A Guide To User Research & User-Centered Design
ChaiOne is an Enterprise Mobility Agency that helps companies transform their business leveraging mobility at scale.
Adrian Garcia is a Senior UX Researcher at ChaiOne. He has published academic articles related to HCI, has improved the design of auditory and WYSIWYG interfaces, and currently helps fortune 500 companies improve their user experience. Adrian Garcia and Jared Huke jointly created ChaiOne’s Design Strategy and process.

Natalie Cheng is the Social Media & PR Coordinator at ChaiOne. She is responsible for creating and editing content for the ChaiOne blog, website, social media accounts, decks, eBooks, and other presentation materials. Before ChaiOne, Natalie was a community manager and writer for a large technology publication.

Naomi Galvez graduated from New York University with honors in 1999 and began a graphic design career in New York City. She worked as an Art Director at Grey Healthcare Group and as a creative director at Publicis Healthcare Communications Group. She continues to focus on brand development, marketing campaigns, and promotions.
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Introduction
INTRODUCTION

Have you ever used a software product at work that was not easy to use and made your job harder? Why would this happen? One answer could be that it wasn’t designed through the user research process. When companies design and develop technology without doing research, they risk introducing software that makes employees’ jobs more challenging, minimizing their profits and introducing bottlenecks in their processes. User research saves companies money by ensuring that the software used on the job makes the work easier. This reduces training time and increases efficiency and employee satisfaction.

In this eBook, we’ll discuss why the development of enterprise software must be guided by user research, explain the User-Centered Design (UCD) process, and give some examples of research success stories.
Why Develop Enterprise Software with User Research and the UCD Process?
WHY DEVELOP ENTERPRISE SOFTWARE WITH USER RESEARCH AND THE UCD PROCESS?

Developing enterprise software without using a user-centered design framework hurts businesses. As Keith Butler from Boeing knows, “Usability issues can be as much as 50% of the total cost of ownership”—and that is if the project is successful (Hartson, Pyla, 2012). In this climate, “25% of software development efforts fail outright, and 60% produce substandard products” (Hartson, et al., 2012). The lack of attention to user input and usability is claimed to be the root cause of the average software development project being 187% over budget, 222% behind schedule and only implementing 61% of the specified features at launch (Hartson et al., 2012).

For the projects and teams that do launch a product, they infrequently produce technology that supports employees in the context of their day-to-day work, causing the business to not perform at its best. This produces products that siphon revenues and effort from other departments. Computer World quoted IT Officials at Boeing and Fidelity Investments saying, “Badly designed software is costing business millions of dollars annually because it’s difficult to use, requires extensive training and
WHY DEVELOP ENTERPRISE SOFTWARE WITH USER RESEARCH AND THE UCD PROCESS? (CONT.)

support, and is so frustrating that many end users under-utilize applications [not maximizing efficiency].” (Hartson, et al, 2012). Furthermore, in a survey conducted by IFS, 20 percent of enterprise-software users said their top causes of wasted time were learning different modules and applications and trying to find task related information. (Ryan, 2009)

WHY IS SOFTWARE DEVELOPMENT WITHOUT USER INPUT SO EXPENSIVE? According to NASA, as teams move through the design process, the cost of changing design requirements increases exponentially. NASA estimates that every dollar spent on collecting user input at the beginning of the lifecycle saves up to $10,000 by the end of the lifecycle (Stecklein et al., 2004). This phenomenon occurs because if teams wait to collect user input until the very end of the project and then discover the design solution is wrong, they will have to start all over by redefining new requirements. The UCD process is a systematic strategy that ensures teams define the right requirements upfront and produce a design solution that best supports employees in the context of their work. This process minimizes the number of design iterations, shortens the time to product launch, and reduces the cost of TOC by including user input early, reducing the need for tech support down the road.
The User-Centered Design Process
THE USER-CENTERED DESIGN PROCESS

The UCD process is a systematic approach that increases the probability of getting effective results. Broadly, the UCD process involves the following steps:

1. KNOWING THE BUSINESS OBJECTIVES
2. UNDERSTANDING END USERS
3. DESIGNING AND DEVELOPING WITH DATA
4. MEASURING RESULTS
KNOWING THE BUSINESS OBJECTIVES

THE BUSINESS OBJECTIVES SHOULD BE THE FOUNDATION OF THE PROJECT. Clear articulation, agreement, and documentation of business objectives provide a clear sense of direction for design and development efforts and resolves design issues. Business objectives are the answer to the team’s questions, “What are we trying to accomplish?” and “How do we know that we’ve accomplished it?”. By starting off with business objectives, the probability that the project delivers something that makes a positive change on the business is greatly increased. Too often teams get wrapped up in designing and coding for the features set and lose sight of the bigger picture—the business. Furthermore, it gives the project scope, focus, and a clear endpoint, which are all factors that contribute to shortening the time to launch. Examples of business objectives include the following:

- REDUCE THE AMOUNT OF HUMAN ERROR ON AN EXISTING SYSTEM
- ELIMINATE REWORK
- MAKE A PROCESS FASTER
- MAKE AN EXPERIENCE MORE SATISFYING
THE USER-CENTERED DESIGN PROCESS (CONT.)

UNDERSTANDING END USERS

Once the business objectives are defined, the next step is to identify who will be affected by the set objectives and to identify the factors that contribute to the project’s success. When dealing with enterprise software, the former task can be accomplished by listing the primary employees who will be using the end product. However, the latter task can only be accomplished by getting input from end users.

For example, let’s say that the objective is to allow lease operators to check well sites faster. To deliver on this objective through the UCD process, teams would need to conduct contextual inquiries before determining the feature set and system requirements.
THE USER-CENTERED DESIGN PROCESS (CONT.)

CONTEXTUAL INQUIRIES
For teams to deliver technology that truly makes the job easier, it is critical to know the challenges employees face on the job daily and the process and strategies they use to do their work. In addition, upper management sometimes has an inaccurate idea of how the work is actually being executed in the field. Contextual inquiries can provide a twofold advantage of identifying system requirements and educating teams. The best way to get this insight is to conduct contextual inquiries.

To continue with the example given above, a contextual inquiry would mean riding along with lease operators as they check each site. While it sounds simple enough, a lot of thought and planning goes into this. For example, you need to select observees carefully. It is important to get a representative sample of the population, and you want to make sure that the sample is not overly saturated with a particular user type, such as expert lease operators or rookie lease operators. Rather, it’s best to get an even spread. Furthermore, researchers conducting the inquiry

WHAT IS A CONTEXTUAL INQUIRY?
Contextual inquiries are a way for development teams to study the actual needs of users in the real context of their work. Broadly, this is a time when members from a project go out and observe employees as they go about their normal day-to-day responsibilities. This technique has the advantage of identifying requirements through direct field observations, ensuring that they will support real world circumstances, and maximizing employees’ efficiency.
THE USER-CENTERED DESIGN PROCESS (CONT.)

need to ensure they are collecting information that is useful and will move the project forward. For teams attempting this on their own, here are a few tips on conducting contextual inquiries:

- **Make sure you know what you’re interested in seeing beforehand.** What issues are most relevant to the project? What are the biggest assumptions being made by the stakeholder and the rest of the team?

- **When observing employees, do more listening than talking.** Make it clear that you are there to learn - they are the experts and you are the learner.

- **Never make an observee feel inferior by suggesting ways to improve their workflow.** Just listen, learn their workflow, and learn their likes and dislikes--ideas for improvements will come later. Critiquing their work will cause them to be quiet and to stop sharing valuable information with you.
Stay out of design mode! This is not the time to brainstorm solutions. There will be plenty of time for that later. Just take it all in and try to understand.

Always ask why. Ask why and then ask why again. This will lead you to the root cause of their behavior, uncovering their motivations. These tend to be the most valuable insights. We’ve found that it is not uncommon for technology to not support the goals of the worker. Asking why uncovers the goals that drive behavior, enabling teams to identify how technology can be redesigned to best support users’ primary goals.

“Contextual inquiries are a way for development teams to study the actual needs of users in the real context of their work.”
THE USER-CENTERED DESIGN PROCESS (CONT.)

ADDITIONAL TIPS

While each project is unique and research teams should strive to collect information most pertinent to the project, some information appears to be universal. When in doubt, collect A.E.I.O.U.

| Activities | They are goal-directed sets of actions—paths towards things people want to accomplish. What are the modes people work in and the specific activities and processes they go through? |
| Environment | Learn about the physical domain where the work is conducted. What about the environment supports or constrains the work? How can technology be used in the environment to support work processes? What are the lighting conditions? How might that affect the color palette of the interface? |
| Interactions | How do users interact with technology, artifacts, objects, etc. to perform their work? Can any interaction be altered for efficiency and simplicity? For instance, are hourly workers standing in line at a kiosk to check in to work by typing a serial number on a keypad? Can this interaction be altered so that an employee is automatically checked in by breaking a geofence? If so, this can eliminate the downtime associated with checking in at the kiosk. |
| Objects | What are the objects a worker group uses to do their job? Does any of it cause rework? For example, are employees filling out paper forms and then transcribing the forms to a program on a desktop at a later time? Can this be streamlined? What are the common errors associated with this workflow? How long do they take to fix? |
| Users | Who are all the players involved with getting work done? If the goal of the project is to promote efficiency, user groups can’t be studied in isolation. Team dynamics need to be understood and supported through good design in order to have a meaningful impact on the company. |
THE USER-CENTERED DESIGN PROCESS (CONT.)

We have consistently found that new opportunities and insights are always discovered when doing contextual inquiries. Even for projects where the stakeholders are adamant that designing for the MVP is the only thing that is needed to make a positive impact with their business, contextual inquiries always reveal that the MVP is incorrect, lacks needed features, or contains unneeded features. It is incredibly cost effective to make these types of discoveries and changes before designing one pixel or writing one line of code.
THE USER-CENTERED DESIGN PROCESS (CONT.)

DESIGNING AND DEVELOPING WITH DATA

SO THE OBJECTIVES HAVE BEEN SET, THE USERS HAVE BEEN DEFINED, AND CONTEXTUAL INQUIRIES HAVE BEEN CONDUCTED. WHAT NEXT? How do these activities shape design and development? Put simply, the first step would be to convert the information into requirements. The second step is to design, test, and iterate.
CONVERTING THE INFORMATION INTO DESIGN REQUIREMENTS

Contextual inquiries leave teams with a high volume of data. Depending on the project objectives, the data can be qualitative, quantitative, or both. In our example with lease operators, the inquiry, if done well, will produce both types of data. To enable lease operators to do a task or tasks faster, it is important to know how long the process currently takes—which would be quantitative—and then be able to describe why the process takes as long as it does qualitatively.

To do this, teams need to dissect their notes and data to reconstruct task flows that are representative of the entire sample. This aggregate task flow would need to be complete with representative numbers that indicate how long each task takes. Next, teams need to examine the qualitative data to identify meaningful trends and patterns that may exist within and between user groups. For instance, do rookie lease operators differ from expert lease operators in some meaningful way that could justify creating two separate applications or interfaces? Are there consistently any likes or dislikes from the user group that may have design implications?

After completing the task flows and identifying all the important trends in the qualitative data, reexamine all the information in light of the business objectives. I.e. Make a mobile solution that enables lease operators to check well sites faster. From looking at the data, what are tasks and activities that could be supported with mobile technology? What inefficiencies do lease operators experience that can be supported with mobility? Do they carry notepads or special documentation when checking wells that can be automated? All this directly informs design. The activities and inefficiencies are the feature set or requirements and the objects and artifacts—if being automated—become the iconography.
THE USER-CENTERED DESIGN PROCESS (CONT.)

DESIGN, TEST, ITERATE

Once the team knows what to make, the next step is to design, test, and iterate.

**Design**
Designers should consider more than simply the feature set. They need to know a worker’s environment and context of use. The environment can inform the color scheme and the context of use determines the interaction type based on the amount of cognitive bandwidth and other constraints users can have for given tasks. For example, if you find that lease operators fill out documentation at each well, the team may decide to digitize the forms to meet the business objective. However, by knowing the context, you may find that lease operators may be wearing gloves under certain circumstances. You may also find that what is written on the documents are the same key pieces of information over and over. In this case, because the circumstance is known, the best interaction may be a stylus. However, to stay true to the business objective of speed, it would be best to design a custom keyboard for quick input since typing with a stylus is slower than typing with two hands.

**Test**
Once the initial design is concepted and prototyped, it’s time to test. At the testing phase, researchers circle back with end users to have them execute real tasks under real world scenarios to gauge if the project objectives are on track to being met. For example, does it appear this design solution will make lease operators faster? If not, iterate.

**Iterate**
At the iterating phase, designers make adjustments based on data collected from end users. For example, what is confusing about the mobile solution? Does it take a long time for lease operators to really get going with the product? If so, why? Even if the solution appears to make them faster than before, are there opportunities to make them even faster than originally thought? Once the design is achieving satisfying levels of success on all the metrics of interest, it is time to develop.

Ensuring the end product is as easy to use as possible ensures that unforeseen expenses won’t have to be made to tech support, bloating the total cost of ownership.
MEASURING RESULTS

At this stage, the product is designed, developed, and deployed and teams are awaiting the big question. Did the objectives get met? Are lease operators actually faster? While the testing stage can give you confidence that the objectives will be met after deployment, the measurement stage is the time to validate. Going through this process ensures that projects will either hit the target or not be far from it after deployment. The UCD process protects teams from failed projects, saving lots of time and money.

“The UCD process protects teams from failed projects, saving lots of time and money.”
User Research Success Stories
USER RESEARCH SUCCESS STORIES

How can all this research be applied? Companies can use this information to design and develop applications, which is actually useful and aligned with business objectives. In this section, two user research success stories will be discussed.
IBM
Because UCD work has been traditionally applied to the military and consumer products, case studies on enterprise software are not commonplace, but they do exist and they show it as an effective approach to designing technology. In one case, IBM applied the UCD process to the development and design of its DB2 Universal Database. The primary objective was to create a system that was more usable, satisfying, and easier to install than their leading competitor, in hopes that this would ultimately lead to growth in revenue and market share (Sobiesiak, Jones & Lewis, 2002).

To deliver on these objectives, they followed the UCD process and initiated a research campaign of understanding their end users by conducting interviews and contextual inquiries to map out task flows and scenarios. The output was design and marketing requirements. Next, they conducted iterative usability testing throughout the design phase from low to high fidelity prototypes, while continuously comparing their usability metrics to that of their competitors and fixing usability issues along the way. Once they designed a solution that collected statistically better metrics than their competitors, they developed (Sobiesiak, et al., 2002).
What was the result? DB2 grew its revenue by 125% in 1999 and 63% in 2000, following the launch of the product. In addition, it increased its market share by 15% in 1999 and 18.5% in 2000 (Sobiesiak, et al., 2002). The product received critical acclaim for its ease of use that continued for a few years:

- “IBM’S DB2 CONTINUES TO PROVIDE TOP-NOTCH DATABASE TECHNOLOGY THAT NOW IS EASIER TO USE AND PROGRAM.” (Sobiesiak, et al., 2002)
- “THE LATEST VERSION OF DB2 BETS ON ITS ADDED EASE OF USE AND E-COMMERCE FRIENDLINESS TO PENETRATE DEEPER IN THE UNIX AND WINDOWS MARKETS.” (Sobiesiak, et al., 2002)
- “WE FOUND THAT THE PACKAGE OFFERS COMPANIES A COMPREHENSIVE, WELL-INTEGRATED HIGHLY PROGRAMMABLE DATABASE.” (Sobiesiak, et al., 2002)
USER RESEARCH SUCCESS STORIES (CONT.)

FOOD DISTRIBUTOR

In another user research success story, a global leader in marketing and distributing food products wanted a mobile solution to solve some of the issues they were facing. The company dealt with problems such as a slow conversion process of new customers, a lack of loyalty among existing customers, and a high turnover rate among the sales team. To tackle these challenges, the ChaiOne research team performed contextual inquiries with a carefully selected sample of the sales team and interviewed a random sample of existing customers, members of the executive board, and other key decision makers. From our research, we discovered various factors that contributed to the company’s challenges and noted down the following observations:

- The training and selection criteria of the sales team was inadequate.
- Customers were unaware of highly valued goods and services offered by the client. In addition, the majority of the sales team were not making customers more aware of these offerings, which slowed down the rate of customer conversions.
- Many improvements can be made in the customers’ day-to-day operations.
- Inefficiencies in order and payment processing and delivery heavily reduced customer satisfaction and loyalty.
- All technology used by the sales team was cumbersome and not easy-to-use.
- The sales team’s software was not usable and greatly contributed to inefficiencies in order and payment processing.
USER RESEARCH SUCCESS STORIES (CONT.)

With this research, we created a customer-facing app that helped increase awareness among new and existing customers by showcasing the client’s goods and services. The catalog, order, and payment processing features were integrated into a unified software solution. The app also encouraged customers to crowdsourced images that would populate the catalog, which increased customer retention. In order to track the results of the app, we tracked KPIs to validate the business transformation.

THE RESULTS WERE AS FOLLOWS:

- Reduced customer conversion from taking 90 visits to 10
- Warm leads increased by 60%
- Increased customer awareness of goods and services offered by client
- Customer satisfaction increased by 20%
- Usability of existing software increased by 90%
- More efficient end-to-end order process
Conclusion
CONCLUSION

As the user research success stories showed, user research and UCD can have a major impact on businesses. In-depth research with well-designed mobile solutions help businesses improve processes and produces technology that employees actually want to use. The earlier a company starts the research process in a project, the better the outcome will be. If there is one key takeaway from this eBook, remember this: DON’T HURT YOUR BUSINESS BY DEVELOPING ENTERPRISE SOFTWARE WITHOUT INPUT FROM USER RESEARCH.
REFERENCES


HAVE QUESTIONS ABOUT USER RESEARCH?

Our mobile experts and researchers are here to provide mobile strategy tips and guidance on user research to help your organization reach its business goals. **Sign up today for a free 30 minute consultation on improving your mobile strategy.**