

CS449/649: Human-Computer Interaction

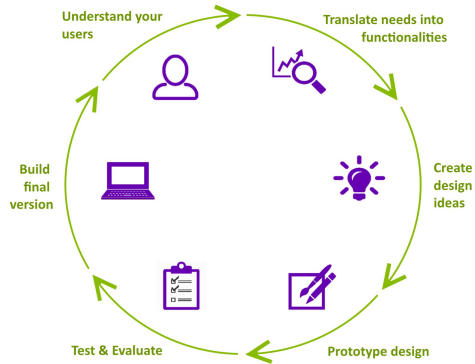
Spring 2017

Lecture XXI

Anastasia Kuzminykh

User Centered Design Process

May 1 - June 14



History of user centered design in HCI

June 19, June 21



Academic HCI

June 26, June 28



Special topics in HCI

July 5, July 10



Course Review

July 12, July 17



Presentation 2

July 19



Last class

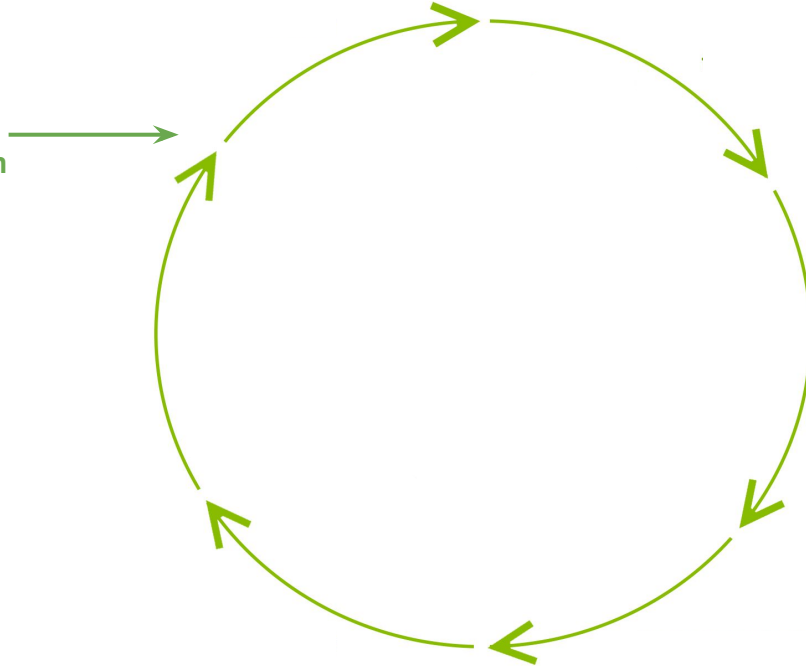
July 24



Course Review

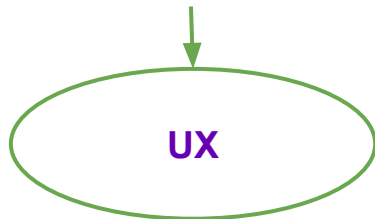


Value Proposition





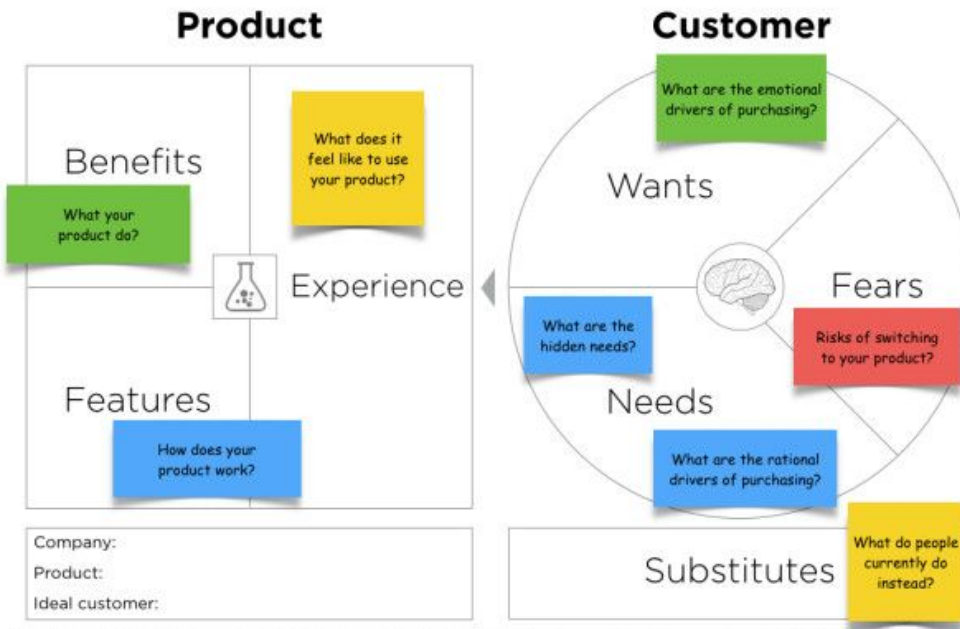
Value Proposition



1. Identify key objectives and desired outcomes
2. Identify corresponding critical aspects of the user experience
3. Identify the design work that can be done



Value Proposition Canvas



Based on the work of Steve Blank, Clayton Christensen, Seth Godin, Yves Pigneur and Alex Osterwalder. Released under creative commons license to encourage adaption and iteration. No rights asserted.

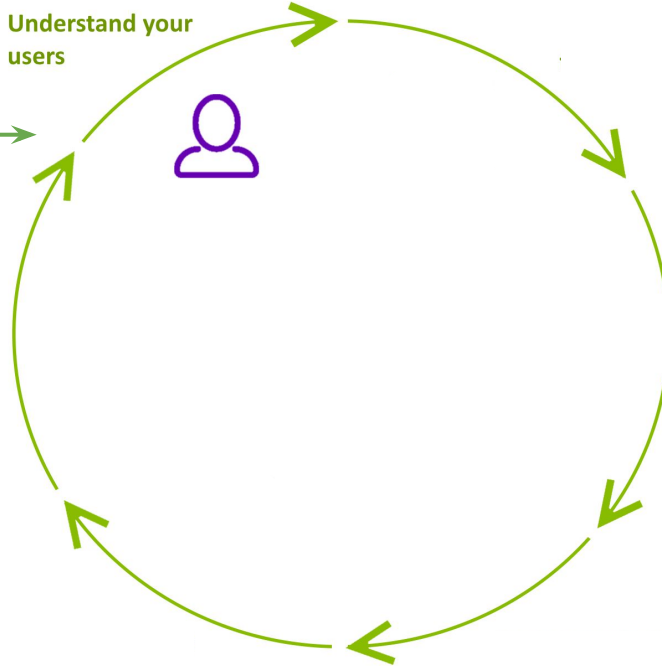


Course Review



Value Proposition

Understand your
users



Data Triangulation

- One question - several methods
- Cross verification

Quantitative

- Fixed & measurable reality
- Analyzed numerically and statistically

Qualitative

- Dynamic & descriptive reality
- Analyzed by themes

Field

- Natural Environment
- Uncontrolled

Lab

- Artificial Environment
- Well Controlled

Behavioural

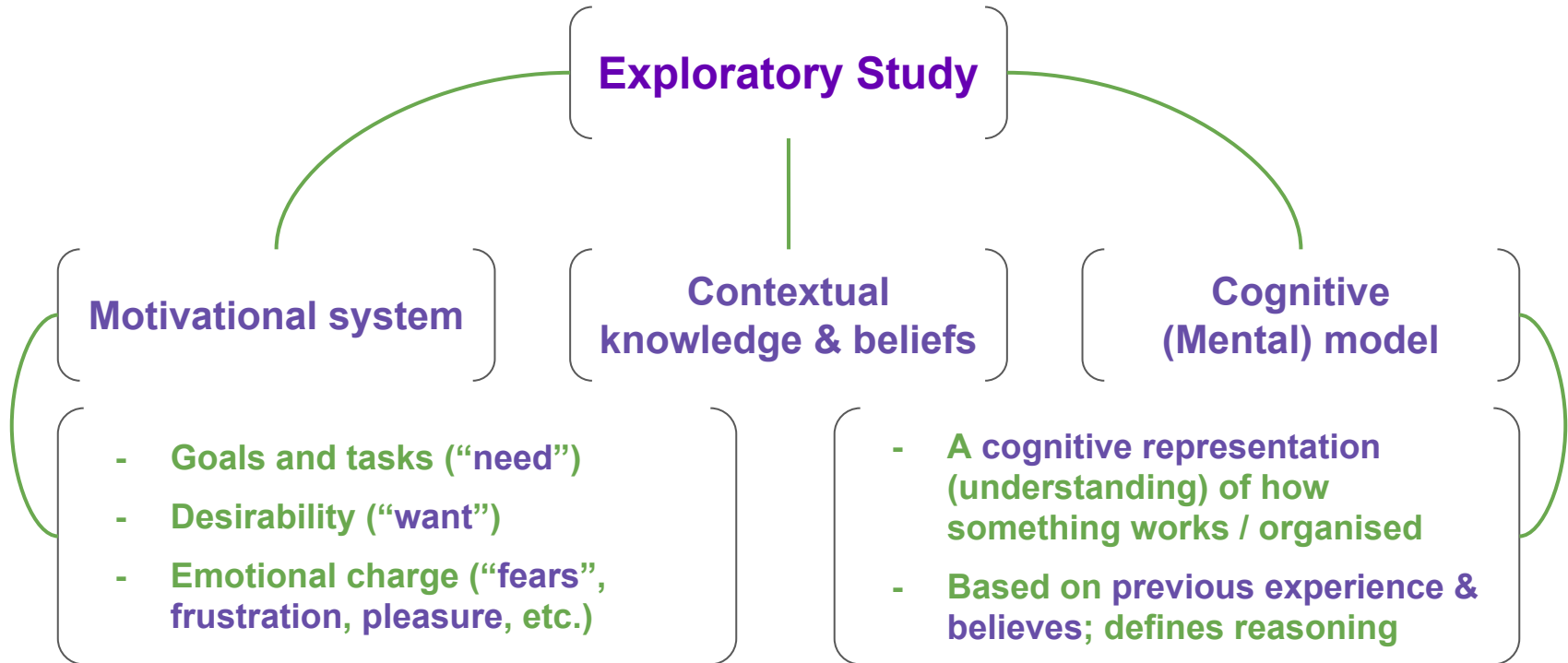
- What people do

Attitudinal

- What people think / feel



Understand Your Users: Exploratory Studies





Understand Your Users: Exploratory Studies

There is a product

- True-Intent Studies
- Remote Unmoderated Usability Studies
- Intercept Surveys
- Clickstream Analysis

There is NO product

- | | | |
|------------------------|------------------|------------------------------|
| • Diary/Camera Studies | • Questionnaires | • Ethnographic Field Studies |
| • Participatory Design | • Observations | • Contextual inquiry |
| | • Interviews | |

Where do you usually eat the following food?

Home Work School N/A

Ice-cream

Salad

Fruits

Any of us can sometimes unexpectedly run out of ice-cream. What do you usually do in such situations?

Ice-cream is my favorite food at this restaurant:

....
Strongly Neutral Strongly
Agree Disagree

What color is your favorite ice-cream?

- ☐ **Red** ☐ **White**
☐ **Blue** ☐ **Other:** _____

My favorite taste of ice-cream is _____.
I usually eat it at (in) _____
when I am _____.

Where would you describe this ice-cream?

Tasty Tasteless

Cheap Expensive

Satisfying Disappointing

What is the first word that comes to mind when you see the following:

Summer, Tasty, Cold, Flavour



Understand Your Users: Exploratory Studies

There is a product

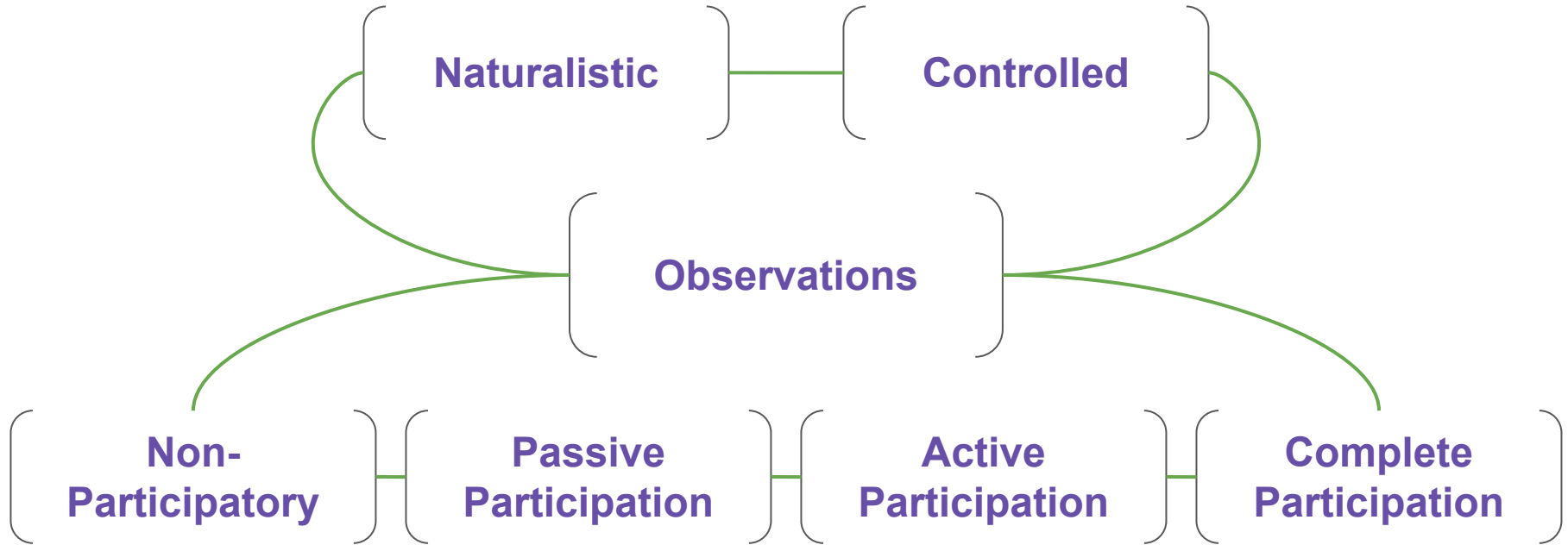
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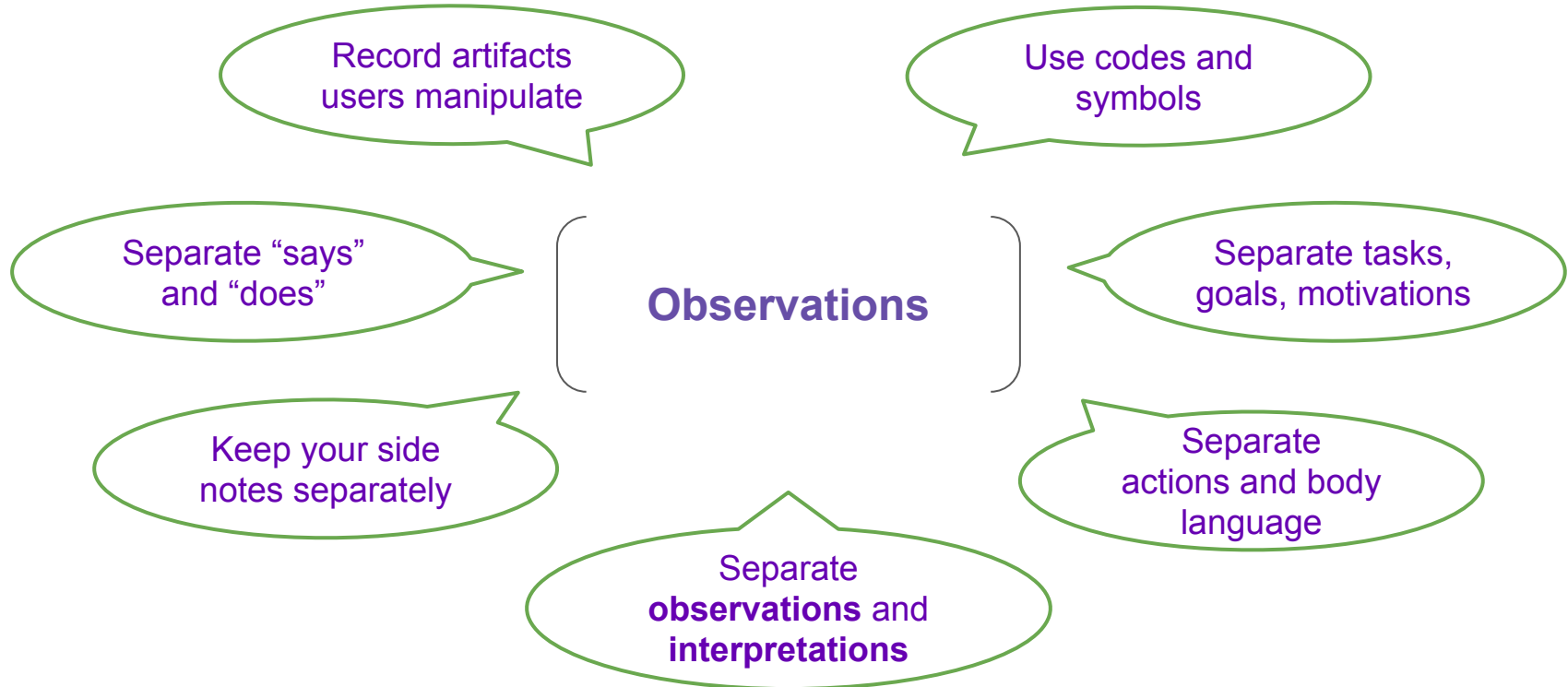


Understand Your Users: Exploratory Studies





Understand Your Users: Exploratory Studies





Understand Your Users: Exploratory Studies

There is a product

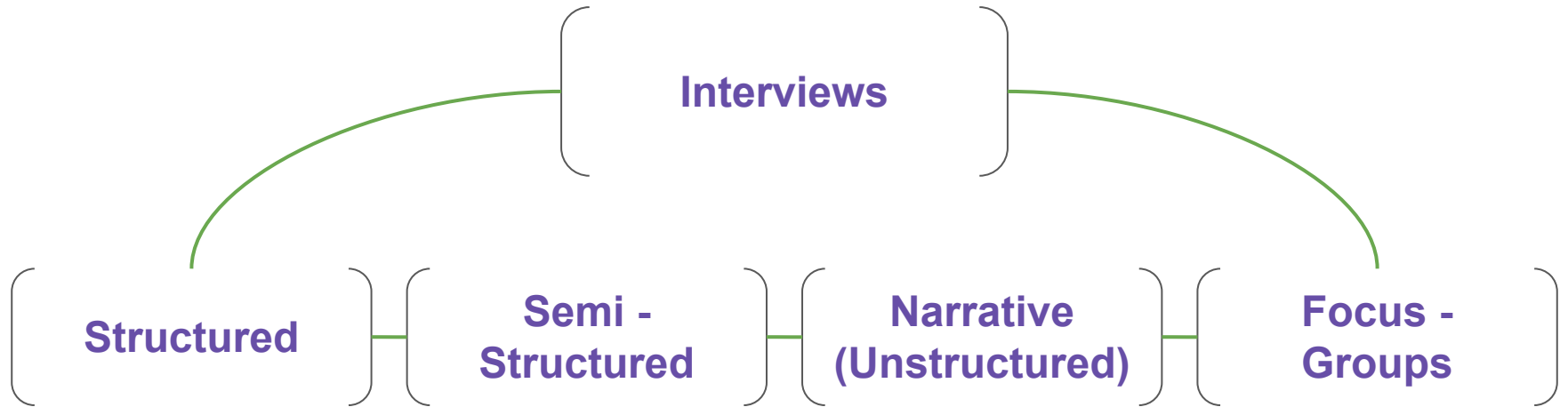
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There is NO product

- | | | |
|------------------------|------------------|------------------------------|
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| | • Interviews | |



Understand Your Users: Interview





Understand Your Users: Exploratory Studies

There is a product

- True-Intent Studies
- Remote Unmoderated Usability Studies
- Intercept Surveys
- Clickstream Analysis

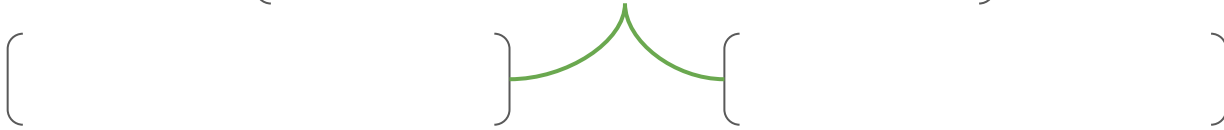
There is NO product

- | | | |
|------------------------|------------------|------------------------------|
| • Diary/Camera Studies | • Questionnaires | • Ethnographic Field Studies |
| • Participatory Design | • Observations | • Contextual inquiry |
| | • Interviews | |



Understand Your Users: Exploratory Studies

Validity of Research Design





Understand Your Users: Exploratory Studies

Generalizability
of outcomes

Validity of Research Design

Trustworthiness
of measurement

External Validity

Internal Validity

Selection of the sample

Size of the sample

Consistency of instruments

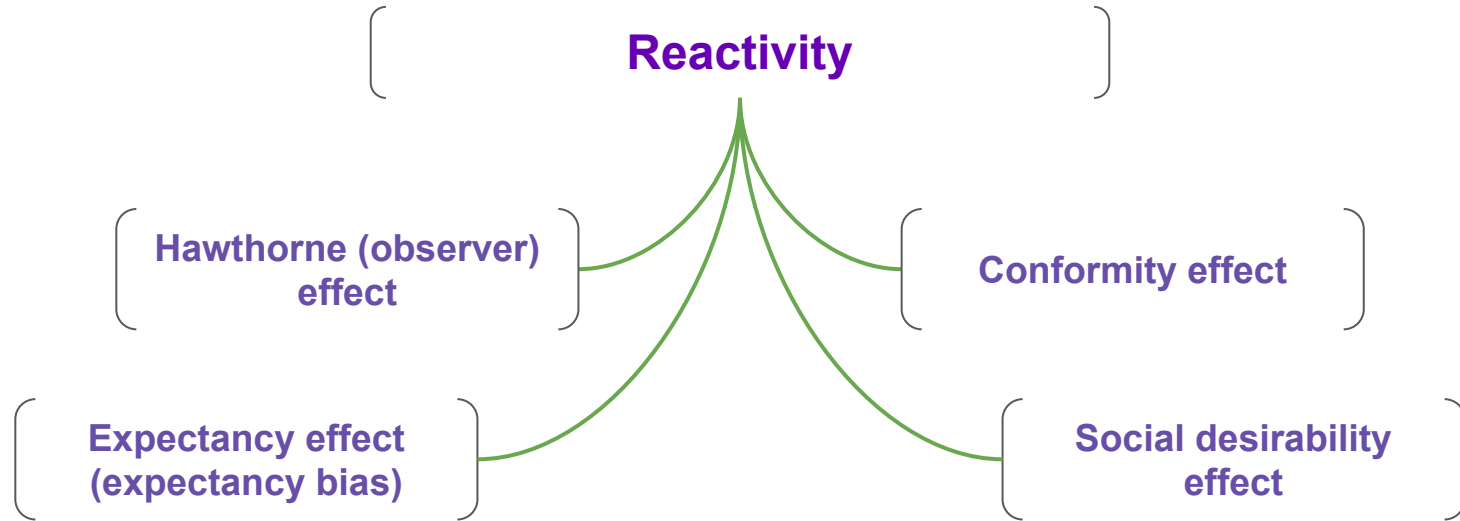
Experimental Situation

Time of the study

Reactivity

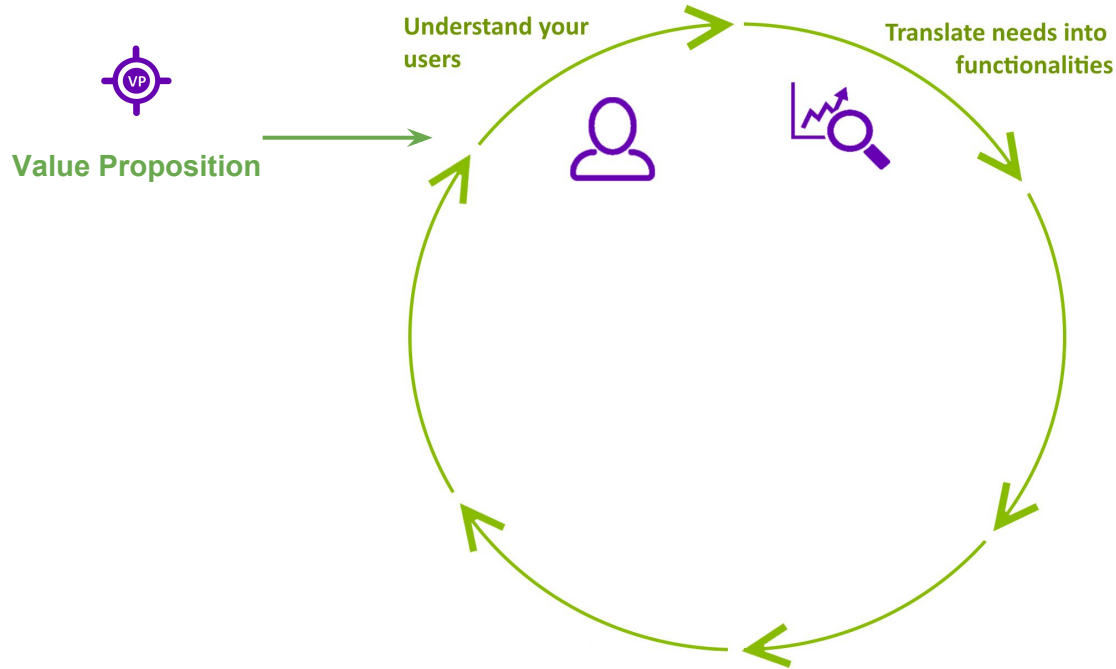


Understand Your Users: Exploratory Studies



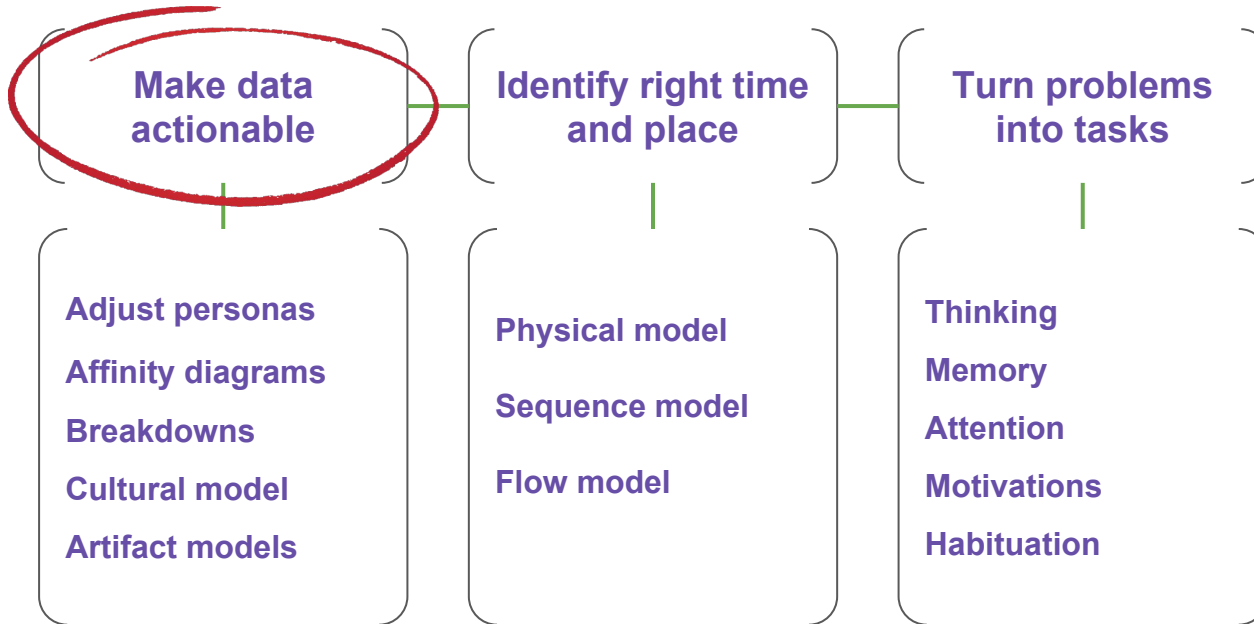


Course Review



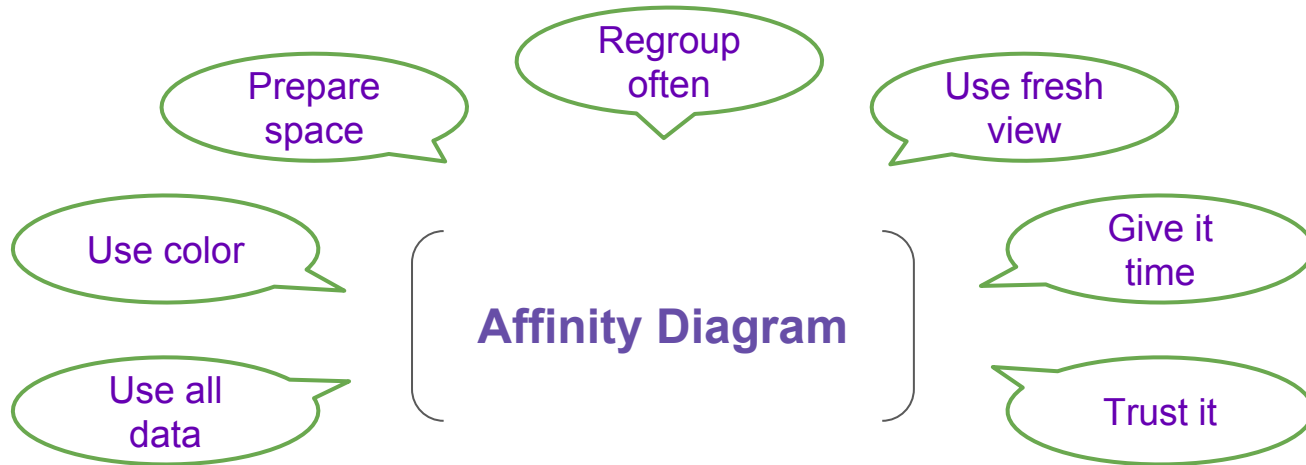


Translating Needs Into Functionalities





Understand Your Users: Analyzing Qualitative data





Translating Needs Into Functionalities

Make data
actionable

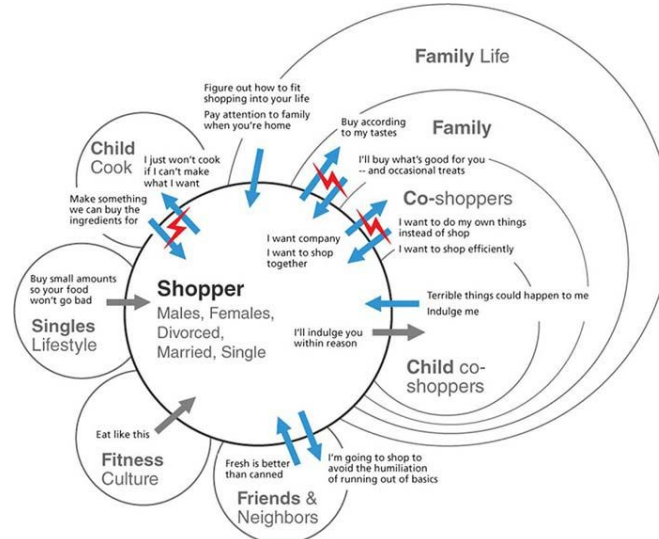
Adjust personas

Affinity diagrams

Breakdowns

Cultural model

Artifact models



Beyer, Hugh, and Karen Holtzblatt. Contextual design.



Translating Needs Into Functionalities

**Make data
actionable**

Adjust personas

Affinity diagrams

Breakdowns

Cultural model

Artifact models

External influences - because:

“Work takes place in a culture, which defines expectations, desires, policies, values, and the whole approach people take to work”

Beyer, Hugh, and Karen Holtzblatt.

Contextual design: defining customer-centered systems.

Includes:

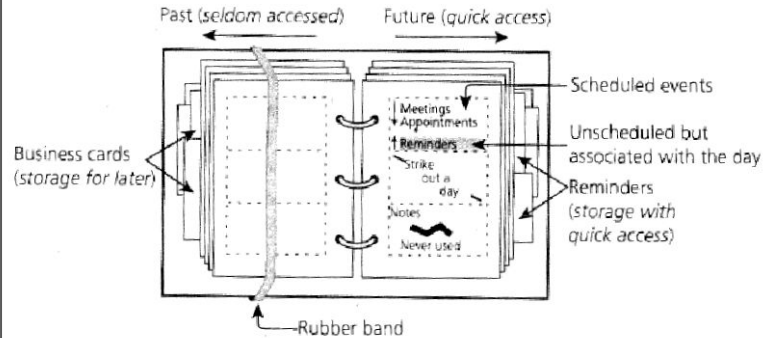
- Influencers (represented as bubbles)
- Extent of influence (overlap of bubbles)
- Influences (as arrows - mind direction)
- Breakdowns



Translating Needs Into Functionalities

**Make data
actionable**

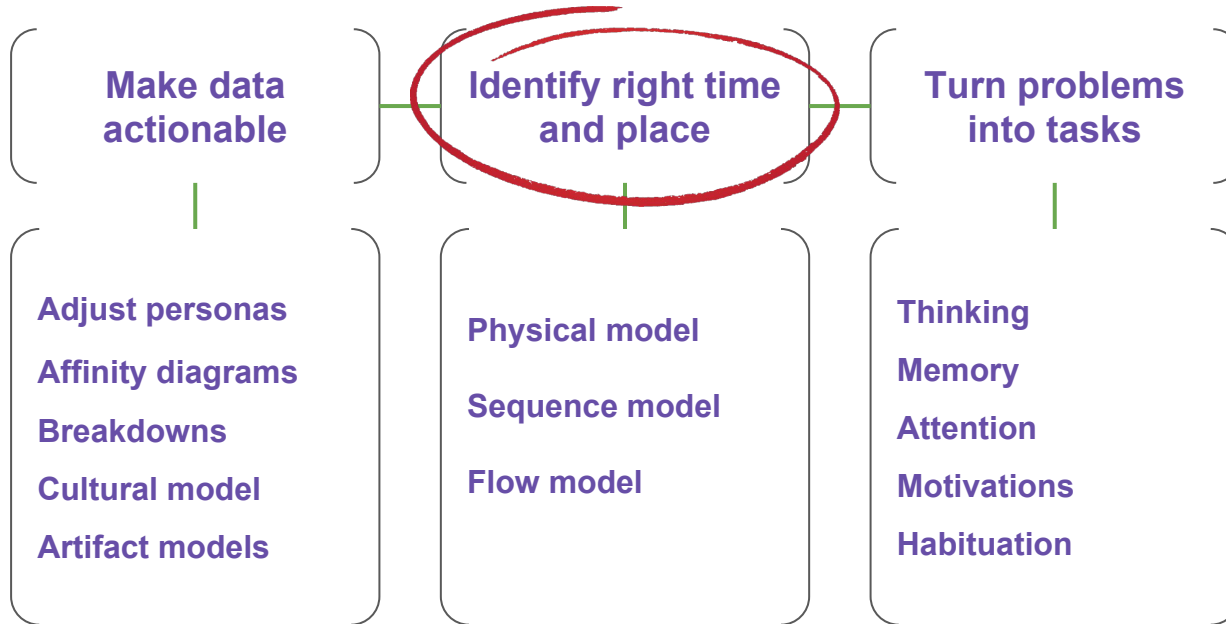
Adjust personas
Affinity diagrams
Breakdowns
Cultural model
Artifact models



Beyer, Hugh, and Karen Holtzblatt.
Contextual design: defining customer-centered systems.



Translating Needs Into Functionalities





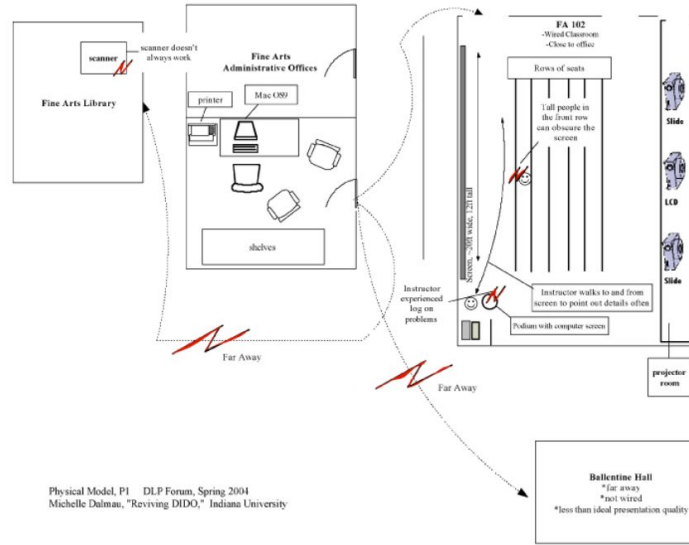
Translating Needs Into Functionalities

Identify right time
and place

Physical model

Sequence model

Flow model



Physical Model, P1 - DLP Forum, Spring 2004
Michelle Daltan, "Reviving DIDO," Indiana University



Translating Needs Into Functionalities

Identify right time
and place

Physical model

Sequence model

Flow model

Intent: Needs to prepare 4 lectures for A214: Life and Art of Ancient Rome – Roman Religion	
	Trigger: Class meets tomorrow afternoon, need to have first lecture ready
Note: In progress: PPT, Netscape 4.x and file Finder windows open before we arrived. Loyal MAC (OS 9.x) user.	Prompted by syllabus – topic for this week, Roman Religion
Intent: Recycle PPT – use a base PPT rather than start from scratch	Find existing PowerPoint (PPT) lecture on similar topic
Note: Keeps all the existing images/PPT slides	Copies (Saves As) PPT as A214 for Roman Religion Lecture
Intent: Colleague normally teaches this class (A214)	Goes to Classical Art Historian's course web page (A210) – Bookmarked
Intent: Colleagues usually has good images (from DIDO)	Browses "Roman Gods" link (see Artifact A210 home page)
Note: Image quality assessment is automatic and very subjective	Identifies desired image /assesses quality
Intent: Expand lecture with reliable resource	*Downloads image (CTRL+Click) to "Download Image to Disk"
Note: Knows keyboard shortcuts	*Saves image to "Roman Art" folder
Intent: Dynamically builds own image collection	No sub-folders – many, many unique images in one folder
	*Renames image (long, descriptive names)
Note: Steps identified with * are done fluidly and repetitively while preparing lecture. Steps will not be represented for every image found as such but in shorthand: Integrates image	*Copy and Paste image into PPT slide
	*Resizes/Positions image in PPT



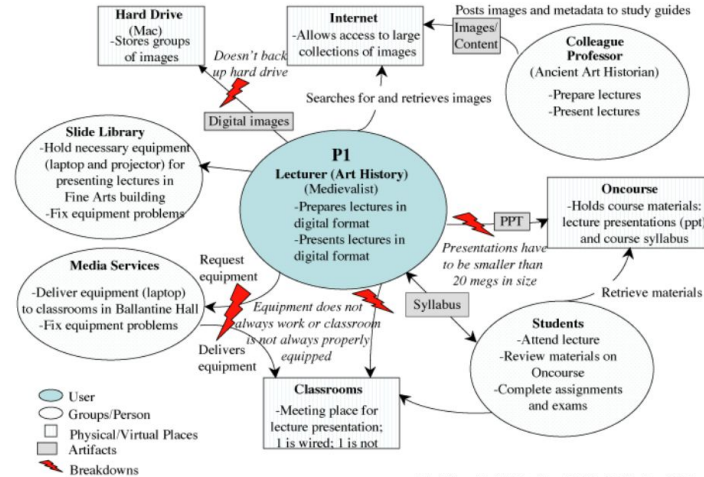
Translating Needs Into Functionalities

Identify right time
and place

Physical model

Sequence model

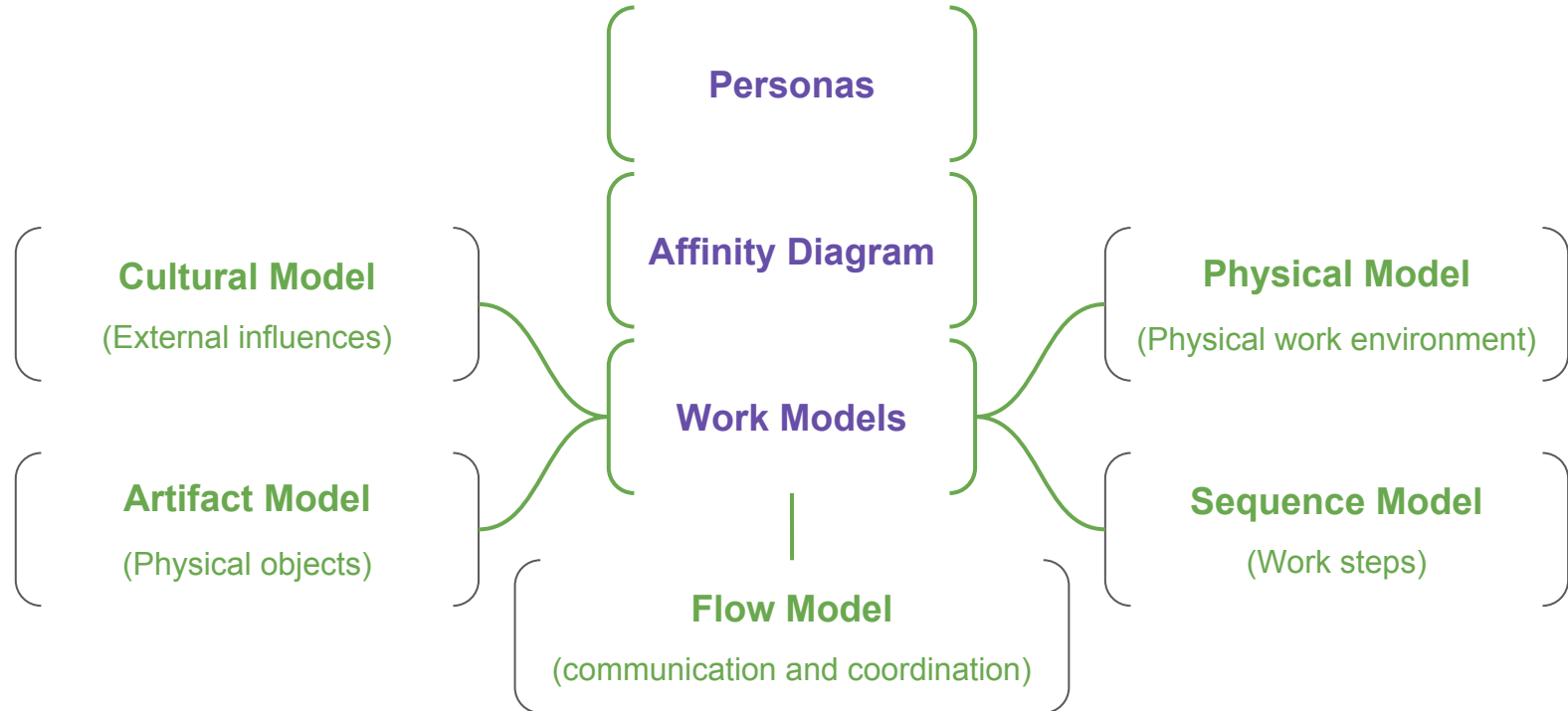
Flow model



Work Flow Model, "Reviving DIDO", DLF Spring 2004,
Michelle Dalmay, Indiana University

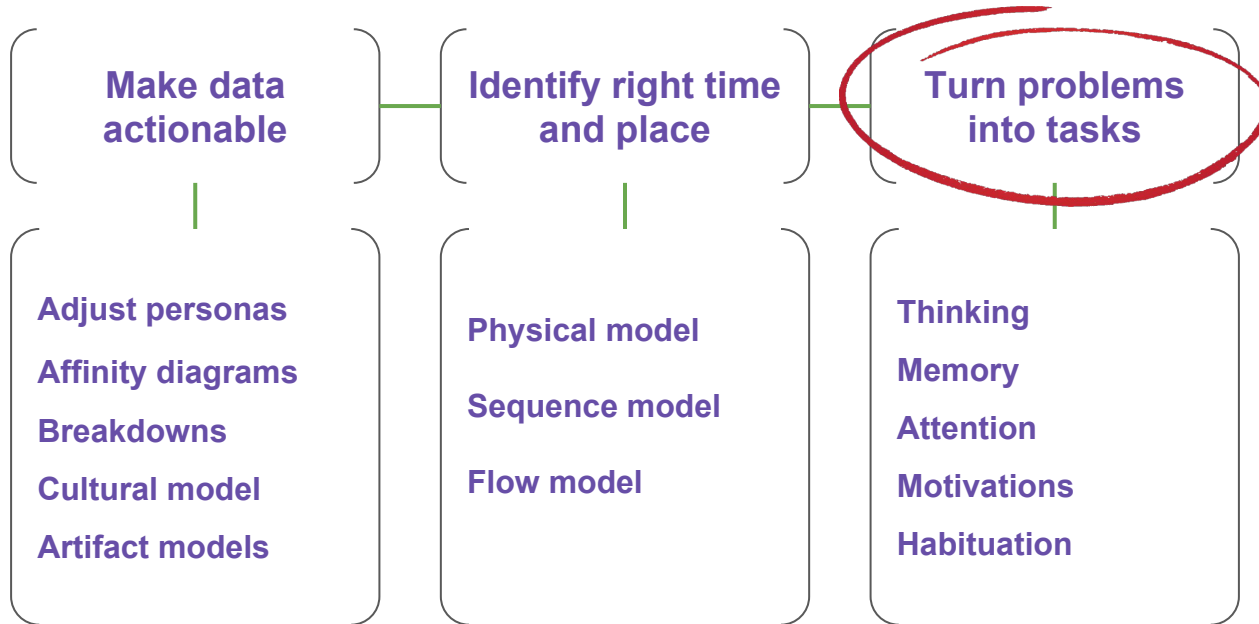


Translating Needs Into Functionalities: Preparation



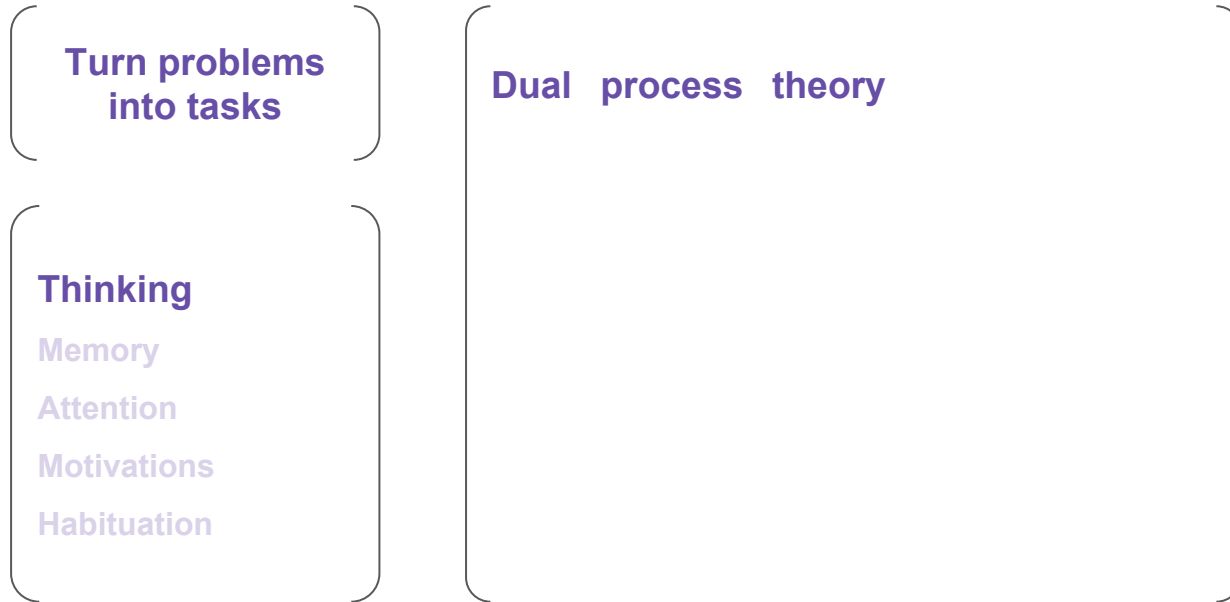


Translating Needs Into Functionalities





Translating Needs Into Functionalities





Translating Needs Into Functionalities

**Turn problems
into tasks**

Thinking

Memory

Attention

Motivations

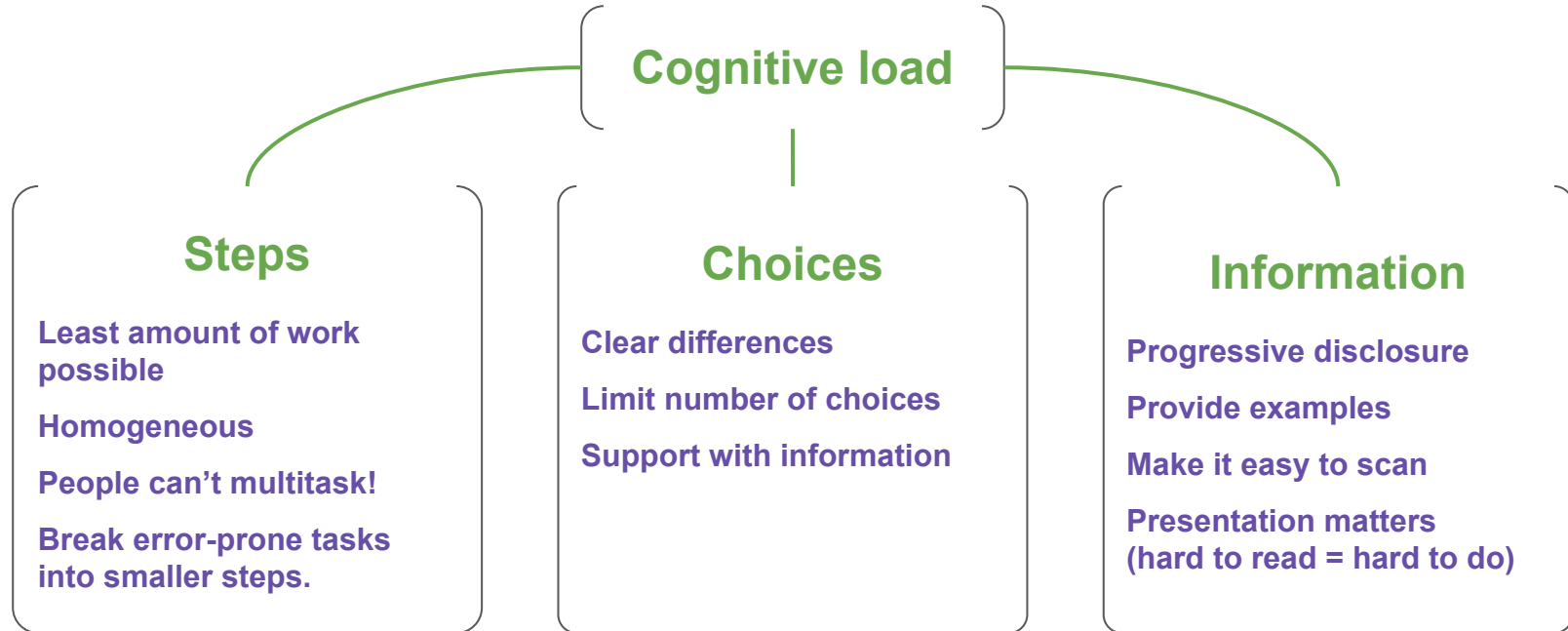
Habituation

Dual process theory

Cognitive load



Translating Needs Into Functionalities





Translating Needs Into Functionalities

**Turn problems
into tasks**

Thinking

Memory

Attention

Motivations

Habituation

Dual process theory

Cognitive load

Anticipate mistakes

(should be easy to undo, avoid error-prompt tasks)

Perception biases

(expectations determine perception)

**Age, socioeconomic status, cognitive
abilities influence decision making**



Translating Needs Into Functionalities

Turn problems
into tasks

Thinking

Memory

Attention

Motivations

Habituation

Perception - storage - retrieval

Recognition rather than recall

People can remember ~3-4 items at a time.

Zeigarnik effect - interrupted tasks are easier to remember (depends on the importance of the interrupted task for the person)



Translating Needs Into Functionalities

**Turn problems
into tasks**

Thinking

Memory

Attention

Motivations

Habituation

Focused attention is limited and selective

Inattentional blindness

Surface (awareness of features) **and content attention** (awareness of information)

Attention is dynamic - allow hierarchy



Translating Needs Into Functionalities

**Turn problems
into tasks**

Thinking

Memory

Attention

Motivations

Habituation

**Tention from unmet needs
(based on formed expectations)**

Work must be meaningful

Reward wisely

Desire to belong to a group

In-group/out-group biases



Translating Needs Into Functionalities

**Turn problems
into tasks**

Thinking

Memory

Attention

Motivations

Habituation

Pavlov's conditioning

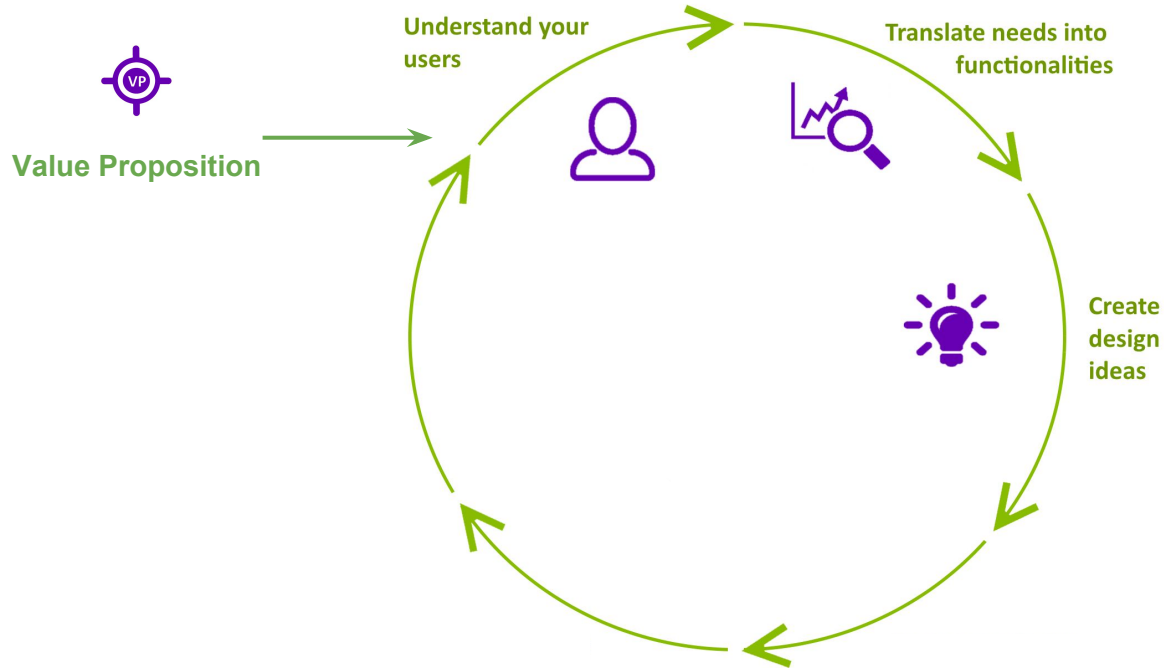
Skinner's operant conditioning (with reinforcement)

Based on formed patterns

Creating new habits: stimulus - response; breaking the pattern

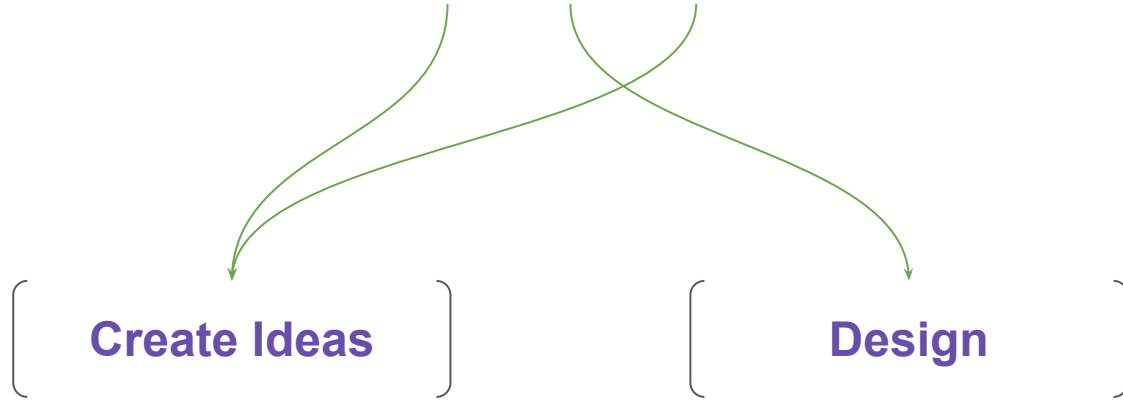


Course Review





Create Design Ideas





Create Design Ideas

Create Ideas

Creativity - process of producing a new idea which has value to someone

Nature

vs

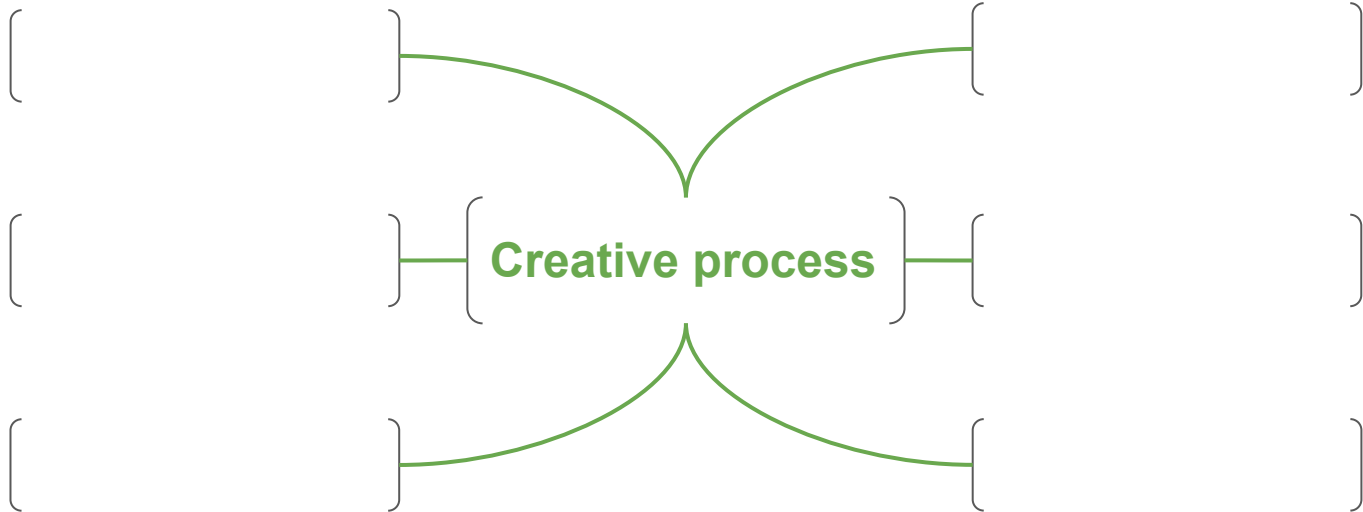
Nurture

Generating ideas: memories → ordinary → extraordinary



Create Design Ideas

Create Ideas





Create Design Ideas

Create Ideas

1. Preparation

Define the constraints: goals, parameters of the challenge, resources, time

Knowledge and understanding around the challenge: both academic and casual

Challenge all the assumptions



Create Design Ideas

Create Ideas

2. Provocation

Overcoming associative limitations

Design Fixation

Concept of *po* by Edward de Bono

Force of habits

Framing and reframing problems

Practice true randomness

Connect and combine

Change the routine



Create Design Ideas

Create Ideas

Mindful procrastination can sometimes be helpful

Different aspects of creativity require different brain activity

3. Incubation

Most ideas are formed subconsciously



Create Design Ideas

Create Ideas

An idea that might solve the challenge is pushed to the conscious level

Usually difficult to explain how you came up with this idea

Always write it down in the moment no matter what

4. Eureka moment



Create Design Ideas

Create Ideas

All ideas are rough when they are first visualized - get through the criticism

Be optimistic, give your crazy ideas a chance

No right answers, only working solutions

5. Verification



Create Design Ideas

Create Ideas

1. Preparation

4. Eureka moment

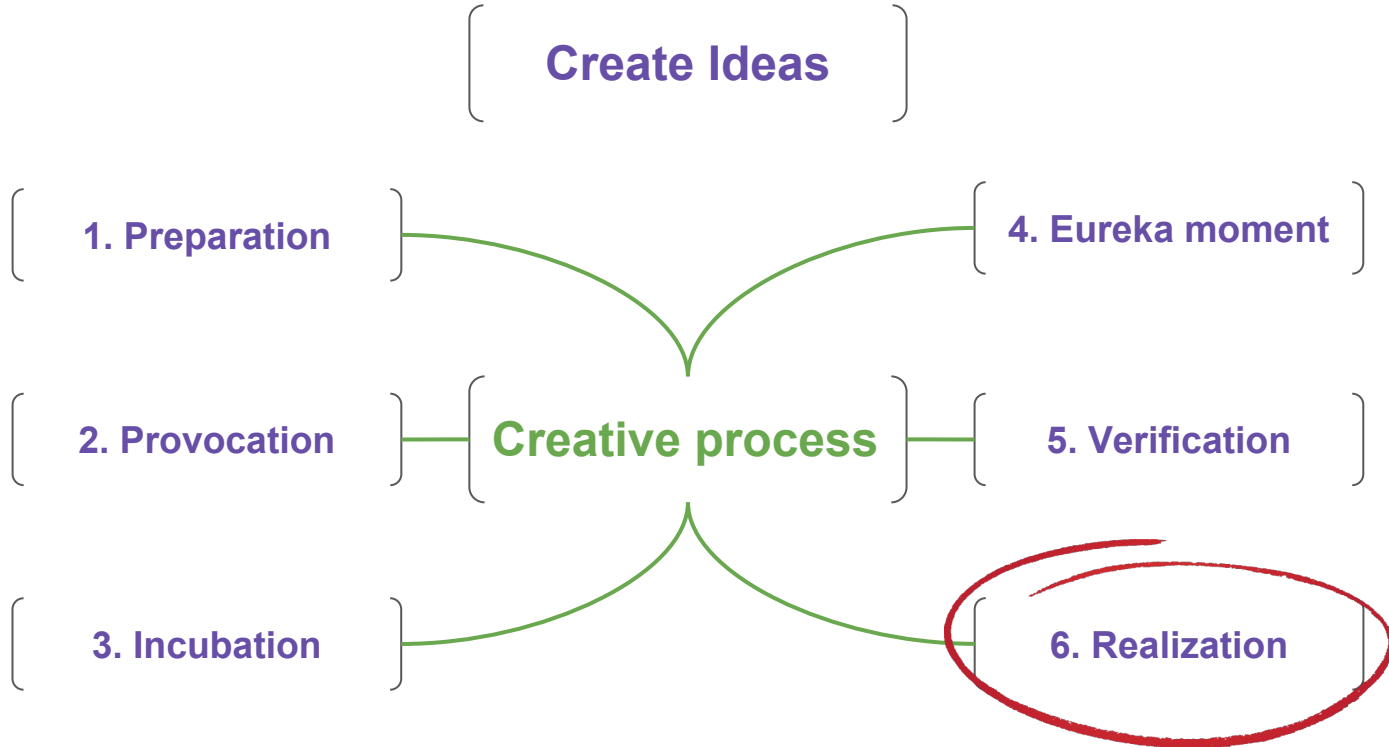
2. Provocation

Creative process

5. Verification

3. Incubation

6. Realization





Create Design Ideas

Sketches

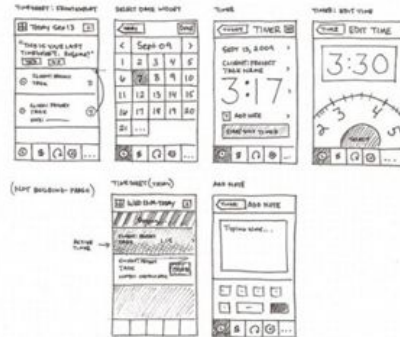
- illustration of how the basic concept works

User stories

- description of a feature from an end-user perspective

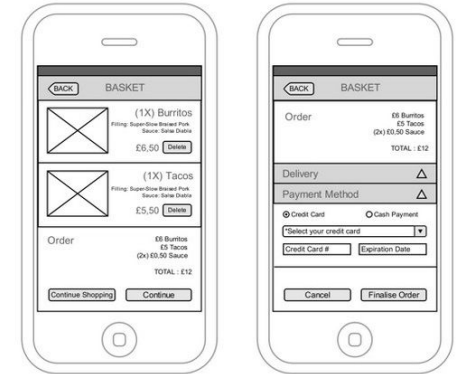
Wireframes

- static representation of the UI layout and user flow



The idea translated into user interface form.

As a user / <persona> ,
I want / need <action>
so that I can <user goal>.





Create Design Ideas

Design

Interface - a surface/place where two independent systems, bodies or spaces meet / form a common boundary, and communicate with each other

Interface - a communication channel

Communication - exchanging of information



Create Design Ideas

Design

Semiotics - the study of signs and symbols

Sign -
anything that
communicates a
meaning

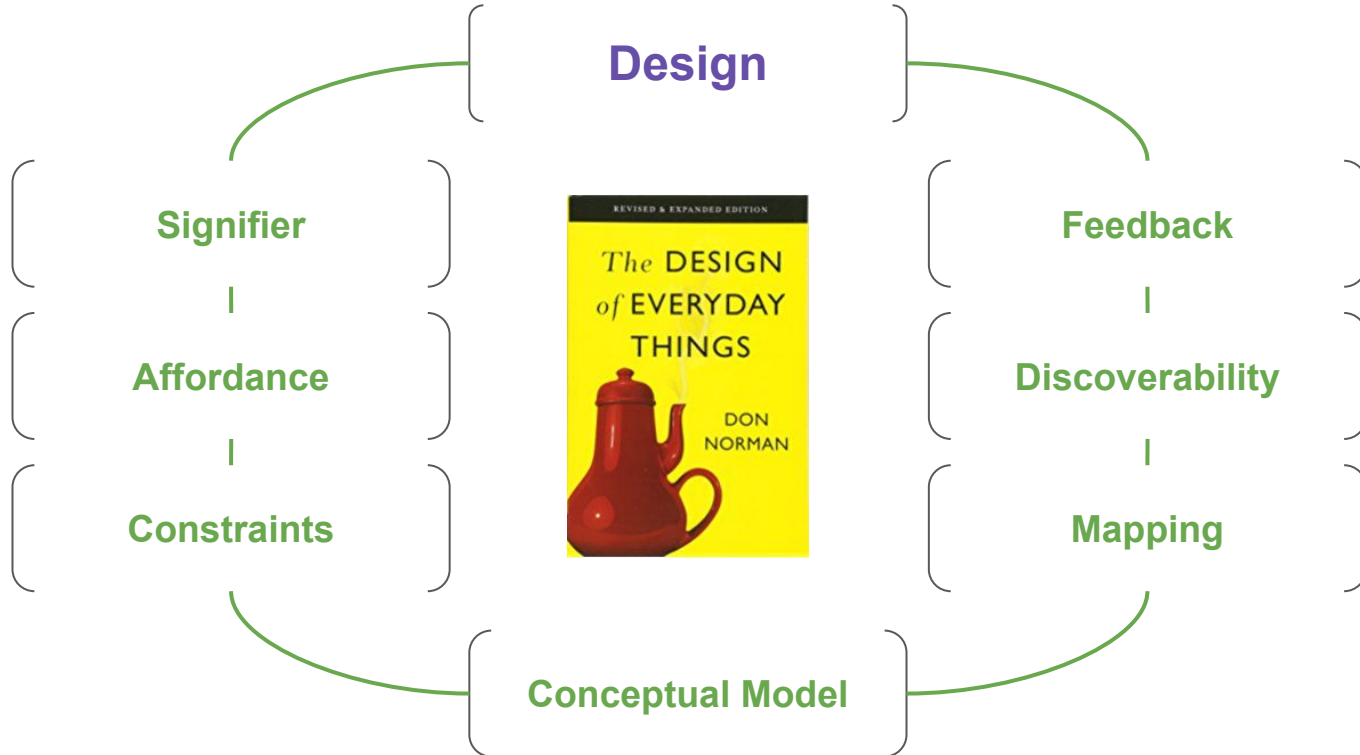
Representamen (signifier) -
the form of the sign

Interpretant -
what people make of the sign

Object (signified) -
the actual reference of the sign



Create Design Ideas





Create Design Ideas

Design

Signifier - indicators of any type that communicate the action needed so the affordance can take place

Affordance - the possible use for an object when interacting with it

Constraints - restrictions that limit the possible actions available with an object

Feedback - conveys effects of user's actions

Discoverability - whether it's possible to figure out how to use an object by interacting with it

Mapping - indication of the relationship between objects

Conceptual Model - user's understanding of how the system works



Create Design Ideas

Design

Signifier - indicators of any type that communicate the action needed so the affordance can take place

Affordance - the possible use for an object when interacting with it

Constraints - restrictions that limit the possible actions available with an object

Physical - caused by physical features

Cultural - based on what is culturally accepted

Semantic - based on the meaning of the situation

Logical - use reasoning to determine the alternatives



Create Design Ideas

Design

Signifier - indicators of any type that communicate the action needed so the affordance can take place

Affordance - the possible use for an object when interacting with it

Constraints - restrictions that limit the possible actions available with an object

Feedback - conveys effects of user's actions

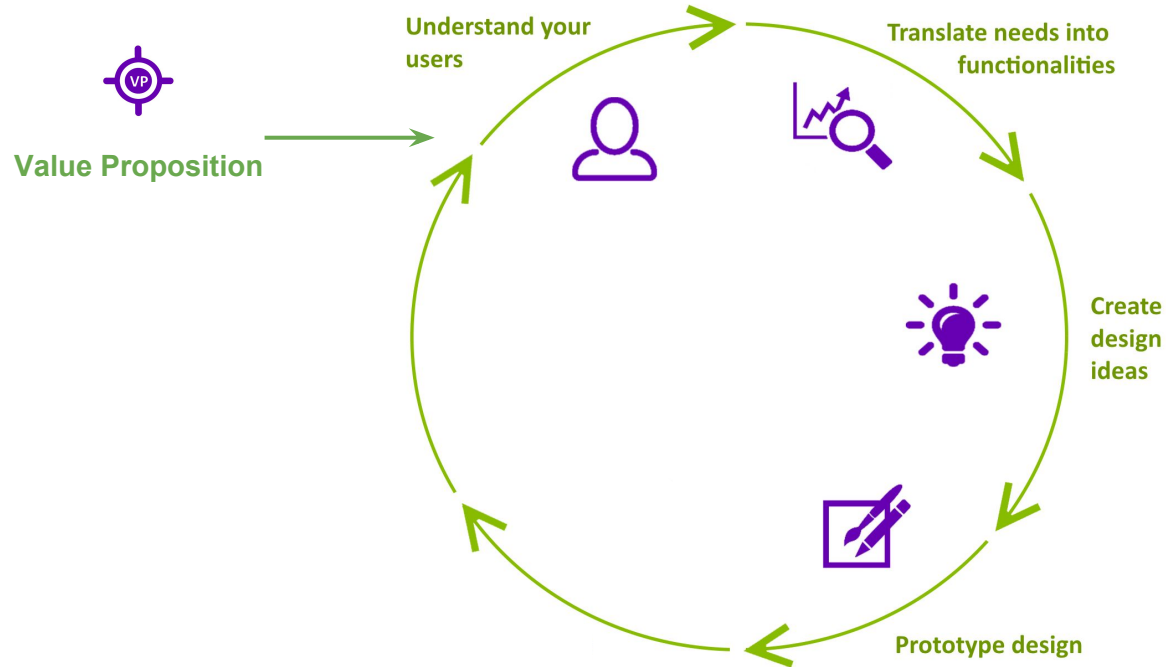
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Conceptual Model - user's understanding of how the system works



Course Review





Create Design Ideas



Prototype Design

Information Architecture - structural design
of shared information environments

Richard Saul Wurman

Users flow through
your product

Catalog user's
information

Presentation of the
information

Decision driving
function



Create Design Ideas



Prototype Design

Knowledge Organisation

Taxonomy

Folksonomy

**Domain Analytics
Approach**



Create Design Ideas

Prototype Design

Knowledge Organisation

Taxonomy

Practice of classification based on hierarchical relationship.

Parent-child hierarchies

Folksonomy

Practice of classification based on non-hierarchical relationship.

Public tags and their frequencies

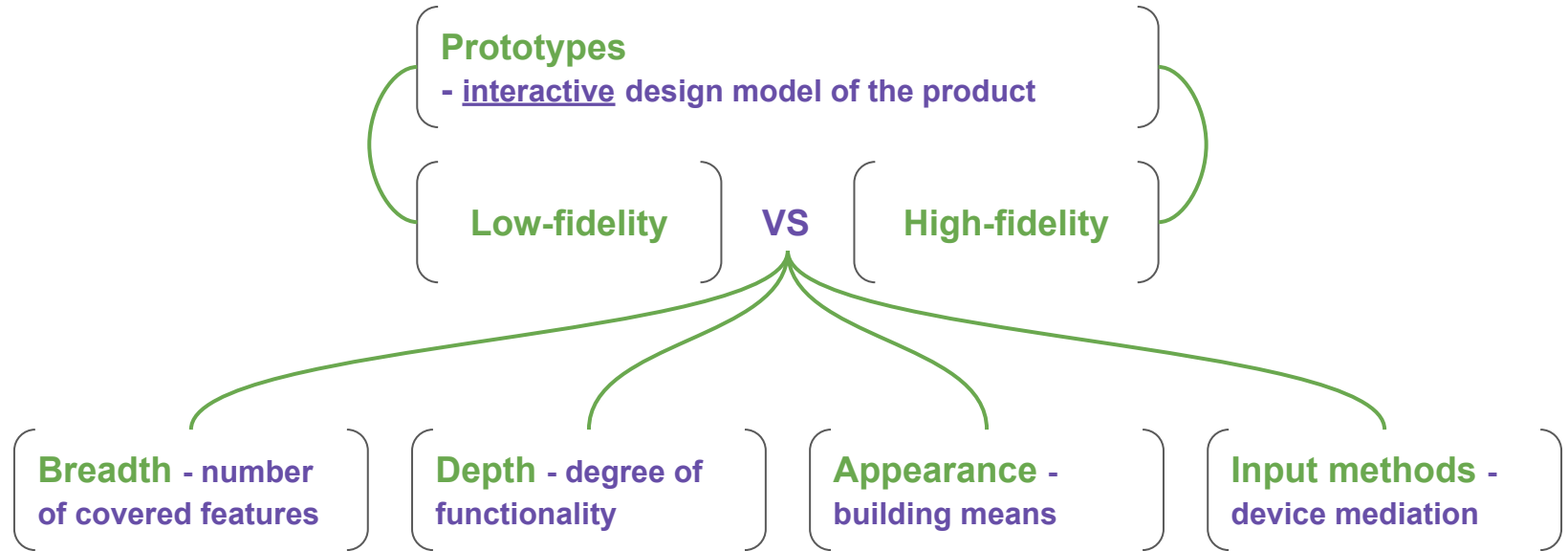
Domain Analytics Approach

Practice of classification based on sociological - epistemological view.

Indexing is suited to fulfill a task by specific group

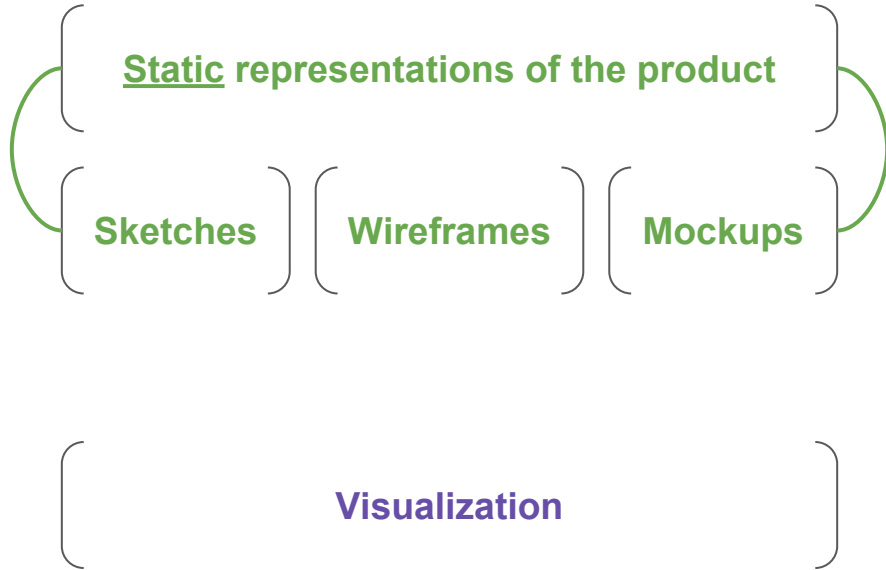


Prototype Design

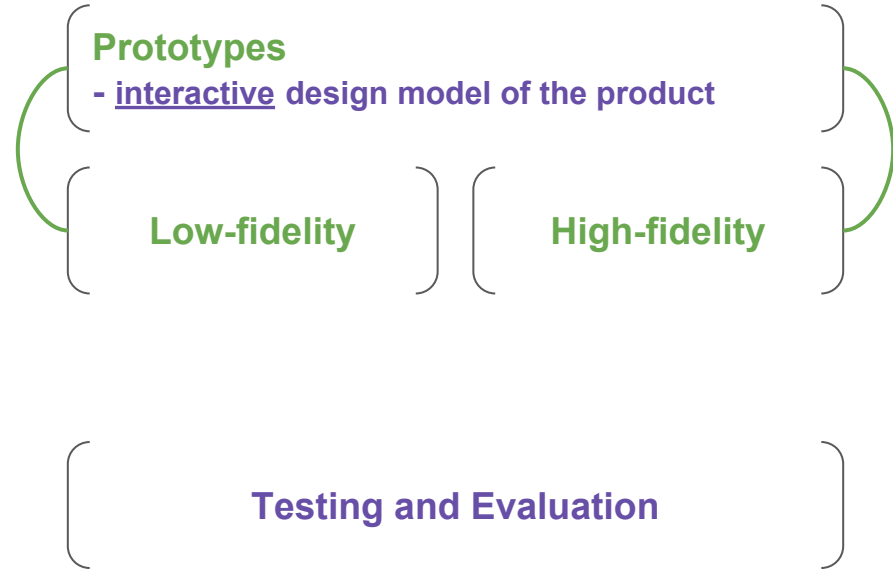




Create Design Ideas



Prototype Design





Prototype Design

Paper Prototyping Tips

Make it large

**Preprint
widgets**

**Add ideas as
they come**

Work fast!

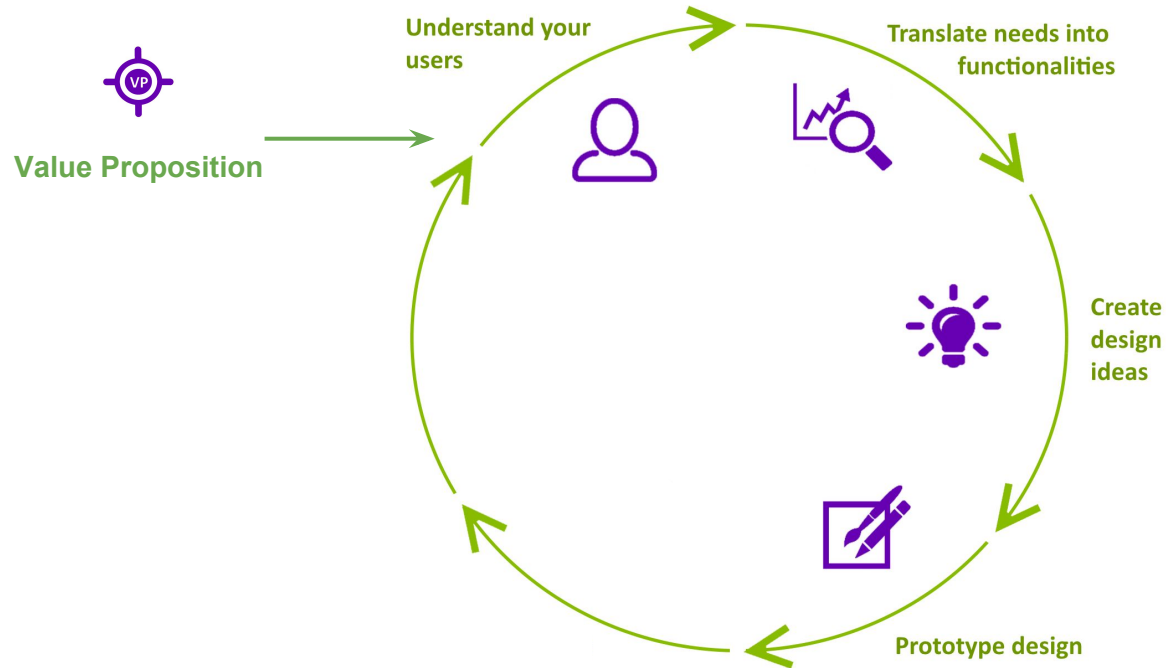
**Use audio
description**

**Make it
monochrome**

**One sketch
per screen**

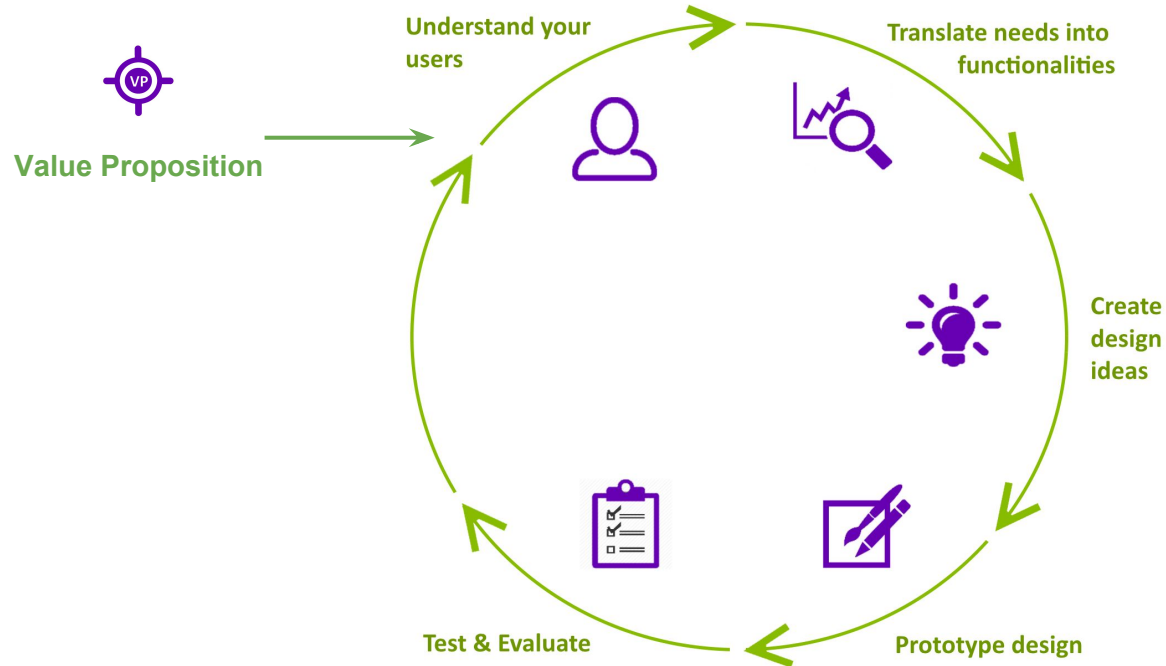


Course Review





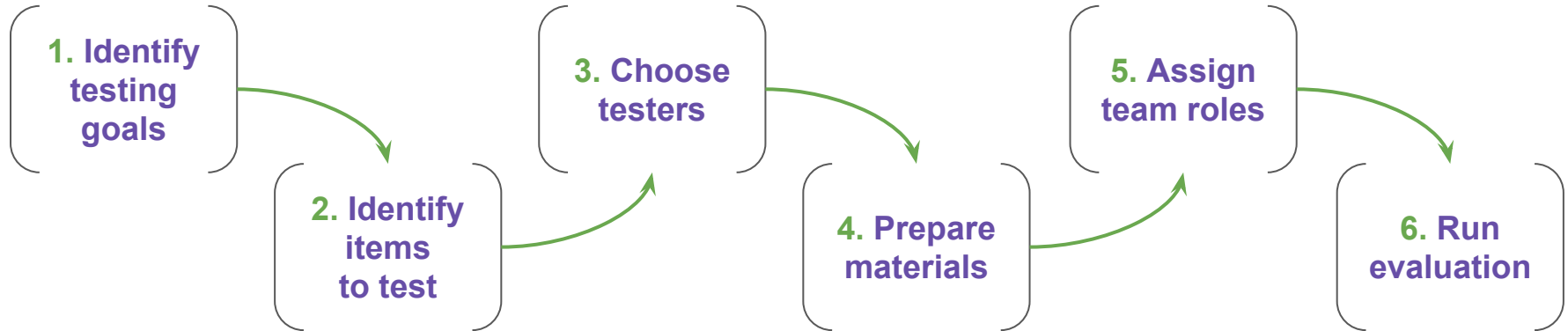
Course Review





Prototype Design

Paper Prototyping Evaluation





Course Review

