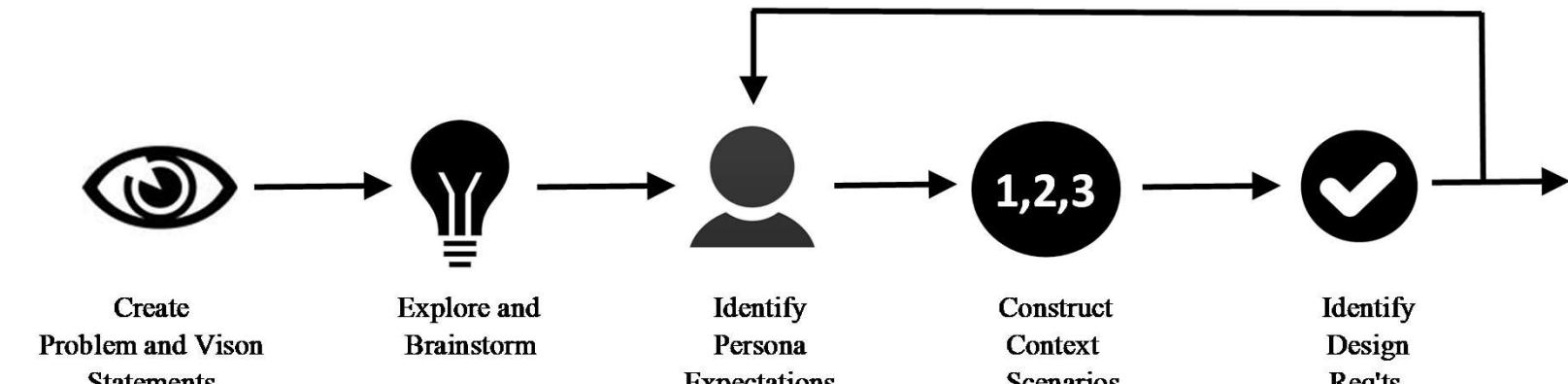


الَّذِي لَمْ يَرَهُ الظَّاهِرُ

"For without doubt in the remembrance of Allah do hearts find atisfaction"

# Requirements Definition Process



## Identify Design Requirements:

Data

Functional

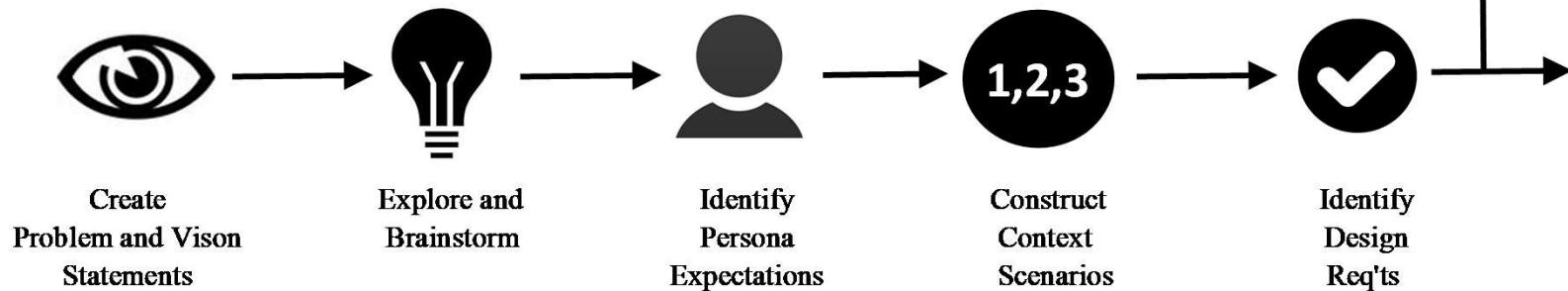
Contextual

(relationships or dependencies between sets of objects in the system... environment product will be used in  
... when choosing items for purchase, a summed list of items already selected)

Other requirements:

Business Brand and experience, technical, customer and partner

# Requirements Definition Process



## Research to Design:

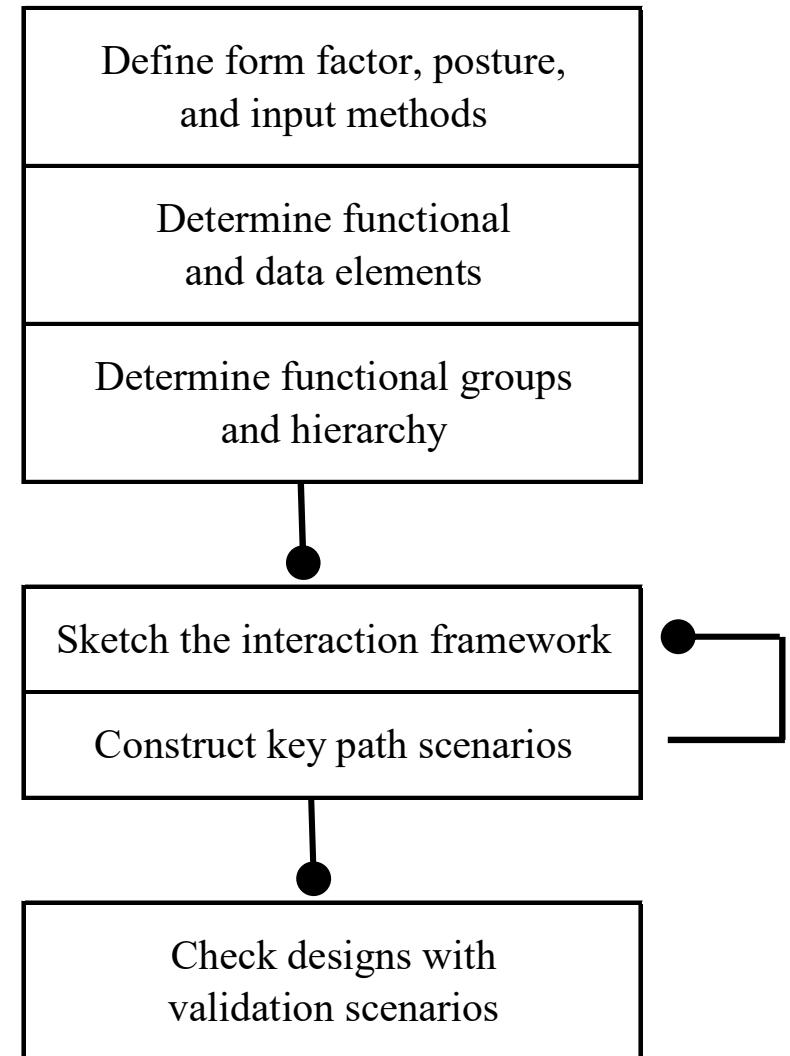
- Scenarios provide means of imagining ideal user interactions
- Use scenarios to extract *design requirements* (needs)
- Use these requirements to define the product's fundamental interaction framework
- Filling in that framework with ever-increasing amounts of design detail

DESIGN  
PRINCIPLE

Define what the product will do before you design how the product will do it.

# The Framework Definition Process

1. Define form factor, posture, and input methods
2. Define functional and data elements
3. Determine functional groups and hierarchy
4. Sketch the interaction framework
5. Construct key path scenarios
6. Check designs with validation scenarios



# 1. Define *form factor*, *posture*, and *input methods*

## Form

Is it a web app to be viewed on HD computer screen?

Is it a phone app (small, low-resolution, visible in bright light)?

What are the constraints?

## Posture

How much interacting will there be?

What level of attention is needed to respond to users?

## Input Methods

Related to *form factor* and *posture*

Keyboard, mouse, keypad, thumb-board, touchscreen, voice, game controller, remote control, etc.



## 2. Define *functional* and *data elements*

### *Data*

Objects (photos, email messages, customer records, etc.)

### *Functional*

Operations on data elements and their representations in the interface

Includes tools to act on and ways to visually and structurally manage data elements

“... return to the context scenarios, persona goals, and mental models to ensure that our solutions are appropriate”



# Criteria for assessing possible design solutions

Again, referring to context scenarios, persona goals, mental models...

Proposed solutions should:

- Accomplish user goals most efficiently
- Be a best fit for your design principles
- Fit within technology or cost parameters
- Possibly differentiate the interaction from the competition
- Other best fit requirements...

Pretend the product is human

Apply principles and patterns

Note: Scenarios provide an inherently top-down approach to *IxD*



# Determine functional groups and hierarchy

Given a good list of top-level functional and data elements...

## Issues to consider:

- ▶ Which elements need a large amount of screen real estate, and which do not?
- ▶ Which elements are containers for other elements?
- ▶ How should containers be arranged to optimize flow?
- ▶ Which elements are used together, and which are not?
- ▶ In what sequence will a set of related elements be used?
- ▶ What data elements would be useful for the persona to know or reference at each decision?
- ▶ What interaction patterns and principles apply?
- ▶ How do the personas' mental models affect organization?

## 4. Sketch the Interaction Framework

Framework sketches should be simple, starting with rectangles, names, and brief descriptions of relationships between functional areas.

Details can be visually hinted at to give an idea of the contents, but don't fall into the trap of designing detail at this stage.

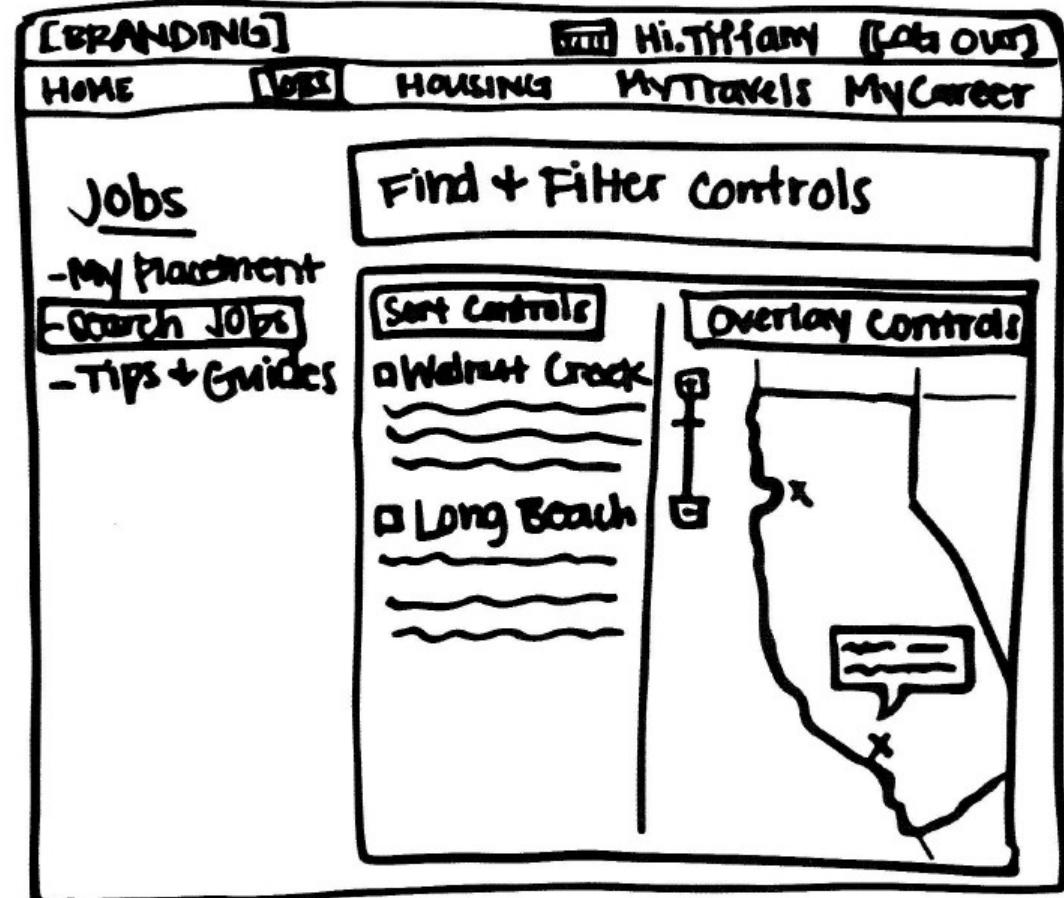


Fig. An early framework sketch from designs Cooper created for Cross Country TravCorps, an online portal for traveling nurses.

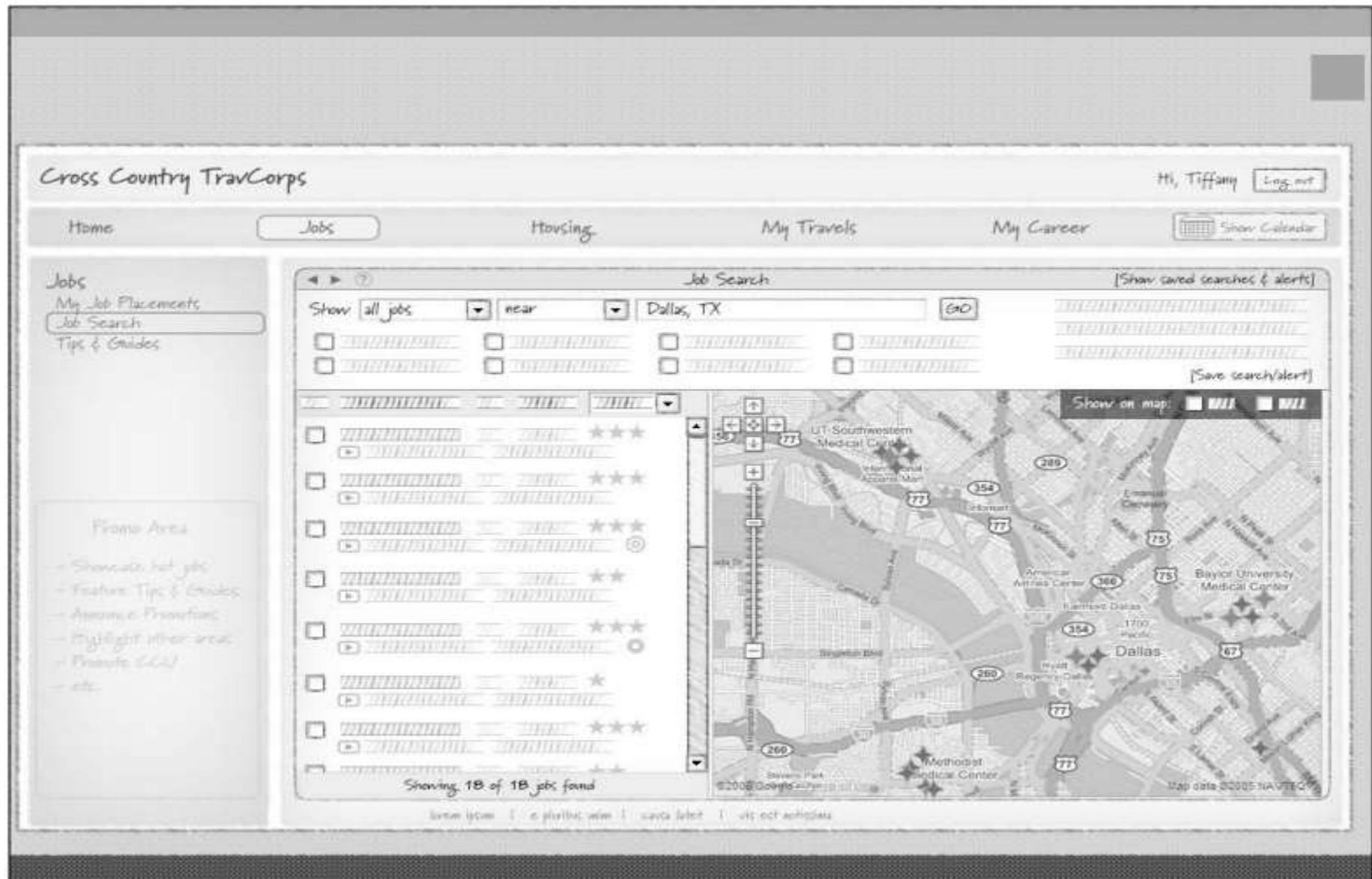
## 5. Construct **Key Path** scenarios

**Key Path**... the way in which the persona interacts with the product.

- ▶ Storyboarding
- ▶ Process variations and iteration

Simulates user accomplishing their goals  
Not typically a simple linear process





**Figure 7-2** An example of a more evolved Framework rendering from the Cross Country TravCorps job search Web application.

## 6. Check designs with validation scenarios

“After you have storyboarded your key path scenarios and adjusted the interaction framework until the scenarios flow smoothly and you are confident...

... shift to the less frequent or less important interactions”

1. Alternative scenarios
2. Necessary-use (must be performed) scenarios
3. Edge-case scenarios



# Defining the visual design framework

## STEPS:

1. Develop experience attributes
2. Develop visual language studies
3. Apply the chosen visual style to the screen archetype

## Cooper process:

- ▶ Gather any **existing brand guidelines**. Familiarize yourself with them. If the company has clear brand guidelines built around one product—the product you’re designing much of your work may have already been done for you.
- ▶ Gather together **examples of strongly branded products**, interfaces, objects, and services. Including multiple examples from particular domains will help stakeholders **think about their differences**.
- ▶ If we include images of cars, for instance, we might include examples from BMW, Toyota, Ferrari, and Tesla.

# Develop experience attributes (Cooper)

- ▶ Work with stakeholders to identify direct and indirect competition.
- ▶ Pull relevant terms mentioned by interviewees in the course of your qualitative research. Pay particular attention to any *pain points* mentioned.
- ▶ For instance, if many mention that a competitor or the existing version of the product is hard to use or "unintuitive," you may want to discuss whether "friendly," "easy," or "understandable" should be an attribute.
- ▶ With the brand guidelines, example products, competition, and user notes on display to reference, have a discussion with stakeholders about the sub brand of the product you're designing. (vote)

# Develop experience attributes (Cooper)

- ▶ From the outcomes of this discussion, identify the minimum number of adjectives that define and distinguish the product
- ▶ If any of the words have multiple meanings, document the exact sense intended. "Sharp," for instance, could refer to precision and sleekness, or it could mean intelligence and wit
- ▶ Consider competitors. If your set of attributes does not distinguish the brand from competitors, refine them until they do. Also make sure that individual attributes are aspirational. "Smart" is good. "Brilliant" is better
- ▶ Check back with the stakeholders (and especially any marketers) your proposed attribute set to discuss and finalize them before moving forward

# Defining the visual design framework

## STEPS:

1. Develop experience attributes
2. **Develop visual language studies**
3. Apply the chosen visual style to the screen archetype

Explore a variety of visual treatments through *visual language studies*.

“Within every picture is a hidden language that conveys a message, whether it is intended or not. This language is based on the ways people perceive and process visual information. By understanding visual language as the interface between a graphic and a viewer, designers and illustrators can learn to inform with accuracy and power”



# Visual Language Studies

- ▶ These studies include color, type, and widget treatments, as well as the overall dimensionality and any “material” properties of the interface (for example, does it feel like glass or paper?).
- ▶ These studies should show these aspects abstractly and independently of the interaction design
- ▶ Our goal is to assess the overall tone and suitability for general interactions, and we want to avoid running the risk of distracting our stakeholders with highly rendered versions of rough interaction designs.

Ut Molestie Ut Molestie Ut Molestie

Consectetur Commodo

Lorem Ipsum   
Dolor Sit Amet   
Integer Lobortis   
Morbi Commodo

Dolor

Nullam non erat at dui

The chart displays a line graph with data points labeled by time: 9am (443), 10am (749), 11am (843), 12pm (570), 1pm (502), 2pm (487), 3pm (469), and 4pm (608). The Y-axis ranges from 200 to 1000.

Time	Value
9am	443
10am	749
11am	843
12pm	570
1pm	502
2pm	487
3pm	469
4pm	608

Working Dolor Dolor Praesent justo

Vestibulum Lacinia

Morbi Commodo

Lorem Ipsum Class Aptent  
Dolor Sit Amet Taciti Sociosqu  
Integer Lobortis Ad Litora Torquent  
Morbi Commodo Per Conubia Nostr  
Tristique Senectus Per Inceptos Hymenaeos  
Nam Eu Mauris At Quam Arou Commodo At Tem  
Nunc Elementum Etiam Bibendum Nisi  
Condimentum Mauris Vitae Felis

A dark-themed version of the interface shown in the top-right corner of the first image. It features a black header with the 'Working' logo and a dark gray sidebar on the left.



Ut Molestie Ut Molestie Ut Molestie

Consectetur Commodo

Lorem Ipsum   
Dolor Sit Amet   
Integer Lobortis   
Morbi Commodo

Dolor

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Praesent justa Dolor Dolor

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Tristique Senectus Per Inceptos Hymenaeos  
Nam Eu Mauris At Quam Arou Commodo At Tem  
Nunc Elementum Etiam Bibendum Nisi  
Condimentum Mauris Vitae Felis

A light-themed version of the interface shown in the bottom-right corner of the first image. It features a white header with the 'Working' logo and a light gray sidebar on the left.



# Defining the visual design framework

## STEPS:

1. Develop experience attributes
2. Develop visual language studies
3. **Apply the chosen visual style to the screen archetype**

“The final step is to apply one or two selected visual styles to key screens... typically coordinate visual and interaction design efforts so that this step is performed close to the end of the interaction framework.

At that point the design has begun to stabilize, and sufficient specific detail reflects the visual style. This further refines the visual style so that it reflects key behaviors and information.

By making the design more concrete, you can better assess the feasibility of the proposed solution without the overhead of updating numerous screens for each minor change.

Additionally, it's easier to elicit feedback from stakeholders.”

# Defining the industrial design framework

Process:

1. Collaborate with interaction designers about form factor and input methods
2. Develop rough prototypes
3. Develop form language studies

Step 1:

DESIGN  
PRINCIPLE

There is only one user experience:  
Form and behavior must be designed in concert

The demands of interaction must guide the industrial design.



# Defining the industrial design framework

Process:

1. Collaborate with interaction designers about form factor and input methods
2. **Develop rough prototypes**
3. Develop form language studies

Industrial designers sketch and create rough prototypes from foam board and other materials. ...often, shown to different stakeholders because each one has different cost and ergonomic considerations



# Defining the industrial design framework

Process:

1. Collaborate with interaction designers about form factor and input methods
2. Develop rough prototypes
3. **Develop form language studies**

... various looks applied to the specific form factors and input mechanisms.

... include shape, dimensionality, materials, colors and finish.

... informed by *persona* goals, attitudes, aptitudes, experience keywords, environmental factors, manufacturing and pricing constraints.

... requiring multiple iterations.



# Defining the Service Design Framework

Process:

1. **Describe customer journeys**
2. Create a service blueprint
3. Create experience prototypes

A descriptive narrative describing the persona's use...

From 1<sup>st</sup> exposure to final transaction...

Each journey provides the designer the opportunity to identify secondary paths... where the service helps the persona recover from a “nuanced” problem



# Defining the service design framework

Process:

1. Describe customer journeys
2. Create a service blueprint
3. Create experience prototypes  
“The big picture”

Touch points where the persona uses the service...

Describes “backstage” processes that deliver a service...

Starting with the customer experience may help identify unexpected touch points in the service map...



# Defining the service design framework

## Process:

1. Describe customer journeys
2. Create a service blueprint
3. Create experience prototypes

Service designers illustrate a persona's individual experience through the experience prototypes...  
... including mock-ups of key touch points...



# Refining the Form and Behavior

... the phase that translates the sketched storyboards into full-resolution screens...

... depicting the user interface at the pixel level.

The end product of the design process:

Often a printable *Form and Behavior* specification

Includes screen renderings... detailed enough for developers to code

The design team should continue to work closely with the construction team throughout implementation



# Validating and testing the design

... putting the designed “solution” in front of users”

Helps in identifying problems with the Interaction Framework and/or the need for refinement

Note the limitation... for new products this process reflects feedback from 1<sup>st</sup> time users only!

Usability tests determine how well a design allows users to accomplish their tasks...

... and, with additional testing, feedback on how well the design helps users reach their end goals.

Remember... user's don't design

Designers may need to go back to their “drawing boards”



# What to test?

Usability testing should be effective in validating:

**Naming** – Do section/button labels make sense? Do certain words resonate better than others?

**Organization** – Is information grouped into meaningful categories? Are items located in the places customers might look for them?

**First-time users and discoverability** – Are common items easy for new user to find? Are instructions clear? Are instructions necessary?

**Effectiveness** – Can customers efficiently complete specific tasks? Are they making missteps? Where? How often?

# Testing

“... be sure that what you are testing can actually be measured, that the test is administered correctly

...that the results will be useful in correcting design issues, and

...that the resources necessary to fix the problems observed in a usability study are available”



# Formative and Summative evaluations?

1. In **Formative** evaluation, programs or projects are typically assessed during their development or early implementation to provide information about how best to revise and modify for improvement.
  - This type of evaluation often is helpful for pilot projects and new programs, but can be used for progress monitoring of ongoing programs.
2. In **summative** evaluation, programs or projects are assessed at the end of an operating cycle, and findings typically are used to help decide whether a program should be adopted, continued, or modified for improvement. manager).



When to test?

## Summative and Formative evaluations

Summative: tests the value of completed products

“... if you need to convince stakeholders or developers that the current product does have a usability problem, ... watching real users struggle through basic tasks is convincing.”

Formative: an iterative process of testing during design

Provides feedback on the effectiveness of the design... and an opportunity to make corrections

“... allowing the designers to see how (and, with interviews, why) their target audience responds to the information and tools ... provided to help them accomplish their goals.”

# Formative Usability Tests: Advice

- ▶ Test late enough in the process so that there is a concrete design to test, and early enough to allow adjustments in the design & implementation.
- ▶ Test tasks & aspects of the user experience
- ▶ Use participants from the target population (personas as a guide)
- ▶ Ask participants to perform tasks while thinking aloud
- ▶ Have participants interact directly with a low-tech prototype (except when testing specialized hardware where a paper prototype can't reflect nuanced interactions)



# Formative Usability Tests: Advice

- ▶ Moderate the sessions to identify issues and explore their causes
- ▶ Minimize bias by using a moderator who has not previously been involved in the project
- ▶ Focus on participant behaviors and their rationale
- ▶ Debrief observers after tests are conducted & identify the reasons behind observed issues.
- ▶ Involve designers throughout the study process



# The need for Designer involvement in Usability Studies

Designers should be the primary “consumer” of the findings

Designers should be involved in:

- Planning the study to focus on important questions about the design
- Using personas and their attributes to define recruiting criteria
- Using scenarios to develop user tasks
- Observing the test sessions
- Collaboratively analyzing study findings



# Synthesizing Good Design: Principles and Patterns

- ▶ Interaction design principles are generally applicable guidelines that address issues of behavior, form, and content.
- ▶ They encourage the design of product behaviors that support the needs and goals of users, and create positive experiences with the products we design.
- ▶ These principles are, in effect, a set of rules based upon our values as designers and our experiences in trying to live up to those values.
- ▶ At the core of these values is the notion that technology should serve human intelligence and imagination (rather than the opposite), and
- ▶ that people's experiences with technology should be structured in accordance with their abilities of perception, cognition, and movement.
- ▶ Principles are applied throughout the design process, helping us to translate tasks and requirements that arise from scenarios into formalized structures and behaviors in the interface.



# Principles operate at different levels of detail

Design principles operate at several levels of granularity, ranging from the general practice of interaction design down to the specifics of interface design. The lines between these categories are fuzzy, to say the least, but interaction design principles can be generally thought of as falling into the following categories:

- ▶ **Design values** describe imperatives for the effective and ethical practice of design. These principles inform and motivate lower-level principles and are discussed later.
- ▶ **Conceptual principles** help define what a product is and how it fits into the broad context of use required by its users. Chapters 3, 9, and 10 discuss conceptual-level design principles.
- ▶ **Behavioral principles** describe how a product should behave, in general, and in specific situations. Chapters 8–20 discuss general behavior-level principles.
- ▶ **Interface-level principles** describe effective strategies for the visual communication of behavior and information. Principles in Chapters 13 and 14 are focused on this level of interaction design, which is also touched upon in many chapters in Parts II and III.

# interaction and visual design principles

- ▶ Most interaction and visual design principles are cross-platform, although some platforms, such as mobile devices and embedded systems, require special consideration because of constraints imposed by factors like screen size, input method, and use context.



# Behavioral and interface-level principles minimize work

- ▶ Types of work to be minimized include:
- ▶ **Cognitive work** — Comprehension of product behaviors, as well as text and organizational structures
- ▶ **Memory work**— Recall of product behaviors, command vectors, passwords, names and locations of data objects and controls, and other relationships between objects
- ▶ **Visual work**— Figuring out where the eye should start on a screen, finding one object among many, decoding layouts, and differentiating among visually coded interface elements (such as list items with different colors)
- ▶ **Physical work**— Keystrokes, mouse movements, gestures (click, drag, doubleclick), switching between input modes, and number of clicks required to navigate

# Design Values

- ▶ Designers should create design solutions that are:
  1. Ethical [considerate, helpful]
    - Do no harm, Improve human situations
  2. Purposeful [useful, usable]
    - Help users achieve their goals and aspirations,
    - Accommodate user contexts and capacities
  3. Pragmatic [viable, feasible]
    - Help commissioning organizations achieve their goals,  
Accommodate business and technical requirements
  4. Elegant [efficient, artful, affective],
    - Represent the simplest complete solution,
    - Possess internal (self-revealing, understandable)
    - Coherence Appropriately accommodate and stimulate cognition and emotion



# Do not harm

- ▶ Design Values
- ▶ Possible types of harm that interactive systems could be a party to include:
  - ▶ Interpersonal harm (loss of dignity, insult, humiliation)
  - ▶ Psychological harm (confusion, discomfort, frustration, coercion, boredom)
  - ▶ Physical harm (pain, injury, deprivation, death, compromised safety)
  - ▶ Environmental harm (pollution, elimination of biodiversity)
  - ▶ Social and societal harm (exploitation, creation, or perpetuation of injustice)

# Improve human situations

Not doing harm is, of course, not sufficient for a truly ethical design; it should be

- ▶ improving things as well. Some types of situations that interactive systems might
- ▶ improve broadly include:
- ▶ Increasing understanding (individual, social, cultural)
- ▶ Increasing efficiency/effectiveness of individuals and groups
- ▶ Improving communication between individuals and groups
- ▶ Reducing sociocultural tensions between individuals and groups
- ▶ Improving equity (financial, social, legal)
- ▶ Balancing cultural diversity with social cohesion



# Interaction Design Patterns

- ▶ Design patterns are a means of capturing useful design solutions and generalizing them to address similar problems.
  - Reduce design time and effort on new projects
  - Improve the quality of design solutions
  - Facilitate communication between designers and programmers
  - Educate designers



# Architectural patterns and interaction design

- ▶ Concern of interaction design patterns not only with structure and organization of elements but also with dynamic behaviors and changes in elements in response to user activity.
- ▶ It is tempting to view the distinction simply as one of change over time, but these changes are interesting because they occur in response to both application state and human activity.



- ▶ The core of each pattern lies in the relationships between represented objects and between those objects and the goals of the user. (This is one reason why a general style guide can never be a substitute for a context-specific design solution.)
- ▶ The precise form of the pattern is certain to be somewhat different for each instance,
- ▶ and the objects that define it will naturally vary from domain to domain, but the relationships between objects remain essentially the same.

# Types of interaction design patterns

- ▶ System level down to the level of individual interface widgets.
- ▶ Like principles, they can be applied at different levels of organization
- ▶ **Postural patterns** can be applied at the conceptual level and help determine the overall product stance in relation to the user.
  - An example of a postural pattern is “transient,” which means that a person only uses it for brief periods of time in service of a larger goal being achieved elsewhere. The concept of product posture and its most significant patterns are discussed at length in Chapter 9.
- ▶ **Structural patterns** solve problems that relate to the arrangement of information and functional elements on the screen. They consist of views, panes, and element groupings discussed briefly in Chapter 7.
- ▶ **Behavioral patterns** solve wide-ranging problems relating to specific interactions with functional or data elements.
  - What most people think of as widget behaviors fall into this category, and many such lower-level patterns are discussed in Part III.



# Structural patterns–Microsoft Outlook

