ADVANCED DESIGN OF INTERACTIVE SYSTEMS

08 JANUARY 2026

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WELCOME

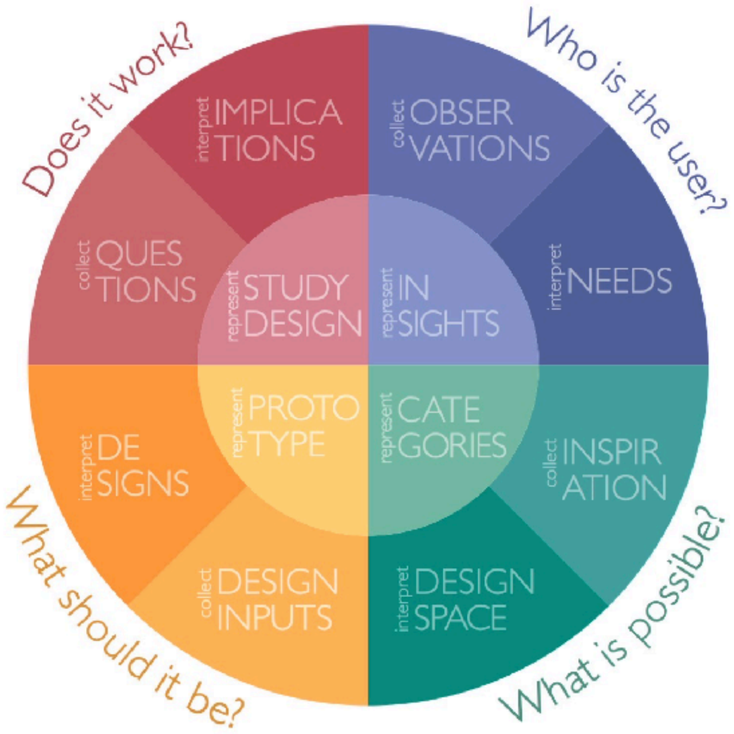
ADVANCED DESIGN OF INTERACTIVE SYSTEMS

Thursday 13:30 - 17:00
Room E 212
8 January - 26 February 2026


Educational Background
Expectations
WHO ARE YOU?
Experience with AI
Future Plans
Technical capabilities

INTRODUCTION COURSE

DESIGN OF INTERACTIVE SYSTEM



1 Learn basic Design Methods

Many hands-on design methods

Discover needs to reflect on your design

2 Learn Design in Teams

Act quickly

Stop arguing

‘Just do it!’

3 Design for user needs

Identify user needs

Design for user needs

Iterate on design ideas

OBJECTIVES

Understand Design Challenges for Human-AI interaction

Justify Human-centered AI Methods

Evaluate Human-AI Systems reliably

Human-centered AI: Challenges of and for Design

LECTURES & TOPICS

1 Introduction

Introduction of Goals and Topic

Exercise: DOIS Quiz & Choose groups

Homework: Story Interviews

2 Understanding Humans

Understand underlying cognitive effects:

Alignment, Theory of Mind, Mental Models

Exercise: Concept Development

Homework: Initial Design

3 Agency and Control in HAI

Explainability, Ironies of Automation

How to design for Error, Feedback and Control?

Exercise: Build Prototype

Homework: Storyboard

4 Iterating on Design

Socio-Technical Systems in AI

Exercise: Prototype + Generative Walkthrough

Homework: Revise Concept

5 Evaluating intelligent Systems

Overview of evaluation methods

Exercise: Revise Prototype

Homework: Evaluation protocol

6 Reflection on HAI

Social, legal, sustainability impact of AI

Discuss the role of designers for HAI interaction

Exercise: Poster, Presentation

COURSE OVERVIEW

Build and evaluate paper prototypes (must be technically feasible)

Work in teams

- Some solo activities
- Mostly group activities

Tasks

- Identify key issues for AI users: What do they need?
- Build on methods from the intro course & create your own methods
- Create a novel, principled design that takes advantage of generative design principles
- Create a final video prototype

Projects involve in-class exercises and homework

Attendance is essential !

Grading:

- Participation (individual) — 10%
- Story Interviews (individual) — 30%
- Prototypes (group) — 30%
- Final Presentation (group) — 30%

After course:

- Support to build and publish ideas
- Possibility to do master thesis project on similar topics

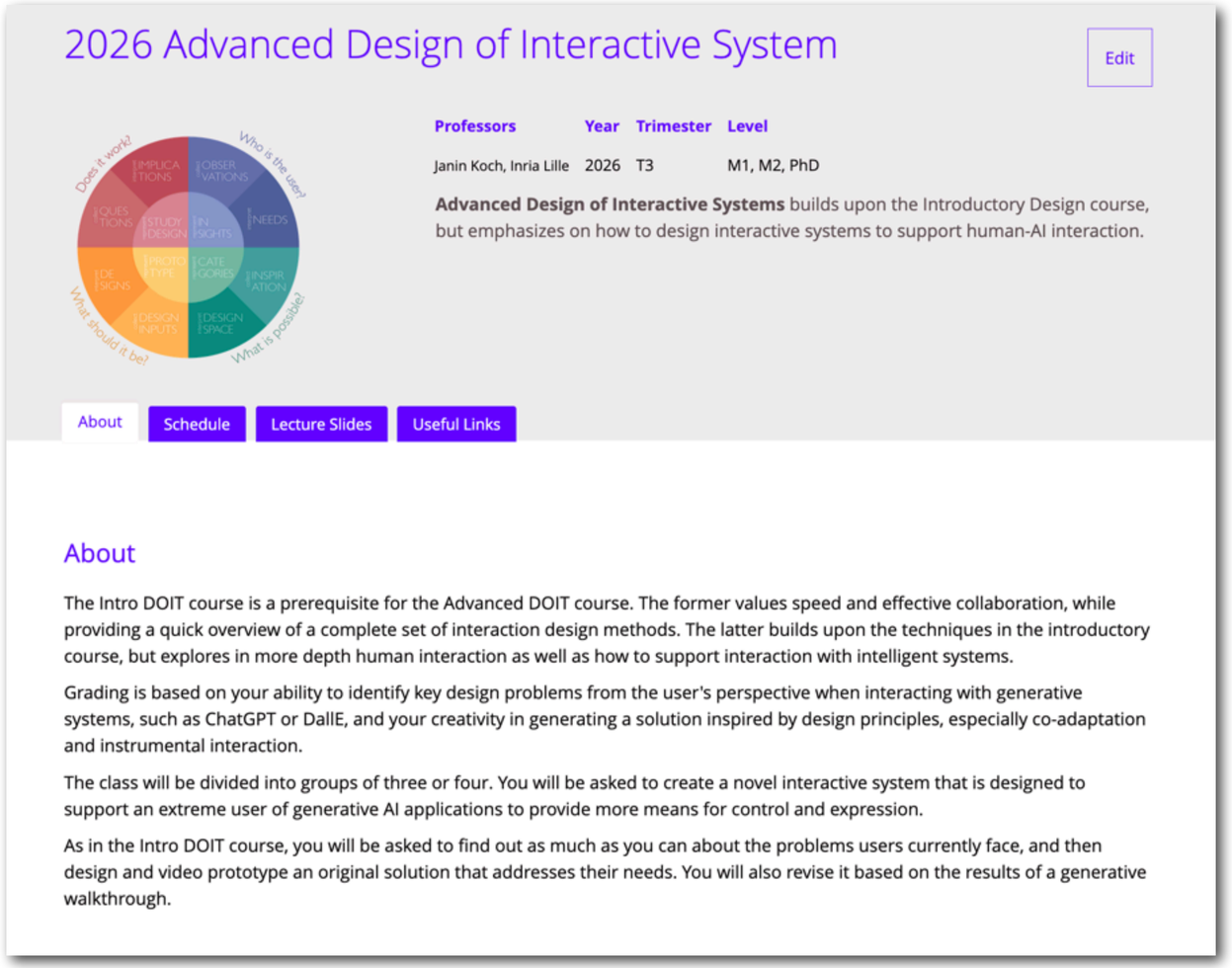
  - especially regarding **Creativity** and **Impact of AI**

COURSE OVERVIEW

General Communication

Website

- Provide email addresses to Xiaohan: xiaohan.peng@inria.fr
- You will receive an email with your username and password
- One group member creates in ‘Student’s Workspace’:
  - A group page (+) in the left column under page
  - Using template: Advanced design Report (private)
  - Add information about group members and target groups



Missing class

- Write an email to me: Janin.Koch@inria.fr
- Get in contact with your group and discuss how you can help them

EXERCISE

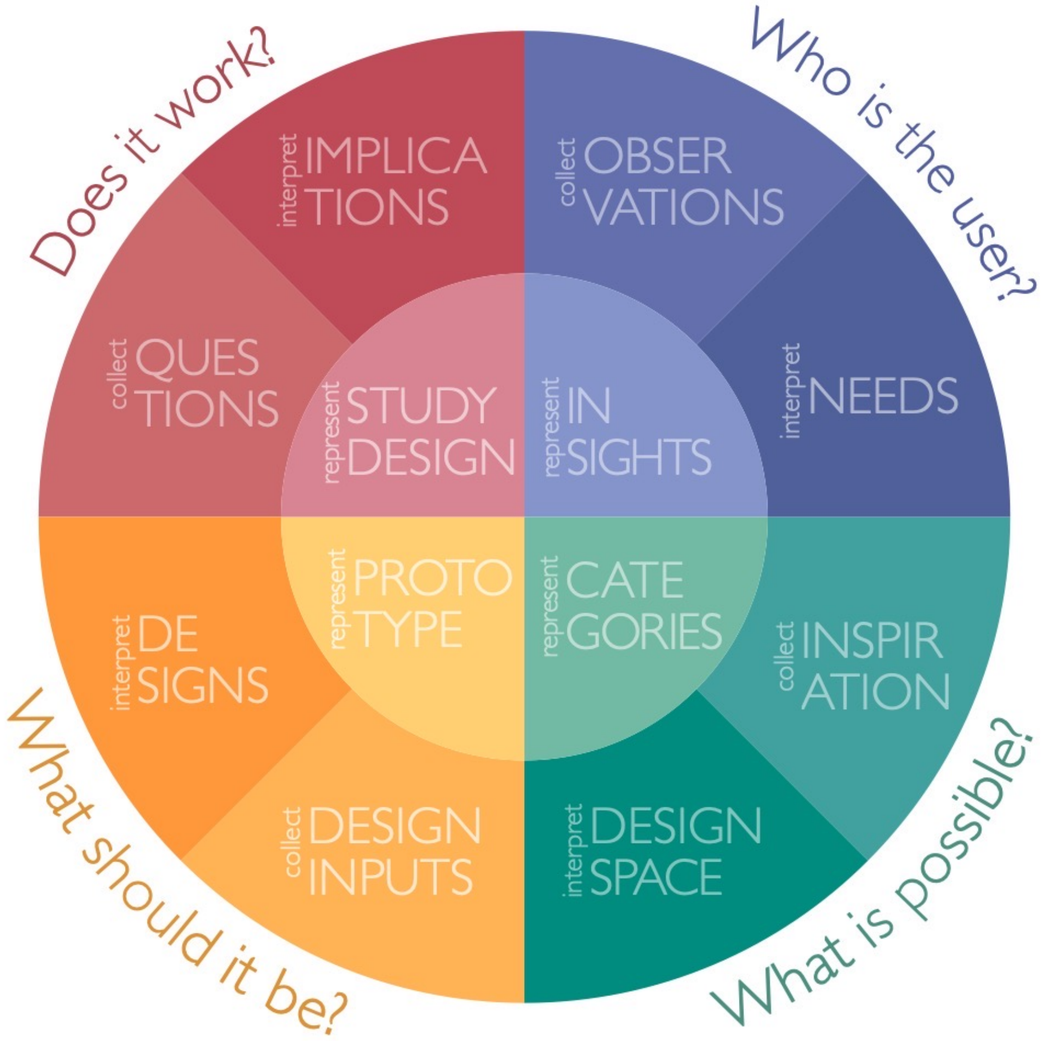
DOIS QUIZ

Recap of the DOIS course

Quiz

Quiz

What are the four key design phases?

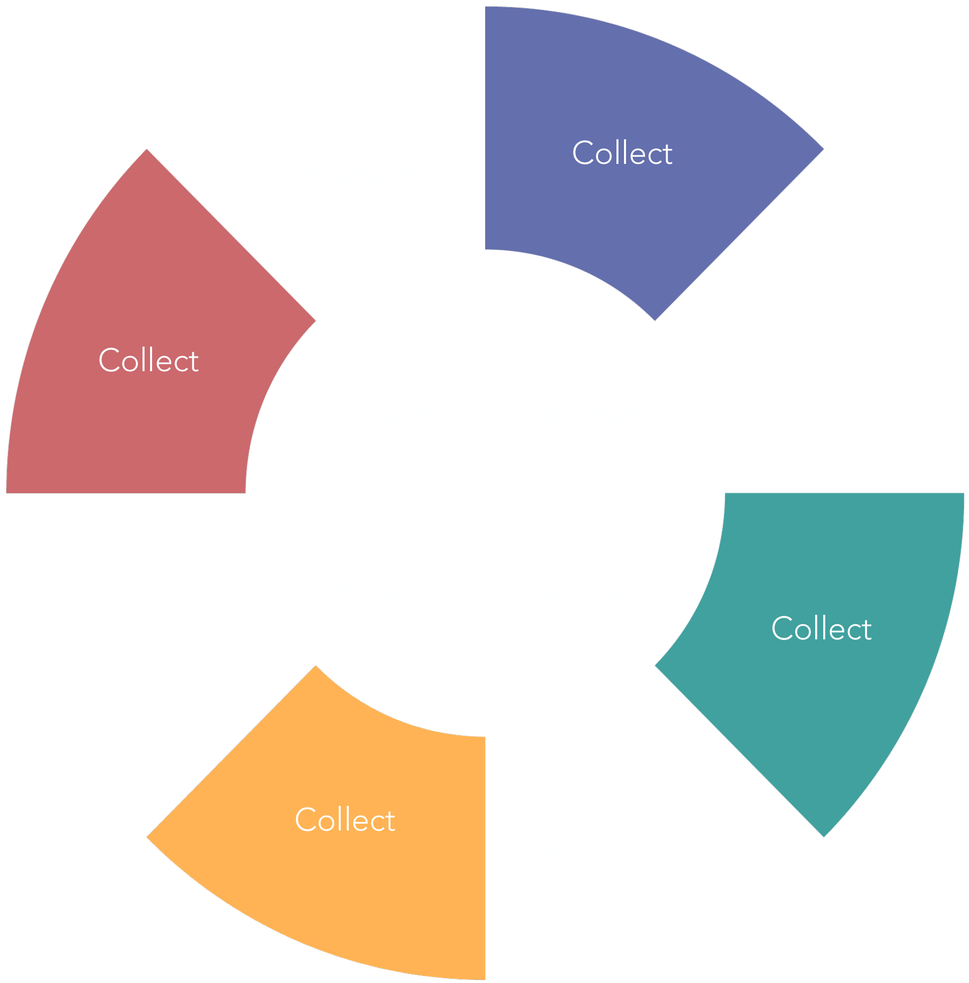


Generative design

Discovery
Who is the user?
Inspiration
What is possible?
Design
What should it be?
Evaluation
Does it work?

Quiz

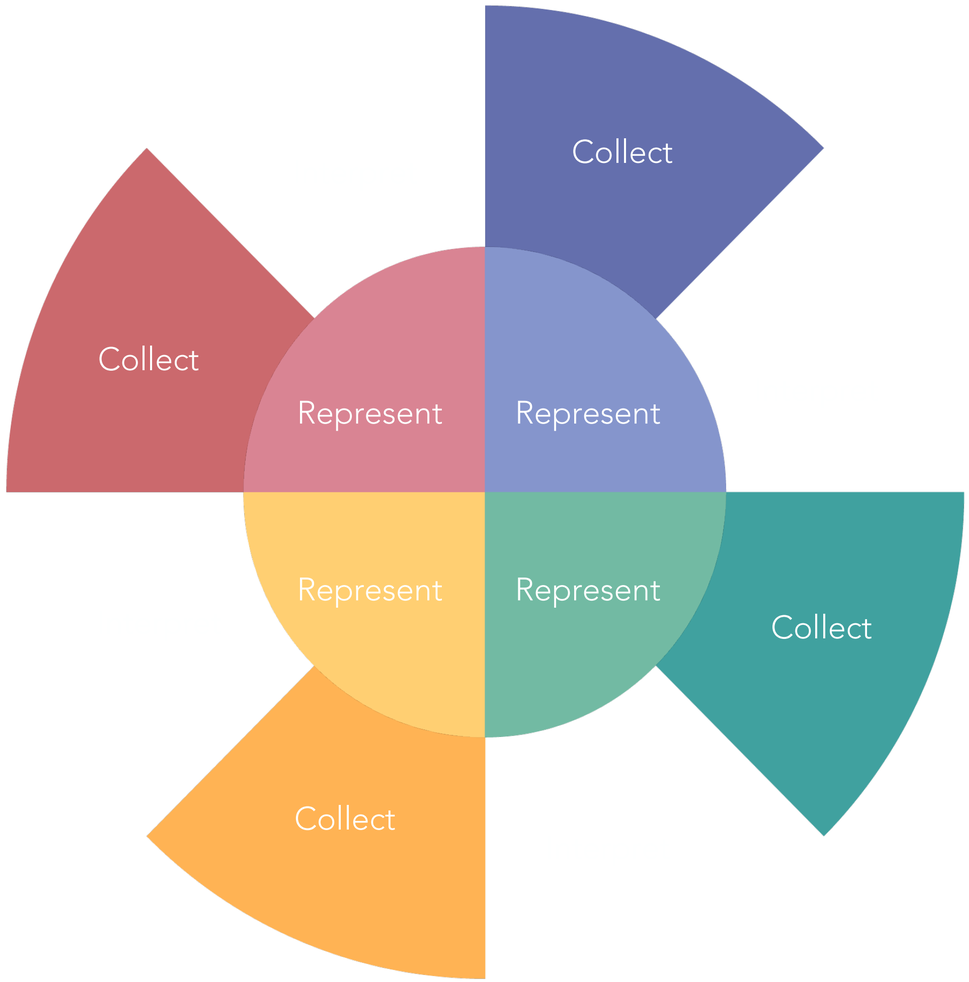
What are the three key activities in each design phase?



Generative design

Key activities

Collect
information

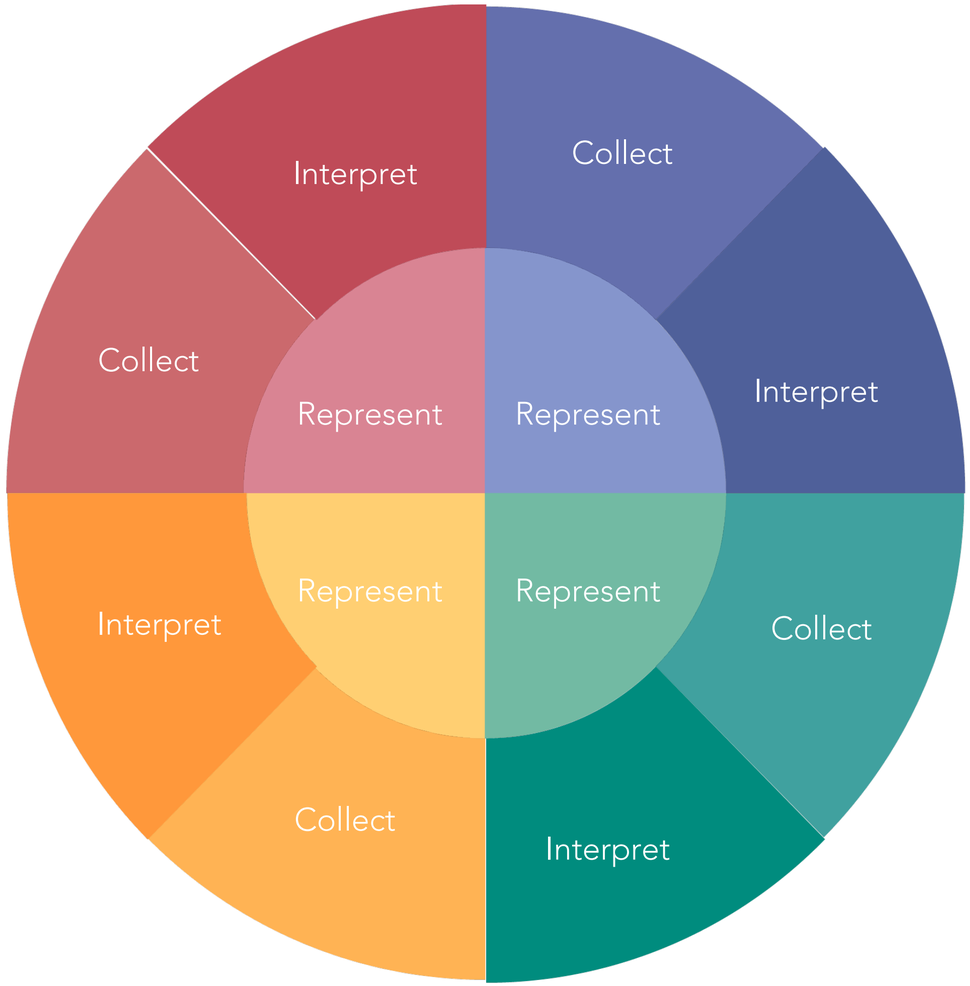


Generative design

Key activities

Collect
information

Represent
with artifacts



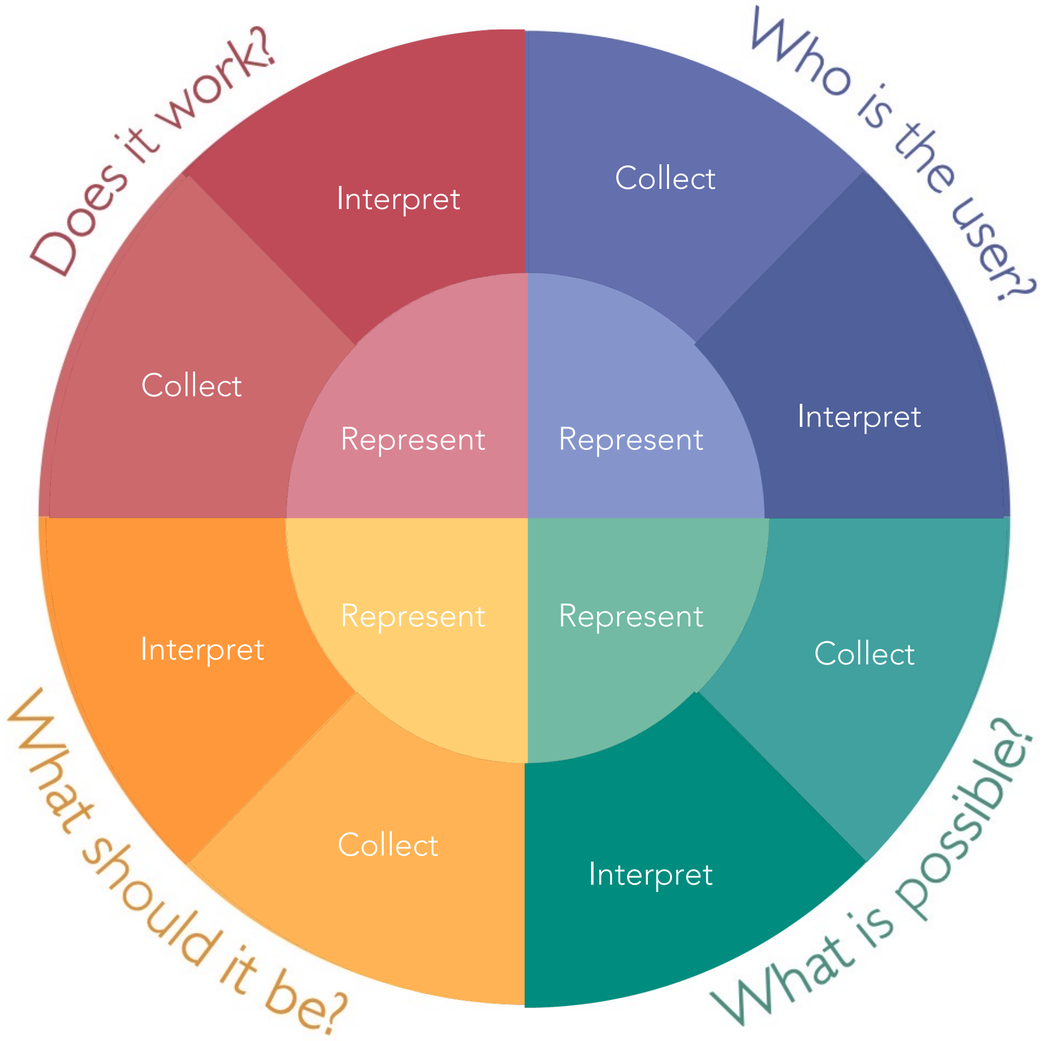
Generative design

Key activities

Collect
information

Represent
with artifacts

Interpret
the results



Generative design

Key activities

Collect
information

Represent
with artifacts

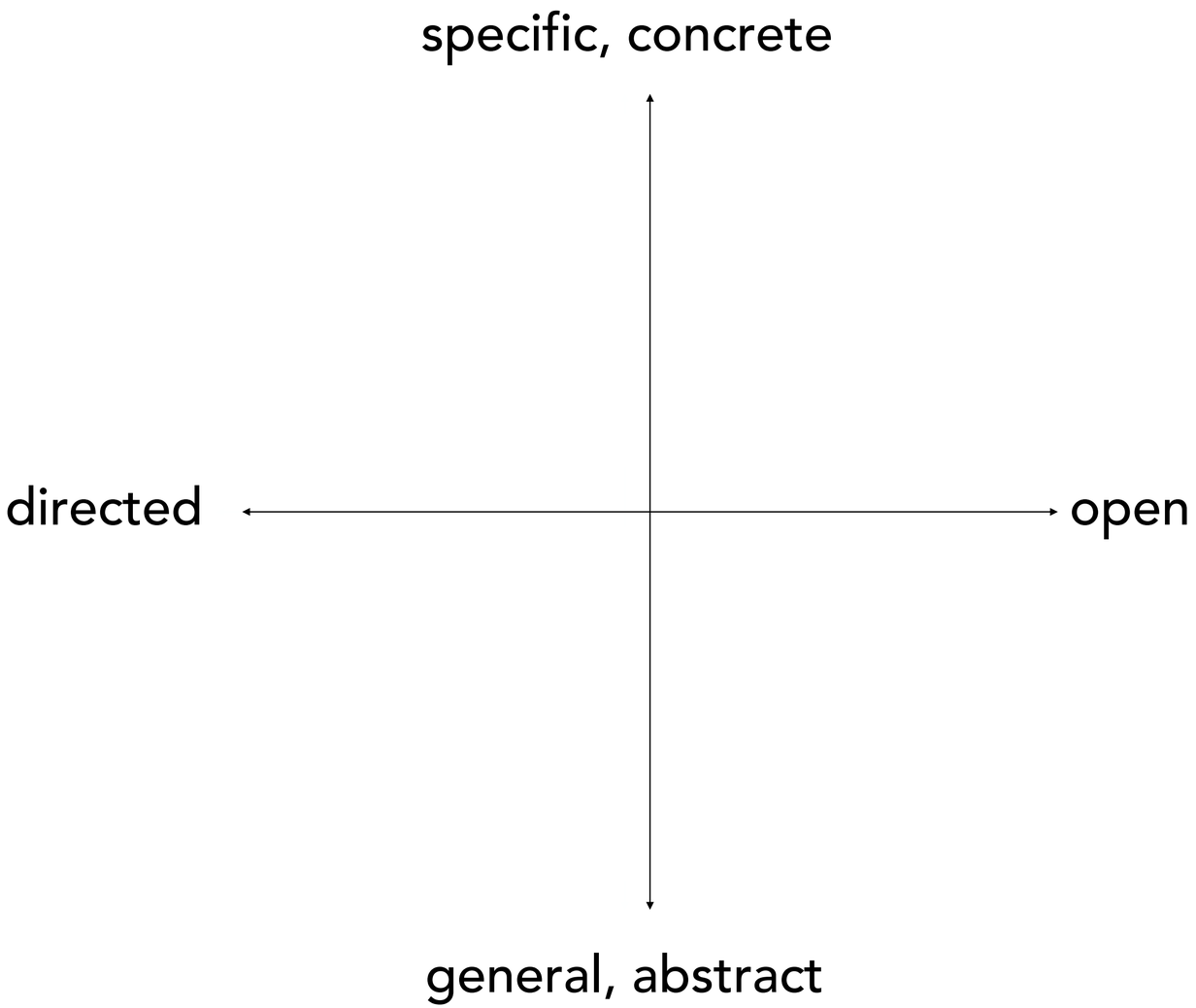
Interpret
the results

Quiz

Is this a good way to start an interview?

What do you think about Excel?
[ ] Yes [ ] No

Explain.



Asking Questions

specific, concrete

Questionnaires

background
classification
Likert scale
multiple choice
daily use

Story Interviews

recent event
critical object
specific time
critical incident
“bright spot”

directed

open

Focus Groups

specific opinion
short answer
elaboration

Market Surveys

general opinion
recommendations
speculation

general, abstract

Asking Questions

Question order matters!

First **specific**	then general
First **concrete**	then abstract
First **directed**	then open-ended
First **facts**	then opinions

Asking questions

You can derive abstractions
from detail...
but you cannot derive detail
from abstractions

Interview types

Story interviews
Elicit real stories in real contexts
including breakdowns and surprises

Tutorial interviews
Describe how it is supposed to work,
not how it actually works

Opinion interviews
Highlights ‘pain points’
Lack detail, often too general for design

Best for:

design

general understanding

marketing

Quiz

What are story interviews?

What types of story interviews do you know?

What are typical Red-flags?

Goal: get a detailed story of interaction

Extremely **recent event**

“Describe what happened at 9:00.”

Flashbulb

Negative memory

Bright spot

Positive memory

Critical object

“Describe how you made this”

Critical incident

“Exactly what happened that time?”

Types of Story Interviews

Red flags

If you hear these phrases…

Save the interview!

Usually …
Sometimes …
Normally …
When I do this, …

Ask more questions
probe for a specific story,
NOT how they usually do things

Critical Incident Technique

Focus on a recent, memorable event:

Describe the initial situation
Tell what happened, step-by-step, in as much detail as possible:

- What did you do?
- How did the system respond?
- What did you do next?

Was the situation resolved successfully?

- If not, what did you do?

Later: Was this typical?

- If typical, find a different example
- If unusual, find a typical example

Examples

Critical Object Technique

Identify an object that you recently created

What led you to create this object?
Tell what happened, step-by-step, in as much detail as possible:

- What did you do?
- How did the system respond?
- What did you do next?

Were you happy with the result?

- If not, what did you do?

Later: Was this typical?
If typical, find a different example
If unusual, find a typical example

Examples

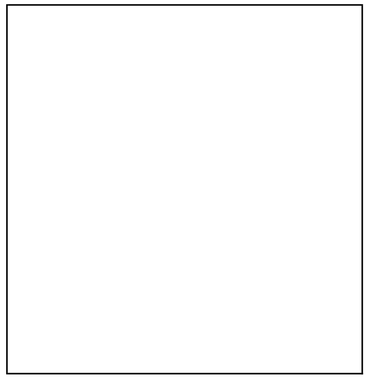
Quiz

. What is an interaction snippet and what would you use it for?

Miniature storyboards

Interaction point: Titlecard

a



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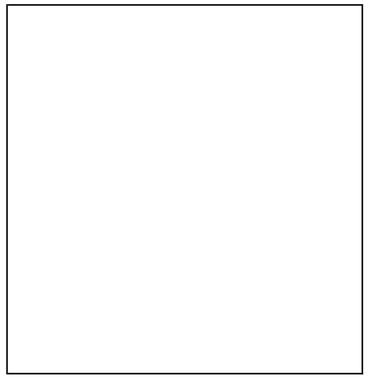
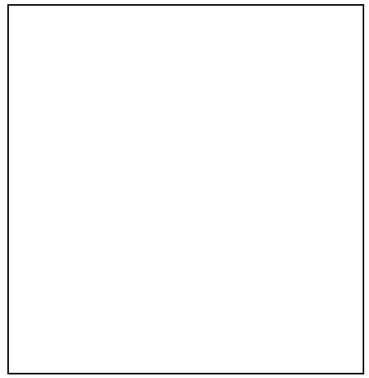


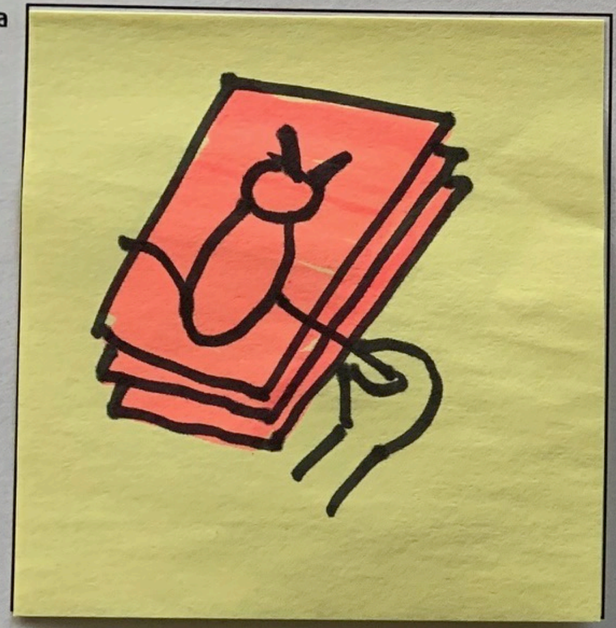
c



Interaction snippets

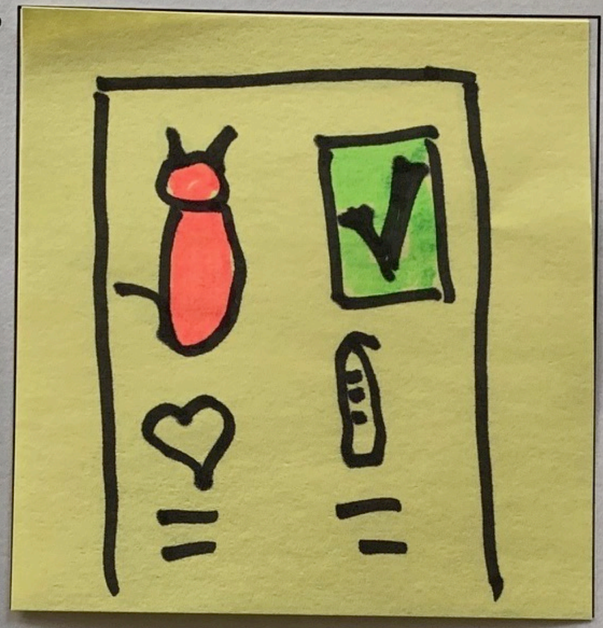
Capture drawing on sticky note pad and project on wall. Projected cat reveals history

a



Draw cat on pink sticky note pad (with Aveto pen)

b



Display cat on wall on medical chart

c

Touch cat to see history

Quiz

What is the difference between a persona and an extreme character?

What makes an extreme character ‘extreme' and how does it help you design?

Types

Personal characteristics

(relevant to the design topic)

Normal hands	Arthritic hands
Takes vitamins	Cancer patient

Extreme situations

(relevant to the current context)

Regular reading	Studying for an exam
Make 1 copy	Make 100 copies

Extreme character

Quiz

What is a Design Concept?

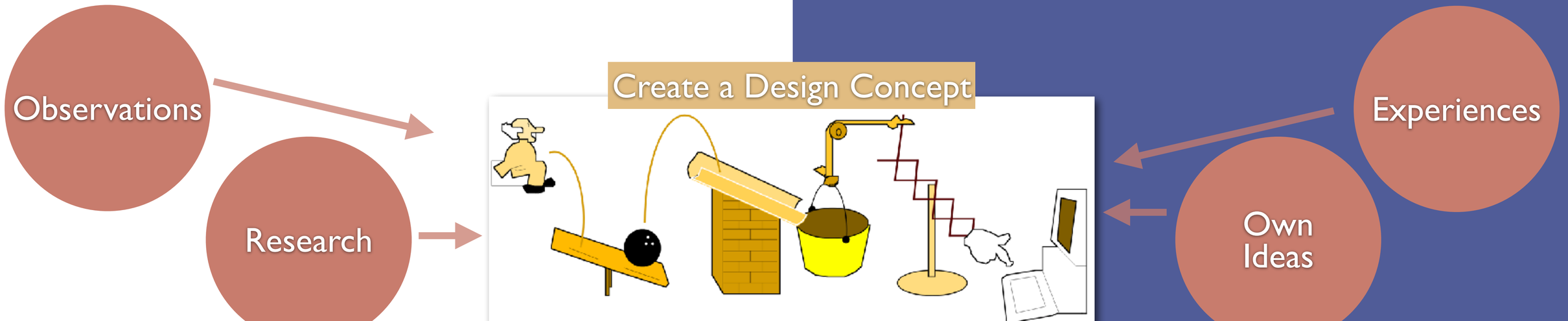
Design Concept

How will the system work?

- Functionality: what should it do?
- User guide: how does it work?
- Scenario: what happens in real-world contexts?

Justification

- What are the alternatives?
- What are the advantages and disadvantages of this solution?



Quiz

What is the difference between **video brainstorming** and **video prototyping**?

Generate ideas

How could the user interact with the system?

Each idea has one director who controls:

- description of the idea
- how to video the idea
- who will do what

Directors can shoot variations of the same idea

Video brainstorming

Tell a story

Illustrate how users will interact the system in a realistic context

Create:

future scenario to describe the interaction
storyboard to illustrate the interaction
video prototype to show live interaction

Video prototyping

Quiz

What is the difference between
a **current scenario** and
a **future scenario**?

Current Scenario

Current scenarios describe *current* activities

Tell a story with a series of action points

Future Scenario

Future scenarios build on the current scenario

Envision a *future* version with a new technology

Both include realistic personas, realistic context, and explore breakdowns, workarounds and surprises

Quiz

- What is the difference between a **video prototype** and a **tutorial?**

Generate ideas

How could the user interact with the system?

Design resources:
Written brainstormed ideas

Each idea has one director who controls:
- description of the idea
- how to video the idea
- who will do what

However, different directors can shoot different
variations of the same idea

Video prototype

Tell a story

Illustrate how users interact with the system through a series of interaction snippets

Design resources:

- Design concept
- User profile, personas
- Use scenario with interaction snippet
- Video brainstormed ideas

Create a storyboard to illustrate how the interaction

Follow the storyboard to create the video

Tutorial

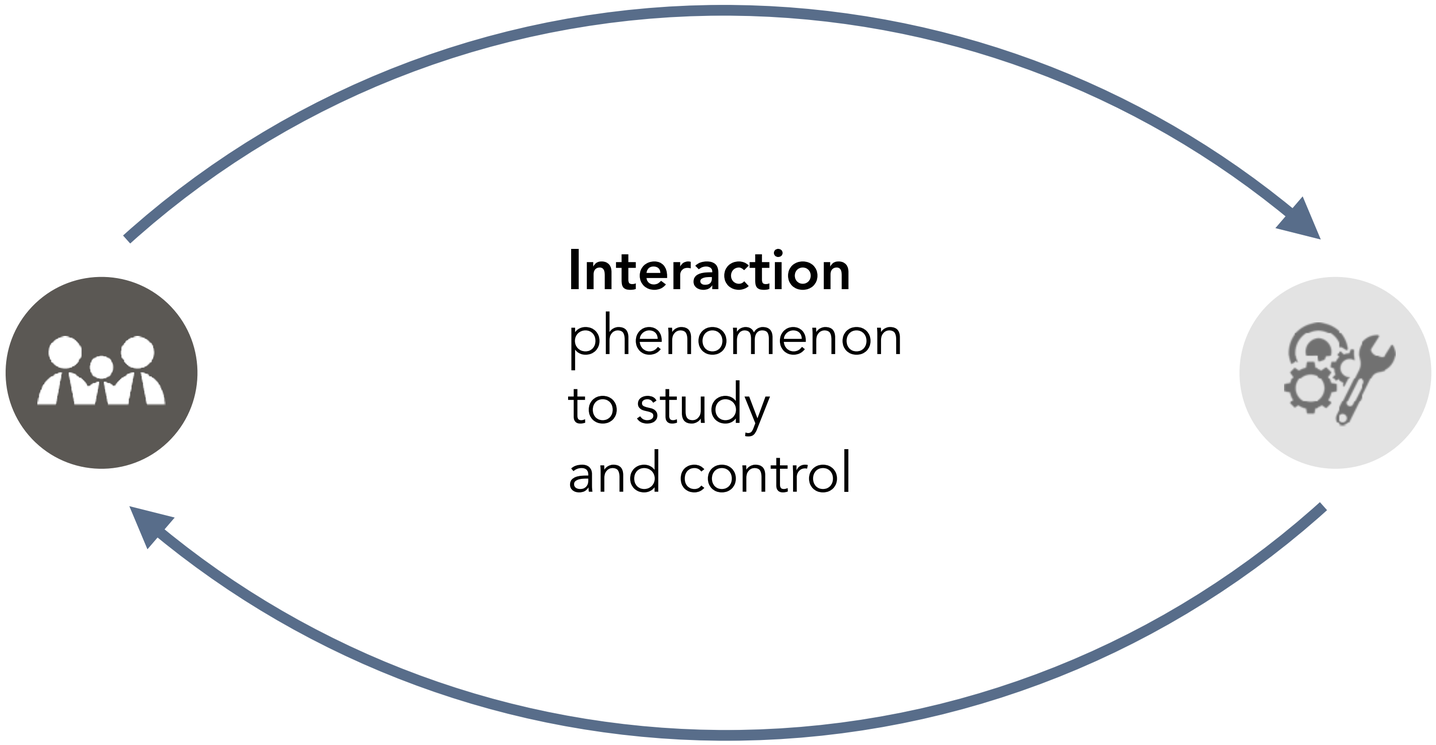
DESIGNING HUMAN-AI INTERACTION

- What is Human-centered AI?
- Introduction to designing HAI

PERSPECTIVES

THE ROLE OF HUMAN AND COMPUTERS

Human skills
perception
cognition
action



Interaction
phenomenon
to study
and control

System capabilities
storage
analysis
input/output

PERSPECTIVES

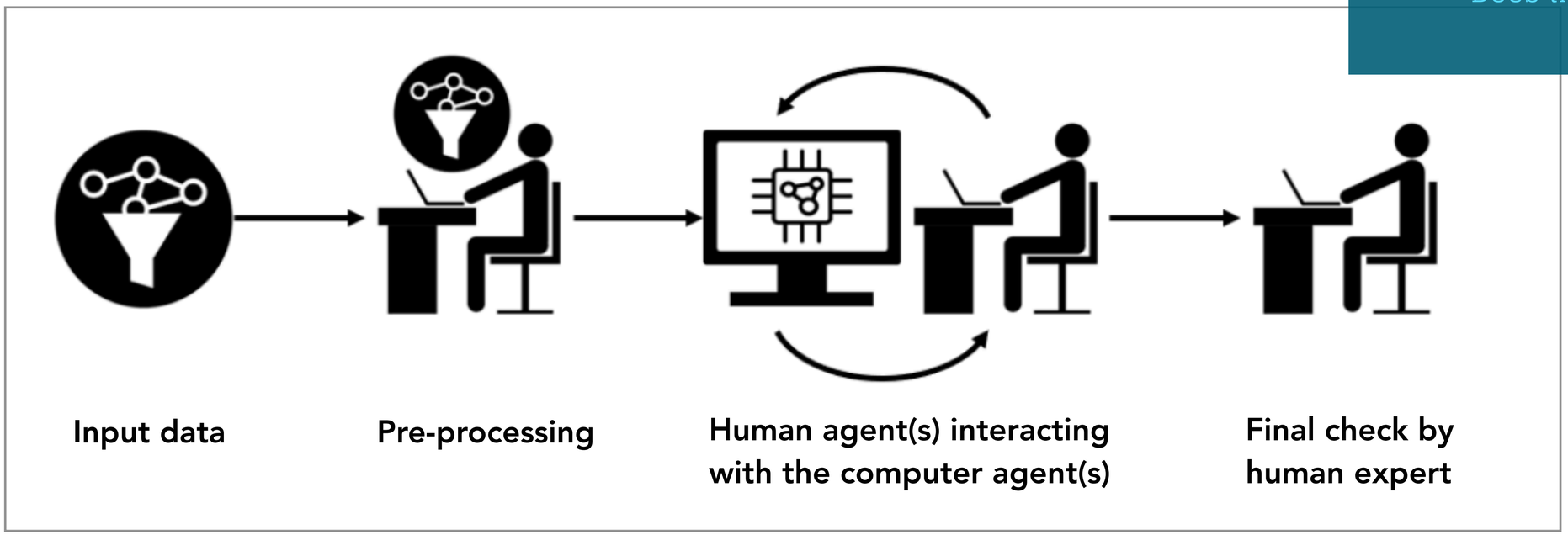
HUMAN IN THE LOOP___

Advancing computers through human intelligence

AI perspective

Measure of success:

Does the algorithm perform better?



iML Human-In-The-Loop Approach (Holzinger 2016), adapted

Holzinger (2016); Interactive machine learning for health informatics: when do we need the human-in-the-loop?, Brain Informatics

Dellermann (2019); The Future of HumanAI Collaboration: A Taxonomy of Design Knowledge for Hybrid Intelligence Systems,HICSS

PERSPECTIVES

COMPUTER IN THE LOOP___

Support humans and improve their work effectiveness and efficiency

HCI perspective

Measure of success:

Is the user better off?

"humans work with others in teams, crews, and groups, with computers best designed as helpful tools that continuously **provide information a**nd **carry out tasks**, but do so **under human control**"

Shneiderman (2020); Human-centered artificial intelligence: Three fresh ideas, AIS Transactions on Human-Computer Interaction

PERSPECTIVES

THE ROLE OF HUMAN AND COMPUTERS

Human skills
perception
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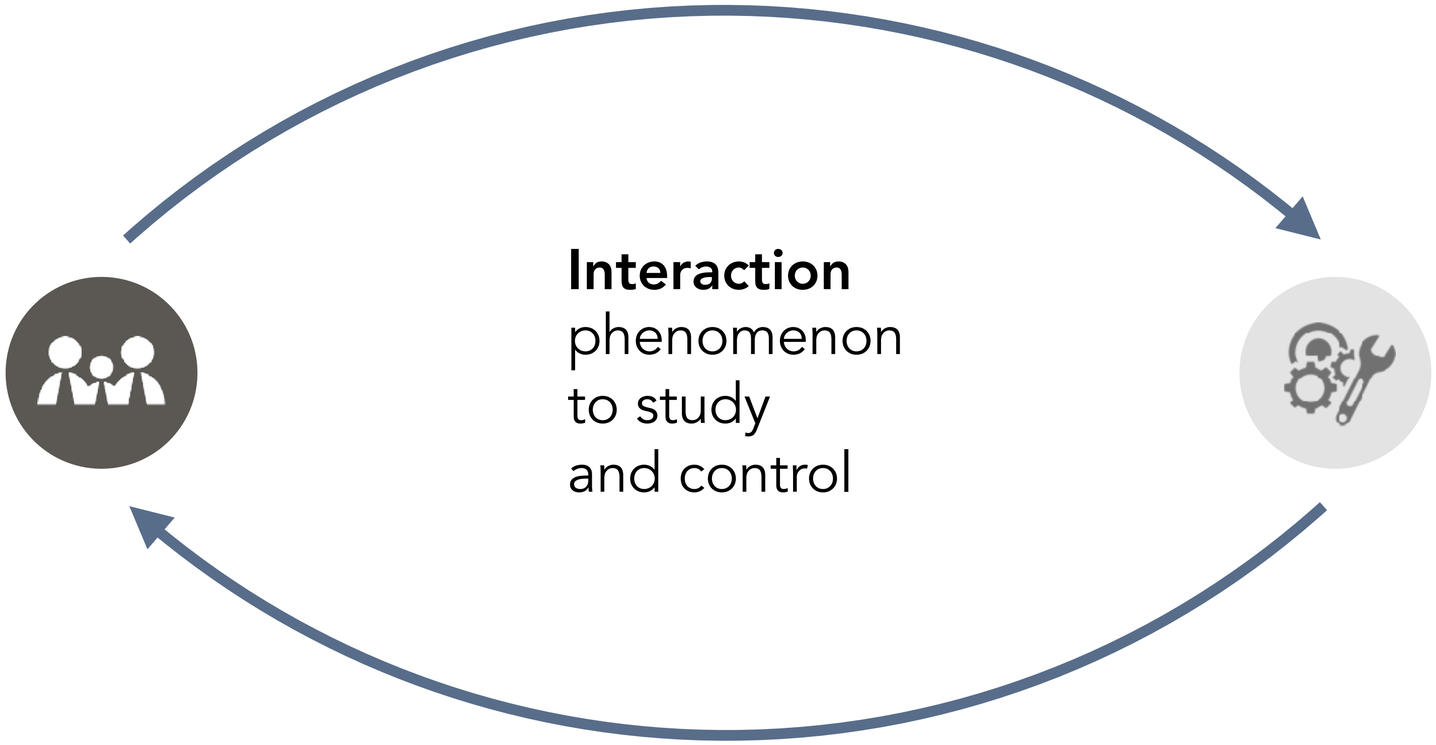
action



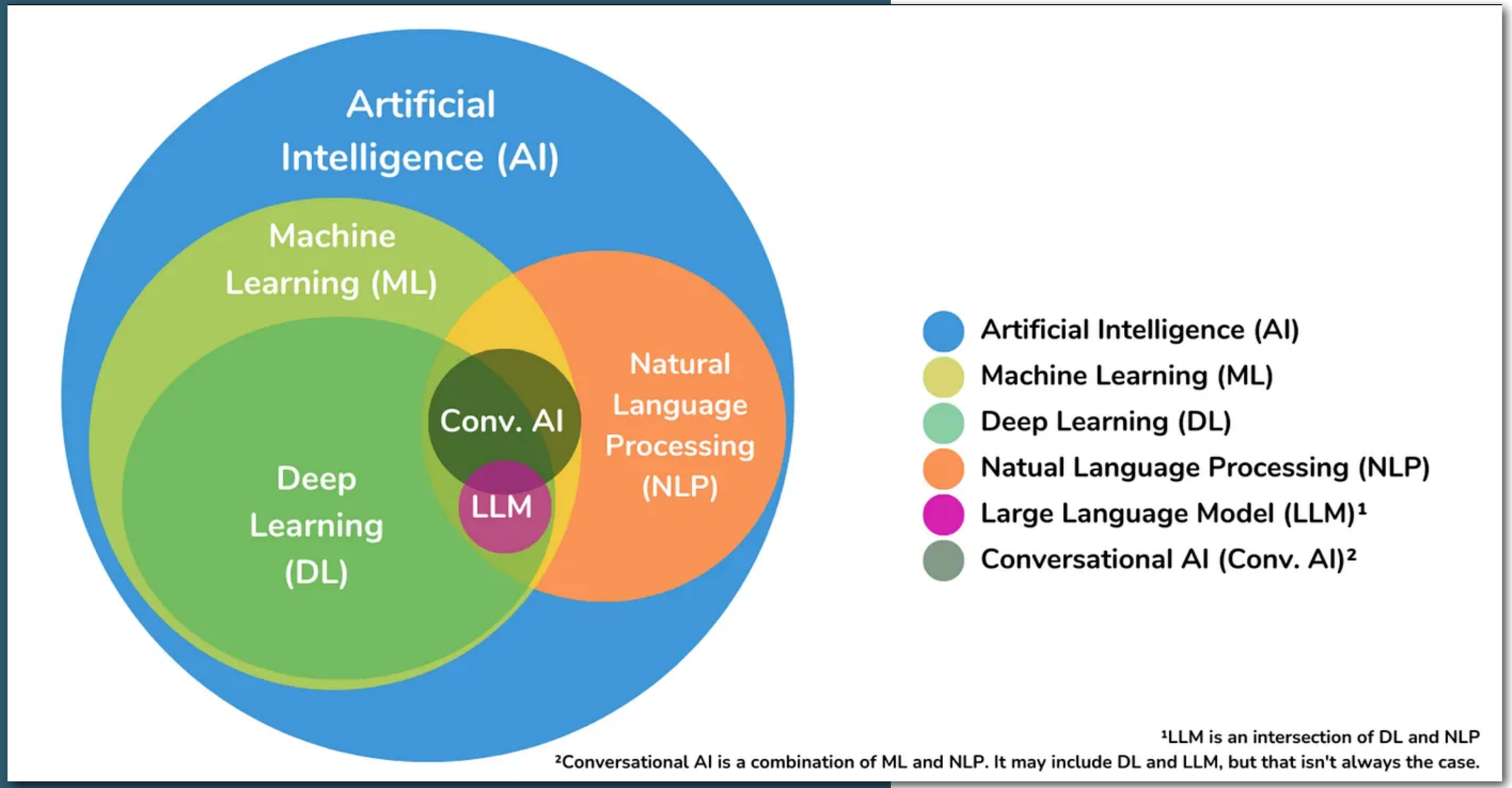
Interaction
phenomenon
to study
and control

AI?

WHAT IS AI?

Systems that both **mirror and augment human capabilities** in their **interactions** with the world and the resulting artifacts.

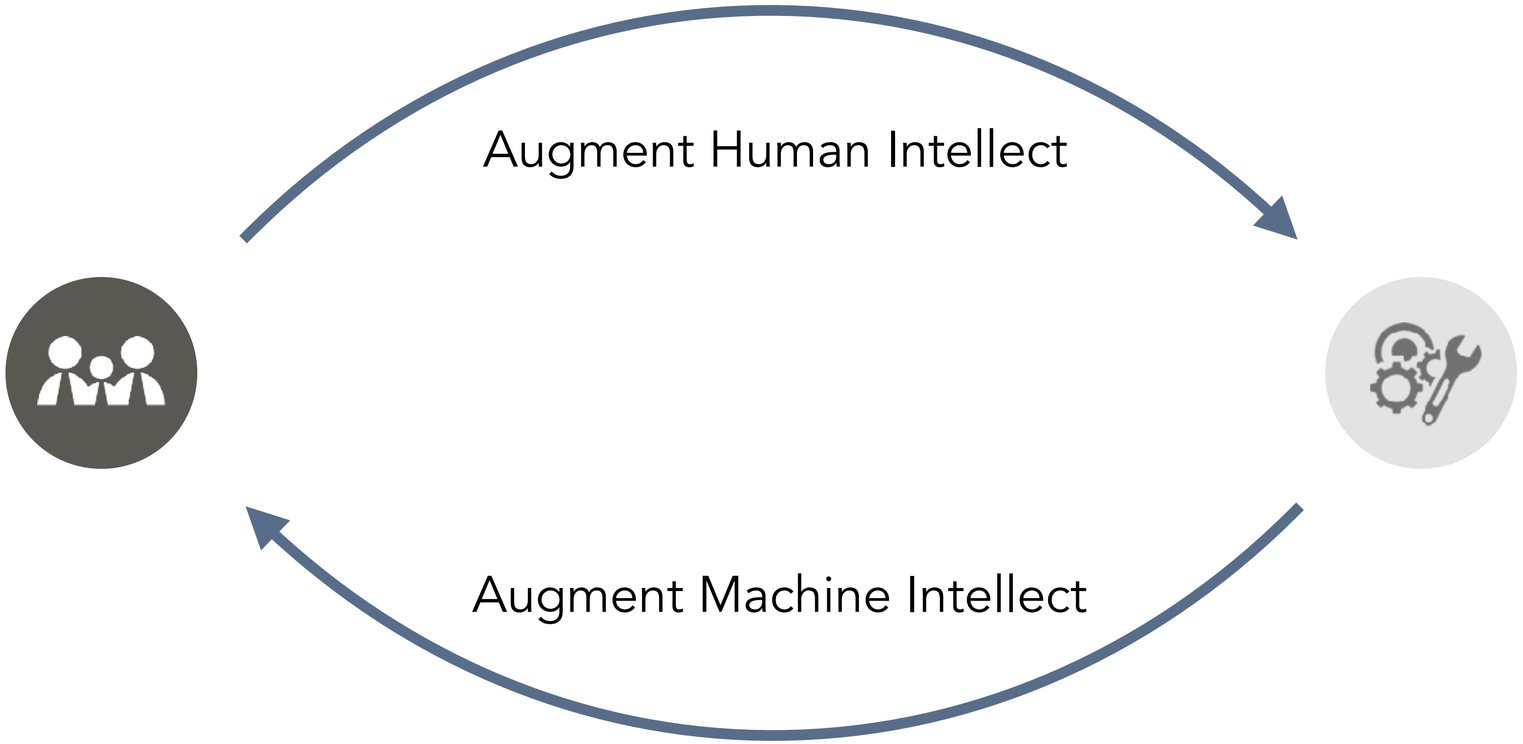
WHAT IS AI?



Source: Sudhanshu Bhargav, GenAI 101

PERSPECTIVES

HUMAN-AI INTERACTION



Take advantage of the best features of humans and computers

Let users benefit from the system input

Empower users:

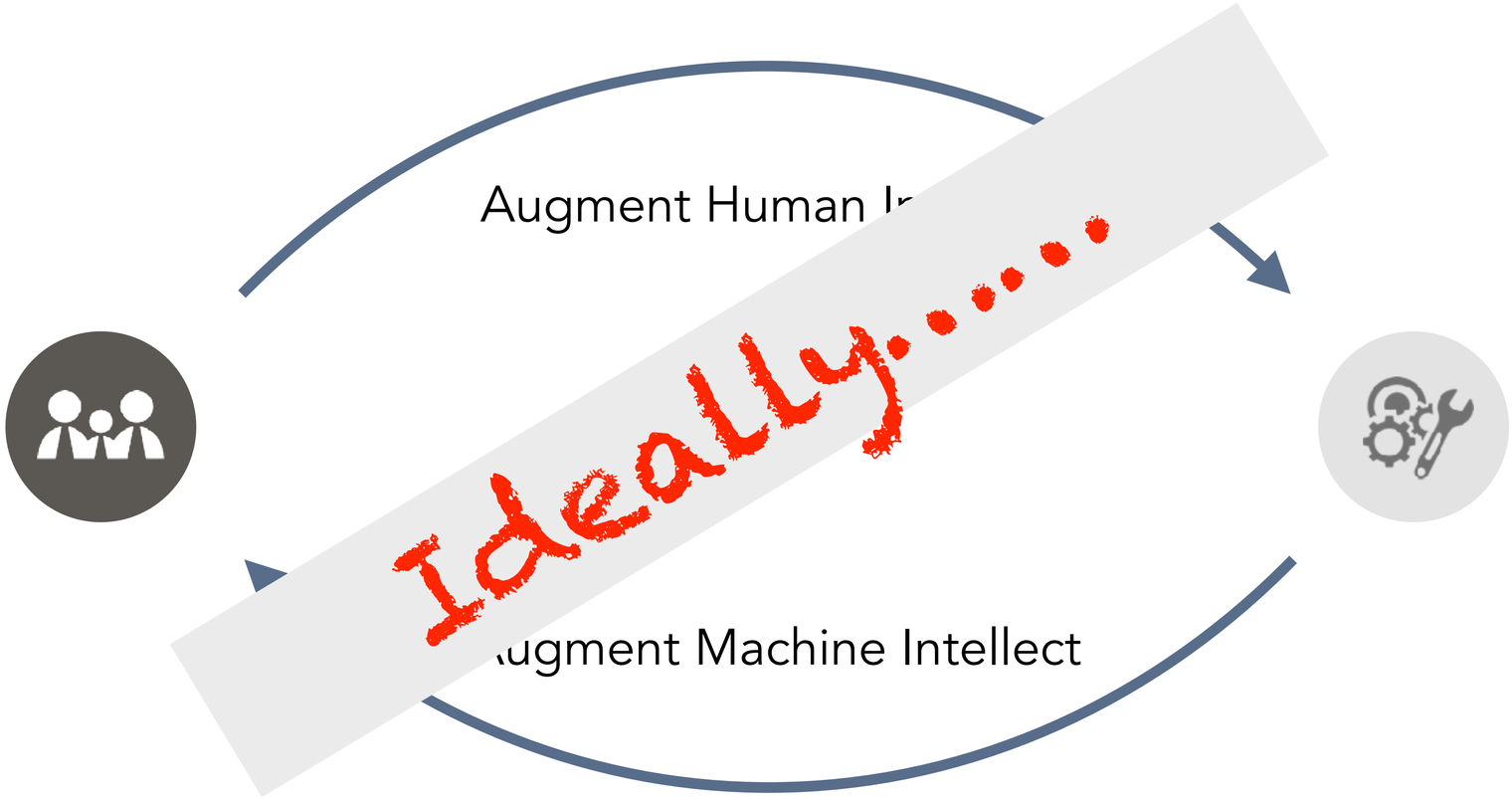
- gain skills
- express ideas
- control the interaction
- reflect on own work

Increase complexity/ personalisation

Improve acceptance and trust

PERSPECTIVES

HUMAN-AI INTERACTION



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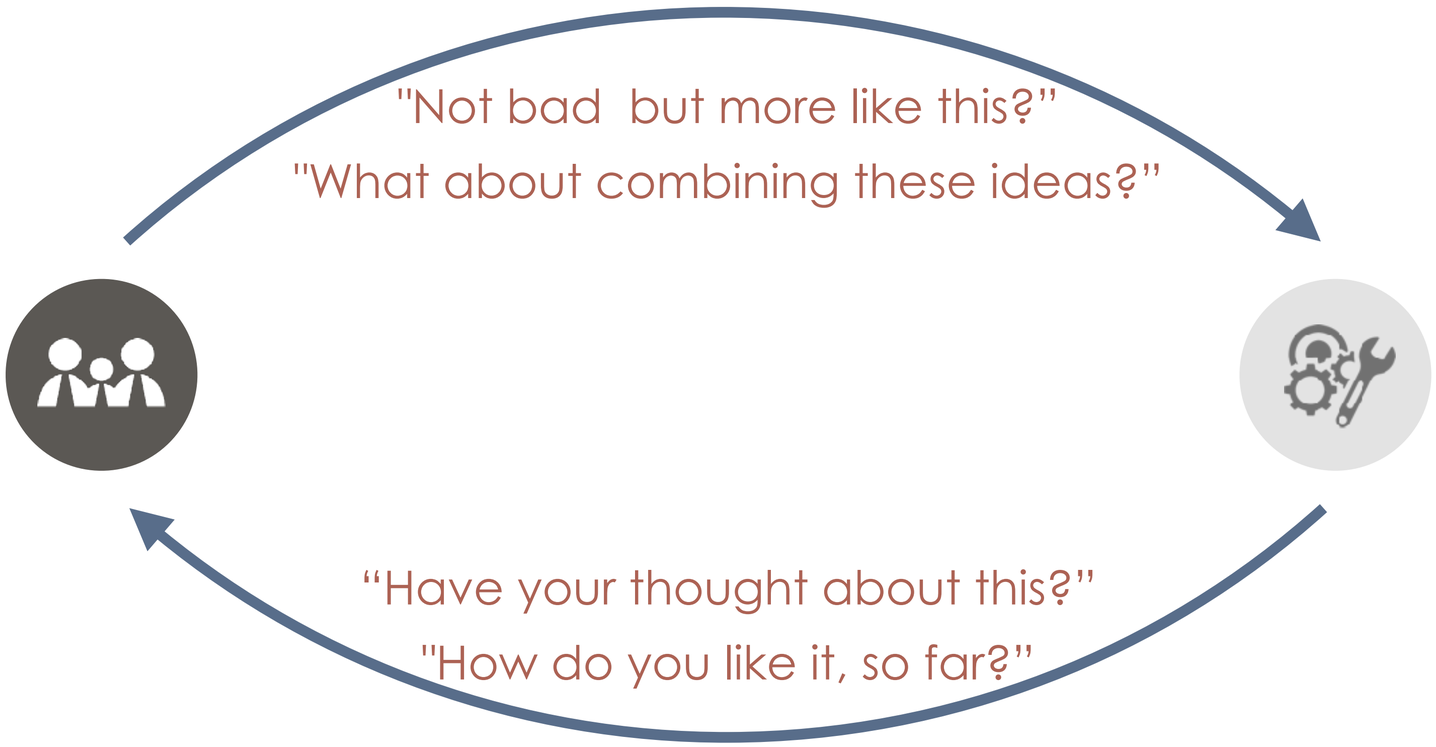
PERSPECTIVES

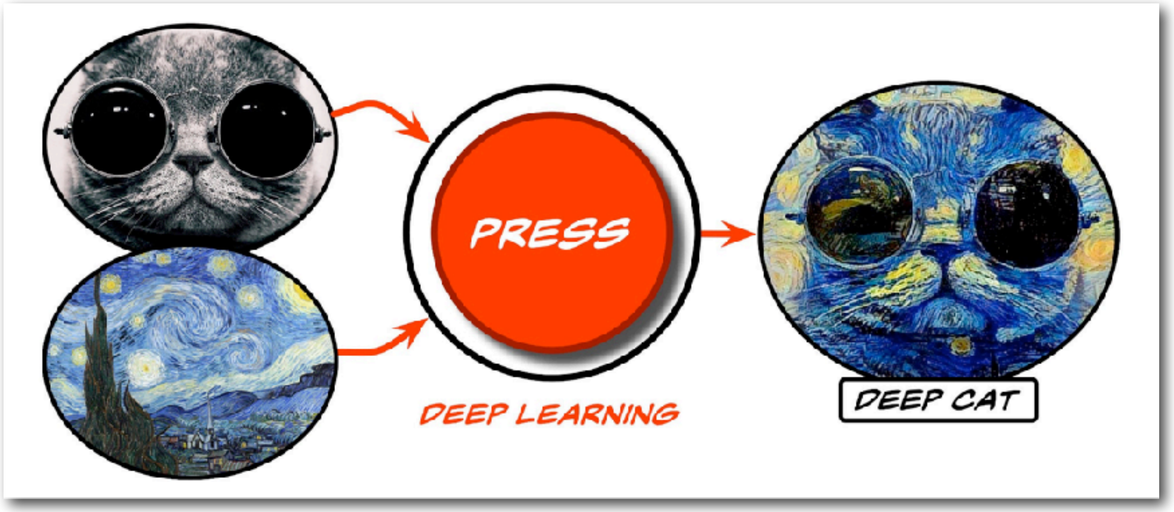
HUMAN-AI INTERACTION

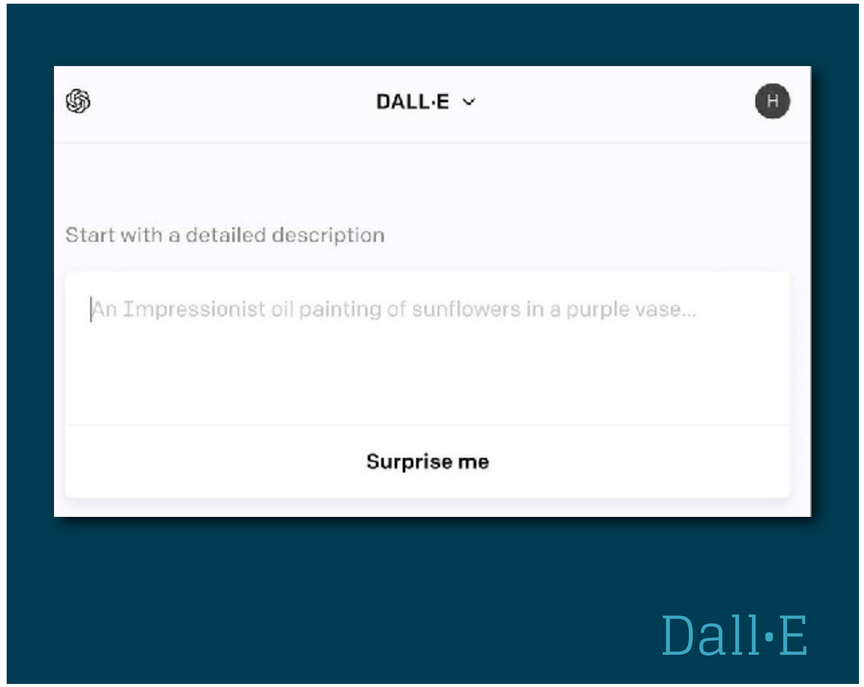


PERSPECTIVES

HUMAN-AI INTERACTION

Big Red Button - Metaphor



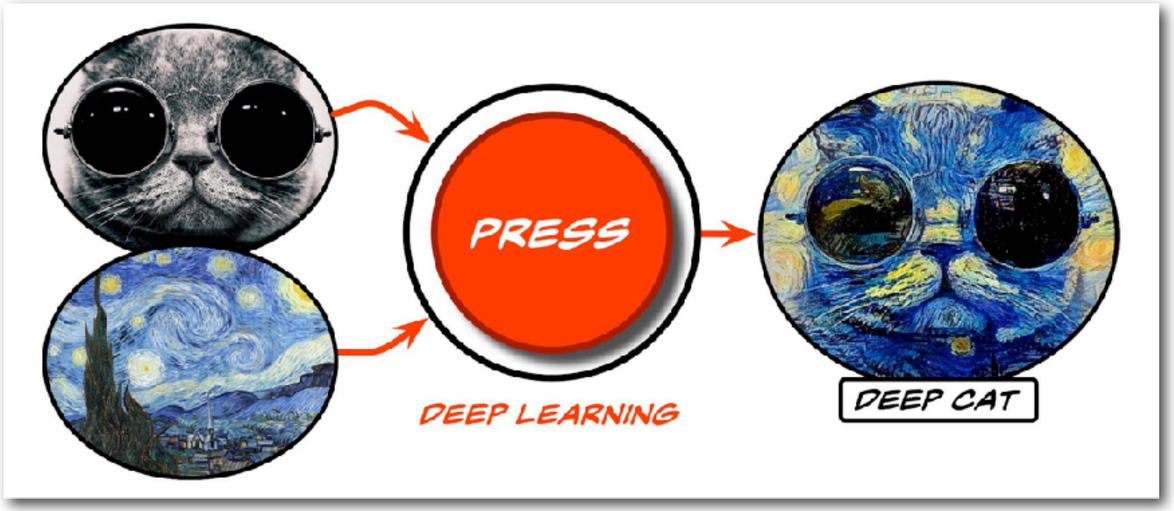


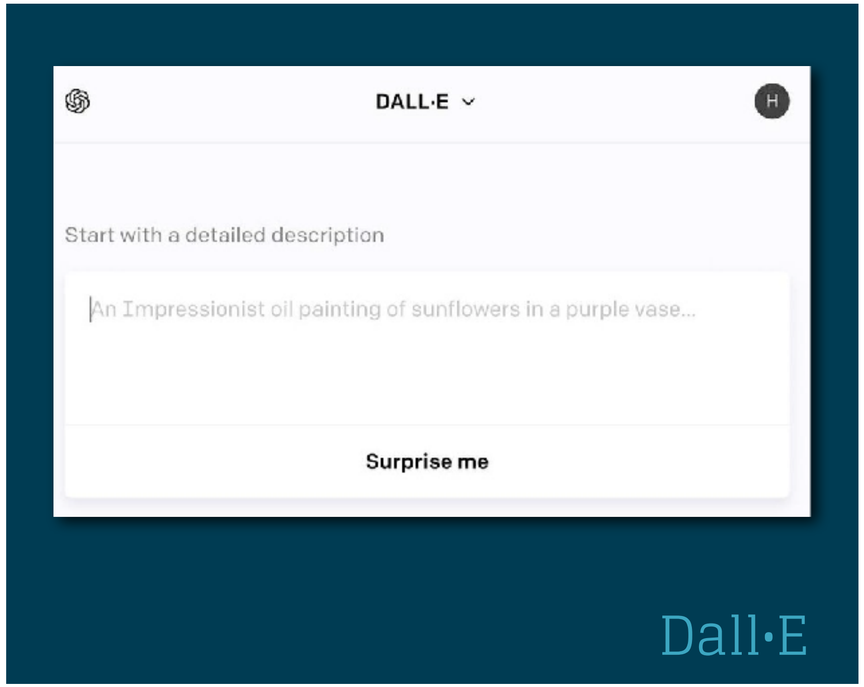
Tell me what you need- Metaphor

PERSPECTIVES

HUMAN-AI INTERACTION

Big Red Button - Metaphor





Tell me what you need- Metaphor

'All of nothing' approach

Limited Control

Focus on Product - not Process

Better algorithms
are neither necessary
nor sufficient

for creating better intelligent systems

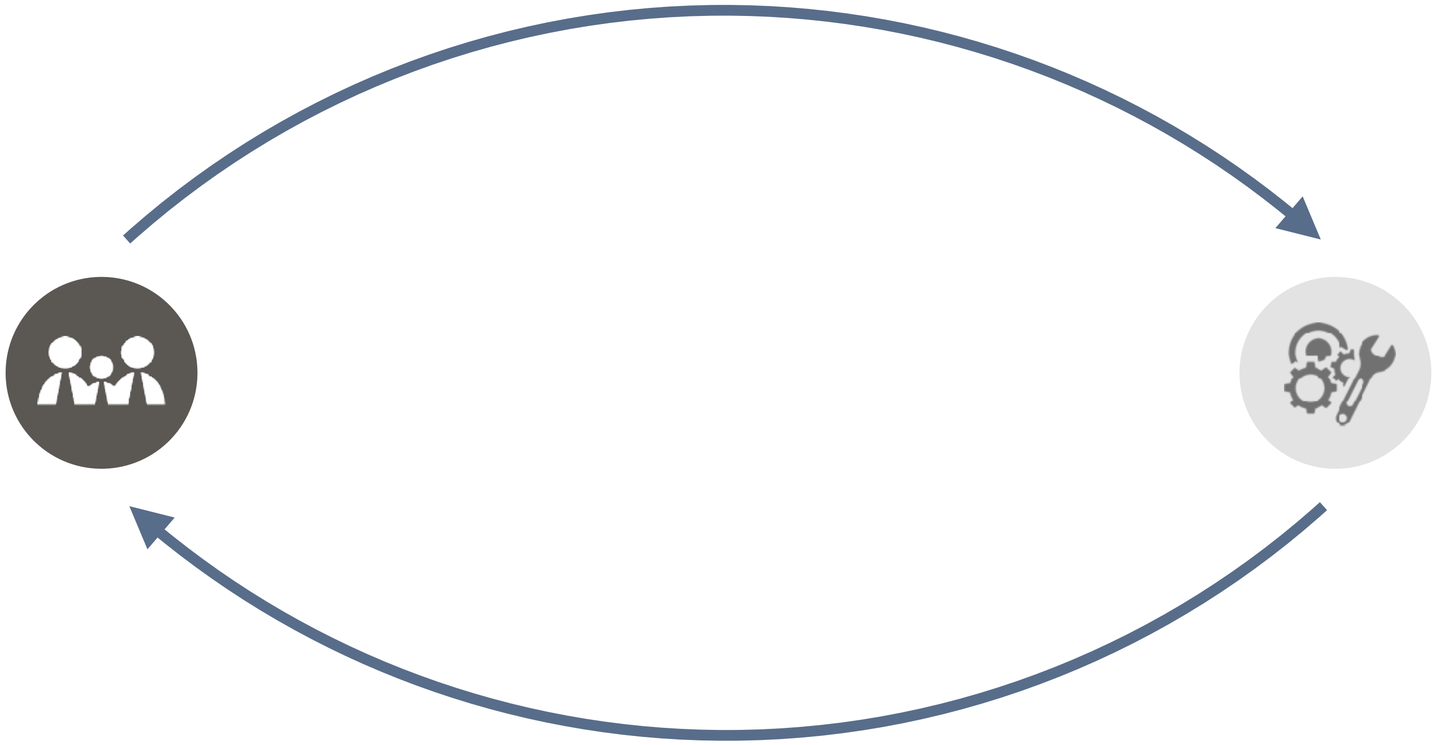
Better algorithms
are neither necessary
nor sufficient

for creating better
intelligent systems

What you need is well-designed H-AI interactions

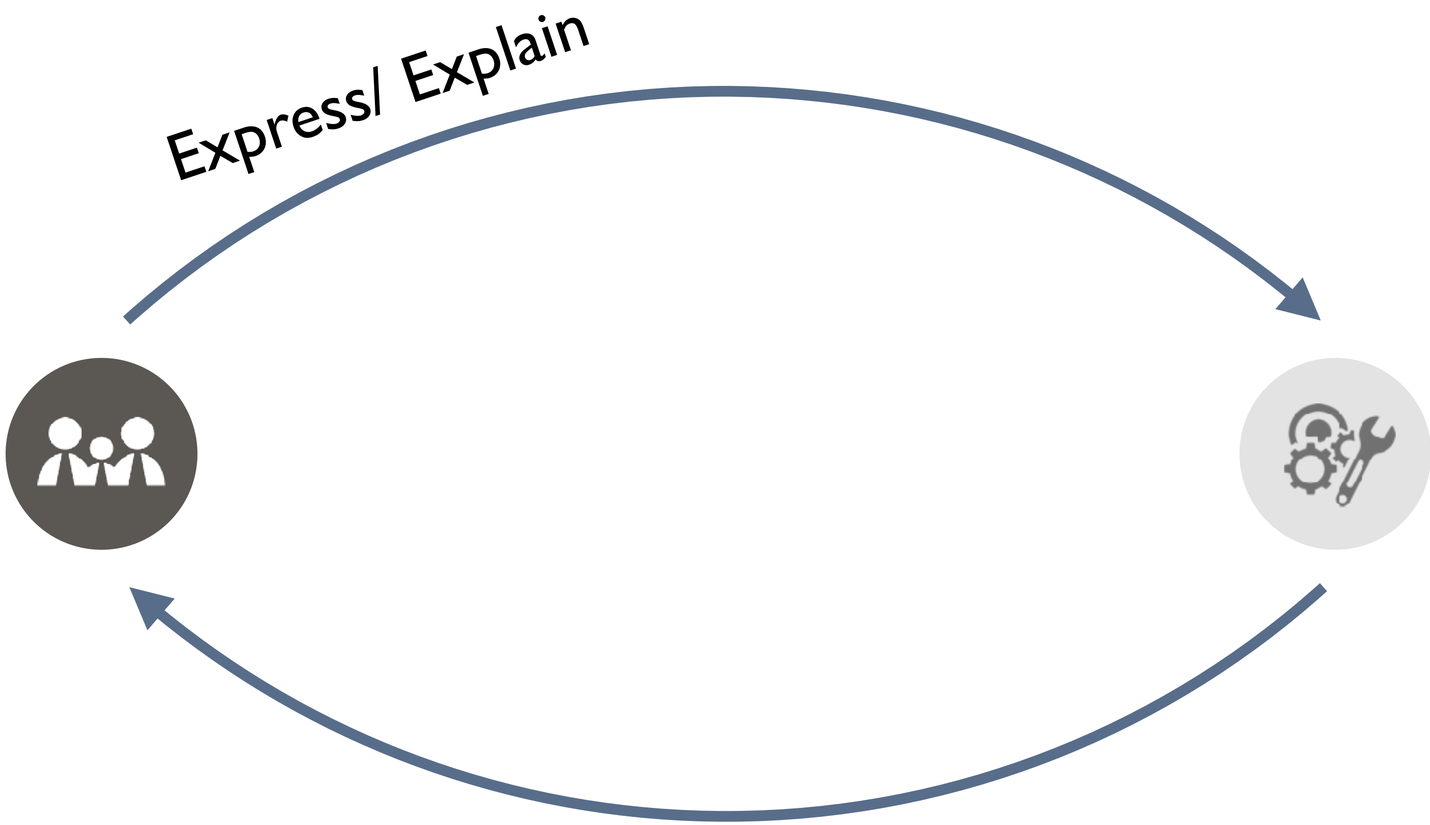
COLLABORATION

HUMAN-AI INTERACTION



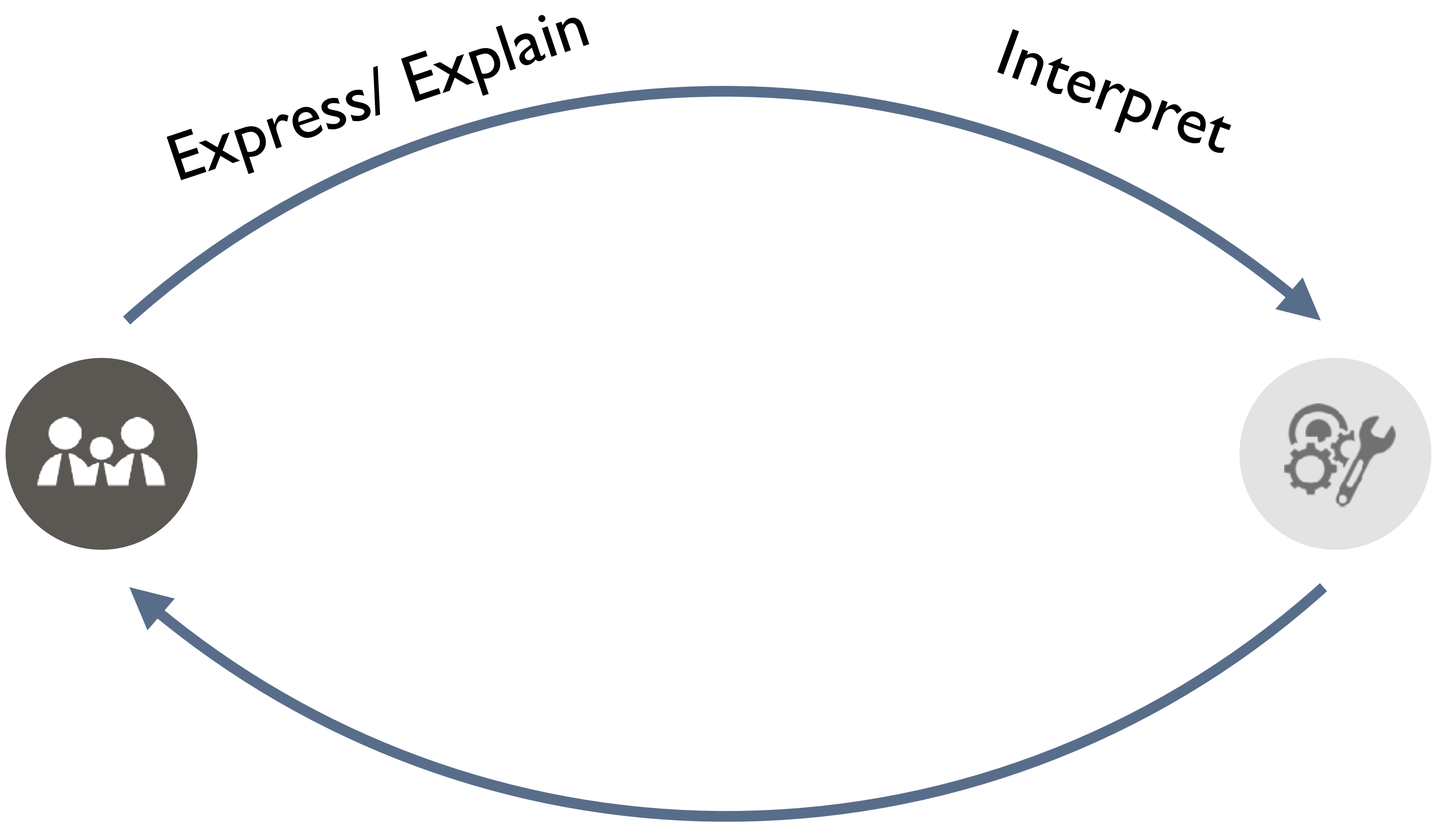
COLLABORATION

HUMAN-AI INTERACTION



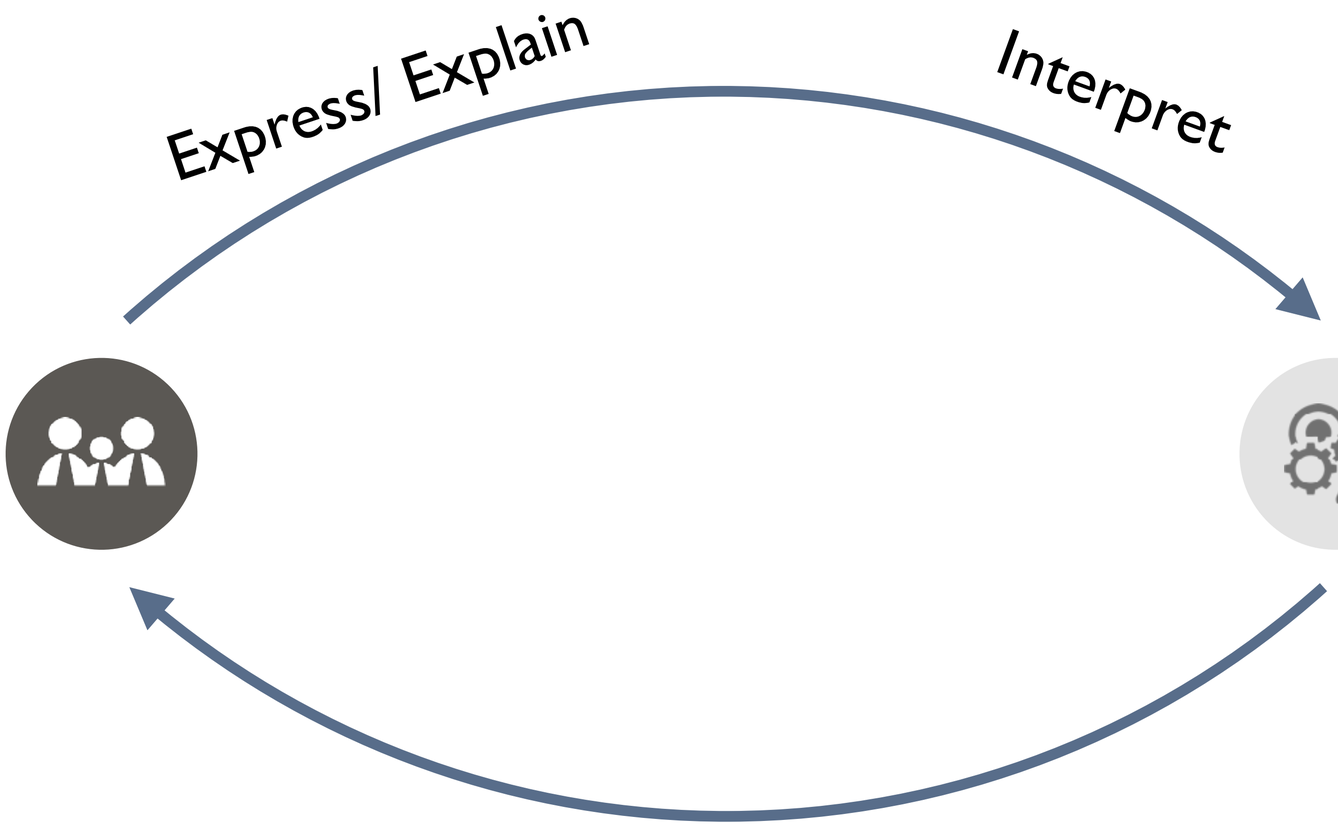
COLLABORATION

HUMAN-AI INTERACTION



COLLABORATION

HUMAN-AI INTERACTION

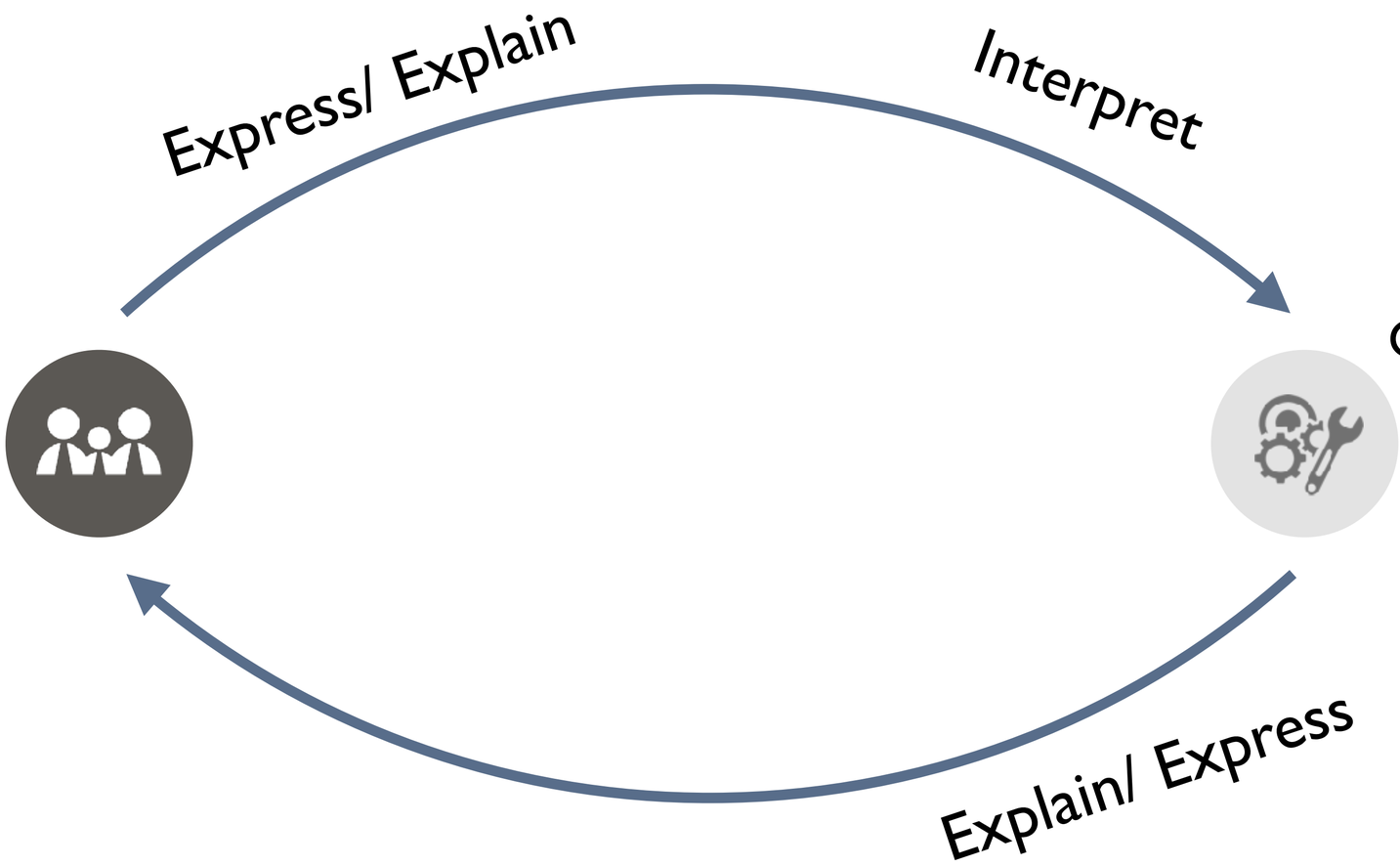


Own Contribution:

- Understand context space
- Explore/ Exploit independently
- Evolve/ align with user
- Explanation

COLLABORATION

HUMAN-AI INTERACTION



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COLLABORATION

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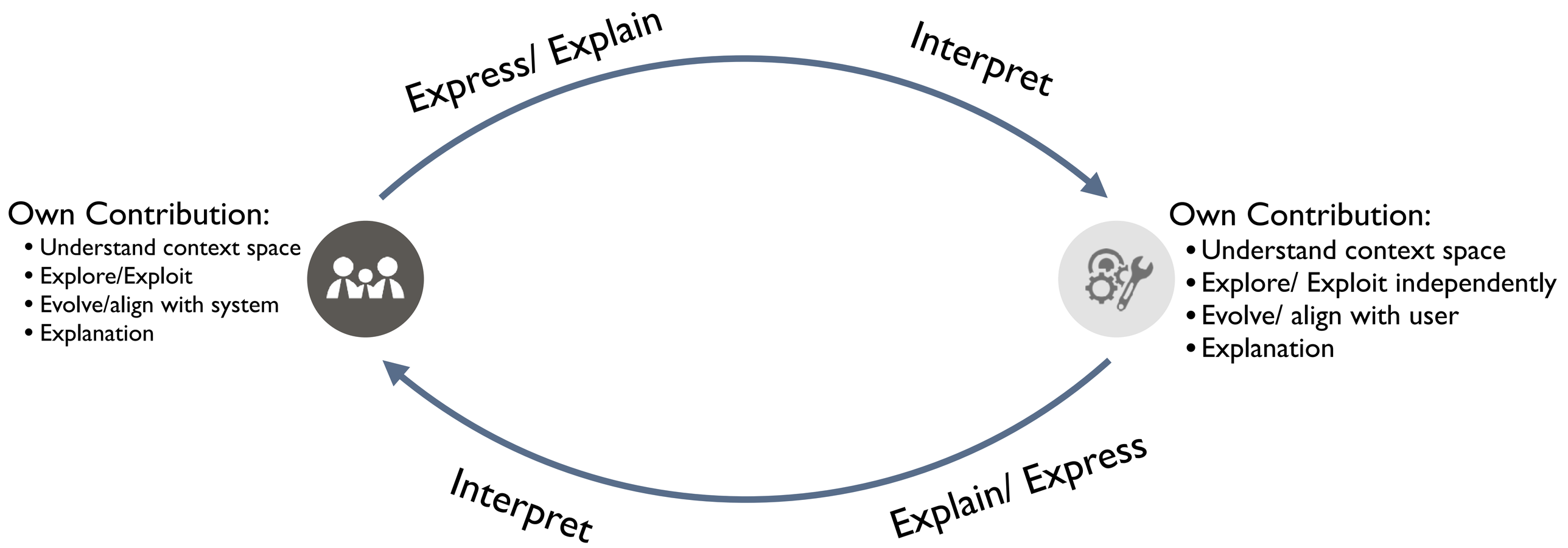
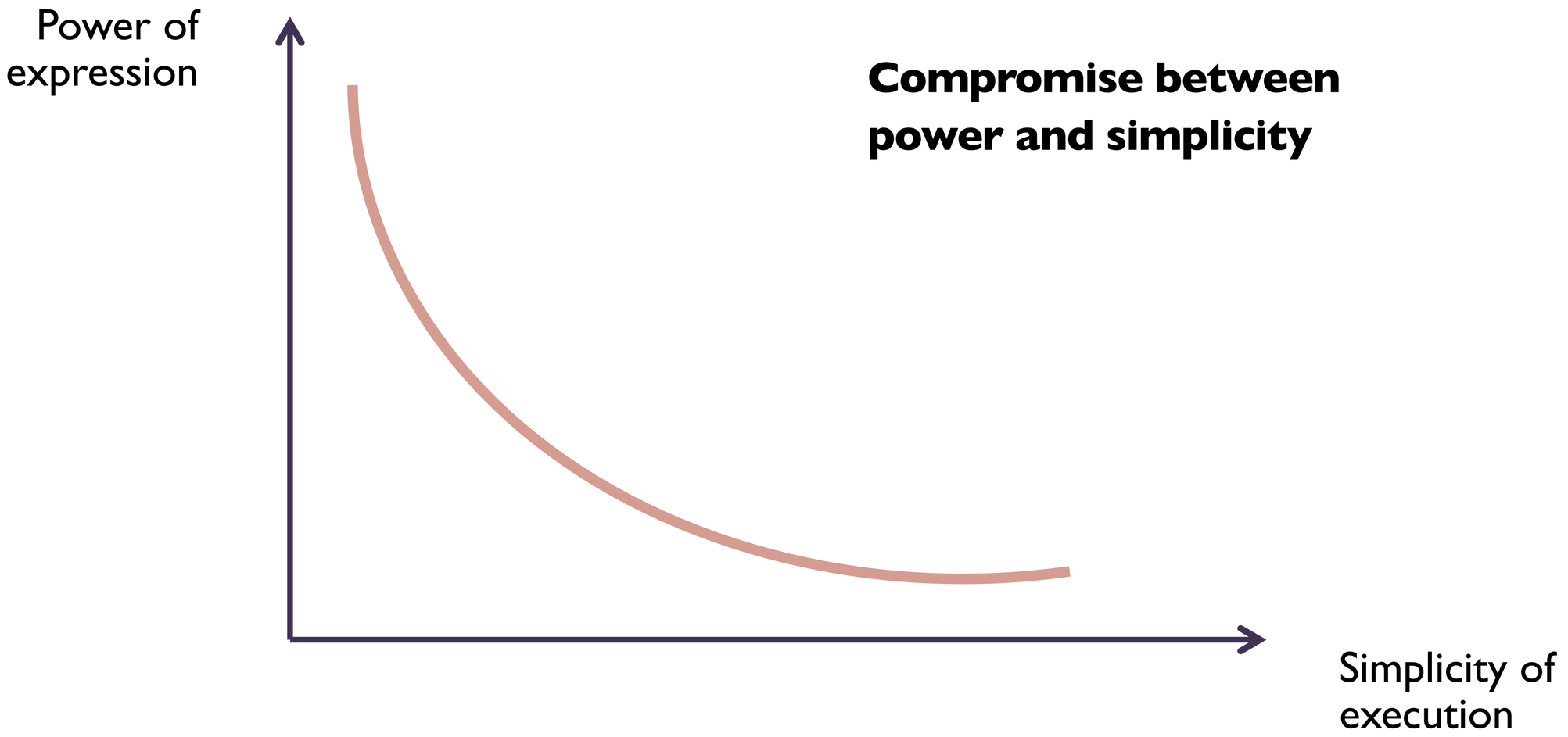


CHALLANGE

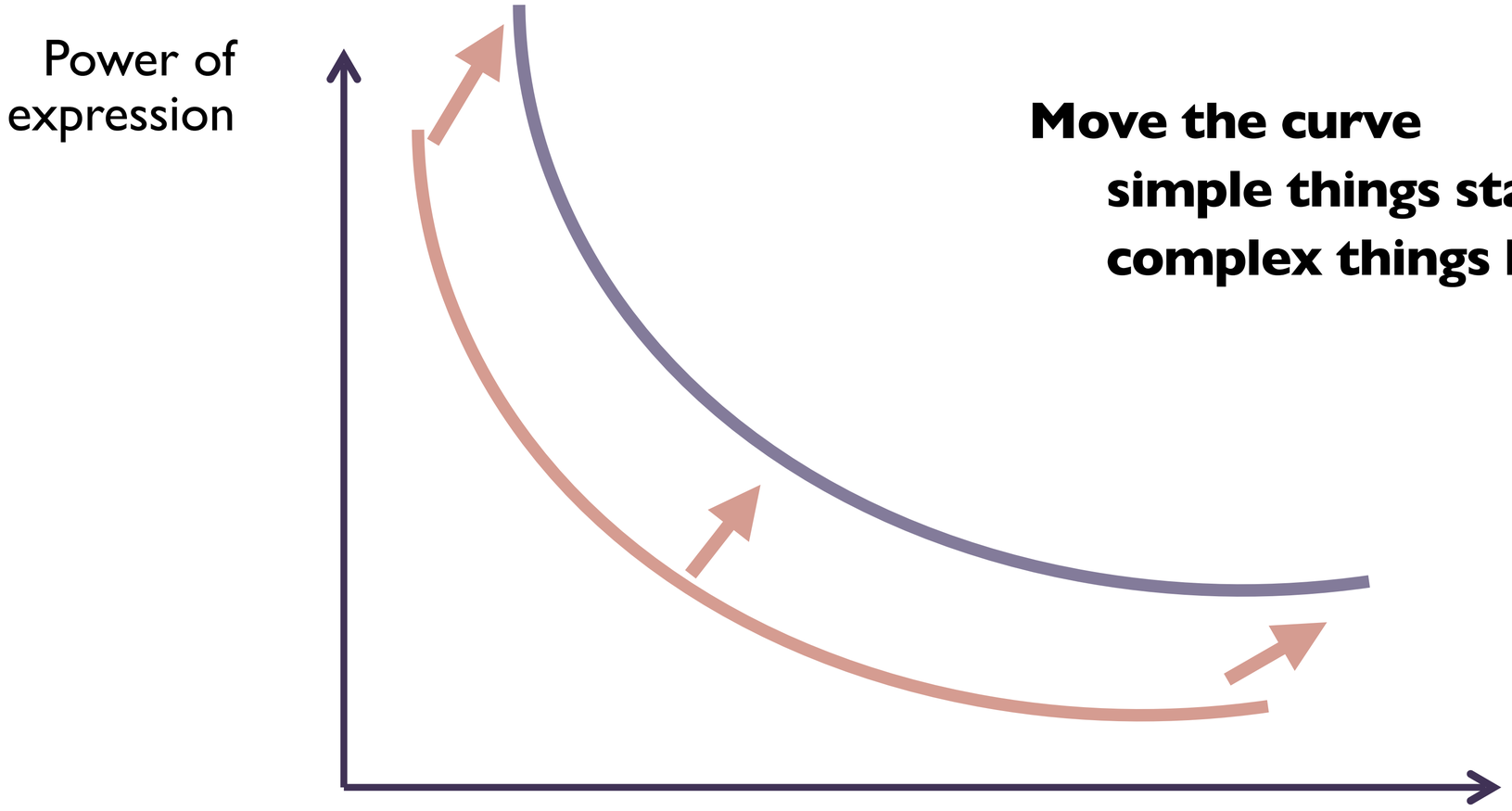
HUMAN-AI COLLABORATION



Compromise between power and simplicity

CHALLANGE

HUMAN-AI COLLABORATION



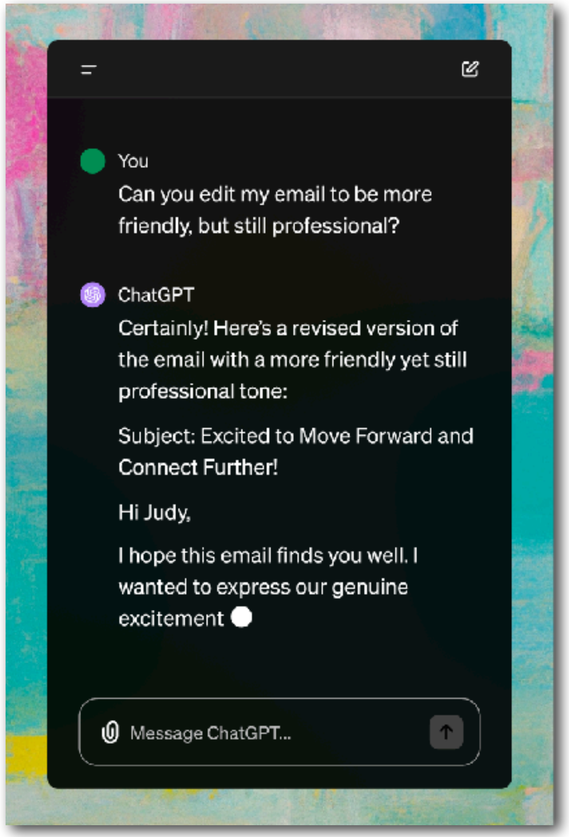
Move the curve

simple things stay simple

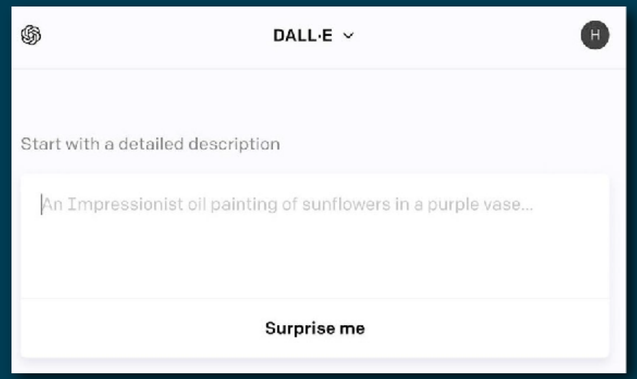
complex things become possible

PROBLEMS OF HUMAN-AI INTERACTIONS

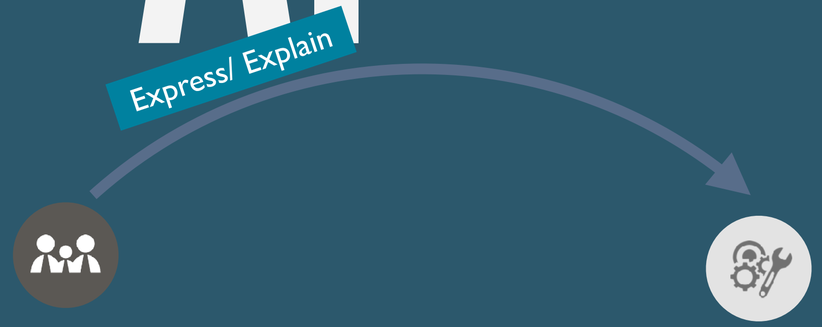
ChatGPT



Dall·E



OF AI



Why Johnny Can't Prompt:
How Non-AI Experts Try (and Fail) to Design LLM Prompts

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ABSTRACT

Pre-trained large language models ("LLMs") like GPT-3 can engage in fluent, multi-turn instruction-taking out-of-the-box, making them attractive materials for designing natural language interactions. Using natural language to steer LLM outputs ("prompting") has emerged as an important design technique potentially accessible to non-AI-experts. Crafting effective prompts can be challenging, however, and prompt-based interactions are brittle. Here, we explore whether non-AI-experts can successfully engage in "end-user prompt engineering" using a design probe—a prototype LLM-based chatbot design tool supporting development and systematic evaluation of prompting strategies. Ultimately, our probe participants explored prompt designs opportunistically, not systematically, and struggled in ways echoing end-user programming systems and interactive machine learning systems. Expectations stemming from human-to-human instructional experiences, and a tendency to overgeneralize, were barriers to effective prompt design. These findings have implications for non-AI-expert-facing LLM-based tool design and for improving LLM-and-prompt literacy among programmers and the public, and present opportunities for further research.

1 INTRODUCTION

The idea of instructing computers in natural language has fascinated researchers for decades, as it promises to make the power of computing more customizable and accessible to people without programming training [4]. The combination of pre-trained large language models (LLMs) and prompts brought renewed excitement to this vision. Recent pre-trained LLMs (e.g., GPT-3 [8], ChatGPT [1]) can engage in fluent, multi-turn conversations out-of-the-box, substantially lowering the data and programming-skill barriers to creating passable conversational user experiences [7]. People can improve LLM outputs by prepending *prompts*—textual instructions and examples of their desired interactions—to LLM inputs. Prompts directly bias the model towards generating the desired outputs, raising the ceiling of what conversational UX is achievable for non-AI experts. In the past two years, social media platforms have witnessed an explosion of posts showing the results of lay peoples' experimentation with LLMs for question answering, creative dialogue writing, writing code, and more. This excitement around LLMs and prompting is propelling a rapidly growing set of LLM-powered applications [23] and prompt design tools [3, 20, 32].

Yet despite widespread excitement, surprisingly little is known

https://dl.acm.org/doi/pdf/10.1145/3544548.3581388

PROBLEMS OF AI

PROBLEMS OF HUMAN-AI INTERACTIONS

AI tools may soon manipulate people's online decision-making, say researchers

Study predicts an 'intention economy' where companies bid for accurate predictions of human behaviour

University of Cambridge researchers believe AI assistants will become adept at influencing those

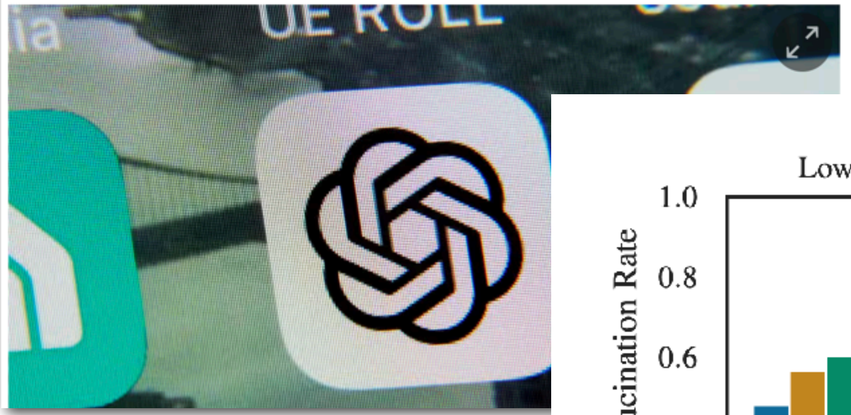
https://www.theguardian.com/technology/2024/dec/30/ai-tools-may-soon-manipulate-peoples-online-decision-making-say-researchers

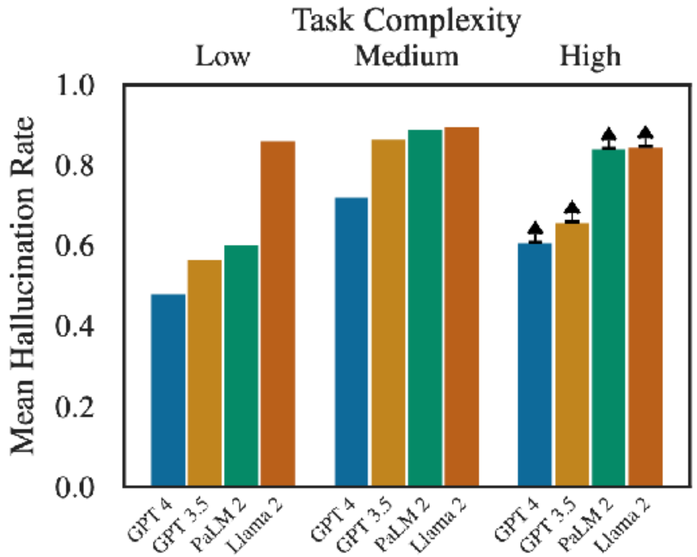
PROBLEMS OF HUMAN-AI INTERACTIONS

OF AI

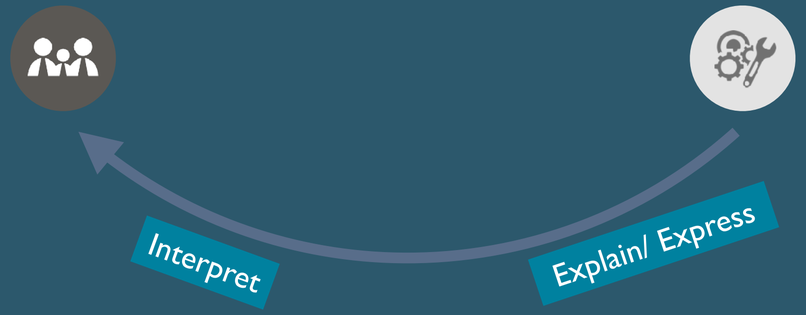
Two US lawyers fined for submitting fake court citations from ChatGPT

Law firm also penalised after chatbot invented six legal cases that were then used in an aviation injury claim





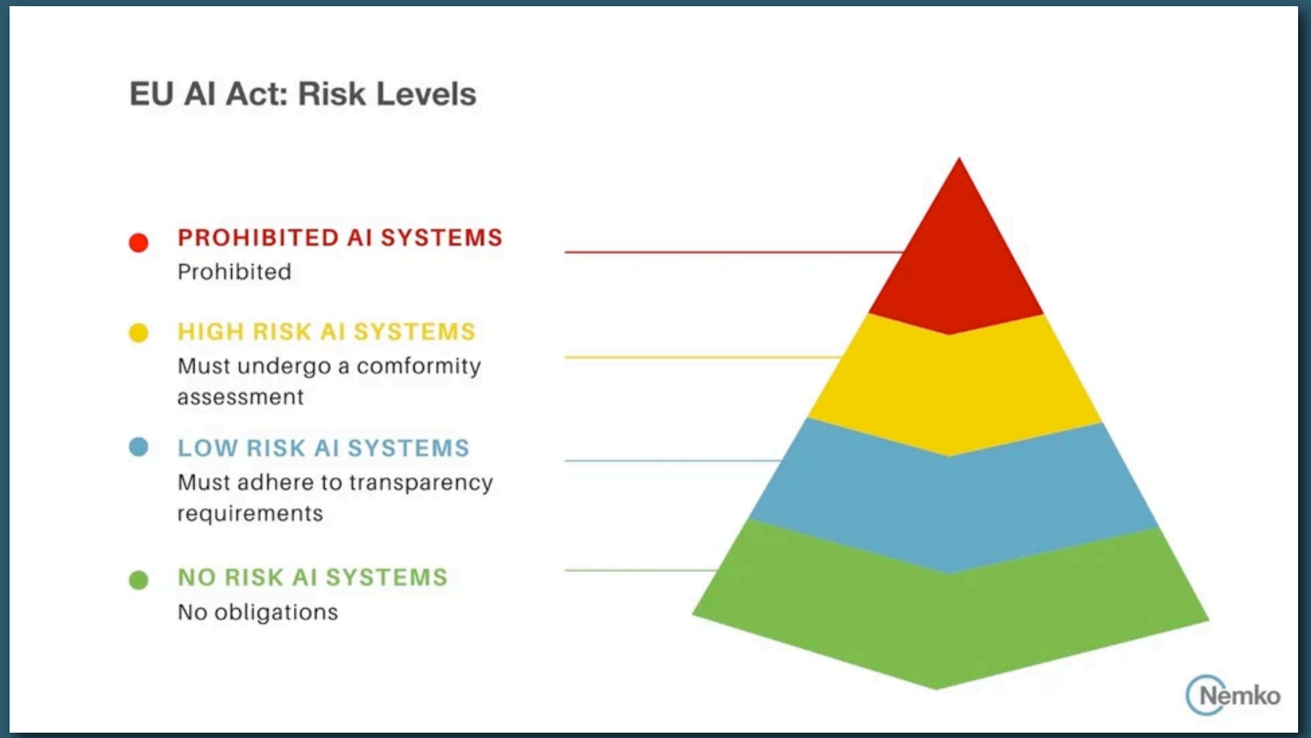
Large Legal Fictions: Profiling Legal Hallucinations in Large Language Models (2024)

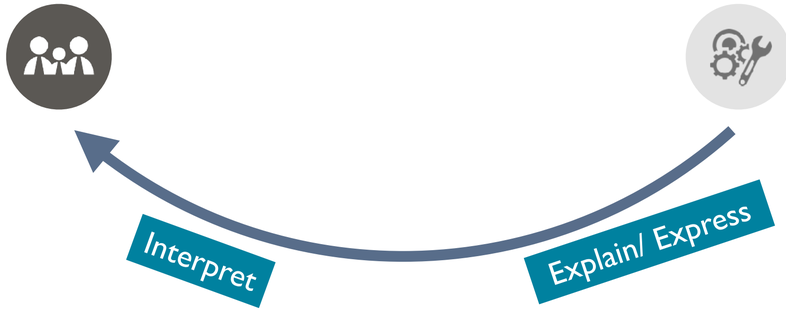


ChatGPT have attracted significant attention doubling the number of weekly users to over 200 million in less than a year (2024)

PROBLEMS OF AI

PROBLEMS OF HUMAN-AI INTERACTIONS





DESIGNING HUMAN-AI INTERACTION

Human-centered Design

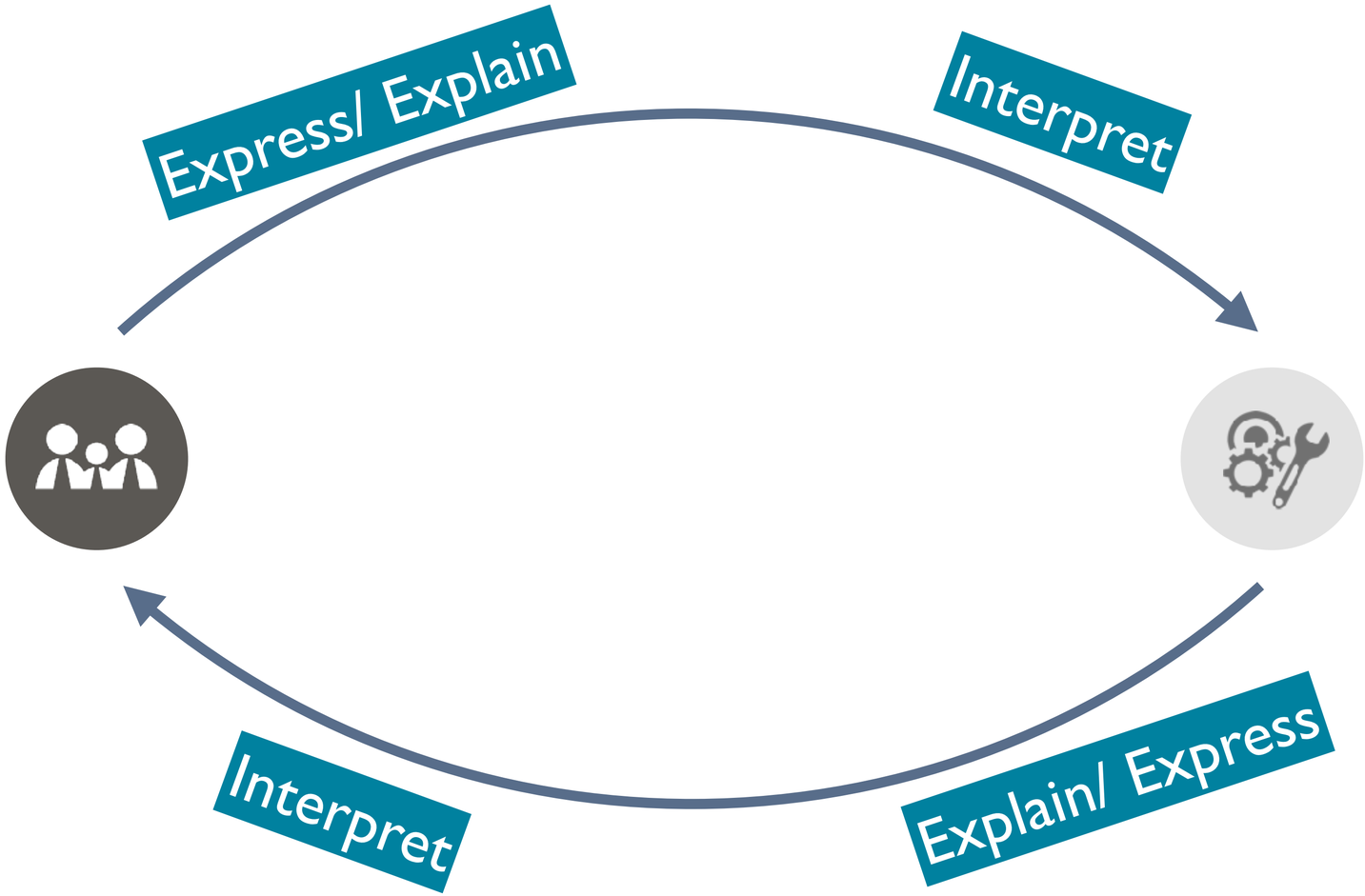
- Early and active involvement of the user during the design process.
- Clarification of user and task requirements.
- User feedback is incorporated into the product’s lifecycle.
- The product is improved using an iterative design process.

Human-centered AI

- Identify/ anticipate user needs through empirical studies
- Adapt AI interaction to align with user's task requirements
- Amplify and augment rather than displace human abilities through feedback
- Preserve human control in a way that ensures AI meets user needs
- Ensure transparency and respect privacy

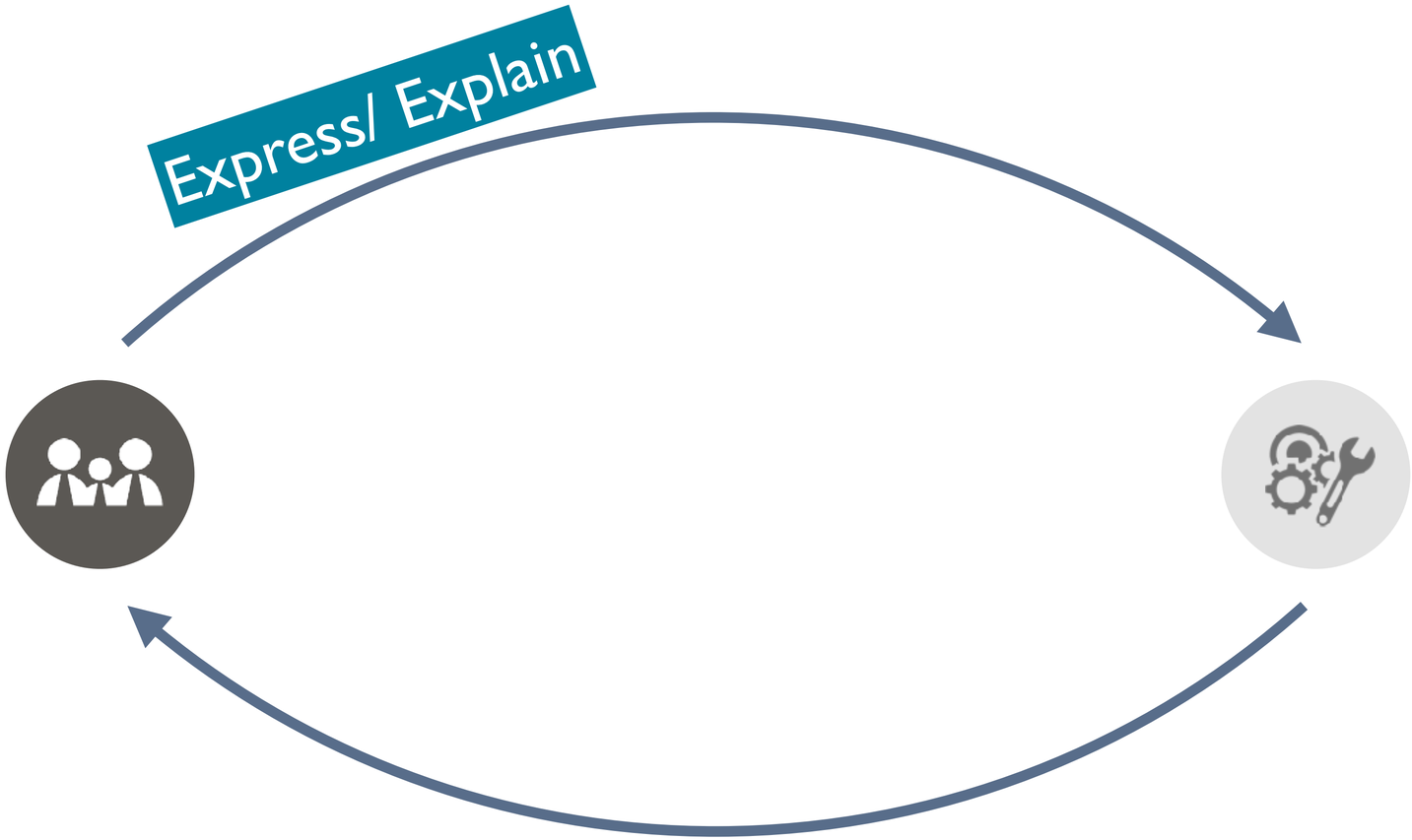
COLLABORATION

HUMAN-AI INTERACTION



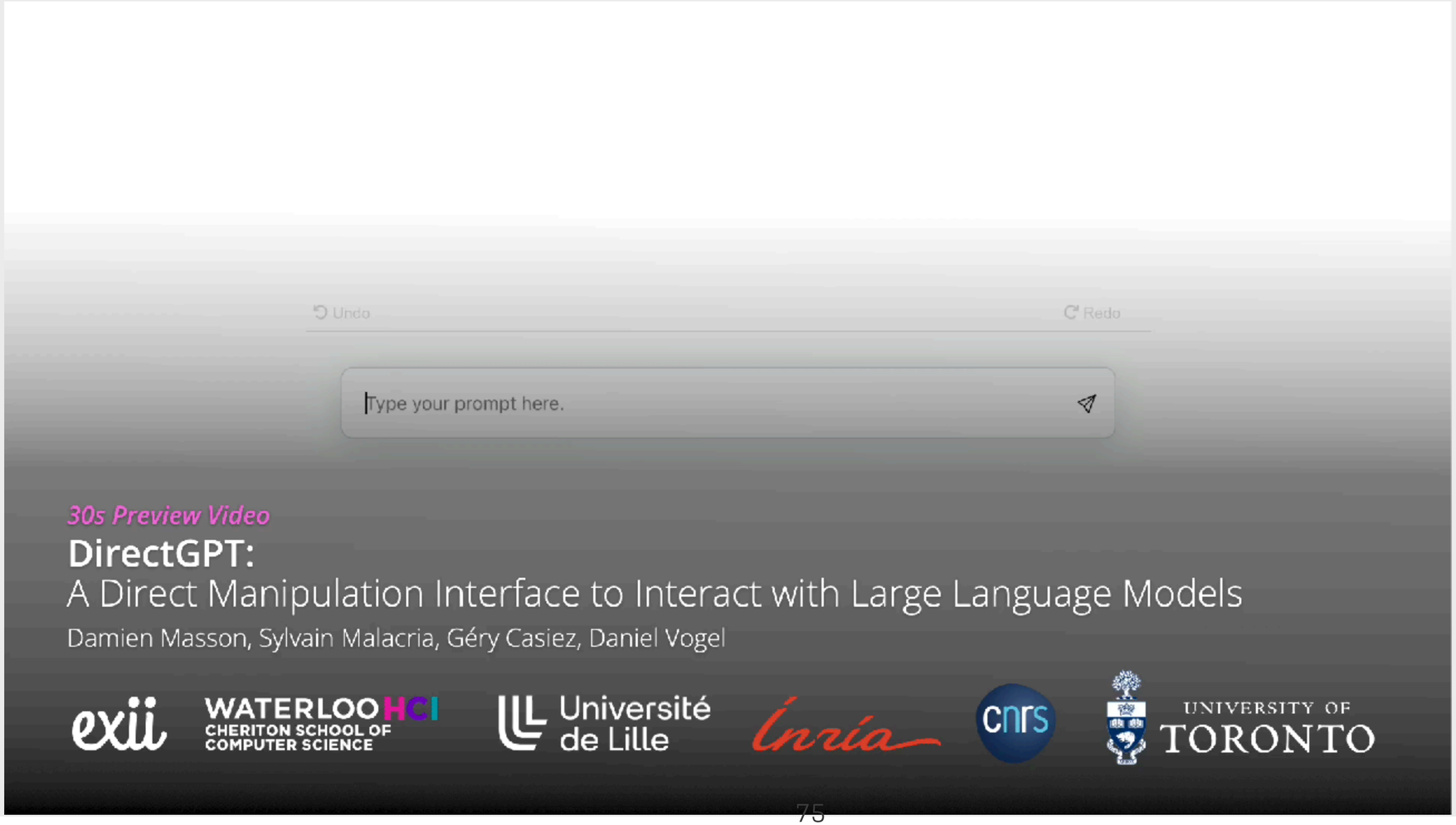
COLLABORATION

HUMAN-AI INTERACTION



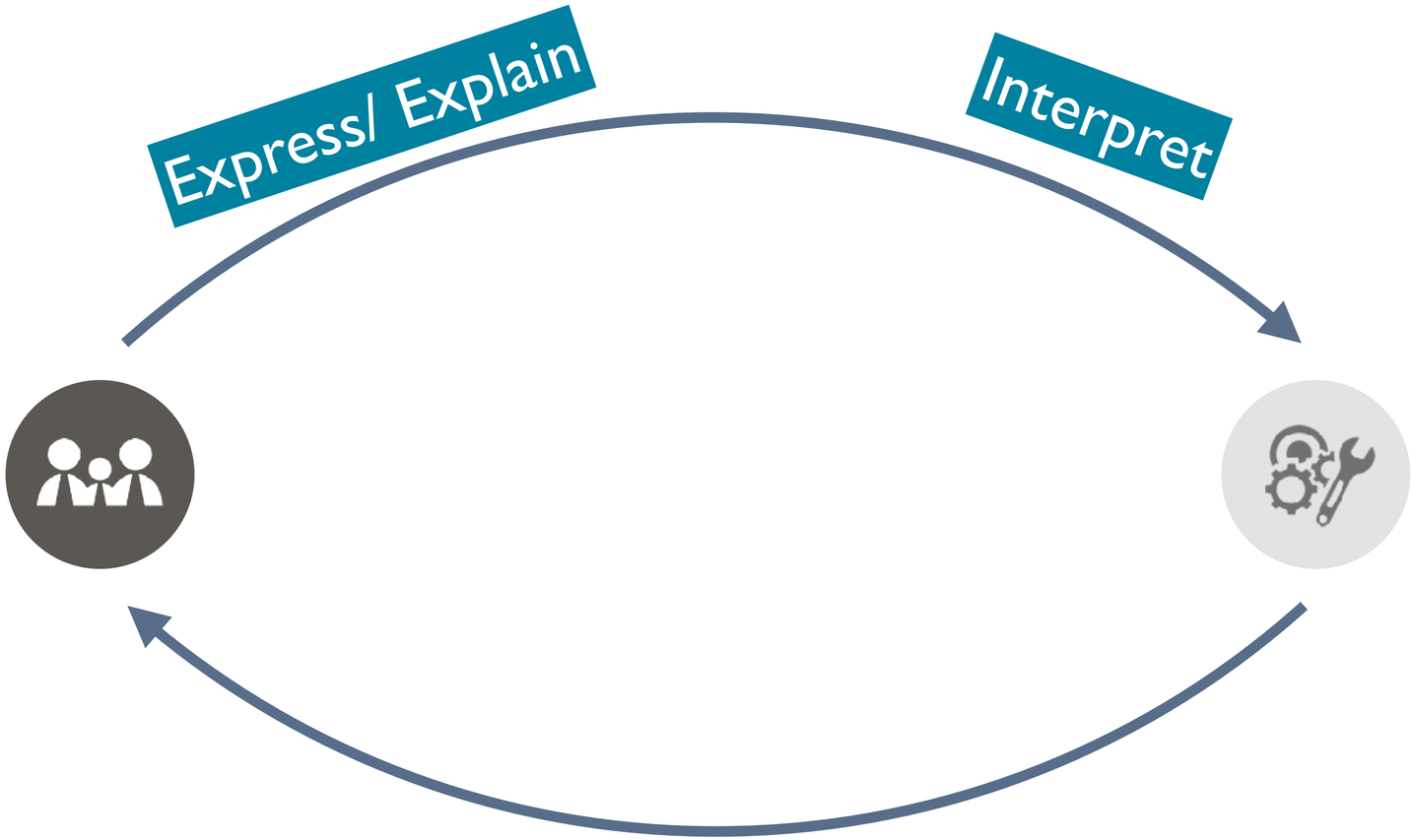
EXAMPLES OF HUMAN-AI INTERACTIONS

DirectGPT (ChatGPT)



COLLABORATION

HUMAN-AI INTERACTION



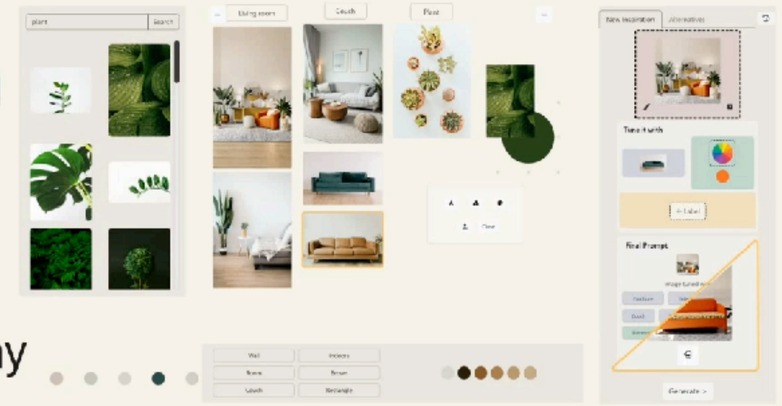
EXAMPLES OF HUMAN-AI INTERACTIONS

DesignPrompt (Dall·E)

ACM DIS 24’

1st-5th July 2024

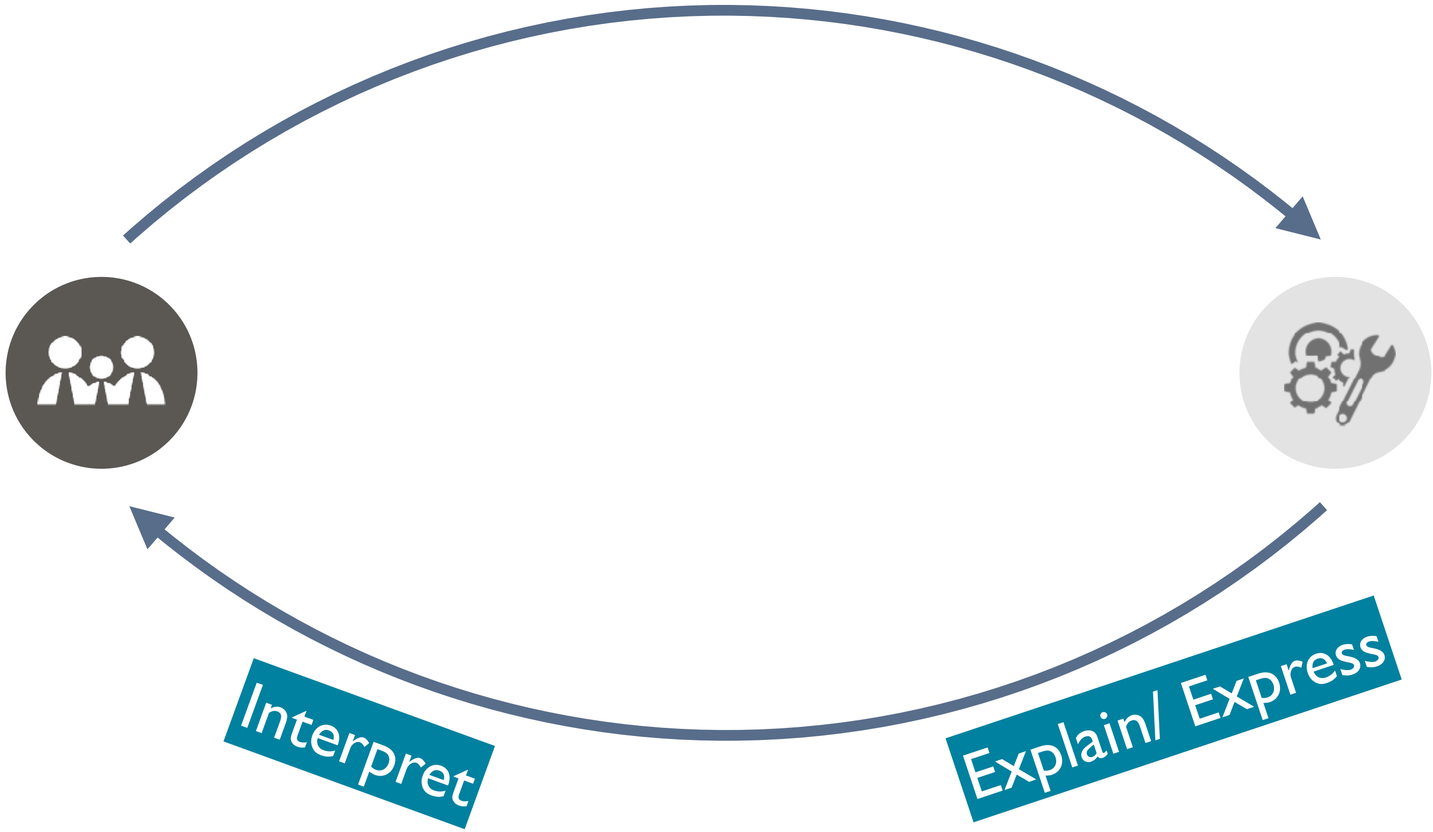
DesignPrompt:
Using Multimodal Interaction for Design Exploration with Generative AI



Xiaohan Peng, Janin Koch, Wendy E. Mackay
Université Paris-Saclay, CNRS, Inria, France

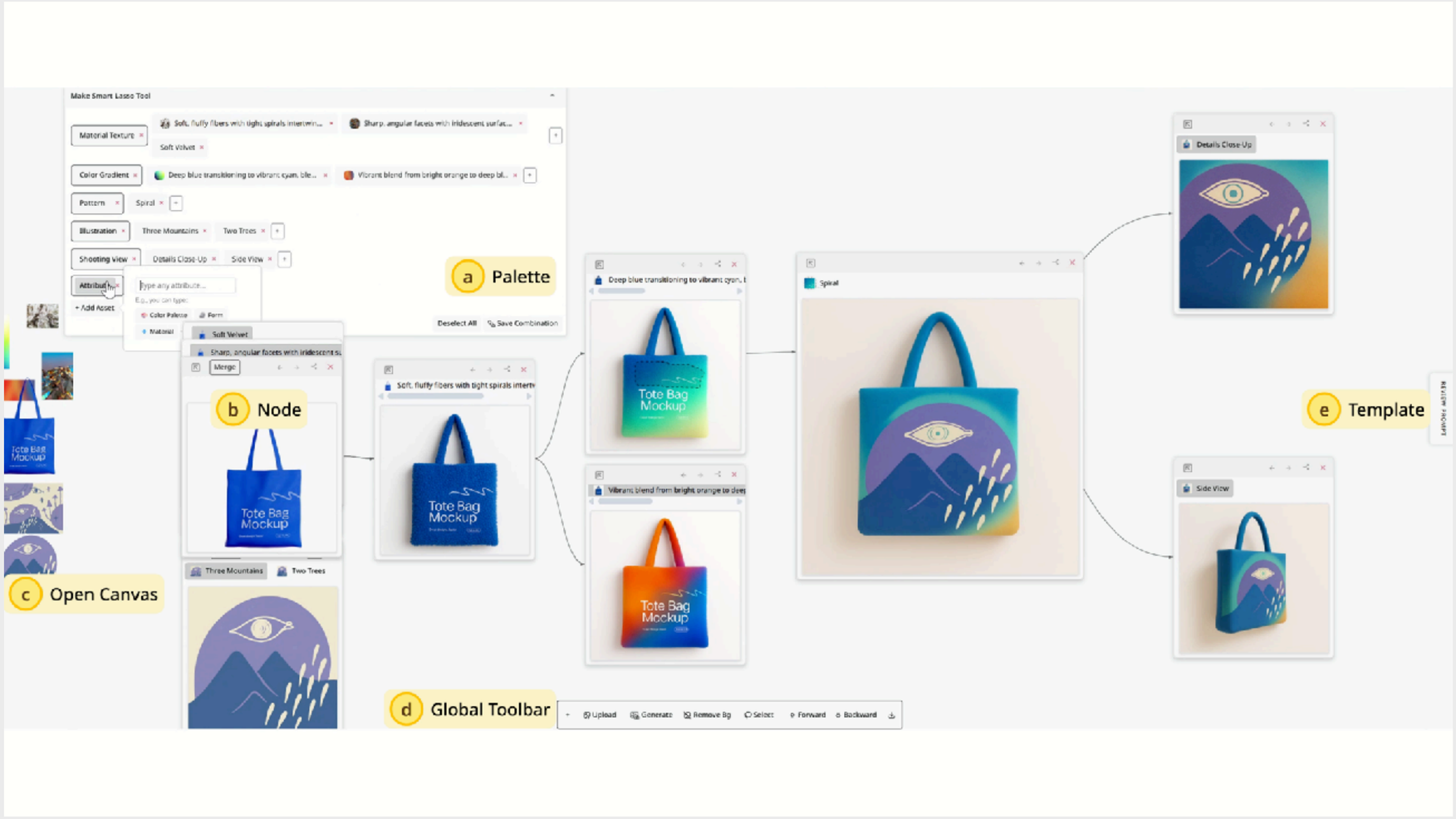
COLLABORATION

HUMAN-AI INTERACTION



EXAMPLES OF HUMAN-AI INTERACTIONS

..... (DallE, ChatGPT)



EXAMPLES OF HUMAN-AI INTERACTIONS

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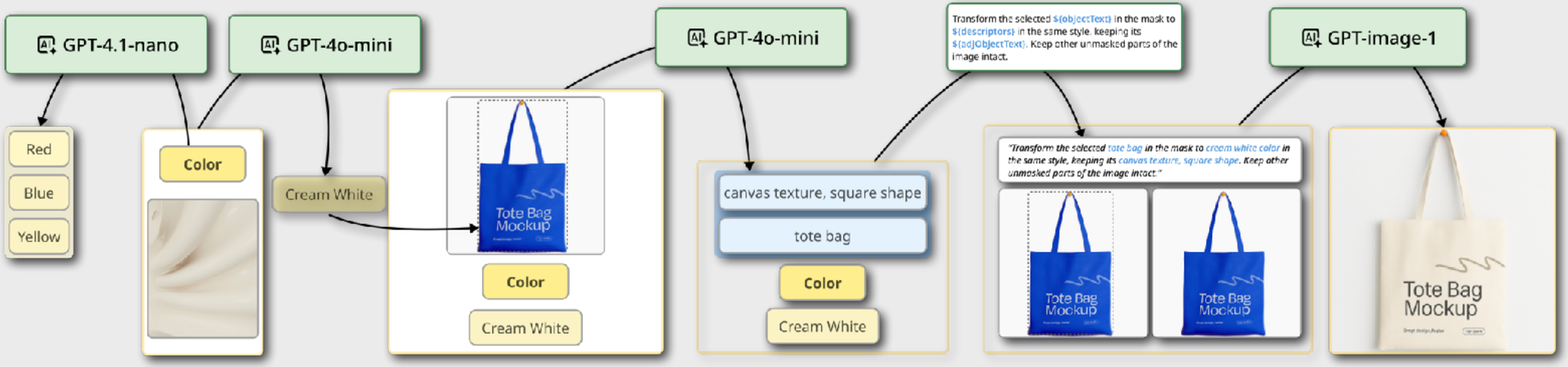
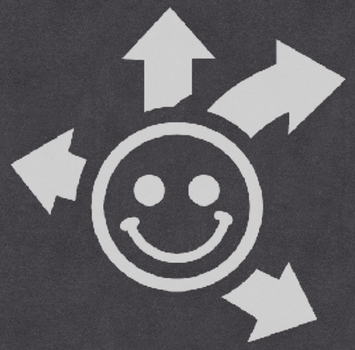




GROUPS...

COURSE PROJECT

Create an original design to support Human-AI interaction

Choose a creative task among you:

- Draw/ Sketch furniture
- Design a dress
- Write an advertisement
- Make a short movie
- Illustrate a children's book
- ….

Select existing AI system that allows (parts of) it

- Discuss systems you know
- See the course website for ideas
- Google is your friend…

Describe your target group:

- 2 Personas
- 2 extreme Characters

HOMEWORK

INTERVIEWS AND METHOD QUIZ

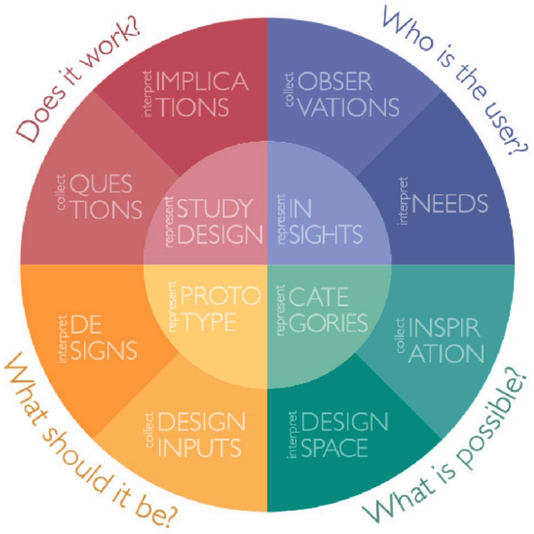
Interviews

- Conduct at least two story interviews with target users
- Transcribe interviews and number each answer
- Describe 3 main issues/needs and add answer number(s)

*Most important exercise in the class!

Technology

- Familiarise yourself with potential the tools
- Understand capabilities & limitations



Method Quiz

- Match specific design activities to locations on the Methods poster

ADVANCED DESIGN OF INTERACTIVE SYSTEMS

08 JANUARY 2026

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