



# Overview & welcome

Research Methods for Human-Centered Computing



# Introduction

Bart Knijnenburg

Current: Clemson University

Asst. Prof. in Human-Centered Computing

University of California, Irvine

PhD in Informatics

Carnegie Mellon University

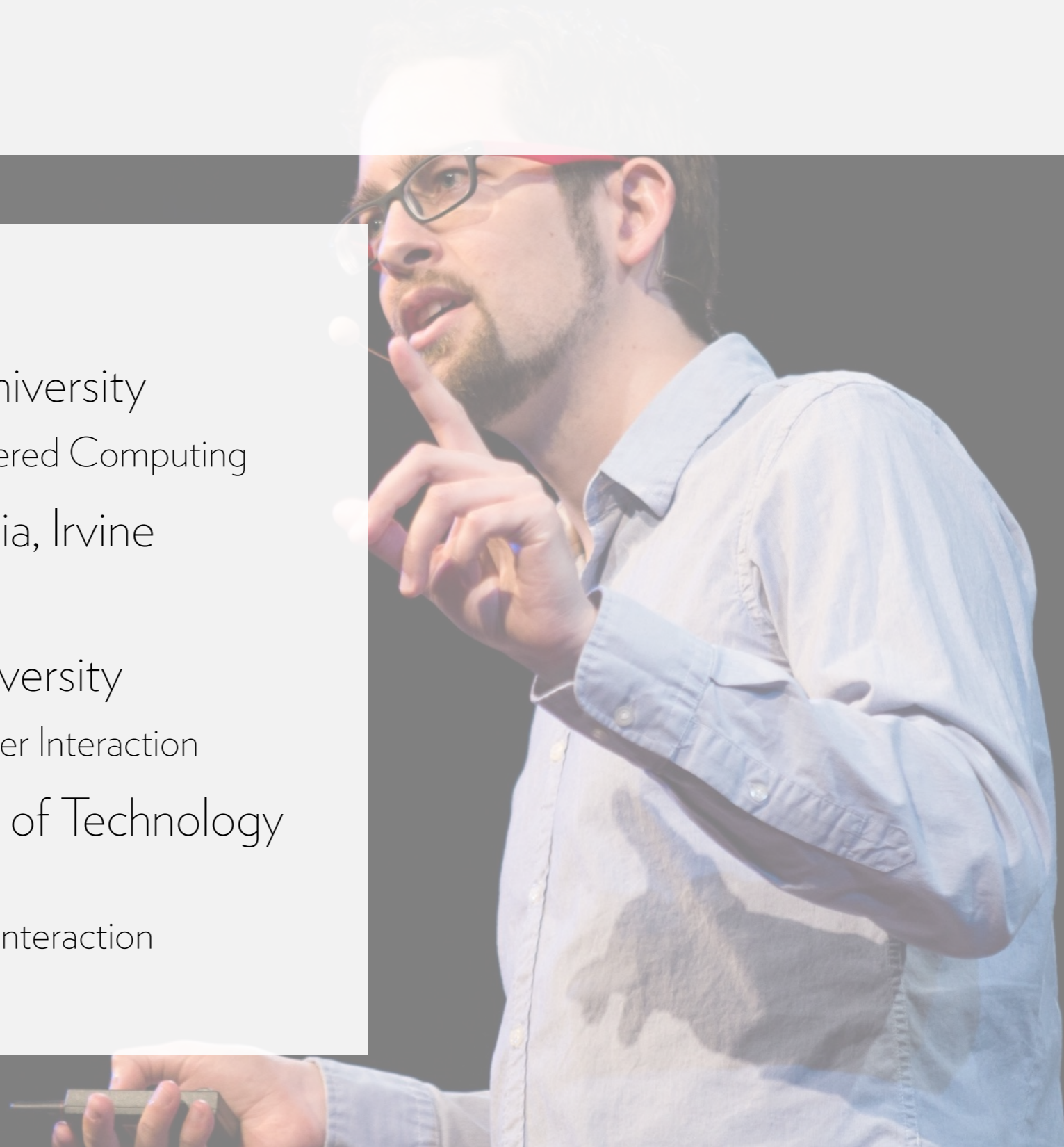
Master in Human-Computer Interaction

Eindhoven University of Technology

Researcher & teacher

MS in Human-Technology interaction

BS in Innovation Sciences





# Introduction

## Research areas

Recommender systems

Expert in user-centric evaluation of personalized systems

Privacy decision-making

Research on adaptive privacy decision support

Google PhD fellowship in Privacy

Human-like interface agents

Research on user expectations and usability



# Introduction

## Hobbies:

Running

Photography

Design

Cycling (more of a lifestyle)

Tolga (my 2-month-old)





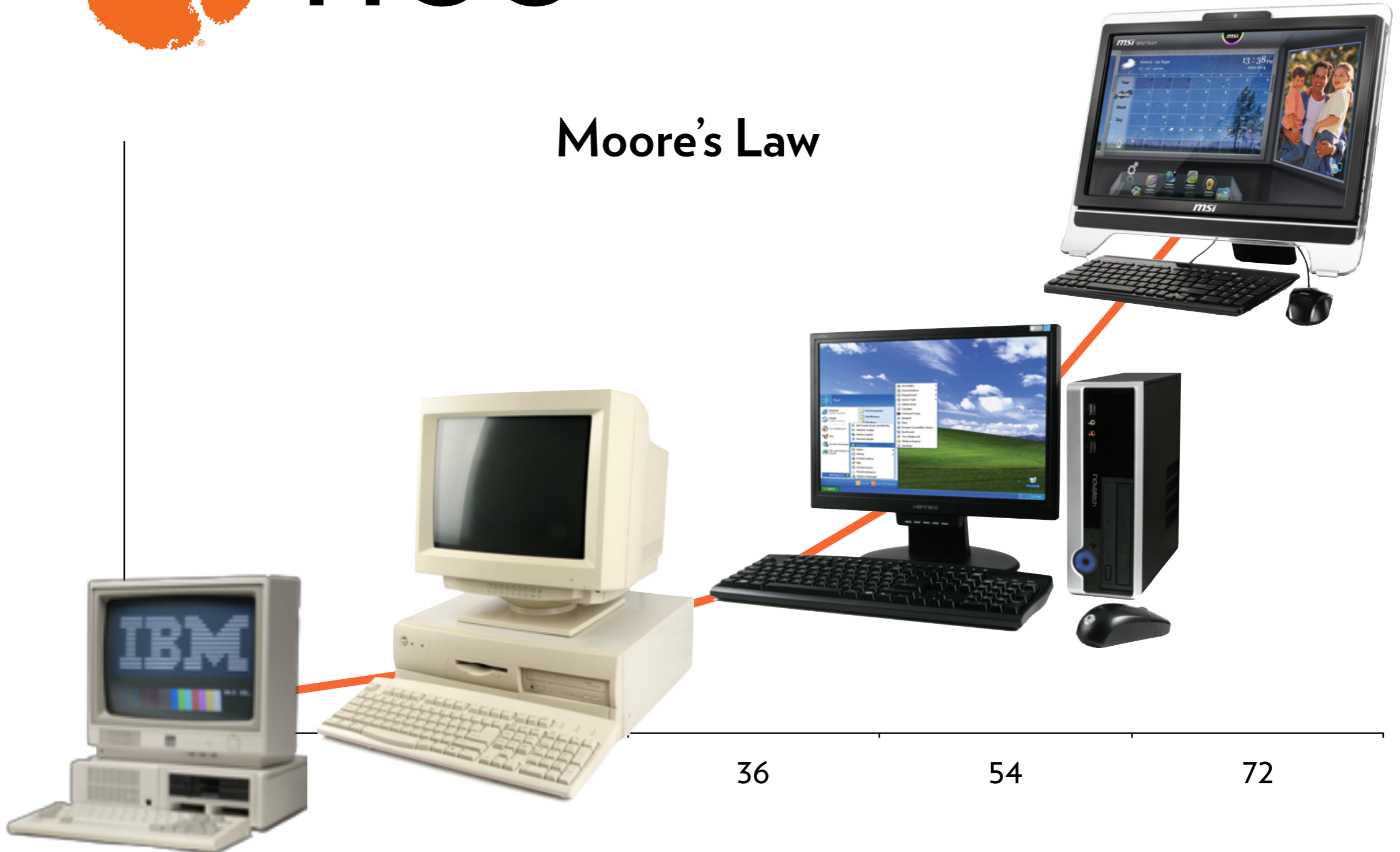
# HCC

What is Human-Centered Computing?



# HCC

## Moore's Law





# Prof. Bill Buxton



## “Threshold of Frustration”

After a certain point  
technology gets so  
complex that it becomes  
too frustrating to use

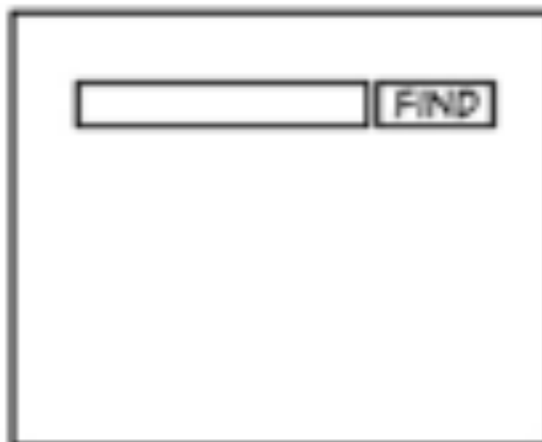


# Doing it wrong...

TYPICAL APPLE PRODUCT...



A GOOGLE PRODUCT...



YOUR COMPANY'S APP...

FIRST NAME:	<input type="text"/>	TYPE CD:	<input type="text"/>	4 - K AA2- DK9B KKA7 CN9 AA-9 NEW DEL
LAST NAME:	<input type="text"/>	TQP STAT:	<input type="checkbox"/>	
SSN:	<input type="text"/>	FT/PT:	<input type="checkbox"/>	
ID:	<input type="text"/>	CAT CD:	<input type="text"/>	
PHONE 1:	<input type="text"/>	CITY:	<input type="text"/>	
PHONE 2:	<input type="text"/>	STATE:	<input type="text"/>	
ADDR 1:	<input type="text"/>	ZIP:	<input type="text"/>	
ACCT #:	<input type="text"/>	ORD #:	<input type="text"/>	
OKAY APPLY SAVE UNDO HELP DELETE EDIT				
SELECT BROWSE ERRORS				

STUFFTHATHAPPENS.COM BY ERIC BURKE



# Solution

**Human-Centered Computing:** The phenomenon of people interacting with computers

- Part computer science (building software)

- Part psychology (understanding people)

- Part design (making things easy to use)

Optional ingredients:

- Social sciences (understanding how people interact)

- Engineering (building hardware)



# HCC Evolutions

Evolved technology:

- Personal
- Mobile and connected
- Pervasive

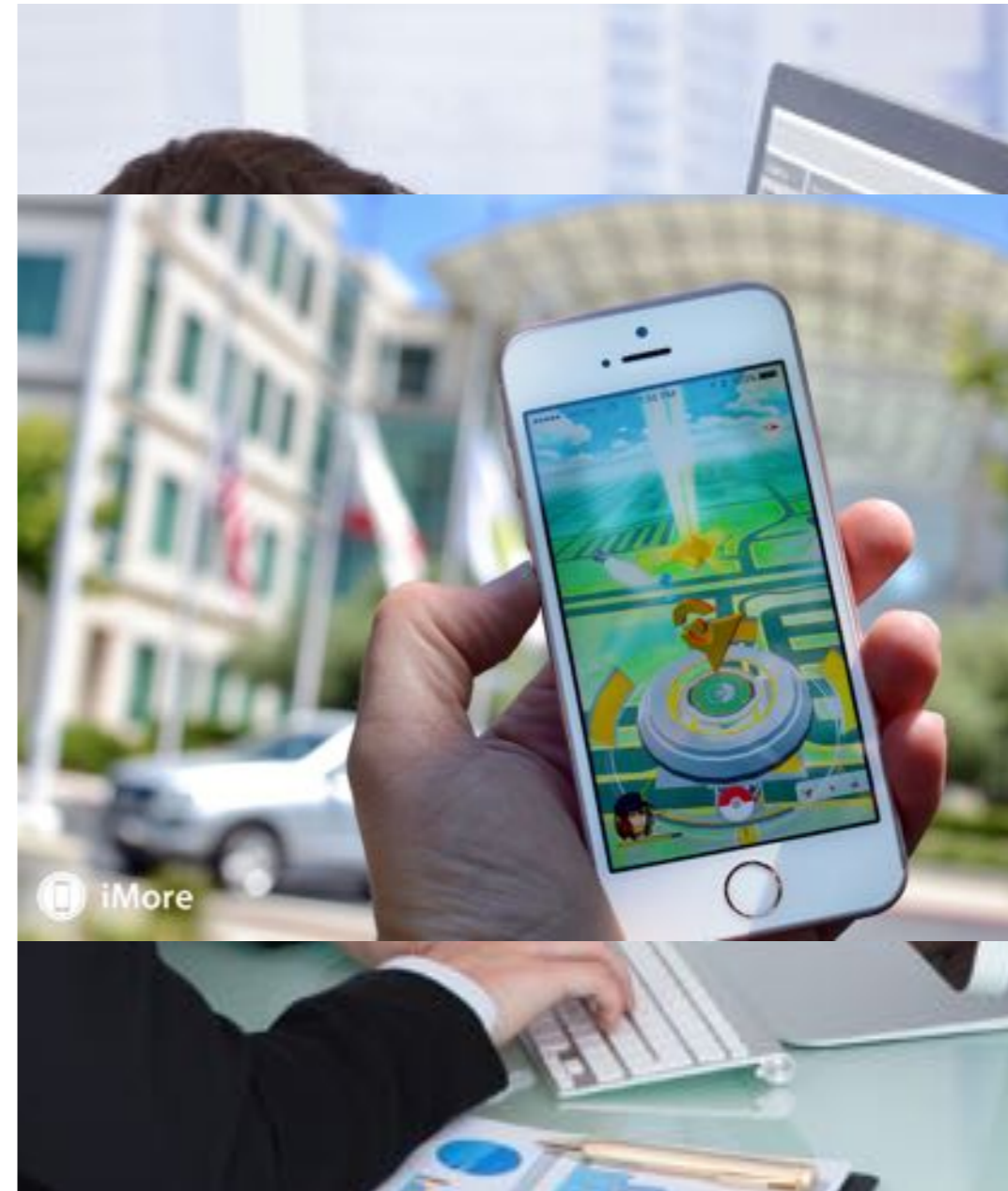




# HCC Evolutions

Evolved applications:

- Work
- Life
- Play

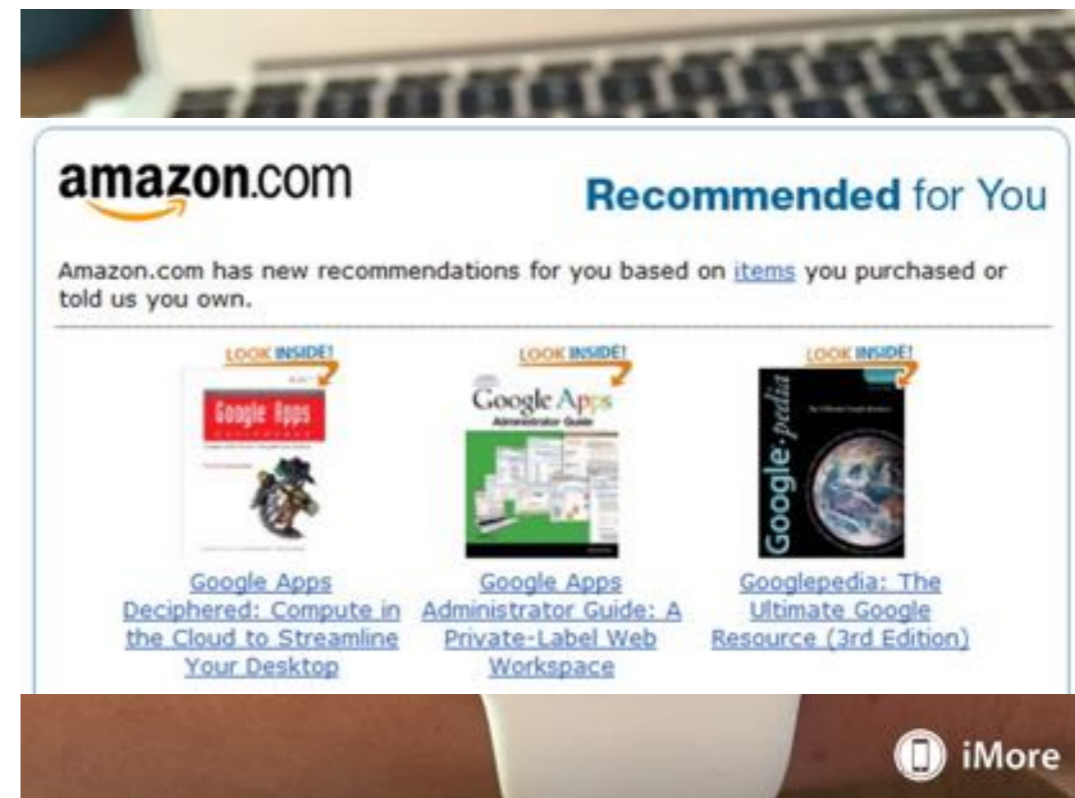




# HCC Evolutions

Evolved agency:

- Reactive
- Proactive
- Predictive

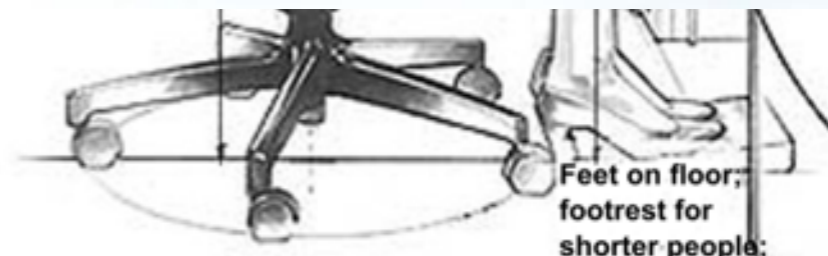
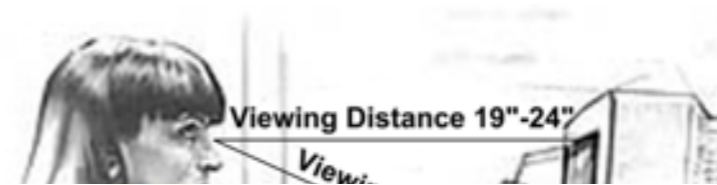




# HCC Evolutions

Evolved thinking about humans:

- Behavioral (ergonomics)
- Cognitive
- Social/Societal/Cultural





# Jobs!

Industry versus academia

Research versus product

Stage in the development cycle





# This course...

Industry versus **academia**

**Research** versus product

Stage in the development cycle

(or even earlier!)





# HCC as a science

What is science anyway?



# HCC as a science

HCC is the **science** of **technology**  
as it relates to **humans**



# HCC as a science

Why do we need the scientific method in HCC?

- Practitioners rely on personal experience and authority
- Without a scientific foundation, these can introduce **bias**

The science of HCC fills this gap by...

- ...building an organized body of knowledge
- ...developing valid, reliable explanations for phenomena
- ...providing recommendations based on predicted future outcomes



# HCC as a science

As HCC PhD students, your goal is to provide unbiased, scientific knowledge about how humans use technology

- Generate the knowledge (research)
- Write it down (papers)
- Translate it for practitioners (“design implications”) and the public (“broader impacts”, outreach)



# How do I science?

Science is...

- an attempt to provide an ordered description and explanation of the world
- based on experience and observation
- self-correcting

**STAND BACK**



**I'M GOING TO TRY  
SCIENCE**



# Replicable & open

Goal of science:

Discover new and useful information...

...in the form of **verifiable data**

Findings which can be **repeatedly ascertained** by other investigators using **similar methods**

To this effect, scientists should make their methods **public**, and their data **available to others**

Many cases of scientific fraud suspected from secrecy and confirmed through openness



# Values vs. facts

## Subjective statements

(cannot be shown to be true or false)

- Handguns should be outlawed
- Smoking is a dirty habit
- Blue is beautiful

## Objective statements

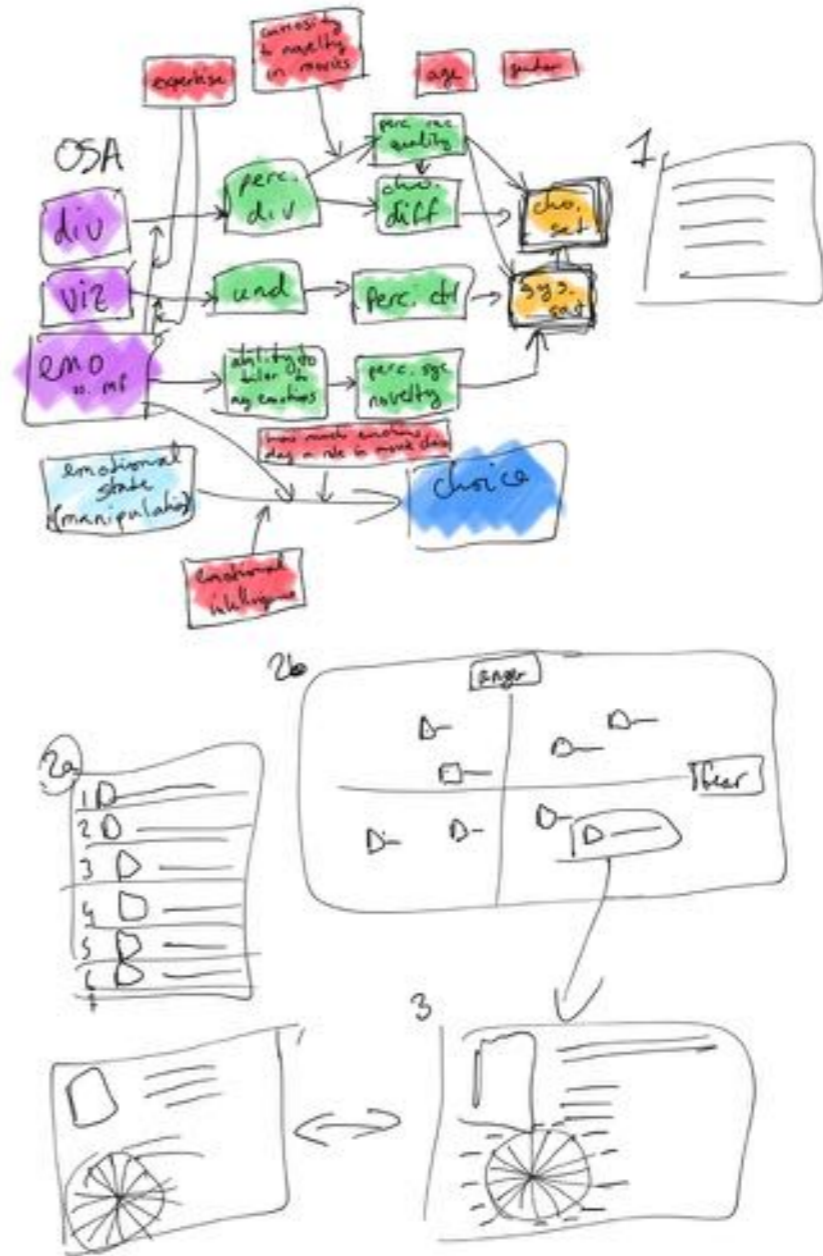
(can be shown to be true or false)

- Handguns caused over 30k US deaths in 2002
- Smoking increases the incidence of cancer
- 35% of college students say blue is their favorite color



## Ideal world:

- exploration (observation)
- theory (hypothesis)
- testing (further observation or experimentation)
- accepted theory (evidence)





# Scientific process

Real world:

- exploration
- theory
- testing
- **completely unexpected results**
- interpretation
- revision
- new theory (etc.)





# Keep in mind...

## Scientists are human

- they can become very attached to theories
- they bring their own opinions to the interpretation of data
- they rarely change their basic approach or paradigm
- they can be swayed by authority

## Science is influenced by social and political pressures

- funding goes to issues deemed more “important”
- popular theories are aligned with societal values



# Research

What is HCC research?



# Research

## HCC research contributions

- Empirical research
- Artifacts
- Methodology
- Theory
- Datasets
- Surveys
- Opinions<sup>\*</sup>



# This course...

HCC research contributions

- **Empirical research**

- Artifacts

- Methodology

- **Theory**

- Datasets

- Surveys

- Opinions<sup>\*</sup>



# Types of studies

Qualitative versus quantitative

Opinions versus behaviors

Observation versus experimentation

Exploration versus confirmation



# Types of studies

## **Ghaiumy Anaraky et al. “Reducing default and framing effects in privacy decision-making”**

Framing and default effects have been studied for more than a decade in different disciplines. A common criticism of these studies is that they use hypothetical scenarios. In this study, we developed a real decision environment: a Facebook application in which users had to decide whether or not they wanted to be automatically publicly tagged in their friends' pictures and/or tag their friends in their own pictures. To ensure ecological validity, participants had to log in to their Facebook account. Our results confirmed previous studies indicating a higher tagging rate in positively framed and accept-by-default conditions. Furthermore, we introduced a manipulation that we assumed would overshadow and thereby reduce the effects of default and framing: a justification highlighting a positive or negative descriptive social norm or giving a rationale for or against tagging. We found that such justifications may at times increase tagging rates.



# Types of studies

## **Page et al. “Social media’s have-nots: an era of social disenfranchisement”**

**Purpose** – The purpose of this paper is to investigate the motivations, concerns, benefits and consequences associated with non-use of social media. In doing so, it extends Wyatt’s commonly used taxonomy of non-use by identifying new dimensions in which to understand non-use of social media. This framework encompasses a previously unidentified category of non-use that is critical to understand in today’s social media environment.

**Design/methodology/approach** – This is an exploratory interview study with 17 self-identified social media non-users distributed across age groups and socioeconomic backgrounds. A thematic analysis is conducted based on a novel extension of Wyatt’s framework and the risk-benefits framework. This is supplemented by open coding to allow for emerging themes.

**Findings** – This paper provides empirical insights into a formerly uninvestigated population of non-users who are prevented from using social media because of social engagement (rather than functional) barriers. It identifies how these individuals face social consequences both on and off social media, resulting in social disenfranchisement.

**Research limitations/implications** – This is an initial exploration of the phenomenon using an interview study. For generalizability, future research should investigate non-use with a broader and random sample.

**Practical implications** – This paper includes design recommendations and implications for social media platform designers to mitigate the consequences experienced by socially disenfranchised non-users.

**Social implications** – Addressing concerns of this newly identified class of non-users is of utmost importance. As others are increasingly connected, these non-users are left behind and even ostracized – showing the dark sides of social media use and non-use.



# This course

What are we going to do in this course?



# This course

Part 1 (week 1-4): Introduction to HCC and research

Part 2 (week 4-9): Conducting user experiments

Part 3 (week 10-14): Other HCC research methods  
(presented by you!)

Part 4 (week 15-17): Feedback on your research proposal

**You should do the readings ahead of class!**

I will assume you've read them!



# Assignments

Your course grade will be determined by:

- Quizzes and assignments: 20%
- Project proposal + IRB docs: 20%
- Proposal presentation: 10%
- Proposal peer review: 10%
- Method presentation: 20%
- Final: 10%
- Class participation: 10%



# Project proposal

Together with 1–2 other students (of your choosing), you will write a research project proposal proposing an **original approach** to answering an **HCC research question**



# Project proposal

Deliverables for this part (graded as a group):

- Sep 4: Form groups
- Sep 11: Research questions (what HCC question are you going to answer?)
- Sep 18: Literature outline (what has already been done?)
- Sep 25: Method outline (how are you going to answer it?)
- **Oct 2+7+9: Proposal presentations** (graded separately)
- **Nov 13: Full proposal due** (formatted as an ACM paper, including IRB docs!)



# Peer review

A **conference-style review** of the other  
research proposal papers

(assigned Nov 25, due Dec 4)



# Method presentation

**Together with 2 other students (I assign groups), you will **present a how-to session** on a non-experimental method to the class**

(groups assigned Sep 9, work sessions Oct 21+23,  
presentations Nov 6-20)



# Quizzes/Assignments

10 Quizzes/assignments (1 will be dropped):

- 1: CITI training (due Aug 28)
- 2: ACM assignment (due Sep 2)
- 3–5: Proposal outlines
- 6: Study participation report (due Oct 9)
- 7: Measurement scale (due Oct 16)
- 8: In-class quiz on experiments (Oct 30)
- 9: In-class quiz on other methods (Nov 25)
- 10: Instructor evaluation (Dec 4)



# Collaboration

General rule:

- It is ok to collaborate
- It is ok to use online materials
- It is **not** ok to copy

Practical implications:

- **Properly cite** your sources
- Submit **original work** (see syllabus: “multiple submissions”)
- Add a **collaboration statement** to all your submissions (see syllabus)



# Final

Exam questions will reflect the material covered in the lectures and assigned readings

Content: mostly short answer, some multiple-choice and essays

Quizzes are similar but shorter

**Bring your laptop!**



# Participation

You are expected to do the readings ahead of class, arrive on time, pay attention, participate in discussions, and treat your instructor and fellow classmates with respect

If you do: full credit!

If you cannot attend: your responsibility to catch up!

Note: **no make-up quizzes** unless absence is excusable (e.g. emergency, job interview, conference attendance)

Please notify me before class (if possible) in case of an excusable absence



# CITI training

Due next Wednesday!



# CITI training

The Institutional Review Board has to sign off on any research that involves human subjects

(including interviews and observation studies)

Research needs to be proposed and approved

Everyone will write a proposal, only submit if you want to actually publish your outcomes

Additionally, human subjects researchers need to do an online IRB training provided by the CITI group

You too!



# CITI training

Go to [citiprogram.org](https://citiprogram.org), Register, Log in

Add a course:

Human Subjects Research (IRB)

Researcher: Principal Investigator (PI), Co-Investigator,  
Research Team Member

Social and Behavioral Science Research (SBR)

Take the course “Group 1 Investigators Conducting Social and Behavioral Science Research (SBR) at Clemson University”



# CITI training

Due next Wednesday

In Canvas, submit a PDF with your training report



# Tips

How can I succeed in this class?



# Tips

## Start early

Writing a proposal takes a lot of effort, developing and operationalizing good research questions takes time

The process is iterative so you cannot do it all at once

## Truly collaborate

Don't just delegate tasks between group members

The best proposals are the result of extensive discussions

You are responsible for your group's work



# Tips

Make your group work fun

Go do something together other than work

No plagiarism!

Learn how to properly cite: <http://bit.ly/citeproper>



# More general tips

## Master students:

Find out whether you want to go into industry, or do a PhD

Put a lot of effort into finding a good internship

## PhD students:

Go to conferences, promote yourself

## Everyone:

Pick your advisor based on style and method, not topic



Questions...



# Topics

How do I find a good research topic?



# Topics

Talk to your neighbor for 5 minutes about possible topics

- Why this topic is interesting from an HCC perspective?
- Can you already think of a research question?
- Are you interested in people's opinions, behaviors, or both? Why?
- Is this a qualitative or quantitative question? Why?
- Would you use experimentation or observation to answer that question? Why?
- Is this exploratory or confirmatory? Why?