

SOFTWARE REQUIREMENTS & INTERACTION DESIGN

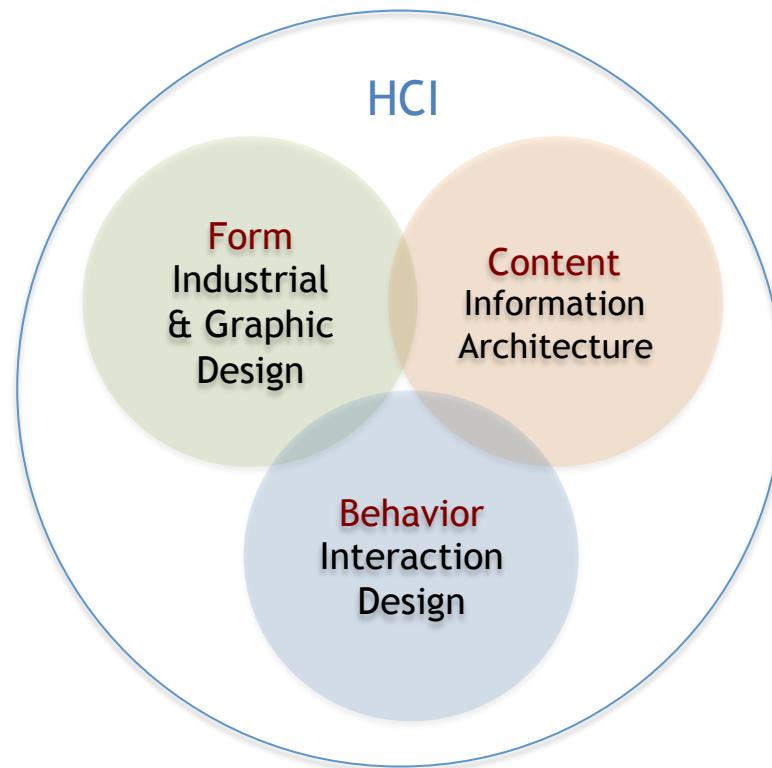


DIVING INTO INTERACTION DESIGN

Cécile Péraire

Human Computer Interaction (HCI)

Design of user experiences
(usefulness, usability, emotional impact)
for interactive computing systems



Interaction Design (IxD)

*“The practice of designing **interactive** digital products []*

Its main focus is on behavior []

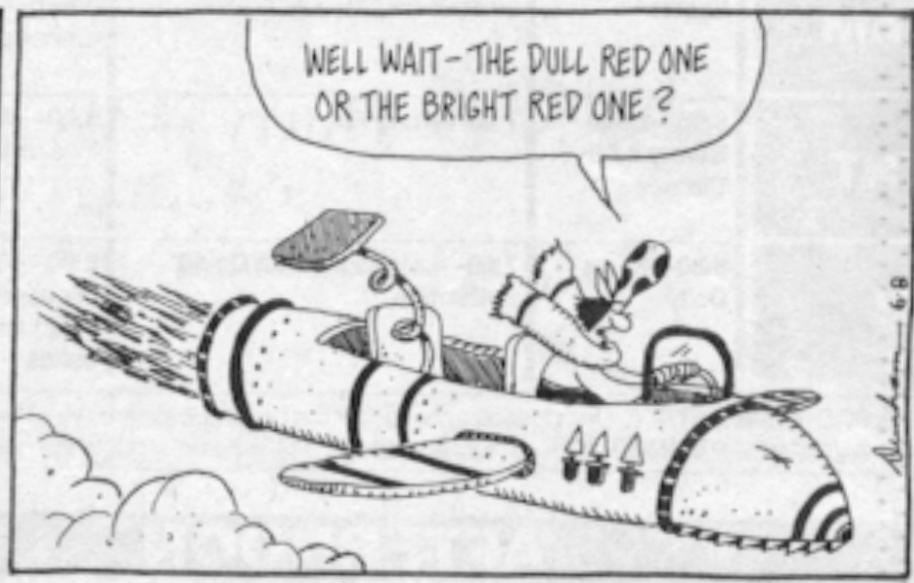
It is about synthesis and imagining things []

*It is concerned most significantly with
satisfying the needs and desires of the people
who will interact with the product”*

Alan Cooper & all, About Face

Any examples of bad interaction design?

OVERBOARD/CHIP DUNHAM



Interaction Problems

Do you have problems interacting with your TV, DVD Player, VCR, Stereo, etc.?

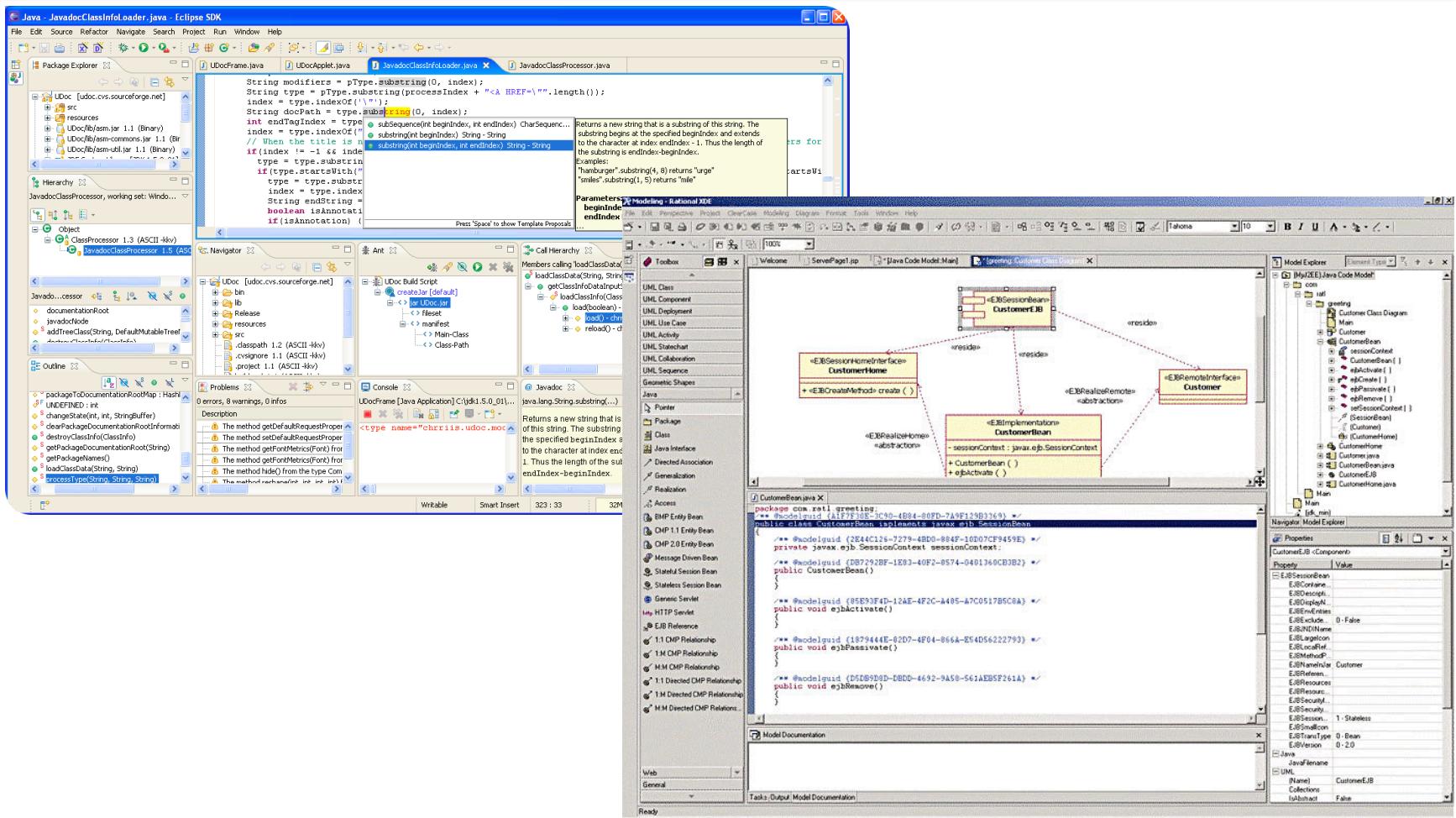


- Too many remotes
- Frustrating remotes
- Frustrating UIs

Interaction Problems



Interaction Problems



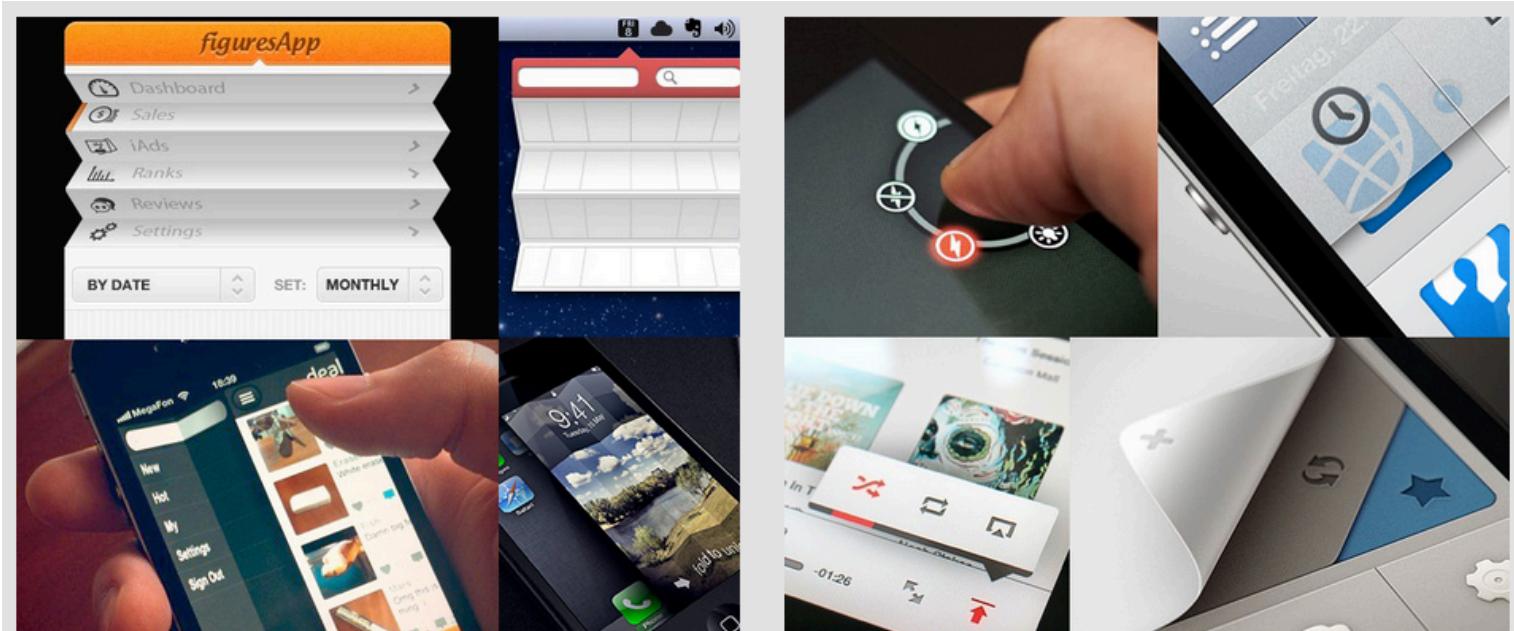
Interaction Problems



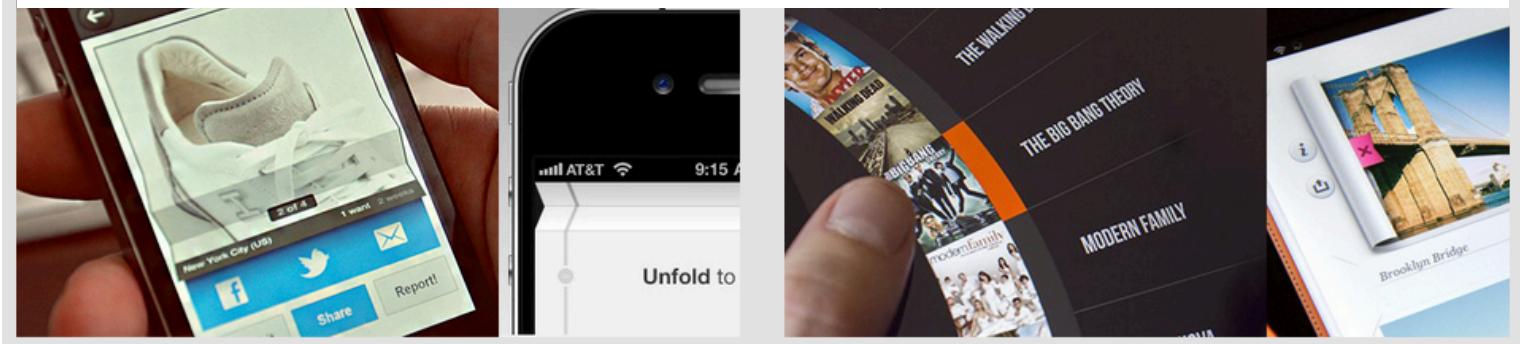
Interaction Problems



Design Innovation



Invent new and effective ways of interacting with information



Source: Awwwards

Design Innovation



iPod & iTunes
(2001)



iPhone
(2007)



Mobile Apps
Marketplace



Samsung
Smartwatch
(2013)



Microsoft Surface
(2012)

Design Innovation

A screenshot of the United.com website homepage. It features a top navigation bar with links for Home, Reservations, Travel Information, Deals & Offers, MileagePlus®, Products & Services, and About United. Below this is a search bar for "Flight, Hotel, Car, Vacation". The main content area includes sections for "Your social network, united.", "Latest News", "Print Boarding Pass", "Check Flight Status", "MileagePlus Sign In", and "Change or View Reservations". There are also promotional banners for "Customize your trip with Travel Options By United*", "Cruise Reservations", and "MileagePlus".

A screenshot of the updated United.com website homepage. It has a more modern, minimalist design with a yellow header bar. The main content area includes sections for "Book travel", "Flight status", "Check-in", "My trips", and a promotional banner for "Get inspired this fall with great fares from San Francisco". At the bottom, there is an offer for "50,000 bonus miles" and a "Boeing 787 Dreamliner - U.S.A." section.

From Web
to Mobile
to Web

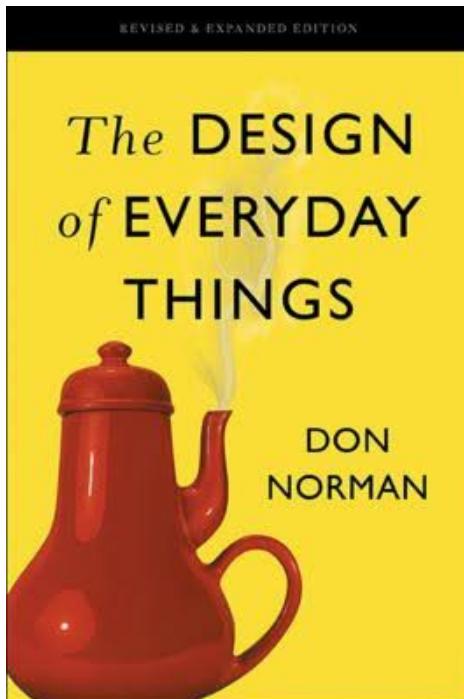


A screenshot of the United mobile application. The screen shows a large airplane image at the top. Below it is a yellow header bar with "Welcome to United" and a "Sign in" button. The main content area is divided into four cards: "Flight status" (with a "L" icon), "Airport maps" (with a compass icon), "Book a flight" (with an airplane icon), and "Check-in" (with a checkmark icon). The bottom of the screen has standard Android navigation icons.

Some HCI Thought Leaders

- Don Norman, Nielsen Norman Group
- Jakob Nielsen, Nielsen Norman Group
- Alan Cooper, Cooper
- Hugh Beyer, InContext
- Karen Holtzblatt, InContext
- Rex Hartson, Virginia Tech
- Brad Myers, CMU HCI
- Ben Schneiderman, University of Maryland
- Bill Buxton, Microsoft

Don Norman



THEORY OF HUMAN BRAIN PROCESSING: VISCERAL, BEHAVIORAL AND REFLECTIVE



Source:
Alan Cooper (based on Don Norman's Theory)

Don Morman's TEDTalk

One of 1,000+
TEDTalks

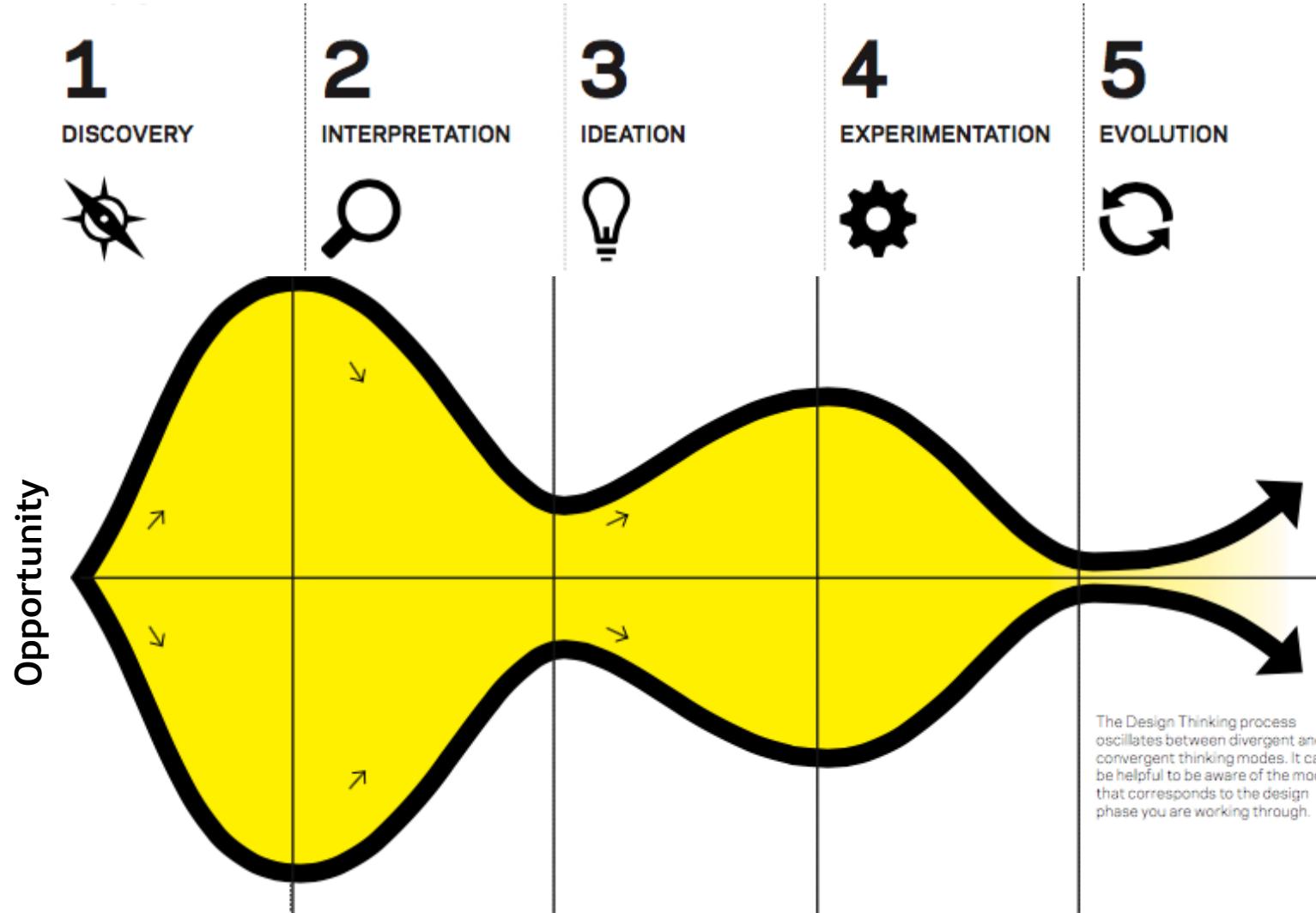
New ideas every weekday

TED.com

Agenda

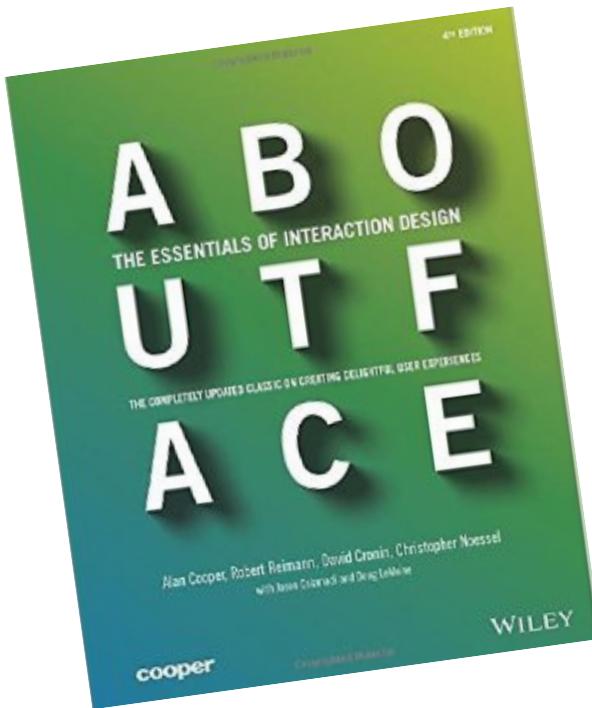
- Interaction Design (IxD) Process
 - Problem Domain
 - Research
 - Analysis
 - Solution Domain
 - Ideation
 - Experimentation

Double Diamond Design Thinking Process

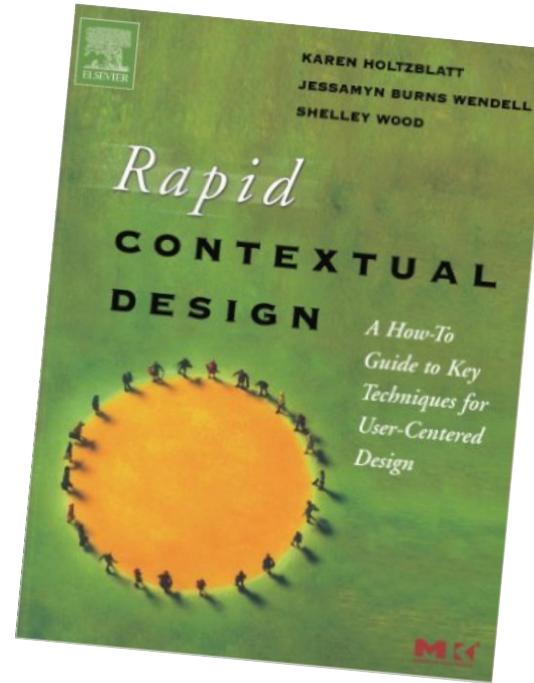


Source: IDEo LLC

References

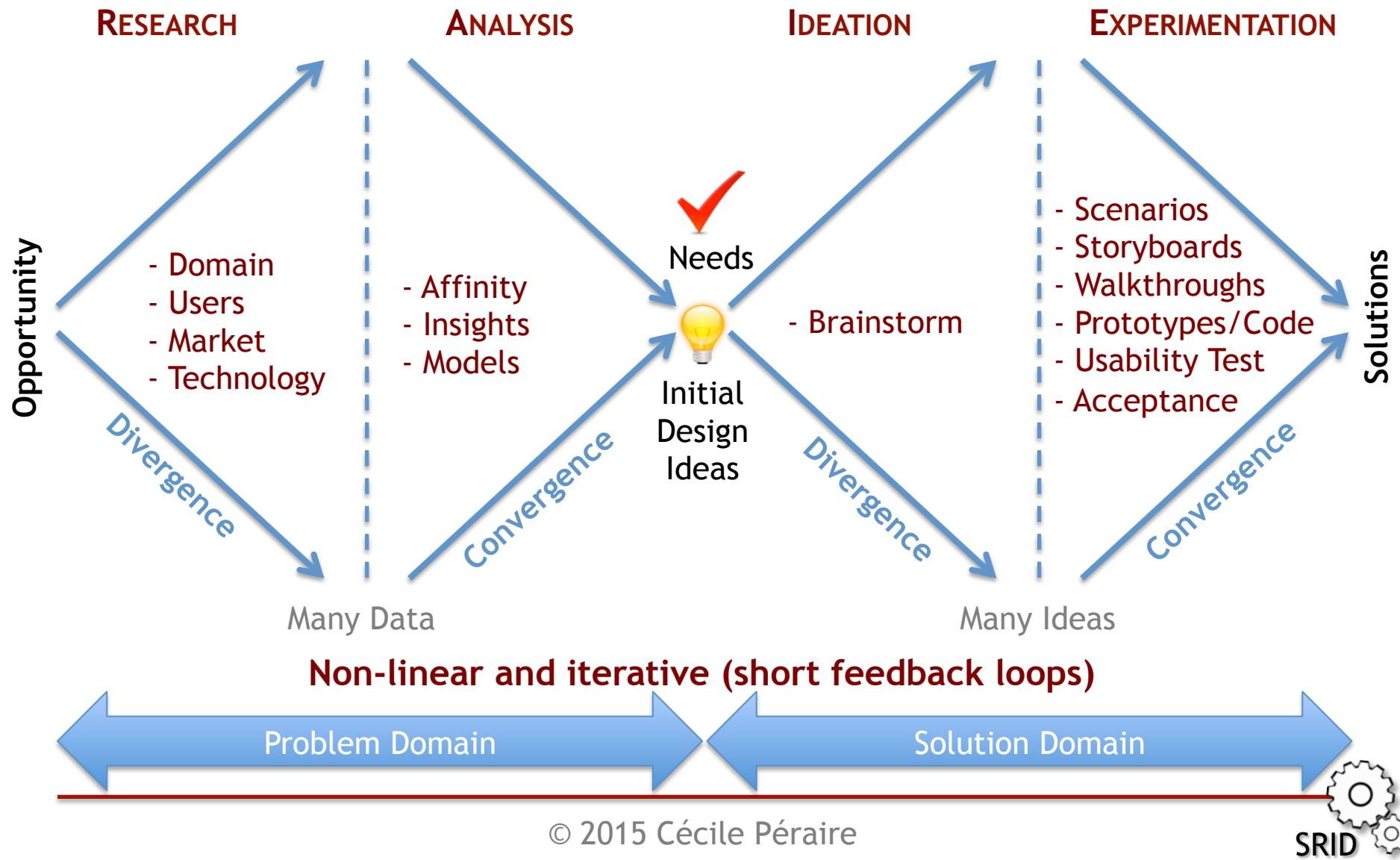


Alan Cooper & all
Process: Goal-Directed Design

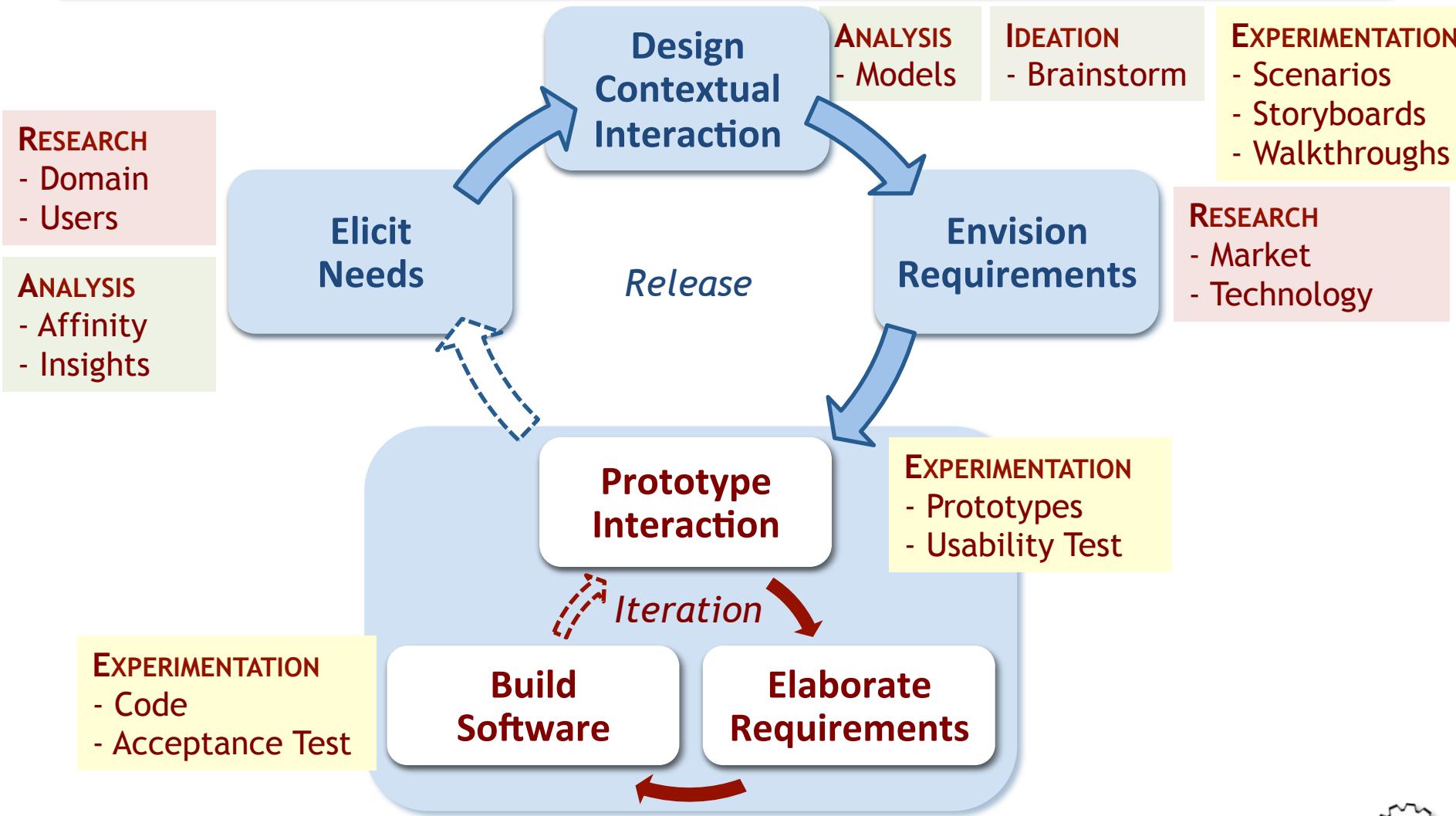


Hugh Beyer & all
Process: Contextual Design

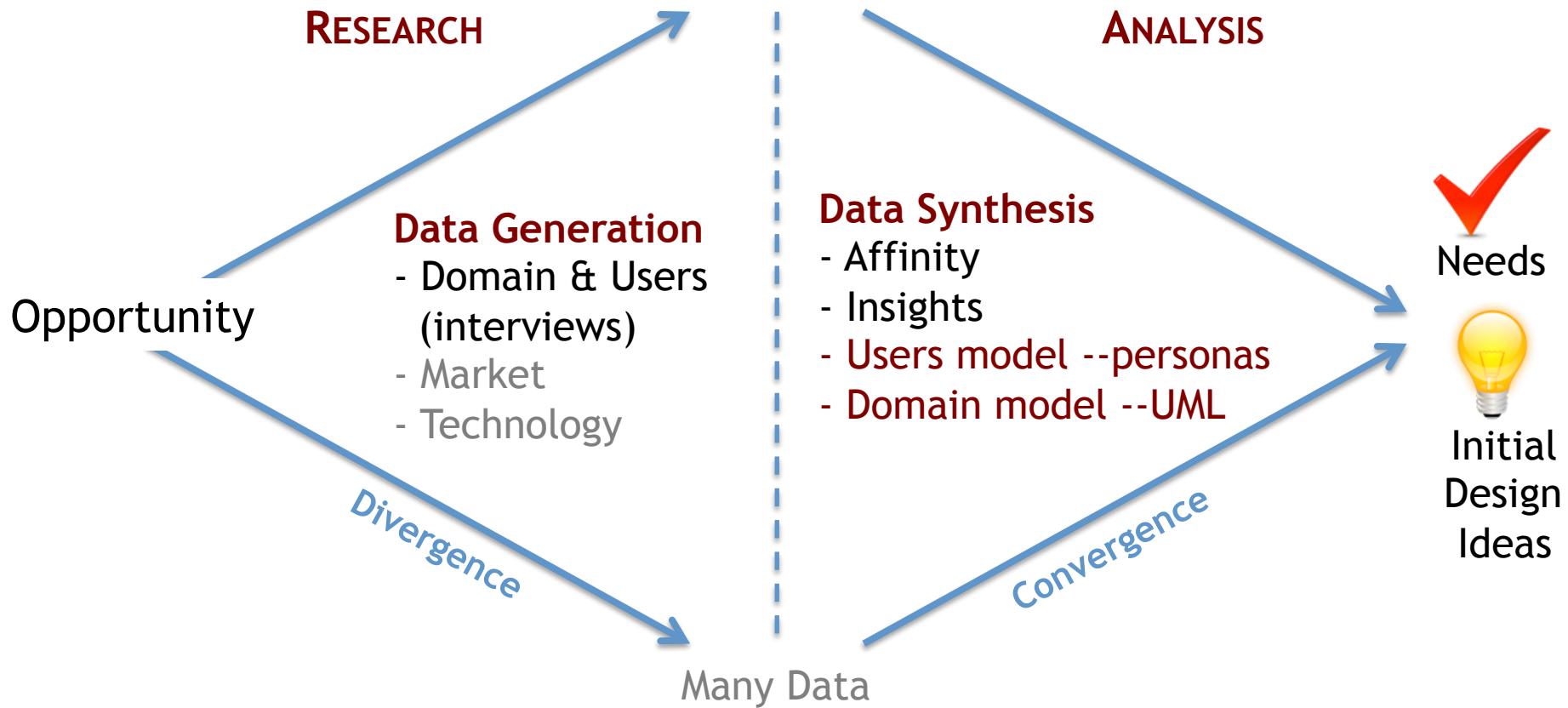
Double Diamond



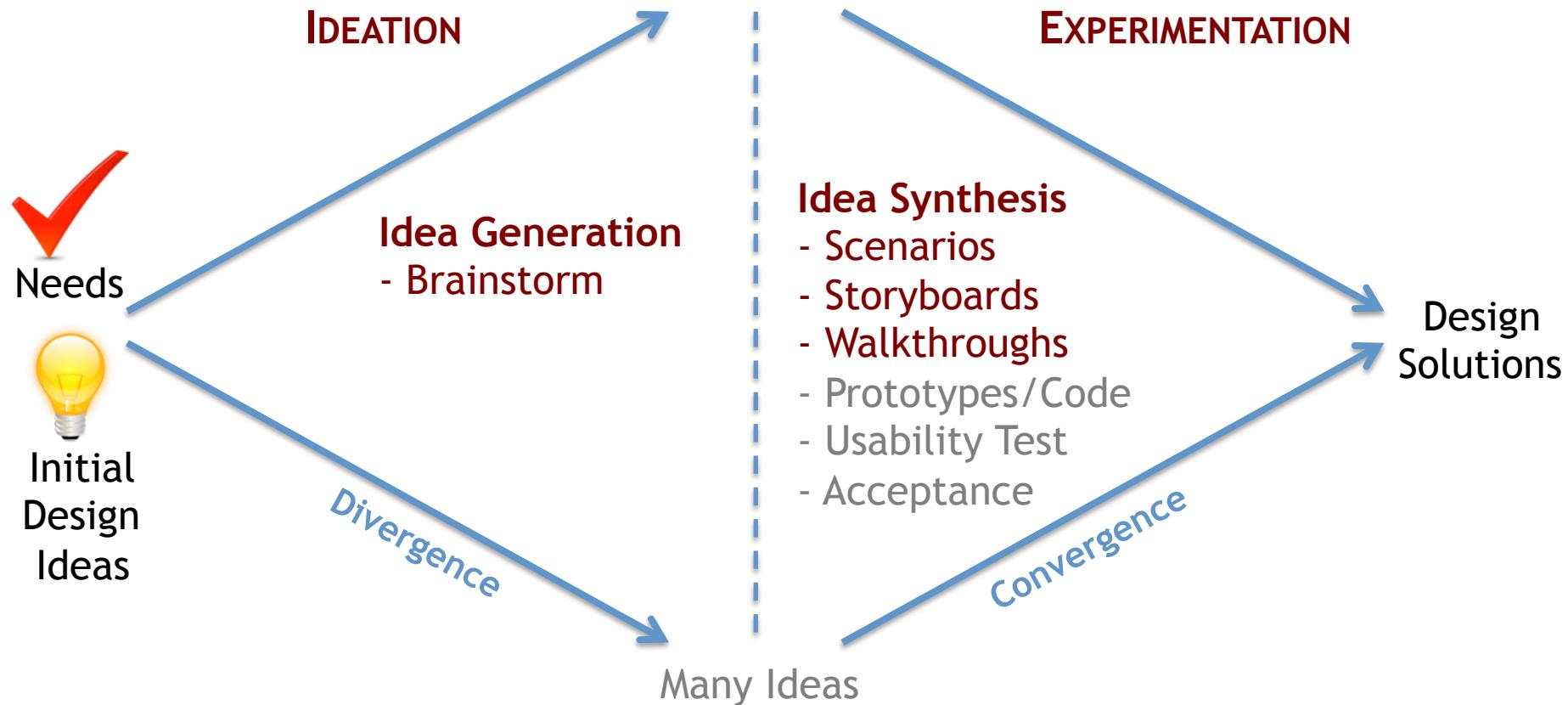
Double-Wheel Human-Centered Development Process



Diamond: Research & Analysis



Diamond: Ideation & Experimentation



Agenda

- Interaction Design (IxD) Process
 - Analysis
 - Model Users with Personas
 - Model Domain with UML
 - Ideation
 - Brainstorm
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 - Validate Interaction with Design Walkthroughs

What's wrong with this tool?



By targeting the entire world's population,
this tool does not serve any user well

Identify the Target Users



John
Sales Representative

*“I need to cut my daily apple,
even when I am on the road”*

Goal: Develop Empathy for Users
What is Empathy?

Empathy for Users

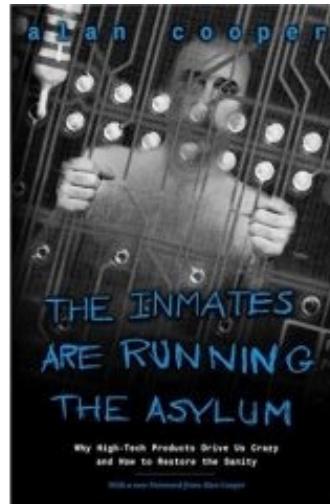
Ability to understand and share the feelings of users



Persona

- **User Archetype**
 - Typical example of a certain type of user
 - A representation of a user group whose members share similar goals, needs, and behavioral patterns

Alan Cooper
The Inmates are
Running the Asylum



Persona Examples

Specific to a Particular Application

Smartwatch Personas

Nicole Discreet 	Mike Tech Savvy 	Wendy Connected 	Richard Swiss Army Knife 
"When in meetings, I need discreet notifications when my kids text me"	"I need to have the latest and greatest technology"	"I almost always have the watch on my wrist to connect me to texts, emails, social networks"	"I want to remotely control nearby devices: phone, TV, lights..."

Help make decisions about the smartwatch app design

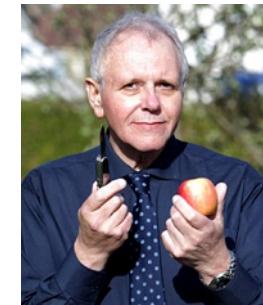
Source: Qualcomm, The Wearable Experience

Persona Creation



Driven by User Research Data (Interviews & Observation)

- Identify groups of users sharing similar:
Goals, Needs, Behavioral Patterns
→ Each group might become a Persona



Notes:

- A persona is NOT a job description
- A persona is NOT an average of all the users in the group
- A persona is NOT an existing person (at least officially😊)
- A persona is a typical user, representative of the group
- Briefly describe each Persona
→ Cast of Characters



Cast of Characters

Name
Title

Photo

Quote

Fitness Tracker Personas

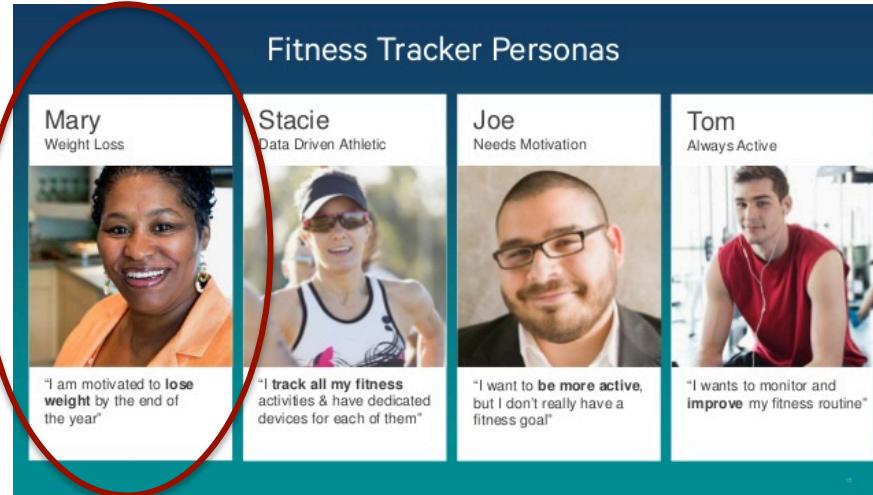
Name	Title	Photo	Quote
Mary	Weight Loss		"I am motivated to lose weight by the end of the year"
Stacie	Data Driven Athletic		"I track all my fitness activities & have dedicated devices for each of them"
Joe	Needs Motivation		"I want to be more active , but I don't really have a fitness goal"
Tom	Always Active		"I wants to monitor and improve my fitness routine"

Source: Qualcomm, The Wearable Experience



Primary and Secondary Personas

Primary Persona



Design for Primary Personas!

- Identify Primary Personas
 - Main target user for a given “interface”
- Identify Secondary Personas
 - Their needs are met, but via the primary persona interface, and without disturbing the primary persona

Detailed Persona Description



Professional and/or Personal Characteristics

Mary works in a coffee shop specialized in French “patisserie”. She cannot resist anything with chocolate. Easy access to delicious food is having a dramatic consequence on her weight. To avoid temptation, Mary is often using her cell phone during breaks to call her friends or connect to social networks. She does not like running, but she forces herself to run twice a week to lose weight.

End Goals

- Loose weight

Experience Goals

- Feel encouraged and supported

Life Goals

- Fit into my wedding dress in 3 months

Needs / Frustrations

- Resist food temptation
- Monitor my weight and calorie intake
- Get customized recommendation about food and exercise
- Share my struggle with others



Persona In-Class Activity

Situation

- **Motivation:** New Learning Management System (LMS)
 - LMS Examples: Acatar, Blackboard, Whiteboard, etc.
- **Context:** Target users interviewed
- **Primary personas identified:**
 - Student, Faculty



Persona In-Class Activity

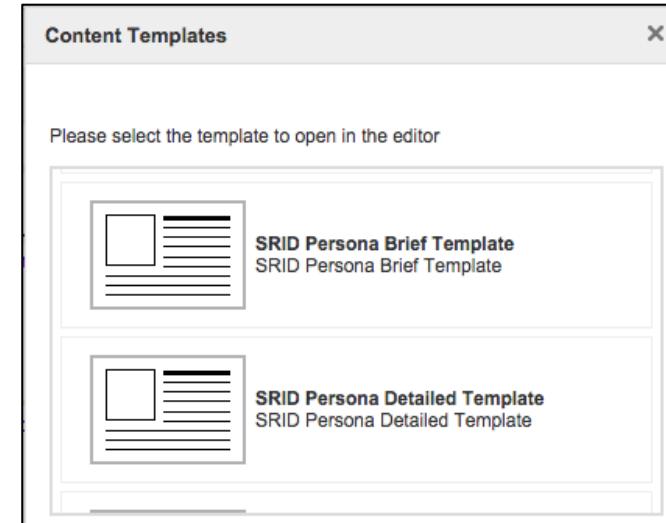
Activity

- **Develop**
 - Detailed description for **Student** and **Faculty** personas
- **Leverage**
 - Jama “SRI Persona Detailed Template”
- **Reflect**
 - What worked well?
 - What did not work well?
 - Did the activity modify your understanding of the users?
- **Share with the class**



In-Class Activity Tips

- Write **Professional and/or Personal Characteristics** narrative before **Goals and Needs**
- If an element does not support the design decision process, do not include it
- If you do not know, do not guess, ask instead
- Leverage Jama templates





Detailed Persona Description

[Photo]

Demographic Information

- **Name:** [First and Last Name]
- **Location:** [City, Country]
- **Title:** [Title]

Quote: ["Quote illustrating the persona key motivation"]

Professional and/or Personal Characteristics

[Short narrative about the persona key characteristics]

End Goals [List]

Experience Goals [List]

Life Goals [List]

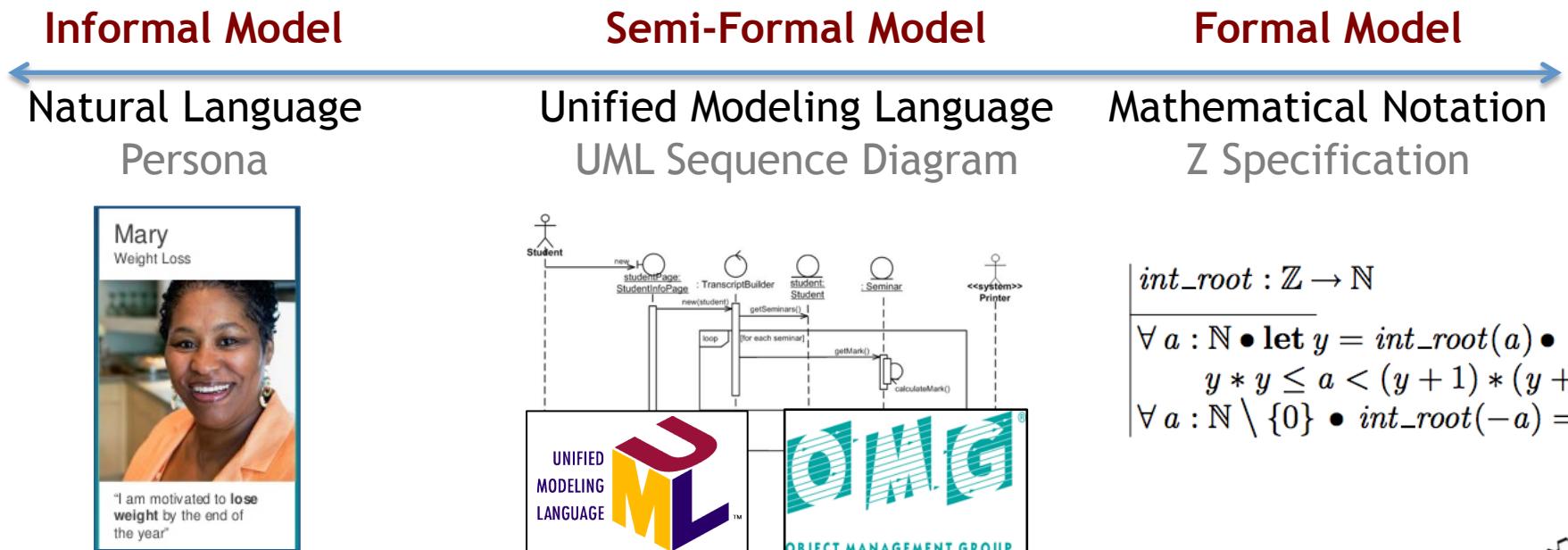
Needs / Frustrations [List]

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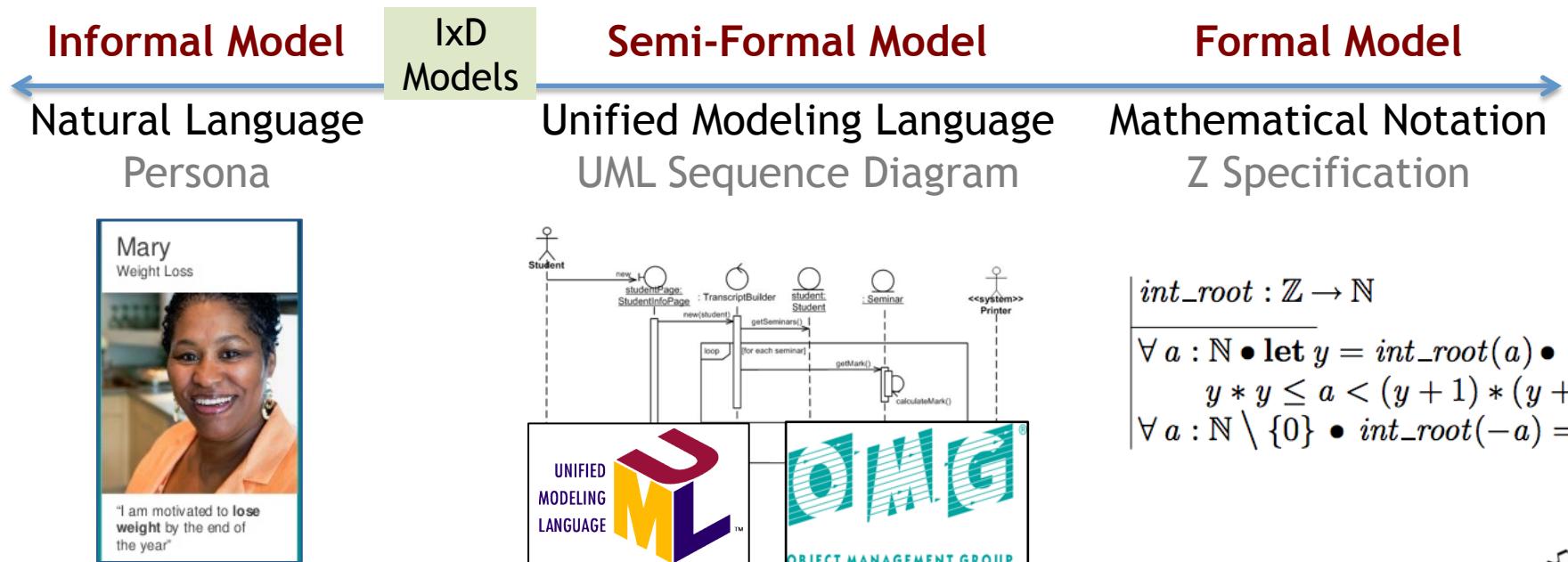
What is a Model?

An abstract representation of an element
(e.g. system, process, domain, user)
describing some of the element's **essential characteristics**
from one or more perspectives.



What is a Model?

An abstract representation of an element
(e.g. system, process, domain, user)
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Examples of IxD Domain Models

- **Flow Model**
 - Key participants and entities in the domain
 - Information flow and processes
- **Sequence Model**
 - Step-by-step description of tasks in the domain
- **Social Model**
 - Social influences, constraints, feelings, concerns
- **Artifact Model**
 - Work products manipulated in the domain
- **Physical Model**
 - Layout of the physical environment

Flow Model Slideshow Presentation

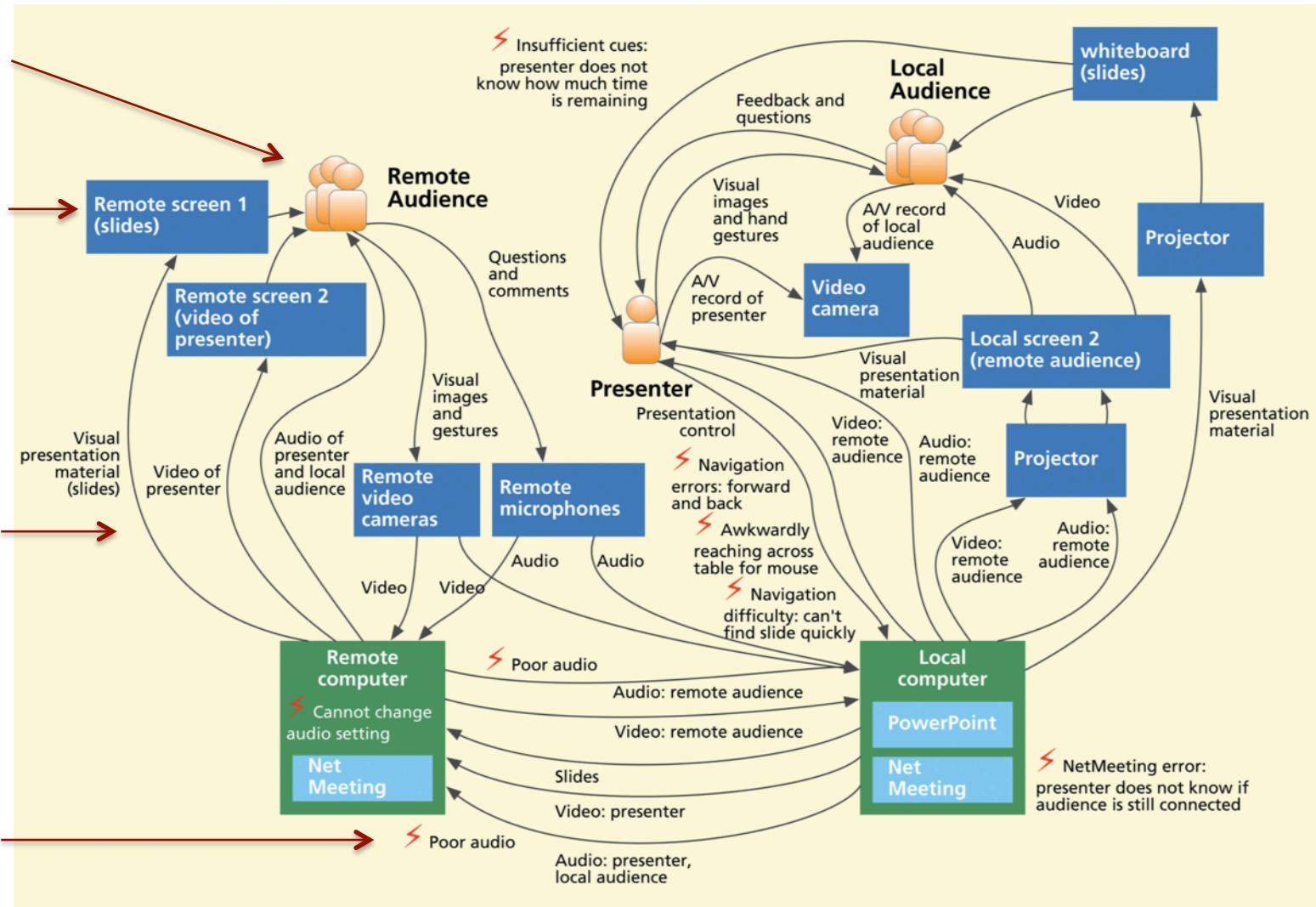
Information
Flow and
Processes

Participant
or Group

Physical or
Conceptual
Entity

Information
Flow

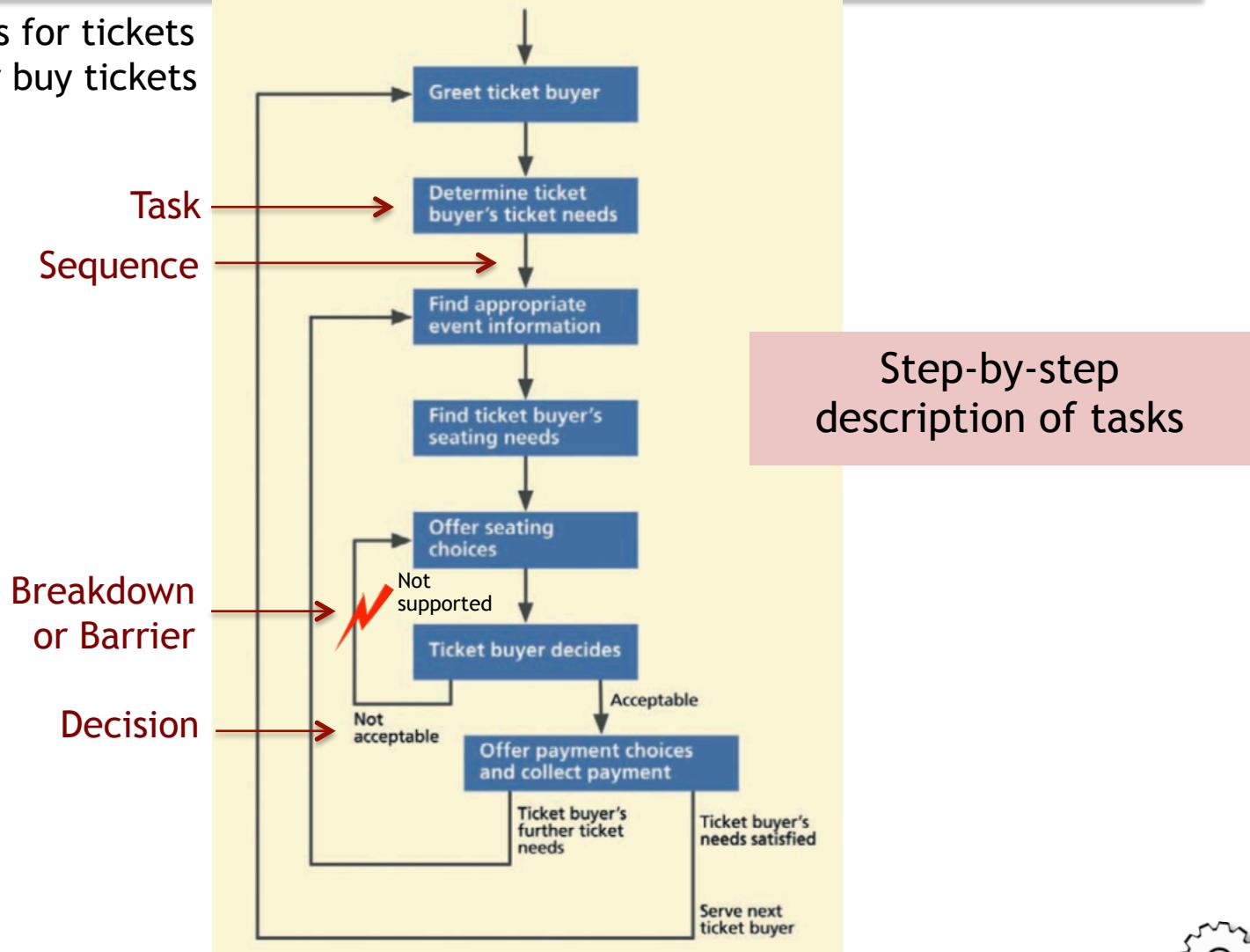
Breakdown
or Barrier



Source: Adapted from The UX Book

Sequence Model Ticket Kiosk System

Trigger: Buyer asks for tickets
Intent: Help buyer buy tickets



Source: Adapted from The UX Book

Social Model Slideshow Presentation

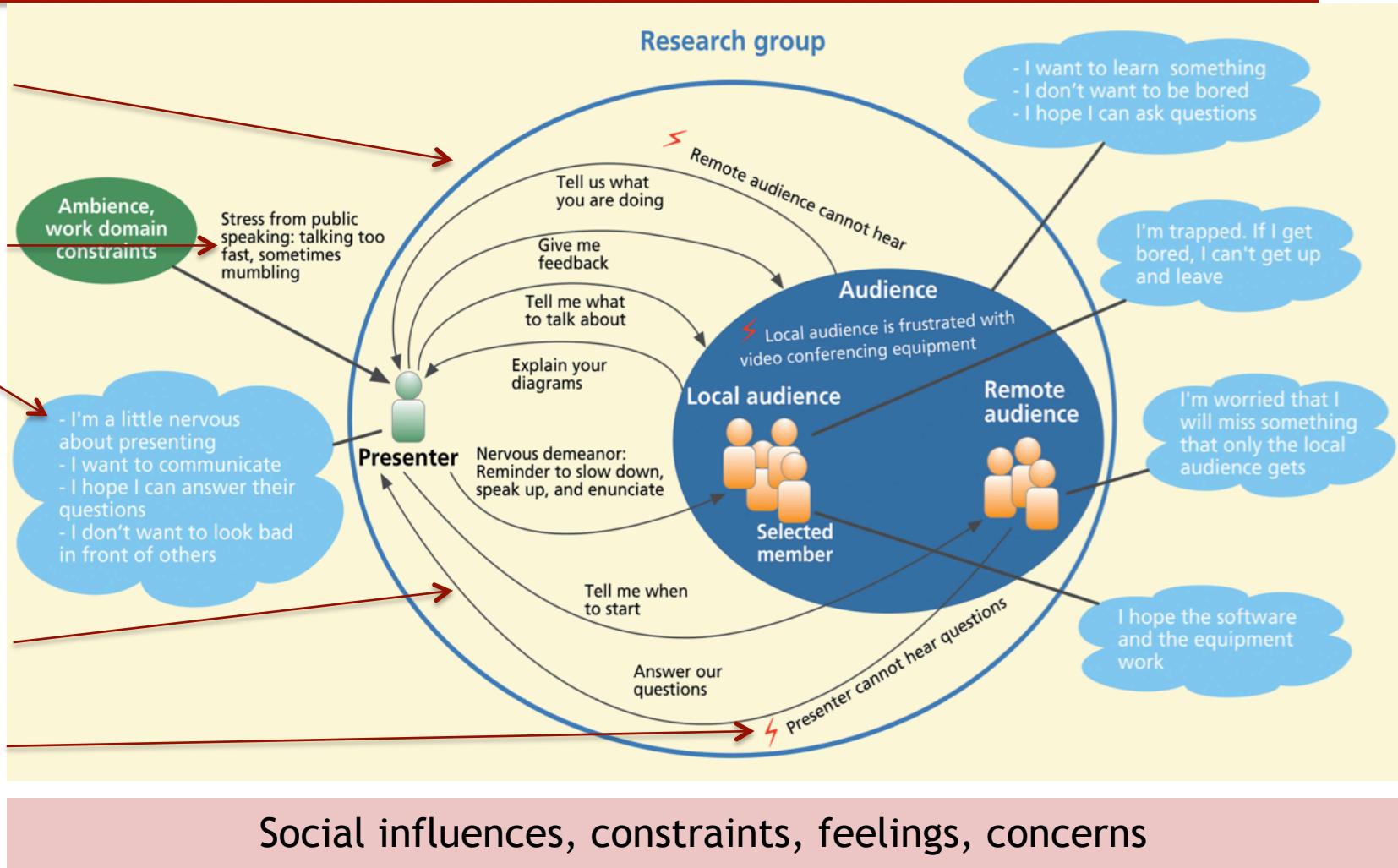
Individual or Group with Influence

Constraints

Feelings Concerns

Direction of Influence

Breakdown or Barrier



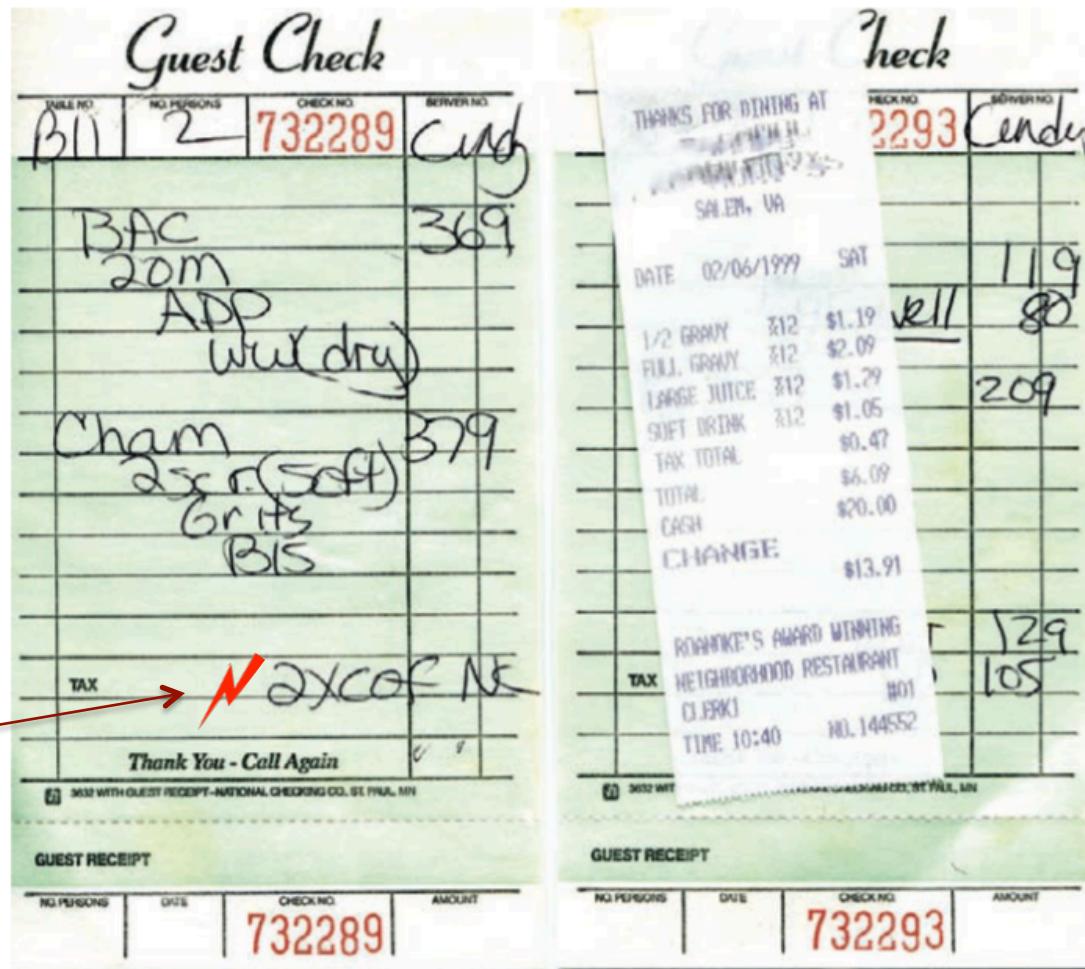
Social influences, constraints, feelings, concerns

Source: Adapted from The UX Book

Artifact Model Restaurant

Work products manipulated in the domain

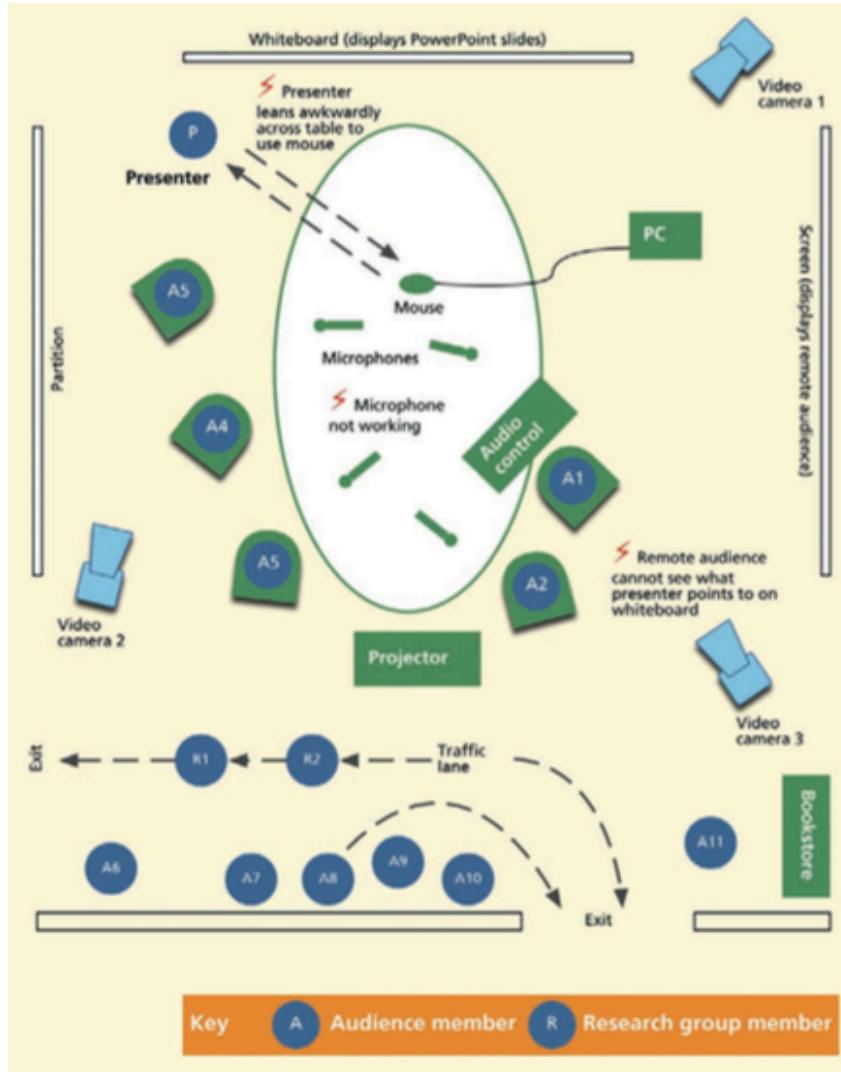
Artifact



Breakdown or
Barrier:
Handwriting
hard to read

Source: Adapted from The UX Book

Physical Model Slideshow Presentation



Layout
of the physical
environment

Source: Adapted from The UX Book

Questions

Why Modeling the Domain?
Benefits or Drawback?

Why Modeling the Domain?

- Refine our understanding of domain & identify gaps
- Identify opportunities to streamline flows & processes
 - Eliminate breakdowns
 - Remove barriers
 - Reduce waste (e.g. steps)
 - Increase communication

Word of Caution

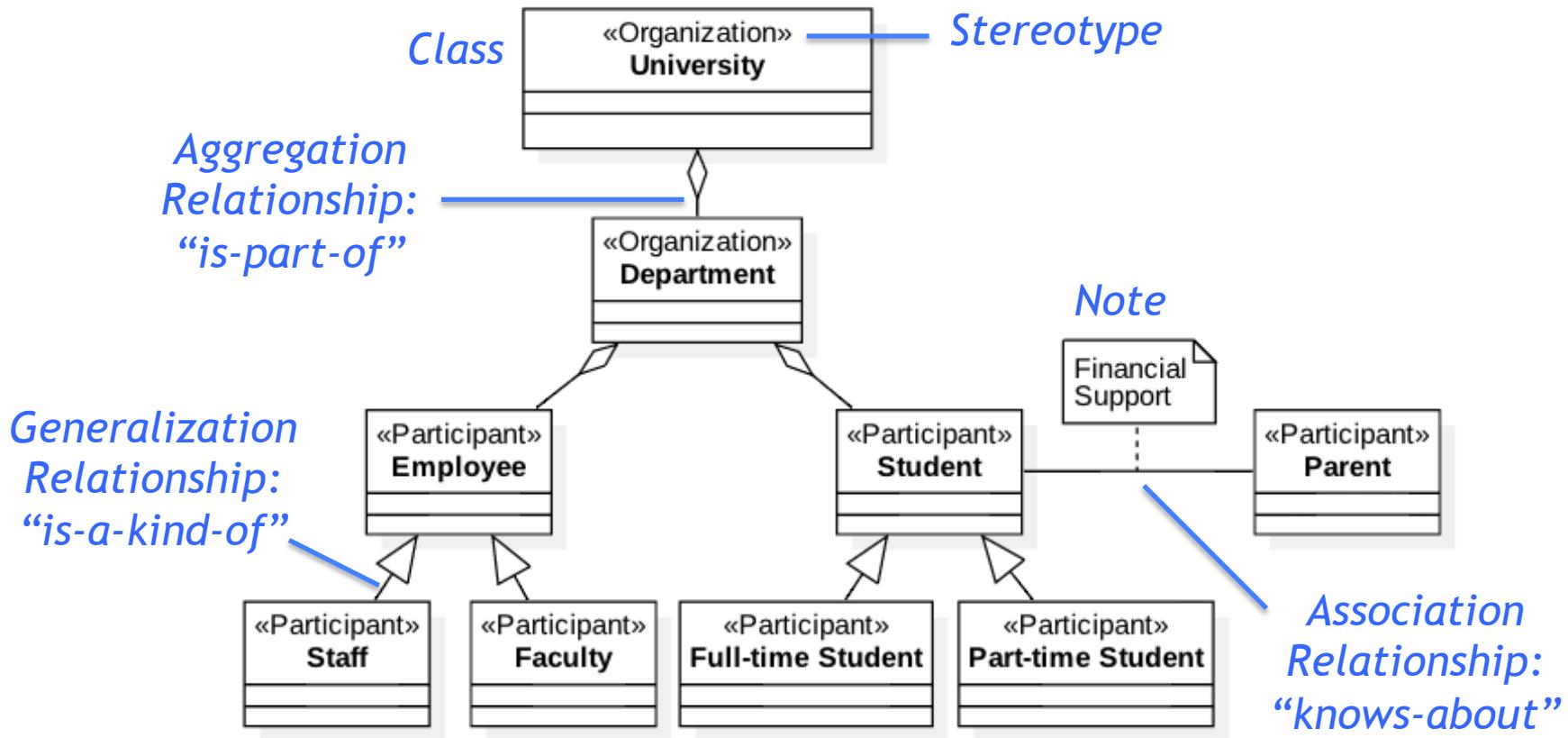
Focusing primarily on domain models could lead to missed innovation opportunities by automating/improving the existing solution versus understanding the user goals

UML Domain Models

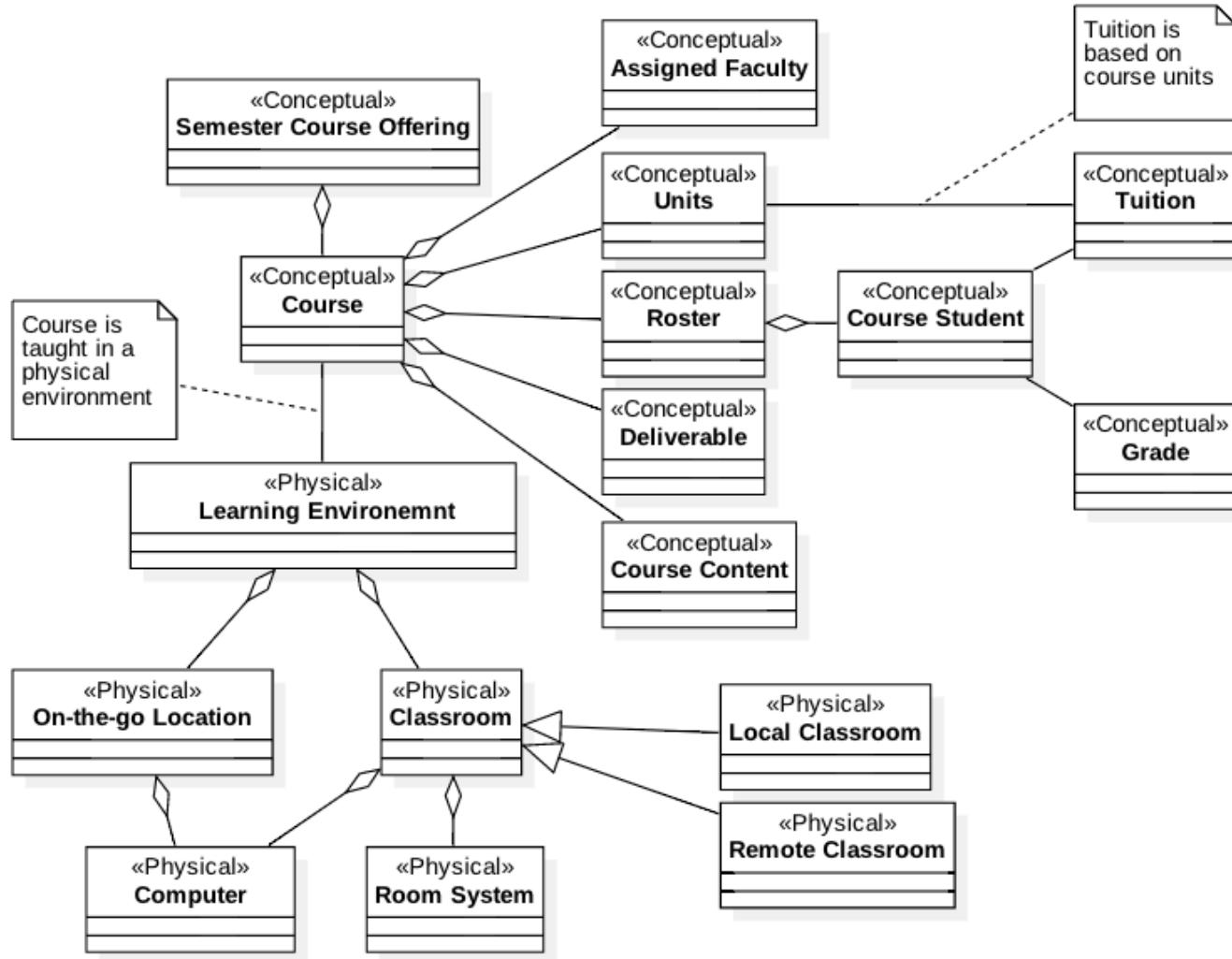
- **Participants Class Diagram**
 - Key participants in the domain, and their relationships
- **Entities Class Diagram**
 - Key physical & conceptual entities, and their relationships
- **Touch-Point Class Diagram**
 - Key interaction, or collaboration between participants, around one or more entities
 - Contextual constraints (e.g. spatial, temporal, others) to paint the context of use



Participants Class Diagram: Learning Management System



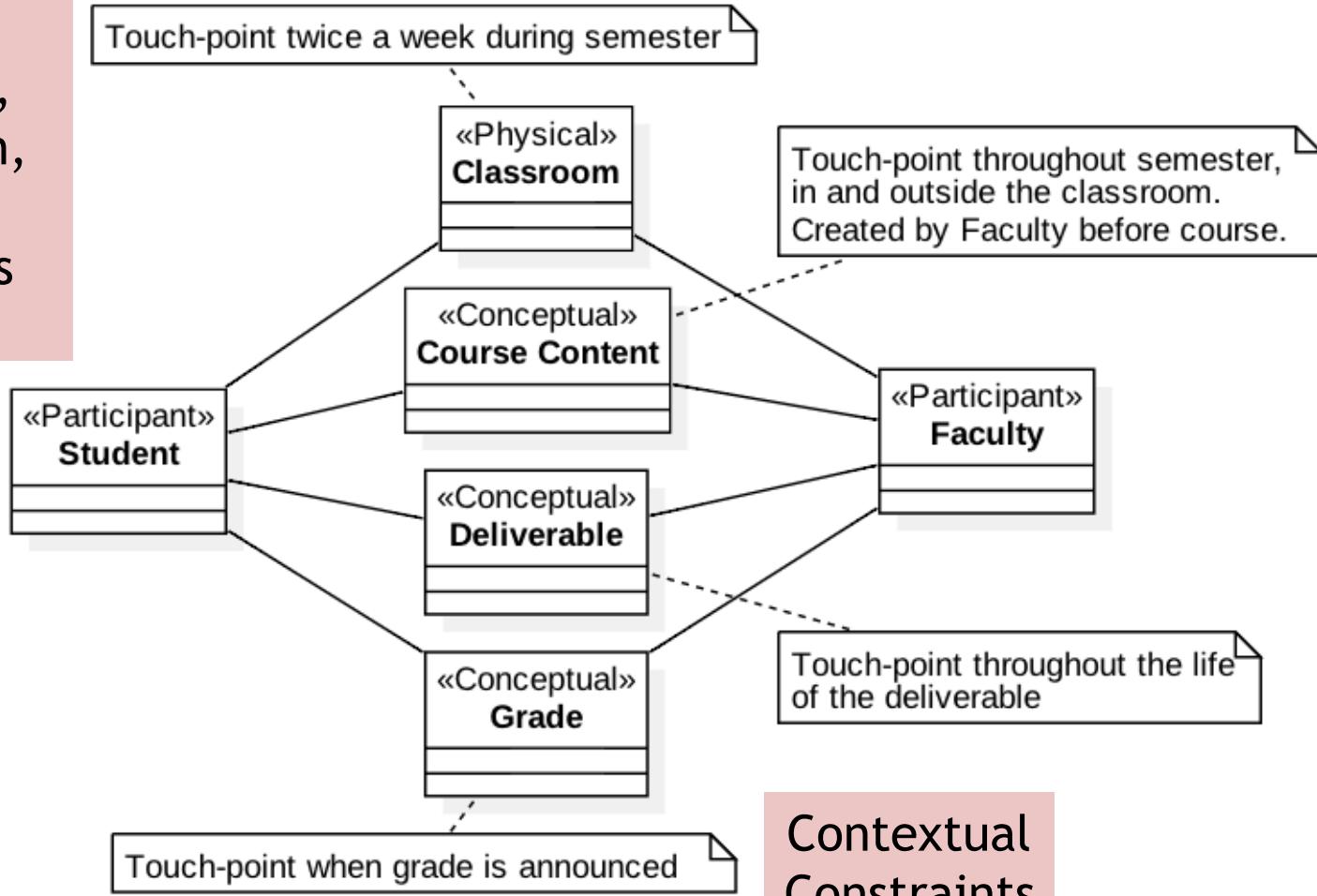
Entities Class Diagram: Learning Management System



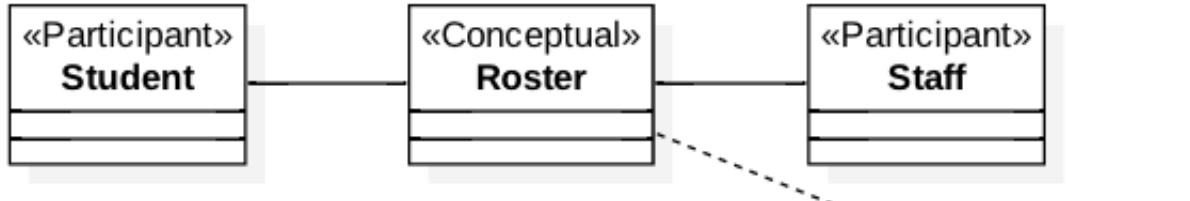
Touch-Point Class Diagram: Learning Management System

Touch-Point:

Key interaction,
or collaboration,
around one
or more entities

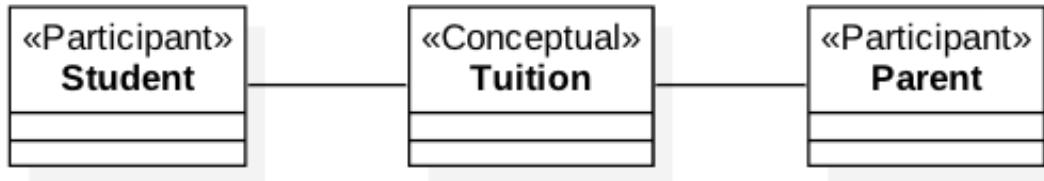


Touch-Point Class Diagram: Learning Management System



Touch-point at the beginning of the semester

Contextual
Constraints



Touch-Point:
Key interaction,
or collaboration,
around one
or more entities





Project Activity: Domain Model

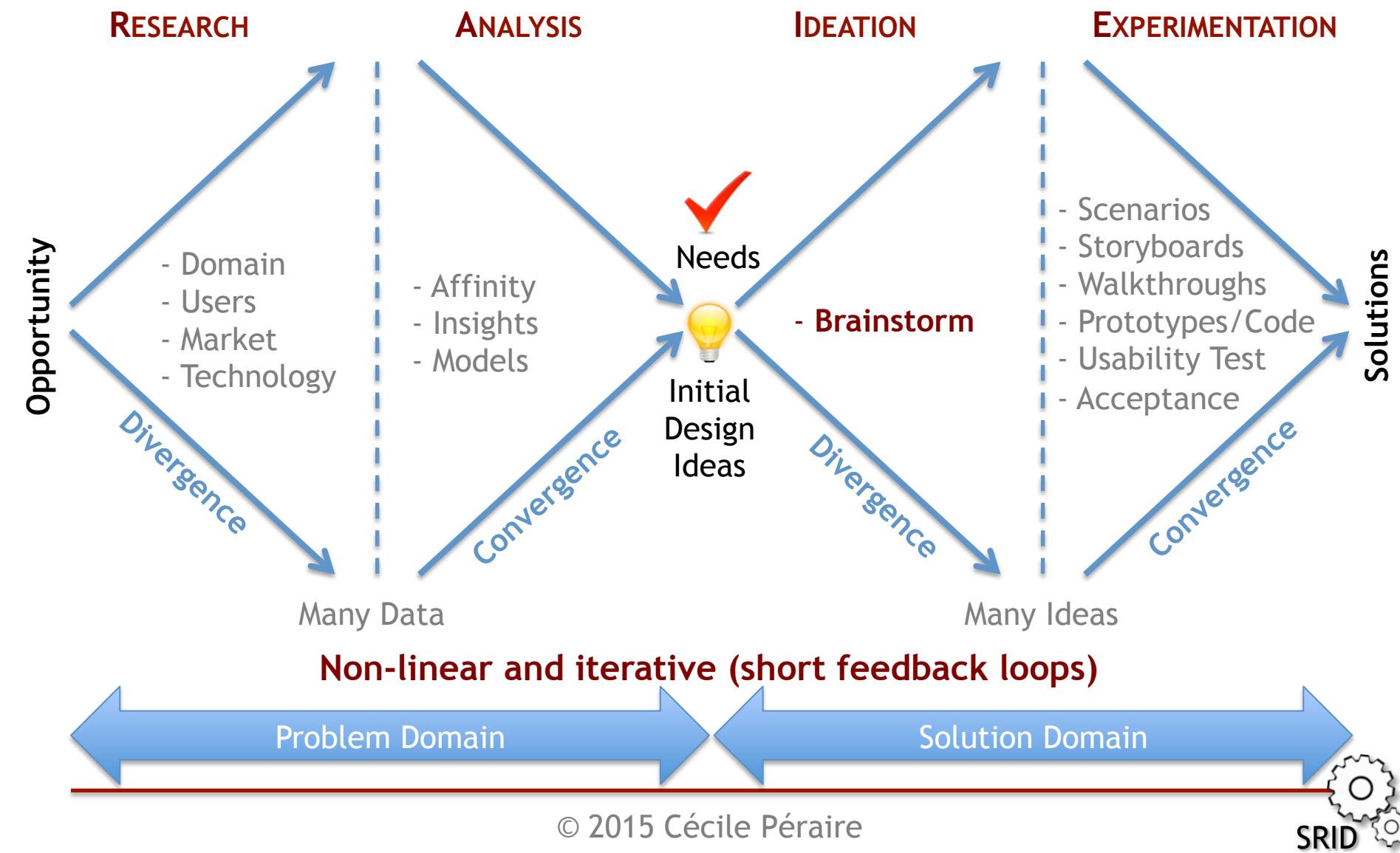
Create the following for your project:

- **Participants Class Diagram**
 - Key participants in the domain, and their relationships
- **Entities Class Diagram**
 - Key physical & conceptual entities, and their relationships
- **Touch-Points Class Diagram**
 - Key interaction, or collaboration between participants, around one or more entities
 - Contextual constraints (e.g. spatial, temporal, others) to paint the context of use
- UML Tool Example: **StarUML**

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Double Diamond



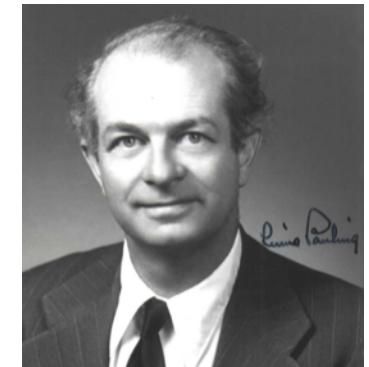
Ideation

- **Motivation**

“If you want to have good ideas
you must have many ideas”

Linus Pauling

Two-time Nobel Prize Winner

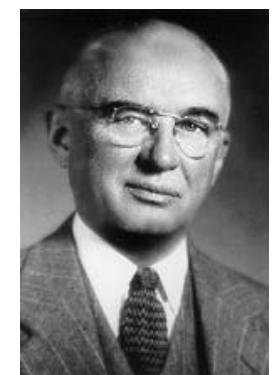


- **Tool: Brainstorming**

Defined by Alex Osborn in 1939

“Brainstorming means using the brain to storm
a creative problem in commando fashion”

Alex Osborn



Osborn Rules for Brainstorming

- Defer judgment
- Go for quantity
- Encourage wild ideas
- Build on other's ideas
- Stay on topic
- Let everyone participate
- Express the essence
- Be visual



How to brainstorm?

By framing questions encouraging exploration:



How Might We (HMW)? Question Templates

- HMW <Break the problem into pieces>?
- HMW <Remove the bad>?
- HMW <Amp up the good>?
- HMW <Explore the opposite>?
- HMW <Question an assumption>?
- HMW <Go after adjectives>?
- HMW <Identify unexpected resources>?
- HMW <Create an analogy>?
- HMW <Play the problem against the challenge>?
- HMW <Change a status quo>?



How Might We (HMW)? Question Examples

Opportunity: Redesign the ground experience at the local international airport

Problematic Situation: Harried mother of three, rushing through the airport only to wait hours at the gate, needs to entertain her playful children because “annoying little brats” only irritate already frustrated fellow passengers.

HMW Questions:

Break problem into pieces: HMW entertain kids? Slow a mom down? Mollify delayed passengers?

Remove the bad: HMW separate the kids from fellow passengers?

Amp up the good: HMW use the kids’ energy to entertain fellow passenger?

Explore the opposite: HMW make the wait the most exciting part of the trip?

Question an assumption: HMW entirely remove the wait time at the airport?

Go after adjectives: HMW make the rush *refreshing* instead of *harrying*?

Identify unexpected resources: HMW leverage free time of fellow passengers to share the load?

Create analogies: HMW make the airport like a spa? Like a playground?

Play situation against challenge: HMW make the airport a place that kids want to go?

Change a status quo: HMW make playful, loud kids less annoying?



Project Activity: Brainstorming

As a team, perform the following for your project:

- Identify the problem to be addressed
 - Imagine a situation illustrating the problem
- Generate HMW questions
- Brainstorm during 40-60 minutes
 - Review brainstorming rules
 - Ask HMW questions one by one
 - Individually write/draw ideas on post-its
 - Present and post ideas on the board
 - No criticism!





Project Activity: Synthesis

As a team, continue as follows:

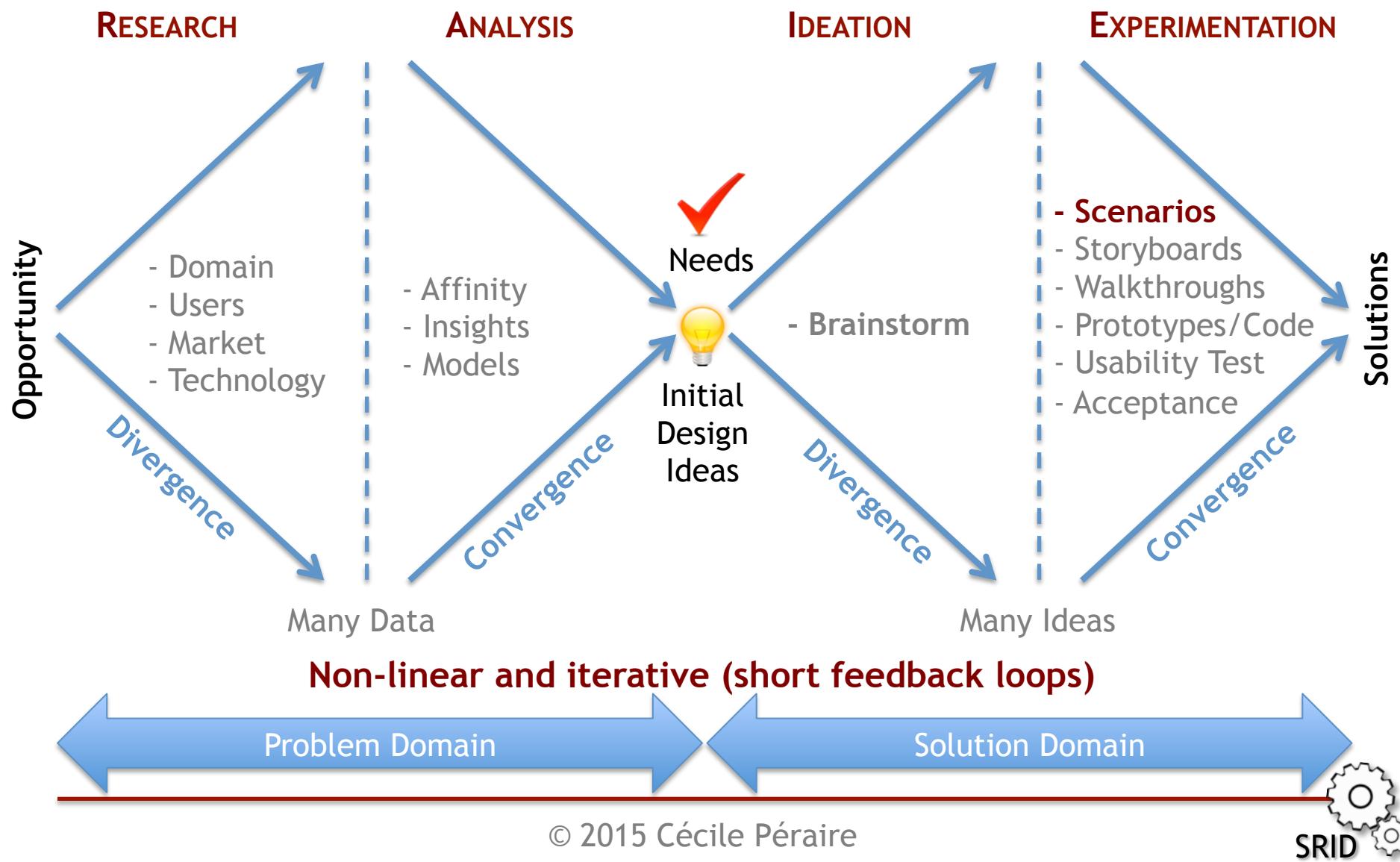
- Start reducing the number of ideas
 - Go through the affinity process
 - Capture the best ideas



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 - **Model Interaction with Scenarios and Storyboards**
 - Validate Interaction with Design Walkthroughs

Double Diamond

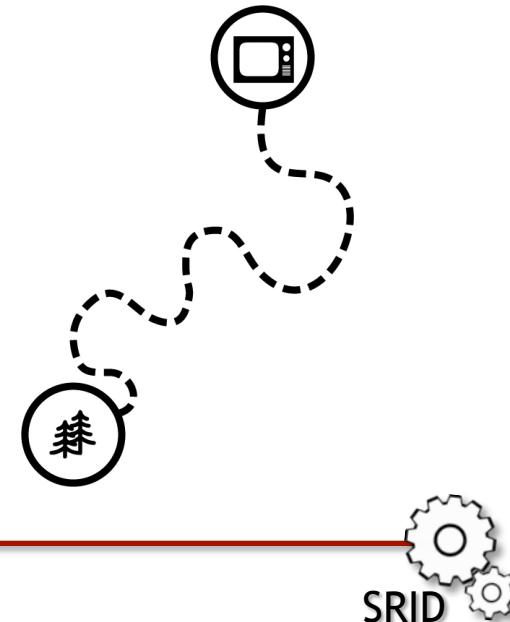


Context Scenario

“A story [written in English] of a particular user persona, with various motivations, needs, and goals, using the future version of your product in a way that is most typical for that persona. It describes the broad context in which that persona’s usage patterns are exhibited”

Cooper & All
About Face

*This is where the design
of your solution begins!*



Context Scenario

- Is broad and defined at a high-level
- Does not describe exactly how things get accomplished
- Helps understand:
 - In what setting(s) the solution is used
 - If the solution is used for extended amount of time
 - If the persona is frequently interrupted
 - If the persona interacts with other participants
 - If the persona interacts with other systems
 - What primary activities the persona performs to meet her goal(s)
 - What is the expected end result of using the solution
 - How much complexity is permissible
(based for instance on persona skill and frequency of use)

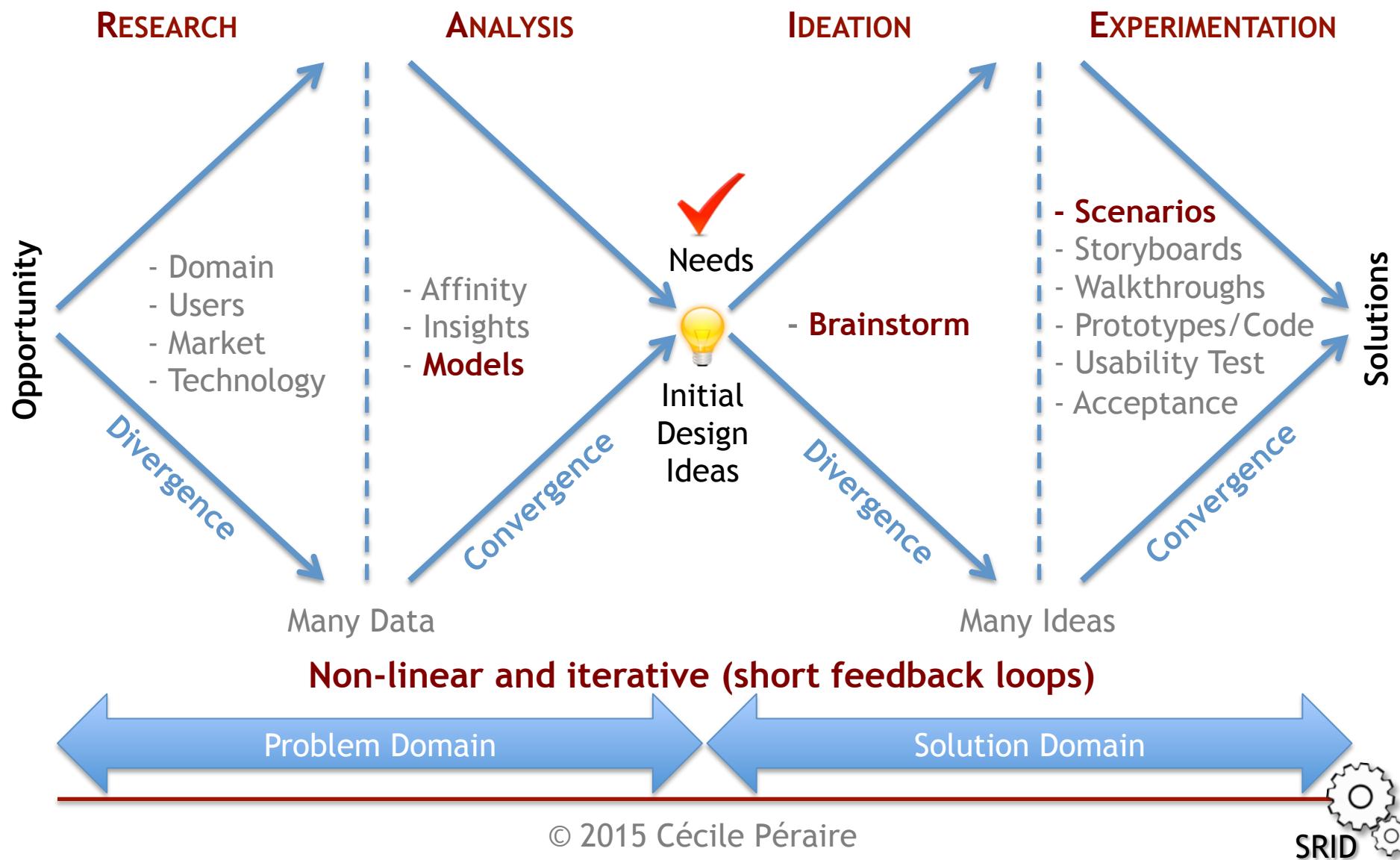


Project Activity: Context Scenarios

Individually/in pairs, perform the following for your project:

- Identify the story components
 - A primary persona
 - 1 or 2 of his goals
 - 1 or 2 of your ideas that might help him reach his goal(s)
 - A situation that motivates the use of the solution
 - The outcome of the situation
- Write a context scenario around these components
 - Rule of thumb: Scenario is about 2 pages long
 - Additional information & example: [Acatar & About Face, Chapter 4](#)
 - English support: Jennifer.Wolfeld@sv.cmu.edu

Project Homework for Next Session



Grading

Component	Performance Criterion	Weight (%)
First Responder Project: Tasks 1 to 2 Deliverables	Individual	25
First Responder Project: Tasks 3 to 4 Deliverables	Individual	25
First Responder Project: Tasks 4 Presentation	Team	10
First Responder Project: Tasks 5	Team	10
Field Research Project	Team	20
Class Participation & Peer Evaluation	Individual	10
Total		100

60% individual grade
40% team grade

Single Ownership Rule Implemented with Jama “Owner” Field and Comments

	ID	Name	Owner	Status	Comments
<input type="checkbox"/>	T SRIDEX-TXT-9	Notes ID#1	Kate Lu	Draft	0 
<input checked="" type="checkbox"/>	T SRIDEX-TXT-5	Recruitment Email	Kate Lu	Ready to Review	
<input type="checkbox"/>	T SRIDEX-TXT-2	Consent Form	Kate Lu	Ready to Review	
<input checked="" type="checkbox"/>	T SRIDEX-TXT-3	Questions	Kate Lu	Ready to Review	
<input type="checkbox"/>	✓ SRIDEX-NEED-3	Increase Situation Understanding	Kate Lu	Ready to Submit	0 
<input type="checkbox"/>	T SRIDEX-TXT-23	Internet Search	Kate Lu	Ready to Submit	0 
<input type="checkbox"/>	T SRIDEX-TXT-4	Interviewees	Kate Lu	Ready to Submit	



Owner Kate Lu

[SRIDEX-TXT-5 Recruitment Email](#) · Show Description ↓

Kate Lu added a Comment

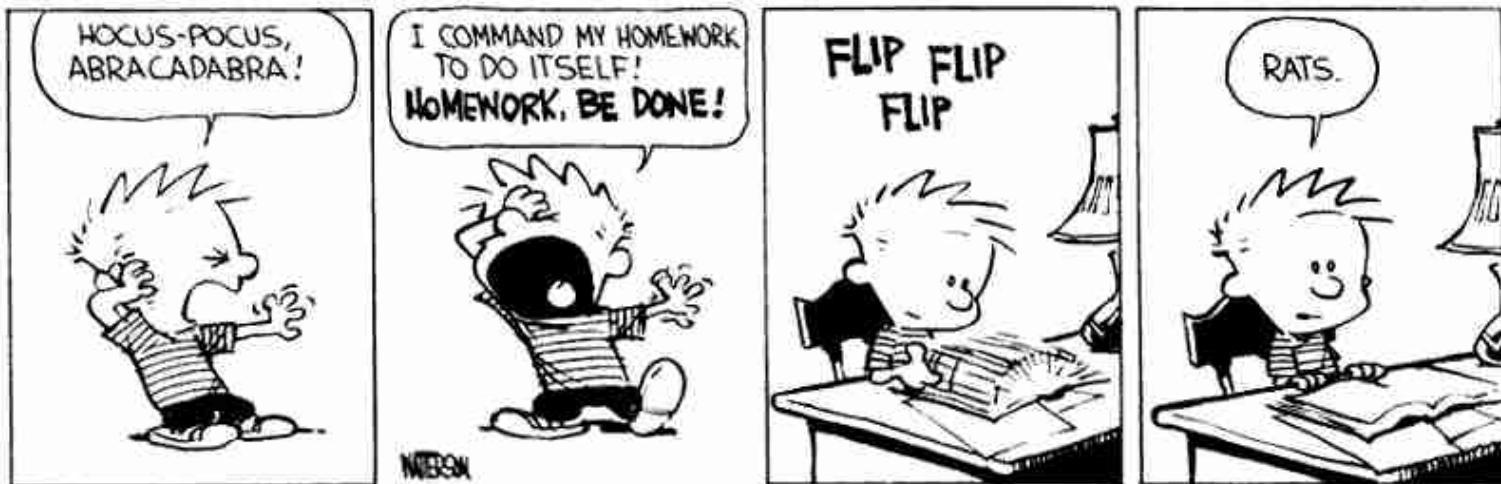
 Cecile Peraire Could you review?

Re: @SRIDEX-TXT-5

Homework

GO TO:

The screenshot shows a course website interface. At the top, there's a navigation bar with the 'Electrical & Computer ENGINEERING' logo, 'Home', and a 'Courses' dropdown menu. Below the navigation bar, the course title '18-658: Software Requirements and Interaction Design' is displayed. A large red header 'Class Preparation' is centered above a grey banner. The banner contains the text 'Welcome to Software Requirements and Interaction Design (SRID)! Access Course Calendar'. On the left side of the main content area, there's a sidebar with links for 'Announcements', 'Syllabus', and 'Class Preparation', where the 'Class Preparation' link is highlighted.



Questions