



Non scholae sed vitae discimus

**Wisdom is not the product of schooling
but the lifelong attempt to acquire it.
- Albert Einstein**

A critical Assessment of ChatGPT and AI for Rethinking Learning, Working, and Collaborating in the Digital Age

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Schedule / Overview

Introduction of Participants (Interest, Experience with ChatGPT)

My Background and Interests

Example -1: A Problem where AI should (and could?) help?

What is AI?

ChatGPT: Examples

Conceptual Framework: Distributed Cognition

Example-2: Adaptive versus Adaptable Components

ChatGPT: Promises and Pitfalls

Challenges for the Future

Basic Objective

objective: empower all stakeholders (designers, users, workers, learners, teachers, citizens,) to address these challenges for the digital age

- improve quality of life
- cope with wicked problems
- future of learning, working, and collaboration
- achieve computational fluency (being independent of high-tech scribes)
- make their voices heard in personally meaningful problems (active engagement)
- be more creative

fundamental question: what are the **promises** and **pitfalls** of

Artificial Intelligence (ChatGPT, LLMs)

for making progress towards achieving these objectives?

Grounding my Interests and Activities

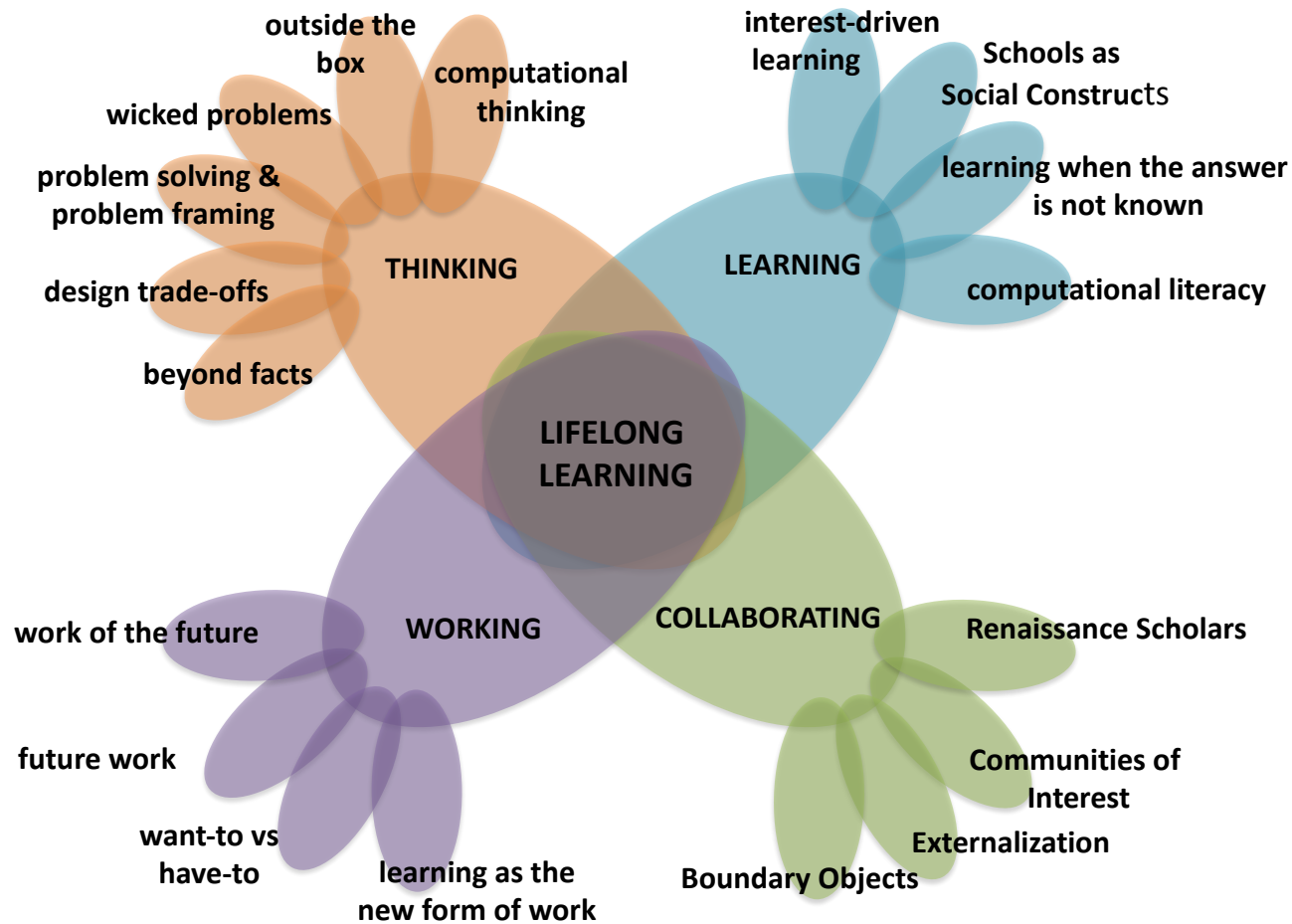
- **The Importance of Problems → Karl Popper:**
 - “Scientific progress does not start with the collection of facts, it starts with problems.”

- **What Kind of Problems → Wicked Problems**
 - complex, multifaceted issues with no boundaries
 - attempted solutions lead to new issues and/or unintended consequences.
 - are crucial for our world because they often relate to significant societal challenges

- **Our Focus and Methodology → engaging in *basic* research on *real* problems**
 - transcending the limitations of “traditional basic research” focused on “ivory tower problems”
 - transcending the limitations of “applied research” where solutions must be reached within fixed time limits

- **Objective of the Tutorial:**
 - engage all participants of the tutorial: → to explore, understand, and successfully exploit the promises and avoid the pitfalls of ChatGPT (LLM, AI)

Thinking, Learning, Working, and Collaborating in the Digital Age



Themes: Not Discussed and Discussed in this Tutorial

Dominance of large organizations
versus university research groups
(Foundation Models)

Copyright Issues — New York Times sued OpenAI
for getting rich using its web content for ChatGPT

Energy consumption: foundation model
require enormous amounts of computation
→ significant carbon footprint

ChatGPT (LLMs / AI)

AI: past, present
and future

Implications for learning,
working and collaborating

Replace: AI versus Humans (Strong AI)

↔

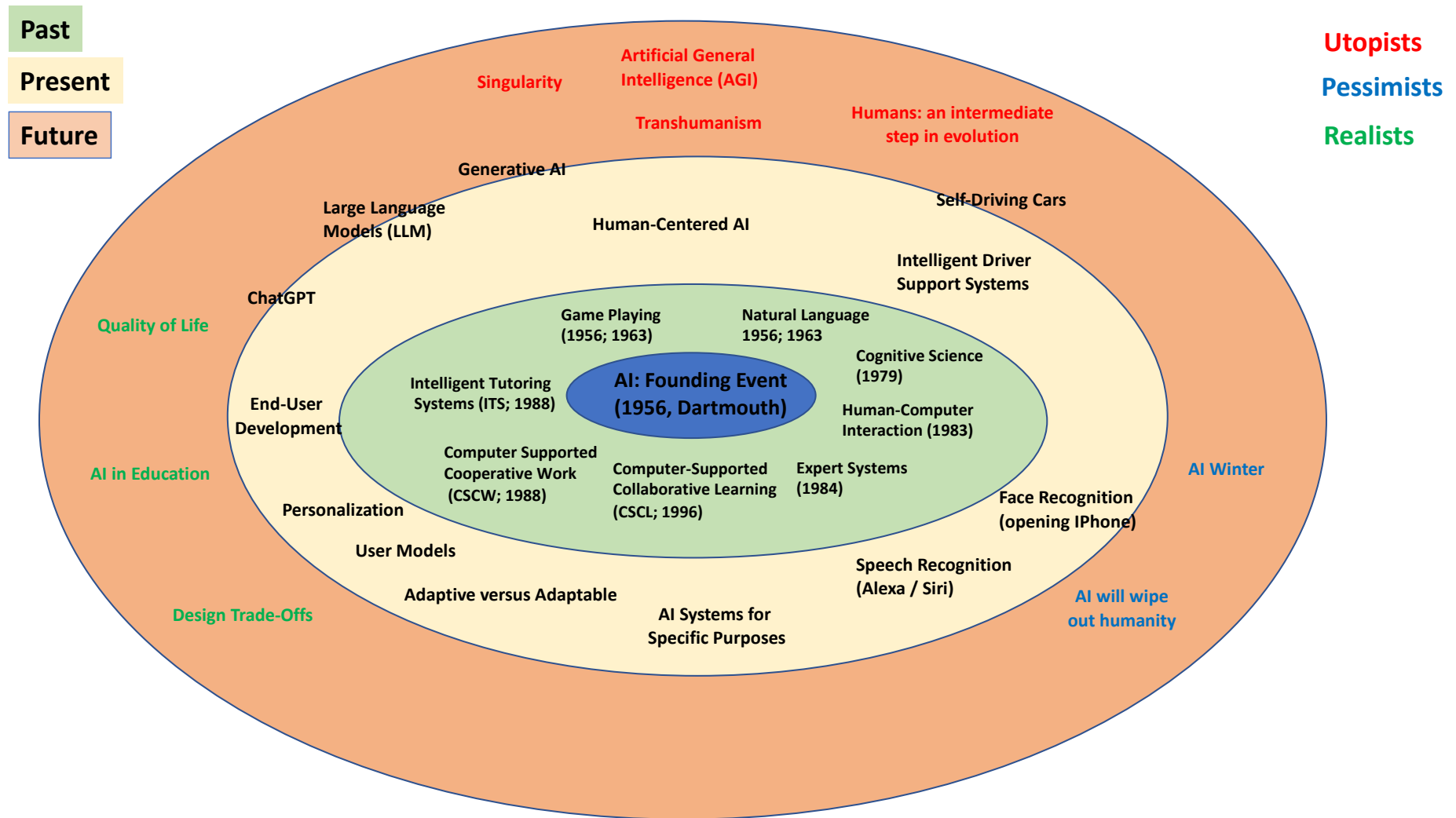
Empower: AI and Humans (Intelligence Augmentation)

Technology → Different Use
→ Cultural Transformation

AI: The Theme of the Year / Decade — My View

- there is **no generally accepted definition for AI** and there is no defined boundary to separate “AI systems” from “non-AI systems”.
- AI is credited with **miraculous abilities** to solve all problems and exploit all opportunities of the digital age — it is currently being considered world-wide as a “deus ex machina” and promoted by numerous people (including: politicians, industrialists, academics,) who did not even know what AI was five years ago
- **AI is at least 50 years old**
 - Dartmouth workshop (1956): credited to be the founding event of AI as a field
 - First Book — Feigenbaum, E. A. & Feldman, J. (1963) *Computers and Thought*
- AI in its history had its ups and downs — e.g.: the hype around expert systems (1984-1990) led to an **AI-Winter** (1995-2005)

AI: Past — Present — Future



Utopists' Vision of AI

- present an optimistic view of AI, focusing on its potential benefits while downplaying potential risks and challenges
- their visions are radical and far-reaching, proposing a complete transformation of current societal structures grounded in the assumption that AI systems will be more intelligent than humans
- some of their beliefs:
 - what will become of humans? It seems clear that human beings will not play a major role in the long term because people will no longer be the main decision-makers.
 - we have to understand ourselves as an "intermediate step" in evolution
 - "super-clever machines" will be particularly interested in other super-clever machines and not so much in humans.
 - in the long run, the "super-clever machines" will be primarily interested in the "incredible resources out there in space" rather than on our limited planet (robots are better suited to exist in outer space than humans)
- some of their concepts:
 - transhumanism
 - singularity

Pessimists' Views on AI

▪ **claims:**

- AI has failed
- the objectives of Artificial General Intelligence (AGI) are dangerous for the future of the human race
- AGI could result in human extinction

▪ **arguments:**

- Job Displacement: automation will lead to widespread job loss resulting in economic instability and increased inequality.
- Erosion of human autonomy and decision-making: as AI systems make more decisions, human choice and free will could be undermined, leading to a loss of autonomy
- Privacy Erosion: Enhanced surveillance capabilities of AI could lead to a significant erosion of privacy
- Bias and Discrimination: biases present in their training data leading to unfair and discriminatory outcomes in critical areas like hiring, law enforcement, and lending.
- Spread Disinformation with AI Deepfakes
- AI Misuse: the development of lethal autonomous weapons
- Societal Dependence: Over-reliance on AI could lead to a deterioration of human skills and deprive humans of essential learning opportunities

Realists' Views on AI

- **assert**

- on one hand there is substantial progress in pursuing and incorporating AI approaches addressing fundamental societal problems
- on the other hand there are just as many unsolved problems for which human intelligence will be far superior to artificial ones for decades to come

- **efforts:**

- focus not on AGI but on the improvement of super-tools in the AISP domains
- use human-centered AI (HCAI; e.g.: Ben Shneiderman (book; 123 Notes on HCAI)) for creating supportive socio-technical environments
- shift our view of progress, putting the emphasis on social and personal flourishing rather than technological enhancements

my objective:

I want to be a Realists and look at “realistic problems”, develop arguments, frameworks, and inspirational prototypes to provide evidence that this is the best way to proceed

Google I/O Keynote sessions

2023: <https://io.google/2023/program/396cd2d5-9fe1-4725-a3dc-c01bb2e2f38a/>

2024: <https://www.youtube.com/watch?v=XEzRZ35urlk>

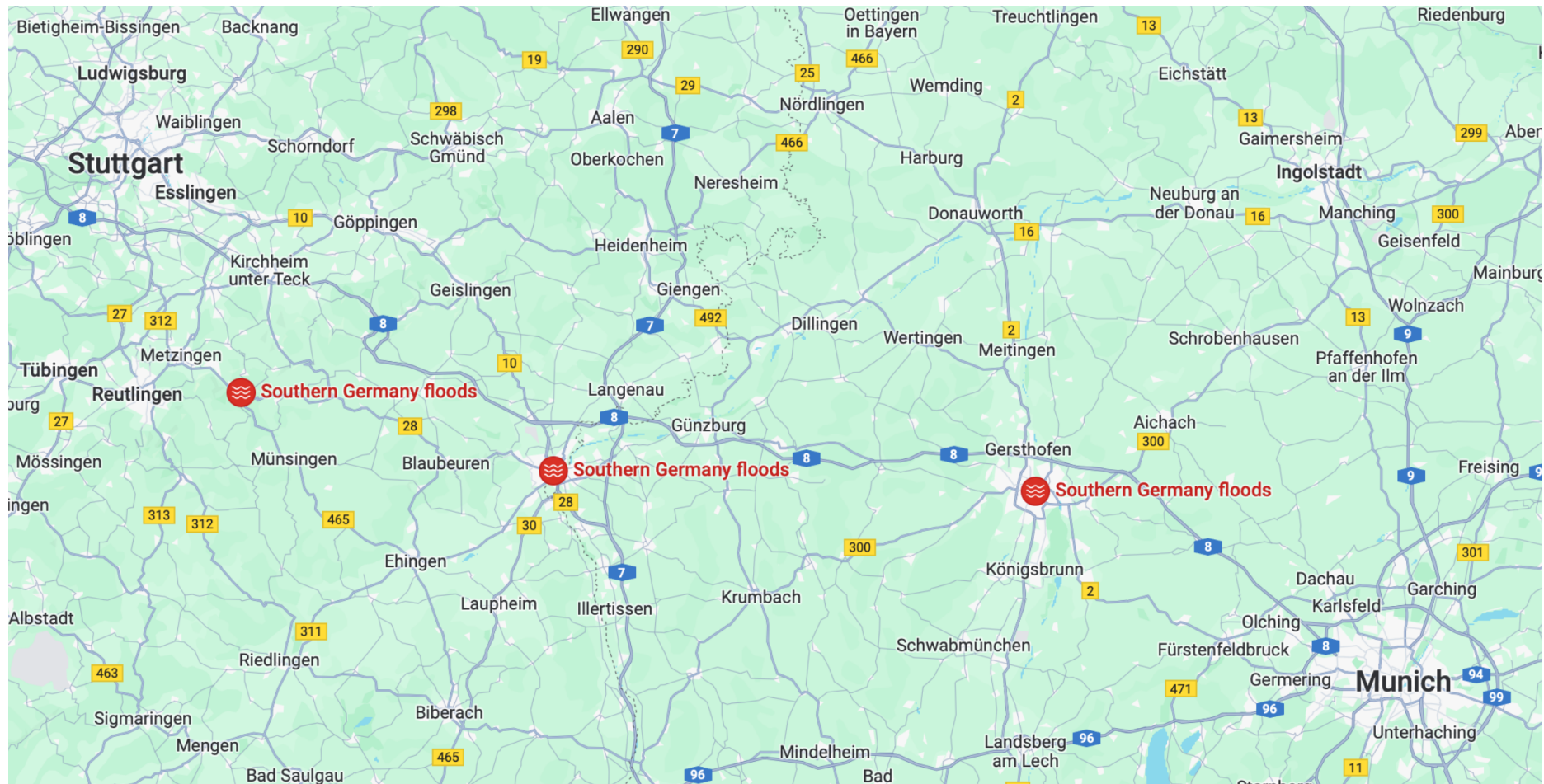
- **Themes:**

- Making AI Helpful for Everyone
- Boosting creativity and productivity

- **different focus:**

- Google: embedding AI features in applications → **empowering** human beings
- OpenAI: approach to featuring ChatGPT as a standalone agent-like partner → **replacing** human beings

Example — Why do I want to be a Realist: My Problems coming to AVI'2024



The Events (Planning and Situated Action)

▪ Planning three Weeks Ago

- go by train from Kuchen to the airport in Munich → bought a “Super-Saving Train Ticket”
- One week before — Message from Deutsche Bahn:
 - Due to a timetable change, your journey from Ulm Hbf to München Flughafen Terminal on 02 June 2024 cannot be carried out as described. Click "Get current information here" for alternative journey options to your destination.
 - The requirement for you to travel on a specific train on your booked connection has been lifted. This means you can also use your ticket on other Deutsche Bahn long-distance trains (e.g. ICE/IC/EC), as well as local trains and S-Bahn trains.
- Saturday (June 1): I chose another train with a tight connection (problematic: could mean I would not be at AVI in time for the tutorial) — there is only one flight from Munich to Genoa (Alternative: flying Munich → Milan: more flights)

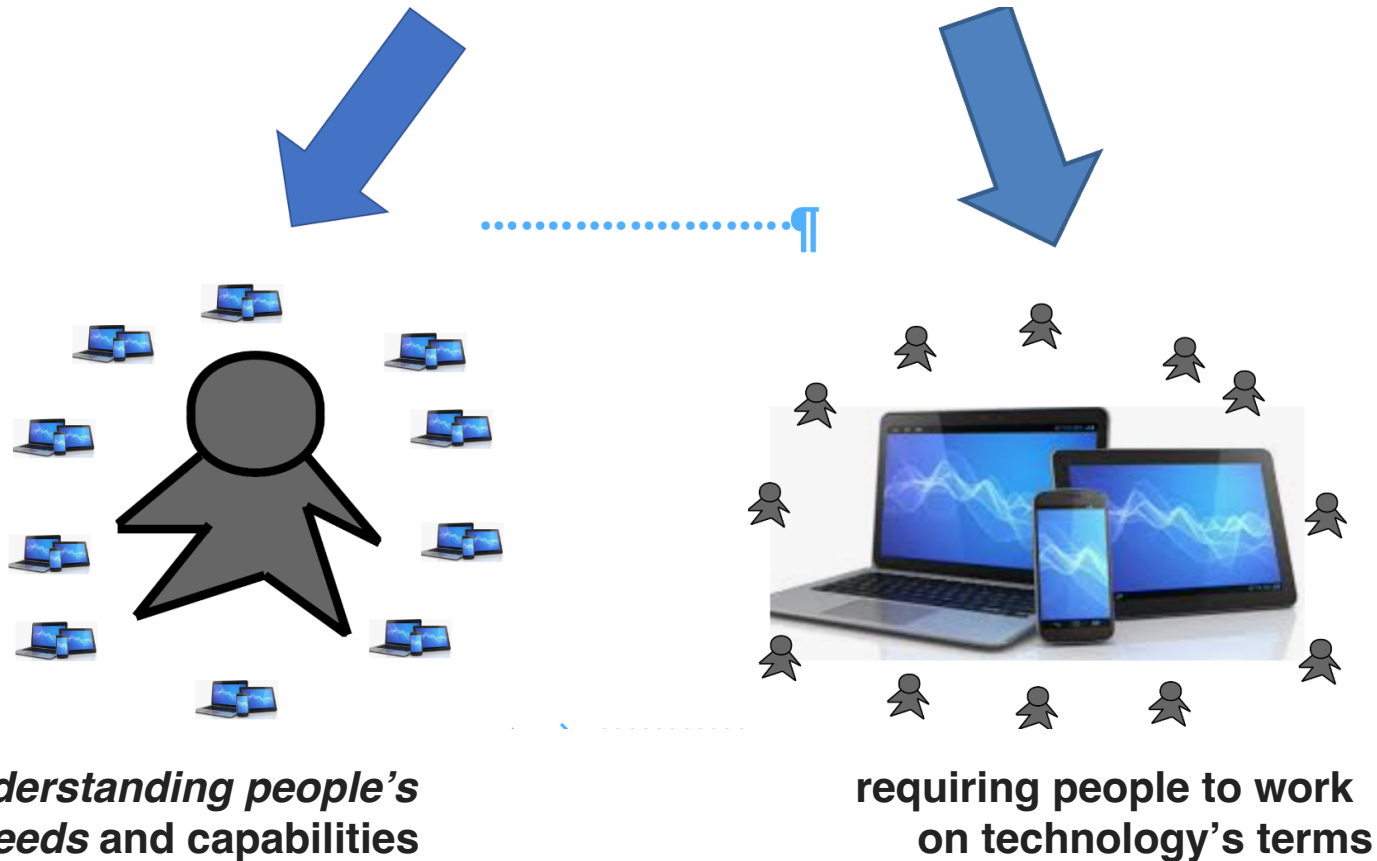
▪ Situated Action:

- Saturday at noon: flooding problem increased → decided to go by train to Munich Main train station and booked a hotel room next to the station
- Saturday at 3:00pm: train traffic between Kuchen and Munich was interrupted (stopped)
- Saturday at 5:00: decided to take a train to Stuttgart Airport for a flight at 20:45 to Munich Airport
- Saturday at 11:00pm: took a train from Munich Airport to my hotel near the Munich Main train station
- travel on Sunday: Munich Train Station → Munich Airport → Genoa Airport → Train to the Hotel (the last part was not trivial)



“AI for Humans” or “Humans for AI”

<<CoPDA Workshop 2022, AVI Rome>>



Advertisement: CoPDA Workshop AVI'2024: “Differentiating and Deepening the Concept of “End User” in the Digital Age” —Tuesday

AI **versus** Humans \leftrightarrow AI **and** Humans

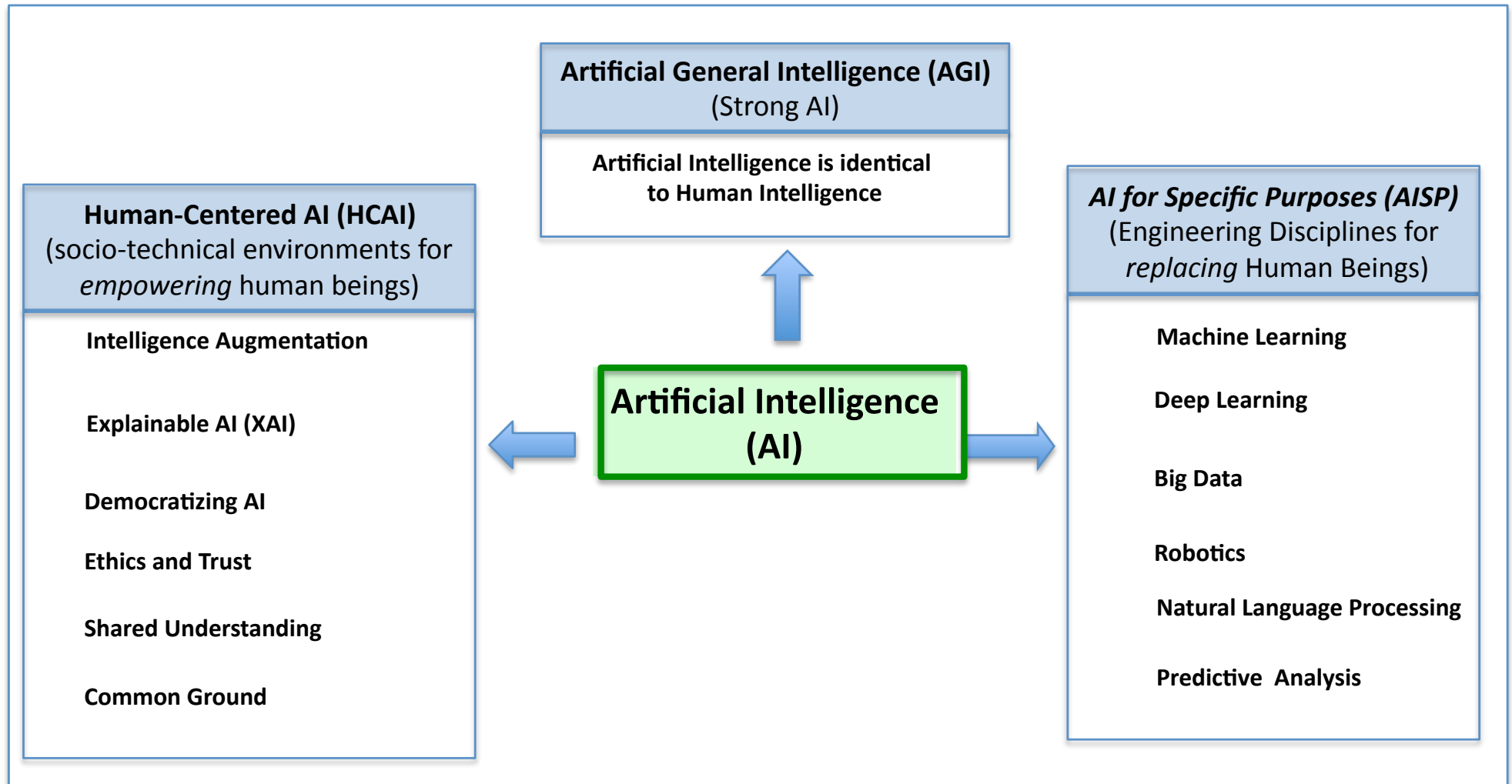
▪ AI **versus** Humans

- separation \rightarrow the two components (agents) act independently
 - Unaided = Humans do it all
 - Automation = computers do it all
- automate whatever can be automated, leaving the rest to people — the machine is the first class citizen whereas people are the second-class participants, asked to pick up the remnants when the first class fails

▪ AI **and** Humans

- **distributed cognition** = the two components/agents act jointly
- design efforts for exploring a **synthesis** of humans and AI by integrating their strengths and reducing their weaknesses as identified by a design trade-off analysis
- humans and computers are different therefore focusing on **complementing** rather than emulating and replacing human capabilities by computers
-

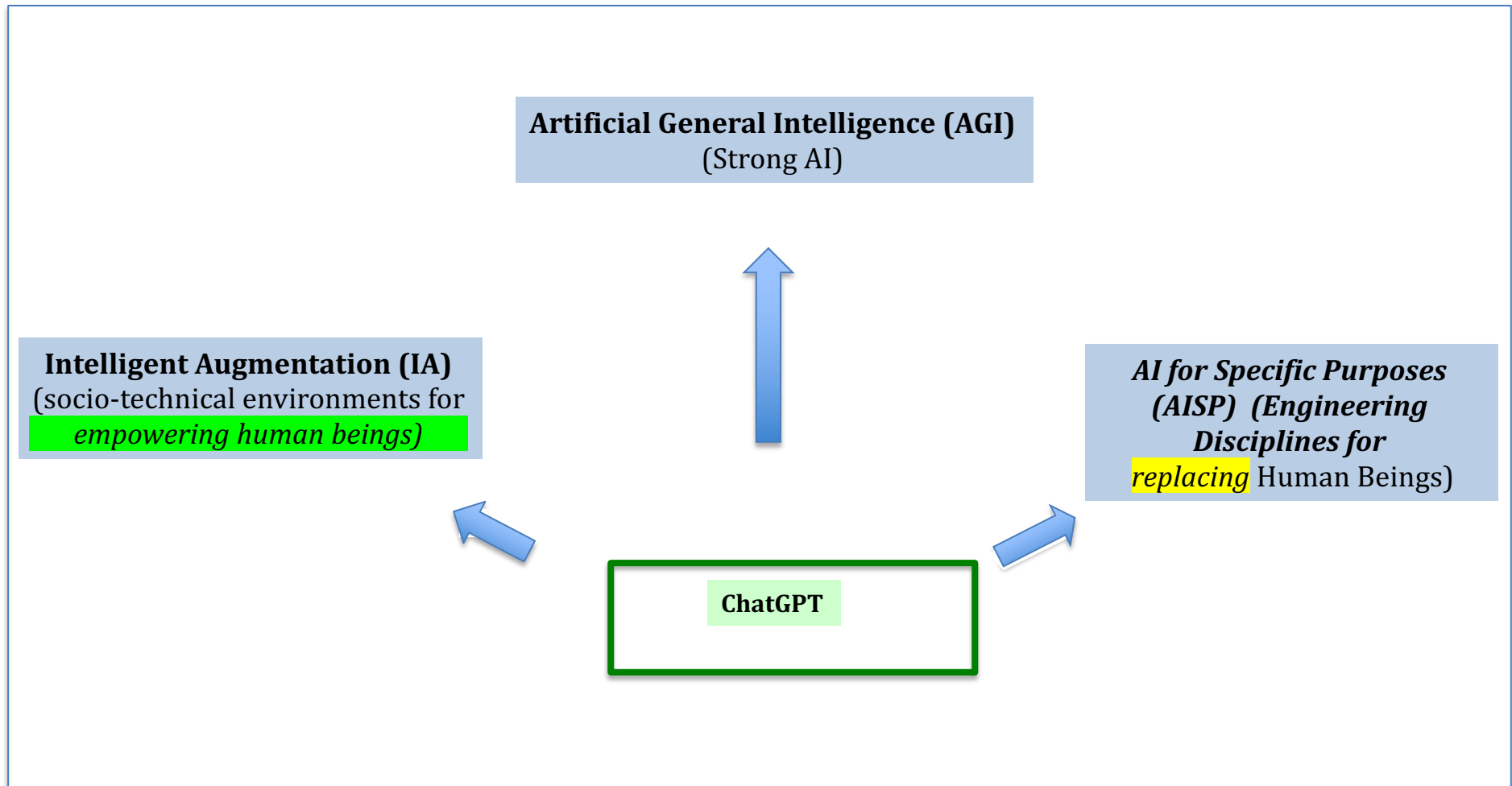
Differentiating AI Approaches



ChatGPT

- **ChatGPT** (Chat Generative Pre-trained Transformer; <https://en.wikipedia.org/wiki/ChatGPT>)
 - credited with miraculous abilities to create unique and far-reaching new opportunities for natural language understanding, question answering, content creation, and education
 - developed by OpenAI and launched in November 2022 — it has generated worldwide attention and the initial assessments combine *praise and fundamental criticisms*
- **in its own words**
 - ChatGPT has the potential to revolutionize education in the digital age, but it should be used with awareness of its limitations and pitfalls. It should be considered as a complementary tool to traditional teaching methods, rather than a replacement for human teachers.

ChatGPT — What Kind of AI??



LLMs (Generative AI) beyond ChatGPT

- **CoPilot (Micosrsoft)**

- use: focus of software development — suggests code and functions in real-time as the developer writes → enhances productivity
- How is Copilot different from ChatGPT?
 - Copilot leverages AI to suggest code snippets and solve programming problems.
- disadvantages of Copilot?
 - risks users becoming overly dependent on the tool,
 - decreases critical thinking and problem-solving skills

- **Gemini (Google)**

- a family of multimodal large language models developed by Google DeepMind
- the successor to LaMDA and PaLM 2. Comprising Gemini Ultra, Gemini Pro, and Gemini Nan
- announced on December 6, 2023, positioned as a competitor to OpenAI's GPT-4.

- **OpenAI:**

GPT-4o New

Our fastest and most affordable
flagship model

GPT-4 Turbo

Our previous high-intelligence
model

GPT-3.5 Turbo

Our fast, inexpensive model for
simple tasks

Multimodal: Text → Images

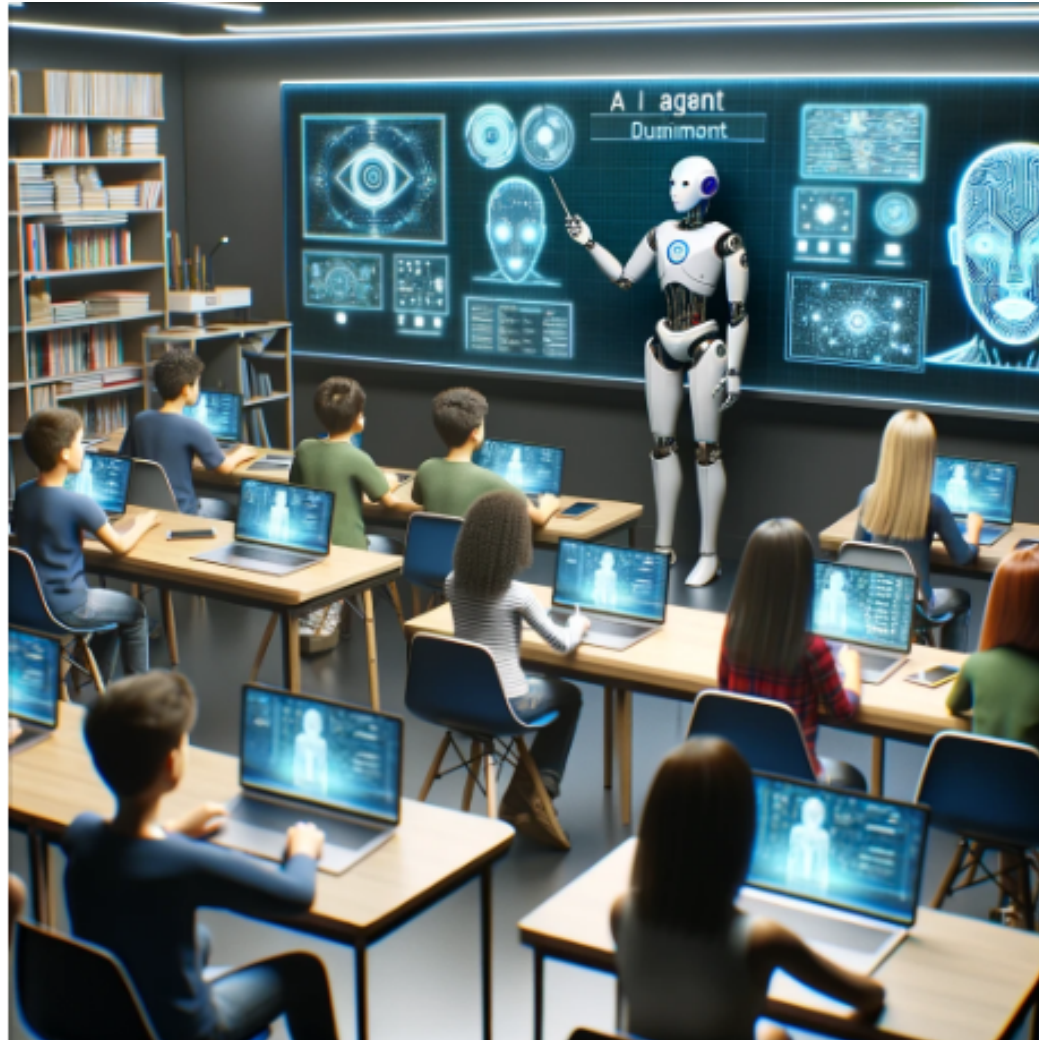
- ChatGPT — “create an image of a skier in powder snow”



- ChatGPT — show an intersection where U-Turns are not permitted



- ChatGPT —illustrate a learning environment in which the teacher is an AI agent



- ChatGPT — show an image that best illustrates the concept of AGI



Utopists, Pessimists, and Realists View of ChatGPT

	Utopists	Pessimists	Realists
Learning and education	<ul style="list-style-type: none"> ▪ revolutionize education ▪ replacement of teachers (a personal tutor available at all times) 	<ul style="list-style-type: none"> ▪ overreliance and loss of critical thinking and problem-solving skills by the learners ▪ responses by the tool based on statistical likelihoods rather than understanding 	<ul style="list-style-type: none"> ▪ augmenting learning by supporting distributed cognition ▪ a powerful tool for exploration, clarification, and practice
Work	<ul style="list-style-type: none"> ▪ enhance productivity ▪ eliminate boring work 	<ul style="list-style-type: none"> ▪ economic disruption and job losses 	<ul style="list-style-type: none"> ▪ personal speech writer
Quality of life	<ul style="list-style-type: none"> ▪ humans can master challenges without substantial efforts 	<ul style="list-style-type: none"> ▪ spread of misinformation 	<ul style="list-style-type: none"> ▪ promote critical thinking and creativity ▪ utility is determined by use

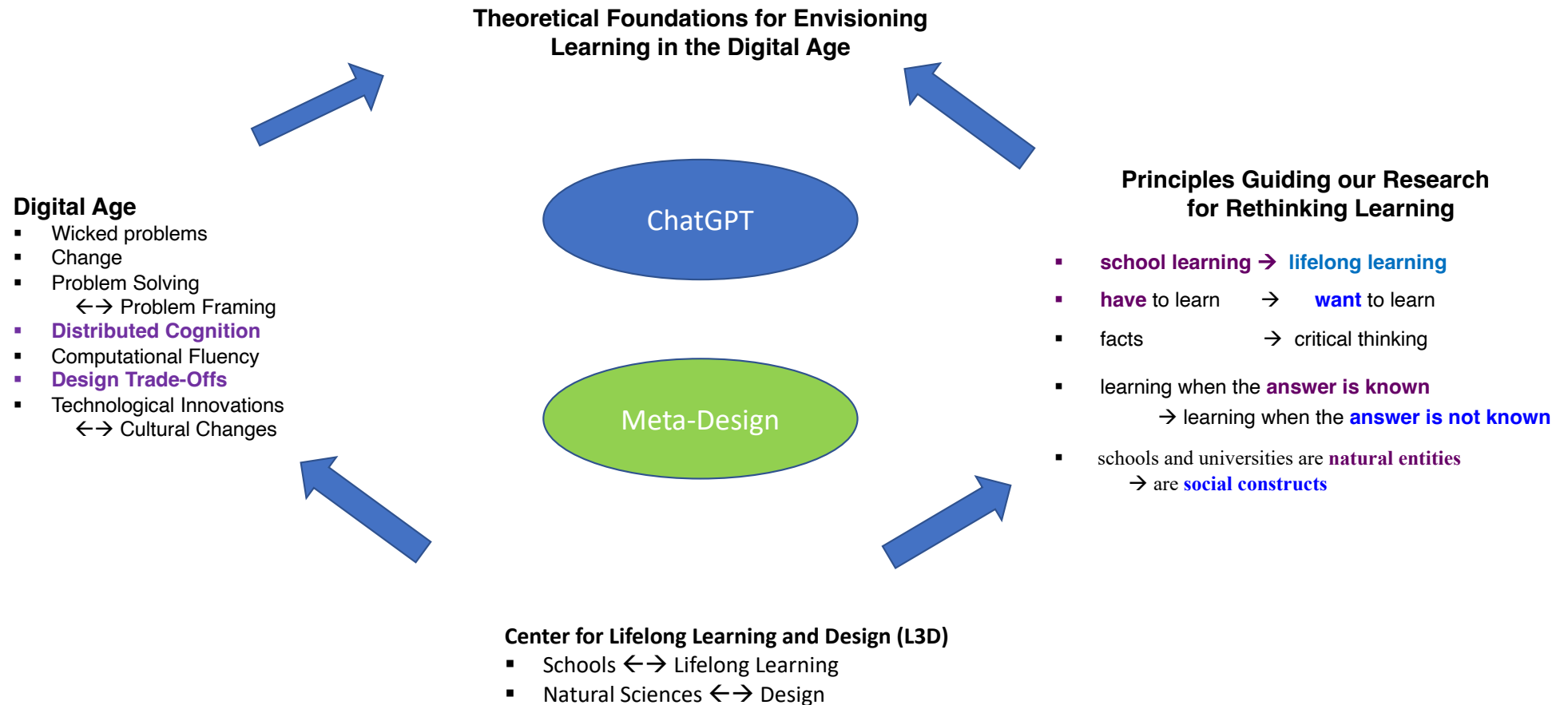
Exploring the Implications of ChatGPT for Learning, Teaching, and Education

- Will ChatGPT enhance or replace the necessity for writing essays?
- Where to draw the line between ChatGPT being used as an assistant for writing (the EUD approach) versus letting it take over the whole process (the AI approach)?
- Will its availability contribute to making the “flipped classroom” a more attainable reality because it makes relevant information readily available?
- Should teachers and learners become informed about the promises and pitfalls of ChatGPT and develop new and different skills?
- Which (current and future) mechanisms are required to turn ChatGPT from a black box into a glass box thereby empowering learners to scrutinize the answers provided?

Research Challenges for the “AI and Humans” (Empowering) Framework

- **overreliance:** despite all the technological support for humans in a distributed cognition framework, which capabilities do humans need to learn to avoid overreliance on external tools?
- **deskilling:** will humans lose important capabilities by using hand-held calculators, spelling correctors, navigation system, automated translation systems,?
- **extensive learning demands associated with powerful and complex tools:** will AI technologies require reasonable learning efforts for humans to understand the possibilities and the limitations of these tools?
- **mutual understanding between computational systems and humans** (e.g.: explainable AI)
- **quality of life:** will “AI and Humans” approaches provide us with a deeper understanding, more creative behavior, more time, less stress, more control,?

The Different Components of our Framework



<In Halmstad-2023>

Distributed Cognition

Einstein: “"My pencil and I are smarter than I am."
”

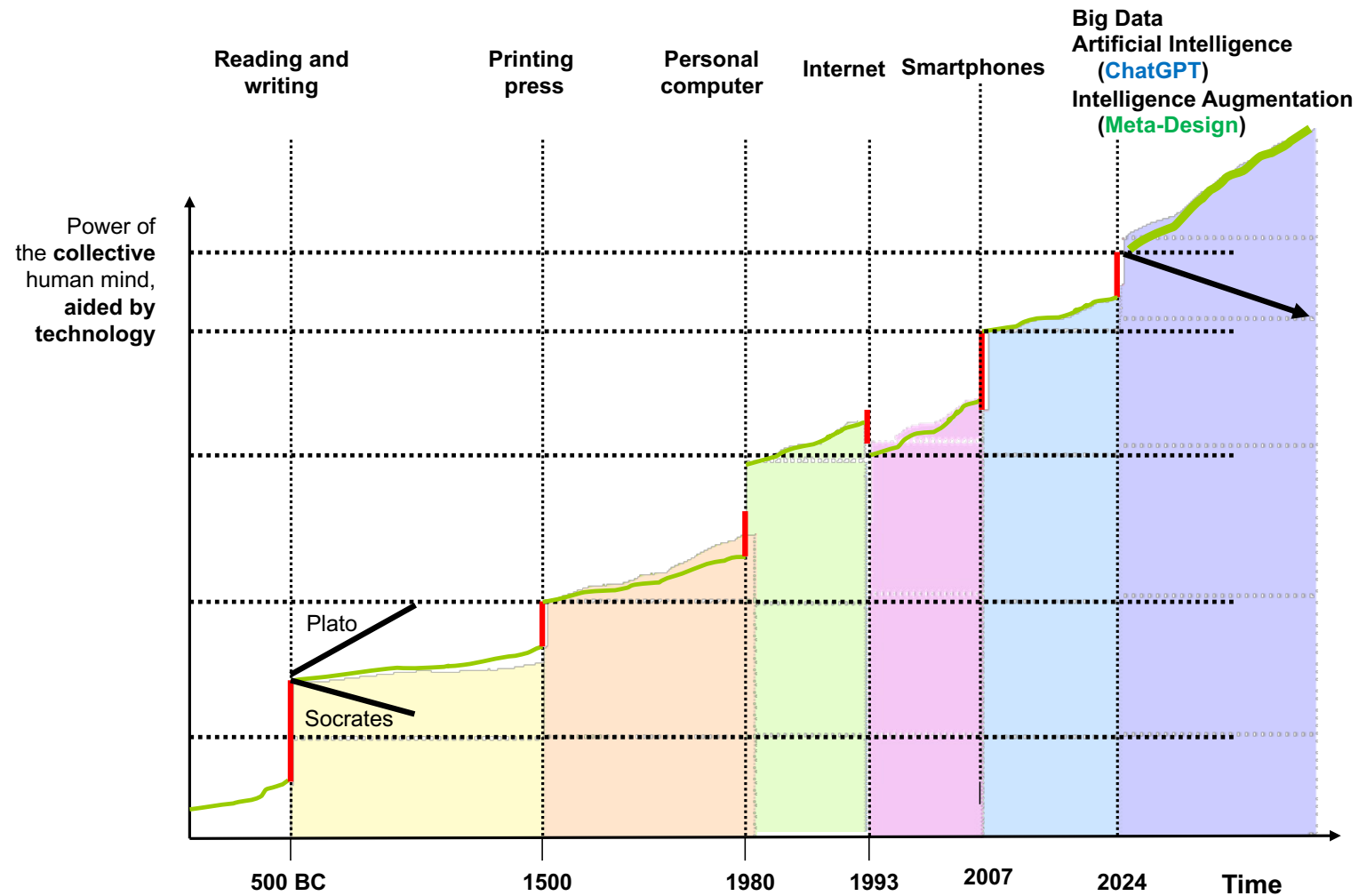
- **claim:** distributed cognition

- **combines** “knowledge in the head” with “knowledge in the world” → **transcends** the traditional view that human cognition exists solely ‘inside’ a person’s head
- provides an effective **theoretical framework** for technology for improving cognitive function
- provides guidelines how artifacts, tools, and **socio-technical environments** can change tasks and empower human beings

- **forms of distribution:**

- **human** ↔ **human**: across groups, teams, social networks, communities
- **human** ↔ **artifacts**: between **internal** (memory, attention, executive function) and **external** (artifacts, tools) structures and resources

Transformative Technologies and Cultural Changes for Transcending the Unaided, Individual Human Mind



Socrates and Plato

—

Envisioning the Transition from Oral to Literate Societies

- **Socrates (Greek philosopher; c. 470–399 BC) — Against Writing**
 - Belief: knowledge could only be obtained through dialogue and active engagement with others
 - Pitfalls: writing would lead to a weakening of the human mind; writing = a passive medium that cannot defend itself or explain itself

- **Plato (student of Socrates; c. 424 – 348 BC) — for Writing**
 - Gain: writing = a powerful tool for preserving knowledge and transmitting it to future generations
 - Pitfall: written texts = easily misinterpreted or distorted → the need for responsible interpretation and critical thinking

Human Abilities Lost / Replaced by Technology

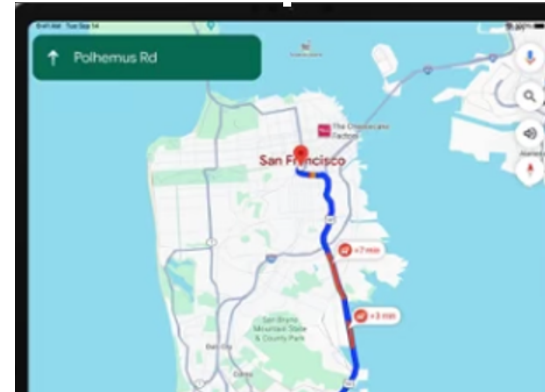
police person (directing traffics) → traffic lights



cutting grass with a scythe → Landmore



Maps in an Atlas (for wayfinding) → Google Maps



Library → Internet



Learning on Demand (with ChatGPT) Not the Optimal Approach in all Situations?





"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

Technology → Different Use Situations

Example: Hand-Held Calculators — How they should be used in Math Education

- **position 1:** ignore the existence of the gadget; we are not interested in technology, but in important mathematical skills — do ***not use*** hand-held calculators in schools
- **position 2:** keep the curriculum the same, make children learn arithmetic, multiplication tables, long division, drawing square root by hands — ***after*** they have it all mastered, allow the use of hand-held calculators.
- **position 3:** create new calculators, new curricula, new scaffolding mechanisms that make learning these skills more fun and create a deeper understanding of underlying concepts — using these hand-held calculators, the learners would acquire the skills and the knowledge and eventually become ***independent*** of the gadget (“scaffolding with fading”, “tools for learning”)
- **position 4:** find new ways to ***distribute responsibilities between humans and machines*** such that humans do the qualitative reasoning, use estimation skills, relate the mathematical result to the real world and machines do the detailed quantitative computations (“distributed intelligence”, “tools for living”)

ChatGPT – Question: “enumerate the major fundamental cultural changes over the last 3000 years based on the invention of new media — for example the invention of reading and writing changing oral societies to literate societies”

ChatGPT

ChatGPT

Over the last 3000 years, human societies have experienced profound cultural changes, many of which were catalyzed by the invention of new forms of media. These shifts in media technology have not only altered how information is recorded and disseminated but have also reshaped social structures, communication methods, and cognitive processes. Here's an enumeration of major cultural changes based on the invention of new media:

1. Invention of Writing (Circa 3000 BCE):

- **Transition from Oral to Literate Societies:** The development of writing systems marked the shift from purely oral cultures to literate societies. This allowed for the recording of history, laws, and literature, enabling the preservation and transmission of complex ideas and knowledge across time and space.

2. Development of Alphabet (Around 1200 BCE):

- **Standardization and Simplification of Writing:** The creation of alphabetic systems made writing more accessible and widespread. It simplified the process of learning to read and write, democratizing knowledge and communication.

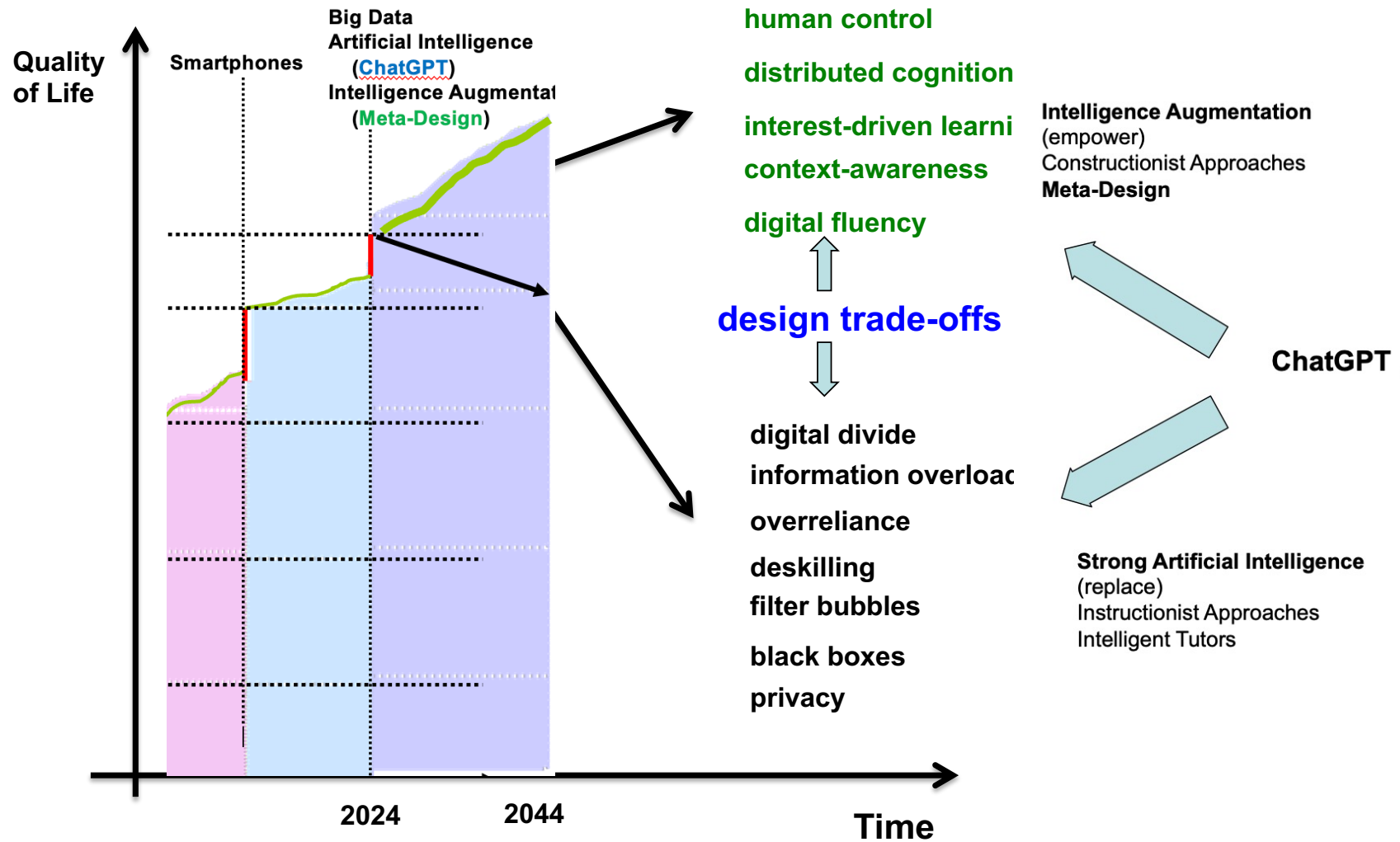
3. Invention of the Printing Press (1440 CE):

- **Mass Production of Texts:** The printing press revolutionized the production and dissemination of written material. It led to increased literacy rates, the spread of scientific knowledge, and the democratization of information.

- **Reformation and Renaissance:** Facilitated the spread of new ideas, contributing to major cultural and religious shifts, like the Protestant Reformation and the Renaissance.
- 4. **Industrial Revolution (18th and 19th Centuries):**
- 5. **Invention of Telegraph and Telephone (19th Century):**
- 6. **Introduction of Radio and Television (20th Century):**
- 7. **Advent of the Internet and Digital Media (Late 20th Century):**
 - **Global Connectivity and Information Access:** The internet revolutionized access to information, enabling instant communication across the globe and the birth of social media.
 - **Cultural Globalization:** The rapid exchange of cultural ideas and values across borders, leading to both homogenization and the proliferation of diverse cultures.
- 8. **Rise of Social Media (21st Century):**
 - **User-Generated Content and Networking:** Social media platforms have changed the way people interact, form communities, and share information, leading to new forms of social interaction and a reshaping of social and political landscapes.

Each of these advancements in media technology has been accompanied by significant changes in societal structures, the distribution of power, and the ways in which individuals think, learn, and interact.

The Future of Distributed Cognition



Example: Adaptive and Adaptable Systems: Differentiating and Integrating AI and EUD

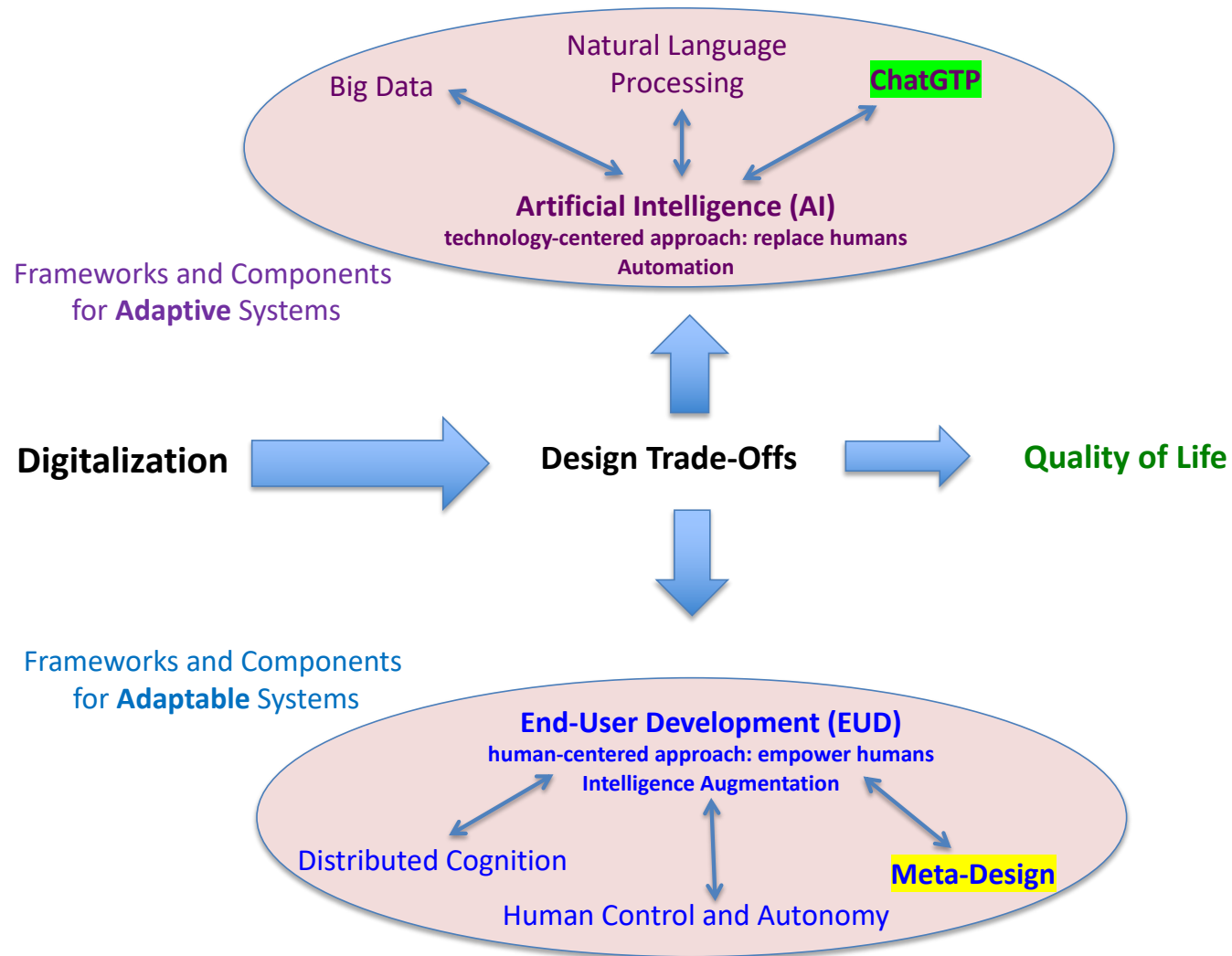
Basic Question

what are the **promises** and **pitfalls** of

- **Artificial Intelligence** (adaptive systems and ChatGPT, based on existing knowledge)
- **End-User Development** (adaptable systems and Meta-Design, based on new additional knowledge)

for making progress towards improving **the quality of life** for all stakeholders in the digital age?

Different Frameworks



AutoCorrect: A Simple Example for Illustration

Typed Text by the User:

This letter is written to **hte** National Science Foundation Agency **EHR**

Revised Text by the AutoCorrect:

This letter is written to **the** National Science Foundation Agency **HER**

These modifications are done ***automatically*** by an AI-based systems relying on

- an extensive dictionary of correct spellings in the English language
- the recognition that “hte” and “EHR” are no English words
- the knowledge that transposition errors are mistakes that people make frequently

Fundamental Limitations of Adaptive Components

<<and AI systems in general>>

- their knowledge of the world is limited
- while the change of “hte” to “the” is welcome → the replacement of “EHR” is inappropriate in this context
- the example documents a real event going unnoticed in a communication with the NSF funding agency “Education and Human Resources (EHR)”

The Interface of AutoCorrect to Support **Adaptations** by Users

Replace:

ehr

With:

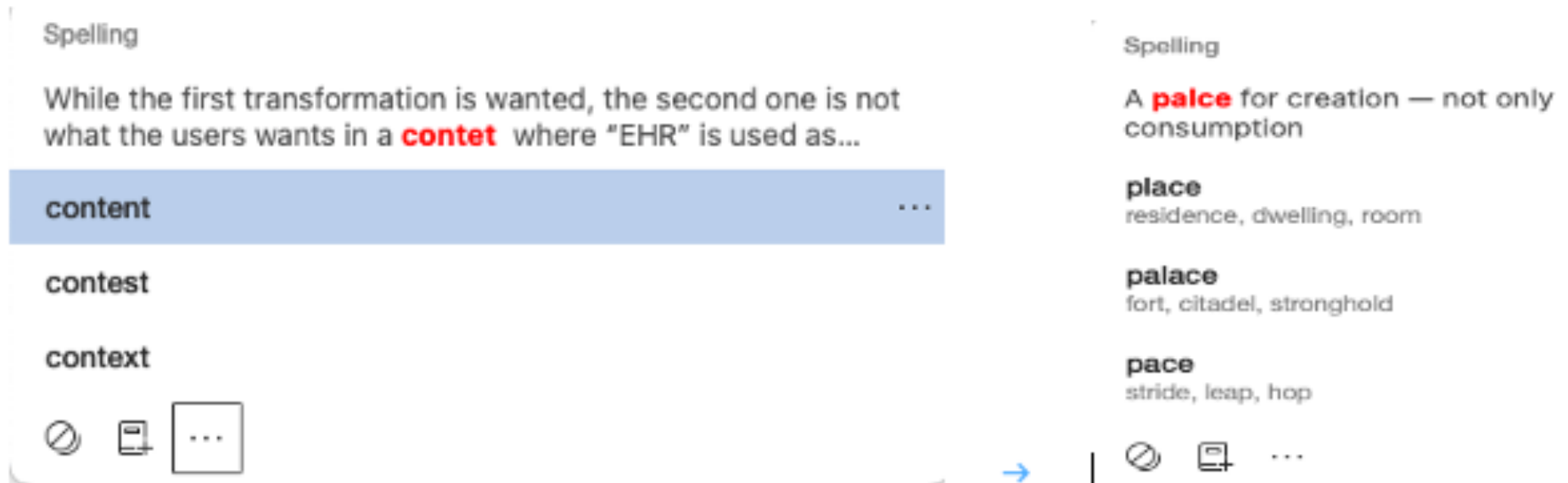
Education and Human Resources

☒ Plain text ☐ Formatted text

effecient	efficient
efort	effort
eforts	efforts
ehr	her
eligable	eligible
embasse	embassy

Replace Delete

Example for a symbiotic relationship between adaptive and adaptable features



Adaptive: a list of suggestions for possible replacements is generated by the system

Adaptable: the users will choose the correct suggestion from the list (in case it is one of the choices)

Benefits and Drawbacks of Adaptive Systems

▪ Benefits

- reducing information overload with personalization
- becoming aware of unknown things with information delivery

Drawbacks:

- personalization leading to a lack of shared experiences and common understanding
- lack of meaningful explanations

Benefits and Drawbacks of **Adaptable** Systems

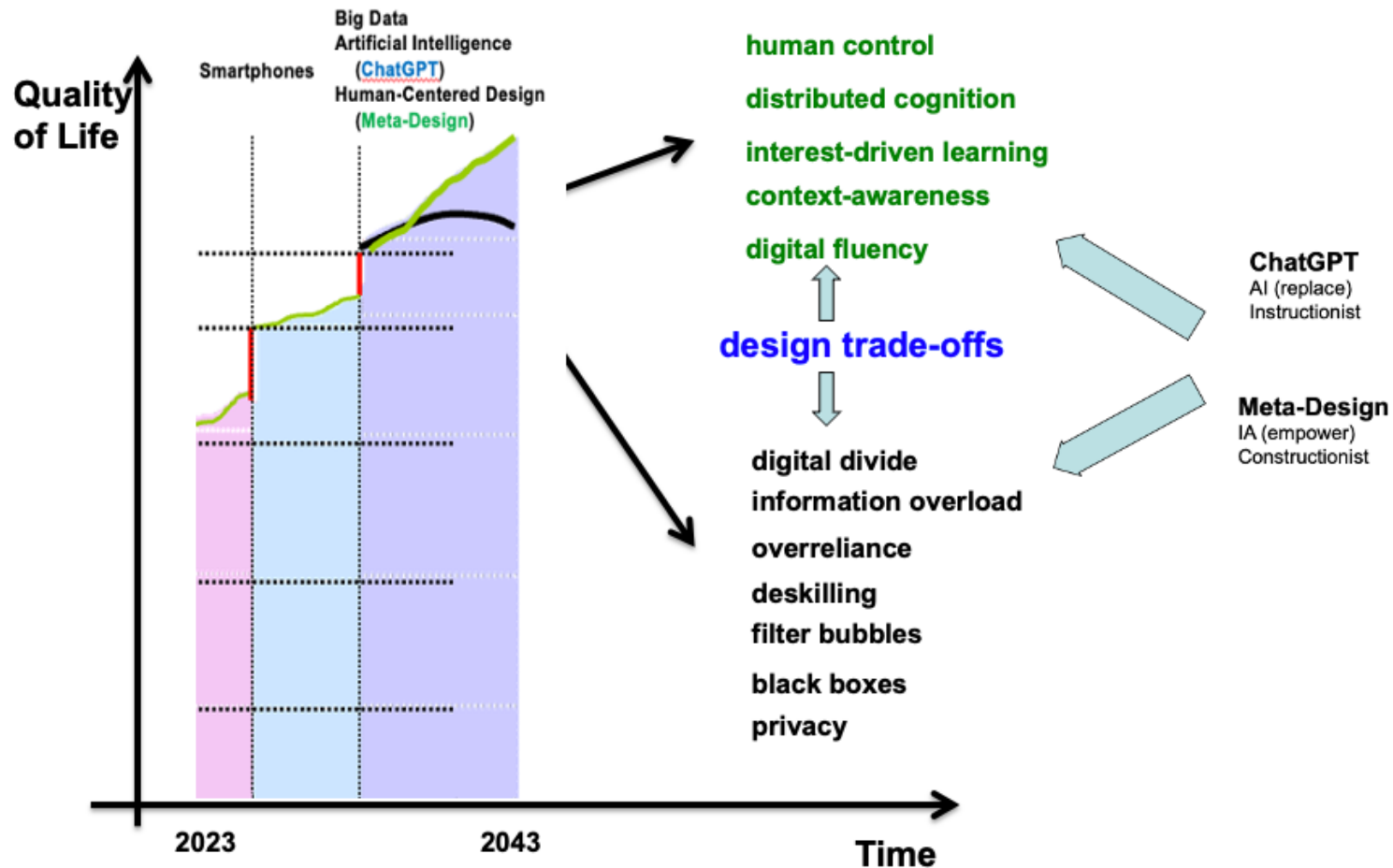
▪ **Benefits**

- creating support environments for adaptable systems with meta-design
- putting the problem owners in charge

▪ **Drawbacks:**

- participation overload
- heterogeneity of end users
- tension between standardization and improvisation. lack of meaningful explanations

Core Interest: Exploring Frameworks for the Future



L3D's Credo of Lifelong Learning

<< founded in 1993 >>

- **assumption:** If the world of working and living relies on *collaboration, creativity, definition and framing of problems* and if it requires dealing with *uncertainty, change, and intelligence that is distributed* across minds, cultures, disciplines, and tools
→ **consequence:** then education should foster on competencies that prepare students for having meaningful and productive lives in such a world

- **research themes of L3D anchoring this credo:**
 - **Cultures of Participation** — migrating from passive consumers to active contributors
 - **Meta-Design** — designing for designers
 - **Collaborative Design** — transcending the individual human mind
 - **Human-AI Collaboration** — transcending the unaided human mind
 - **Learning-on-Demand** — motivating learners to engage in interest-driven activities
 - **Courses-as Seeds** — “flipped classroom”, students as active contributors, peer-to-peer learning

The Envisionment and Discovery Collaboratory (EDC) supporting “Learning When the Answer is not known”



Identifying the Best Possible Mixes with Design Trade-Offs

Every positive value has its price in negative terms ...
the genius of Einstein leads to Hiroshima.
Pablo Picasso

- will ***distributed cognition*** support the unaided human mind or will it lead to an overreliance on external tools thereby suppressing the acquisition of basic knowledge and skills (e.g.: navigation systems may have a negative impact on geographical knowledge)?
- will **interest-driven learning** lead to insufficient exposure to basic skills?
- will ***communication tools*** increase and widen the collaboration with other learners, or will it increase social isolation because individuals will be sitting at home in front of a computer and interacting less with other people?
- will **personalization** reduce the information overload problem or will it create filter bubbles preventing people from understanding each other?
- will digital technologies widen the “***digital divide***” or reduce it by making educational opportunities available to many more learners in all parts of the world (e.g. with Massively Open Online Courses (MOOCs))?

Promises and Pitfalls of ChatGPT (and other AI technologies)

▪ Promises

- producing articles in response to open-ended questions that are comparable to good high school essays
- changing our minds about how we work, how we think, and what human creativity really is
- **beneficial use:** ChatGPT's responses as a contribution/source for the learners' own creative processes, not as a replacement— use answers as an additional resource for further reflections (similar to critiques provided by a colleague)

▪ Pitfalls

- its fluency is an illusion that stems from the combination of massive amounts of data, immense computing power, and novel processing techniques
- it is not capable of understanding the context or meaning of the words it generates; it can only produce text based on the probabilities of certain words or sequences of words appearing together, based on the training data it has been given
- limited support for asking questions and framing problems
- it is difficult for humans to scrutinize the answer produced
- it will give sometimes answers that are not related to the questions asked,
- it will make up facts or “hallucinate” and gives wrong answers
- **undesirable use:** unreflective use of its answers, constraining learners' agencies

ChatGPT explaining its answers – Limitations?

ChatGPT

ChatGPT can generate explanations for the answers it provides to some extent, but its explanations are inherently limited by a few factors:

1. Lack of Self-Awareness:

- ChatGPT doesn't have self-awareness or consciousness, meaning it doesn't “understand” the information it provides in the way humans do. Its responses are generated based on patterns in the training data and aren't derived from an internal understanding or reasoning process.

2. No Access to Training Data:

- It doesn't have direct access to its training data or know where its responses come from. Therefore, it can't provide specific sources for its answers or explain how it learned a particular piece of information.

3. Inability to Explain Reasoning:

- While it can generate responses that mimic explanation, it doesn't actually “reason” about information. ChatGPT selects responses based on statistical relationships in the training data, not through logical reasoning or a coherent understanding of topics.

4. Generalized Knowledge:

- It provides generalized responses based on patterns and associations in the data on which it was trained, up until September 2021. It doesn't generate responses based on real-time information or updates.

5. Limitations in Detailed Explanation:

- While it can provide generalized explanations, it might struggle to provide detailed, step-by-step breakdowns of complex reasoning processes or justifications for nuanced points of view.

What will Meta-Design mean for human learning and education?

▪ Promises

- provide learners with opportunities to set their own goals, build on their own interests, express their own ideas, or feel a sense of control and ownership over their own learning
- cope with wicked problems
- support for interest-driven, constructionist learning
- engagement and motivation
- creativity and innovation

▪ Pitfalls

- complexity
- learning demands
- participation overload
- engagement in personally irrelevant problems
- lack of standardization

A New Challenge for Users/Learners of ChatGPT

Finding Answers (Problem Solving) → Asking Interesting Questions (Problem Framing)

- what are the major meta-design practices?
- compare the strengths and weaknesses of meta-design and ChatGPT for learning and education
- compare user-centered design, participatory design, and meta-design
- write a summary of the book Thaler, R.H. and C.R. Sunstein, "Nudge — Improving Decisions about Health, Wealth, and Happiness. 2009" from a meta-design perspective
- create a Table of Contents for a book with the title "Meta-Design: Empowering Humans" with a focus on having a core message, providing examples, enumerating promises and pitfalls and examples from the domains of lifelong learning and artificial intelligence

Asking “Interesting” Questions (by the Research Community)

- not: Will AI replace humans (teachers, journalists, radiologists,)?
- but: **Will humans not using AI be replaced by humans using AI?**



ChatGPT (LLMs) for the Future of Work



Butler, J., Jaffe, S., Baym, N., Czerwinski, M., Iqbal, S., Nowak, K., Rintel, R., Sellen, A., Vorvoreanu, M., Hecht, B., and Teevan, J. (Eds.). Microsoft New Future of Work Report 2023. Microsoft Research Tech Report MSR-TR-2023-34 (<https://aka.ms/nfw2023>), 2023.

Insight into AI and work practices → content related to:

- **LLMs for Information Work:** How do LLMs affect the speed and quality of common information work tasks? LLMs can boost productivity for information workers.
- **LLMs for Critical Thinking:** How can LLMs help us break down and build up complex tasks?
- **Human-AI Collaboration:** How can we collaborate effectively with LLMs? Effective collaboration with LLMs depends on how we prompt, complement, rely on, and audit them.
- **LLMs for Complex and Creative Tasks:** How can LLMs tackle tasks that go beyond simple information retrieval or generation?
- **Domain-Specific Applications of LLMs:** How are LLMs being used and affecting different domains of work? We focus specifics on software engineering, medicine, social science, and education.
- **LLMs for Team Collaboration and Communication:** How can LLMs help teams work and communicate better?
- **Knowledge Management and Organizational Changes:** How is AI changing the nature and distribution of knowledge in organizations?
- **Implications for Future Work and Society:** What implications will AI have for the future of work and society?

Can we (should we) police ChatGPT?

Newspaper Story:

William, unfortunately it appears as though this exam is plagiarized. The answer to Q3, in particular, is drawn from ChatGPT... –UC Davis Professor

University student William Quarterman was recently accused of using AI to cheat on his history exam. He received an F on his exam and was reported to the university for academic dishonesty.

His professor had used **GPTZero, an artificial intelligence detection software**, which declared that Quarterman had used AI to complete his assignment. The student objected and was ultimately able to prove that the submitted work was his own.

Some **educators** think **we should crack down on AI**, and others **advocate for its widespread adoption and integration** for both students and educators. Some think AI will undermine progress in closing equity gaps while others believe AI offers equity solutions. But who's right? Where do we go next?

Can/should we **exploit** the unique opportunities or **police** AI?

Example for **Policing AI — Professor Dr. Karla Pollmann, President, Uni Tübingen— Excerpts**

As many of you already know, the artificial intelligence tool ChatGPT(Generative Pre-trained Transformer) is able to generate texts and answers to users' questions, which in many cases are both astonishingly complex and whose content is broadly correct. The texts or answers are compiled by ChatGPT from a variety of written sources. The AI tool does not name its sources.

For schools and universities, the main focus is currently on the question of how it will be possible to recognize, for example, the extent to which a piece of written assessment was actually generated by the student - or whether it is entirely or partially the product of ChatGPT. Currently, conventional plagiarism software appears unable to disassemble ChatGPT-compiled texts to identify its sources or to recognize it as plagiarism if the text has brought together more than freely available general knowledge.

The President's Office assesses the current situation as follows:

I. TEXTS COMPILED BY ChatGPT MAY NOT BE USED BY STUDENTS IN THE CONTEXT OF WRITTEN COURSEWORK OR ASSESSMENT (examinations, theses, etc.), unless this has been justified in individual cases as part of the assignment and permitted in accordance with the law:

II. TEXTS COMPILED BY ChatGPT MAY NOT BE USED BY RESEARCHERS FOR INTEGRATION INTO PUBLICATIONS, not even when AI use is disclosed

For the future, our common goal is to get the necessary clarity as soon as possible on how to use tools like ChatGPT in a meaningful and legally sound way to help solve tasks.

The Digital Age: From Technological Innovations to Cultural Changes

- **Claim:** technology alone does not determine social structures, nor does it change human behavior
 - it creates feasibility spaces for new social practices,
 - it can persuade and motivate changes at the individual, group, and community level in all domains of human existence and activities
- **Claim:** innovative technological developments are *necessary* for achieving new objectives and empowering learners and workers, but they are not *sufficient* — for example:
 - putting all schools on the Internet is *necessary* but it is not *sufficient*
 - Digitalpakt of the „Deutsche Bundesregierung“ in 2018: 5 Billions Euro for the digitalization of schools
- **The real challenge: to complement the discourse**
 - **from:** a concern who has **access** to new information technologies?
 - **to:** socio-technical environments that will position learners, teachers, and citizens to design, create, invent, and use the technologies to **enhance their personal lives and social worlds**

Where are we in 2024?

- *“This is not the end. It is not even the beginning of the end. But it is, perhaps, the **end of the beginning.**”* —Winston Churchill
- The major challenge for learners, teachers, workers, researchers and citizens in 2024: **“Change is the only constant”**
 - immense **learning effort** (→ lifelong learning)
 - empirical observation: *“The smartest people in the world do not generally look very intelligent when you give them a problem that is outside the domain of their vast experience.”* (Herbert Simon)
- **the BIG question:**
 - Will another **AI Winter** be coming following the current hype?

Challenges for the Future

<<My Basic Message>>

- the growth of technology is certain, the inevitability of any **particular future** is not
 - **limited objective:** “*learning as it is understood and practiced today enriched by digital technologies (= gift-wrapping)*”
 - **desired objective:** “fundamentally rethinking what education and learning should be about in the digital age” (= co-evolution)
- the impact of ChatGPT in the digital age is multifaceted and characterized by many **design trade-offs**
- the future is not out there to be discovered — it has to be invented and designed → question: **by whom?**
 - **by them:** technocrats from Silicon Valley → technology driven and dominated
 - **by us:** HCI, AI, Design researchers, learning scientists, educators → co-evolution, cultural transformations

Background Information

All my publications with PDF files are at:

<https://l3d.cs.colorado.edu/wordpress/people/home-folders/gerhard-fischers-home-page/gerhard-fischers-papers/>