

# Research in An Automated Future

## The Birth of AI/ML Design Research



Advancing Research Conference 2022  
Ovetta Sampson  
V.P. of Machine Learning Experience Design and Responsible Artificial Intelligence  
Capital One  
March 2022



*“To amplify the beauty of humanity with design while avoiding practices that exploit its fragility.”*



Ovetta Sampson (Design Ethics Principle)

A yellow dotted line starts below the attribution text and extends diagonally down and to the right towards the bottom right corner of the slide.

# About Me

## V.P. of Machine Learning Experience Design at Capital One

- **CURRENT ROLE:** Lead design for enterprise machine learning platform that helps Capital One associates create all of the company's ML models, lead Responsible AI programs for the company including operationalizing RAI throughout the company, lead design for risk-mitigation and machine learning governance programs at the company. Formerly Microsoft, and IDEO...
- **MY JAM:** End-to-end design, rapid prototyping, enterprise software design, machine learning and AI systems design
- **ADJUNCT PROFESSOR:** Teach "Designing Ethical AI," at the School of Design at DePaul University (Chicago)

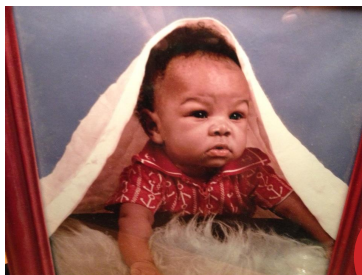



# My Background



30+ years with data and people, machine learning and AI

- **EDUCATION:** B.A. in Communications and M.S. in Computer Science (DePaul HCI)
- **BACKGROUND:** Former journalist, computer-assisted reporting and data visualization experience
- **EXPERIENCE:** Designed intelligent systems using IoT, AI, digital technology in financial, health care, service, human resources, automotive, mobility and nonprofit, government industries





*“Increasingly, our role as designers will be to determine what NOT to design in a quest to preserve human culture, values and rituals in our future world.”*




Ovetta Sampson,

“A Lovely Day: An Optimistic Vision for an Automated Future,”

**Interactions Magazine**




# SOME LEVEL-SETTING DEFINITIONS



*“Design is the conscious and intuitive effort to impose meaningful order to chaos...”*



Victor Papanek, author of “Design for the Real World.”



*“Design is the conscious and intuitive effort to impose meaningful order to chaos...”*



Victor Papanek, author of “Design for the Real World.”





*“Design is not research. Research is design.”*



*Demystifying Design Research*

*Trygve Faste and Haakon Faste*

# ➤ ML, AI and MLXD

# What is Machine Learning?

## Automated learning



At its foundation machine learning is category of artificial intelligence where computers “learn,” to achieve a desired outcome **by applying problem-solving rules “automatically,”** after being trained to do so.

## Replicating the Human Brain



Some machine learning algorithms, called neural networks, are **modeled after the human brain** and can execute outcomes with or without supervision from human programmers.

## Passive observations



While machine learning allows machines to “see, hear, think and act,” it’s limited in that it **focuses on problem-solving based upon passive observations,** rather than actively interacting with the environment to make decisions.

# Algorithms are the lifeblood of AI systems

Algorithms are a series of unambiguous rules used to solve a problem.

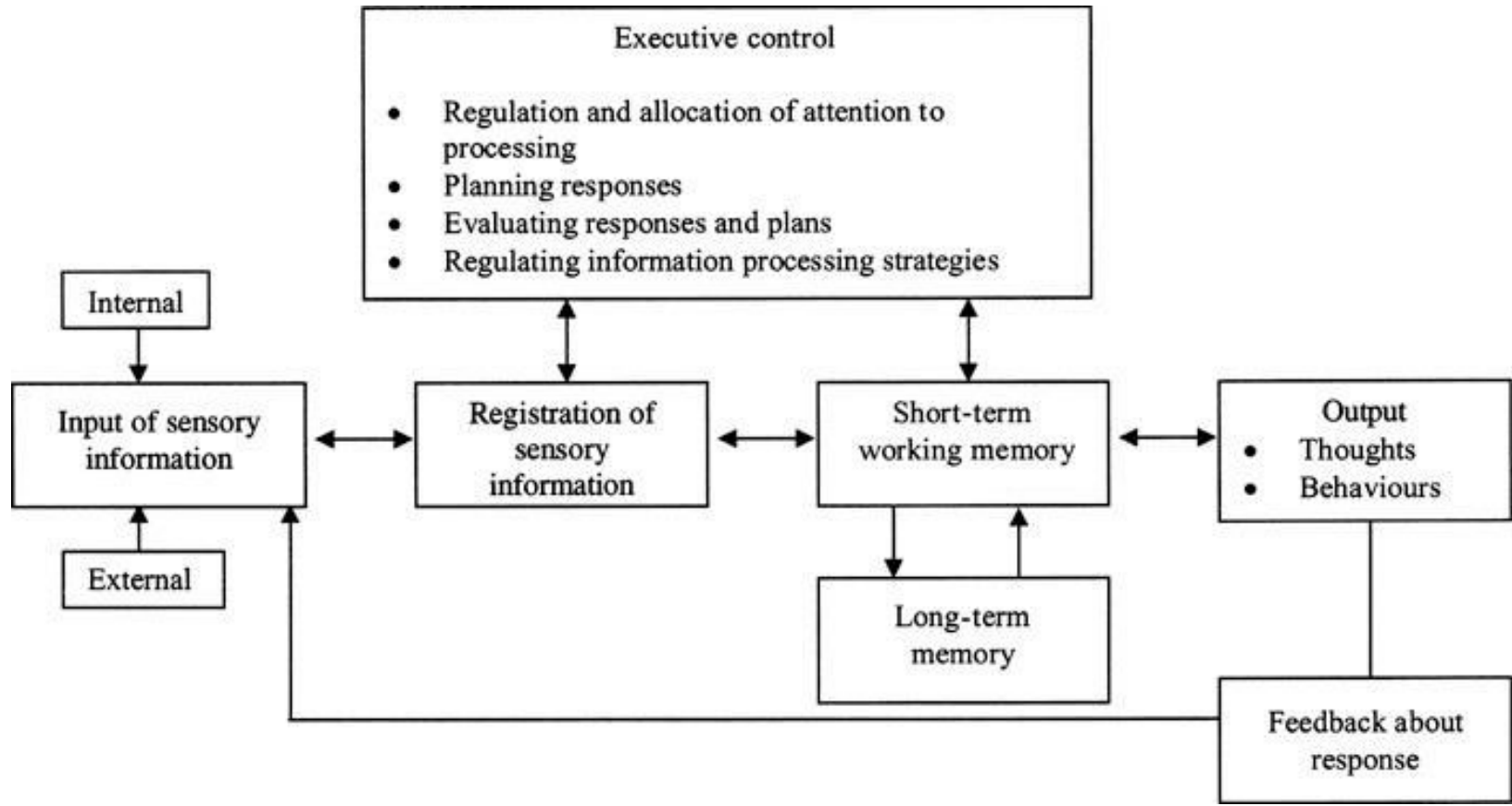
These rules can be simple or complex.

We create algorithms everyday. Especially when it rains.

Socrates is said to have created the first algorithm



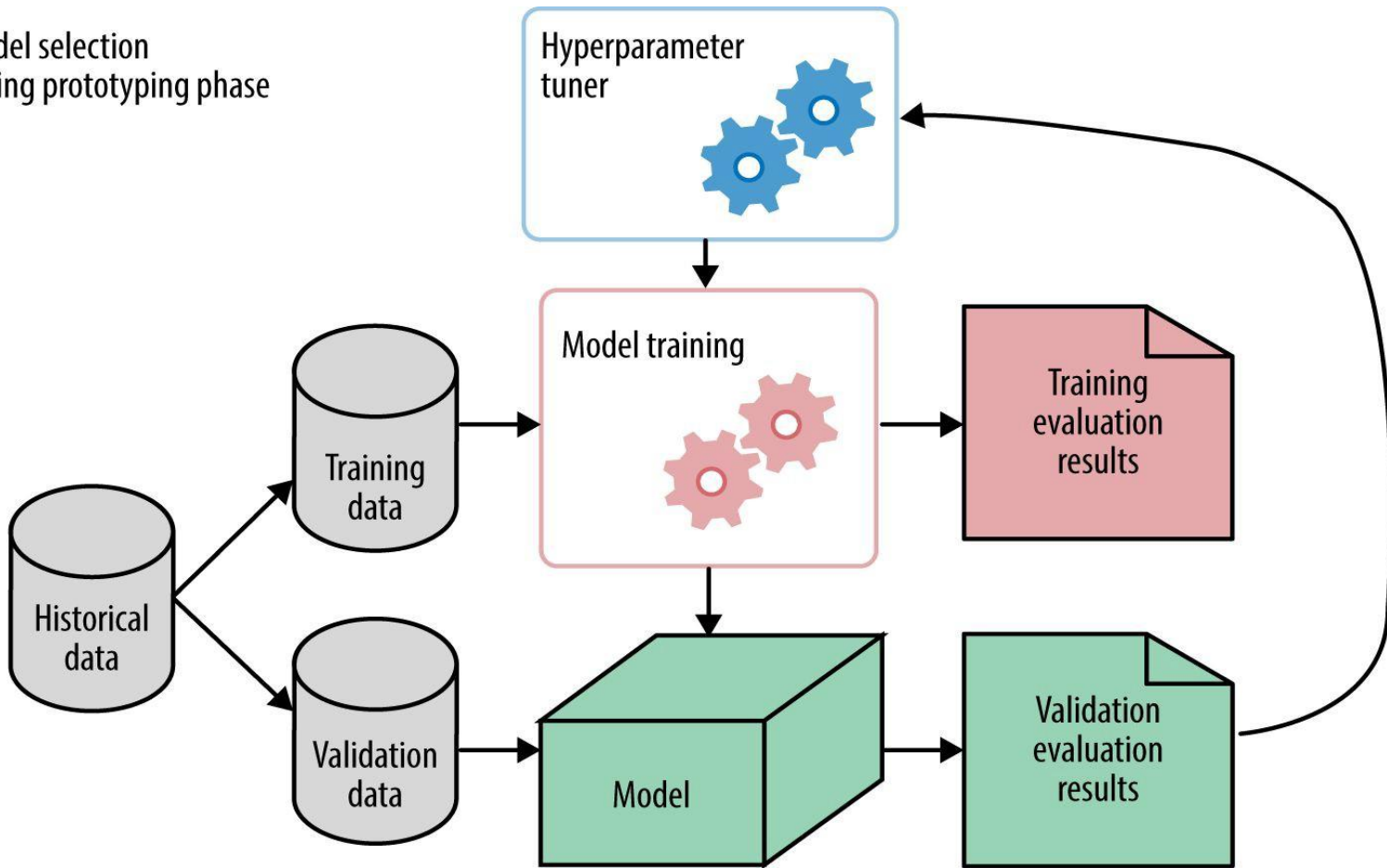
# How Humans Process Information






# Data Science Model Development Process

Model selection  
during prototyping phase





*“Machine learning is category of Artificial Intelligence in which computers ‘learn,’ to achieve a desired outcome by applying problem-solving rules ‘automatically,’ after being trained to do so.”*



# What is Machine Learning In Practice?



## Anomaly detection



Data mining, and detecting unique data or outliers within large data sets through automatic tasks that machine learning is often used to do.



## Classification Models



Classifying photos, for example determining whether a picture is a dog or a cat (or neither) is a common use of a machine learning model.



## Recommendation Models



Predicting what Netflix movie you would like to watch next is a classic example of a machine learning model that learns based upon past actions and predicts future decisions.

# Silver Shows How Machine Learning Models Operate

Supervised




Unsupervised



Reinforcement





*“Artificial intelligence is the field computer science that focuses on giving computer-enabled programs or machines the ability to transform information by learning and decision-making.”*

# What is Artificial Intelligence?

## Transform information



Artificial intelligence is the field computer science that focuses on giving computer-enabled programs or machines **the ability to transform information by learning and decision-making.**

## Dynamic behavior



Artificial intelligence is simply when **computers use their environment to do tasks that have historically required human intelligence** including seeing, learning and acting.

## See, hear, taste, smell



When combined with other technology such as camera, sensors, IoT, or AR/VR AI products can do almost anything humans can do including **write poetry, smell bread, taste sugar and see to drive.**

# AI/ML Replicates Humans in the Real World

People	AI/ML Powered Machines
WE SEE	➤ <b>Computer vision</b> - Autonomous cars, Google image search/classification, facial recognition
WE HEAR	➤ <b>Auditory sensors</b> - synthetic music, listening processors, sound predictions
WE SPEAK	➤ <b>Natural language Processing</b> - Alexis, Siri, Cortana, Eno
WE ACT	➤ <b>Automation</b> - delivery bots, dancing robots
WE MAKE DECISIONS	➤ <b>Recommendation Models</b> - Netflix, Facebook, Twitter

# Major AI Capabilities



Natural language processing

Knowledge representation

Automated reasoning

Machine learning

Computer vision

Robotics

# Limitations of ML and AI

- No data, no dice
- Garbage in - Garbage Out
- No rules no action (not yet)
- Nuance is the enemy of machine learning and AI
- ML and AI is meant to replicate human rationality but in reality humans are keenly irrational



# Key AI Terms

## Algorithms



Coined by the Persian mathematician Muhammad ibn Musa al-Khwarizmi, algorithms are the lifeblood of intelligence programming. **An algorithm is simply a rule-based problem solving entity.**

## Machine Learning



Machine learning algorithms **use statistics to find patterns in massive, large data sets** and execute desired outcomes.

## Deep Learning



Deep learning uses neural networks to boost a machine's ability to identify patterns and make decisions from ginormous data sets. Often **doesn't require step-by-step programming and can make decisions on its own.**

## Narrow AI



Also known as "Weak AI," nearly all of the machine learning we see today fits into this category. It's the field of AI that is **programmed to perform specific tasks in real-time, using data extracted from a particular data set.**

## Generative AI



The Holy Grail of AI, is when machines can perform any human task without human intervention using their own intelligence. **This does not exist.**

## AI Singularity



The new Holy Grail of AI. This is said to occur when **AI machines become "self-aware."** This does not exist.

# AI/ML Replicates Humans in the Real World

People	AI/ML Powered Machines
WE SEE	➤ <b>Computer vision</b> - Autonomous cars, Google image search/classification, facial recognition
WE HEAR	➤ <b>Auditory sensors</b> - synthetic music, listening processors, sound predictions
WE SPEAK	➤ <b>Natural language Processing</b> - Alexis, Siri, Cortana, Eno
WE ACT	➤ <b>Automation</b> - delivery bots, dancing robots
WE MAKE DECISIONS	➤ <b>Recommendation Models</b> - Netflix, Facebook, Twitter

# What you need to know about AI/ML...

- Data is the fuel for all machine learning models.
- Data scientist use algorithms to use data to train and teach machines to solve problems through models.
- Algorithms are the lifeblood that carries that fuel allowing machine learning models to sense, act and learn.



# ML/AI In the Real World

- Self-driving cars
- Smart assistants
- Fraud detection
- Covid detection from x-rays
- Ad targeting
- Lead scoring systems
- Stock trading
- Chat-bots/ virtual assistants



*“Computers are able to see, hear and learn. Welcome to the future.”*



Dave Waters, Director of Geoscience Consultant, UK

### Artificial Nose

The Artificial Nose experiment is a smart device trained to recognize a variety of smells. With a simple gas sensor and a micro-controller, you can build an AI nose that can identify the smell of bread, coffee, and more.

[Try the Artificial Nose demo](#) >



# Redefining Design Research



CULTURAL  
PROBE

DEVELOP  
PERSONAS

CARD  
SORTING

CUSTOMER  
INTERVIEWS

LISTEN IN ON  
CUSTOMER  
SERVICE CALLS

FIELD  
VISITS

RUN A  
USABILITY  
TEST

USER  
SURVEY

# Why Designing for AI is Different?

## Current Technology

- The user controls the device
- Context of use is single-agency
- The user interaction is one-way
- Technology use is task-based
- Technology use has affordance; user interacts with device in the same consistent way
- Technology is static; device performs tasks in the same way

## Automated or Intelligent System Technology

- User and machine can be in control
- Context of use is multi-agency
- Interaction is two-way
- Technology use is decision-based
- Technology affordance can change over time because machine can learn
- Technology is dynamic; machine learns and performs differently with new knowledge

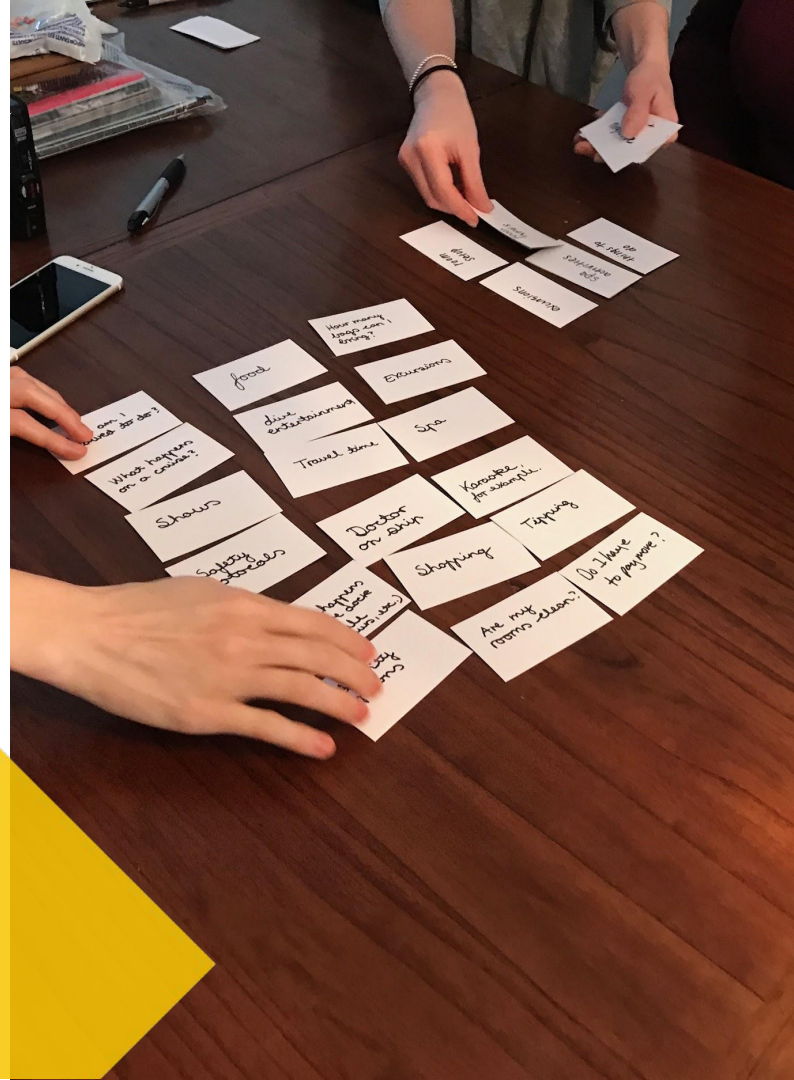


**Research Today:  
Behavioral Focus Design Research**



## Challenges Using Current Methods for AI Design

- Research must be future-oriented instead focused on present
- Speculative research is difficult with current UX Research methods
- Research must be dynamic as AI technology is not static
- Research must go beyond single-agency framework and consider eco-system of multi-modal AI environment



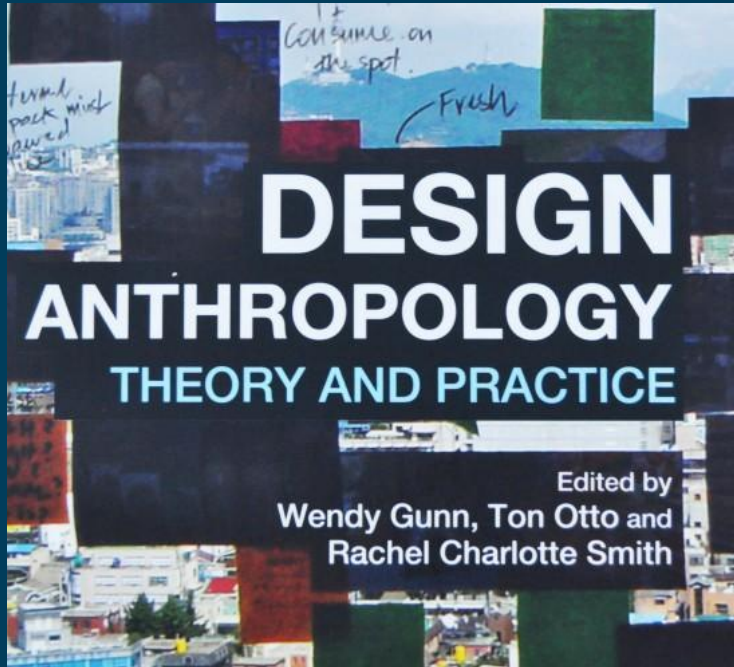
# Beyond usability and desirability

- Pre-software we worried about how a product is made
- Post-software design we must worry about how a product behaves
- This takes paradigm shift in our research approach
- We have to look beyond desires and behavior
- We have to seek the unexpressed rituals, cultures, values, an irrational practices that makes us distinctly human



Sampson and Associates LLC

# Beyond tools, users and functions



“... This hybrid mode of investigation, building from design anthropology, is a way for us to overcome the difficulties in studying speculative objects. Technologies that do not yet exist must be imagined or brought into being as they are investigated”

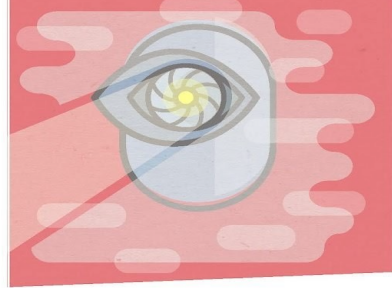
*Rachel Charlotte Smith*

Sampson and Associates LLC



Experience  
Design

# What is Design Anthropology?



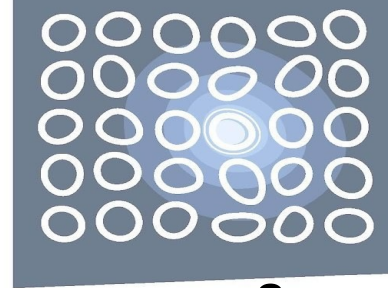
## Super Vision

- + Can see what's ahead and keeps you informed.
- Is a big ol' nag and shares everything with you!



## Fast Eyes

- + Takes you wherever you like to go, letting you relax and take a break!
- Always taking you out of the way of the road.



## Go On

- + Can perform any task or make any choice and do it better than anyone else.
- You can't do anything that you will regret.



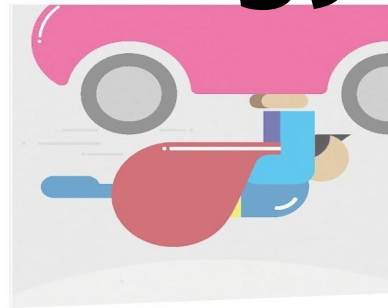
## Mind Reader

- + Does everything in the vehicle exactly how you would even without asking...
- Gossips! Shares all your preferences with everyone.



## Time Share

- + Can drive for you whenever you want on any route you pick!
- Only drives for 7 minutes then takes a 1 minute break.




## Superhero

- + Swoops in to save you just before a potential collision.
- You might forget it's there and fight for control when it kicks in...







*Anthropology is “the study of how people collectively organize, understand and live in the world.”*



- *Dr. Carole McGranahan, Professor of Anthropology University of Colorado*



*Ethnography is an embodied, empirical, experiential field-based knowledge practice grounded in participant-observation.*

# Shift in Design Requires

# Shift in Research Focus



“ Design anthropology seeks to understand how the processes and artifacts of design help to define what it means to be human...Design anthropology is a method of research that focuses on how design translates human values into tangible experiences.” ”

- Elizabeth “Dori,” Tunstall, Dean of Design at OACD

# Design Anthropology Characteristics

## Transdisciplinary



Is transdisciplinary; weaving together the psychological, cultural values and human nature of people to create design

## Multi-Agency



Considers multi-agency prospective including systems, environments and social connections and not just the individual

## Requires Co-Participatory Design



Requires co-participation from people engaging in contextual speculative scenarios to understand conscious and unconscious latent needs, behaviors and motivations

## Research Led Design



Is design and research led, rather than technology led; focusing individuals, social connections and environments to influence design

# Design Anthropology Methods

## Provocation Prototypes



Uses artifacts such as boundary concepts, provo types and prototypes as research tools rather than interviewing, surveying and testing

## Perpetual Synthesis



Is in a state of perpetual synthesis

## Future oriented



Seeks to anchor images of the future through reliable constructions of the past

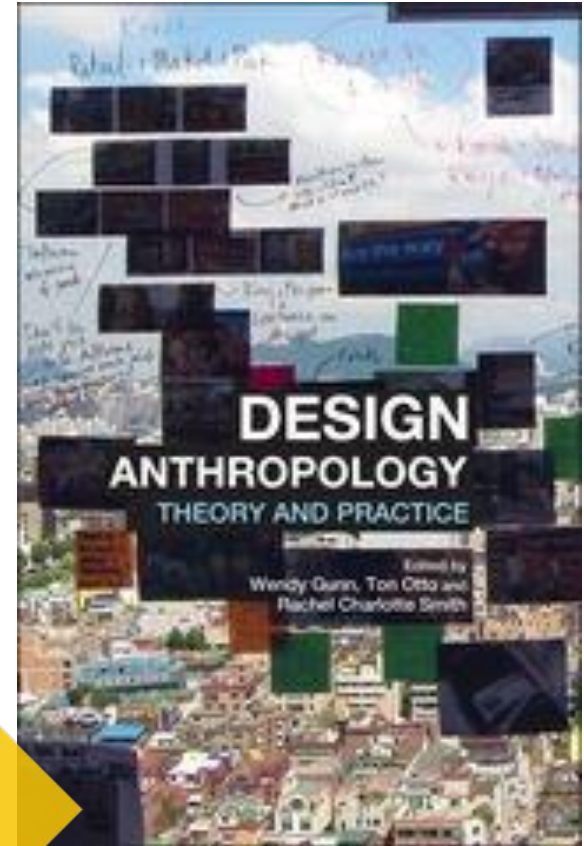
## Considers value, culture and rituals



Is concerned with the unique sensitivity to the value orientation of the various group, consumers, producers and audiences affected by the design

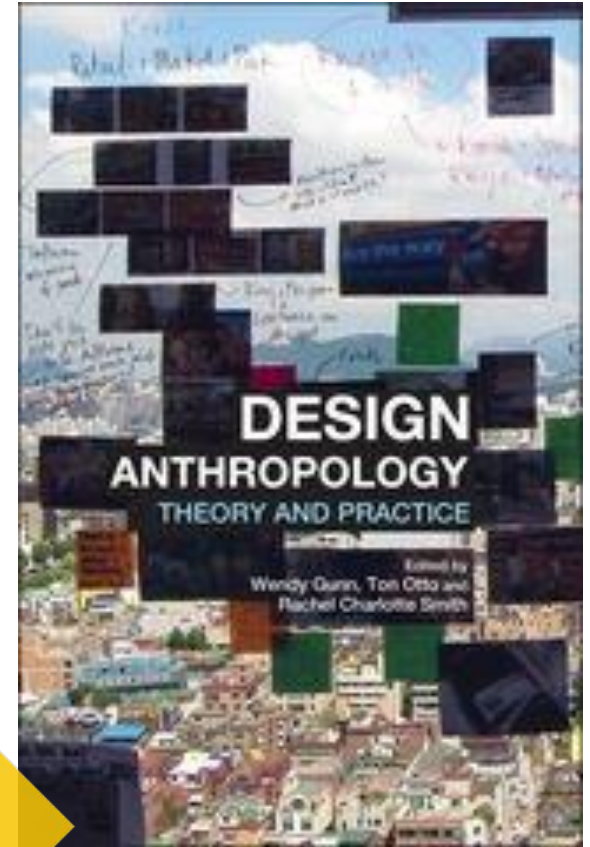
# DESIGN ANTHROPOLOGY

- Ethnographic fieldwork is iterative and both reflection and action oriented
- Less reliant on observing current states and employs simulations, mock-ups, props and tangible interactions to explore futuristic and speculative design

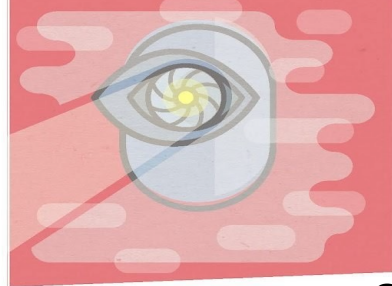


# DESIGN ANTHROPOLOGY

- Research tools are less observation of current state and more scenario-based, taking various forms of games, performances and enactment
- Teams are transdisciplinary, each member working together to create new conceptual, theoretical, methodological and translational innovations that integrate and move beyond discipline-specific approaches to address a problem



# Design Anthropology in Action...



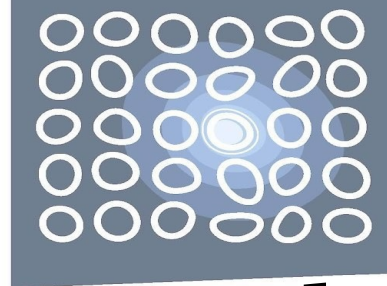
## Super Vision

- + Can see what's ahead and be informed.
- Is a big of a nag and shares everything with you!



## Enter E

- + Always over your drive, letting you relax and take a break!
- Always takes you out of route to your destination.



## Pick O

- + Can choose your drive, your choice and it's better than anyone else.
- You ask it to do anything else it will probably fail...so don't ask!



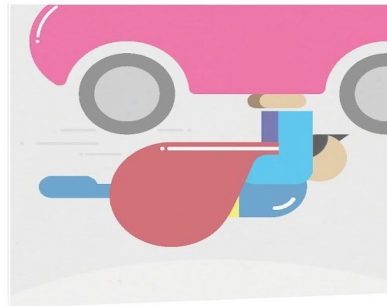
## Mind Reader

- + Does everything in the vehicle exactly how you would even without asking...
- Gossips! Shares all your preferences with everyone.



## Time Share

- + Can drive for you whenever you want on any route you pick!
- Only drives for 7 minutes then takes a 1 minute break.



## Superhero

- + Swoops in to save you just before a potential collision.
- You might forget it's there and fight for control when it kicks in...



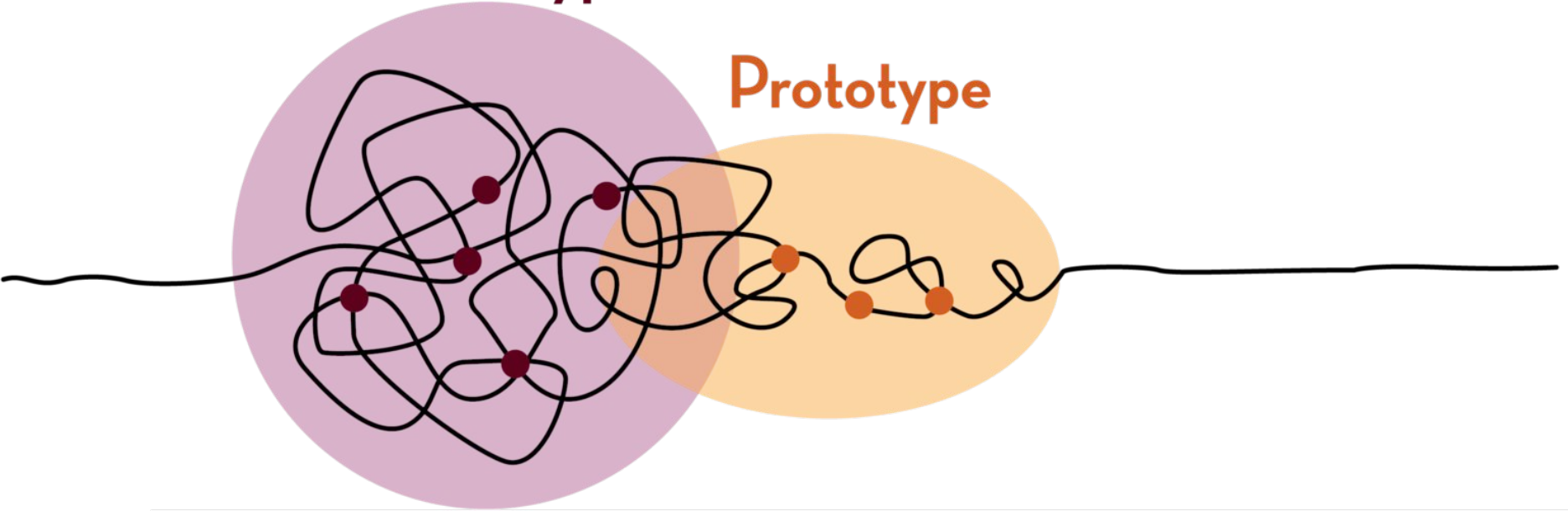
# Key Methods Introduced by Design Anthropology

- Provotypes
- Games for research purposes
- Simulations
- Reenactments



# Provotype

# Prototype



discovery  
(fuzzy front-end)

concepting

production

# Evolution of Design and Research Methods

## Adopting Design Anthropology

- Replace traditional research methods with simulations, props, mock-ups, tangible interactions to explore futuristic and speculative design scenarios
- Focus less on human behavior and decision making and more with culture, rituals and values
- State of iterative and perpetual synthesis for dynamic products

## Multi-agency Framework

- Move beyond “user and device,” to consider dynamic ecosystem
- Focus not on the use of a product but on the intrinsic value a person brings to a dynamic product that is “sentient.”
- Shift mental model to view “user,” as part of a dynamic system that changes over time.

## Multi-disciplinary Teams

- Employ interdisciplinary people with expertise in art and engineering, or physics and literature
- Hire diverse designers from a wide range of backgrounds, LGBTQ, BIPOC, rural, military, etc.,
- Designers, data scientists, engineers and product managers work on same team.

**REDEFINING DESIGN FOR AN AUTOMATED FUTURE**







# Thank You!

For Additional Information or Questions:  
[Ovetta.Sampson@capitalone.com](mailto:Ovetta.Sampson@capitalone.com)



Experience  
Design