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

The Second International Conference on Advances in Computer-Human Interactions

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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

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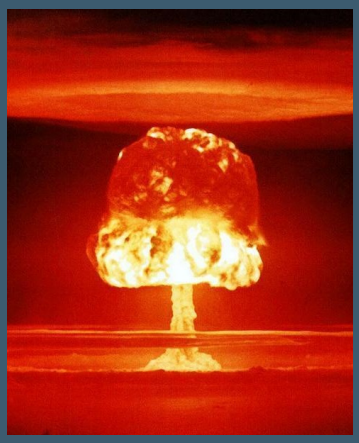
Software Crisis

In 2006 Standish Group Reported that

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



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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
  - …

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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?

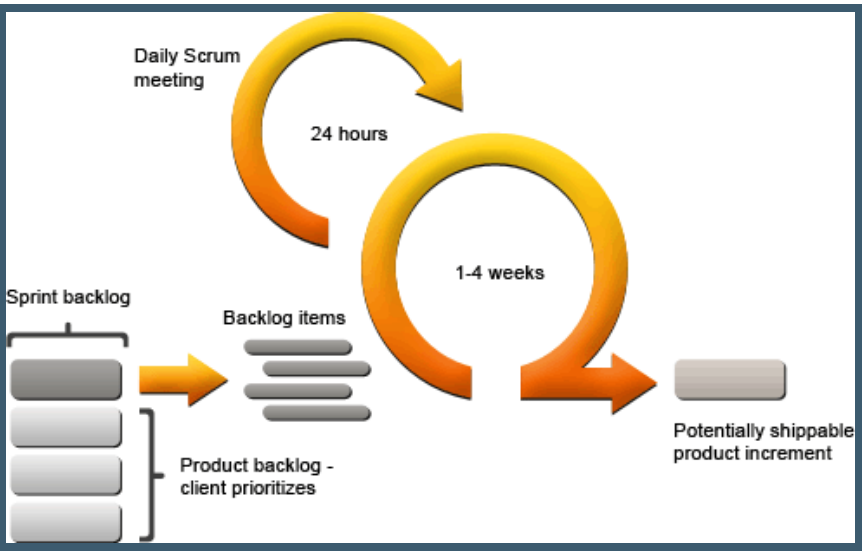
Break time!

- 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

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
- …

How Agile works



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.

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- Working closely with the customer will result in a usable end product.

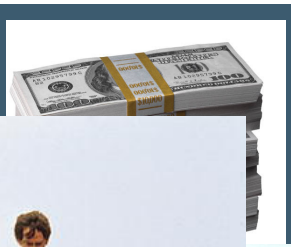
This is a bad assumption.

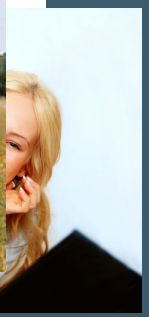
Agile usability

- 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**
- Differ
- Differ
- Differ
- Powe





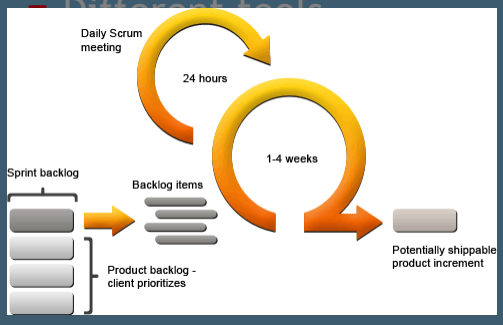
Challenges of integration

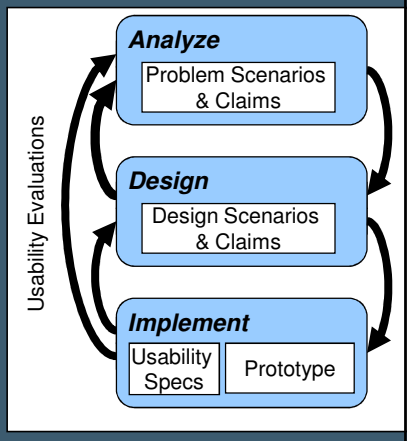
- Different goals
- **Different languages**
- Different approaches
- Different tools
- Power imbalances

"This design is simple and elegant."

Challenges of integration

- Different goals
- Different languages
- **Different approaches**
- Different tools





Challenges of integration

- Different goals
- Different languages
- Different approaches
- **Different tools**
- Power imbalances

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Challenges of integration

- Different goals
- Different languages
- Different approaches
- Different tools
- **Power imbalances**

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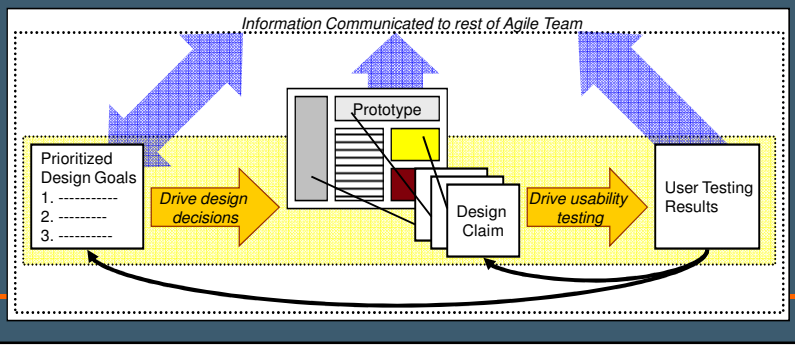
Meeting the challenges

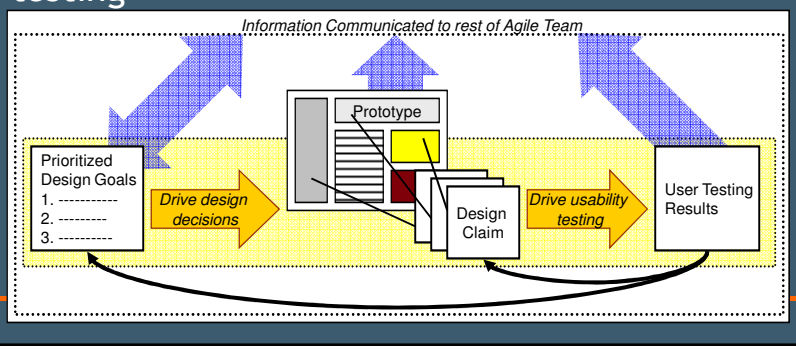
Managing different goals

- 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



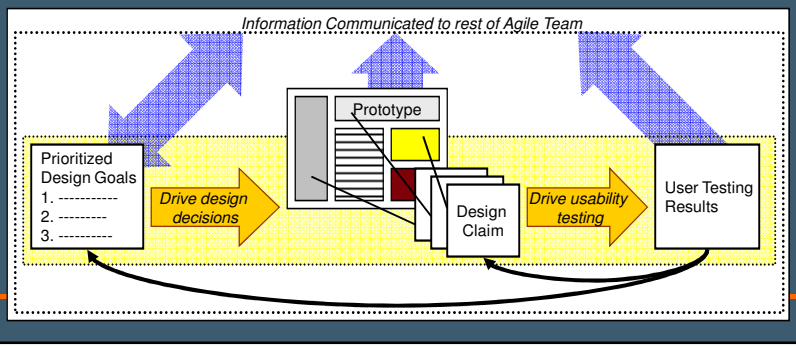
Rapid prototyping

- 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

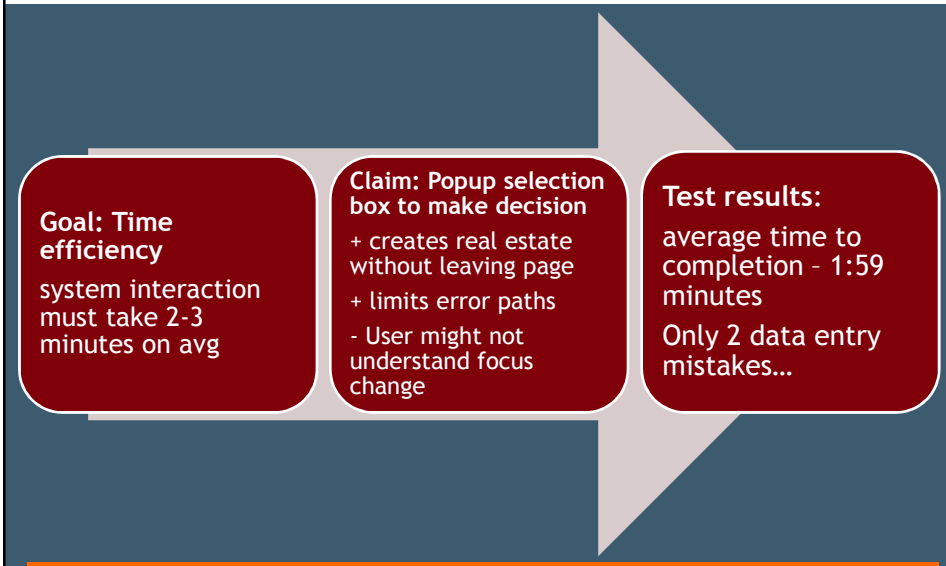


Usability testing

- 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



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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

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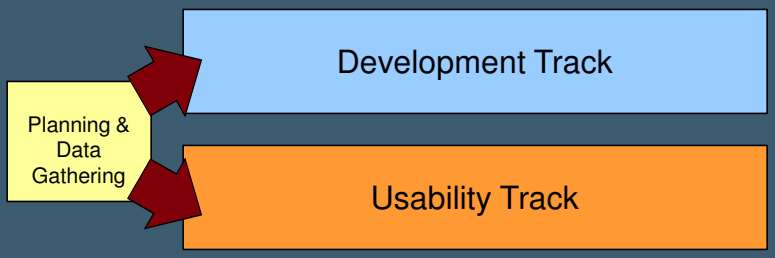
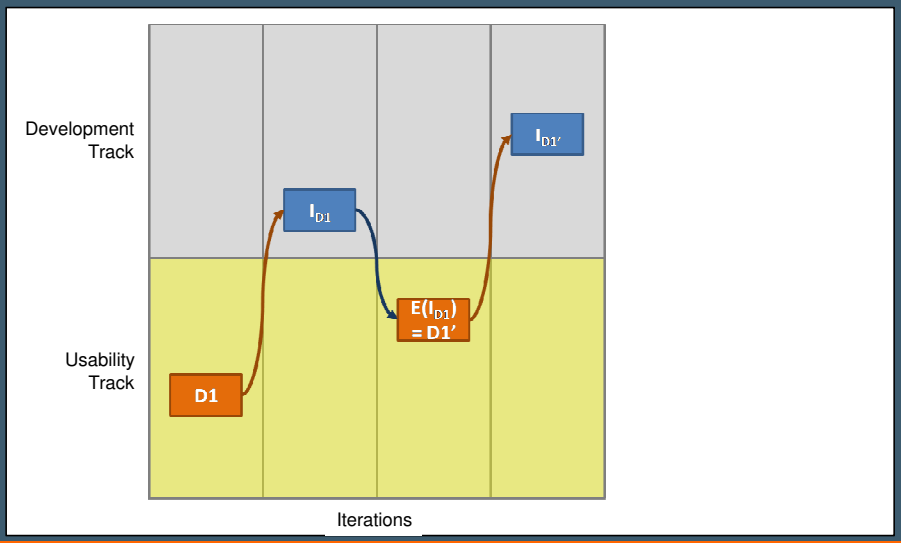
Integrating different approaches

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



Parallel development in detail



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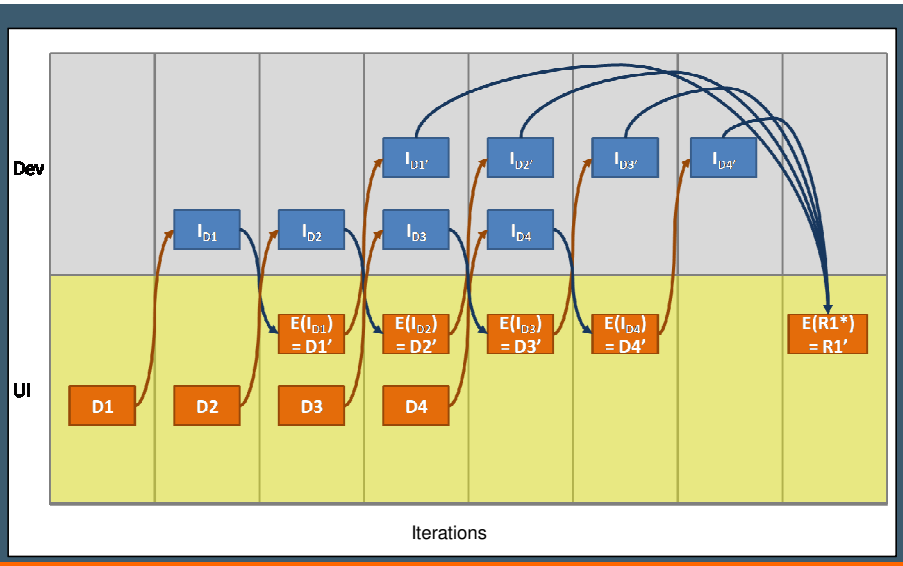

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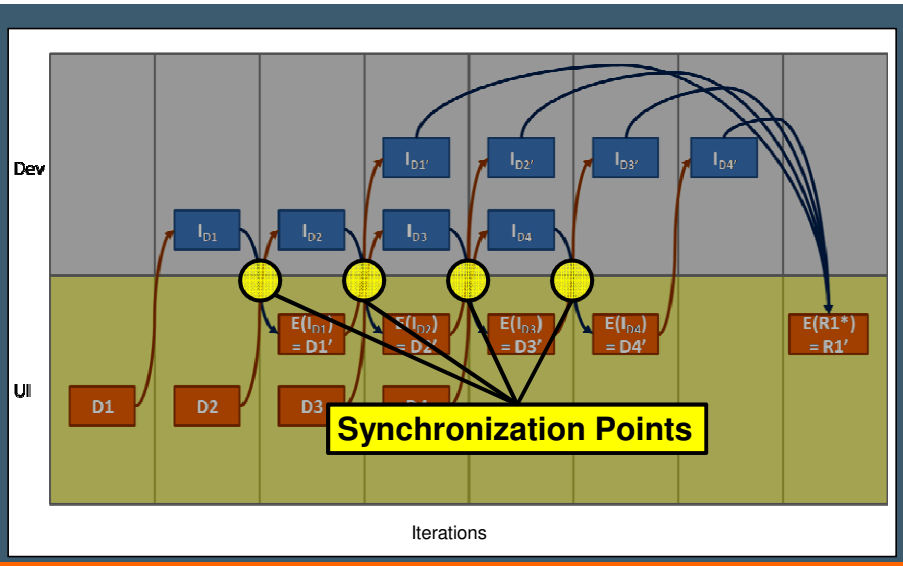


Synchronization is critical!

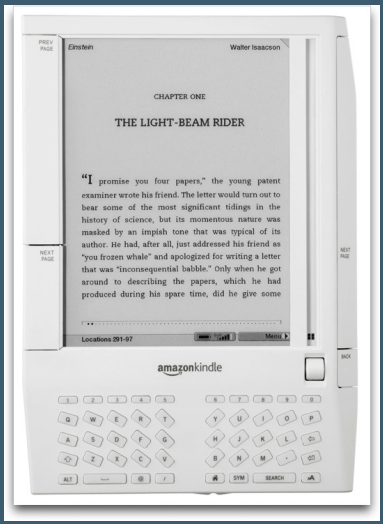
- Parallel development tracks enables
  - Usability engineers to focus on user interface design
  - Software developers to focus on implementation
- But risk of drift between ***interface design*** and ***implementation*** due to
  - Poor communication
  - Implementation limitations
  - Changing requirements

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



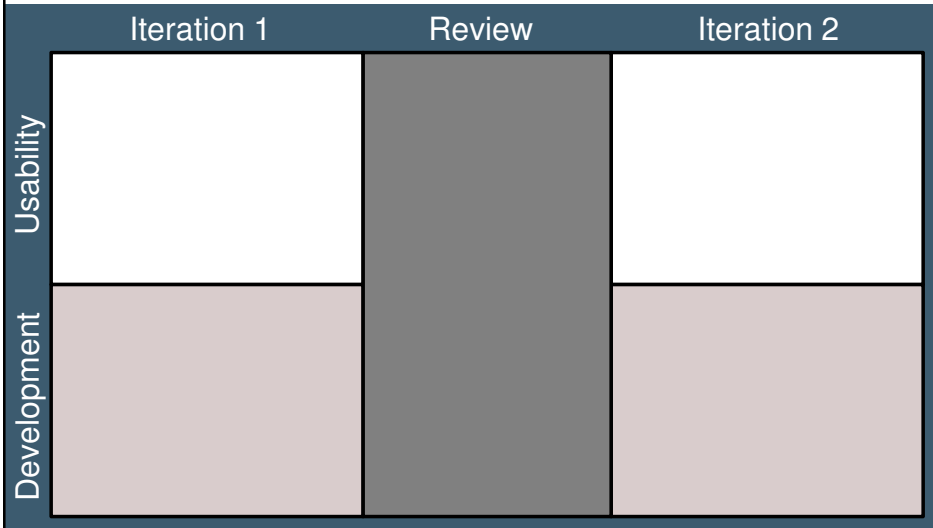
Activity 2: Directions

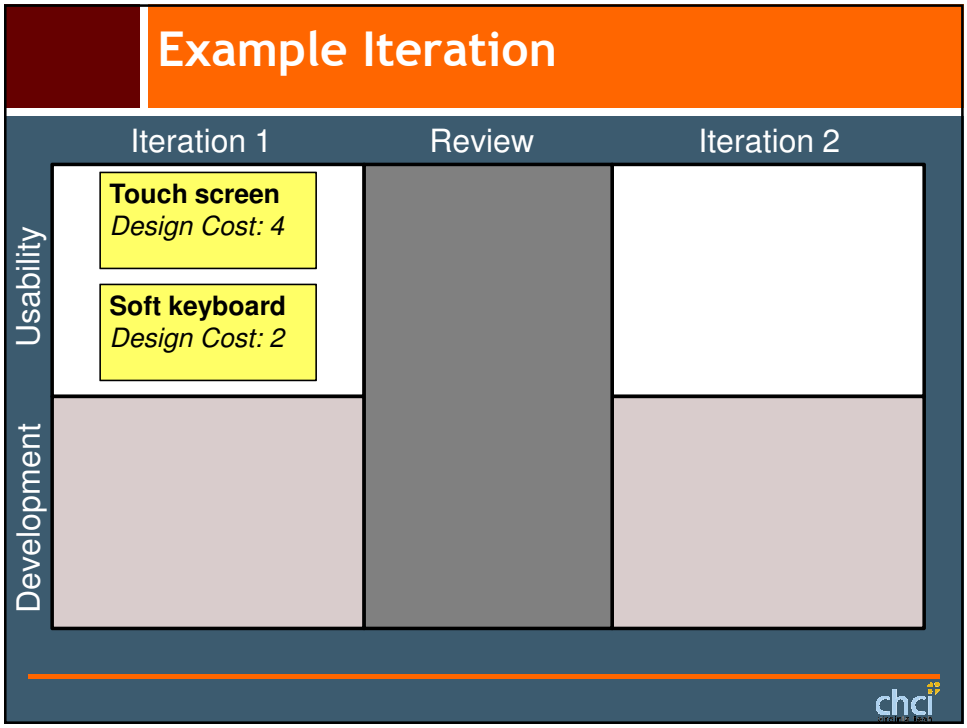
- Each group divide up into two: usability team and development team
- Given
  - List of goals
  - Usability team and Dev team given their own list with features & development cost in terms of points (Don't share these!)
- Rules
  - Simulate 3 iterations of work
  - All features must be designed BEFORE 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




Example Iteration
Iteration 1
Review
Iteration 2
Usability
Development
Touch screen
Design Cost: 4
Soft keyboard
Design Cost: 2
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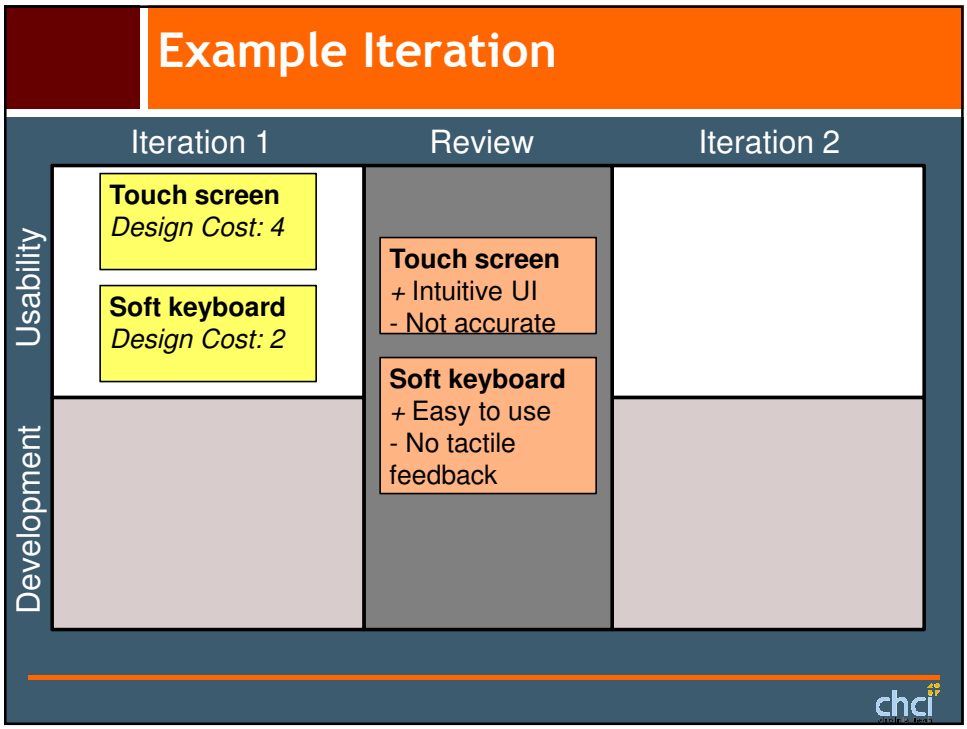
Example Iteration
Iteration 1
Review
Iteration 2
Usability
Development
Touch screen
Design Cost: 4
Soft keyboard
Design Cost: 2
Touch screen
+ Intuitive UI
- Not accurate
Soft keyboard
+ Easy to use
- No tactile feedback
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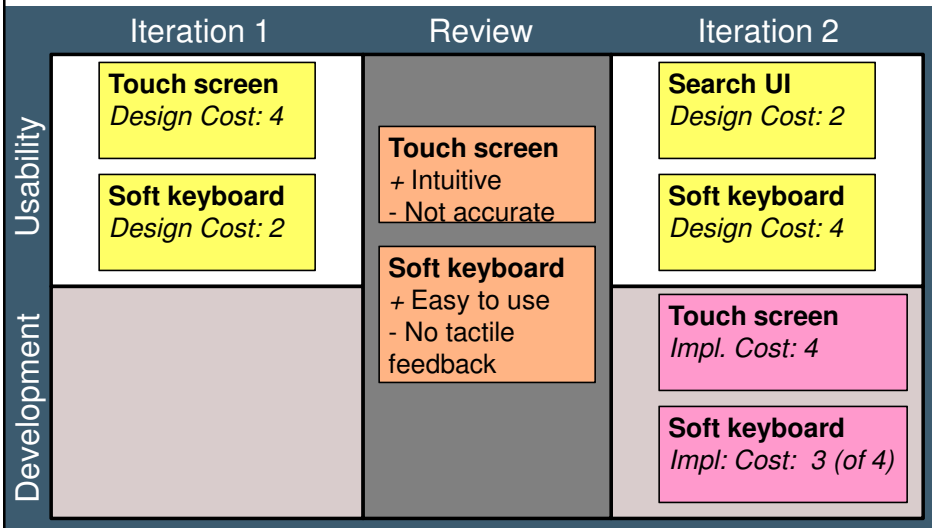
Example Iteration



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

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

Activity 2: How did it work?

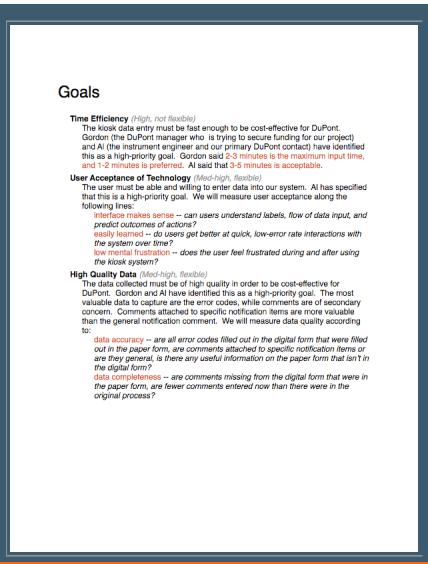
- Review: How did each group do?
- What was different from Activity 1?
- What were benefits of approach?
- What were challenges encountered?

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)



Goals

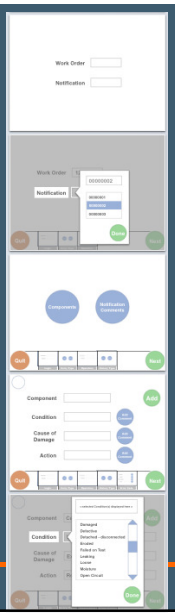
Time Efficiency *(High, not flexible)*
The kiosk data entry must be fast enough to be cost-effective for DuPont. Gordon (the DuPont manager who is trying to secure funding for our project) and Al (the instrument engineer and our primary DuPont contact) have identified this as a high-priority goal. Gordon said 2-3 minutes is the maximum input time, and 1-2 minutes is preferred. Al said that 3-5 minutes is acceptable.

User Acceptance of Technology *(Med-high, flexible)*
The user must be able and willing to enter data into our system. Al has specified that this is a high-priority goal. We will measure user acceptance along the following lines:
- interface makes sense -- *can users understand labels, flow of data input, and predict outcomes of actions?*
- easily learned -- *do users get better at quick, low-error rate interactions with the system over time?*
- low mental frustration -- *does the user feel frustrated during and after using the kiosk system?*

High Quality Data *(Med-high, flexible)*
The data collected must be of high quality in order to be cost-effective for DuPont. Gordon and Al have identified this as a high-priority goal. The most valuable data to capture are the error codes, while comments are of secondary concern. Comments attached to specific notification items are more valuable than the general notification comment. We will measure data quality according to:
- data accuracy -- *are all error codes filled out in the digital form that were filled out in the paper form, are comments attached to specific notification items or are they general, is there any useful information on the paper form that isn't in the digital form?*
- data completeness -- *are comments missing from the digital form that were in the paper form, are fewer comments entered now than there were in the original process?*

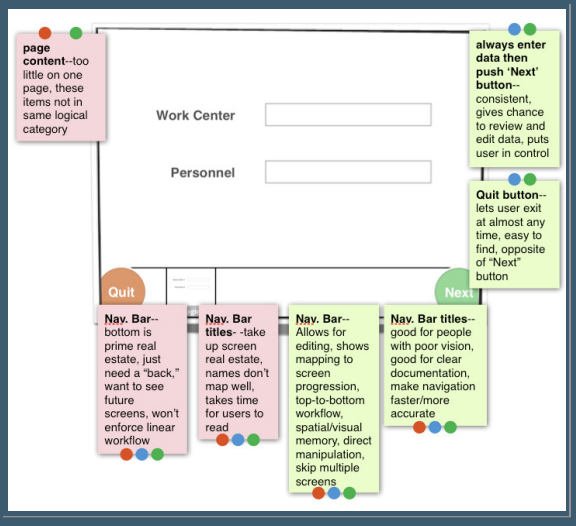
Iteration Activities

Design mockups for next iteration



Iteration Activities

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

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Other Questions and comments?

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