

UXSTRATEUROPE

Framework for Human-Centered AI Innovation

Sarah Tan

Founder, Formatif

about me

Sarah Tan

Founder and CEO of **formatif**
0 → 1 Venture Design Studio

Experience:

- Startup product design for over 26 startups
- VC investments in Silicon Valley (Incubate Fund)
- Innovation and strategy consulting for MNCs
- Human-Centered AI research collaboration with AI Singapore



Designing with AI
brings new product
and ethical challenges

? Uncertain AI capabilities

- New constraints – what AI can do
- User-data technical feasibility
- Design for unknown?

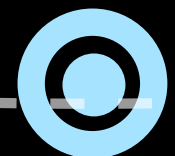
🤔 AI output is complex

- Never 100% accurate
- Infinite outcomes – unable to predict for infinite outputs

🌍 Responsible AI concerns

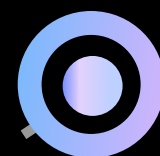
- Make or break society
- Trust and privacy
- Data regulations

History of AI



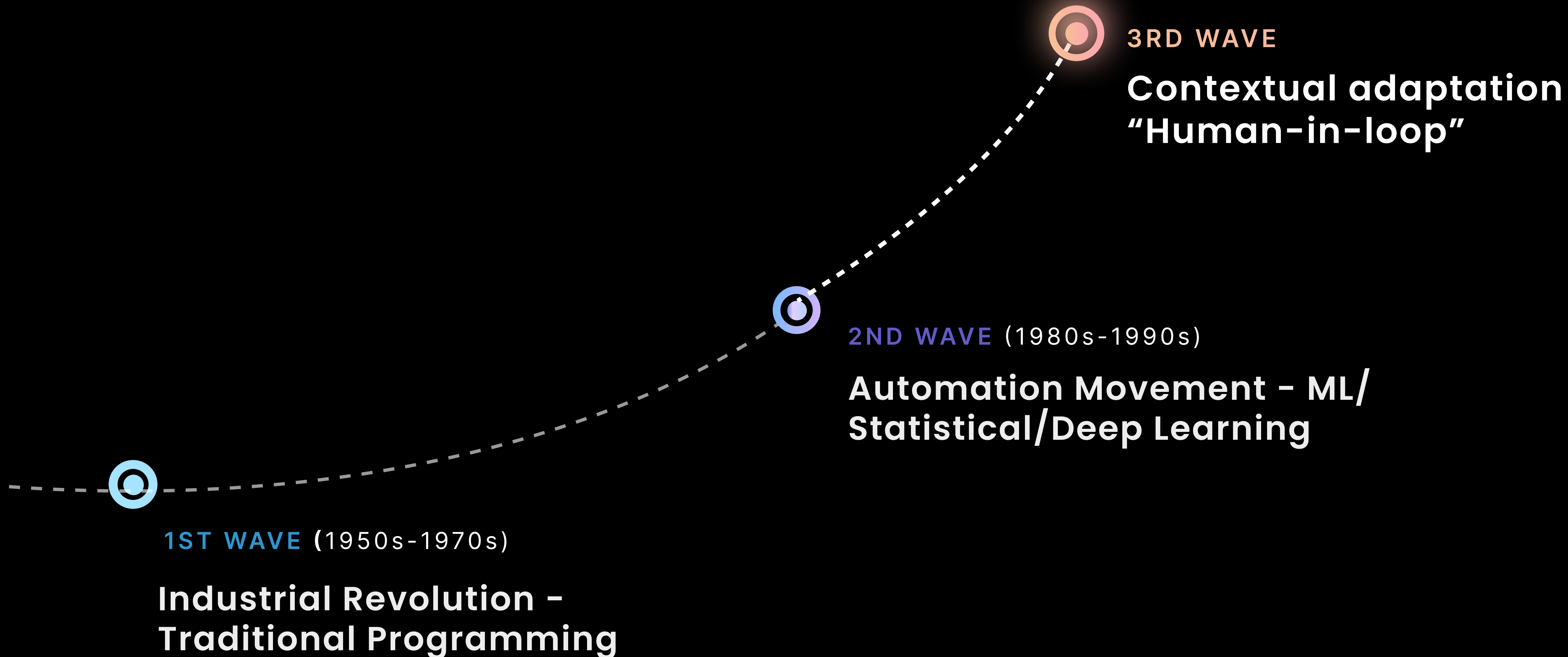
1ST WAVE (1950s-1970s)

**Industrial Revolution -
Traditional Programming**



2ND WAVE (1980s-1990s)

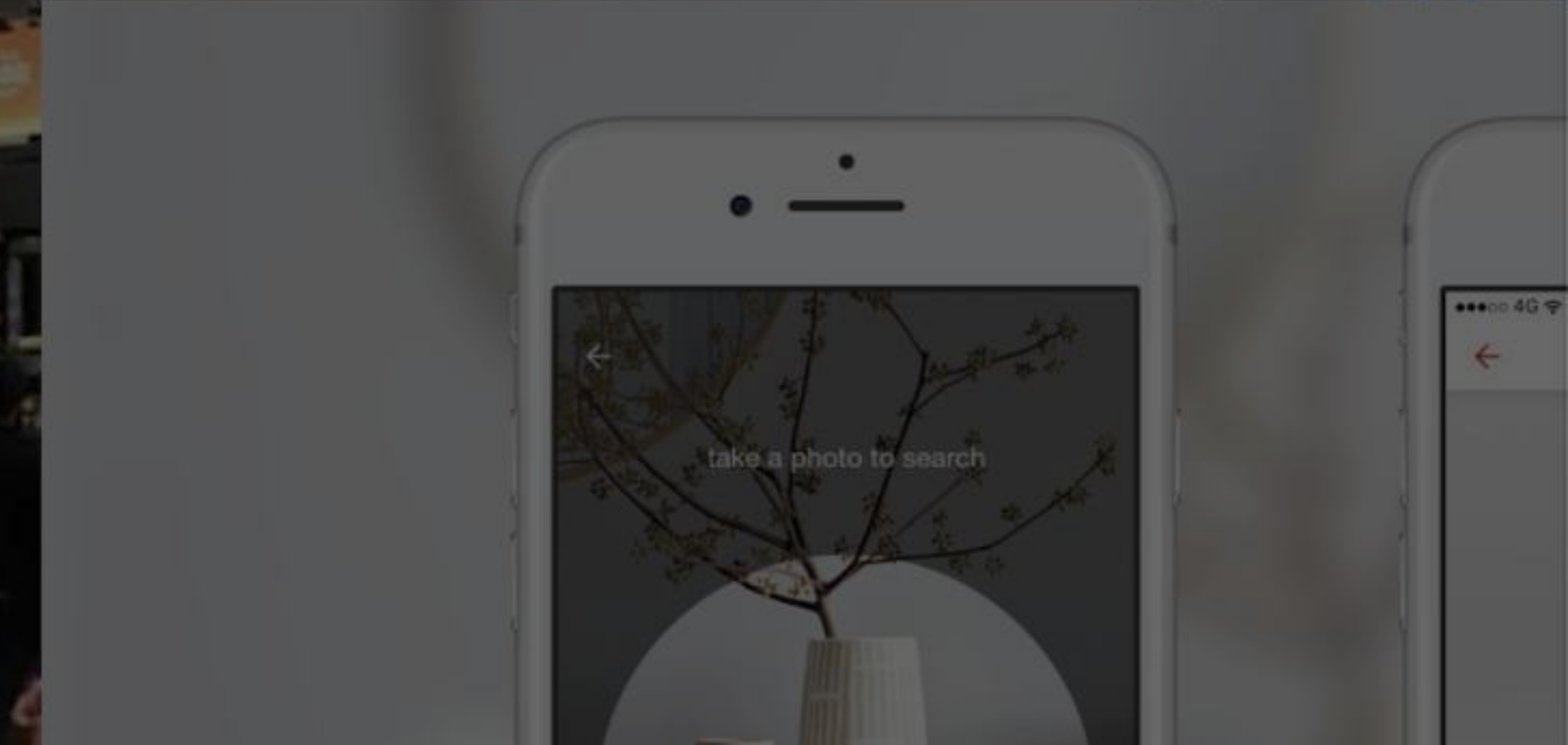
**Automation Movement - ML/
Statistical/Deep Learning**



A worker in a yellow hard hat and safety glasses is operating a control panel in a factory. The background shows a complex industrial environment with multiple yellow robotic arms and machinery. The scene is dimly lit, with the worker's face and the control panel being the primary light sources.

THEN Automation

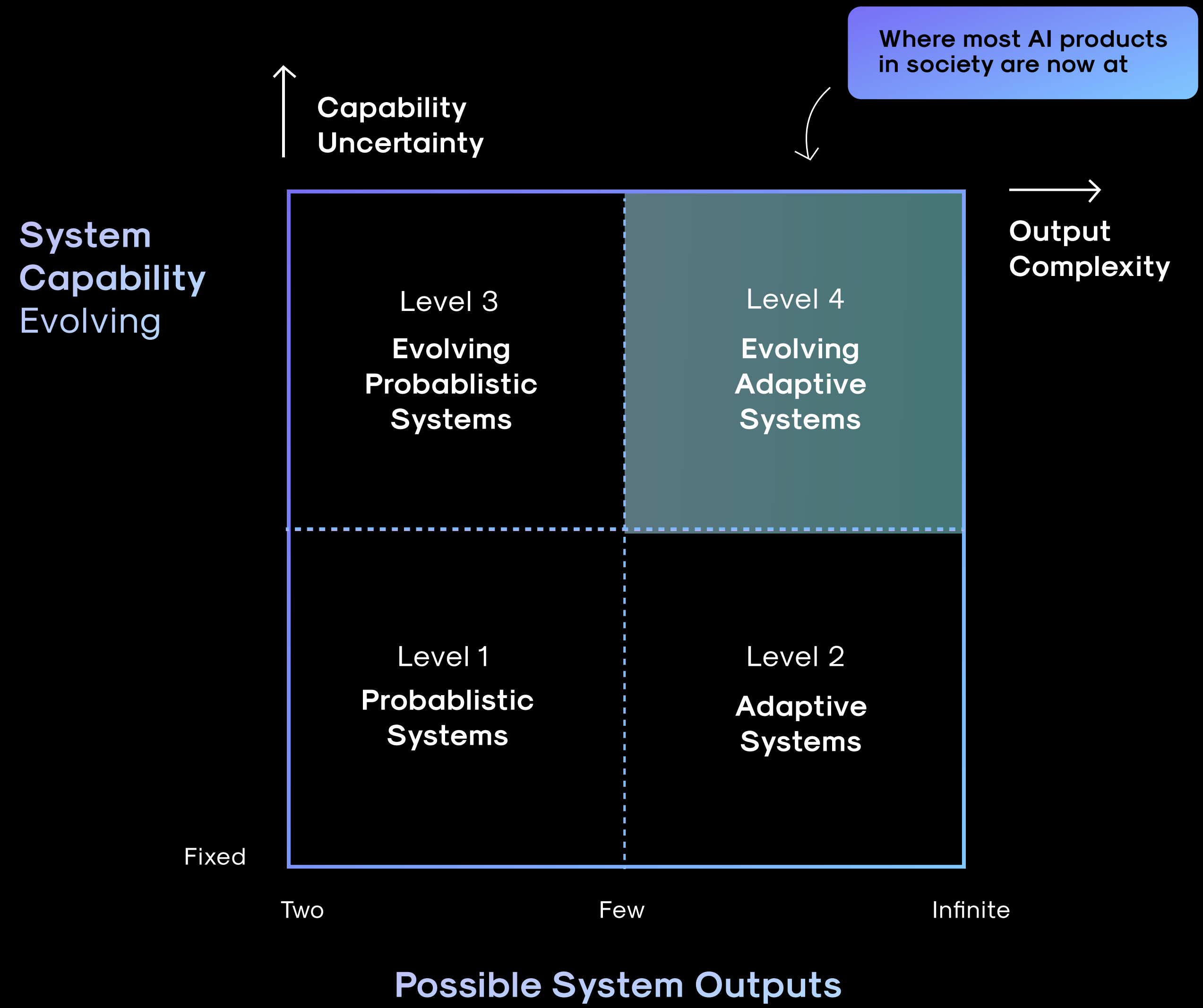
Clear outputs
Repetitive, predictable outcomes



NOW

Augmentation

Augmenting human intelligence
Enhancing our daily experience



Sam Altman: CEO of OpenAI calls for US to regulate artificial intelligence

16 hours ago

Economy | Technology

AI 'could be' danger to society, US President Biden says

Joe Biden says AI developers have a responsibility to ensure products are safe before releasing them to the public.

ARTIFICIAL INTELLIGENCE

Artificial Intelligence Will Do What We Ask. That's a Problem.

35 |

By teaching machines to understand our true desires, one scientist hopes to avoid the potentially disastrous consequences of having them do what we command.

TECH

Elon Musk, who co-founded firm behind ChatGPT, warns A.I. is 'one of the biggest risks' to civilization

PUBLISHED WED, FEB 15 2023-10:24 AM EST | UPDATED MON, MAR 6 2023-7:40 AM EST



Ryan Browne
@RYAN_BROWNE

SHARE f t in

Smarter together: Why artificial intelligence needs human-centered design

Deloitte Review, issue 22

AI Security: How Human Bias Limits Artificial Intelligence

April 15, 2021 | By Mark Stone | 6 min read

The dangers of trusting black-box machine learning

By Ben Dickson - July 27, 2020

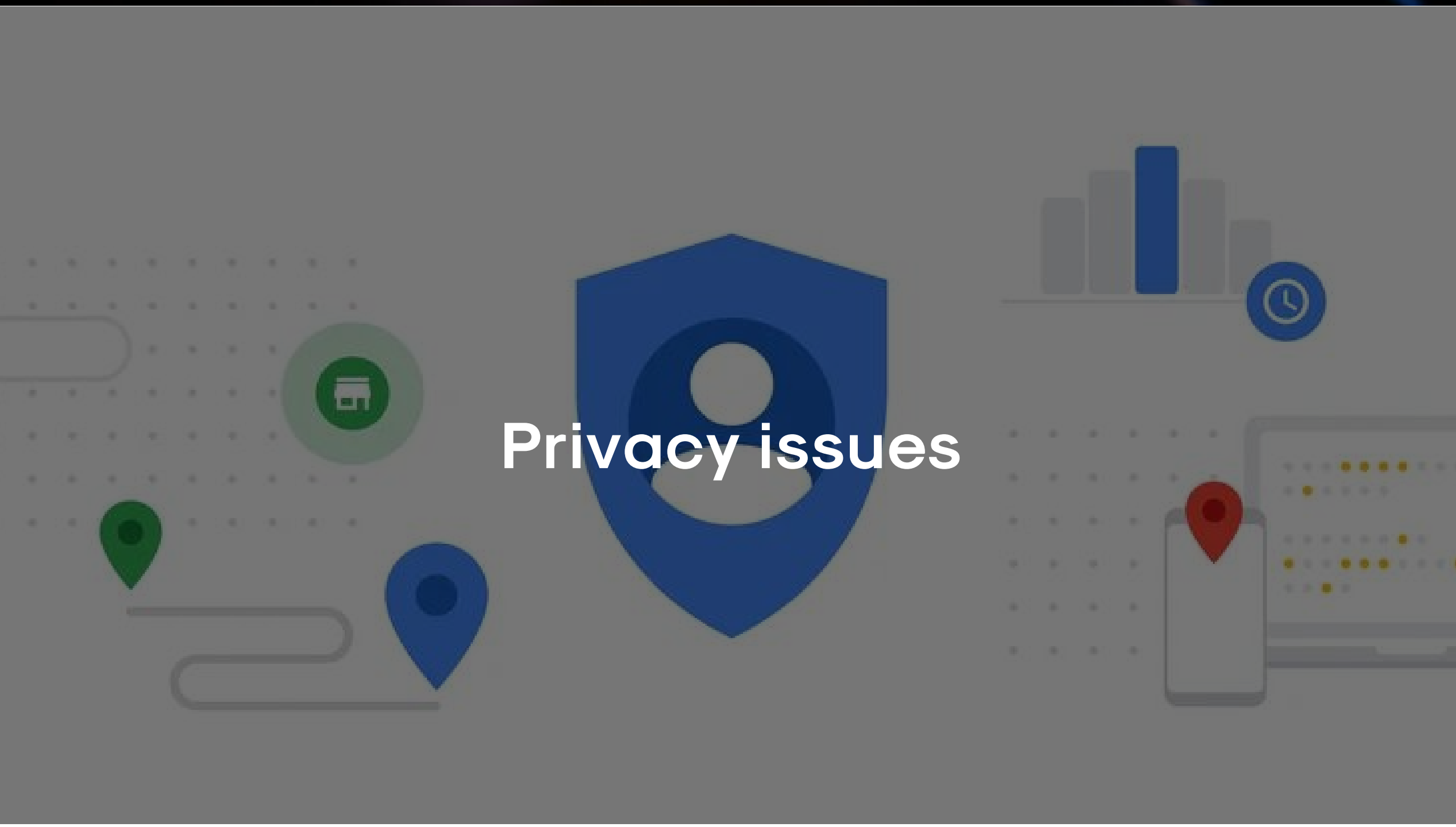
Sam Charrington of TWiML&AI: Thinking AI is Magic is a Dangerous Proposition



Malicious use



**Lack of transparency
and control**



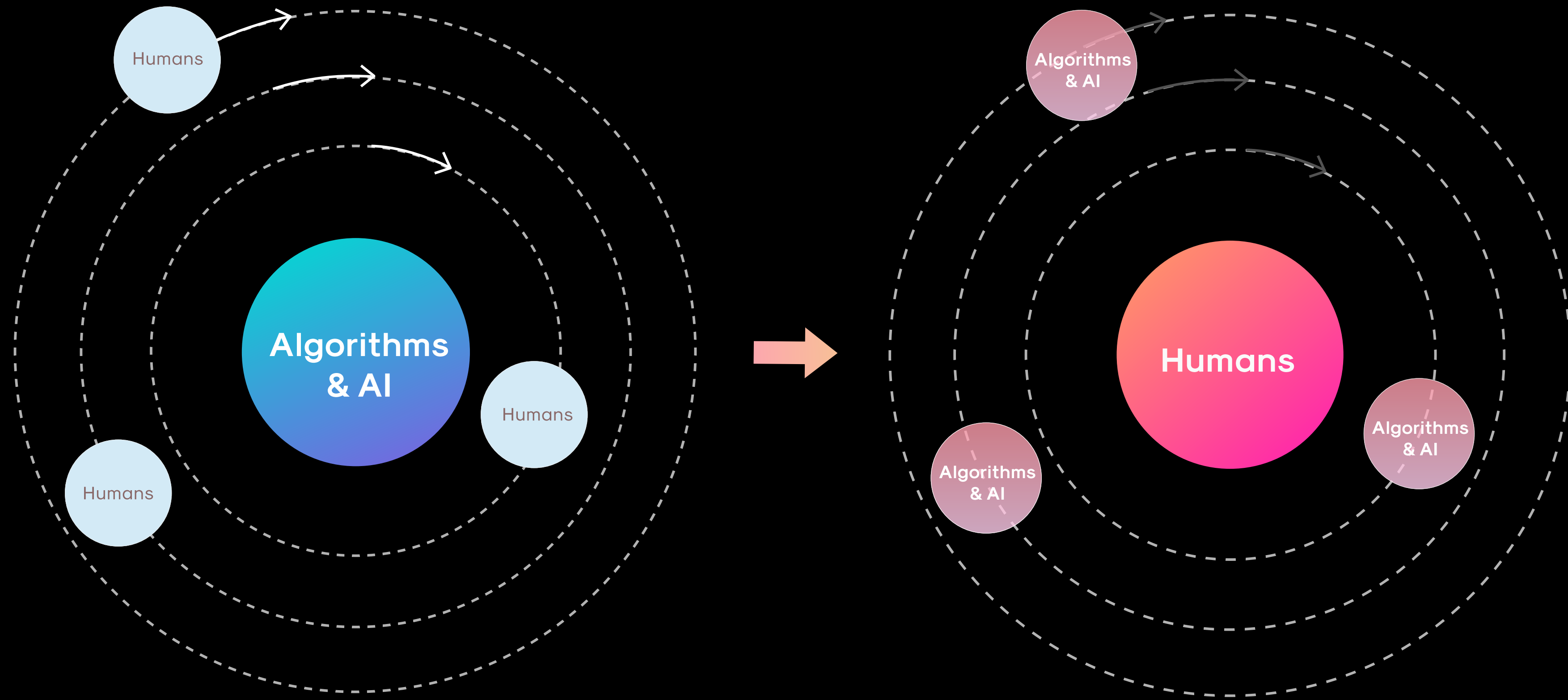
Privacy issues



Data biasness

-Innches

Human-Centered AI?

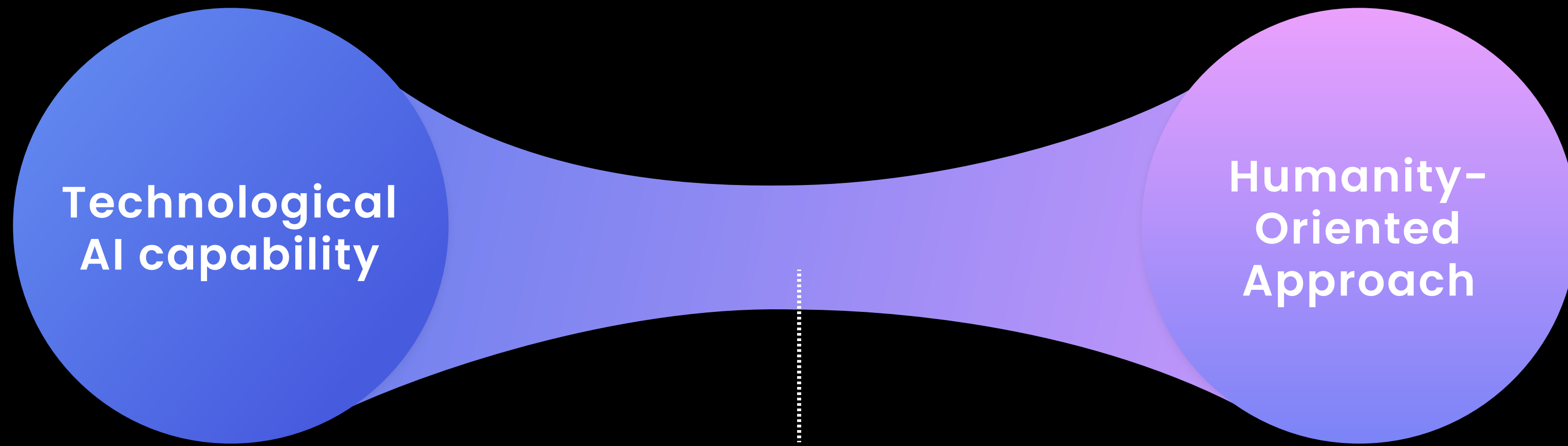




Technological
AI capability



Humanity-
Oriented
Approach



Technological
AI capability

Humanity-
Oriented
Approach

Human-Centered AI

Human-Centered AI



Design using AI

AI as a tool to augment design materials



Design **with** AI

Integrate design processes with AI/ML life cycle stages



Design for AI

Design AI-driven products, interfaces and UX

Design

Create

Develop

using AI

AI-powered tools and softwares
(ChatGPT, Copy.ai)

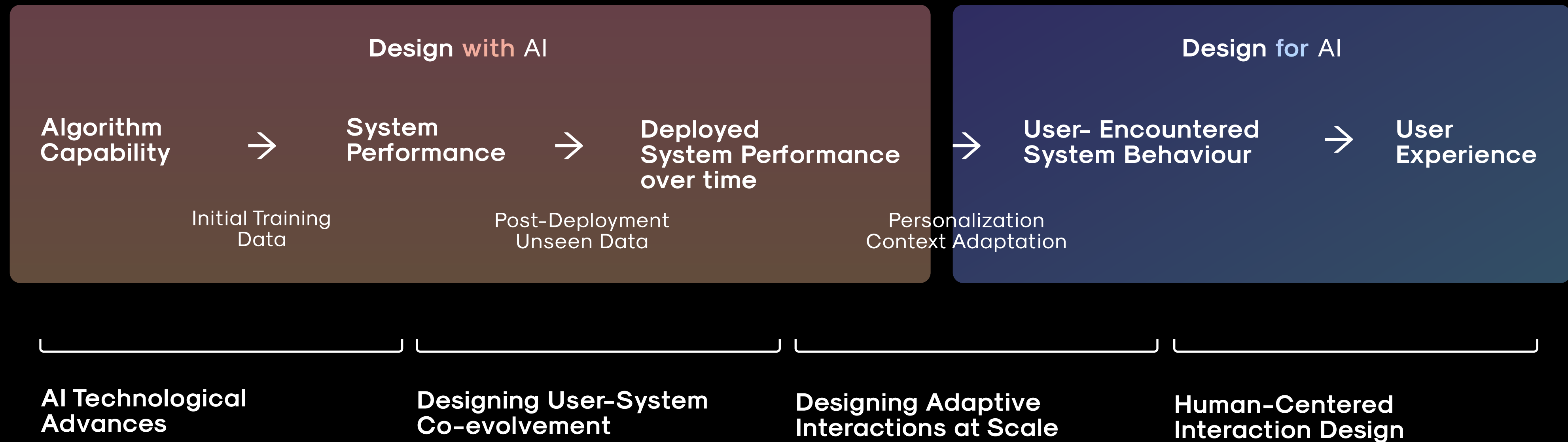
with AI

AI life cycle stages and processes
(Simulation, Wizard of Oz)

for AI

front-end AI driven products, interfaces
(Conversational UX, AI-enabled features)

Human-Centered AI



Humanistic

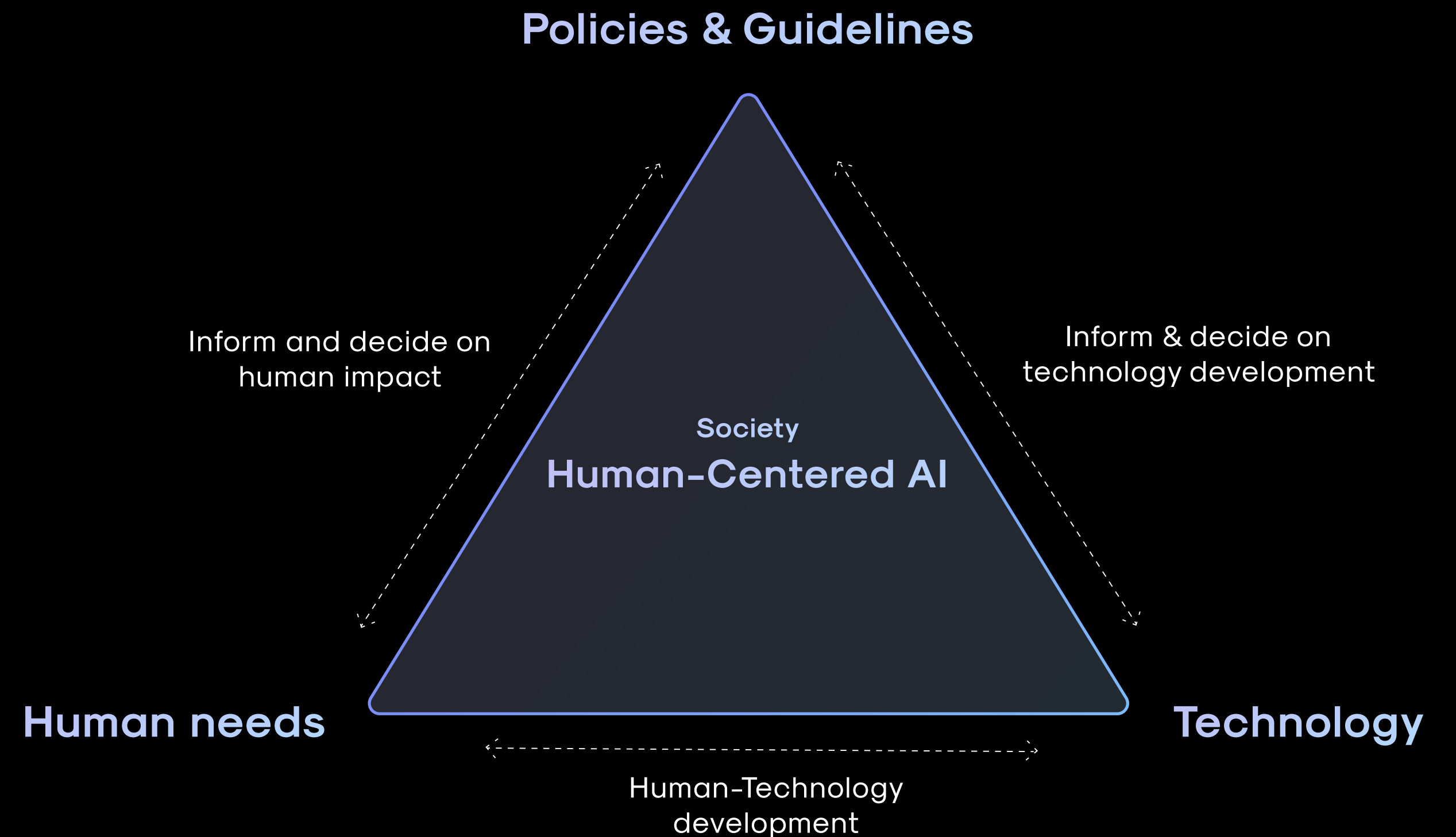
Considering ethics and societal impact

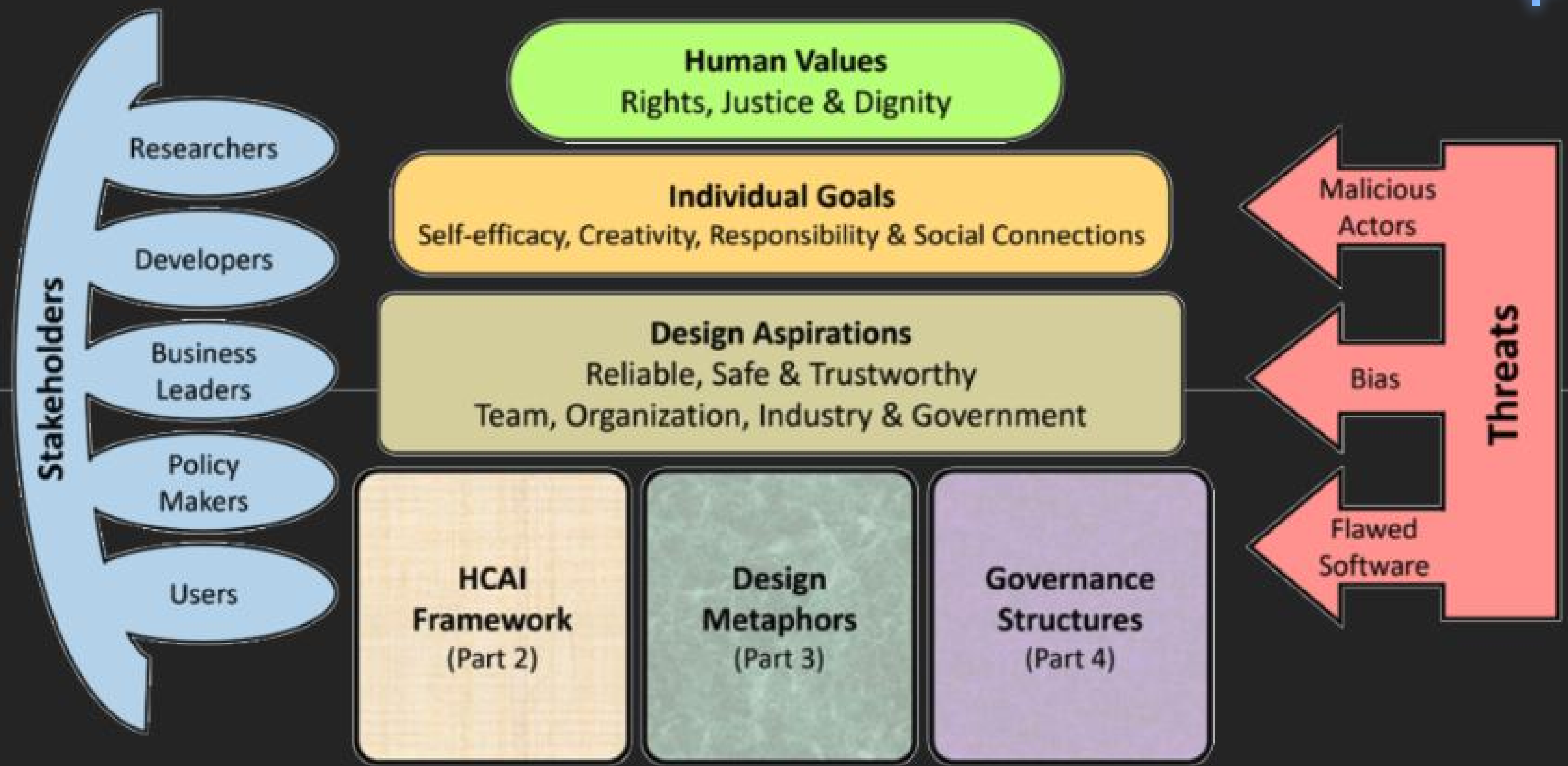
Technological

Understanding AI complexities and designing with AI capabilities

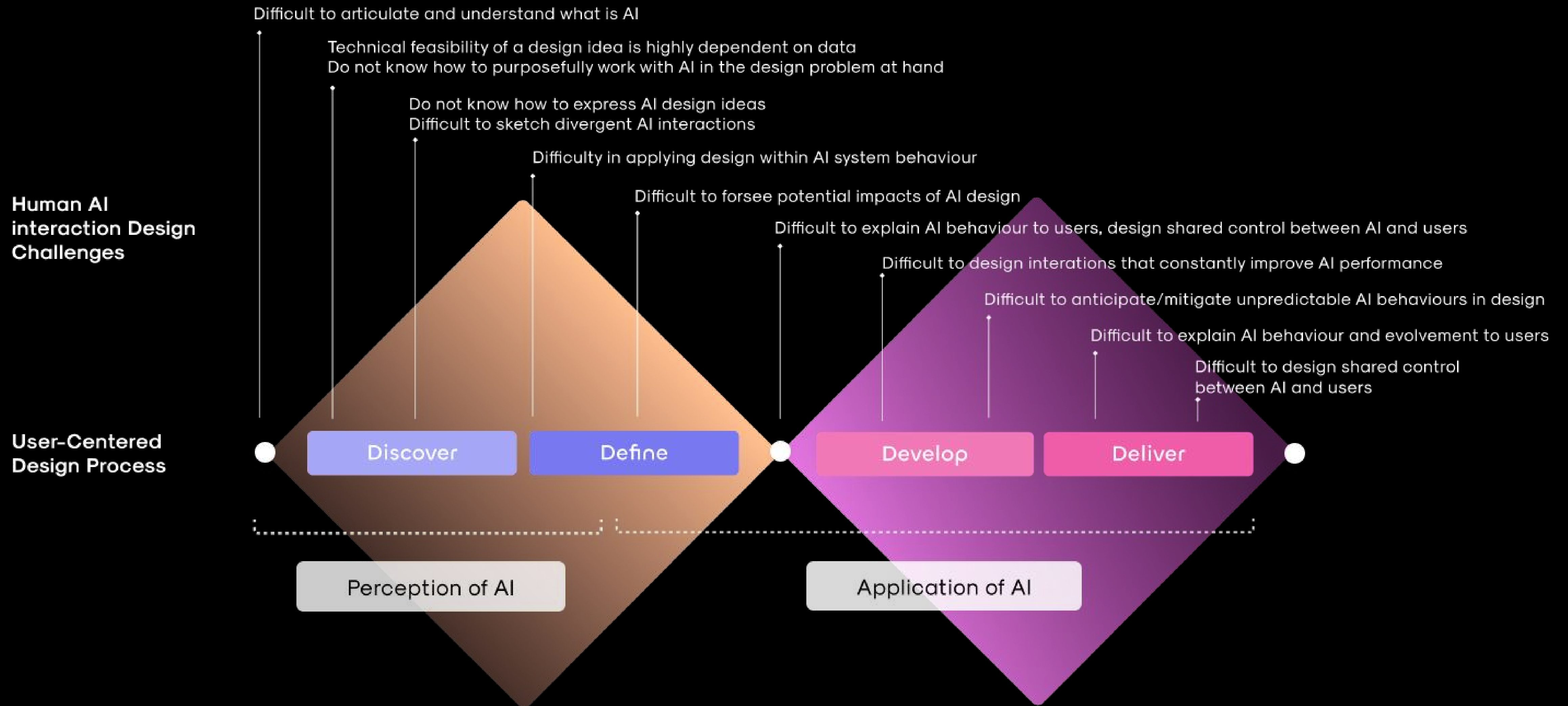
Judicial

Ethical AI, Responsible AI policies and guidelines





Limitations of design thinking in the context of AI



-Innches

Design thinking with the new context of AI models

01 AI capability uncertainty

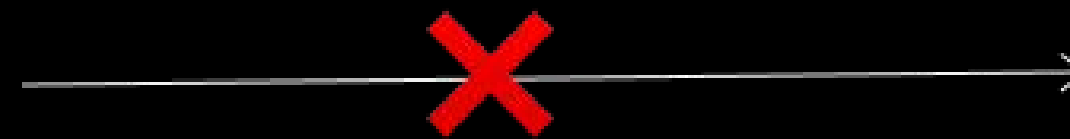
02 AI output complexity

01 AI Capability Uncertainty

EMPHATISE

Define user needs

Traditional Design Thinking



IDEATE

Ideate AI-enabled opportunity



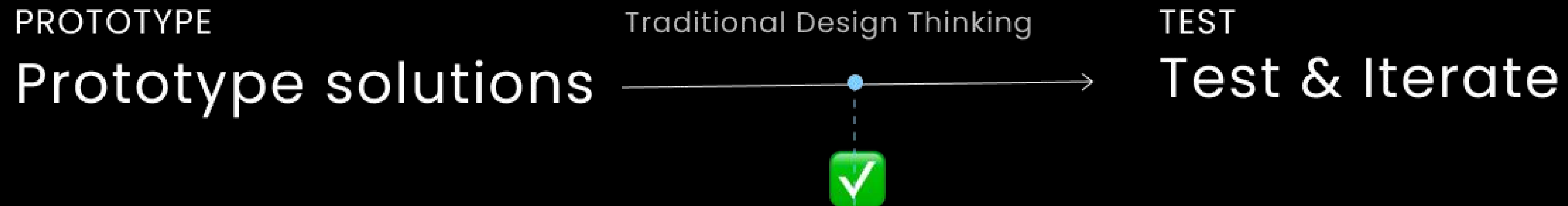
ALIGN → IDEATE

Align user needs to AI model

- ? what capability of AI makes this possible
- ? what datasets do we need



02 AI Output Complexity



EXPLAIN → IMPACT

AI Model Lifecycle

- ? AI capability uncertainty -----> Consider scenarios & unintended consequences
- ? AI output complexity -----> Explain and manage expectations of AI features to users

The 21st Century AI Designer

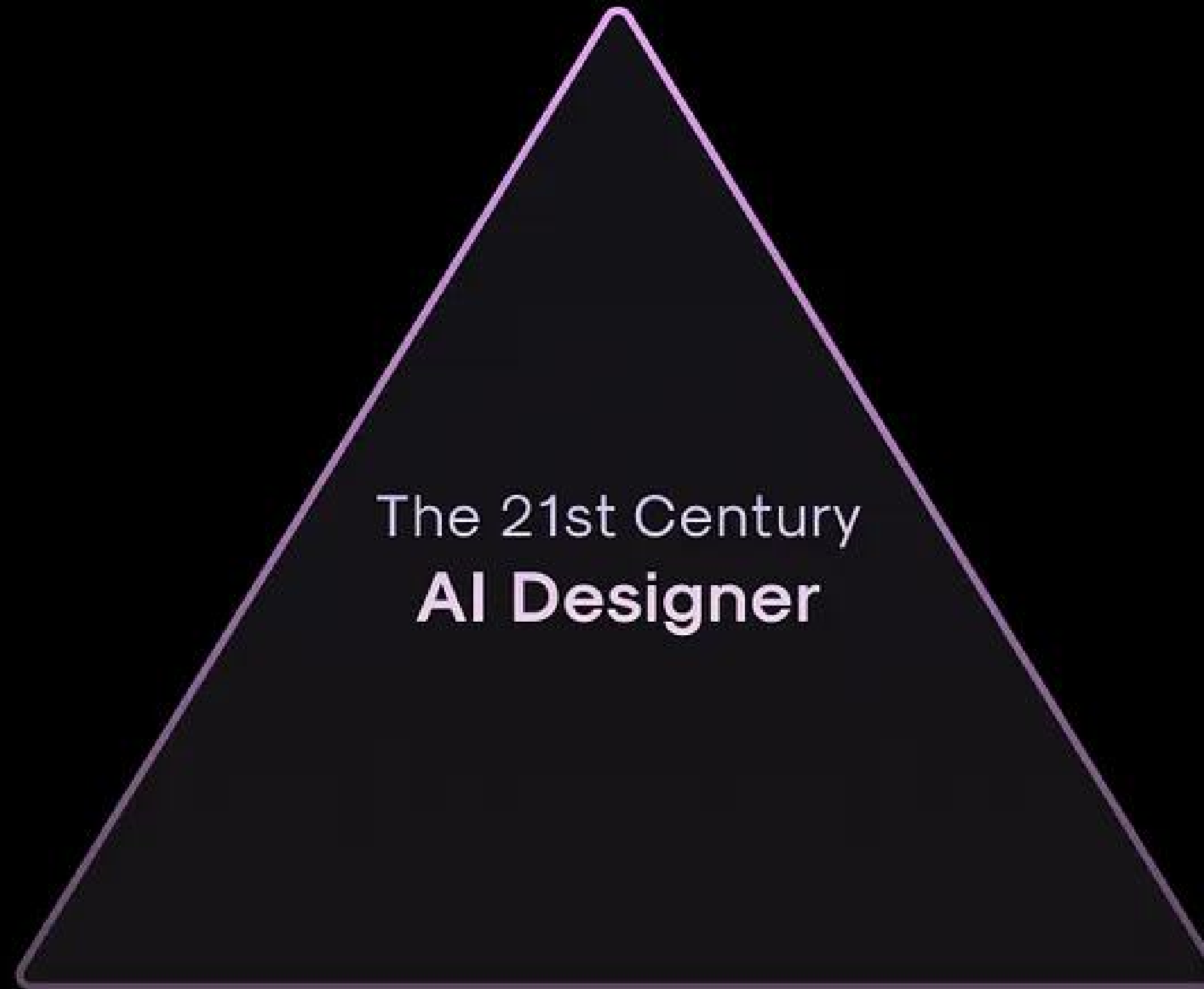
-Innches

Design **FOR** AI
Front-end UX for AI

The 21st Century
AI Designer

Design **USING** AI
Creative AI tools

Design **WITH** AI
Design Thinking in AI
model development



Everyone talks about HCAI, but how?

14 October 2021 | Impact Press Releases Research Highlights

NUS, Facebook AI and other world-class universities collaborate to teach AI to understand the world through our eyes

MIT launches MIT IQ, aims to spur human, artificial intelligence breakthroughs, bolster collaboration

Perhaps the biggest takeaways from MIT IQ are that algorithms need new approaches and multiple disciplines and research areas need to collaborate to drive AI breakthroughs.

How IBM Is Working Toward a Fairer AI

by Francesca Rossi

November 05, 2020

Stanford
Human-Centered
Artificial Intelligence



MARCH 18, 2019

Stanford University launches the Institute for Human-Centered Artificial Intelligence

The new institute will focus on guiding artificial intelligence to benefit humanity.

 Google AI

Toward Human-Centered Design for ML Frameworks

Tuesday, March 3, 2020

 Microsoft

Advancing Human-Centered AI

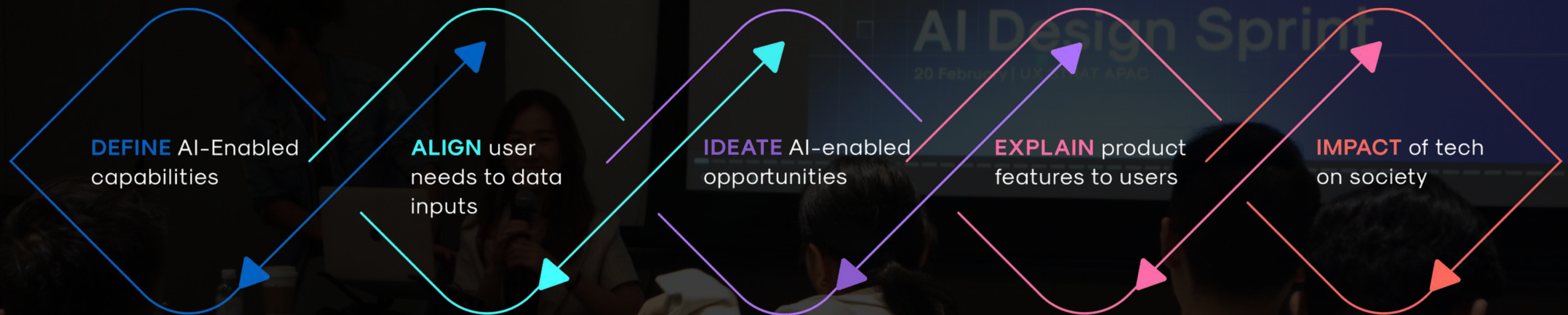
Published March 18, 2019

-Innches

Human-Centered AI

the new pan-disciplinary product design thinking for AI

HCAI Innovation Framework



1. Define

Identify business opportunities, user painpoints, and areas where AI can add value

2. Align

Align business and user needs to achievable data needs and AI inputs

3. Ideate

Brainstorm and generate ideas for new possibilities enabled by AI capabilities

4. Explain

Communicate what AI does to manage user's expectations and build trust

5. Impact

Consider impact of AI solutions across different aspects of society and evaluate unintended consequences

-Inniches

Before we put it into action...

01

Data Preparation:

Gathering and organizing relevant data

02

AI Modeling: Building the model using algorithms and data.

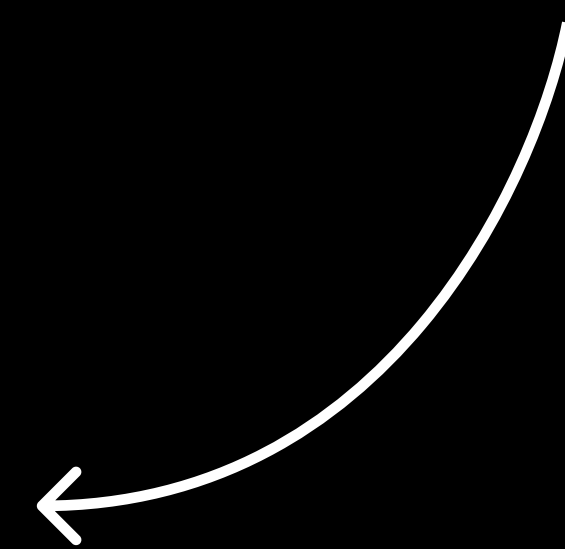
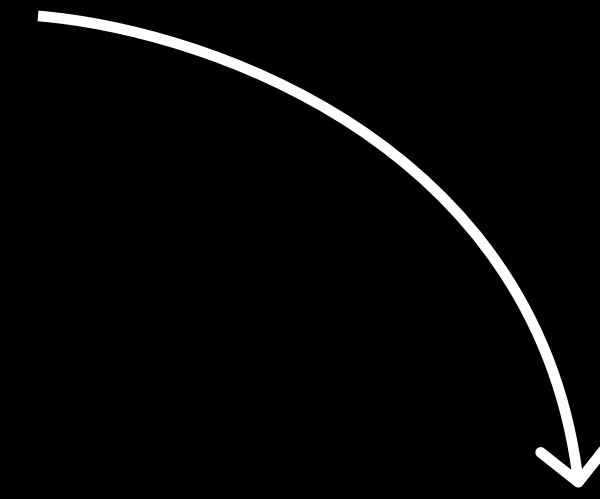
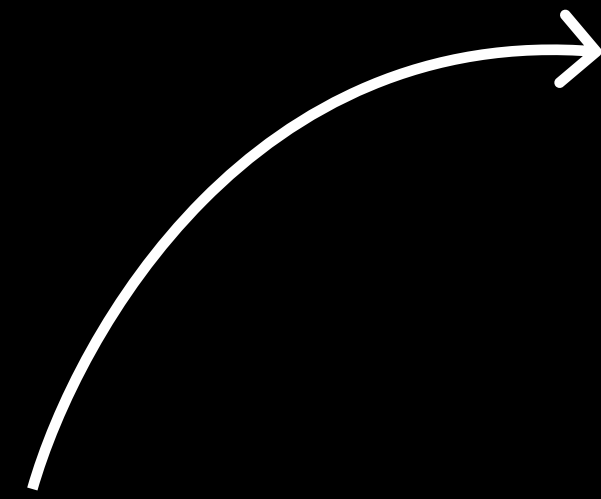
03

Deployment: Implementing the model in real-world applications.

04

Simulation & Test:

Evaluating the model's performance and accuracy





Step 1

Identify AI-enabled opportunities

Identify current painpoints and potential areas where AI can provide value



~~Can we use AI to solve _____~~
~~How might we solve _____~~



“Can AI solve this problem in a unique way?” 🤔



Identify if AI adds unique value

Pattern

Is there a user need and associated pattern behaviour?

Success

Is there a definition of success to optimize for?

Value

What is the additional non-value add of AI?

Type

Who are the stakeholders involved?



Example: Flight app

- **Opportunity:** How might we improve flight booking conversion for users of our app?
- **User journey:** Flight booking experience for user on app
- **User personas:** Parents looking for family vacations, Corporates travelling for business, individual travellers



user value

Improve flight booking experience + conversion of flight bookings of flight app

business value

- User need: "When to book for best price"
- User Pattern: "Check multiple sites and find the best price to book"
- Success: "Buying at the right time and price"
- Optimize: "Best time to buy, avoid false price predictions"



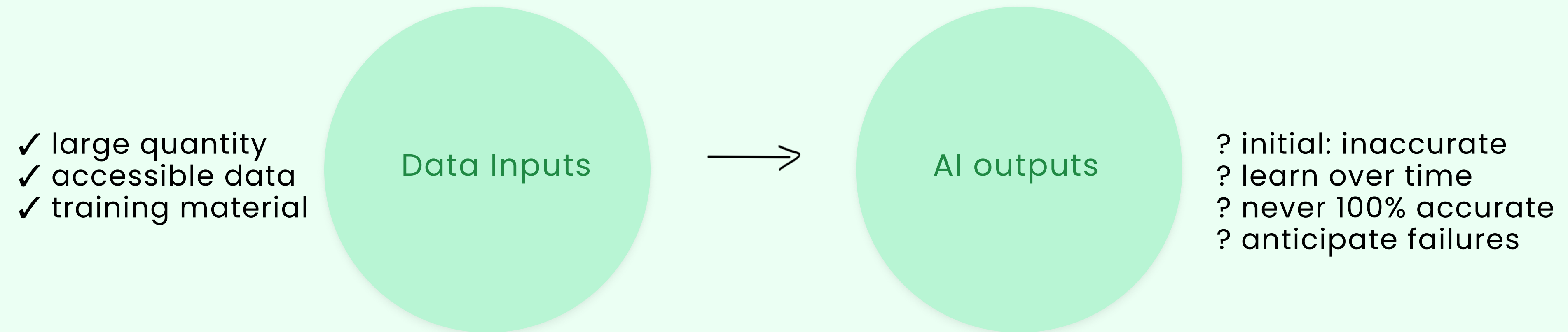
Step 2

Align user needs to data inputs

Assess how feasible to turn user needs into tangible data and AI outputs



AI model





Align user needs to data

Align

Is there a user need and associated pattern behaviour?

Map

Is there a definition of success to optimize for?

Source

What is the additional non-value add of AI?

Access

Who are the stakeholders involved?

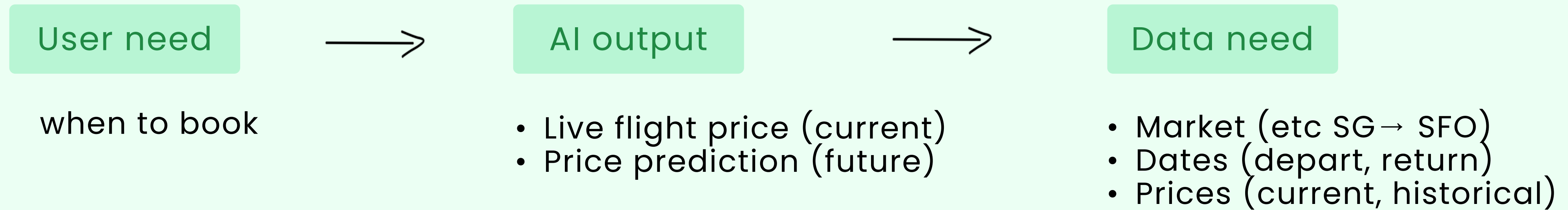


Questions to ask:

- User needs: What are the associated user needs and actions?
- Data inputs: What data needs to be collected to address this user need?
- AI outputs: What is the intended new user value? What business impact will this bring?



Example: Flight prediction





Step 3

Ideate possibilities with AI capabilities

Understanding unique capabilities of AI and ideate opportunity to use AI



Ideate AI solutions

Capability

What is the unique capabilities of AI that makes this possible?

Features

What are some AI enabled features that solves your user's painpoints?

Datasets

What datasets needs to be obtained for this AI technology to work?



Machine Learning



trained models &
datasets

Computer Vision



interpret visual
information

**Natural Language
Processing**



human language



AI capability cards

Machine Learning

Context Awareness + Human Activity Recognition
What if you can... Understand where your user is & what they're doing?
Use location, time, device, and other data to understand user behavior and context.

Customer Journey Mining + User Behaviour Analysis
What if you can... Know the pain points and moments of delight for your user?
Analyze user journeys to identify key touchpoints and areas for improvement.

Anomaly Detection
What if you can... Automatically identify anomaly and undesired circumstances?
Detect unusual patterns or events in user data to flag potential issues.

Adaptive User Interfaces
What if you can... Adapt elements of the interface to every user in real-time?
Personalize the user interface based on individual preferences and usage patterns.

Recommender Systems
What if you can... Tailor the content for each individual?
Suggest personalized content or products based on user history and preferences.

Psychographic Segmentation & Profiling
What if you can... Understand your user's habits and preferences on a micro level?
Group users based on personality traits and interests for targeted marketing.

Reinforcement Learning + Pattern Recognition
What if you can... Automate certain tasks without need for user intervention?
Use machine learning to optimize system performance and automate repetitive tasks.

Predictive Modeling + Predictive Analytics
What if you can... Predict what your user will need or want to do next?
Forecast user behavior and needs based on historical data and trends.

Generative Adversarial Networks (GAN)
What if you can... Create realistic outputs at scale simply based on examples?
Generate high-quality synthetic data or content that mimics real-world examples.

NLP

Emotion Recognition Systems
What if you can... Detect and understand your user's real-time emotions and feelings?
Analyze facial expressions and voice tones to gauge user sentiment.

Natural Language Understanding
What if you can... Identify key topics in documents or chunks of text effortlessly?
Extract meaningful information and themes from large volumes of text.

Natural Language Generation (NLG)
What if you can... Converse with your user like a human being?
Generate human-like text for chatbots, emails, and other communications.

Sentiment + Sentiment Analysis
What if you can... Sense your user's tone or emotion from text or words?
Determine the positive, negative, or neutral sentiment of user feedback.

Natural Language Generation (NLG)
What if you can... Simulate human qualities like empathy and humour with AI?
Create AI-driven responses that show understanding and personality.

Natural Language Understanding
What if you can... Extract and summarize information from large sets of text?
Process and condense vast amounts of text into concise summaries.

Face + Speech Recognition
What if you can... Understand your users' social context - who they're with and their relationship?
Identify individuals and their interactions in social media or video content.

Computer Vision

Object Detection + Instance Segmentation
What if you can... Respond to your user's real-time body and hand gestures?
Identify and track specific objects or body parts in real-time video feeds.

Object Detection + Instance Segmentation
What if you can... See from your user's lens and respond in real-time to what they're seeing?
Analyze the user's camera view to provide context-aware recommendations.

Action Recognition
What if you can... Adapt actions based on real-time context and location?
Recognize user activities and locations to trigger appropriate system responses.

Semantic Segmentation
What if you can... Understand every detail of an image with accuracy?
Classify individual pixels in an image to understand their meaning and context.

Image Classification
What if you can... Recognize objects in images and decipher them?
Identify and categorize the main subjects within an image.



NLP

What if you can...

Detect and understand your user's real-time emotions and feelings?



What If Design Opportunity

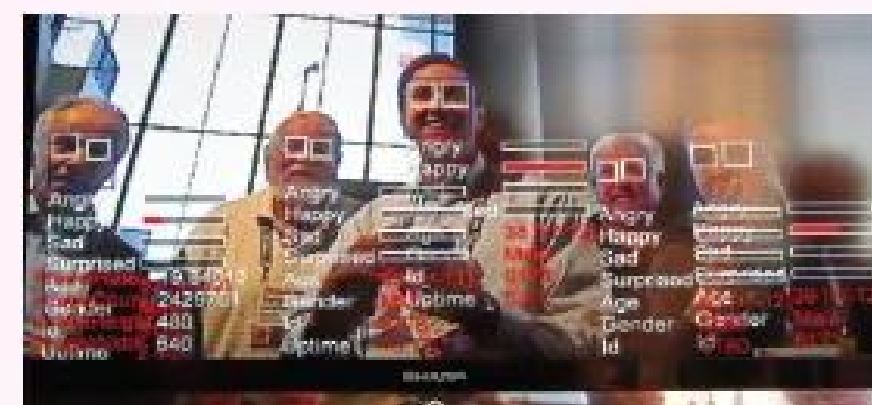
NLP

HOW?

Emotion Recognition Systems

Detect users' emotions through facial expression detection and speech emotion recognition

Affectiva's Affex SDK, Empath's or DeepAffects' Emotion Recognition API



Applications

- Customer Experience Enhancement
- Virtual Meeting Analysis
- Emotion-aware Content Delivery
- Mental Health Monitoring

AI capability



Step 4

Explain AI-enabled features to users →

How to explain UX of AI to users, to communicate what AI does to manage user's expectations and build trust



Explain AI solutions

Understand

How do you communicate how the AI works to users?

Accuracy

What if your AI is wrong in scenarios?

Literacy

How will users of different tech literacy understand and use your product?

How do you build trust with users?



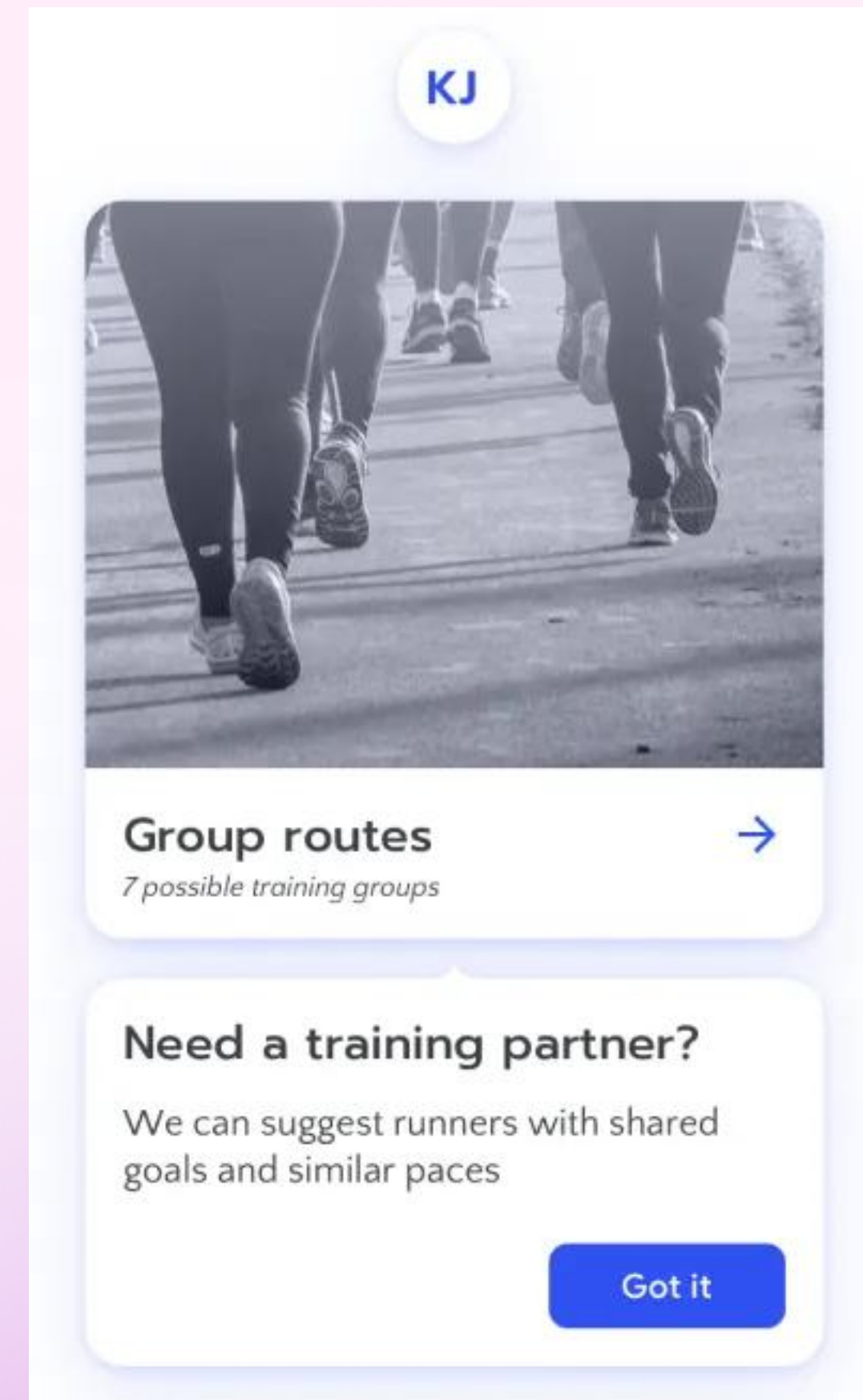
**Manage user's
expectations**

**Enable user's
feedback**

**Empower user
autonomy**

Manage user's expectations

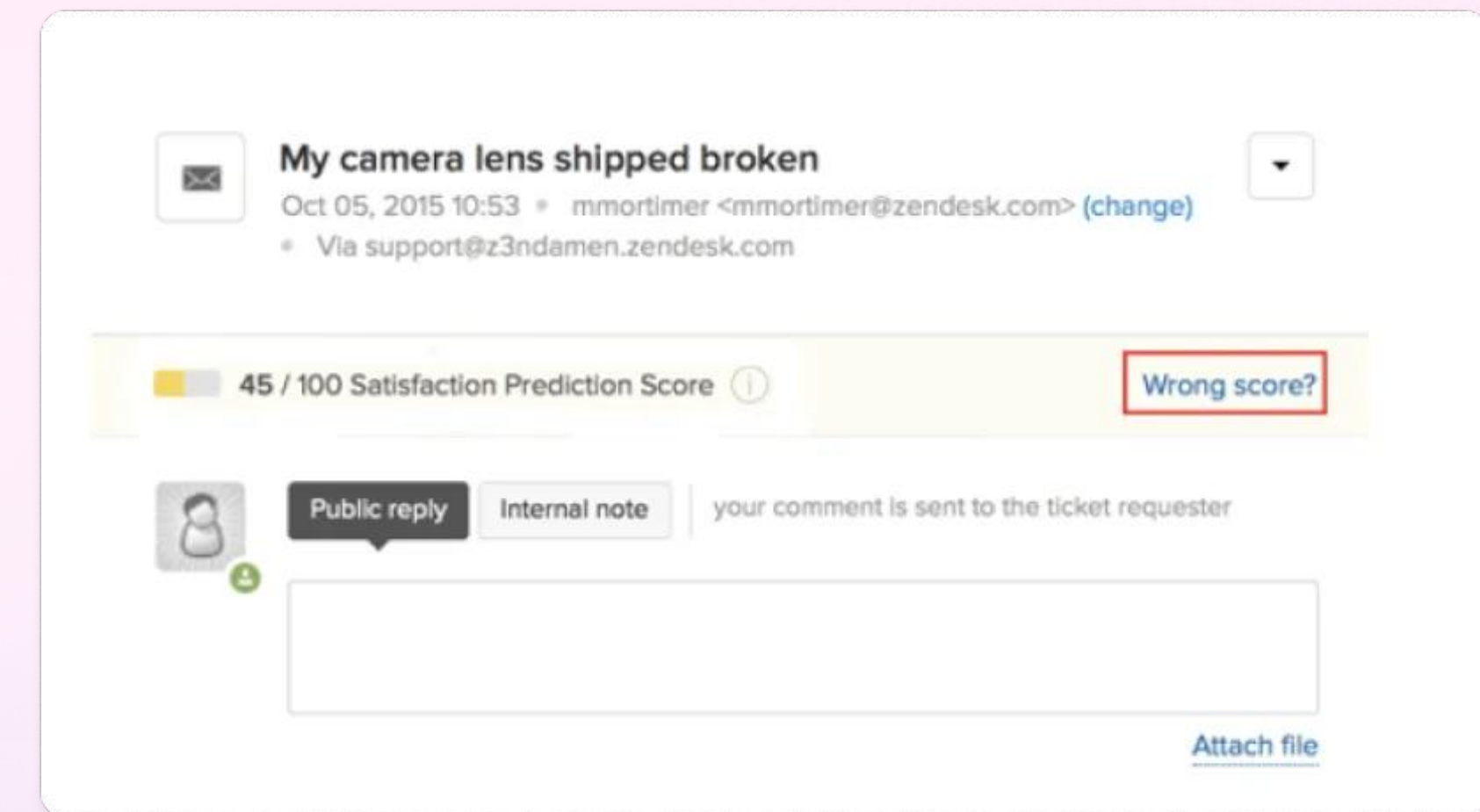
- Never assume that users understand how to use your feature
- Introduce it at the right time of user action, in the most appropriate and relevant context





Enable user's feedback

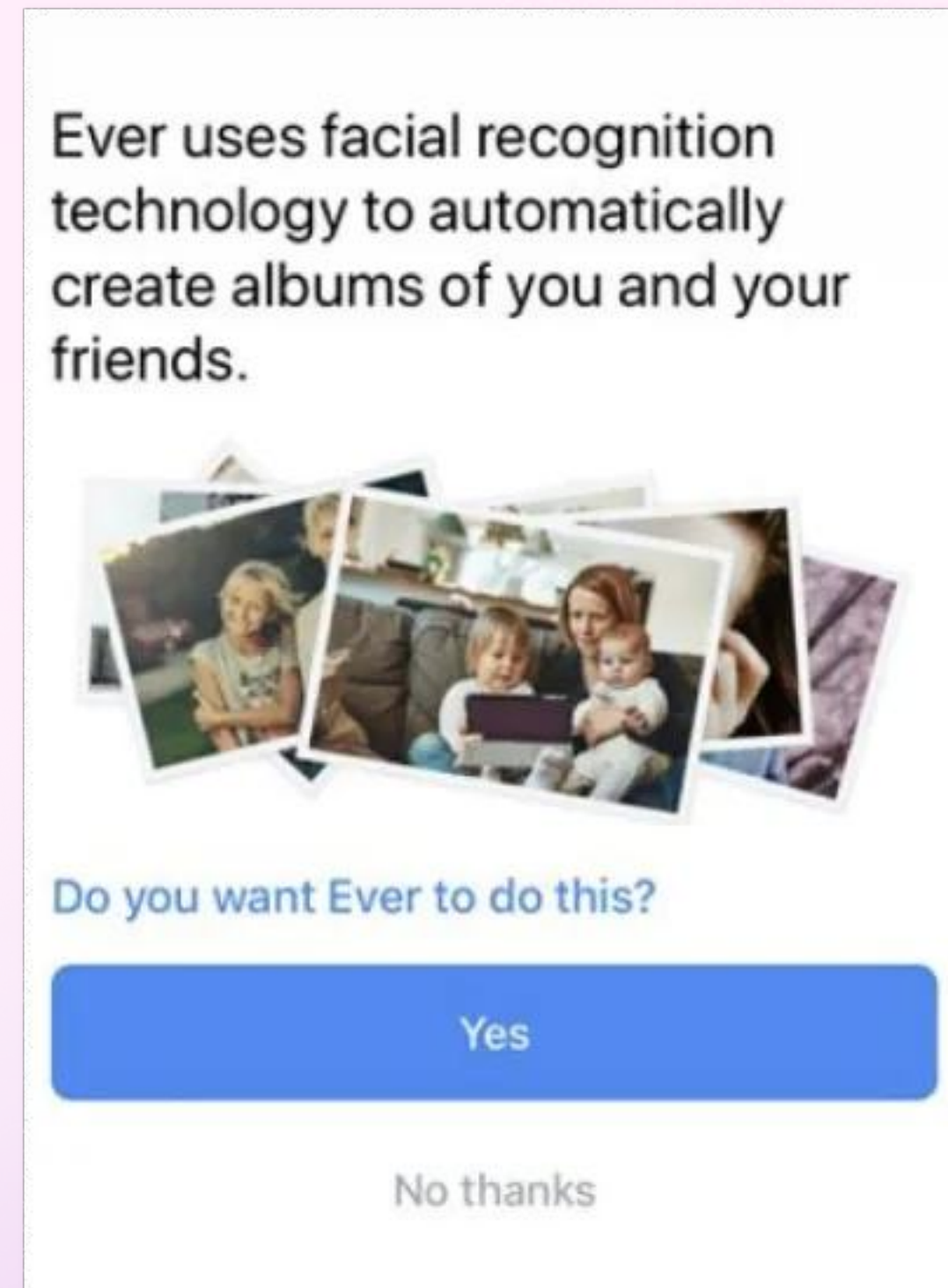
- Allow for users to provide feedback easily
- Empower users to help AI model learn from data through feedback
- Regularly communicate updates or improvements



Example - Zendesk

Empower user autonomy

- Clearly communicate how data is collected, used, and secured
- Enable user controls and customization
- Promote transparency and ownership in data handling - always ask!



Example - Ever



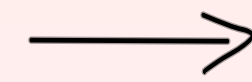
Step 5

Impact of AI on society →

Evaluate potential societal impact of your AI solution + unintended consequences



**Adopt
various lens
& scenarios**



**Evaluate impact
of your AI
solution**



Impact of your AI solution

Impact

How will AI be used for good and bad?

Influence

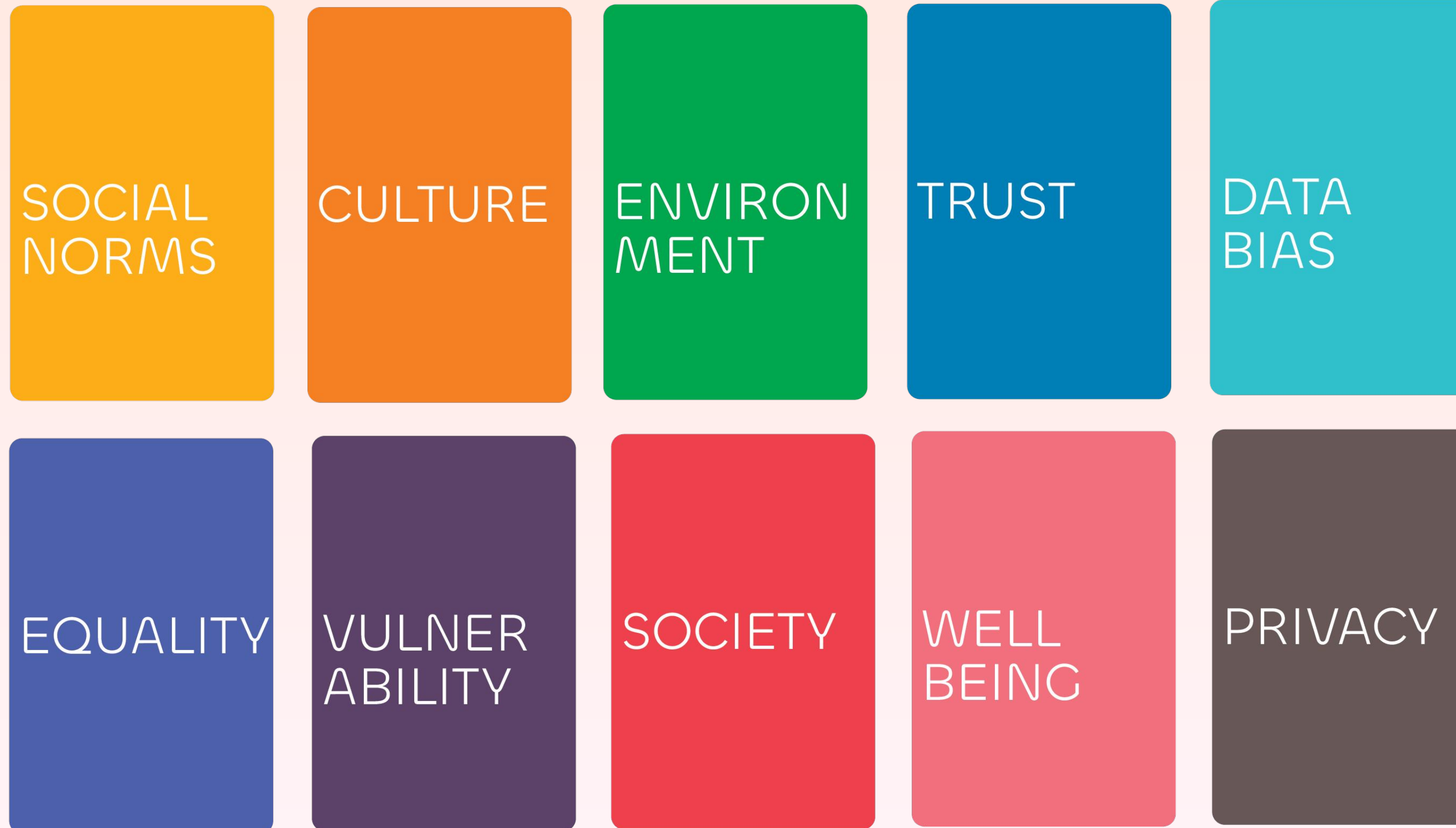
How will your product affect aspects of society?

Usage

What are potential scenarios where the AI might be misused? What may be some outliers?

Scale

What may potentially happen as your solution scales?





SOCIAL NORMS

**What happens when
100 million people use
your product?**

What would mass scale
usage of your product
reveal or cause?

In what ways can mass
usage potentially
become a liability?



Human-Centered AI Workshops

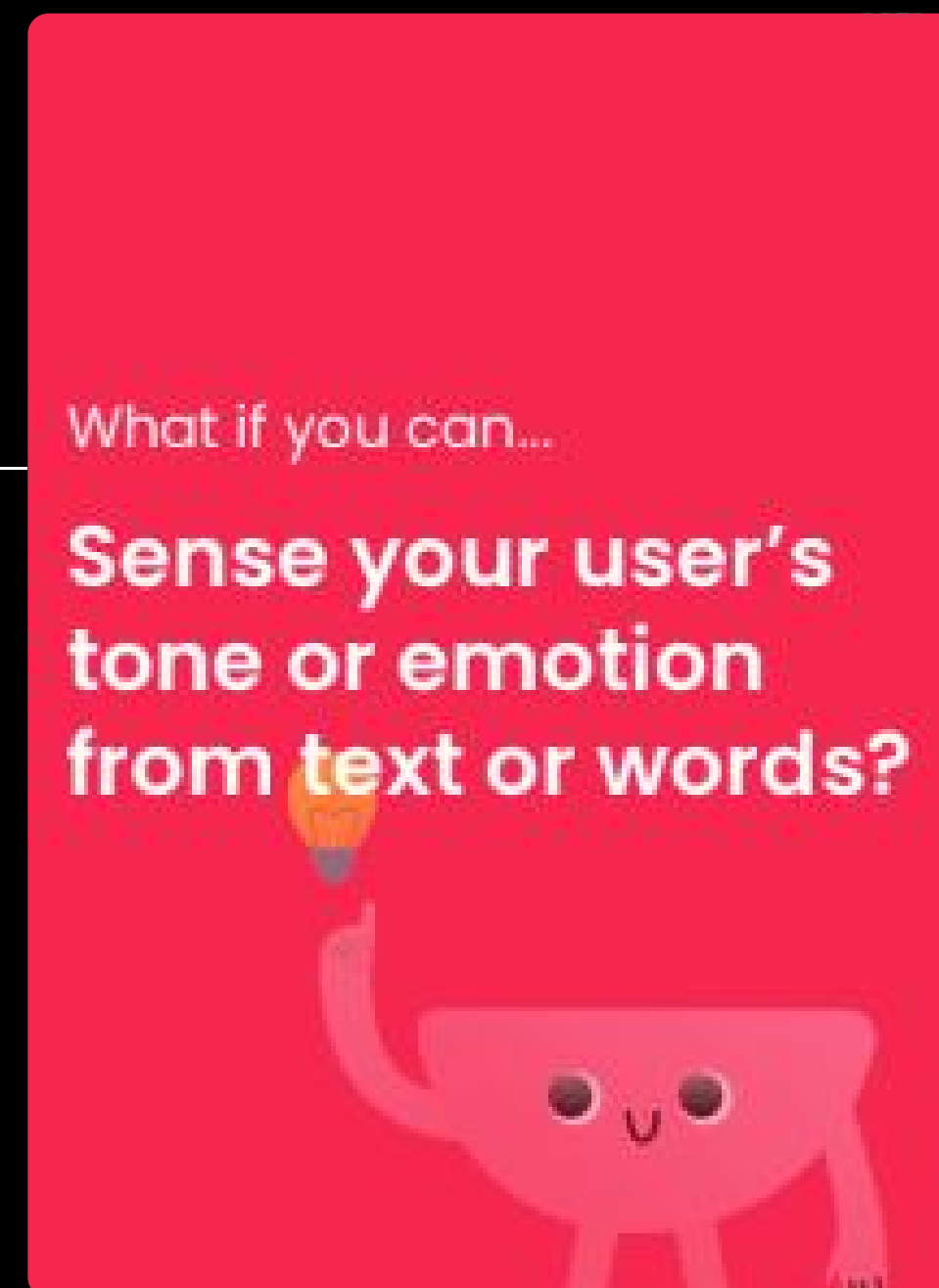
AI CAN... simulate human qualities to interact

NLP

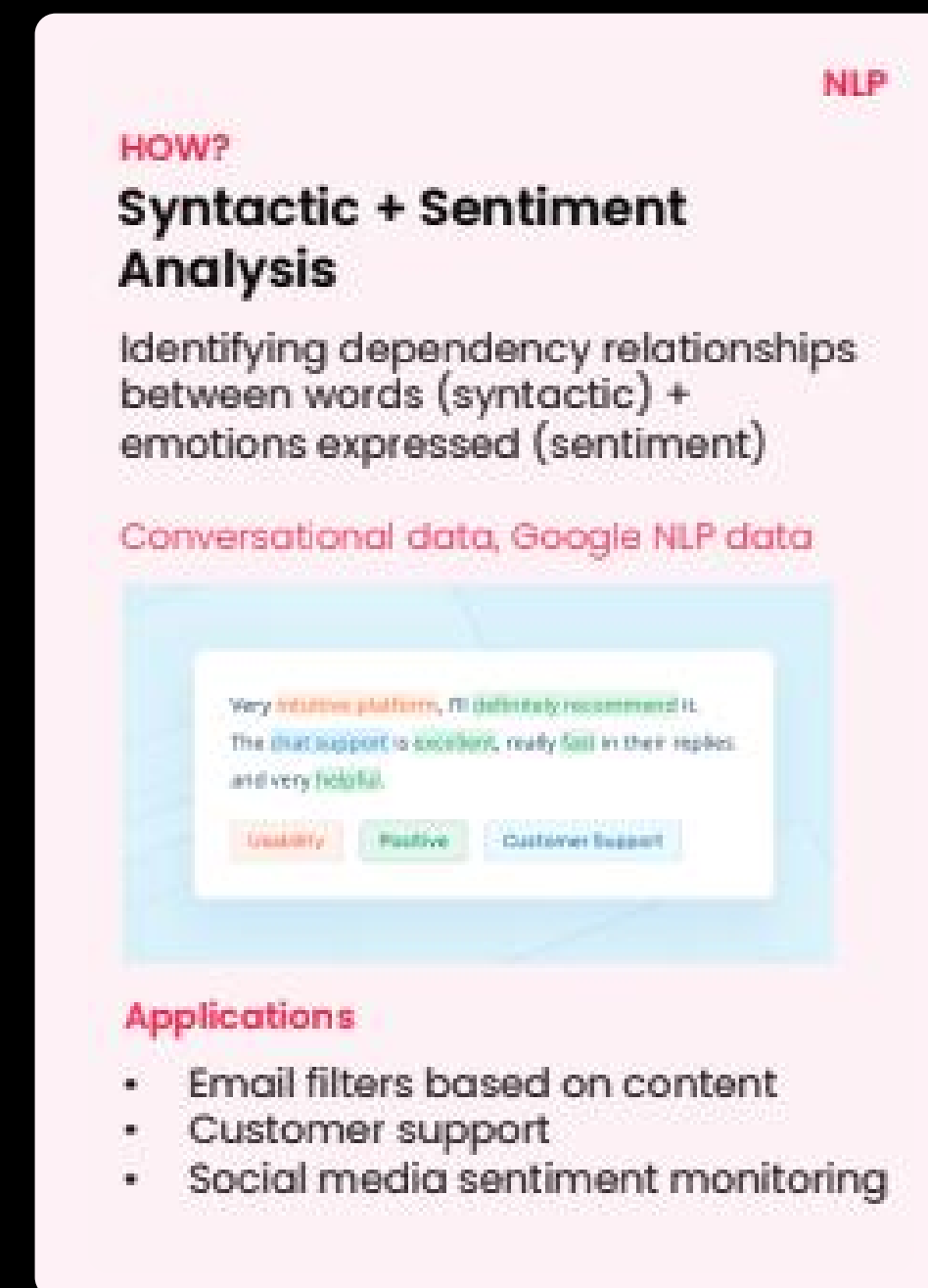


Example: AI Capability cards

User opportunity enabled by AI



Card segmented by AI themes: ML, CV & NLP



AI Capability enabling design opportunity

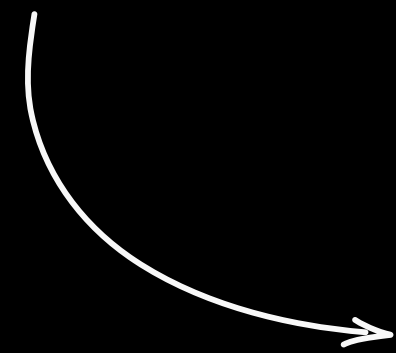
Open-source public datasets available

Visual graphic of AI capability

Real-life applications



Recent initiatives



Led a 1-day HCAI sprint workshop at **UX STRAT APAC 2024** in Bangkok



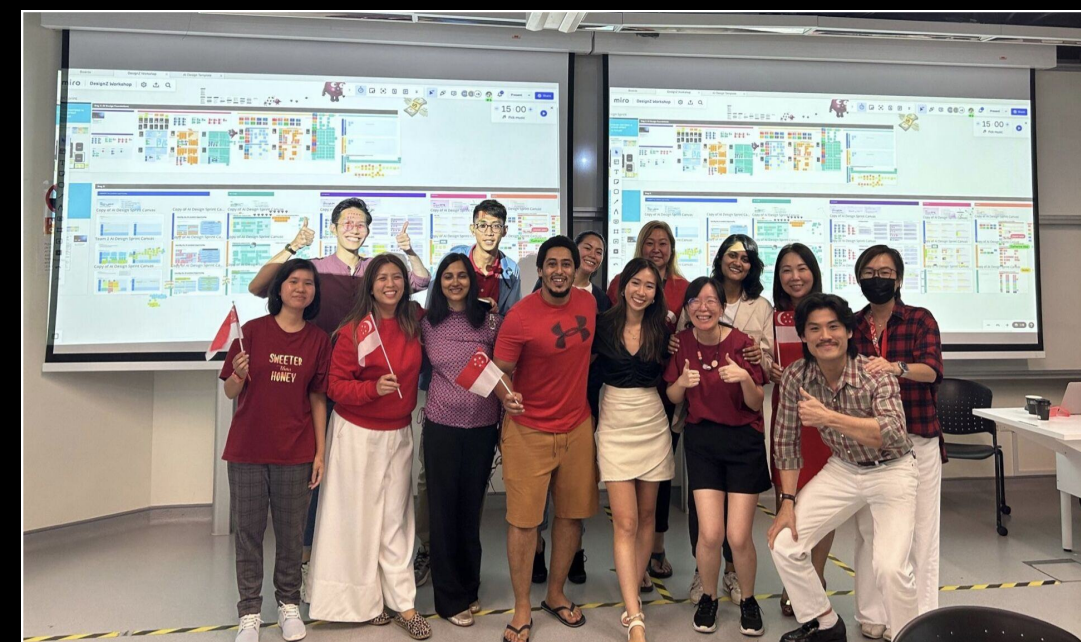
AI Innovation Workshop Panelist during **Singapore Design Week 2023**



HCAI Talk at **SUTD AI Mega Center**



Developed **Human-Centered AI Design Toolkit** and card set



Conducted 2-day HCAI Workshop for **School of Technology & Design (SUTD)**



Speaker for Neural Networking event by **National AI Office Singapore**

formatif

More about my research on HCAI

Get latest dips on our upcoming HCAI workshop

Sarah Tan

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www.formatif.co

