Do Multi-Fidelity Levels improve Mockup-Driven Development?

Kickoff Presentation Master’s Thesis
René Milzarek, 11.07.2016, Garching-Forschungszentrum
Overview

1. Introduction
2. Problem Statement
3. Related Work
4. Research Questions
5. Proposed Solution
6. Timeline
Siemens GS IT HR
(Information Technology – Human Ressources)

Human Resources and Supply Chain Management services and solutions for all divisions worldwide.

Headquarter
Siemens AG
Global Services – Information Technology
Otto-Hahn-Ring 6
81739 München
Introduction
Terminology

**Usability Engineering**

The process of defining, measuring and improving the usability of a product.

**Usability** = *The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use* [ISO 9241-11].

**Agile Software Development**

Values of the **Agile Manifesto**¹:

*Individuals and interactions* over processes and tools
*Working software* over comprehensive documentation
*Customer collaboration* over contract negotiation
*Responding to change* over following a plan

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**Mockup-Driven Development**

Motivation: The Problem of mockups being usually discarded before the development.

**Mockup-Driven Development** = “A model-driven approach [for] transforming [mockups] into a technology-dependent model.”²

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1) Website: [http://www.agilemanifesto.org/](http://www.agilemanifesto.org/)
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Problem Statement
Vision for a Mockup-Driven Development Process

Usability Engineer  Designer  Software Developer

Usability Engineer  Software Developer

Vision
for
a
Mockup-Driven
Development Process

Define Components
UI Component Catalog

Include
Siemens-specific components

Mockup Collaboration Software

Generate Code

Customer

User

Twitter Bootstrap Siemens Theme

Continuously Deploy Mockups
Collect Feedback

Context for a case study
## Problem Statement

### Requirements and Existing Solutions

<table>
<thead>
<tr>
<th>Academic Research Gap</th>
<th>Justinmind</th>
<th>iRise Studio</th>
<th>Balsamiq</th>
<th>Pixate Studio Beta</th>
<th>Visual Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Fidelity Mockups (support transitions between fidelity levels)</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Custom Component Catalog</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>?</td>
</tr>
<tr>
<td>Platform-Support (create mockups for mobile apps and web applications)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Collaboration (deliver to endusers, collect feedback)</td>
<td>✓</td>
<td>✓</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Integration with ALM (Link to requirements, single source for reporting)</td>
<td>○</td>
<td>✓</td>
<td>○</td>
<td>X</td>
<td>?</td>
</tr>
<tr>
<td>On-Premise Solution (Host collaboration platform internally)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Export Code</td>
<td>✗</td>
<td>✓</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Test on the Target Platform</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>

✓ = fullfilled, ○ = partially fullfilled, ✗ = not fullfilled, ? = unknown
Problem Statement
Demo of Current Solution
Overview

1. Introduction

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Related Work
From mockups to user interface models: An extensible model driven approach

Mockup file constructed with tool 1
Mockup parser for tool 1
Processing Engine
Abstract mockup model
Generator for technology 2
Generator for technology 1
Mockup file constructed with tool 2
Mockup parser for tool 2

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

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

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## Research Questions

<table>
<thead>
<tr>
<th>RQ1</th>
<th>What is the definition of Mockup-Driven Development and the different fidelity levels?</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ2</td>
<td>What are the requirements for a Multi-Fidelity Mockup-Driven Development system and how could a implementation look like?</td>
</tr>
<tr>
<td>RQ3</td>
<td>How to evaluate if a Multi-Fidelity Mockup-Driven Development system improves the software development process?</td>
</tr>
</tbody>
</table>
“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

<table>
<thead>
<tr>
<th>Category</th>
<th>Criterion</th>
<th>Prototype</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sketch</td>
<td>Wireframe</td>
</tr>
<tr>
<td>General</td>
<td>Technique</td>
<td>paper-based</td>
<td>computer-based</td>
</tr>
<tr>
<td></td>
<td>Speed</td>
<td>fast</td>
<td>fast</td>
</tr>
<tr>
<td></td>
<td>Cost</td>
<td>cheap</td>
<td>cheap</td>
</tr>
<tr>
<td>Fidelity</td>
<td>Low-Fidelity</td>
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<td>✓</td>
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<tr>
<td></td>
<td>Medium-Fidelity</td>
<td>x</td>
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<tr>
<td></td>
<td>High-Fidelity</td>
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<td>x</td>
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<td>Behaviour</td>
<td>Navigation</td>
<td>x</td>
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<tr>
<td></td>
<td>Interactive Elements</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Structure</td>
<td>Responsive Design</td>
<td>multiple static screens</td>
<td>multiple static screens</td>
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<tr>
<td></td>
<td>Placeholders</td>
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<td>✓</td>
</tr>
</tbody>
</table>

✓ = applies, ✓ / x = optionally applies, x = not applied
## Research Questions
### Definition of Fidelity Levels

<table>
<thead>
<tr>
<th>Category</th>
<th>Criterion</th>
<th>Sketch</th>
<th>Wireframe</th>
<th>Mockup</th>
<th>Software Prototype</th>
<th>Product</th>
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</thead>
<tbody>
<tr>
<td><strong>Information</strong></td>
<td>Label</td>
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<td>✓</td>
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<tr>
<td></td>
<td>Text</td>
<td>✗</td>
<td>x</td>
<td>✓ / ✗</td>
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<td>✓</td>
<td>✓</td>
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<td><strong>Style</strong></td>
<td>Colors</td>
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<td>black &amp; white</td>
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<td>black &amp; white</td>
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<td></td>
<td>Icons</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>Typography</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ = applies, ✓ / ✗ = optionally applies, ✗ = not applied
Definition of Fidelity Levels

- Speed
- Cost
- Navigation
- Interactivity
- Responsiveness
- Information (Text & Images)
- Style

Fidelity

Software Prototype
Mockup
Wireframe
Sketch
Research Questions
Definition of Fidelity Levels

- **Fidelity**
- **Speed**
- **Cost**
- **Navigation**
- **Interactivity**
- **Responsive ness**
- **Style**
- **Information (Text & Images)**

**Wireframe**

- **Sketch**

**Software Prototype**

- **Mockup**

**Low-Fidelity Prototypes**

**High-Fidelity Prototypes**
Overview

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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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Timeline

<table>
<thead>
<tr>
<th>MA</th>
<th>Literature Research</th>
<th>Requirement Elicitation</th>
<th>Implementation</th>
<th>Design of Evaluation</th>
<th>Evaluation</th>
<th>Writing</th>
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</tbody>
</table>

Today
Thank you! Questions?
### Definition Mockup-Driven Development

<table>
<thead>
<tr>
<th>Mockup Driven Web Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of Cascading Tree Sheets (CTS)</td>
</tr>
<tr>
<td>CTS as input for the generation of a web application</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Coined the term: MockupDD (Mockup-Driven Development)</td>
</tr>
<tr>
<td>Mockup as “requirement elicitation helper”</td>
</tr>
<tr>
<td>Create User Stories and Mockups</td>
</tr>
<tr>
<td>Use the SUI Model to generate Code and MDWE Models</td>
</tr>
</tbody>
</table>