UX Research

Embedded Interface Design

with **Bruce Montgomery**

Learning Objectives

Students will be able to…

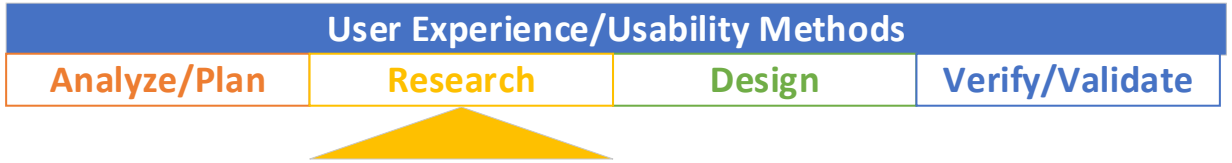
- Understand the importance of the user research phase
- Recognize the cost of change
- Recognize the cone of uncertainty
- Consider how user research impacts the design cycles to come

Research

Research: careful or diligent search, studious inquiry or examination, the collecting of information about a particular subject [1]

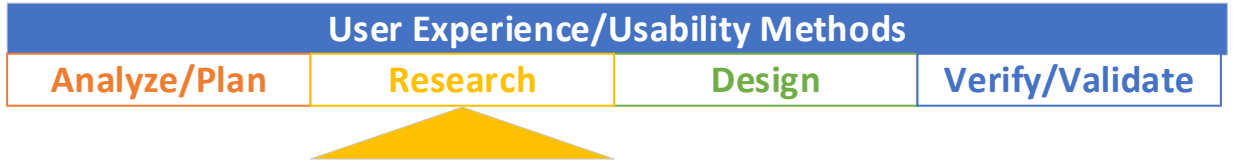
“Pay attention to what users do, not what they say.”
— Jakob Nielsen

UX (User) Research



- Why?
- What if we don’t?
- The cost of change
- The cone of uncertainty

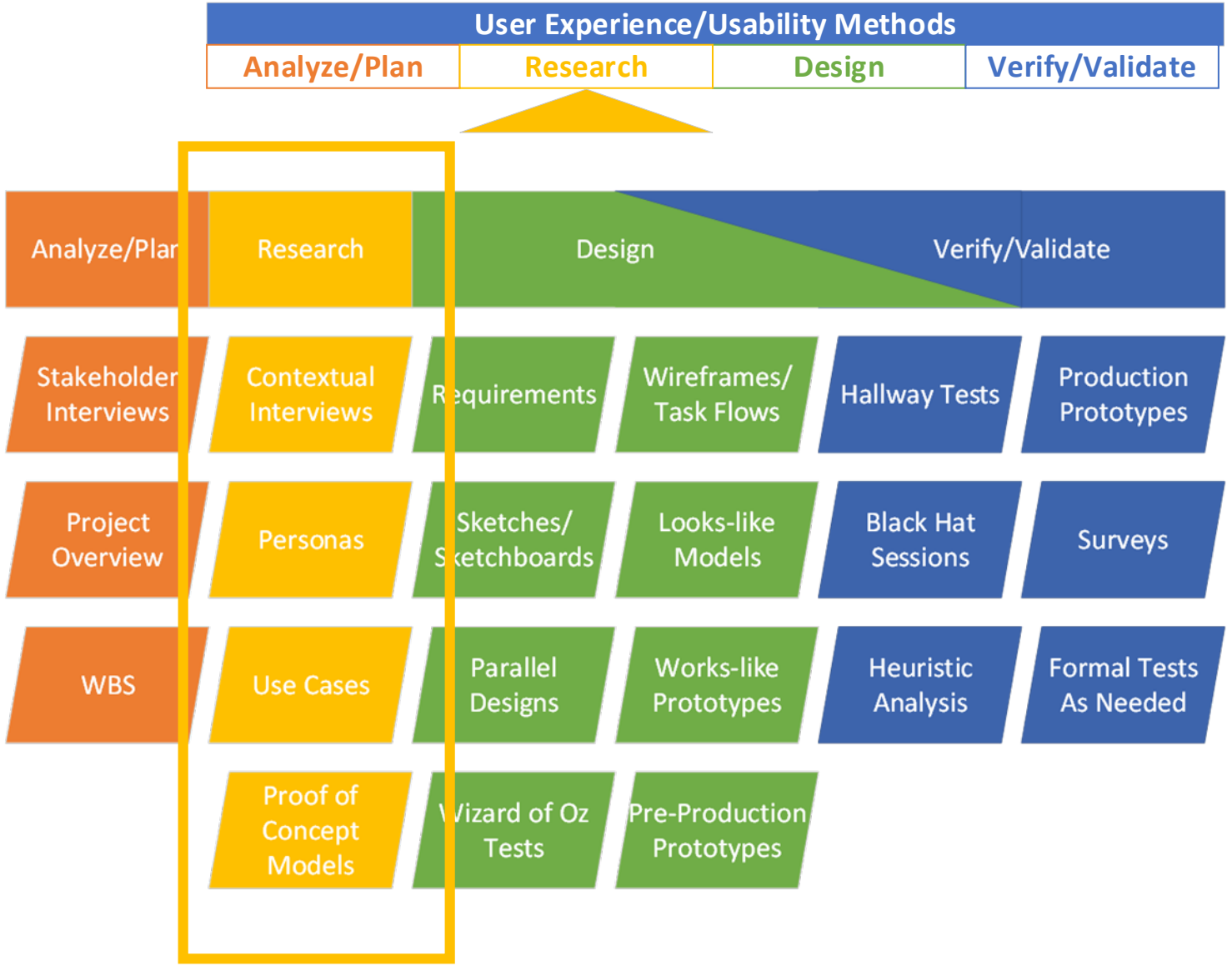
User Research: Why?



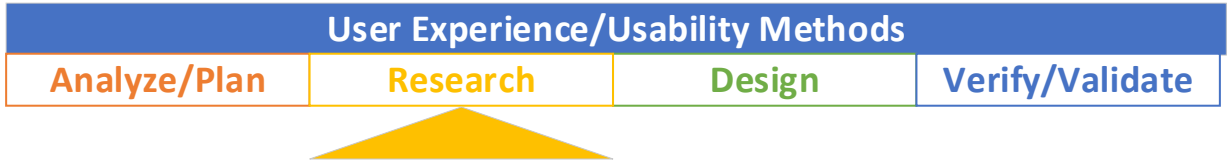
- Really, we're still not making anything?
- At this point in the UX Process, we're in the second phase of the UX effort (per our earlier planning, which we may revisit based on what we learn)
- Our goal here is fairly simple, to understand the users:
  - Who are they?
  - What tasks to they need to perform?
  - What goals do they have for the system?
  - What other factors impact the system's use?

UX Research Phase

Per the phased approach, we're following our plan, and using this stage to develop an understanding of users and tasks. We may do a little early modeling to verify what we learn…

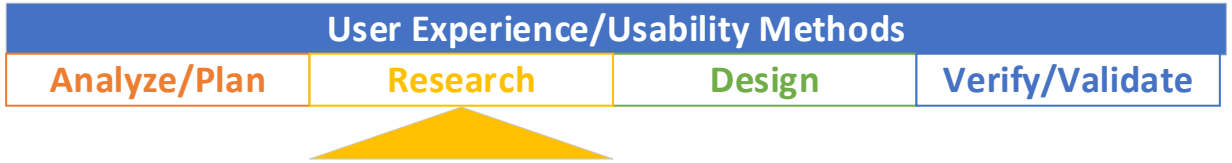


User Research: Why?



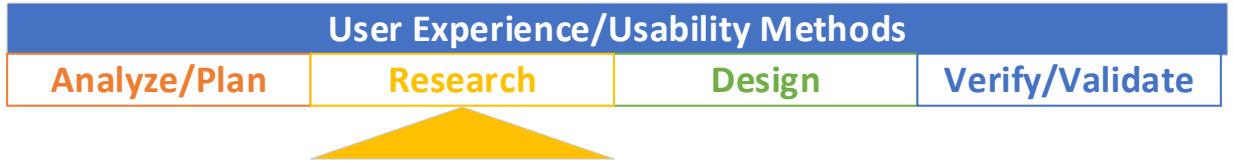
- UX (and User) Research focuses on methods for defining and understanding user behaviors, needs, and motivations [2]
- From the start, design systems and devices with the user in mind
- Research methods provide direct and indirect insights into your users, their needs, and perceptions
- Who are the typical (or specific) users?
- What are they trying to accomplish?
- Where will they use the device?
- Other aspects: Basic profile, personal limitations, environmental constraints
- All leads into basis for next phase: Design

What if we don't?

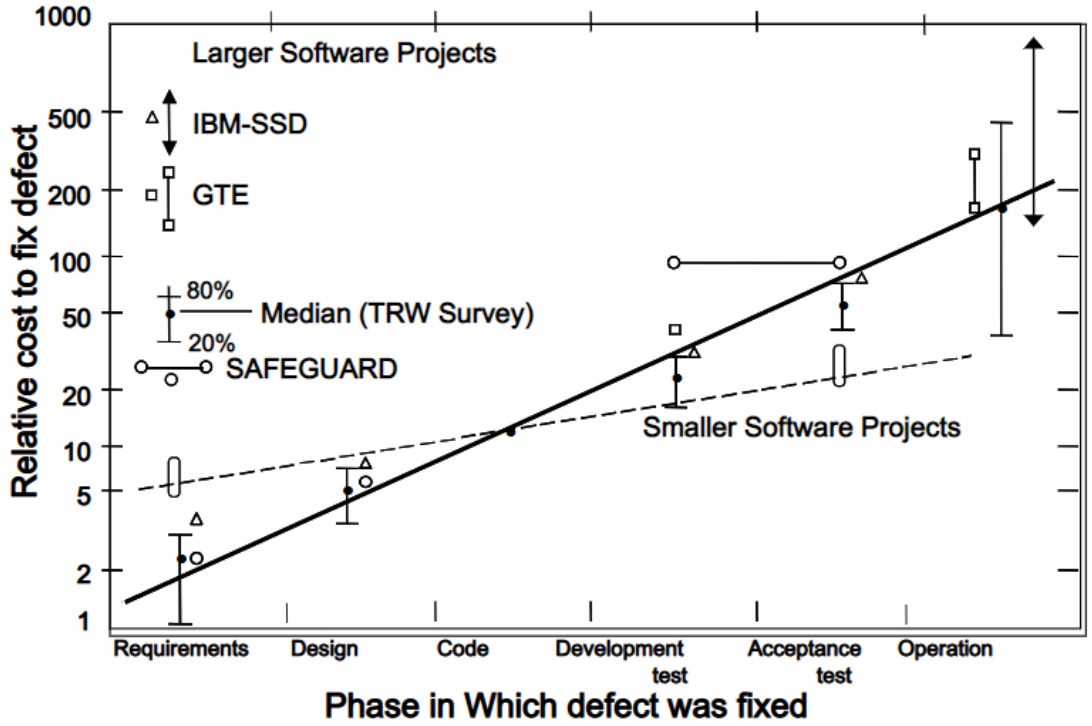


- No doubt, we can design a device or a system without learning more about the users, just based on what we know today (or think we do)
- But… consider the cost of a mistake at different project stages
- In early stages, while designs are still on paper, the cost of a change is low
- Even in later stages of making prototype devices, iteration of design changes is fairly normal, but the cost of a change is a bit higher
- It's clear that the cost of change in later stages or after release is higher still
- Our goal then should be to discover and iterate through changes as early as possible

Cost of change

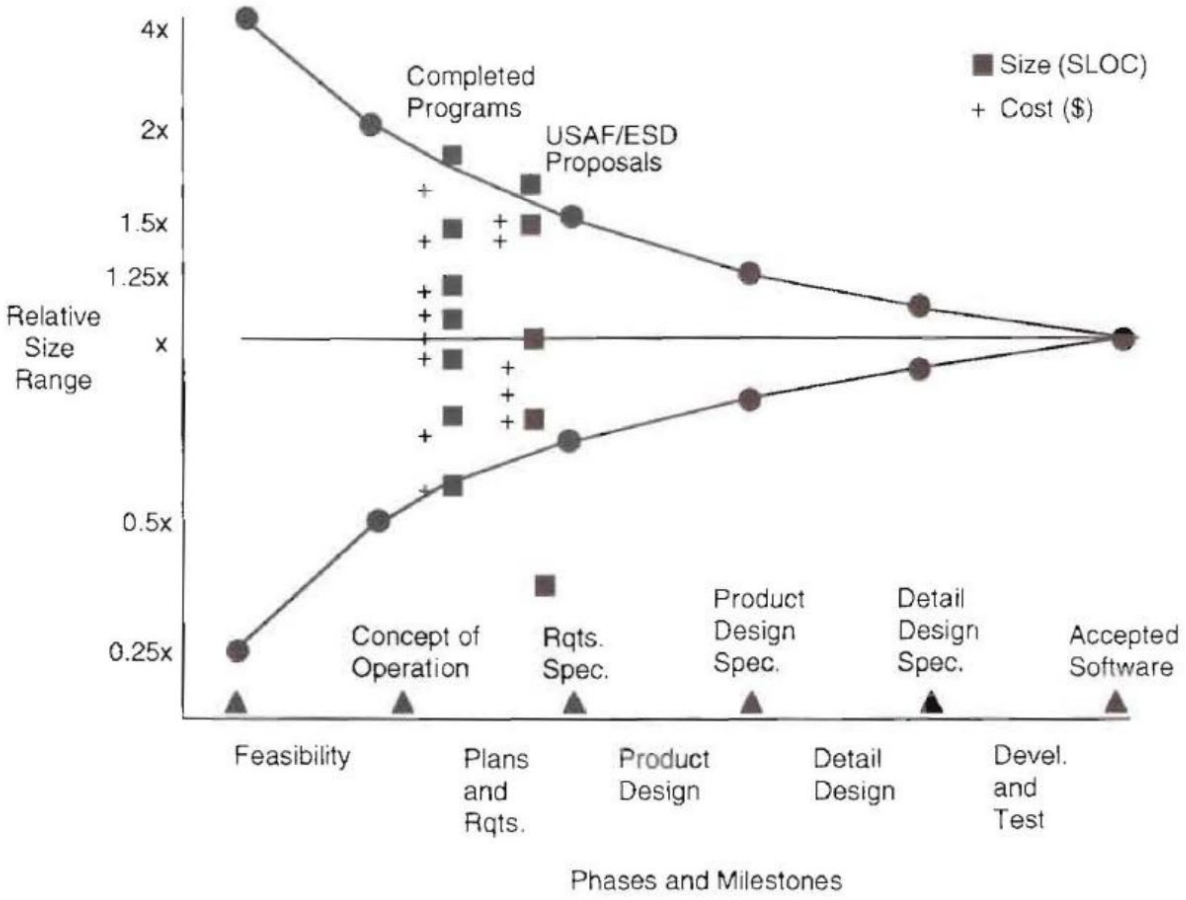


Increase in Software Cost-to-fix vs. Phase (1976)



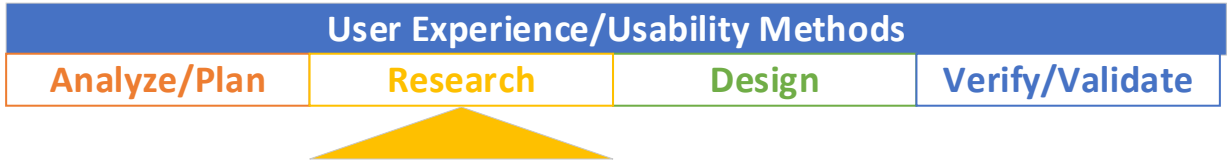
- Barry Boehm developed a famous cost of change curve in 1976 [3]
- While many will dispute the cost values or the impact of modern development tools on easing response to change, most of us understand intuitively that the cost of change is less if issues are found sooner in a development process

Cone of uncertainty



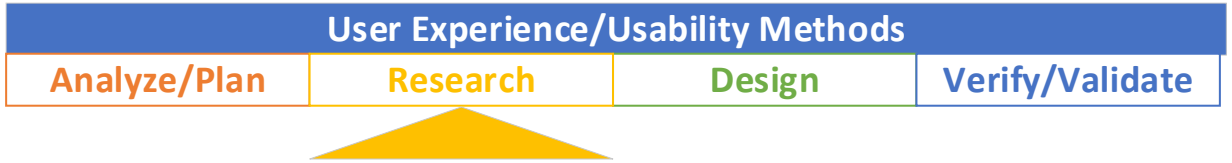
- Barry Boehm was also responsible for another classic development graphic, the “cone of uncertainty” [4]
- Through progressive elaboration across design iterations, we come closer to knowing what our users actually expect – what are the real product requirements

Users at the Center of the Design



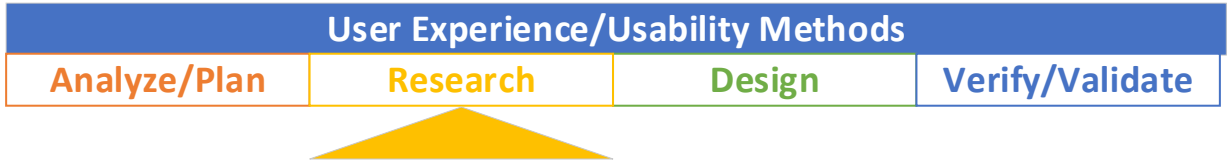
- User research methods help you and your design team keep the user and their needs at the center of the design process
- By doing this you drive
  - Relevance – making sure your designs have the appropriate meaning to your users
  - Ease and pleasure – ensuring users can do their selected tasks in the most enjoyable fashion
  - Return on investment – understanding what benefits your user-centric design may bring: e.g. more sales, more customers, or more efficient use
- Reference [5]

Summary



- Users, tasks, goals – what can we learn (and document)?
- How much can we reduce design changes by our research to understand the users?
- How can we keep this image of the user in the forefront of the design considerations?
- How do the methods move us out of design uncertainty?
- Which user research methods provide the best information for our efforts?

Summary



- As we look at the methods used in this phase, consider what we learn and how it impacts the designs we may produce
- As always we must be prepared to iterate through the process if we make discoveries that change our plans
- But we'll begin to lay a foundation for a user-centric design that will satisfy and perhaps delight those that use the devices and systems we develop
- Let's look next at the specific methods…

References

[1] https://www.merriam-webster.com/dictionary/research
[2] https://www.usability.gov/what-and-why/user-research.html
[3] University of Southern California Center for Systems and Software Engineering, Barry Boehm, USC CS 510 Fall 2013 - https://slideplayer.com/slide/8396980
[4] https://www.researchgate.net/publication/220883691_Reducing_estimation_uncertainty_with_continuous_assessment_tracking_the_cone_of_uncertainty
[5] https://www.interaction-design.org/literature/article/user-research-what-it-is-and-why-you-should-do-it