Working in Harmony: Integrating the efforts of usability engineers and agile software developers

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About us

- **Jason Chong Lee**
  - Two years experience working at Meridium, Inc.
  - Ph.D. at Virginia Tech, June 2009 (expected)
  - Developed Agile Usability approach at Meridium and Virginia Tech, funded in part through an NSF STTR grant

- **D. Scott McCrickard**
  - Over eight years as a faculty member at Virginia Tech
  - Consultant for many companies on usability and interface issues

- **Stacy M. Branham**
  - Ph.D. student at Virginia Tech
  - Internship at Meridium, Inc. as a usability engineer
Software Crisis

In 2006 Standish Group Reported that

- 19% Total failures
- 46% Challenged
- 35% Successful

Agile Methods

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

- Mitigate risks through
  - Iterative and incremental development
  - Continuous customer contact
  - JIT requirements engineering
  - Test-driven development
  - ...

Agile Usability

- Shared design goals and artifacts
- Leverage lightweight prototyping & evaluation methods
- Developers and usability engineers work in parallel
- Regular synchronization points

Overview

- Getting to know you
- Activity: Build something fun!
- Discussion: Understanding the issues
- Break
- Presentation: Agile Usability
- Activity: Agile usability in action
- Discussion: How did it work?
- Discussion: Issues to address & future vision
- Extended discussion on the beach...
Getting to know you

- Where are you from?
- What is your area of study?
- Knowledge/experience with Agile?
- Why are you here?

Activity 1: Building a ball transporter

- Purpose: understand some challenges of integrating agile and usability

- Activity: Build an apparatus to transport a ball the greatest horizontal distance using materials provided.
Building a ball transporter: Instructions

- Design session: design the ball transporter using paper & pencil. (10 minutes)
  - You will implement the design of another team so make it understandable!
  - Review the materials given to you. These are what the other team will use to implement your design.

Building a ball transporter: Instructions

- Implementation session: Implement the design of another group (10 minutes)
  - Adhere to the design as closely as possible but make changes as necessary
  - You cannot communicate with the other team. Use only the design.
Building a ball transporter: Instructions

- Now let’s see how we did!

Activity 1: Debriefing

- How closely did the design match the implementation?
- What problems were encountered?
- What were the causes of those problems?
Break time!

- Back in 10 minutes

Next up

- Presentation: Agile Usability
- Activity: Agile usability in action
- Discussion: How did it work?
- Discussion: Issues to address & future vision

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Why is there a “software crisis”? 

- Poor customer/end user communication
- Poorly articulated project goals
- Unrealistic development schedules
- Poorly defined requirements
- Poor project management
- Commercial pressures
- ...

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How Agile works

- Daily Scrum meeting
- 24 hours
- 1-4 weeks
- Potentially shippable product increment
- Sprint backlog
- Backlog items
- Product backlog - client prioritizes

Why does usability matter

- Important part of successful design
- Contributes to business value
- Good UI design is hard!
Why doesn’t agile do usability?

- Early agile projects had simple UIs
- No distinction between customer and end user
- Working closely with the customer will result in a usable end product.

This is a bad assumption.
Agile usability

- Integrate usability into agile organizations-leveraging similarities
  - Cyclical development
  - Human-centered development
  - Focus on team coordination & communication

- Benefits of agile usability
  - Usable for end users
  - Meeting customer requirements
  - Is on-time and on-budget

Challenges of integration

- Different goals
- Different languages
- Different approaches
- Different tools
- Power imbalances
Challenges of integration

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“This design is simple and elegant.”
Challenges of integration

- Different goals
- Different languages
- Different approaches
- Different tools
- Power imbalances
Meeting the challenges

Managing different goals

- Usability managed as a quality characteristic
  - Usability goals prioritized relative to other goals
  - Specifying usability goals as objectives
  - Assessing and redesigning to meet these objectives
  - Define users and their key characteristics
**Rapid prototyping**

- Develop prototypes using low/med-fidelity tools
- Prototype activities, don’t focus on details
- Communication with others is key!
- Claims to track key design decisions—leads to testing

**Usability testing**

- Usability testing tied to design claims
- Lightweight usability testing within iterations
- Summative testing at end of release cycles
- Can usually run tests on working systems
Example claim

Goal: Time efficiency
system interaction must take 2-3 minutes on avg

Claim: Popup selection box to make decision
+ creates real estate without leaving page
+ limits error paths
- User might not understand focus change

Test results:
average time to completion - 1:59 minutes
Only 2 data entry mistakes...

Getting people to speak the same language

- Usability engineer as a member of the team throughout the development process
- Shared understanding of goals and their relative priorities
- Continuous collaboration and communication between team members
- Shared design artifacts
Integrating different approaches

- Abbreviated requirements analysis phase
  - Define high level goals
  - Define vision
  - Collect info on end users

- Parallel development tracks
  - Development Track
  - Usability Track

Parallel development in detail
Synchronization is critical!

- Parallel development tracks enables
  - Usability engineers to focus on user interface design
  - Software developers to focus on implementation

- But risk of drift between *interface design* and *implementation* due to
  - Poor communication
  - Implementation limitations
  - Changing requirements

Optimizing Synchronization

- How do synchronizations happen
  - Shared design artifacts, models
  - Verbal communications
  - Electronic communications

- Where do synchronizations happen
  - Mandatory sync points
  - Opportunistic sync points
Activity 2: Designing a E-Reader

- Purpose: understand how some of the integration issues are being addressed.
- Activity: Design an E-Reader for college students to use to store and use their text books

Activity 2: Directions

- Each group divide up into two: usability team and development team
- Given
  - List of goals
  - Usability team and Dev team given their own list with features & development cost in terms of points (Don’t share these!)
- Rules
  - Simulate 3 iterations of work
  - All features must be designed BEFORE they are IMPLEMENTED unless design cost is 0
  - Once an iteration ends; can’t change what was done in that and previous iterations
  - Try to develop as many features as possible to get a system that meets the defined goals
Activity 2: Design goals

- Be as quick and easy to use as a physical text book
- Easy to pick up and use—leverage students’ existing experience with computers/internet.
- Be able to store at least 7 test books simultaneously (full semester load)
- Support people with visual disabilities

Example Iteration

<table>
<thead>
<tr>
<th>Development</th>
<th>Usability</th>
<th>Review</th>
<th>Iteration 1</th>
<th>Iteration 2</th>
</tr>
</thead>
<tbody>
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Example Iteration

**Development**

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*Design Cost: 4* |        |             |
| **Soft keyboard**  
*Design Cost: 2* |        |             |

**Usability**

| Touch screen  
+ Intuitive UI  
- Not accurate |
|---------------|-------------|
| Soft keyboard  
+ Easy to use  
- No tactile feedback |

**Example Iteration**

**Development**

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Example Iteration

Iteration 1

Usability

Touch screen
Design Cost: 4

Soft keyboard
Design Cost: 2

Review

Touch screen
+ Intuitive
- Not accurate

Soft keyboard
+ Easy to use
- No tactile feedback

Iteration 2

Search UI
Design Cost: 2

Soft keyboard
Design Cost: 4

Activity 2: summary slide

Goals
- Be as quick and easy to use as a physical text book
- Easy to pick up and use—leverage students’ existing experience with computers/internet.
- Maximize performance of the system (memory, power usage, etc)
- Support people with visual disabilities

Prioritize goals
- Each group can only spend 7 points per iteration
- Every feature must be designed before it can be implemented (unless design cost is 0)
Activity 2: Start!

- Break out into groups and start
  - Use the large paper to fill in the iterations.
  - Usability team uses yellow post-it notes.
  - Development team uses pink post-it notes.
  - Use orange post-it notes for claims.

- We will be around to help if there are questions

Activity 2: Progress

- Iteration 1 planning
- Iteration 1 review
- Iteration 2 planning
- Iteration 2 review
- Iteration 3 planning
- Iteration 3 review
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- Iteration 3 planning
- Iteration 3 review

Activity 2: How did it work?

- Review: How did each group do?
- What was different from Activity 1?
- What were benefits of approach?
- What were challenges encountered?
Experience from the trenches

- Meridium Inc.
- Touchscreen app for factory floor
- 3 months, 4 iterations
- 1 site visit, weekly customer calls
- Diverse team: PM, TL, 2 SDs, UE, QA, Doc

Iteration Activities

Identify usability goals
(1st iteration)
Iteration Activities

Design mockups for next iteration

Doc. claims (during design, from feedback)

Identify features to test (from claims, user goals)
Iteration Activities

User Testing and bug fixes

Agile Usability Reflection

- Claims, user tests help establish UE status
- Claims focus design on priority goals
- Mockup-prototype synchronization is tricky
- Iterative UI can work
Issues to address & future vision

- Addressing socio-organizational issues
  - Power balancing issues
  - Different cultures
- Broadening scope to include other areas
  - Quality Assurance
  - Product Management
  - Documentation
  - ...
- Using approach in broader spectrum of development efforts

Other Questions and comments?

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