



## **Usability Testing:** The Matrix Approach for wider test coverage

## What is Usability?

Usability is the ease of use and learn ability of an object where the object of use can be a software application, website, book, tool, machine, process, or anything a human interacts with. Usability includes methods of measuring the same and the study of the principles behind an object's perceived efficiency or elegance.

Usability is what makes an application or a website work, more specifically; it's the degree to which a website or software program helps users do what they want to do. Whether they intend to make a specific purchase, find a specific piece of information or simply browse, or execute a function.

Usability testing is a black-box testing technique. The aim is to observe people using the product to discover errors and areas of improvement. Usability testing generally involves measuring how well test subjects respond in following areas: efficiency, accuracy, recall, emotional response, ease of learning, and subjective satisfaction etc.

- Performance -- How much time, and how many steps, are required for people to complete basic tasks. (For example, to find something to buy, create a new account, and order the item)
- Accuracy -- How many mistakes did people make? (And were they fatal or recoverable with the right information?)
- Recall -- How much does the person remember afterwards or after periods of non-use?
- Emotional response -- How does the person feel about the tasks completed? Is the person confident, stressed? Would the user recommend this system to a friend?
- Ease of learning: the interface needs to allow users who have never seen it before to learn to use it quickly to succeed in accomplishing basic tasks
- Efficiency of use: the interface needs to be designed to allow rapid accomplishment of tasks for more experienced users
- Subjective satisfaction: the experience of using a web interface should be a pleasant one

Though usability is critical to the success of any interactive design, it's consistently the most frequently overlooked and undervalued aspect of design, possibly because usability problems are frequently invisible to the untrained eye.

## Why is Usability Important?

Usability testing is the only way of ensuring a usable interface, using known usability design principles will reduce the likelihood of usability problems ensuring a better ROI, higher customer retention, reduced development costs etc.

This sums up to a better perception and experience of the company's brand and credibility and adds to higher results in:

- Store visits
- Receiving media-based marketing messages
- Support and telemarketing calls
- Product use
- Website visits

Many companies spend millions of dollars on marketing media, attempting to "communicate" their brand. Customers increasingly base their brand perceptions on their interactions with a company, and how those interactions live up to the marketing promises the company makes. In short, a multimillion-dollar ad campaign can be instantly sabotaged by a dinnertime telemarketing call or a dissatisfying web site visit.

Poor usability carries damaging consequences, regardless of the type of application being designed:

Type of Application	Consequences of poor usability
Informational web site	Unsatisfactory interaction and subsequent damage to the brand
Intranet or software application	Reduced productivity, creating a steady flow of lost resources
E-commerce web site	Aborted transactions, abandoned shopping carts, low conversion rates (browse-to-buy ratios)

### Parameters to measure the usability:

To successfully test for the usability of web applications, usability testing team need to define the parameters that plays key role in defining the success of usability. The following are list of few parameters that define usability.

- A-Accuracy
- M-Memorably
- N-Navigation
- E-Error rate
- L-Learning
- S-Satisfaction
- ER-Emotional response
- TOT-Time on Task
- P-Performance

### Matrix Design construction process:

Based on the **usability goals** matrix with different set of parameters will be defined. A matrix will be construed and constructed as follows:

- A matrix is a rectangle of parameters.
- Matrix can be of different types which are detailed below:
  - Vector matrix –with only one usability parameter-more frequently used for small websites.

$$\text{ex: [A L M] or } \begin{pmatrix} A & P \\ L & S \end{pmatrix}$$

- Prepare matrix with the required usability parameters

$$\text{Ex: [A] } \begin{pmatrix} A & N \\ L & TOT \end{pmatrix} \begin{pmatrix} A & M & E \\ S & & LE \end{pmatrix}$$

While preparing the matrix parameters both the customer and the user will be considered.

Customer Driven parameters	Customer matrix	User driven parameters	User Matrix	Final Matrix
<p>The usability parameters will be defined as requirements during usability study.</p> <p>All these parameters will be part of the customer matrix.</p>	$\begin{pmatrix} A & P & S \\ L & T & O & T & E \end{pmatrix}$	<p>Users here are referred to as customers, end users, or usability testers.</p> <p>Users will be requested to provide their own set of parameters as usability goals.</p> <p>This will define user matrix</p>	$\begin{pmatrix} A & P & L \\ N & E & R & M \end{pmatrix}$	<p>Final matrix will be designed based on the common matrix attributes between customer and user matrix along with the left over attributes from the customer matrix.</p> <p>More weight age will be given to the common attributes</p>

- Design Weightage scale based on the requirements belonging to the particular usability goal/parameter. This scale will be ranging from 0-10.
  - Where 0 Indicates non-requirement for usability testing
  - 1-5 indicates, medium parameters
  - 6-10 indicates High parameters
- Attach weightage to the parameters defined in the matrix that is constructed as above. For example:

$$\begin{pmatrix} A & L \\ M & N \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 2 & 1 \end{pmatrix}$$

### Matrix Design implementation process:

After deriving matrix based on usability goals and attaching weightage to the parameters based on the usability requirements, matrix design is completed. This matrix design method is effectively used for wide coverage of usability testing.

Implementation process:

If there are four parameters then the matrix will be 2\*2, similarly based on the number of parameters and the weightage to particular parameter matrix will be designed.

Few samples: Ex 1:

$$\begin{pmatrix} A & L \\ M & N \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 2A & 3L \\ 2M & N \end{pmatrix}$$

Ex 2

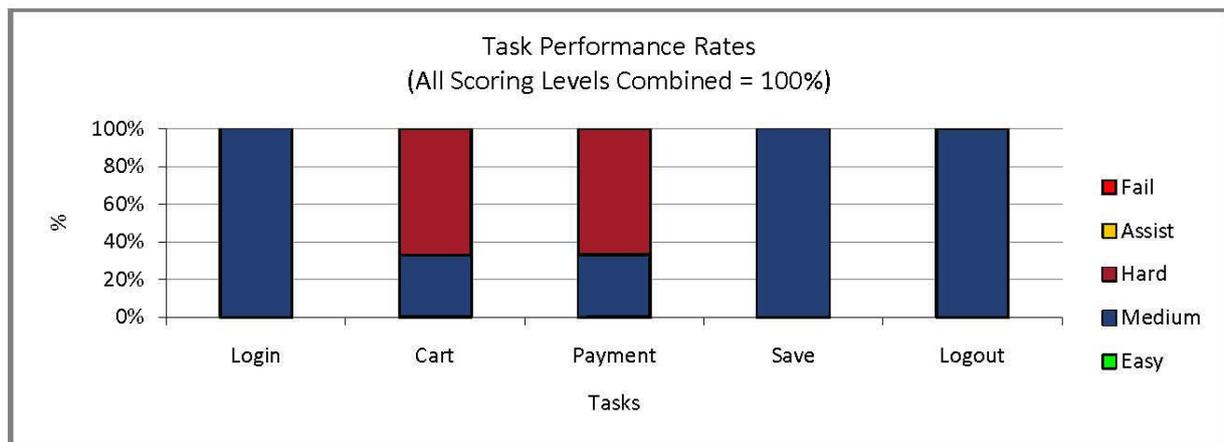
$$\begin{pmatrix} A & L \\ M & P \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 0 & L \\ 2M & P \end{pmatrix}$$

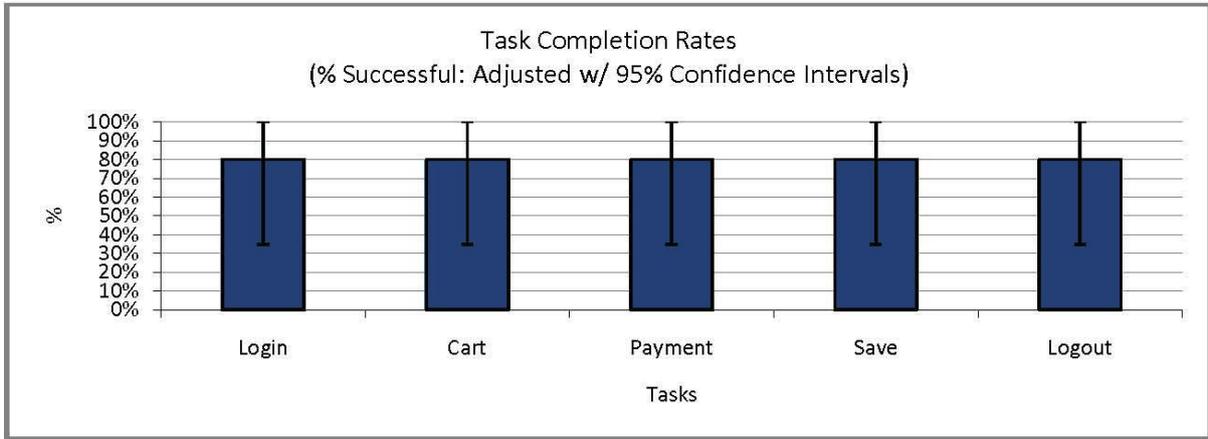
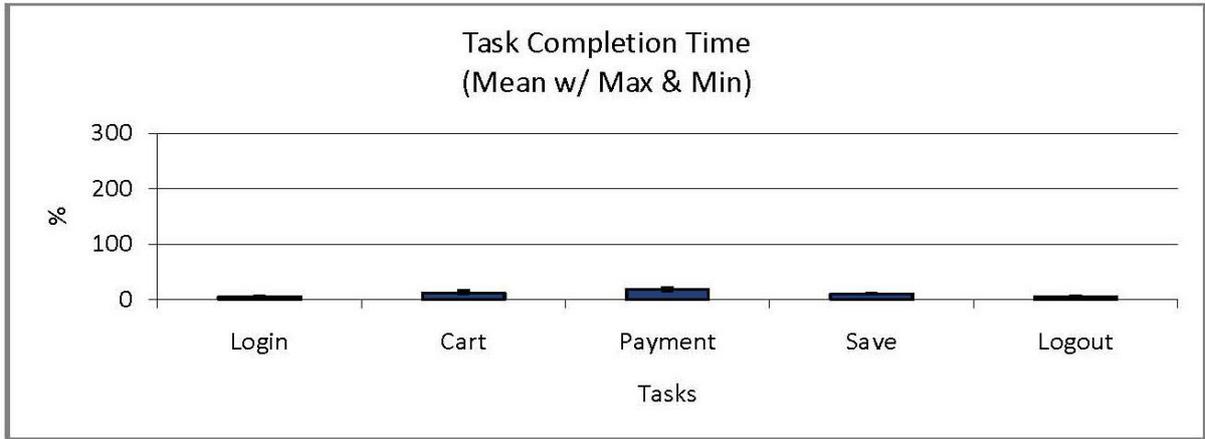
### Matrix Design Benefits:

- Parameter wise coverage
- Requirements will be given weight age based on the usability goals, which in turn will be attached to the Matrix design
- Matrix design will help in reduction of usability testing effort
- Matrix design allows you to specify what to test for specifically vis a vis what your end users might look for
- Provides maximum coverage of tests for maximum possible parameters of a product /web site
- Advantage of having strength & weakness analysis for any product /service
- Identification of core area of strengths and concern by implementing matrix design method
- Better than the traditional testing methods such as heuristic evaluation, walkthroughs, user testing etc.
- Shorter test cycle and quicker go to market of the product /service
- Higher tangibility of the parameters and the overall testing process
- Matrix design method is dynamic in nature, so it will address dynamic changes in the requirements and multiple releases across product/project life cycle without any re-work

### Matrix Design Results:

#### Sample Chart for Task Performance:





**Conclusion:**

Of the many methods available for Usability testing such as heuristic evaluation , walkthroughs, user testing etc. it is our conclusion that the Matrix methodology offers the maximum flexibility of choosing areas of focus to test more efficiently both from the end user as well as the customer’s perspective, thus providing greater depth and higher penetration of testing .

## About 3i Infotech

3i Infotech ([www.3i-infotech.com](http://www.3i-infotech.com)) provides software products and IT services for the Banking, Financial Services & Insurance (BFSI); Manufacturing, Retail & Distribution; and Government verticals. The Company's quality certifications include ISO 9001:2008 for BPO, ISO/IEC 27001:2005 for Data Center Operations and ISO/IEC 20000-1:2005 for Data Center Management Services. The Company has embarked on re-appraisal under SEI CMMI ML 5 for some of its software development Centers in India.

By using its domain knowledge and through continuous investment in technologies, 3i Infotech enables corporations transform their businesses through its expertise in enterprise-class software solutions, software services including Testing Services, information security consulting, system integration services, IT infrastructure and Disaster Recovery solutions.

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