)	X	X	○	X	X
Custom Component Catalog	✓	✓	✓	X	?
Platform-Support (create mockups for mobile apps and webapplications)	✓	✓	✓	✓	✓
Collaboration (deliver to endusers, collect feedback)	✓	✓	○	○	○
Integration with ALM (Link to requirements, single source for reporting)	○	✓	○	X	?
On-Premise Solution (Host collaboration platform internally)	✓	✓	✓	X	X
Export Code	X	✓	X	X	X
Test on the Target Platform	✓	✓	X	✓	X

✓ = fulfilled, ○ = partially fulfilled, X = not fulfilled, ? = unknown



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Motivation

- Mockups merely as a method for requirements elicitation
→ **No reuse in development**
- Mockups require a comprehensive documentation or rely on the interpretation of the software developer

Summary

- Exemplary process implementation with WebTDD
- Defined a metamodel for mockup tools
- Reference translator: Assure consistent UI element identifiers
- Algorithm to detect the layout

¹ Rivero, J. M., Rossi, G., Grigera, J., Burella, J., Luna, E. R., & Gordillo, S. (2010). From mockups to user interface models: An extensible model driven approach. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 6385 LNCS, pp. 13–24). doi:10.1007/978-3-642-16985-4_2

Summary

- Identified the same research gap of missing support for fidelity transitions
- Focus on the transition from “no-fi” (hand drawn) to “lo-fi”
→ Gesture recognizer
- Low shape detection speed
→ Problematic when used for complex UIs
- Static templating: “custom element could be drawn in lo-fi and a predefined widget could be added in me-fi or hi-fi”

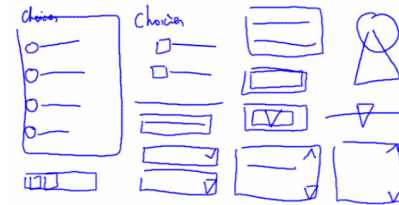


Fig. 1. No-fi mode without labels

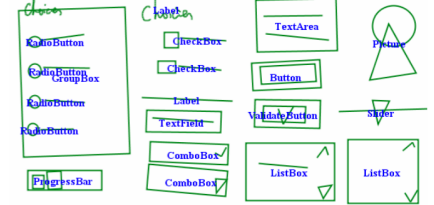


Fig. 2. Lo-fi mode for sketching UI elements (with labels)

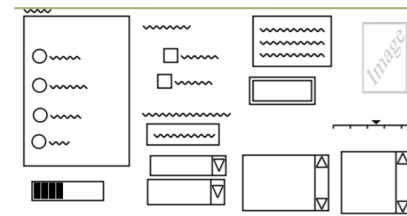


Fig. 3. Me-fi mode without labels

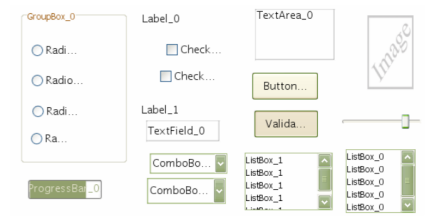
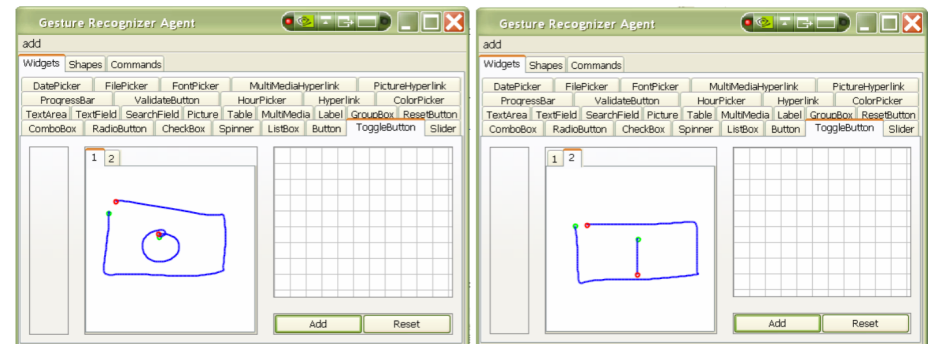
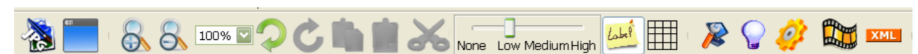


Fig. 4. Hi-fi mode without labels



¹ Coyette, A., Kieffer, S., & Vanderdonckt, J. (2007). Multi-fidelity prototyping of user interfaces. Human-Computer Interaction – INTERACT, 4662, 150–164. doi: 10.1007/978-3-540-74796-3_16

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RQ1

What is the definition of Mockup-Driven Development and the different fidelity levels?

RQ2

What are the requirements for a Multi-Fidelity Mockup-Driven Development system and how could a implementation look like?

RQ3

How to evaluate if a Multi-Fidelity Mockup-Driven Development system improves the software development process?

“Mock-ups are early low-fidelity prototypes.”

Glossary of Human Computer Interaction.

“High-fidelity wireframes communicate form and function better.”

uxmovement: 4 Things no one told me about high-fidelity Wireframes.

“A wireframe is a low-fidelity blueprint represented by gray boxes and placeholders for detailed content.”

UXPin: Designers shouldn't neglect mockups.

→ No consistent use of terminology in literature and online resources!

Research Questions

Definition of Fidelity Levels

Category	Criterion	Prototype				Product
		Sketch	Wireframe	Mockup	Software Prototype	
General	Technique	paper-based	computer-based	computer-based	software-based	software-based
	Speed	fast	fast	slow	slow	slowest
	Cost	cheap	cheap	expensive	expensive	most expensive
Fidelity	Low-Fidelity	✓	✓	✗	✗	✗
	Medium-Fidelity	✗	✓	✓	✗	✗
	High-Fidelity	✗	✗	✓	✓	✓
Behaviour	Navigation	✗	✓	✓	✓	✓
	Interactive Elements	✗	✗	✓	✓	✓
Structure	Responsive Design	multiple static screens	multiple static screens	single interactive screen	CSS / Other Technology	CSS / Other Technology
	Placeholders	✓	✓	✓ / ✗	✓ / ✗	✗

✓ = applies, ✓ / ✗ = optionally applies, ✗ = not applied

Research Questions

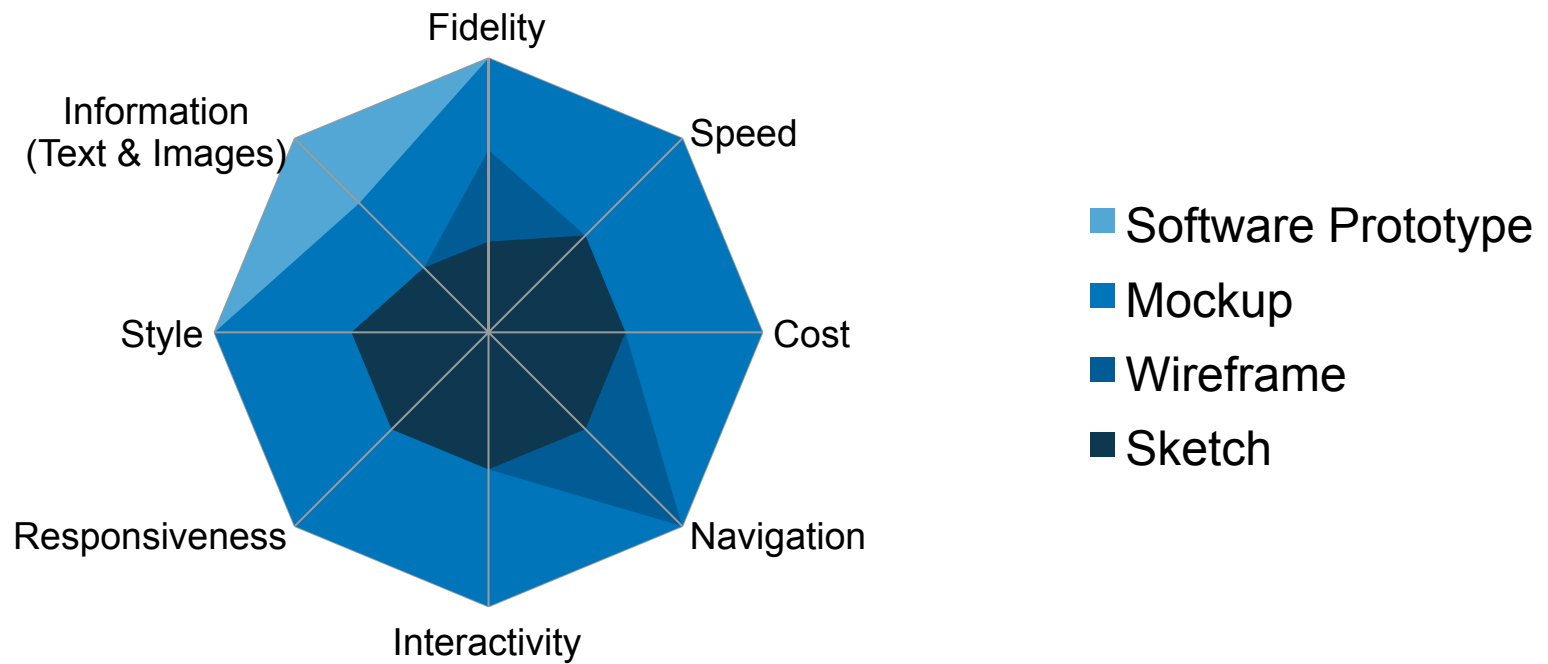
Definition of Fidelity Levels

Category	Criterion	Prototype				Product
		Sketch	Wireframe	Mockup	Software Prototype	
Information	Label	✓	✓	✓	✓	✓
	Text	✗	✗	✓ / ✗	✓	✓
	Images	✗	✗	✓	✓	✓
Style	Colors	black & white	black & white	colored	colored	colored
	Icons	✗	✗	✓	✓	✓
	Typography	✗	✗	✓	✓	✓

✓ = applies, ✓ / ✗ = optionally applies, ✗ = not applied

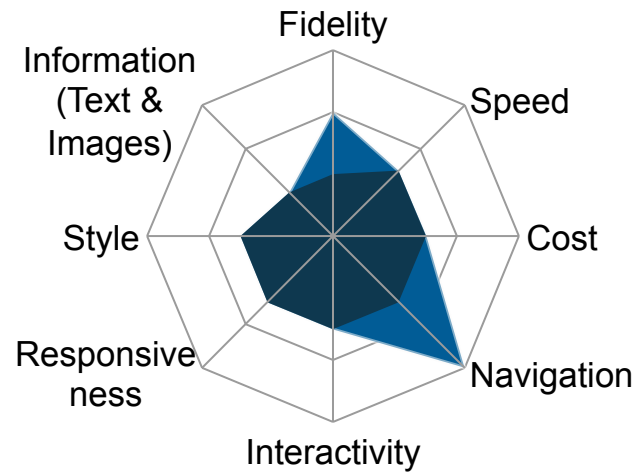
Research Questions

Definition of Fidelity Levels



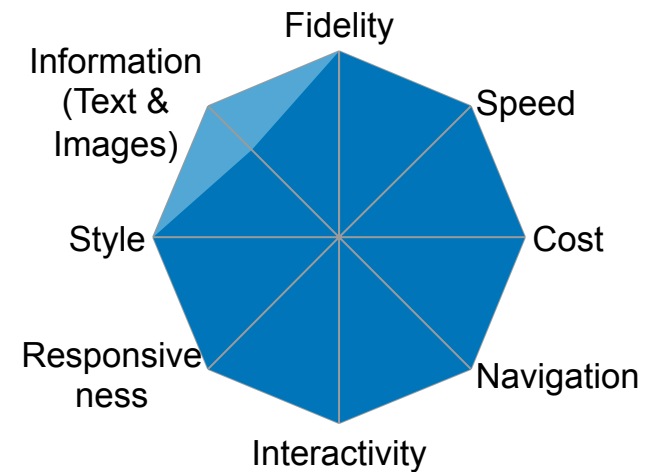
Research Questions

Definition of Fidelity Levels



■ Wireframe ■ Sketch

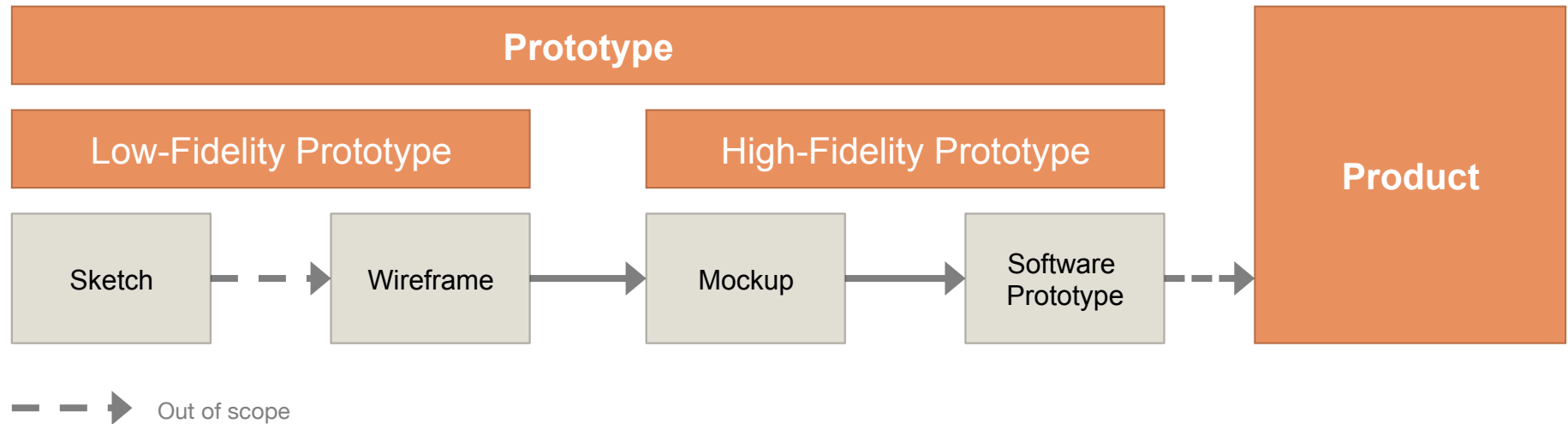
Low-Fidelity Prototypes



■ Software Prototype ■ Mockup

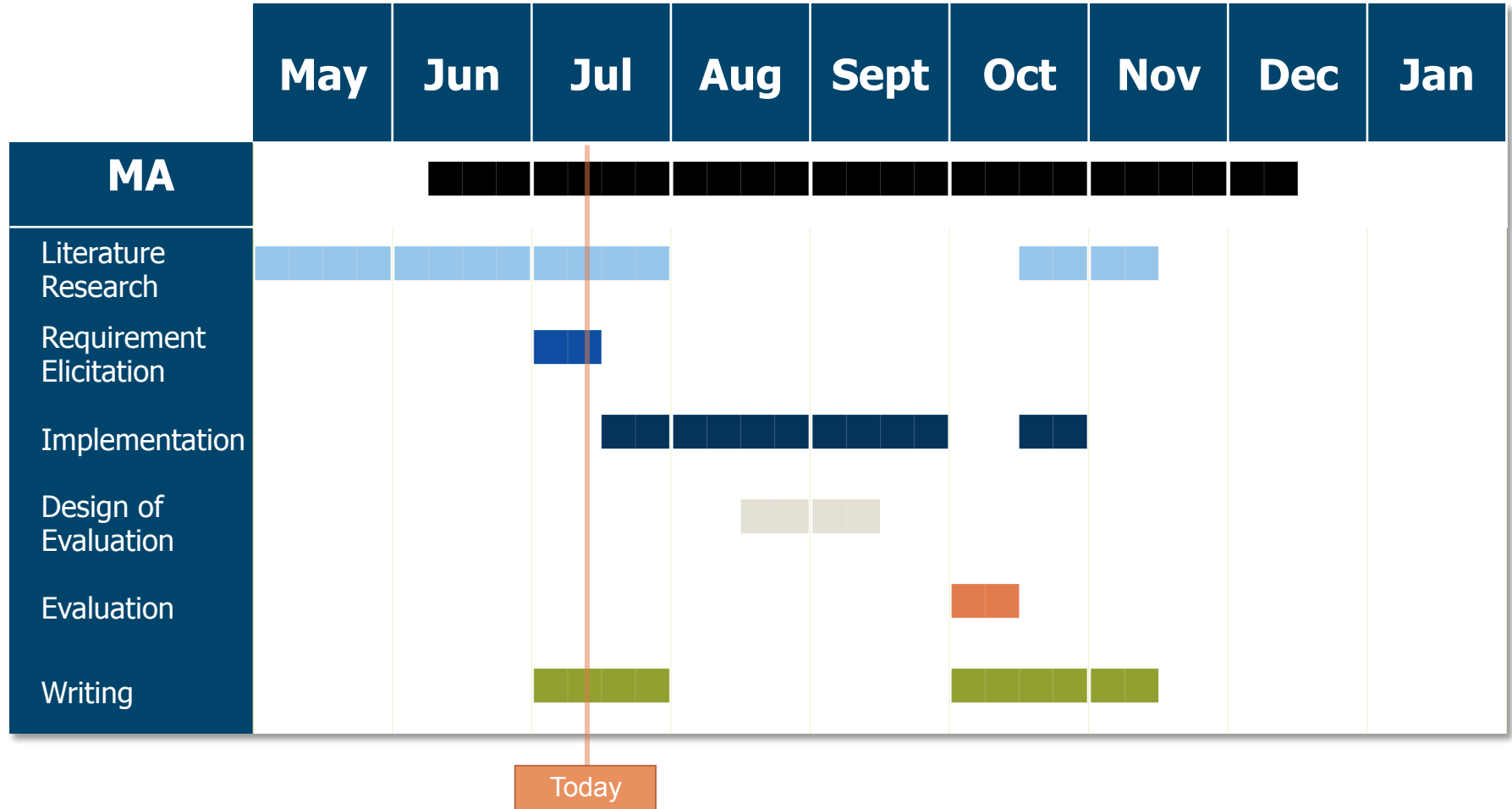
High-Fidelity Prototypes

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- Prototypes as an artifact, which evolves throughout the different fidelity levels
- Define a DSML for each fidelity level considering its capabilities
- Support the easy transition between fidelity levels
- **No “disposal mockups”**
→ systematically enrich the mockups till the “code level” is reached

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Thank you! Questions?



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Backup

Mockup Driven Web Development

- Definition of Cascading Tree Sheets (CTS)
→ Describe relationship between content and structure
- CTS as input for the generation of a web application

Benson, E. (2013). Mockup Driven Web Development. *Proceedings of the 22nd International Conference on World Wide Web Companion*, 337–341.

Mockup-Driven Development: Providing agile support for Model-Driven Web Engineering

- Coined the term: MockupDD (Mockup-Driven Development)
- Mockup as “requirement elicitation helper”
- Create User Stories and Mockups
→ Mapping through a SUI (Structural User Interface) Model
- Use the SUI Model to generate Code and MDWE Models

Source: Rivero, J. M., Grigera, J., Rossi, G., Robles Luna, E., Montero, F., & Gaedke, M. (2014). Mockup-Driven Development: Providing agile support for Model-Driven Web Engineering. *Information and Software Technology*, 56(6), 670–687. doi:10.1016/j.infsof.2014.01.011