Optimizing Usability Testing with Collaborative Method in an E-Commerce Ecosystem

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Abstract—Usability testing (UT) is one of the vital steps in the User-centred design (UCD) process when designing a product. In an e-commerce ecosystem, UT becomes primary as new products, features, and services are launched very frequently. And, there are losses attached to the company if an unusable and inefficient product is put out to market and is rejected by customers. This paper tries to answer why UT is important in the product life-cycle of an E-commerce ecosystem. Secondary user research was conducted to find out work patterns, development methods, type of stakeholders, and technology constraints, etc. of a typical E-commerce company. Qualitative user interviews were conducted with product managers and designers to find out the structure, project planning, product management method and role of the design team in a mid-level company. The paper tries to address the usual apprehensions of the company to inculcate UT within the team. As well, it stresses upon factors like monetary resources, lack of usability expert, narrow timelines, and lack of understanding of higher management as some primary reasons. Outsourcing UT to vendors is also very prevalent with mid-level e-commerce companies, but it has its own severe repercussions like very little team involvement, huge cost, misinterpretation of the findings, elongated timelines, and lack of empathy towards the customer, etc. The shortfalls of the unavailability of a UT process in place within the team and conducting UT through vendors are bad user experiences for customers while interacting with the product, badly designed products which are neither useful and nor utilitarian. As a result, companies see dipping conversions rates in apps and websites, huge bounce rates and increased uninstall rates. Thus, there was a need for a more lean UT system in place which could solve all these issues for the company. This paper highlights on optimizing the UT process with a collaborative method. The degree of optimization and structure of collaborative method is the highlight of this paper. Collaborative method of UT is one in which the centralised design team of the company takes for conducting and analysing the UT. The UT is usually a formative kind where designers take findings into account and uses in the ideation process. The success of collaborative method of UT is due to its ability to sync with the product management method employed by the company or team. The collaborative methods focus on engaging various teams (design, marketing, product, administration, IT, etc.) each with its own defined roles and responsibility in conducting a smooth UT with users In-house. The paper finally highlights the positive results of collaborative UT method after conducting more than 100 In-lab interviews with users across the different lines of businesses. Some of which are the improvement of interaction between stakeholders and the design team, empathy towards users, improved design iteration, better sanity check of design solutions, optimization of time and money, effective and efficient design solution. The future scope of collaborative UT is to make this method leaner, by reducing the number of days to complete the entire project starting from planning between teams to publishing the UT report.

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I. INTRODUCTION

INTRODUCING and practicing UT religiously in a product lifecycle is a tough task, especially for a mid-level company in any e-commerce enterprise. The reasons for not employing any form of UT in the product life-cycle are many.

To name a few:
1) Extra time and effort from designers, technology team, and product managers, etc.
2) Squeezing UT inside a narrow sprint timeline is difficult.
3) Availability of bandwidth of associated resources.
4) Pressure of shipping the product to the market to beat competition.
5) Dedicated usability experts for conducting and running the test.
6) Extra monetary implications on the company and department.
7) Lack of faith in UT results and lack of understanding of advantages of UT by higher management.
8) Improper UT lab infrastructure.

All these reasons mentioned above can prevent an enterprise in taking the first step towards any UT setup [4]. However, when the numbers crumble and conversions take a deep dive, these reasons does not seem unfathomable. During this code red situation product managers, product heads, design heads and other important stakeholders huddle and try to figure out possible reasons and solutions. While data analysis gives a blurry image of where the problem lies in the product or the system, it fails to answer why and how one can fix it. It becomes evident that to know the why part of the situation you need to reach out to your users/customers; that is, those users who interact with your product, avail your services and are unhappy users who are forfeiting your product at a certain step and never returning due to a critical or non-critical error of the product. The problem could be anything related to the service, usability, experience, navigation, information architecture (IA), content, aesthetics, user behaviour, etc.

The outcome of the huddle is to conduct some kind of validation, assessment, UT or evaluation of the existing product. The big decision that the primary stakeholders of the company have to make is whether to build infrastructure for UT in-house or to outsource.

Outsourcing UT to a reliable vendor comes with its own array of considerations, as listed below:
1) Finding an expert vendor in the field of user research, and

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UT is time consuming and difficult.

2) Huge cost.
3) Lengthy timelines.
4) Dependency on the vendor for insights and reporting.
5) Non-involvement of the design team with users' interactions with the product.
6) Minimal to much less collaboration within the team to understand users.
7) Difficulty in consuming elaborate and non-perceivable UT reports delivered by the vendor.
8) In practice, use of these reports by designers and product managers is very low.

Due to all these problems, employing a vendor for conducting a UT does not appear fruitful for the company. While for some companies, recruiting an appropriate vendor for the job is the only way out of the situation.

One of the vital steps in the UCD process is assessment. This step allows designers and design team to validate and find out what are problems with the design solution and move on to the iteration process before the big launch. When you ship a product to market without testing it, there is big chance it is going to fail with your users. This is because the solution is an outcome of the stakeholders and designers mental model; so, unless it is tested with actual unbiased users in an actual context it is difficult to determine the real problem and usability issues users might face while interacting with your product.

Assessment of the design solution gives validation of the design solution and whether it will work for your user or not; even if the solution works, it helps to understand how efficient, effective and satisfactory the solution is for the user. The type of assessment depends wholly on the type of product, enterprise, process, team structure, etc. Over a period of time, teams with any type of assessment method in place tend to succeeded in launching better products with lesser iterations, and also with better acceptance of their product from the user base.

A. A Typical Mid-Level Company in an E-Commerce Ecosystem

Reference [3] defined a well-established mid-level company in an e-commerce ecosystem as having the following features: a work force of 500-1000+, a user base of 1 million to 10+ million depending on the type of product, branch offices and retail stores in the country, as well as a well-defined leadership team, technology team, finance team, sales team, product managers, design team, support, marketing, and IT, etc. Most projects are identified and initiated by the product managers after analysing and studying data. The structure of the design team can be in one of these two forms: squads or centralised. In a squad structure, all designers are assigned and managed by the leads of the line of businesses. In a centralised structure, a group of designers work under a design head, and designers work on different line of business (LOB) with product managers. A typical design team consists of interaction designers, visual designers, design managers, design head and also hybrid designers. Hybrid designers are those resources who have both an interaction and visual design job profile. Most of the product based companies especially start-up companies try to hire hybrid designers and to extract work of all job profiles like researchers, user experience designer, visual designer and usability expert etc. In an ideal scenario, a typical design team consists of 10-30 designers, based on the size of the company, and consists of design researchers, interaction designers, visual designers, usability experts and content strategists.

B. Type of Product Management Methods

In order to ship new features and products to market according to a Sprint plan, the product management team selects a suitable project management method. A product management method is selected based on the team structure, type of project, goal, project timeline, etc. Some of the popular project management methods used by companies are Lean, Agile, Scrum, Kanban, Six Sigma, Waterfall, etc. After the project management method is in place, every team has to adhere to the process and timeline.

C. Role of Design Team

The role of the design team in a company depends on the value it brings to the company and product. Its value depends on the value the leadership team gives to the team. As mentioned previously, a design team can be in squads where designers act just as a support team to tech and development and under LOB leads. The other type is a centralised design team when the company is very design centric and values the role of the design team. Design centric does not mean the design team will act autonomously. The design deliverables are still very much aligned to the product management method employed by the company.

D. UCD Process of Design Team

UCD is a process employed by design teams all over the world, where a designer follows a step-by-step process to achieve desired goals. Over time, the nomenclature of the steps has changed but the core principle and identity have remained the same. In an ideal scenario, to create and ship a product to market, designers should follow each step of the UCD process, starting from research and analysis to assessment, religiously [2].

The success of the product depends on the how a design team approaches the problem, and how closely they are following the UCD process and how the team's design strategy is woven around it. But the real situation in an E-commerce ecosystem is far away and different from the theoretical approach of the process. Hence, an ideal situation of the UCD process may not exist in the current market scenario, and as such, steps might have to be omitted or reiterated, the process changed, and the timeline extended or shortened; all these to meet the competition and capture market. In this dynamic environment, it is difficult to follow a hard drawn process. The success and failure of the design team depends on the dynamicity of the team to adapt to the pragmatic changes of the ecosystem and formulate new methods and processes which still adhere to UCD processes.

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E. Project Planning and Scheduling in an Ecommerce Ecosystem

A product manager under the LOB head leads all new projects. The higher management set the goal for the quarter or year. The stages that a team passes through to build a product and launch it to the market are as below (not necessarily in the same chronological order or using the same jargon).
1) Data analytics reveals or identifies a problem area.
2) A project spec is created by the product manager around an identified problem.
3) Sprint timelines are planned and scheduled, post discussion with the project management team.
4) Product manager decides the MVP vs. Version 1 vs. Version 2, product structure.
5) Kick off meeting (Product managers, Designers, etc.).
6) Expectation set for the sprint for the design team.
7) Analysis of data and problem statement by designer
8) Design ideation (solution iteration).
9) Selection of ideas (best feasible idea within the timeline and technology capabilities).
10) Development phase.
11) Expose new changes in app or website to only 5% or 10% userbase, to observe changes in conversion and bounce rates.

F. Design Team Working

A project starts for the design team when it if flown down from the product manager or higher management. But the other way is that the design team initiates its own projects, which is aligned with the product manager and sprint cycle.
1) Objective gathering and problem identification via a kick-off meeting with the team.
2) Project spec and data analysis.
3) Defining scope and mapping expectations.
4) Ideation.
5) Team Analysis on first draft of ideation.
6) Refining the idea.
7) Idea/s finalization.
8) Team consensus on final product idea.
9) Handover of visuals and design specification to development team.

In this kind of working pattern, the space for UT is very narrow, and as such, most design teams avoid adding UT as one more step to the process which could extend project timelines. Therefore, there was a need for a method which could streamline and align all teams (design, tech, marketing, product etc.) and facilitate UT in the work culture.

II. COLLABORATIVE METHOD FOR CONDUCTING UT

Overview of the collaborative method of UT: Reference [5] introduced a collaborative method of UT in an e-commerce company, in which all the teams including design, product, marketing and administration, come together to conduct a lean, efficient and effective UT on the product (App, Website, PWA, mSite, etc.). The projects are normally in the form of testing the entire App or website, or one or many particular screens, widgets, or features to find usability issues. The UT is conducted pre- or post-launch of the product to market and sometimes done both the times to get the most efficient results. Normally, the UT is of a formative kind. The design team acts as the primary team and usually employs a usability expert to drive the entire project. The secondary team is the product team which sometimes defines the problem statement for the design team after data analysis and also lends data to the design team as and when required. The marketing team facilitates the usability expert with the quantity of participants as per the user profile requirements. The administration team of the company helps the usability expert with all the logistics. With the help of these teams, the usability expert conducts the in-house UT usually within 5-7 days. After completion of the in-house UT, the usability expert prepares an elaborate report and conducts a session with the design and product team to share insights from the testing. The teams identify the most critical issues at hand and identify P0 and P1 projects which could be aligned with the sprint cycle. The entire process of conducting UT is normally completed within five days, which otherwise might take 20-30 days from start to finish. Hence, optimizing it to a maximum level possible for a mid-level e-commerce company, and thus, saving time, money, and effort for the company from running expensive UT. Optimization is achieved and calculated in terms of the number of days to complete one project, the number of UT projects completed in a quarter, number of successful iterations done within a product or feature before launch, and the effectiveness and efficiency of the UT projects on conversions or reduction in call drivers.

A. UT Project Identification

Identification of a UT project can either be done by the design team or the product team. A product team identifies the need of a UT by analysis of user data of an existing product live for users. Analysis of data reveals the area of concern. But in order to find the reason for the aberration, UT must be conducted. The second type is where the design team identifies a need for reaching out to users to get an early insight about the idea. The third kind is where a usability expert evaluates the existing product and finds usability issues which are shared with product team and designer as expert review; and, a UT is mandated to validate the findings of the usability expert.

B. Definition of Usability

The definition of usability taken into consideration for the purpose of this study is from Schneiderman, Which talks about the speed of performance, time to learn, retention over time, rate of errors by users, and subjective satisfaction [1].

C. Types of UT (Formative vs. Summative)

Reference [1] shows there are two types of UT: summative and formative. The objective of summative UT is to describe the usability of the system using certain standard metrics, while for formative usability, it is testing is to find the usability issues and fix them. The latter is more appropriate for

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the collaborative method of UT, as usability issues found during testing are fixed by the product managers and designers. New design ideation sessions are carried out based on the usability report. This gives the team the opportunity to better the product and improve usability.

TABLE I
PROCESS OF COLLABORATIVE METHOD OF UT

Duration: 2-5 Days	Duration: 2 Days	Duration: 3 Days
Pre-UT	During UT	Post-UT
First kick-off meeting (Designers, Product Managers, Usability Expert) Objective, scope, timeline, Bandwidth, POC's, Work allocation. Usability expert shares the Statement of work (SOW) with the team. Designer shares filled SOW with the team. Project assignment presented to the marketing team to start recruitment. Project manager shares the user database for participant recruitment based on the user profile required. Marketing team reaches out to the vendor for participant recruitment. Shares the final UT dates. Designers share the prototype ready dates. Usability expert prepares the discussion guide (Moderator transcript). Usability expert evaluates the prototypes and shares the feedback with the designer. Designer prepares the final iterations on the prototypes.	Usability Lab setup: Testing Device. Video camera (only testing device screen and voice recorded). Zoom Set up (Captures screen). Moderator transcript. Usability expert interaction with the moderator. Project objective. Prototypes walkthrough. Moderator walkthrough. Entire project team observes in-depth interview over Zoom. Usability expert observes over Zoom. Usability expert collects the insights from the moderator after the interview.	Transcription of the interview videos. Preparation of UT report. Walkthrough to team. Archive report.

TABLE II
ROLES AND RESPONSIBILITY OF TEAMS

Team Name	Key Player	Responsibility	Role
Design Team	Usability Expert	Conducts the entire UT, Coordinates with different teams and stakeholders. Prepares UT report, Conducts insight session with team.	Primary
Product Team	Mid-high level manager	Problem identification within product, Data analysis, Data facilitation to UT expert.	Secondary
Marketing Team	Mid-Level manager	Recruitment of participants. Coordinates with vendors for moderators.	Facilitator
Administration Team	Low-Mid level resource	Lab infrastructure and logistics.	Facilitator

D. Comparative

In a collaborative method of UT, two types of comparatives are usual considered.
1) Within Subject: Same user, all products.
2) Between Subjects: Different users, one product.

E. Type of Interview

The most common type of testing conducted in a collaborative method is in-depth interviews, in which a session normally last from 30 minutes to an hour. A room with proper ventilation, lighting and seating is chosen by the administration team for the day of testing [2], [6].

F. Various Team Roles and Responsibilities

The four teams essentially required for conducting UT in a collaborative method are Design, Product, Marketing and Administration. Each team has its own roles and responsibilities based on the timeframe of the project. Each one plays its part in facilitating the requirements as expected and assigned. The roles and responsibilities of each of the four teams are explained in Table II.

G. UT Scheduling and Type of Prototype

A UT is normally scheduled either before or after the launch of the product, and sometimes at both times depending on the timelines. To run a UT, the teams involved need the prototypes which participants can view, feel and interact with. The user experience designer is responsible for preparing the prototypes for testing. The type of prototypes tested affect the insights gained from the user and usability issues identified. The shape of a prototype can be anything from a simple paper mock up to an actual test build. Depending on how closely it mocks the actual product in the context of use for a user, a degree of actuality (0= not close at all, 4= very close) is assigned to the prototype.

H. Type of Participants

Participants are the primary requirement for any UT. As well, it is very important to find the correct user profile for the test. The user profile should adequately match the requirements set by the usability expert such as expertise around similar products, digital literacy, and type of user depending on buying capacity, etc. The user profile required for testing is decided depending upon the product, LOB, feature, or widget which needs to be tested. The type of participant recruited for the UT depends on the time available in a Sprint cycle before the product launch and the availability of the participant around the stipulated time.

I. UT Document Formats

Each stage of the UT requires certain format of documents to understand the process and archive it for future reference. The format of documents helps in achieving standardization and better understanding of the entire process.

J. Dependencies

Since the collaborative method of UT is a team effort, the dependencies between the teams involved is very high. As a result, there is always the increased possibility of a lack of coordination. A lack of coordination and miscommunication

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can affect the whole layout, which drastically impacts upon the timelines of the project.

TABLE III
TEST SCHEDULING AND TYPE OF PROTOTYPE

Stage of product	Type of prototype	Description	Degree of Actuality	Benefits	Drawbacks
Pre-launch	Paper	Pencil or pen drawings of wireframes, depicting idea and navigation.	0	Very Quick	Biased opinion, Too much hand holding by moderator, Total dependency on participant imagination.
	Concept sketches	Text, images, drawing to put forward idea in front of users to get a 'Go' or 'No' go kind of response.	0	Very Quick	Biased opinion, Assistance required by user. Total dependency on participant imagination.
	Wireframes	Greyscale version of app or website structure and navigation.	1	Navigation and functionality of the system is depicted. Useful for identifying user mental models	Unreliable results. Assistance required by user to understand system. Lack of usability issues regarding aesthetics.
	Low fidelity visual prototypes	A minimum interactive prototype with some amount of aesthetics assigned to the ideas. Dormant replica of actual system.	2	Navigation and functionality of the system is depicted. Useful for identifying user mental models.	User needs assistance from moderator around certain areas.
	High fidelity visual prototypes	A close replica of the system prepared by using a high-end prototyping tool.	3	Close to actual product. User interactivity can be tested, Much less hand assistance required.	Time consuming. A huge combined is effort put in by UX designers and visual designer together to build the prototype.
	Test build	A developed app/website which is prepared for the QA, this is very close to an actual app or website	4	All interactions and navigation possible, much less to no requirement of assistance to understand system.	Content might be confusing for participant. Time consuming.
Post Launch	Live App/Website	App/Website/PWA, mSite which is launched by a company to market.	4	Every navigation and interaction can be tested. Actual context of use can be tested.	Time consuming.

TABLE IV
TYPE OF PARTICIPANTS

Stage of product	Type of Participants	Description	Benefits	Drawbacks
Pre-launch	Hallway participants	Colleagues who wish to participate in UT. Normally non-designer, non-product and non-tech team members are preferred.	Easy to find. Quick to conduct	Biased opinion. Seriousness regarding the testing is low. User profile match is negligible.
	Rolling stone	Friends of friends, colleagues who can be found while conducting the UT.	Quick to conduct	Biased opinion. Seriousness regarding the testing is low. User profile match is negligible.
	User-based	Actual user list prepared from the database.	Matching user profile or sample, Unbiased insights, legitimate testing is possible.	Difficult to find participant sample.
Post-Launch	User-based	Actual user list prepared from the database.	Matching user profile or sample, Unbiased insights, legitimate testing is possible.	Difficult to find participant sample.

Team dependencies at various stages are as follows:
1) Pre-UT: Marketing team, Designers, Product Managers.
2) During UT: Moderator, Administration, IT.
3) Post-UT: Designer and Product Managers.

K. Advantages of the Collaborative Method of UT
1) Time and cost effective.
2) Works in synergy with the company's project management method.
3) Team involvement is high.
4) Effective and efficient.
5) Better ideation by designer.
6) Conversions are high due to launch of useful, usable and utilitarian product into the market.
7) Better planning and scheduling of Sprint plans.
8) Improved communication between various teams within an organization.
9) Empathy by designers and product managers towards the product user.
10) Better conversion in revenue due to improved product launches into the market.

L. Secondary Advantages
1) Due to the format of in-depth interviews, designers and product manager get a first-hand narration of various user journeys, customer stories, problem areas, real encountered scenarios from the user. In the long run, this format helps in the development of new ideas and

features.
2) Over a period of time design team and product team get to

have a closer look at the user persona.

TABLE V
TYPE OF DOCUMENT REQUIREMENT

Name of document	Prepared by	Description
SOW (Statement of work)	Usability Expert	A document which captures the objective of the study, key scenarios, use cases, methodology, tasks, etc. It is prepared by the usability expert and completed by the user experience designer
User database (xls.)	Product Manager	A document which has user data information such as name, contact number and email. This document is prepared by the product team and shared with marketing. The marketing team share this document with the vendor to recruit participants for the UT.
Prototypes low to high/live app	User experience designer/Interaction Designer	Mock ups/prototypes are prepared by the user experience designer or interaction designer using a prototyping tool (InVision, Craft, Principle, Framer etc.). This is evaluated by the usability expert.
Moderator transcript/discussion guide	Usability Expert	This document is prepared by the usability expert and captures all the tasks, scenarios and conversations the script moderator can use while interacting with a participant [6].
In-Depth interview transcription doc	Usability Expert	This document is created by the usability expert after viewing the in-depth interview videos and contains all the important tasks, gestures, and insights shared by all participants, as narrated by a user.
Usability test report.	Usability Expert	This is the final document prepared by the usability expert, which provides the concluding insights from users and all the usability issues found during the UT. The document is colour coded identifying various types of errors and recommendations from the usability expert to improve product.

III. CONCLUSION

Collaborative method of UT is an efficient way of conducting UT in a mid-level to low -level E-commerce enterprise. As observed from the 150 odd UT's conducted using the method, this an efficient form of UT method which saves time, effort and money of the enterprise by aligning all important teams to the sprint plan. This method as observed this method very clearly adapts the vital assessment step of UCD method in the product lifecycle. The documentation helps team refer to UT report and plan to changes according to the sprint plan and collaboration with the design team. Collaborative method could be the next step adapted by enterprises was assessment step is omitted due to lack of infrastructure, money, and fear of effort.

REFERENCES

[1] Ahmed Seffah, Mohammad Donyaee, Rex B. Kline, Harkirat K. Padda, Usability measurement and metrics: A consolidated model.
[2] "Quantifying the User Experience, Practical statistics for User Research)," Jeff Sauro and James R. Lewis. Published by Elsevie, 225 Wyman Street, Waltham, MA 02451, USA.
[3] The Product Manager and the Product Development Process, Martin Cagan, Silicon Valley Product Group.
[4] Re-Assessing the Usability Metric for User Experience (UMUX) Scale, Mehmet Ilker Berkman, Dilek Karahoca, Vol. 11, Issue 3, May 2016 pp. 89–109.
[5] Usability Testing: Developing Useful and Usable Products, Students in the Master of Technical and Scientific Communication Program, Miami University of Ohio October 2002 Edited: October 2004.
[6] Evaluation of Procedures for Adjusting Problem-Discovery Rates Estimated From Small Samples, James R. Lewis, International Journal Of Human–Computer Interaction, 13(4), 445–479 Copyright © 2001, Lawrence Erlbaum Associates, Inc.