The UCD Perspective: Before and After Agile

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Abstract

In the agile and user-centered design (UCD) communities it is often believed that agile's quick development cycles do not allow time to fully understand our user's needs. In our experience it is just the opposite: agile and UCD methods are not at odds with each other. As more development teams using UCD are finding, the iterative approach to agile is a natural fit for UCD. Though we have day to day challenges, we are successfully demonstrating how two UCD teammates on the agile team can aid in upfront and continual user input.

1. Introduction

In 2005, Elsevier (a global leader in medical, scientific and technical publishing) began an initiative referred to internally as the "Agile Workstream." The goal of the workstream was to prove how agile methods could be used for product development. The initial project was to develop an online decision-support resource for pathologists – Path Consult. One of several challenges of the endeavor was to integrate multiple disciplines and globally distributed team members (in London, UK; Philadelphia, PA and Dayton, OH) into the process. We will discuss one of these disciplines, namely UCD [1].

2. Background

Prior to working within an Agile team, our UCD team supported online product development in a more traditional waterfall style approach. UCD would typically join a project after its requirements had been defined and tasked with developing and testing the user interface (UI) prototype. The UI prototype is a model that communicates product concepts, navigation, interaction design, visual design and overall product vision to all parties.

Actually, this was often the best case scenario – and not always typical. Sometimes the development work would already be done and we would test a developed website just before launch to identify any usability snags that may be encountered after launch.

With the success of Path Consult, more agile development projects were initiated throughout the company. In a second agile project – Rad Consult – the team was tasked with developing an online decision-support resource for radiologists. Rad Consult would assist radiologists in their diagnostic decision making when reading patient case images.

When asked to participate in Rad Consult, the UCD team stepped back and gave thought to the effectiveness of the UCD role in that first agile project. Elsevier's successful Path Consult agile team consisted of familiar roles: product manager, project manager, iteration manager, QA specialist, developers, operations lead and UCD – but only a single UCD person. This individual had many responsibilities. He conducted the user understanding activities, created and maintained the UI prototype, wrote the UI specifications, managed communication with representative end users and did usability testing of the UI prototype ahead of the development team. These were the same activities and deliverables as UCD has provided on other "traditional" development projects.

Based upon that single UCD person's experience on the Path Consult project, we soon discovered that one UCD person had difficulty managing all the activities and deliverables. If a single UCD member was to continue supporting an agile project, then tradeoffs would have to be made and possibly compromise the project's chances of success. Embracing one of the basic agile tenets of "inspect and adapt", one of the most important changes we made to the team as a result of this was adding a second UCD member to the project.

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3. Early End User Research and Project Kick-off

For all projects in which UCD is involved, we try to do early user understanding of representative end users. This ensures that the design fits the user's workflow and environment. It also helps to ensure that the right features make it into the product.

Prior to project approval and project kickoff of Rad Consult, one UCD person conducted field research on a part-time basis over a five month period. This research supported the creation of a high-level concept prototype and concept testing of that prototype. This is not always typical for our projects, but we had the time, money and support of the product owner to see that the proper understanding took place. The unofficial product manager at the time recognized the market opportunity and worked with UCD to better understand how radiologists use and seek information.

Given approval to move forward with the project, a formal team was brought together for project chartering sessions. Some of the team, developers and the iteration manager, had worked together previously on the Path Consult project. Others on the team attending the chartering session included: one UCD member, product manager, project manager, content managers, business stakeholders and chartering facilitators. We also had seven radiologists in attendance.

As part of the chartering sessions, information from the UCD field research activities was shared with the team. Contextual quotes, pictures of workspaces and explanations of information needs were shared with the team. UCD emphasized why, when and how information was gathered by radiologists in aiding the clinical diagnosis of patient case images. When developers were later asked about this they said it was "*Very informative, [I] knew nothing about [our users' field] before.*"

4. The Agile Team and Dynamics

Many practitioners consider it a best practice for the team to be co-located, for obvious reasons – collaboration is much simpler if you can turn around to a teammate to ask a question. However, the Rad Consult team was going to be globally distributed across two countries, three cities, and five time zones. London is home to the bulk of the Rad Consult team:

- Project manager
- Iteration manager
- QA specialist
- Developers (3 pairs)
- Operations lead

In Philadelphia, PA we have

- Product manager
- UCD person

In Dayton, OH is a second UCD person.

Our iterations are one week long and the iteration planning meeting is held every Wednesday at 4:00 PM GMT (11:00 AM Eastern). Given our time zone challenge, team meetings are held during U.K. afternoons and U.S. mornings. We also connect daily via telephone during our stand-up (except on iteration planning day).

In addition to these meetings, the "customer team" (comprised of the product manager, the two UCD members, iteration manager and QA) meet daily over the phone for 15-20 minutes. During this call, we discuss the current user research, UI prototype status, usability testing plans and feedback, as well as possible stories for consideration in the next iteration.

To narrow our geographical gap, we also come together occasionally at one location for a week to work together. This means that the two UCD team members and product manager travel to be with the development team. The in-person time has proven to be invaluable. However, as a team we still have challenges from time to time. When the UCD members specifically asked the developers about their experiences on a globally distributed team, they said:

- *"It's a nice experience to work in an agile team, but I think a distributed agile team has some limitations. In true agile, all the team members should be in sync with others in the project. Sometimes I found [in our project] that the whole team wasn't in total sync."*
- *"It has been fantastic - There have been a few teething issues which we overcome as a team. Truthfully, it has been very much seamless - next only to co-location."*
- *"Mostly positive, but can be difficult when 'hands on' help is needed and the team are in different time zones."*

With one week iterations, the UCD members have tried to stay at least two iterations ahead of the developers with design of the UI. This worked well in the beginning, but staying ahead of the curve has been a challenge. In late November, we knew that we wanted to gather feedback from radiologists at a major tradeshow. In addition, we worked to

add new product concepts to test at the tradeshow and still had to maintain our pace for delivering UI specifications for UI-related stories.

5. Development Partners

We established a "development partner (DP) program" with our target end users, diagnostic radiologists. Our UCD group had previously utilized development partners for other new products in development with great success and it was something the team knew would help us keep moving forward at a steady pace. If we had a pool of representative and some expert users, we could continuously obtain feedback on the user interface, user interaction and information design.

We invited some representative end users to join us for segments of our chartering sessions. We also invited users that we agreed to work with as DPs. Having users at our chartering sessions helped the team focus on the product vision. They also contributed to story creation and influenced story priorities.

Some of these users, not yet in our DP program, believed so much in the product idea and its vision defined from the chartering sessions that they requested to be part of the DP program. They wanted to continue to work with us on the product definition and design. DPs are thought of as our "superhero" team members – real life people who understand the benefit of the product concept and the efficiency that it will provide to their workflow. They became an extension of the team.

Figure 1 shows a timeline of "interaction (IX) moments" that UCD has had with DPs (and non-DP users) from the kickoff meeting to the time of this writing. They include over 140 field visits, in-person concept or usability tests and remote concept or usability tests.

Working with users so closely has helped us evolve the design from ideas on paper (Figure 2) to a high fidelity UI prototype that will aid the radiologist in their decision making (Figure 3). In no way could we have created the end result without their ongoing participation. Their input has impacted all aspects of the product from content preparation, site navigation, on-screen terminology and visual design.

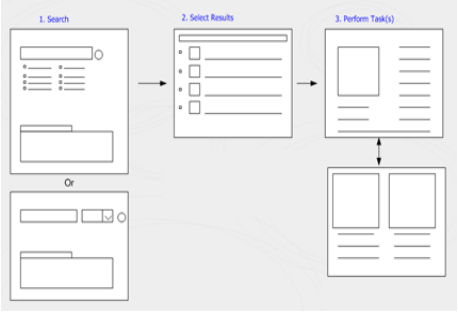

Figure 2. Early Rad Consult user interface task flow wireframes

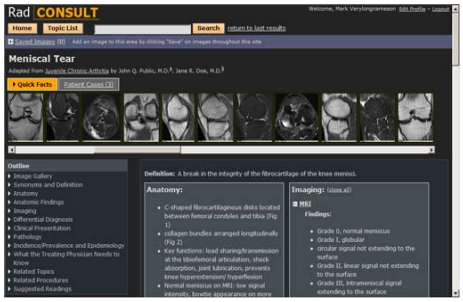

Figure 3. Quick Facts diagnosis page of Rad Consult

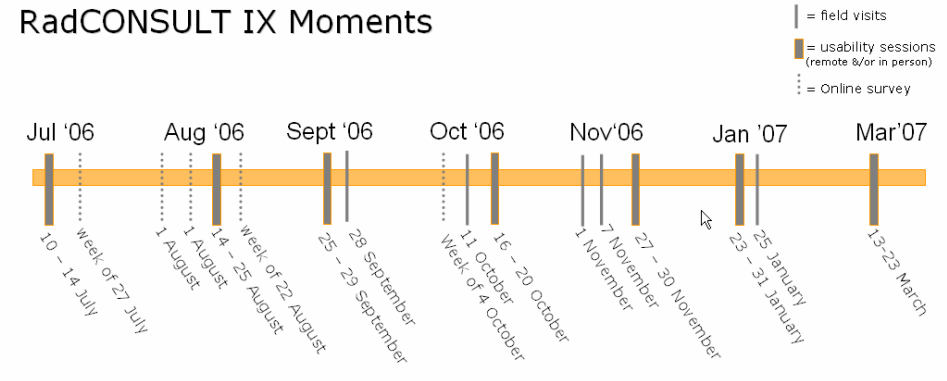

Figure 1. Development Partner (DP) Interaction (IX) Moments for Rad Consult

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A questionnaire was sent to the development partners about their experiences with the project and here is a sampling of what they said:

- "*Absolutely wonderful experience to date.*"
- *"I would have given you and your associates very high marks for the pleasure of interaction with you and your obvious dedication to your work."*

6. UCD Roles

We learned from Path Consult that a single UCD person was not enough to maintain an active level of user engagement and still provide the other deliverables related to the detailed design of the product. Two UCD members with specific roles and responsibilities worked well for us: the UCD researcher and UCD prototyper.

The authors are the two UCD teammates and connect daily via e-mail, instant messenger and telephone to discuss the user findings and how they will be used to evolve the prototype.

6.1 UCD Researcher Role

The first UCD team member has taken the "research" role. This person:

- Conducts user understanding and communicates it back to the team
- Translates understanding into wireframes and interaction designs which defines how users will use the product to find specific information of interest to them
- Schedules and conducts usability testing of the prototype in person and remotely
- Works closely with the UCD prototyper to communicate feedback on existing concepts as well as new concepts
- Works closely with the product manager and iteration manager to communicate the user understanding findings that influence story priorities
- Conducts usability testing of the prototype in person and remotely

A typical day for the UCD researcher would start with a morning email review of notes from the London team, review UI prototype changes, and manage the calendar for DP activities. On a day with no planned DP activities, the UCD researcher would iterate through wireframes and/or prepare a test script for concept testing.

Each morning at 9:00 AM EST, on non-iteration meeting days, the UCD pair join the customer team for the daily 'customer team call' to catch up on development and DP activities. Before the whole team standup the wireframe interaction designs are shared with the prototyper for further prototype development.

6.2 UCD Prototyper Role

The UCD prototyper role works closely with the UCD researcher, product manager, and product developers. He has a usability/human factors background in addition to a computer science background. The UCD prototyper attends the same customer team and standup calls as the UCD researcher and is responsible for the following:

- Creates and maintains a high fidelity, web-based prototype
- Adds new product concepts into the UI prototype
- Integrates new content samples into the UI prototype (images, image captions and other image meta-data, templated quick reference information, full-text articles, etc.) that come from authors who are experts in the field of radiology
- Tests for browser compatibility from a UI rendering perspective
- Writes UI specifications for the developers
- Pairs with developers when co-located

The UI prototype is made to appear as real as possible. In fact, many people who come in contact with the prototype think that it is a completed product and this has helped to elicit feedback at a very detailed level. The attention to detail has also proven to be invaluable for communicating to the development team how a specific feature fits in with the rest of the product.

UI prototype limitations have also come to be understood and include the following:

- The UI prototype is limited in breadth and depth of representative content (images, quick reference information, full-text articles, etc.). This becomes apparent to end users when they search the UI prototype for specific information and can't find it.
- The UI prototype does not use the real product's search engine. This influences the relevance of search results.

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A few of the product concepts that have been explored in the UI prototype for Rad Consult include:

- Side-by-side comparison of diagnoses (differential diagnosis)
- Drag/drop of images to a saved images area
- Image manipulation functionality
- Navigation via voice recognition
- Patient case image galleries

When new product concepts are added to the UI prototype, little regard is given to browser compatibility and rendering differences. New product concepts that are added to the prototype are sloppily coded and tuned to one specific browser. This is because the goal is to gather feedback on the concept and the sooner that feedback is acquired, the sooner the product's direction can be validated by development partners. While browser compatibility is the UCD prototyper's responsibility, this activity is usually not addressed until after the story has been selected for the current iteration and is part of the UI specification writing process.

Feedback gathered from DPs by the UCD researcher significantly influences the next steps for a product concept. After discussions between UCD and the product owner, one of the following decisions could be made with regard to a specific product concept:

- UCD researcher to gather more DP feedback and usability data.
- UCD prototyper to make minor improvements based directly on DP feedback and usability data.
- Product owner, UCD researcher and UCD prototyper discuss alternative approaches to the product concept. This new approach may replace the existing concept in the UI prototype or may be used for comparative purposes during future DP sessions.
- UCD prototyper to remove the product concept from the UI prototype.

The UCD prototyper wears the UI developer hat on the team. There is no dedicated UI developer on the London-based team. It is the UCD prototyper that provides detailed UI specifications to the development team.

The format of a UI specification has evolved over time, but is in essence a single web page that includes the following information for a user story that includes some user interface:

- Brief description (usually one sentence taken from the story card)
- Screen capture(s) from prototype
- Limitations of prototype disclosure
- "Files you may need" (usually images and JavaScript files)
- HTML code
- CSS styles
- "While testing" section includes end-user scenarios to consider when QA tests the functionality

A UI specification has taken as little as 30 minutes and upwards of 1.5 days to write. This variability is due to the level of complexity of the story, how much refactoring (improvement) of the code needs to be done, and how much browser compatibility tweaking needs to be made.

The HTML portion of a UI specification is a combination of HTML code and embedded comments. The embedded comments often include pseudocode that instructs developers of algorithmic constructs such as conditional statements ("if {condition} is true, then display the following HTML") and loops ("for each image, display the following HTML").

Developers use the UI specifications in the following way: After understanding the essence of the story and as part of their test-driven development process, they first write a unit test which is designed to fail because the new functionality is not there yet. They then copy and paste the HTML code from the UI specification into their coding environment. They also copy the CSS styles into the appropriate stylesheet file. After it is integrated, they then run all unit tests with the end goal of all unit tests passing.

A back-log of UI specifications has never existed for this project. UI specifications are not written until after the story has been selected. Why spend time and energy writing a UI specification while feedback is still being collected and there's a chance that it may never be played as a story? This is where the timing of UI specification deliverables becomes very important.

Iteration planning meetings take place every Wednesday afternoon at 4:00 PM GMT (11:00 AM EST). If it has been decided to play one or more stories in the next iteration that require UI specifications, the UCD prototyper has all Wednesday afternoon (U.S. Eastern time) to prepare and finalize UI specifications for the new iteration that starts the next business day (U.K. time). Typically, the stories for each iteration include some that have a user interface aspect and some that do not. Over the course of this project, there were only a few iterations that required preparation of 3 or 4 UI specifications. Based on story

priorities for a given iteration, additional time may be available to prepare a given UI specification based on when developers anticipate starting the development of that story. Usually towards the end of the iteration planning meeting, the UCD prototyper tells the team when he believes he will have a specific UI specification finished and also asks the developers when they think they'll begin development on a specific story. Typically, all UI specifications are finished by Friday morning (U.S. Eastern time).

While the prototype has been invaluable for eliciting feedback, a UI prototype is not the real product and can only go so far. The prototype as a vehicle for obtaining development partner feedback hit a wall due to its lack of breadth and depth of content. DPs naturally wanted to use the prototype to find answers to real problems that they recently encountered in their clinical setting, but couldn't due to a very small set of content.

As the developers build the real product, the UCD prototyper spends less time on the prototype and more time reviewing the development system. He can fix some user interface issues remotely, but he also pairs with a developer when co-located with the team.

7. A Different Way of Working

Supporting an agile project has very much changed the way in which our UCD group has worked within a product team and its deliverables. The transition from supporting non-agile projects to agile-based projects has been an adjustment, but has also become a preferred way of working.

Our UCD experiences associated with supporting non-agile projects has led to mixed results. On non-agile projects, our UCD group has written UI specifications that are Word documents that can range from 5 to 200 pages of descriptions and screen images of the user interface. It can take weeks or months to put a UI specification document together and then there needs to be meetings to review it and answer questions about it. Developers have also been known to miss details buried in the document and there can be room for (mis)interpretation of how something should really work.

The following table compares various aspects of project life before and after our UCD experiences on an agile project.

BEFORE AGILE	AGILE
Abundant documentation.	Minimal documentation:
Business requirements that are medium/long-term focused	Story cards and lean UI specifications
Inflexible: change control process takes time and may not see end-user focused changes made for a long time	Flexible: can respond to end user feedback and market changes in one iteration (one week)
Varied and numerous meetings. Sometimes meetings to discuss meetings. Purpose, goals and outcomes of meetings can be fuzzy.	Meetings that are brief and focused
End user feedback may occur infrequently, after launch, or not at all	Ongoing development partner feedback
Sluggish decision-making. Product team can agonize on making the right decision.	Rapid decision-making. Can always change or improve it later.
UI specifications tended to be long documents that describe user interaction and details. Developers may not read all the details and can misinterpret what is described.	UI Specifications are concise and provide all the user interface code, styles, and images needed by the developers.

8. Lessons Learned

At the time of this writing, we are eleven months into our project. We continue to learn from our experiences, improve upon our activities and tackle challenges.

- It is a significant challenge for one UCD person to perform all development partner activities in addition to prototype development and UI specification writing.
- The division of UCD responsibilities into the two roles of UCD researcher and UCD prototyper has allowed us to become focused and efficient.
- UCD methods and principles can work well within an agile development process.
- While co-location is preferred, we've been able to get the job done being geographically dispersed.
- A development partner program is a key ingredient that has provided continuous user feedback and this feedback has influenced product priorities and decision making.
- Once UCD team members at our company have been involved in an agile project, they have a strong preference to continue supporting agile-based projects.

9. References

1. Honious, J., and J. Clark, "Something to Believe In", Agile 2006.