Human-Centered Artificial Intelligence

Lecture 1: Many People in AIs

Chat Wacharamanotham

Fall Semester 2025

Chatchavan Wacharamanotham

Tenured lecturer at University of Zurich

PhD in Human–Computer interaction from RWTH Aachen University, Germany

Previously:

- Assistant professor at University of Zurich
- Lecturer at Swansea University, UK

Research: Improving how computer can help people do better and transparent science https://chatw.ch

Starter: What AIs do you know?

> **Artificial intelligence:** the application of computer systems able to perform tasks or produce output normally requiring human intelligence, especially by applying machine learning techniques to large collections of data
>
> — *New Oxford American Dictionary, 2023*

(5 minutes) Work in pairs

1. Say hi to the person next to you
2. Together: Come up with **names AI systems**, as many as possible
3. Write your answer in the poll

https://chatw.ch/hcai25

Building traditional software vs. building AI

Software engineering

Building systems that do the right thing,
dealing mostly with ***complexity***

💰 Banking program
(traditional software)

Artificial intelligence

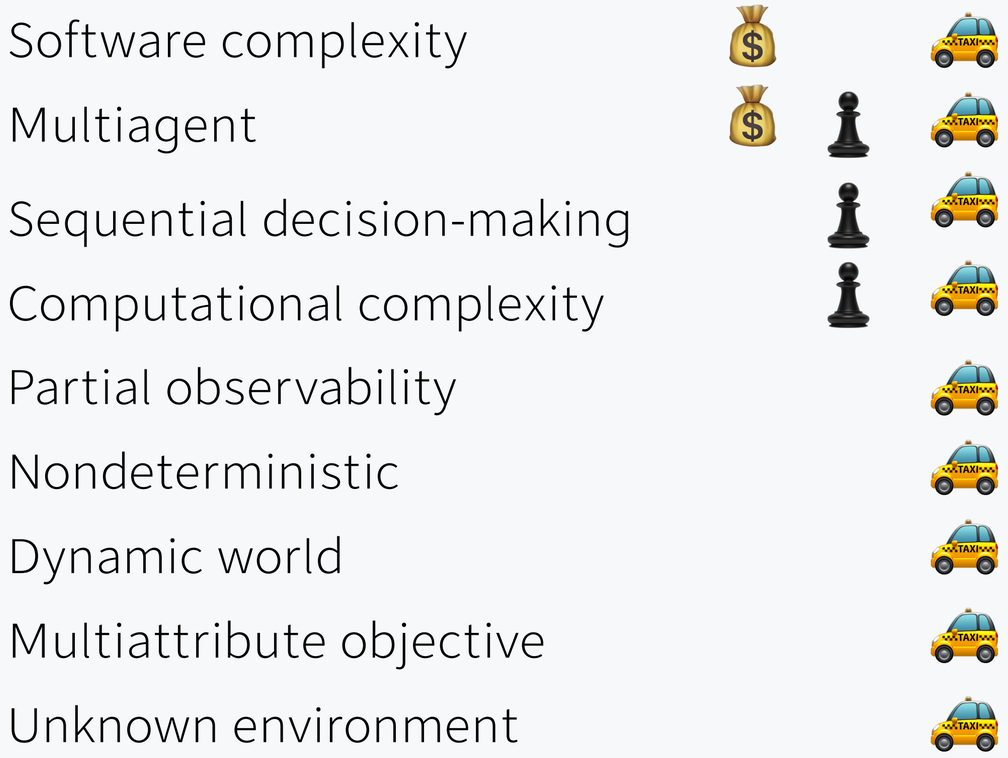
Building systems that do the right thing,
dealing mostly with complexity and ***uncertainty****,*
for tasks human do with ***intelligence***

🚕 Self-driving car (modern AI)

♟️ Chess player (old-school AI)

 Based on Dan M. Russell & Peter Norvig course and MIT AI Ethics Education Curriculum

💰 Banking program (traditional software)	♟️ Chess player (old-school AI)	🚕 Self-driving car (modern AI)



AI-related terms

- **Expert Systems**

  AI that was hand-coded to imitate experts

- **Machine Learning**

  AI that generalizes from examples

- **Deep Learning**

  AI that generalizes from examples in multiple steps

- **Artificial General Intelligence (AGI)**

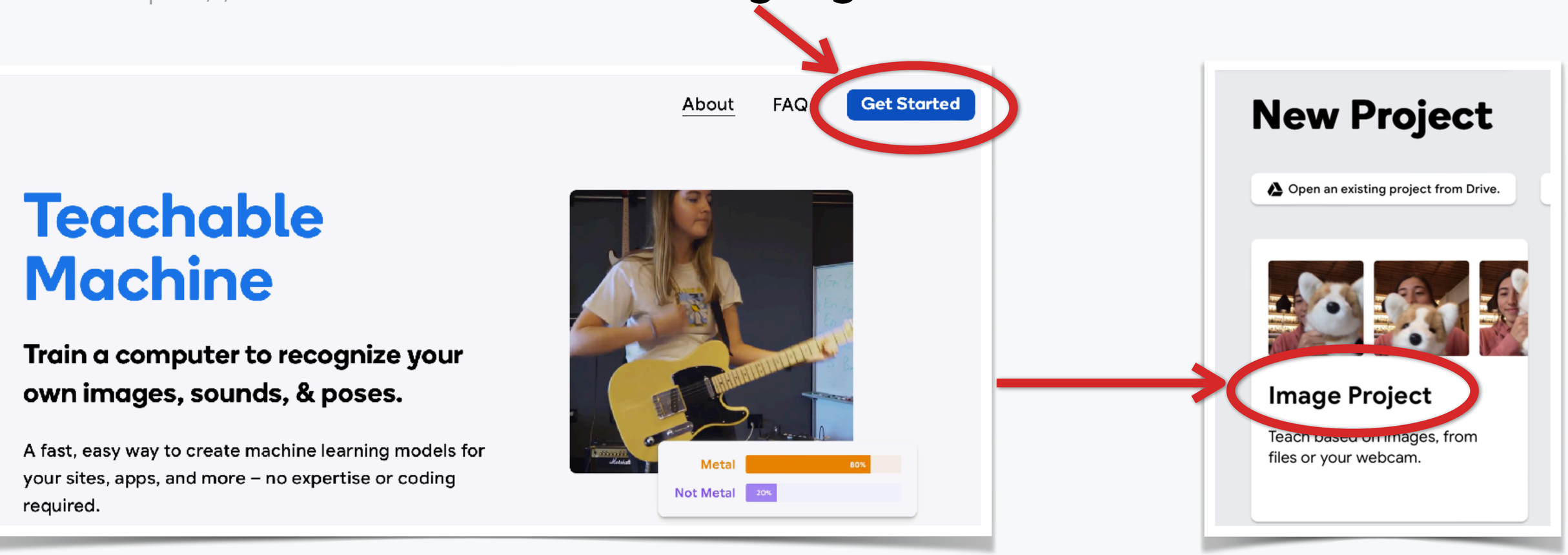
  AI that solve open-ended class of problems

- **Artificial Superintelligence (ASI)**

  AI that greatly exceeds human cognitive performance in all domains

Exercise: Teachable machine

https://**teachable**machine.**withgoogle**.com



 Based on Dan M. Russell & Peter Norvig course and MIT AI Ethics Education Curriculum

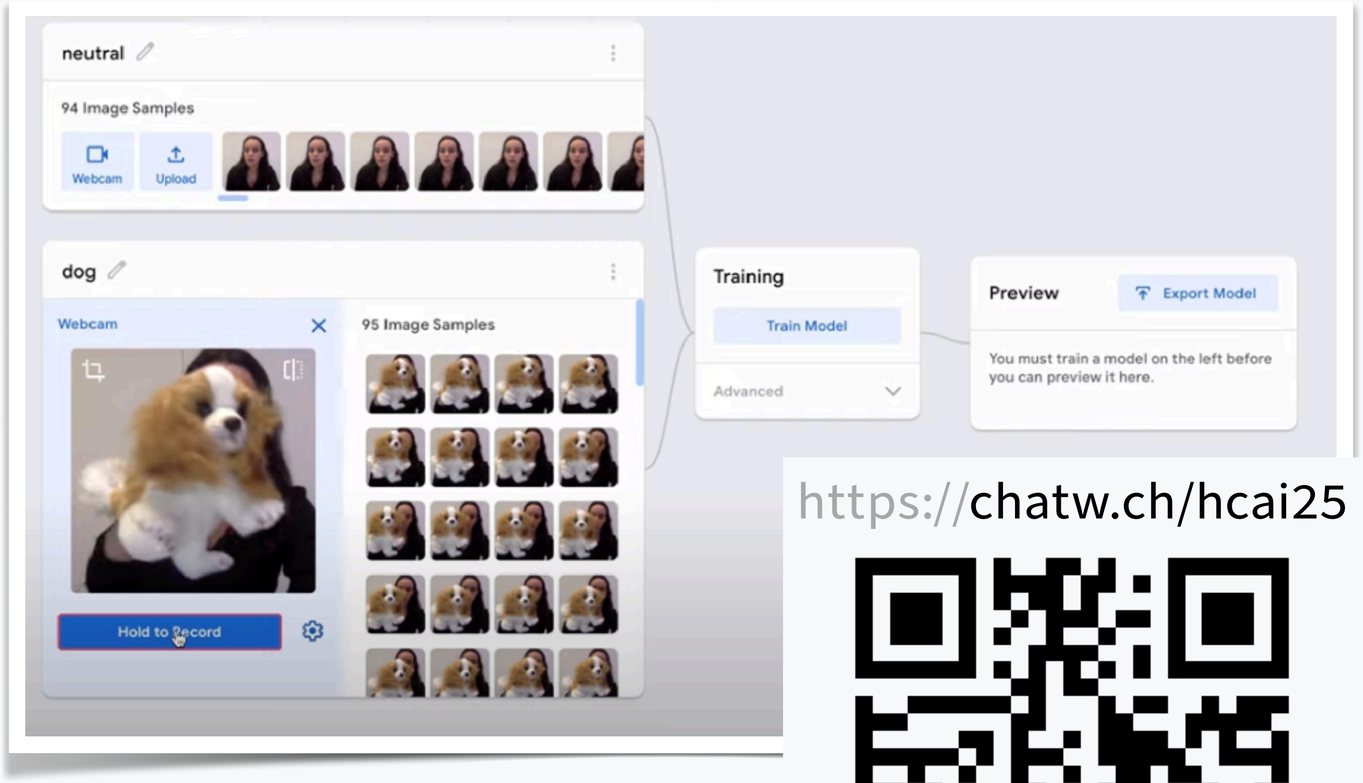
DEMO

Exercise: Teachable machine

https://**teachable**machine.**withgoogle**.com

(15 minutes) In teams of 2 or 3:

Build a model to recognize two classes of object (e.g., mobile phone, pen, water bottle)



Discuss

- What works?
- What doesn't?
- When it fails, how does it fail?

Write your insights in this poll →

https://chatw.ch/hcai25

Exercise: People in AIs

(10 minutes) Work in pairs:

1. **Sketch the process** of how AI systems are developed and used

   (Don’t spend too much time on this step. It serves as input for the next one)

2. Based on your sketch, **determine different groups of people** who are involved throughout the lifecycle of the AI system. Put your answers in the poll.

https://chatw.ch/hcai25

Some groups of people involved in AI lifecycle

 Shneiderman (2022) Human-Centered Artificial Intelligence. Oxford University Press. (p. 13)

Intended learning outcomes

By the end of this course, students will be able to

- ❏ Explain **terms that characterize AIs** and their cousins in written analysis
- ❏ Recognize and explain **challenges in the process of developing AIs** that differ from those of traditional software to peers with IT background
- ❏ Examine **why it is important to consider different groups of people** involved in the AI life cycles.

AI-related terms

- **Expert Systems**
  AI that was hand-coded to imitate experts
- **Machine Learning**
  AI that generalizes from examples
- **Deep Learning**
  AI that generalizes from examples in multiple steps
- **Artificial General Intelligence (AGI)**
  AI that solve open-ended class of problems
- **Artificial Superintelligence (ASI)**
  AI that greatly exceeds human cognitive performance in all domains

x

Building traditional software vs. building AI

	💰 Banking program (traditional software)	♟️ Chess player (old-school AI)	🚗 Self-driving car (modern AI)
Software complexity	💰		🚗
Multiagent	💰	♟️	🚗
Sequential decision-making		♟️	🚗
Computational complexity		♟️	🚗
Partial observability			🚗
Nondeterministic			🚗
Dynamic world			🚗
Multiattribute objective			🚗
Unknown environment			🚗

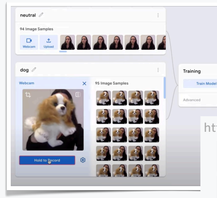
x

Exercise: Teachable machine

https://**teachable**machine.**withgoogle**.com

(15 minutes) In teams of 2 or 3:
Build a model to recognize two classes of object (e.g., mobile phone, pen, water bottle)

Discuss
- What works?
- What doesn't?
- When it fails, how does it fail?



https://**chatw.ch/hcai25**

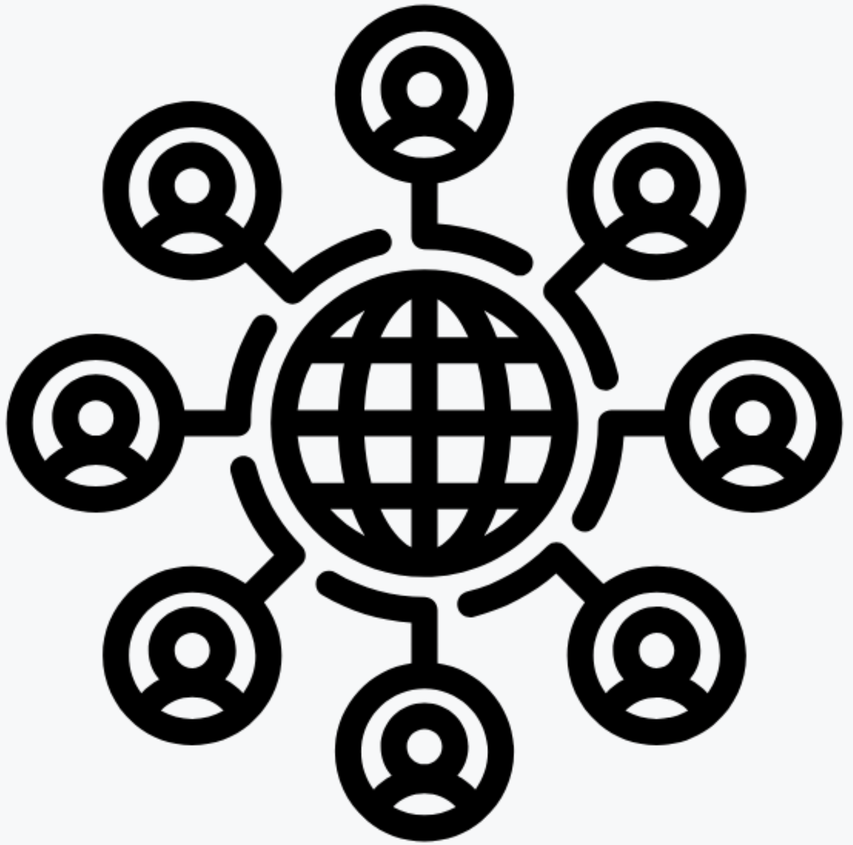
Write your insights in this poll →

x

People in AI

Users

Stakeholders



Society

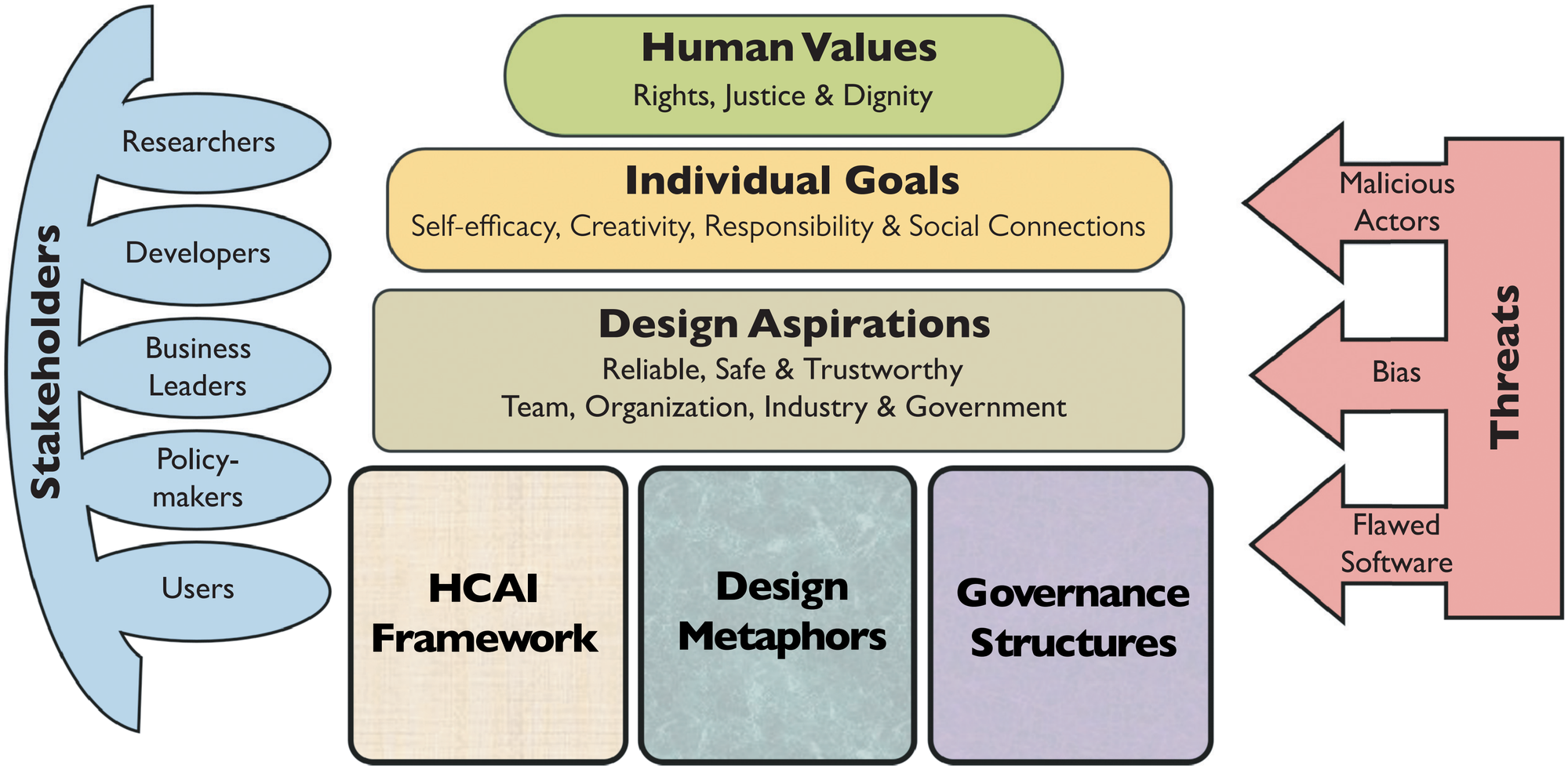
Human-Centered Artificial Intelligence

HCAI **products** aim to:

- augment, not replace human
- provide fair benefits, and mitigate harm to humans
- be understandable and usable
- be compatible with human brain and behavior

HCAI **process** draws from user experience design methods of user observation, stakeholder engagement, usability testing, iterative refinement, and continuing evaluation

Shneiderman (2022) Human-Centered Artificial Intelligence. Oxford University Press. (p. 9)



 Shneiderman (2022) Human-Centered Artificial Intelligence. Oxford University Press. (p. 11)

Course logistics

See the syllabus

https://chatw.ch/hcai25

Human-Centered Artificial Intelligence

Instructor: Chat Wacharamanotham (to email, see OLAT) Office hours: https://chatw.ch/h
Course format: Lecture with in-class exercises

COURSE DESCRIPTION

Artificial Intelligence (AI) is now a building block of computing systems. When developers of AI-powered systems change their algorithms or training data, the system could change its behavior wildly. This dynamic nature makes designing the user experiences of AI-powered systems more difficult than deterministic systems. Beyond the immediate users of such systems, the behavior of the AI-powered systems may impact the lives of other people and society at large. Hence, designing systems with AI is a broader perspective.

In this course, you will learn about the capabilities and limitations of various current AI systems. You will also learn about desirable qualities of AI systems, e.g., effectiveness, fairness, and ethics. You will also learn processes and techniques for designing AI-powered systems. Finally, you will learn about AI's current and potential impacts on users and society and how to study them.

INTENDED LEARNING OUTCOMES

1. Students can explain the capabilities and limitations of current AI systems and their implications for interaction design
2. Students understand and can critically analyze AI systems in their ethics, fairness, accountability, and transparency aspects
3. Students can apply a human-centered design process to design the user experience of systems with AI components
4. Students can explain the implications of AI applications that have an impact beyond their immediate users
5. Students can identify research methods to study HCI in AI-powered systems

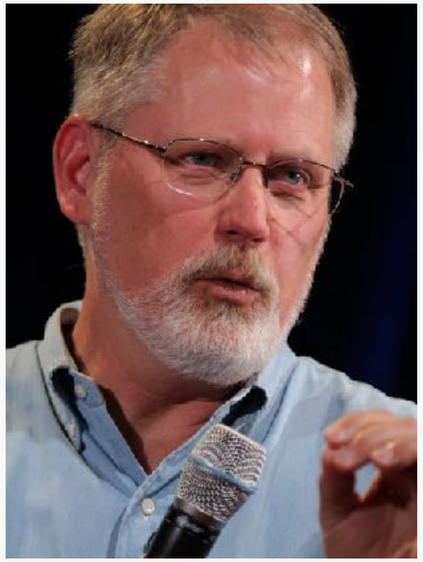
PRIOR KNOWLEDGE

Experiences with the following topics can be helpful, but they are not requirements:

- Human–Computer Interaction (HCI), e.g., Human-Centered Design process, Usability study methods
- Basic programming or computational thinking skills(e.g., functions, iterations, recursions)

Acknowledgement

Materials in the course are heavily influenced by the course by Dan Russell and Peter Norvig. We also draw upon courses by Iris Howley, Cori Faklaris, and many others



Daniel M. Russell

Peter Norvig

Iris Howley

Cori Faklaris

 Peter Norvig's photo credit: Christopher Michel

Homework

1. Create **your *HCAI workspace* document**
   - Create a document with any software that allow you to add images and create tables (e.g., MS Word, Apple Pages, or Google Doc)
   - We won't ask you to share this file with anyone
   - Keep this file open in the next lectures

2. Between now and tomorrow, **collect names of IT systems** that you interacted with or are involved in.
   - Type them down, one name per line, **in a spreadsheet** software, e.g., MS Excel or Apple Numbers
   - Bring this list tomorrow

3. Tomorrow: **bring a laptop** (or sitting next to somebody who will bring one)
   and **a piece of paper** and **a pen**