# Design Approaches to Enhance Usability for E-Commerce Sites

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**Abstract**

Human computer interaction has a great collaboration with World Wide Web. The fastest growing web technology and interaction issues are compelling web designers to think for quality and user friendly designs in the web. Websites are expected to be designed in a way which will allure the visitors who are looking for particular information. E-commerce sites are one of the fastest growing sites where consumers or users shop things without any burden of being physically present at the shop and receive products at home. We are proposing novel design approaches which will ameliorate the interaction styles and will help the users to access information and do shopping efficiently.

***Keywords:*** *Ethnography; Usability; Problem Space; Design Implication; Prototypes; Evaluations.*

## 1. Introduction

E-commerce site [1] is defined as any Web Site offering pre-sale support, products for sale or after sales service and backup. The discerning thing is that the consumers don't have to be physically present at the store rather they can buy anything online by credit card. But there is still lack of a good number of sites where customers are happy with service and support. As the world is facing a huge change in perspective of information technology so this aspect should also be considered. So we need more and more good number of websites where all types of feasible services and user friendly interaction will be present to make customers interested and make their life comfortable with so many privileges.

We are proposing an optimized design for a Mobile Phone Accessories e-commerce websites which will ensure the customer interaction with no complexity and access to the information will be much easier than any other sites present in the web now-a-days. Initially we focus on identifying user needs, understanding the problem space, social context, environment, describing tasks, and user and design implications. We have got some requirements using web survey and ethnography for our mobile phone accessories e-commerce site and we constructed low fidelity prototypes using sketching. As design issues are related with our project so it is better to use sketching for prototyping.

Finally we used evaluation techniques to evaluate the implemented design of the website for mobile phone accessories and according to our survey through Google docs we found our design is more efficient and user friendly. Subsequent parts contain the background study, proposed methodology, exemplary design, conclusion and references.

## 2. Background Study

### 2.1 Identifying User Needs & Establishing Requirements

First, For a Mobile phone accessories website a particular consumer will basically look for the following things

- Products and its classification
- Price
- Condition: HD Photo & Streaming Video
- Transactions
- Money back guarantee

Figure 1. From a large pool of products the customer should be able to find out the stipulated product and its type momentarily. Relevant information like prices, conditions, transactions and terms & conditions will have to be discerned very meticulously. According to these needs we have to ensure the website design. And most importantly the information access is the key issues to be considered. Here ethnography is used to find out the regular interactions and those will be analyzed to enhance the understanding of user needs.

The first issue [2] in problem space is what we want to create and the answer is pretty simple. We want to develop an e-commerce site for mobile phone accessories which will eradicate the existing problems and will enhance user interaction style.

The second issue [2] is assumptions. According to the user needs and requirements we assume that current e-commerce sites are way too complex for the ordinary non-tech users but it is expected to develop a site which can be used by all. More importantly we are considering the transaction system is still too complex and requires many procedures to complete the total process. And the visibility issues are still not handled carefully due to bad design in some places. The third issue [2] is claims. We are claiming that we are going to implement a novel approach which will focus more on the complexities. Basically the complexity arises in case of such sites when the customer finds difficulty to understand the actual condition of a product and transaction procedures. We are going to implement such design which will eradicate all these. The final issue [2] in problem space is whether our approach is going to be successful or not. We have studied the design of various e-commerce sites which will help us to understand the existing lacking and to develop far better sites than that and to burgeon the superb usability engineering, experience etc.

The main task of this site will be to meet the customers need. As it is an e-commerce site and the site deals with mobile phone accessories, the main task will be serving the customers with state-of-the-art accessories as well as normal accessories.

Now, we need to define the users of this site. This site will be a marketplace of mobile phone accessories for all types of people. A person who wants to buy a brand new iPhone4 and the person who wants to buy the simple micromaxX210; both are the user of this site. Also, people who run this site and administer all type of transactions and inclusion of all the products are also termed as the users. It is a website and like all other websites, its environment will be the World Wide Web (www). It will use the power of www to gather the general users. This site has a long range of customers. From a high end user to a low end user, this site will meet all their expectations. So, this site will cover all the possible customer classification and will be helpful for all the people. Also, this site will use the positive power of social networking for its marketing; it will help the internet aware people to know about the site.

## 2.2 Prototyping

Prototypes [5] are a useful aid when discussing ideas with stakeholders; they are a communication device among team members, and are an effective way to test out ideas for you. The activities of building prototypes encourage reflection in design, as described by Schon (1983) and as recognized by designers from many disciplines as an important aspect of the design process. Liddle (1996), talking about software design, recommends that prototyping should always precede any writing of code. Prototypes answer questions and support designers in choosing between alternatives. Hence, they serve a variety of purposes: for example, to test out the technical feasibility of an idea, to clarify some vague requirements, to do some user testing and evaluation, or to check that a certain design direction is compatible with the rest of the system development. Which of these is your purpose will influence the kind of prototype you build. So, for example, if you are trying to clarify how users might perform a set of tasks and whether your proposed device would support them in this, you might produce a paper-based mockup.

**Different kinds of prototypes**

**ii. Low fidelity**

**A** low-fidelity prototype is one that does not look very much like the final product. For example, it uses materials that are very different from the intended final version, such as paper and cardboard rather than electronic screens and metal. The lump of wood used to prototype the Palm Pilot described above is a low-fidelity prototype, as is the cardboard-box laser printer.

**ii. High fidelity**

High-fidelity prototyping uses materials that you would expect to be in the final product and produces a prototype that looks much more like the final thing. For example, a prototype of a software system developed in Visual Basic is higher fidelity than a paper-based mockup; a molded

piece of plastic with a dummy keyboard is a higher-fidelity prototype of the PalmPilot than the lump of wood.

**Prototype Construction**

When the design has been around the iteration cycle enough times to feel confident that it fits requirements, everything that has been learned through the iterated steps of prototyping and evaluation [6] must be integrated to produce the final product. Although prototypes will have undergone extensive user evaluation, they will not necessarily have been subjected to rigorous quality testing for other characteristics such as robustness and error-free operation. Constructing a product to be used by thousands or millions of people running on various platforms and under a wide range of circumstances requires a different testing regime than producing a quick prototype to answer specific questions.

## 2.2 Evaluation Approaches

Using evaluation, designers make sure that their software is usable and is what users want. Evaluation [6] is the process of systematically collecting data that informs us about what it is like for a particular user or group of users to use a product for a particular task in a certain type of environment. The basic premise of user-centered design is that users' needs are taken into account throughout design and development. This is achieved by evaluating the design at various stages as it develops and by amending it to suit user's needs. The design, therefore, progresses in iterative cycles of design evaluate redesign.

Iterative design & evaluation is a continuous process that examines:

- Why: to check those users can use the product and that they like it.
- What: Conceptual model, early prototypes of a new system and later, more complete prototypes.
- Where: in natural and laboratory settings.
- When: throughout design; finished products can be evaluated to collect information to inform new products.

Designers need to check that they understand users' requirements.

**Evaluation approaches**

- Usability testing
- Field studies
- Analytical evaluation

**Usability testing**

Usability testing [5] involves measuring typical users' performance on carefully prepared tasks that are typical of those for which the system was designed. Users' performance is generally measured in terms of number of errors and time to complete the task. As the users perform these tasks, they are watched and recorded on video and by logging their interactions with software. This observational data is used to calculate performance times, identify errors, and help explain why the users did what they did. User satisfaction questionnaires and interviews are also used to elicit users' opinions.

**Field studies**

The distinguishing feature of field studies [6] is that they are done in natural settings with the aim of increasing understanding about what users do naturally and how technology impacts them. In product design, field studies can be used to

- help identify opportunities for new technology;
- determine requirements for design;
- facilitate the introduction of technology; and
- evaluate technology

**Analytical evaluations**

In analytical evaluations [5] experts apply their knowledge of typical users, often guided by heuristics, to predict usability problems. The key feature of analytical evaluation is that users need not be present, which makes the process quick, relatively inexpensive, and thus attractive to companies; but it has limitations.

**Usability Inspections**

There are several kinds of usability inspections [6]. Experts use their knowledge of users & technology to review software usability. Expert critiques can be formal or informal reports. Heuristic evaluation is a review guided by a set of heuristics. Walkthroughs involve stepping through a pre-planned scenario noting potential problems.

**Heuristic evaluation**

Developed Jacob Nielsen in the early 1990s. Based on heuristics [5] distilled from an empirical analysis of 249

usability problems. These heuristics have been revised for current technology. Heuristics being developed for mobile devices, wearable's, virtual worlds, etc. Design guidelines form a basis for developing heuristics. 3 stages for doing heuristic evaluation:

- Briefing session to tell experts what to do.
- Evaluation period of 1-2 hours in which:
  - Each expert works separately;
  - Take one pass to get a feel for the product;
  - Take a second pass to focus on specific features.
- Debriefing session in which experts work together to prioritize problems.

**Cognitive walkthroughs**

Focus on ease of learning. Designer presents an aspect of the design & usage scenarios [7]. Expert is told the assumptions about user population, context of use, task details. One of more experts walks through the design prototype with the scenario. Experts are guided by 3 questions. These are:

1. Will the correct action be sufficiently evident to the user?
2. Will the user notice that the correct action is available?
3. Will the user associate and interpret the response from the action correctly?

## 3. Proposed Methodology

### 3.1 Rational Description for selecting low fidelity prototype

Web design is to be done efficiently so that visitors can access information easily and interact with the website very easily. So to make that happen designer has to go through so many alternative designs. The more alternatives we make we have to keep in mind that we have to think about our financial support and time according to user requirement. That's why we decided to use low fidelity prototype.

### 3.2 Usabity Testing

From our study, we have tested the approaches which suit the common users. Typical users don't want some heavy, colorful, difficult to understand design. As we have mentioned earlier, our design has the clear and easily understandable abstraction for the typical user class. From the survey results, our users give positive results about our proposed design. The survey enables the users to express their valuable opinions and that opinion shows that, from other e-commerce sites, our site has more points about usability. This observational data is then used to determine performance of the design. We have found that the design has some simple errors like small scroll bar etc. But obtained data from the survey gives us the answers from users. With the help of these answers we can differentiate the basic and advance user needs. Basic user needs are already implemented in the design because most of the users are classified as basic users. If we can satisfy the need of most of the users, we can then concentrate on the advance users. Our simple design elaborates the user's expectation for e-commerce websites and related the usability [5, 6] part of the site. Our design consists of the goal which is termed as easily understandable design. Users can view the necessary information and product condition in the most possible easiest way from this design. Users can get the contract information as well as terms of service and unlike other sites, users find the terms of services in an easily findable location. This option made our design unique from the other designs.

## 4. Design

Here in this section we are presenting some exemplary design of e-commerce sites. Our proposed approaches are perfect for achieving usability goals and with better user experience than other state-of-the-art e-commerce sites [8]. Some screen shots of our designed e-commerce site for mobile phone accessories are shown below:

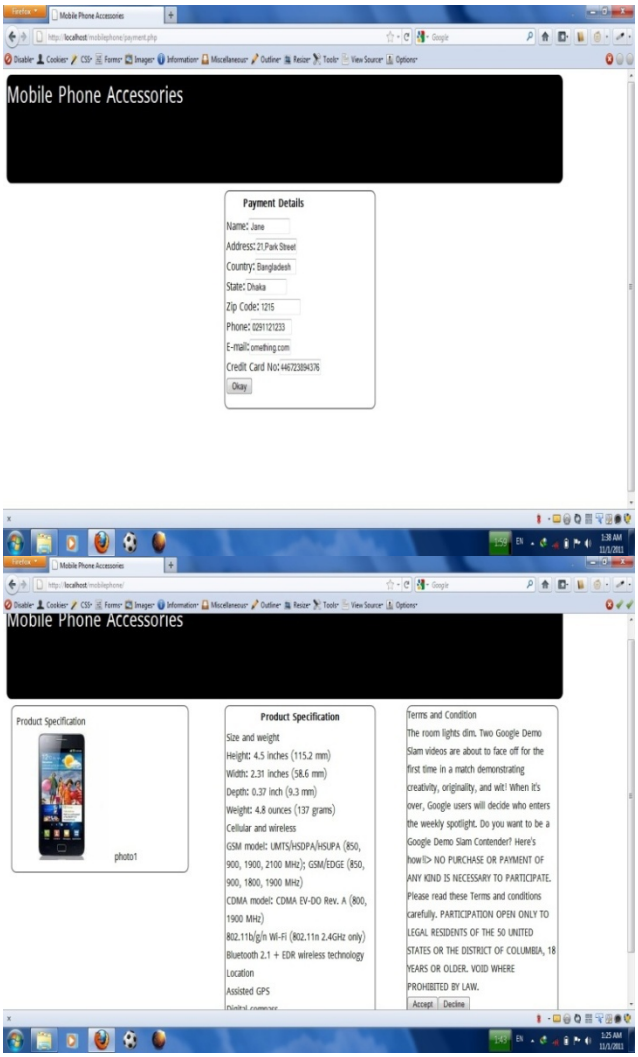


Fig: Two screenshots of our designed approaches

## 5. Conclusion & Future Works

We have discussed the prototype we used for designing and developing an e-commerce site for mobile phone accessories. And the necessary data and information is elucidated in the corresponding sections. Throughout our work we have tried to emphasis on the interaction issues corresponding to electronic commerce sites. And finally we have utilized the knowledge on various perspectives in HCI to accomplish our goal to ease the usage of e-commerce sites. Our future plan is to work thoroughly with this particular issue and with performance evaluation of our proposed design with the state-of-the-art designs and to help novice users to accomplish the task of online transactions smoothly without any vulnerability of phishing and other malicious disorders.

## References

[1] http://www.networksolutions.com/education/what-is-ecommerce/

[2] Bridging the Web Accessibility Divide. IV Ramakrishnan, J Mahmud, Y Borodin, M A Islam, F Ahmed, Electronic Notes in Theoretical Computer Science, Elsevier, 2009.

[3] http://en.wikipedia.org/wiki/Ethnography

[4] Accessibility challenges and tool features: an IBM Web developer perspective. Shari Trewin, Brian Cragun, Cal Swart, Jonathan Brezin, John Richards, W4A '10: Proceedings of the 2010 International Cross Disciplinary Conference on Web Accessibility (W4A), ACM.

[5] Interaction Design-beyond Human Computer Interaction, by Yvonne Rogers, Helen Sharp, Jenny Preece, Wiley, 2nd edition, 2007.

[6] Human-Computer Interaction, by Alan Dix, Janet Finlay, Gregory Abowd, and Russell Beale. Prentice Hall, 2004.

[7] Improving Accessibility of Transaction-centric Web Objects.. M A Islam, F Ahmed, Y Borodin, J Mahmud, I. V. Ramakrishnan, SIAM International Conference on Data Mining (SDM), 2010.

[8] http://www.usabilityinstitute.com/resources/stateOfTheArt.htm

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