



## Understanding: User Experience Design

User experience (UX) is a term used to describe the overall experience and satisfaction a user has when using a product or system. <sup>1</sup> This document lists the benefits of UX design, provides an overview of the ERCOT UX design process and includes examples of UX deliverables.

### Return on Investment

Usability increases user satisfaction and productivity. Over time it results in cost savings in development. Allowing time in the design cycle for iterations and testing save huge costs, compared to making those changes after the system has been developed. Specifically, usability returns these benefits, both internally and externally:

#### External ROI

- Increased user productivity
- Decreased user errors
- Decreased training costs
- Decreased user support
- Increased trust in systems
- Increased user satisfaction

#### Internal ROI

- Savings gained from making changes earlier in the design life cycle
- Savings gained from lower redesign costs
- Decreased development costs and time
- Reduced maintenance costs

### The User Experience Design Process

The UX design process maps to the Rational Unified Process (RUP) used by ERCOT for its development methodology. The UX life cycle begins with analyzing business requirements and continues through post-production evaluation.

#### 1 ANALYSIS

**Objective: Understand users, goals, decisions, tasks, and environment**

The overall business requirements go hand-in-hand with user needs. User research, workplace observation, artifact gathering and structured interviews are tools used to define user needs. While the business requirements define what the system does, the user needs provide further insight into how users prefer to perform their tasks. Deliverables for this phase include:

#### User Descriptions

User descriptions identify primary user groups and define their role, characteristics and capabilities. For example, “Does the user use the system once a month or eight hours a day?” and “Is knowledge of SQL required to perform a query on the system?” are typical questions.

<sup>1</sup> User experience design. (2007, July 21). In Wikipedia, The Free Encyclopedia. Retrieved 21:29, August 13, 2007, from [http://en.wikipedia.org/w/index.php?title=User\\_experience\\_design&oldid=146032630](http://en.wikipedia.org/w/index.php?title=User_experience_design&oldid=146032630)

<sup>2</sup> Glib, Tom (1988) Principles of Software Engineering Management. Wokingham, England: Addison-Wesley

#### 3 DEVELOPMENT

**Objective: Identify improvements to user performance such as improving the time it takes to do a task and eliminating unforeseen errors.**

#### Usability Test

Once development begins, usability tests evaluate actual screens and code in development with users. The scope of the evaluation broadens to cover the job instead of a task by task perspective.

#### 4 PRODUCTION

**Objective: Ensure user interface meet the requirements.**

#### Usability Test

Usability testing now moves to evaluating the production level code after the users have had an opportunity to use the product for several weeks. Measurements are made to determine if the requirements have been met.

#### Prioritization of Nodal Projects

To prioritize the UX work, the ERCOT UX team evaluated nodal systems based on total number of users, percentage of market participant users and criticality of the system. Based on that criteria, the team organized the systems into three tiers. This guides the UX team in allocating time and resources to each project.

##### Tier 1 Projects

Energy Management System  
Market Management System  
Market Information System

##### Tier 2 Projects

Network Model Management System  
Outage Scheduler  
Congestion Revenue Rights  
Settlements and Billing: Statements and Invoices

##### Tier 3 Projects

Credit Monitoring Management  
Financial Transfer  
Registration

#### User Interface Subgroup

To ensure market participants have the opportunity to participate in the UX design process, ERCOT formed the User Interface Subgroup. The subgroup is open to any market participant interested in providing feedback, participating in usability testing, and sharing ideas that improve user experience.

This subgroup originated as the MIS Subgroup and was limited to the Market Information System project. It has recently been expanded to include all nodal projects that have a market-facing user interface.

The subgroup meets on an as-needed basis. Announcements of meetings are published in the following places:

- ERCOT.com calendar
- What’s New calendar in the Readiness Center on the nodal website
- Texas Nodal Newsletter
- Nodal Market Notices (sent to Nodal Market Readiness subscribers)

*Note: The exploder list [missubgroup@lists.ercot.com](mailto:missubgroup@lists.ercot.com) will be renamed to [uisubgroup@lists.ercot.com](mailto:uisubgroup@lists.ercot.com). Subscribers to the missubgroup list will be transferred to the new list.*

#### Still have questions?

If you have questions, suggestions or feedback, you can contact the Texas Nodal team at this address:

[TexasNodal@ercot.com](mailto:TexasNodal@ercot.com)

We will respond to all questions.

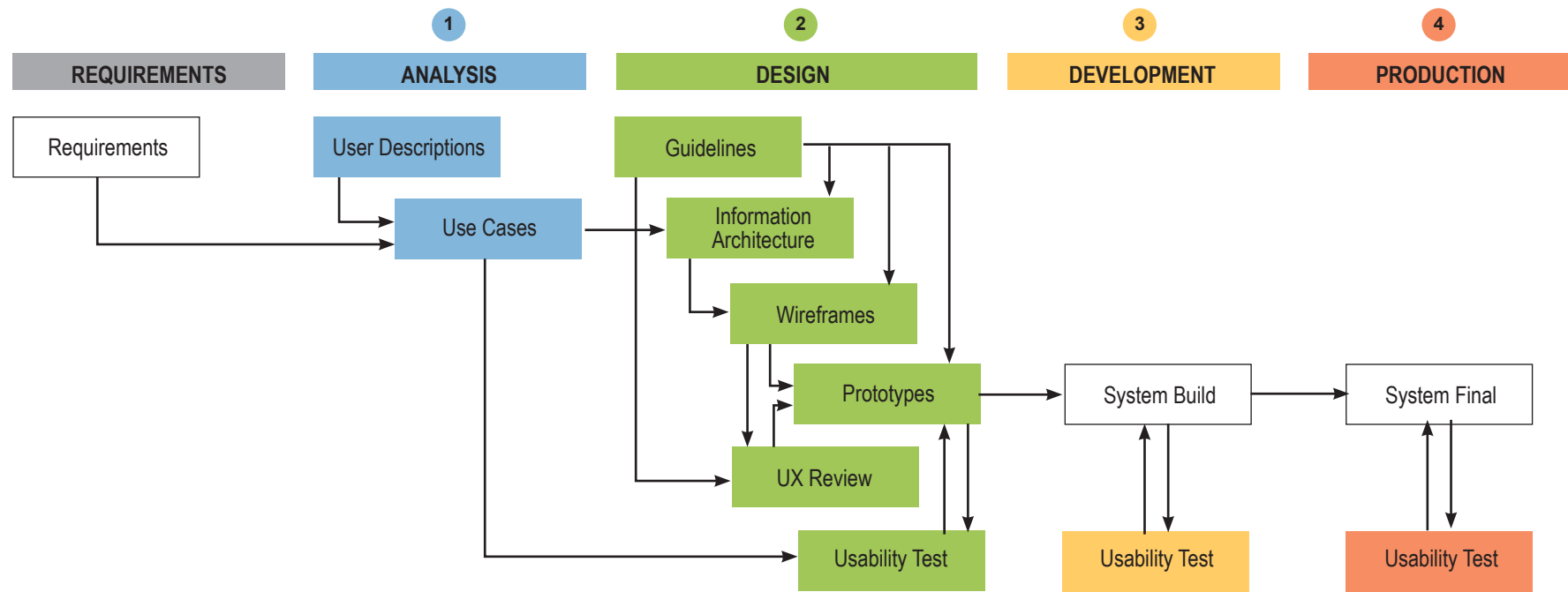
*“Once a system is in development, correcting a problem costs 10 times as much as fixing the same problem in design. If the system has been released, it costs 100 times as much as relative to fixing in design.”<sup>2</sup>*

*Glib, 1988*

*The goal of UX is to provide an efficient, effective and consistent user experience as users perform their tasks.*

# User Experience Design Process

This diagram illustrates the four phases of the design process, the deliverables and artifacts produced and the drivers and dependencies each has on the others.



Below an excerpt from a use case illustrates the conversation between a user and a system. The use case informs the information architecture and wireframes.

**CRR.UC1 - Open PCRR Allocation**

This use case describes how the CRR Market Operator prepares a PCRR allocation market for associating a network model.

**Main Success Scenario**

- The CRR Market Operator requests the CRR Market Manager create the PCRR allocation market, defining the schedule, times of use, and calendar period.
- The CRR Market Manager requests the CRR Integration Manager send the PCRR allocation notice to the MIS.
- The CRR Integration Manager requests, via the ESB, the MIS post the PCRR allocation notice.
- The CRR Market Manager requests the CRR Messaging Manager provide the PCRR allocation notice to all CRR Account Holders.
- The CRR Market Manager presents the CRR Market Operator with a success message indicating that the PCRR allocation market has been created.
- Use case ends.

**Alternative Flows**

- 2.a CRR Market Manager unavailable
- 2.b Validation Failure
- 4.a MIS/ESB unavailable
- 4.b CRR Messaging Manager unavailable

## Use Cases

Use cases define the activities and order required to perform the activities. Use cases are like a dialog between a user and a system. They document each user action and resulting system action. Use cases not only document the “happy path”, which is a correctly performed task; they also document the alternative paths. A use case provides the skeleton for the interaction between user and system.

Use cases form the foundation for design and the basis for writing test cases, which define the expected results of each possible outcome for each step in the use case.

## 2 DESIGN

**Objective: Make the user's interaction as intuitive and easy-to-use as possible**

The design phase of the process calls for different types of design, including information design, interaction design and visual design. Deliverables include:

### Information Architecture

Information architecture defines structure of information across the activities and establishes information organization. The use cases help determine which type of structure works best. For example, is the user performing a sequence of steps? Is the user toggling between summary-level information and detailed information? Is the user trying to make a decision from various information sources? Are there related activities that need to be quickly accessible to the user? Decisions made about the information architecture are reflected in wireframes, prototypes and site maps.

### Wireframes

Wireframes are simple diagrams of the proposed user interface that provide a low fidelity method to evaluate task flow and organization. Wireframes reflect the information architecture, the placement of information on the screen and the interaction controls used for navigate and perform transactions. The advantages of using wireframes are: 1.) they are easy to revise and facilitate the iterative design process, and 2.) they focus attention on the information, rather than colors and graphics.

## Prototypes

Once the design and usability issues have been addressed on the wireframes, the next deliverable is the high-fidelity prototype. The prototype provides a visual representation of the user interface and allows for more extensive testing.

ERCOT has established guidelines that ensure consistency in naming, menus, interaction controls and information common across applications. Consistency reduces learning time and makes the application more intuitive.

## UX Review

As wireframes and prototypes are being developed, UX review involves having the user experience team examine the interface and judge its compliance with recognized usability principles. The user experience team applies the ERCOT Visual Design Guide and the User Experience Guidelines both of which follow the current industry standards for user experience.

The deliverable from a UX evaluation is a list of the well-designed aspects of the interface, the usability problems, and recommendations for change based on known human factors, cognitive and behavioral principles, and recognized best practices.

## Usability Test

A usability test is an evaluation performed by the users (such as market participants) on prototypes that has as its goal improvement of the usability of the product. Users perform actual tasks while the user experience team records information and identifies usability problems. These tests are always designed to require minimal time for the user.

The deliverable from a usability test is a report that details the problems encountered by the participants and recommendations for change based on known human factors, cognitive, and behavioral principles, and recognized best practices.

A wireframe diagram contains all the information that would be displayed on the screen, including navigation and interaction controls. A series of wireframes illustrates screen or task flow and is often used in usability testing.

A prototype adds the graphic elements and shows what the actual user interface will look like. These prototypes are also used in usability testing.