Introduction to Intelligent User Interfaces

Introduction and Motivation

Team

Albrecht Schmidt

Andreas Butz

Sven Mayer

Luke Haliburton

Jesse Grootjen

Information Regarding Corona

- The „3G“ rule applies in university buildings (while the incidence is higher than 35)
- Certificate is controlled at entrances
- Testing possibility for students: www.schnelltest-lmu.de
- Medical facemasks are required indoor

Exams

- „3G“ rule does not apply for exams
- Masks can be taken off during exams while seated (because the safety
- distance of 1.5m is maintained)
- Similarly, the presenter can take off masks while maintaining the 1.5m distance.

As regulations change frequently, check the LMU website to stay up to date

Organization

- **Lecture**: Thursday 12-14 c.t.,
  - Geschw.-Scholl-Pl. 1 (M), M 101
  - https://lmu-munich.zoom.us/j/95176165936?pwd=RHB2Q3hiRjMxQ0FvZTZqWmJBQzJUUT09
- **Tutorials:** Monday 16-18 c.t.,
  - Amalienstr. 73A, Room: 220
  - Zoom TBA
- Live sessions will not be recorded
- **Practical projects**: one (iteration of a) practical project over the course of the lecture; intermediate presentations in the tutorials and final presentation at the end of the lecture

News

- **Uni2Work course** https://uni2work.ifi.lmu.de/course/W21/IfI/IUI
- **Website** http://www.medien.ifi.lmu.de/lehre/ws2122/iui/

Exam

The exam will consist of two parts

- Your practical project including the final presentation (1/2 of the final grade)
- An oral exam of ~10 minutes about the content of the lectures and exercises (1/2 of the final grade)

- This lecture has 6 ETCS which is equivalent to 180h of work

Lectures

Date	Location	Topic	Recording for this Topic
21.10.	In person	Introduction to Intelligent User Interfaces	
28.10.	In person	Discussion Artificial Intelligence	Lecture 02
11.11.	In person	Discussion Deceptive User Interfaces & Voice UI	Lecture 03, Lecture 04
25.11.	In person	Discussion Intelligent Text Entry	Lecture 05
02.12.	In person	Discussion Text and Natural Language Processing	Lecture 06
09.12.	In person	Discussion Context Awareness Interaction in Smart Environments	Lecture 07
20.01.	In person	Discussion Recommender Systems	Lecture 08, Lecture 09, Lecture 10, Lecture 11
03.02.	In person	Discussion Explainable AI, Bias and Ethics, and Q&A	Lecture 12, Lecture 13
10.02.	In person	Final Presentations (10+5)	Lecture 14

Tutorials

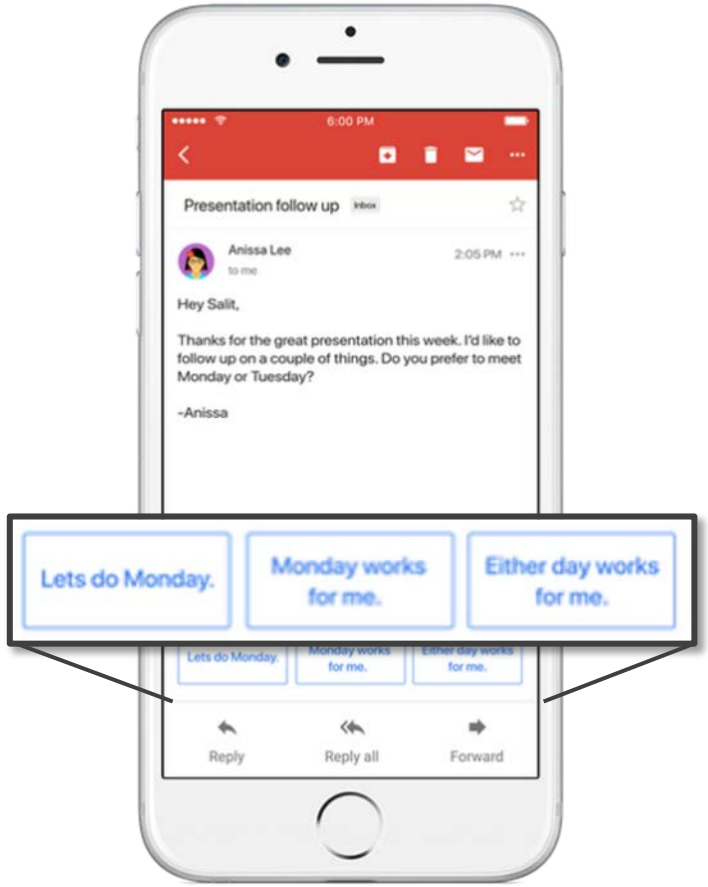
- Oct 25 Organization, Live Coding Session: Introduction to Python and ML
- Nov 01 Live Coding Session + Q&A
- Nov 08 Live Coding Session
- Nov 15 **Project Ideation** + Q&A
- Nov 22 **1min Project Pitches** + Live Coding Session
- Nov 29 Live Coding Session + Individual Help for Projects if Needed
- Dec 06 **3min Project Pitches**: Show Current Project Status
- Dec 13 Live Coding Session + Individual Help for Projects if Needed
- Jan 10 **5min Project Report**: Show Current Project Status
- Jan 17 Individual Help for Projects if Needed
- Jan 24 Introduction to Giving Great Project Presentations, Individual Help for Projects
- Jan 31 Individual Help for Projects if Needed
- Feb 07 Q&A: Exam preparation

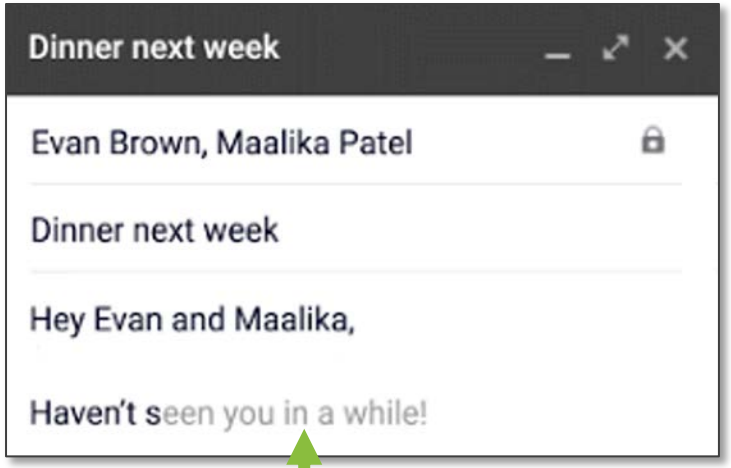
Projects

Introduction and Motivation

Text Suggestions

Google‘s Smart Reply & Smart Compose



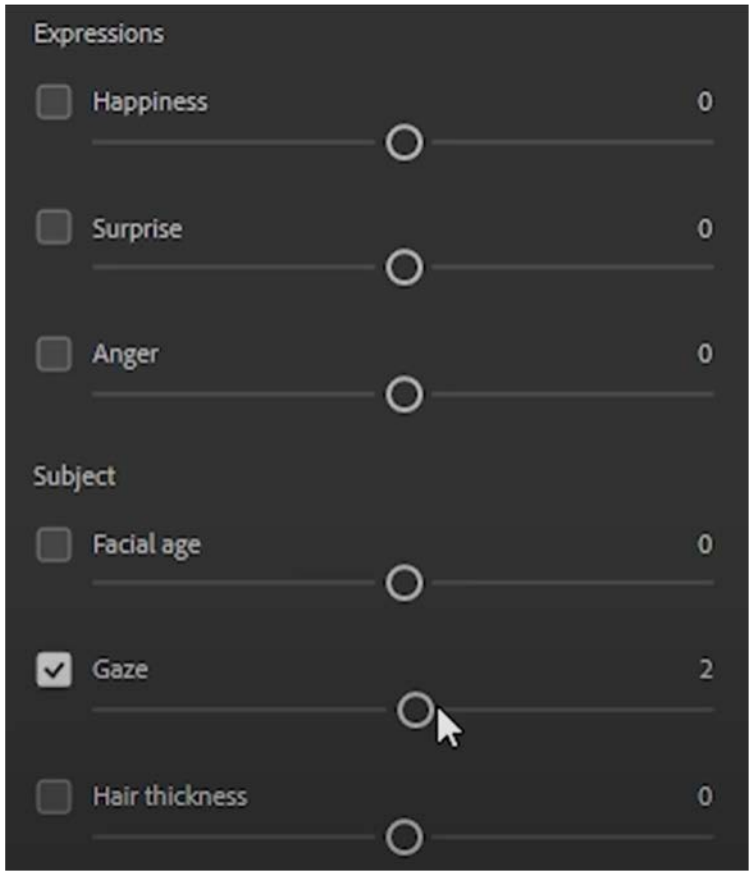


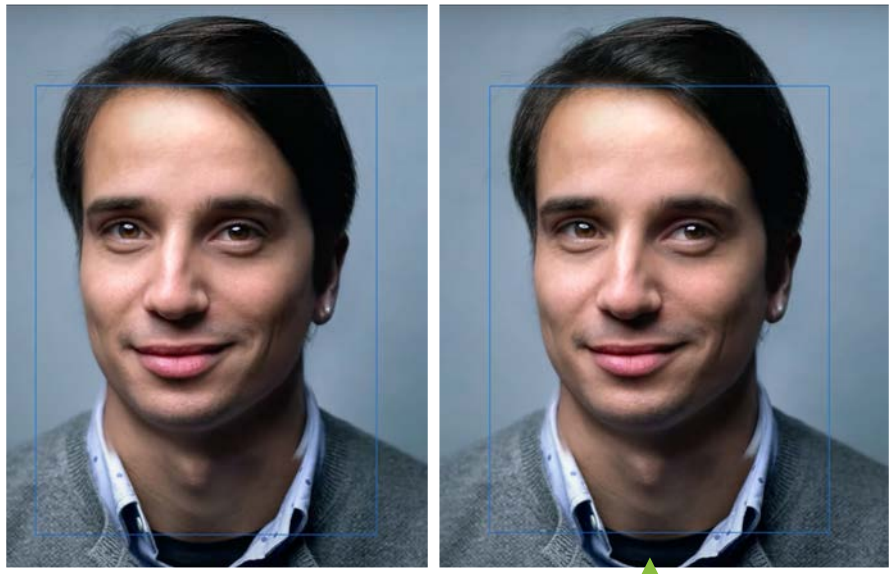
Language model, given email text

https://blog.google/products/gmail/save-time-with-smart-reply-in-gmail/
https://ai.googleblog.com/2018/05/smart-compose-using-neural-networks-to.html

Semantic Image Manipulation

„Smart Portrait Filters“ in Adobe‘s Photoshop





Generative model,
learned from many portraits

https://blog.adobe.com/en/2020/10/20/photoshop-the-worlds-most-advanced-ai-application-for-creatives.html
https://blogs.nvidia.com/blog/2020/10/20/adobe-max-ai/, https://github.com/NVlabs/stylegan2

Recommender Systems

How do recommender systems impact the user experience?

Carlos A. Gomez-Uribe and Neil Hunt. 2015. The Netflix Recommender System: Algorithms, Business Value, and Innovation. ACM Trans. Manage. Inf. Syst. 6, 4, Article 13 (December 2015), 19 pages. DOI: https://doi.org/10.1145/2843948

Why are recommender systems used?

How do recommender work?

What data do recommender systems require?

amazon.com ebay

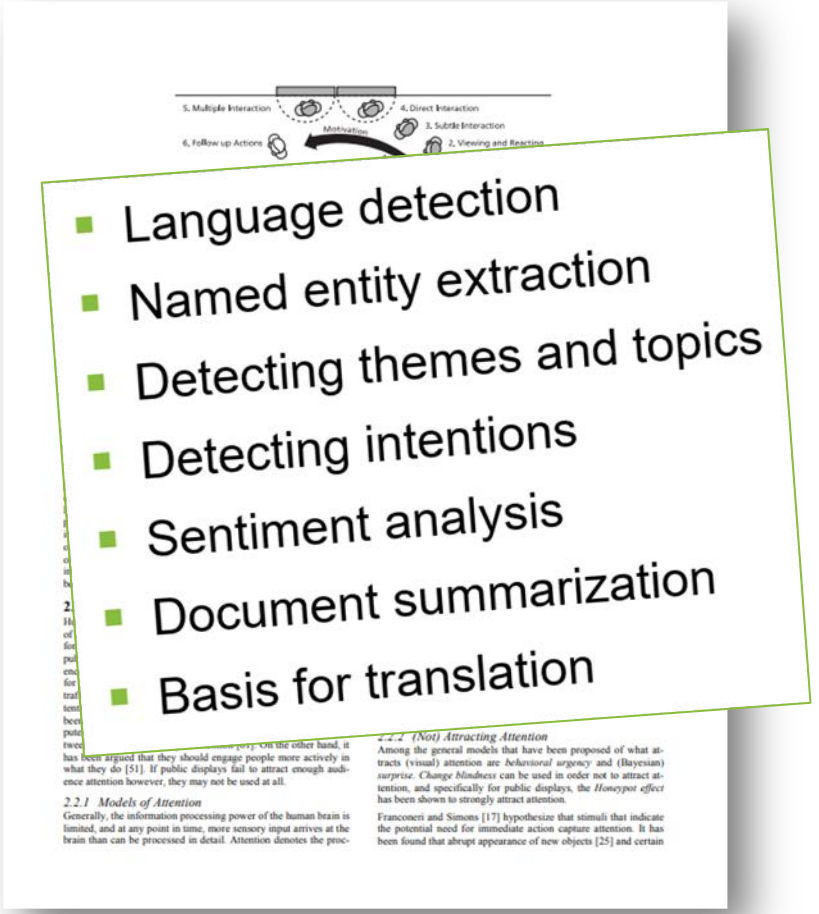
YouTube Spotify

Text analytics

Where can we use it and how can it improve interaction?

- Answering questions like
  - What is this text about?
  - What did the person communicate?
  - What is the key information in this document?
  - What feelings are communicated?
  - Is this different from what was said before?

- Application areas
  - Social media analytics, e.g. twitter
  - Communication and reading interfaces
  - Customer reviews and feedback
  - Chat bots
  - Text Forensics



http://www.medien.ifi.lmu.de/pubdb/publications/pub/mueller2010mm/mueller2010mm.pdf

VUI design process

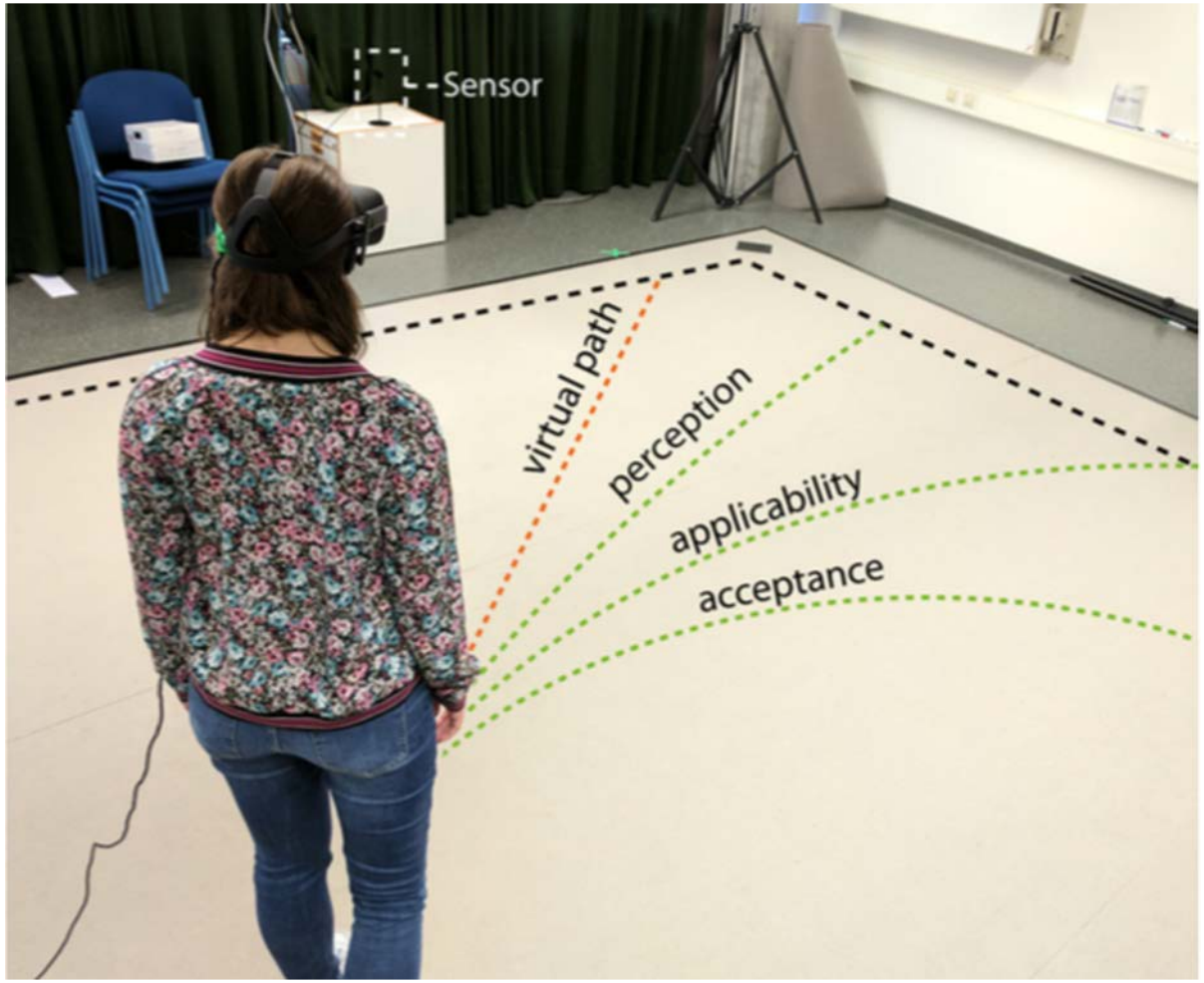
How to design a dialog structure?

- Think of alternatives
  - structure
  - wording
- Try out your dialog
  - wizard of Oz technique!
  - use outside people
- Refine, Revise, Repeat

Image by Gregory Varnum, CC BY-SA 4.0 via Wikimedia Commons
https://commons.wikimedia.org/wiki/File:Amazon_Echo_Dot_-_June_2018_(1952).jpg

A Deceptive UI: redirected Walking

What is real in an intelligent UI?



M. Rietzler, J. Gugenheimer, T. Hirzle, M. Deubzer, E. Langbehn and E. Rukzio, "Rethinking Redirected Walking: On the Use of Curvature Gains Beyond Perceptual Limitations and Revisiting Bending Gains," *2018 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, Munich, Germany, 2018, pp. 115-122, doi: 10.1109/ISMAR.2018.00041.

Image from https://ieeexplore.ieee.org/abstract/document/8613757

Facial Recognition

Convenient biometric or overly powerful?

- Unlock your phone
  - Hands-free identification
  - What are the major issues?

- Surveillance
  - Privacy
  - Tricks to „hide“ from facial recognition technology

https://www.bbc.com/news/uk-51237665

(a) Near infrared LED not lit (detection successful)

(b) Near infrared LED lit (detection failed)

http://research.nii.ac.jp/~iechizen/official/research-e.html#research2c

HCI Replacing HHI in Stores

„Just Walk Out“ shopping experience at Amazon Go

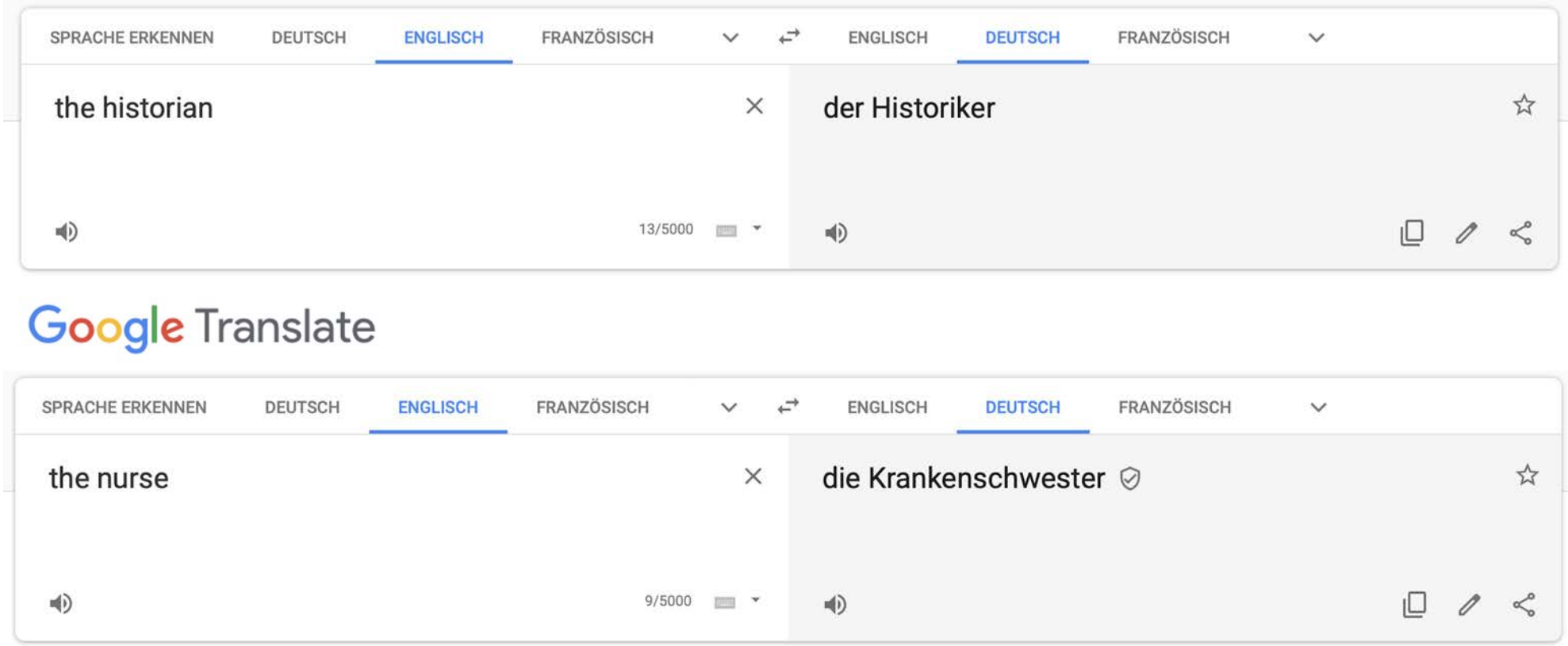
- Surveillance-powered shopping
  - Does not use facial recognition
- How does it work?
  - Is it „intelligent“? How so?

AI Recruiting

Is an AI a “fairer“ recruiter?

Natural Language Translation

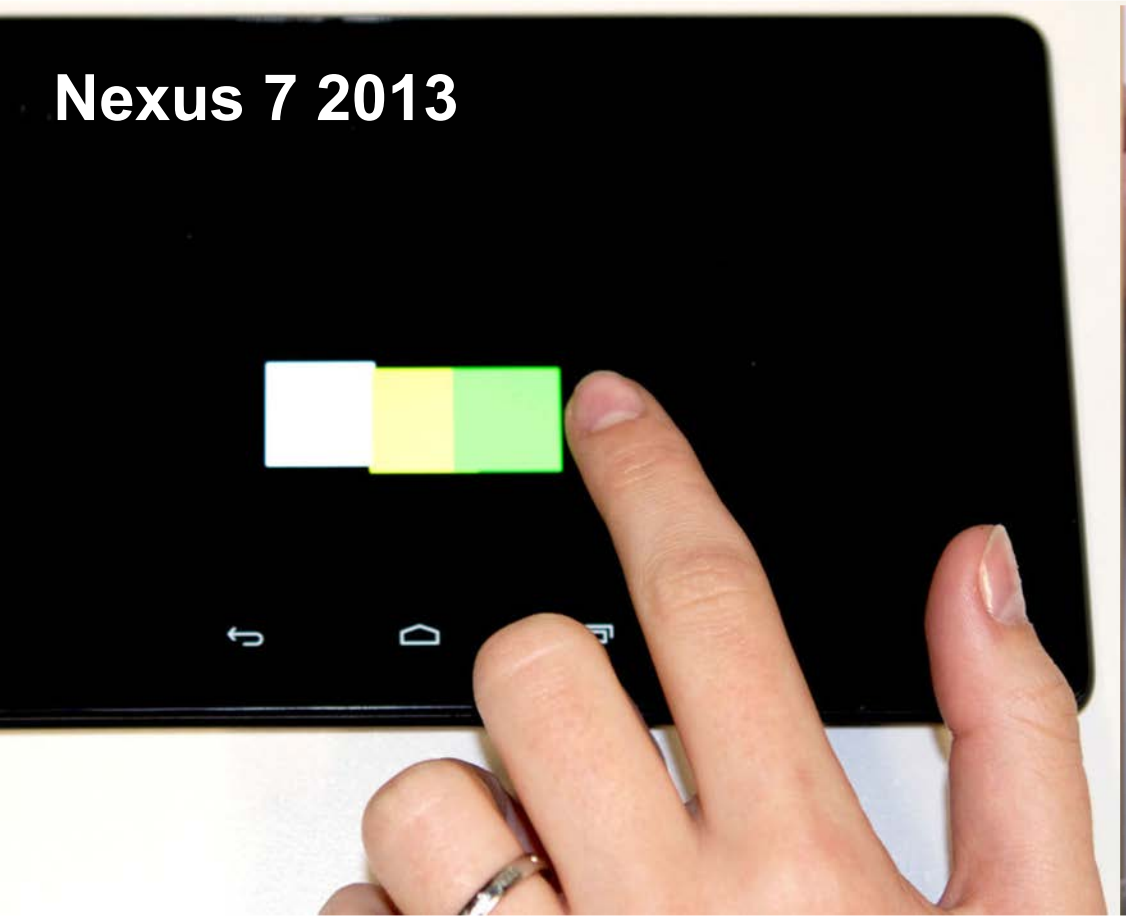
Female historians and male nurses do not exist?

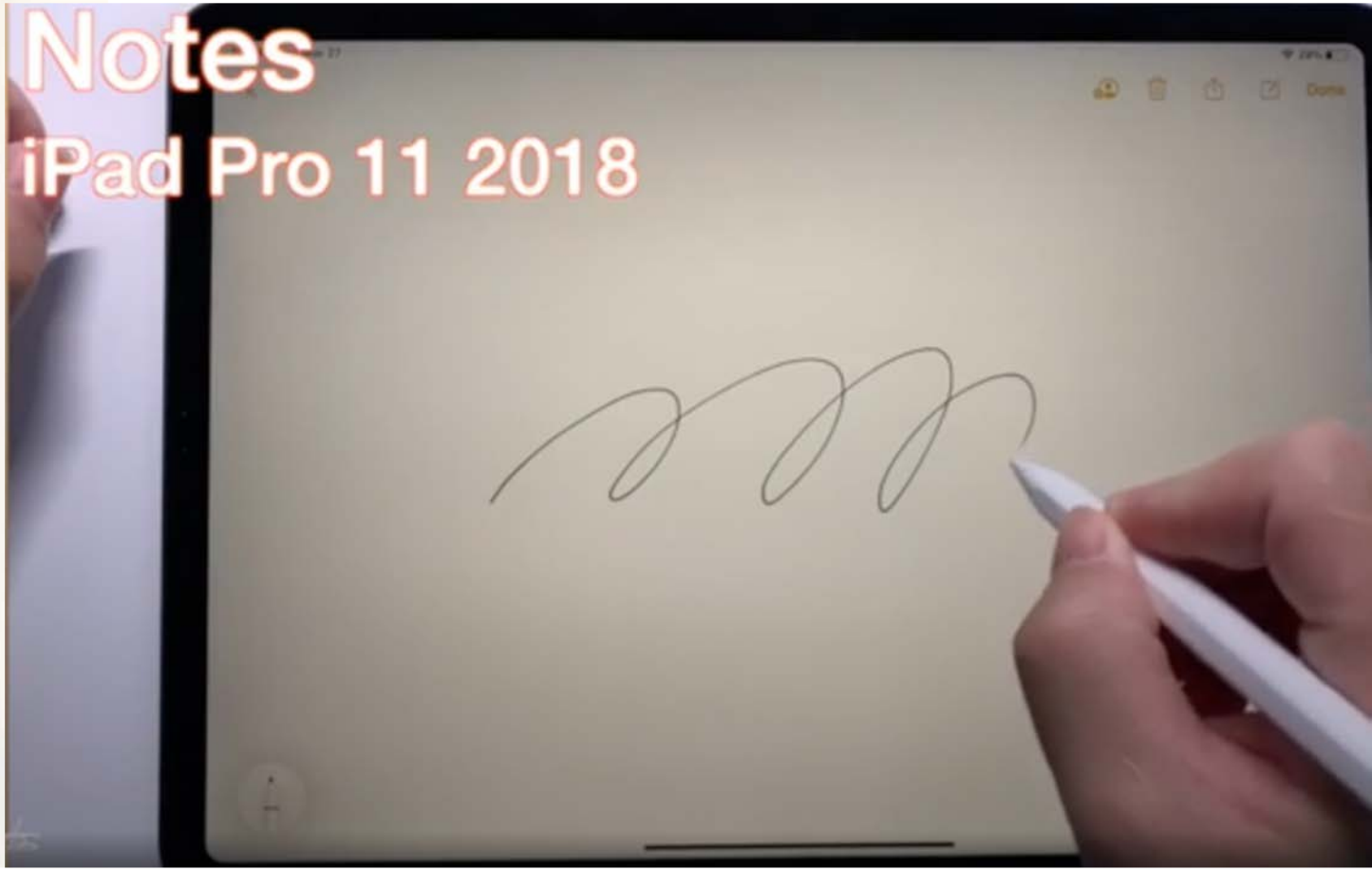


https://translate.google.com
https://algorithmwatch.org/en/story/google-translate-gender-bias/

Intelligent Touch

Why are we so precise with our fingers on a screen?





Henze, N., Mayer, S., Le, H.V. and Schwind, V. Improving software-reduced touchscreen latency. *Proc. MobileHCI '17* https://doi.org/10.1145/3098279.3122150

https://www.youtube.com/watch?v=l6Nz8wVUU74

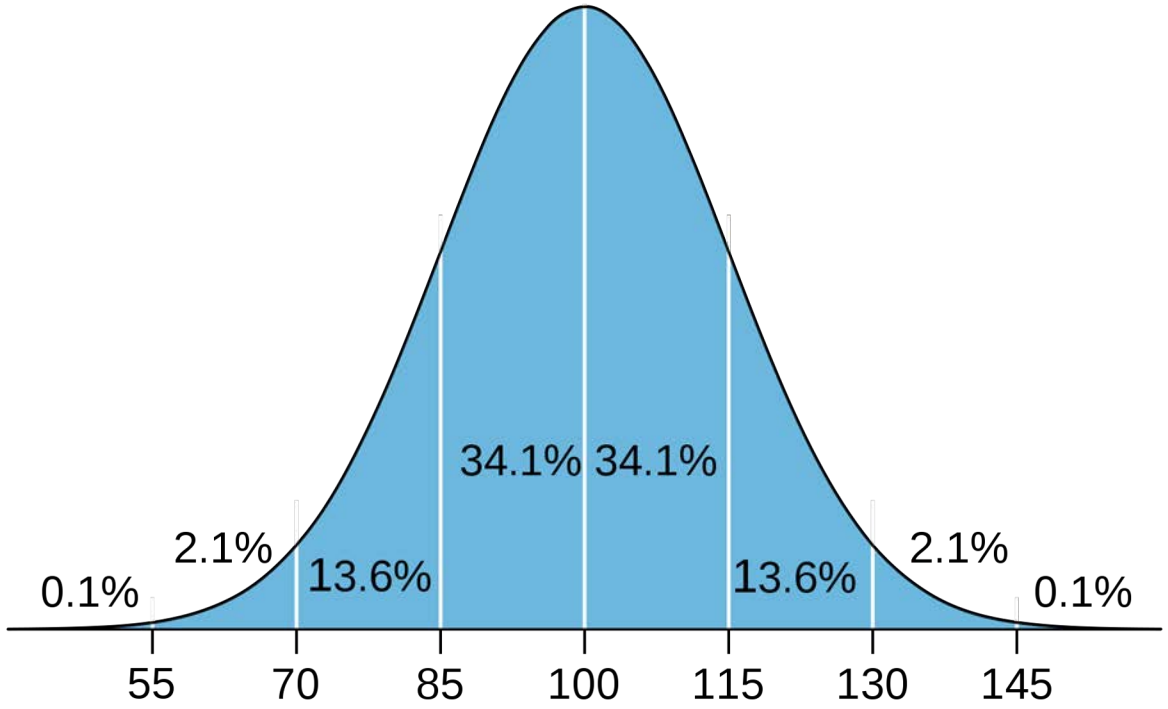
Intelligence and Artificial Intelligence

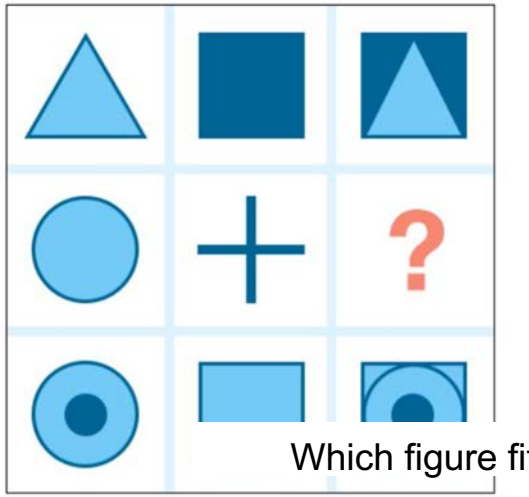
HCI perspective

What is considered Artificial Intelligence?

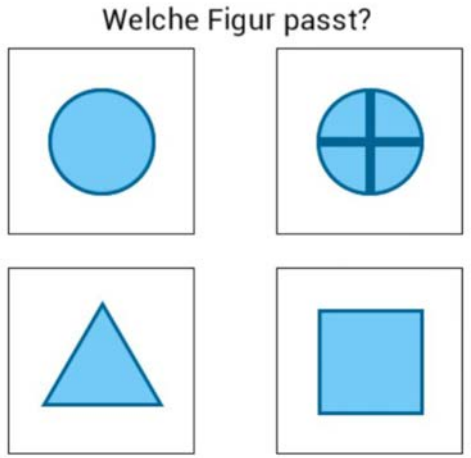
What is considered Artifical Intelligence?

What is Human Intelligence?





Which figure fits?



What is in an IQ test?

Many different types… typical questions include:

Finding Analogies (math and verbal)

Pen and writing, cup and ???

Finding / extending Pattern (graphical and math)

45 … 40 … 60 … 55 … 75 … 70 … ???

Classification tasks

Make two groups: apple, plate, grape, cake, spoon, knife

Making sense spatial and visual representations

Reasoning and logical

General knowedge

Goal:
Design Human-machine systems outperform humans as well as machines

Intuitive cooperation between humans and computers is the key challenge

Cyborg chess - centaur chess' advanced chess - freestyle chess

- People play and use computer assistance

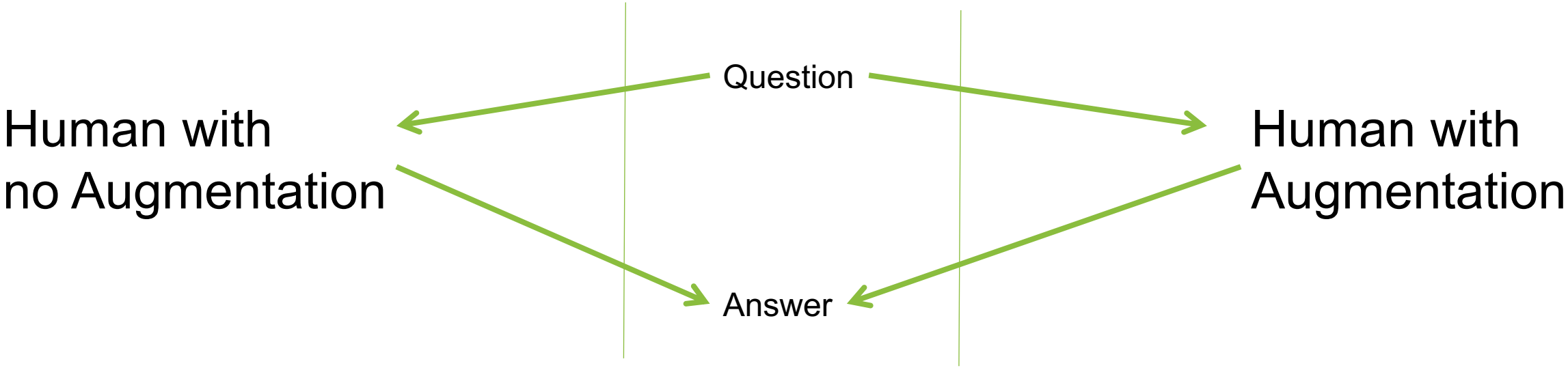
… not sure about this in chess, however in open problems this is the way forward

https://labs.sogeti.com/decision-support-better-than-machine-intelligence/

Who is more intelligent?
Who appears more intelligent?

https://www.flickr.com/photos/tenspeedphotography/3536942268
by Richard Heaven [CC BY 2.0]

Technologies make us (observable) intelligent!



Automation or Augmentation?

Who is in Control?

Augmenting – Amplifying Human Cognition

- What cognitive and perceptual abilities can we enhance?
- Where will cognitive and perceptual enhancement be hard?

Augmentation not automation… or towards amplification?

- As We May Think by Vannevar Bush (Bush, 1945)
- Joseph Lickider's idea of a "Man-Computer Symbiosis" (Licklieder, 1960)
- Douglas Engelbart's research on "Augmenting [the] Human Intellect" (Engelbart, 1962)
- Ubiquitous Computing as described by Mark Weiser (Weiser, 1992)
- Augmented Cognition (DARPA)

Bush, V.,1945. As we may think. *The Atlantic*, July 1945, pp.101-108.
Licklider, J. C. R., 1960. Man-Computer Symbiosis. *IRE Transactions on Human Factors in Electronics*, HFE-1, March 1960, pp 4-11
Engelbart, D. C. 1962. Augmenting Human Intellect: A Conceptual Framework. *SRI Summary Report AFOSR-3223*. October 1962.
Weiser, M., 1991. The computer for the 21st century. *Scientific American* 265.3, pp94-104, 1991.

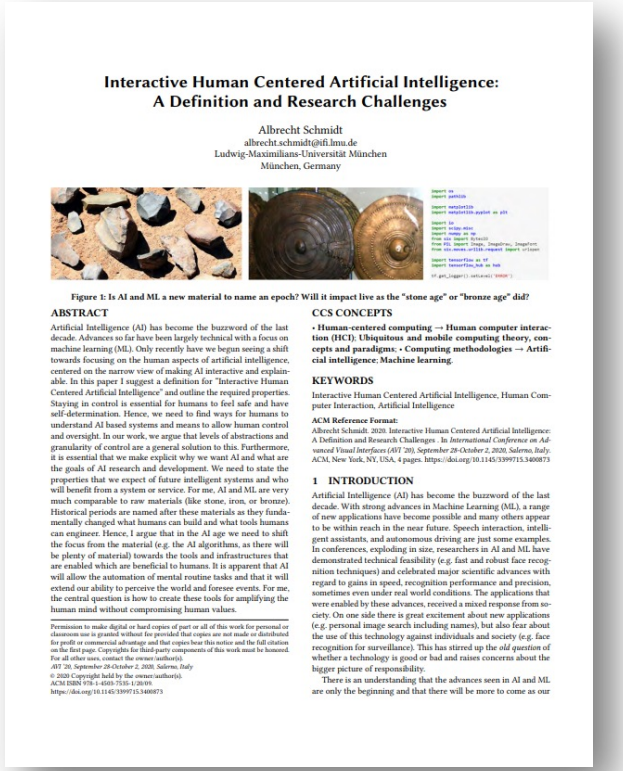
Enhancing and amplifying perception and cognition

- Theoretical motivation
  - Extended mind and active externalization
  - Distributed cognition
  - Collaborative knowledge and group cognition
  - Use of space and external representations
- Technology push
  - Superior sensing and capture systems
  - Advances in AI, processing, and communication
  - Devices for embedded presentation and augmented reality

Hollan, J., Hutchins, E. and Kirsh, D., 2000. Distributed cognition: toward a new foundation for human-computer interaction research. *ACM Transactions on Computer-Human Interaction (TOCHI)*, *7*(2), pp.174-196.
Clark, A. and Chalmers, D., 1998. The extended mind. analysis, 58(1), pp.7-19.
Kirsh, D., 2010. Thinking with external representations. *Ai & Society*, *25*(4), pp.441-454.
Stahl, G., 2006. Group Cognition: Computer Support for Building Collaborative Knowledge (Acting with Technology).

Definition

An Interactive Human Centered Artificial Intelligence is an Artificial Intelligence that enables interactive exploration and manipulation in real time and is designed with a clear purpose for human benefit while being transparent about who has control over data and algorithms.



Interactive Human Centered Artificial Intelligence:
A Definition and Research Challenges

Albrecht Schmidt
albrecht.schmidt@ifi.lmu.de
Ludwig-Maximilians-Universität München
München, Germany

Figure 1: Is AI and ML a new material to name an epoch? Will it impact live as the "stone age" or "bronze age" did?

ABSTRACT

Artificial Intelligence (AI) has become the buzzword of the last decade. Advances so far have been largely technical with a focus on machine learning (ML). Only recently have we begun seeing a shift towards focusing on the human aspects of artificial intelligence, centered on the narrow view of making AI interactive and explainable. In this paper I suggest a definition for "Interactive Human Centered Artificial Intelligence" and outline the required properties. Staying in control is essential for humans to feel safe and have self-determination. Hence, we need to find ways for humans to understand AI based systems and means to allow human control and oversight. In our work, we argue that levels of abstractions and granularity of control are a general solution to this. Furthermore, it is essential that we make explicit why we want AI and what are the goals of AI research and development. We need to state the properties that we expect of future intelligent systems and who will benefit from a system or service. For me, AI and ML are very much comparable to raw materials (like stone, iron, or bronze). Historical periods are named after these materials as they fundamentally changed what humans can build and what tools humans can engineer. Hence, I argue that in the AI age we need to shift the focus from the material (e.g. the AI algorithms, as there will be plenty of material) towards the tools and infrastructures that are enabled which are beneficial to humans. It is apparent that AI will allow the automation of mental routine tasks and that it will extend our ability to perceive the world and foresee events. For me, the central question is how to create these tools for amplifying the human mind without compromising human values.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; **Ubiquitous and mobile computing theory, concepts and paradigms**; • **Computing methodologies** → **Artificial intelligence**; **Machine learning**.

KEYWORDS

Interactive Human Centered Artificial Intelligence, Human Computer Interaction, Artificial Intelligence

ACM Reference Format:

Albrecht Schmidt. 2020. Interactive Human Centered Artificial Intelligence: A Definition and Research Challenges. In *International Conference on Advanced Visual Interfaces (AVI '20), September 28-October 2, 2020, Salerno, Italy.* ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3399715.3400873

1 INTRODUCTION

Artificial Intelligence (AI) has become the buzzword of the last decade. With strong advances in Machine Learning (ML), a range of new applications have become possible and many others appear to be within reach in the near future. Speech interaction, intelligent assistants, and autonomous driving are just some examples. In conferences, exploding in size, researchers in AI and ML have demonstrated technical feasibility (e.g. fast and robust face recognition techniques) and celebrated major scientific advances with regard to gains in speed, recognition performance and precision, sometimes even under real world conditions. The applications that were enabled by these advances, received a mixed response from society. On one side there is great excitement about new applications (e.g. personal image search including names), but also fear about the use of this technology against individuals and society (e.g. face recognition for surveillance). This has stirred up the *old question* of whether a technology is good or bad and raises concerns about the bigger picture of responsibility.

There is an understanding that the advances seen in AI and ML are only the beginning and that there will be more to come as our

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).
AVI '20, September 28-October 2, 2020, Salerno, Italy
© 2020 Copyright held by the owner/author(s).
ACM ISBN 978-1-4503-7535-1/20/09
https://doi.org/10.1145/3399715.3400873

https://uni.ubicomp.net/as/iHCAI2020.pdf

Properties (1/2)
Interactive Human Centered Artificial Intelligence

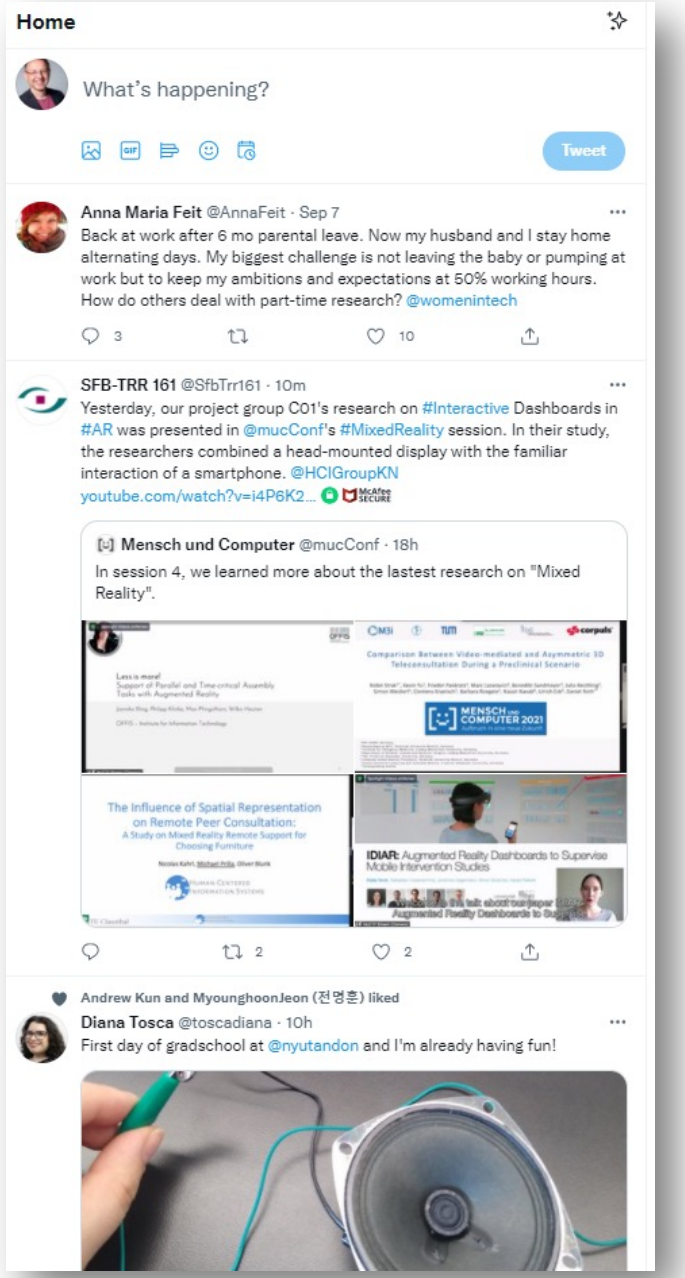
1. Individuals can **interact in real time** with the **algorithms**, **models**, and **data** and can manipulate and control all relevant parameters.
2. The impact of changes and **manipulations** made by the user can be **observed in real time**.
3. In fast processes the speed **can be reduced to allow interactions**, interventions, and manipulation.
4. Individuals can **interactively explore** why and **how specific decisions** are made and find out how changes in the parameters, data, and models impact outcomes.

Properties (2/2)
Interactive Human Centered Artificial Intelligence

5. It states **how humans can benefit** from the artificial intelligence.
6. It explains **what risks the artificial intelligence** poses for individuals as well as on societal level.
7. It is visible **who has control** of the artificial intelligence, in particular who has the **power over data, models, and algorithms**.
8. It is visible **what data, knowledge base, and information** is used or has been used **to create and inform** the artificial intelligence.

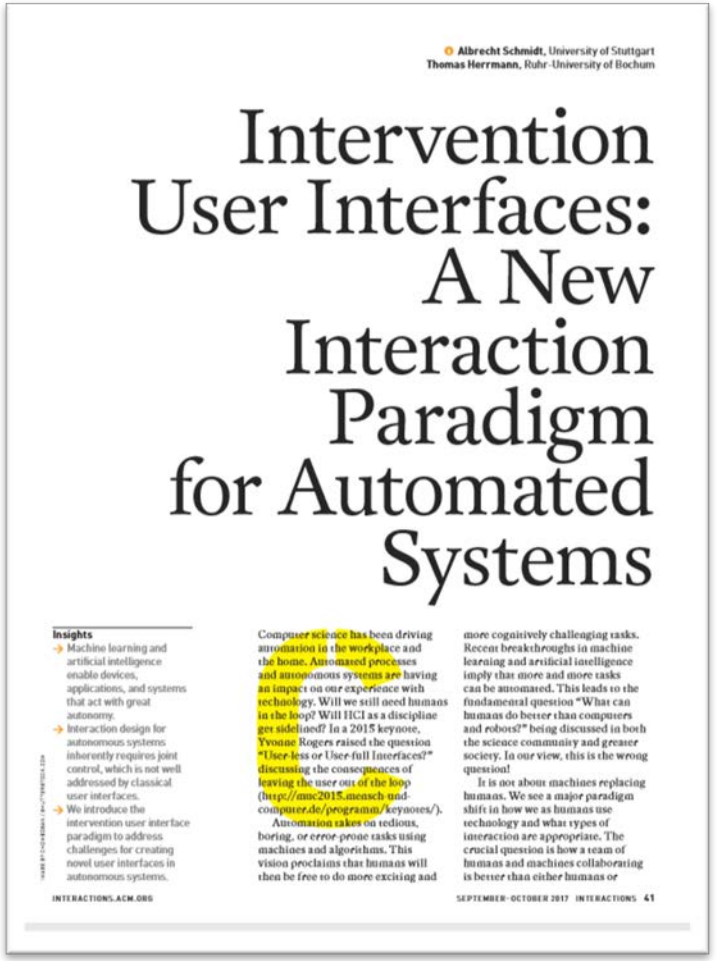
Is the Twitter-Algorithm a iHCAI?

1. Individuals can **interact in real time** with the **algorithms**, **models**, and **data** and can manipulate and control all relevant parameters.
2. The impact of changes and **manipulations** made by the user can be **observed in real time**.
3. In fast processes the speed **can be reduced to allow interactions**, interventions, and manipulation.
4. Individuals can **interactively explore** why and **how specific decisions** are made and find out how changes in the parameters, data, and models impact outcomes.
5. It states **how humans can benefit** from the artificial intelligence.
6. It explains **what risks the artificial intelligence** poses for individuals as well as on societal level.
7. It is visible **who has control** of the artificial intelligence, in particular who has the **power over data, models, and algorithms**.
8. It is visible **what data, knowledge base, and information** is used or has been used **to create and inform** the artificial intelligence.



How can humans stay in control?

In the future, we believe that a large class of automated and **autonomous systems** allow for **joint control**, where the majority of **decisions are automated** but where users can **intervene**.



Albrecht Schmidt, University of Stuttgart
Thomas Herrmann, Ruhr-University of Bochum

Intervention User Interfaces: A New Interaction Paradigm for Automated Systems

Insights

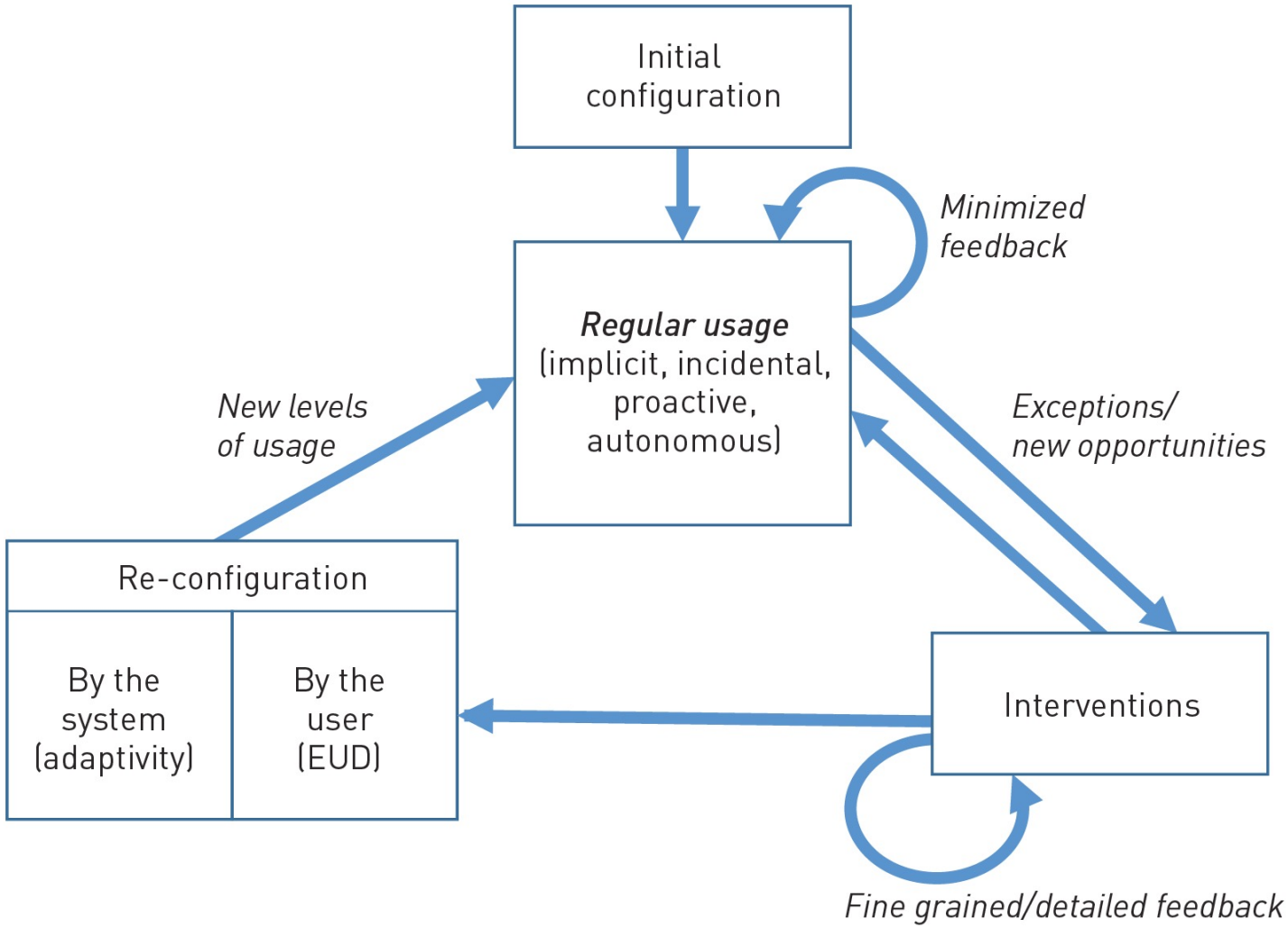
- Machine learning and artificial intelligence enable devices, applications, and systems that act with great autonomy.
- Interaction design for autonomous systems inherently requires joint control, which is not well addressed by classical user interfaces.
- We introduce the intervention user interface paradigm to address challenges for creating novel user interfaces in autonomous systems.

Computer science has been driving automation in the workplace and the home. Automated processes and autonomous systems are having an impact on our experience with technology. Will we still need humans in the loop? Will HCI as a discipline get sidelined? In a 2015 keynote, Yvonne Rogers raised the question "User less or User full Interfaces?" discussing the consequences of leaving the user out of the loop (http://mc2015.mensch-und-computer.de/programm/keynotes/).

Automation takes on tedious, boring, or error-prone tasks using machines and algorithms. This vision proclaims that humans will then be free to do more exciting and more cognitively challenging tasks. Recent breakthroughs in machine learning and artificial intelligence imply that more and more tasks can be automated. This leads to the fundamental question "What can humans do better than computers and robots?" being discussed in both the science community and greater society. In our view, this is the wrong question!

It is not about machines replacing humans. We see a major paradigm shift in how we as humans use technology and what types of interaction are appropriate. The crucial question is how a team of humans and machines collaborating is better than either humans or

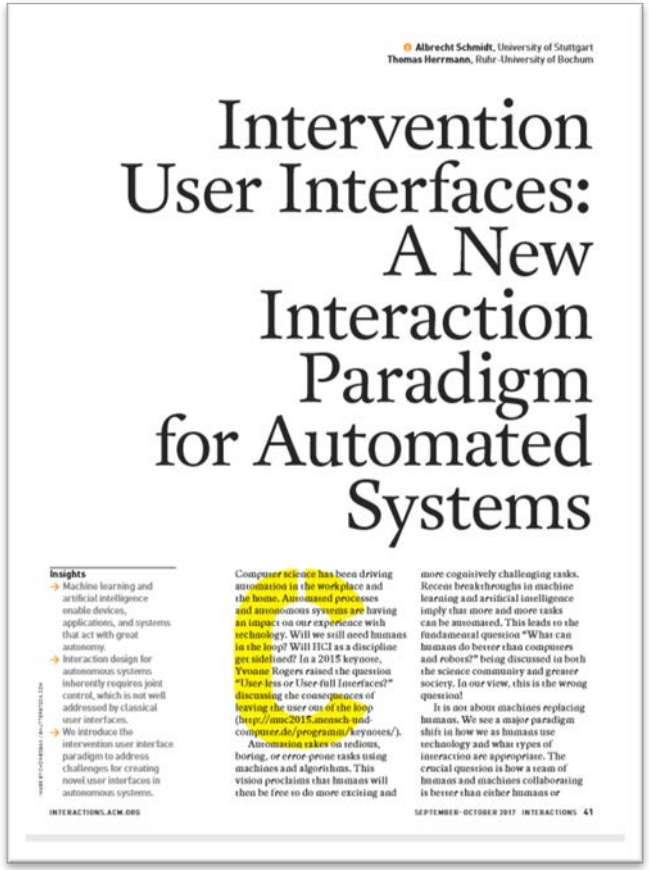
Interaction with Intervention User Interfaces



Design Principles for Intervention user interfaces

- Ensure expectability and predictability.
- Communicate options for interventions.
- Allow easy exploration of interventions.
- Easy reversal of automated and intervention actions.
- Minimize required attention.
- Communicate how control is shared.

For more details and a set of rules see:



Albrecht Schmidt, University of Stuttgart
Thomas Herrmann, Ruhr-University of Bochum

Intervention User Interfaces: A New Interaction Paradigm for Automated Systems

The End of Serendipity?

Optimal Solutions for Everything?

… some things just happen

I met her accidentally and we get on well together

it was pure chance that we were there at the same time

we sat next to each other and realized we work
on the same thing

Boundaries are gone

Unlimited content,
impossible choice

AliExpress

shirt

Tutte le Categorie › **"shirt"** (219,490 Risultati)

Categorie collegate

- Abbigliamento da donna
- Abbigliamento da uomo
- Sport e intrattenimento
- Mamma e bambini

Visualizza altro

Marche

LI-NING · ESDY · SIMWOOD · Naturehike · INBIKE

Visualizza altro

Cerca Anywhere, Anytime!

Scansione oppure clicca per scaricare

Prezzo: min - max · Spedire da

SALDI · Consegna in 10 giorni · Consegna combinata · Spedizione gratuita · ★★★★☆ o più · Consegna in 10 giorni

In ordine di: **Migliori Abbinamenti** | Ordini | Novità | Prezzo

Gli annunci possono influenzare le classifiche, scopri qui come organizziamo i nostri r

Moda estate uomo polo camicie st...
Slim | Solid

Prezzo nuovo utente
€ 10,15

34 venduti | ★ 4.2
Spedizione gratuita

China Men's jeans Store · Ann.

2021 estate nuova moda Casual all...

€ 5,60

24 venduti | ★ 5
+ Spedizione: € 2,73

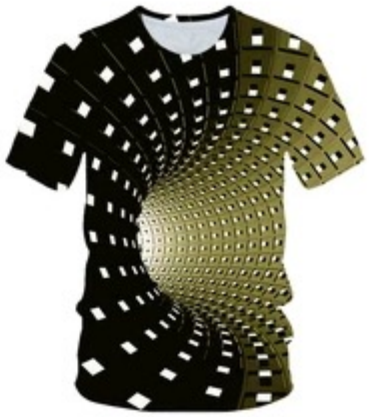
YINZHUOLAI 520 Store · Ann.

21ss nuovi marchi di lusso design ...

€ 33,62

1 venduti
+ Spedizione: € 6,49

AMI01 Store · Ann.



T-shirt con stampa 3D a spirale ast...

Prezzo nuovo utente
€ 2,74

3 venduti | ★ 5
+ Spedizione: € 5,08

print T-shirt Store · Ann.

Content Selection Dilemma
… random selection of content would not work

We need algorithms, which will inevitably introduce bias, manipulate us, and reduce choice and serendipity.

This also leads to the question of who has control over algorithms?

The End of Serendipity: Will Artificial Intelligence Remove Chance and Choice in Everyday Life?

Albrecht Schmidt
albrecht.schmidt@ifi.lmu.de
Ludwig-Maximilians-Universität München
München, Germany

Figure 1: He Loves Me? He Loves Me Not? A chance game. Will we keep pulling off petals to get an answer?

ABSTRACT

Software defines our everyday experiences! Communication in families as well as in the workplace is largely software mediated. The choices we make, from the news articles we read to the movies we watch and the people we date, are to a large extent software supported. Personalized news portals, navigation systems, social media platforms, shopping portals, music streaming services, and dating apps are only some examples of systems that affect what we experience, think, and do. Improvements in human computer interaction have led to a wide universal adoption of these systems in many areas. Artificial intelligence, learning about the users and their preferences, and striving for simplification in interaction, reduces the need to make active decisions and herby removes chance and choice. Will this lead to highly optimized systems – that apparently work great for the user, but at the same time end the element of randomness and serendipity in our lives? Simplified content creating, recommender systems and augmented reality are drivers for this. Can interactive human centered artificial intelligence help to keep the user in control or if this is just an illusion?

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; **Ubiquitous and mobile computing theory, concepts and paradigms**; • **Computing methodologies** → **Artificial intelligence**; **Machine learning**.

KEYWORDS

Interactive Human Centered Artificial Intelligence, Human Computer Interaction, Artificial Intelligence

ACM Reference Format:

Albrecht Schmidt. 2021. The End of Serendipity: Will Artificial Intelligence Remove Chance and Choice in Everyday Life? . In *CHItaly 2021: 14th Biannual Conference of the Italian SIGCHI Chapter (CHItaly '21), July 11–13, 2021, Bolzano, Italy.* ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3464385.3464763

CHItaly '21, July 11–13, 2021, Bolzano, Italy

ACM ISBN 978-1-4503-8977-8/21/06.
https://doi.org/10.1145/3464385.3464763

1 INTRODUCTION

There are phrases that are still common "I met her accidentally and we get on well together", "it was pure chance that we were there at the same time", or "we sat next to each other on the train, and realized we work on the same thing". Until now, many of our major decisions in life, such as the job we work, the people we live with, or whether and with whom we start a family, largely depend on chance and the choices we make. This may be history!

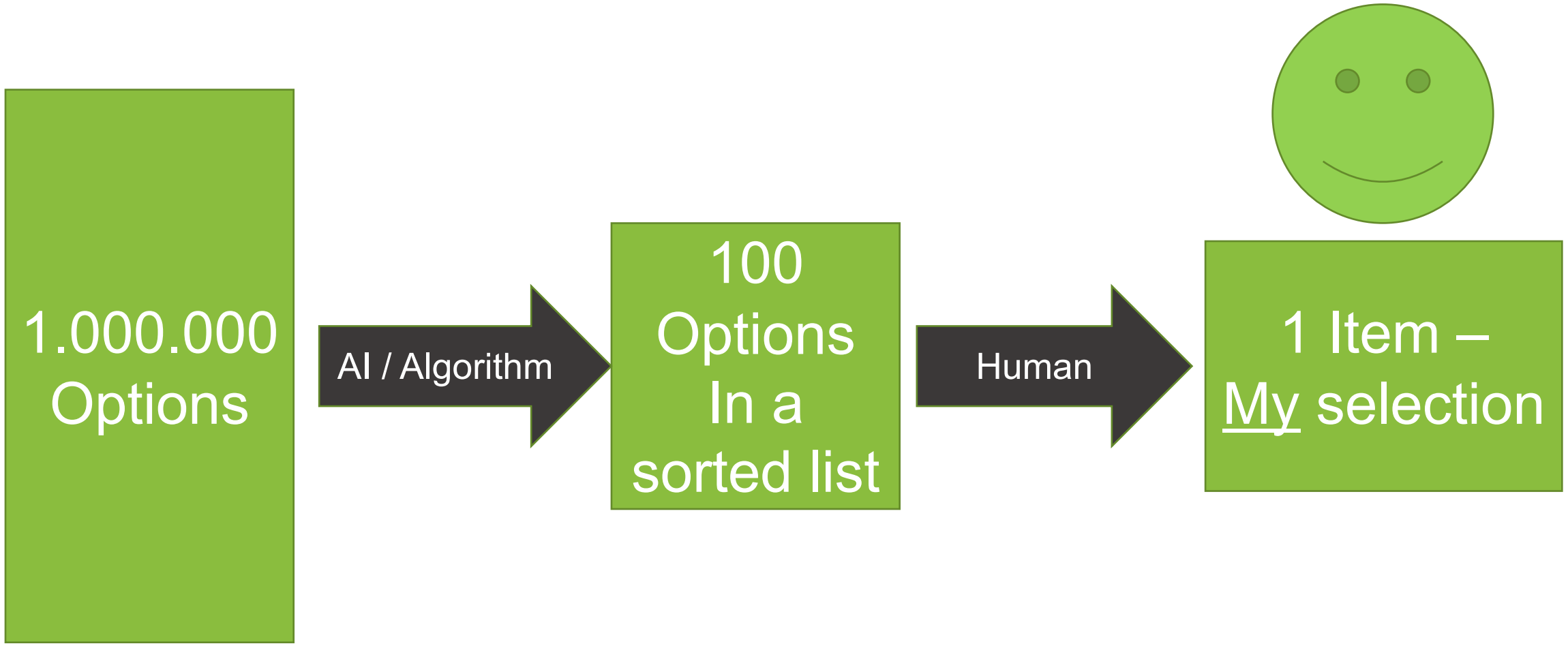
In the pre-digital age, the choice was much smaller, since you were, in most cases, essentially limited to your community (local as well as societal). These limitations applied to mundane everyday tasks, such as what and where to buy an item, as well as to big life choices of what school to go to or whom to marry. As the choice was limited, no recommender systems were required. In many cases, chance played a major role as well as the social environment people were in. Decision support, if required, was provided by friends or even by playing a chance game, such as the daisy oracle, depicted in figure 1, where you alternate choices (e.g. yes, no, yes, no, etc.) while pulling off petals, till all are gone.

With digital technology our horizon widens, we have much more choice. We have access to virtually unlimited information and we can connect to people all around the world. However, this comes at a price! As choice becomes huge and the number of options is more than we can look at in a lifetime, we need algorithms that help us

https://uni.ubicomp.net/as/as-chocie.pdf

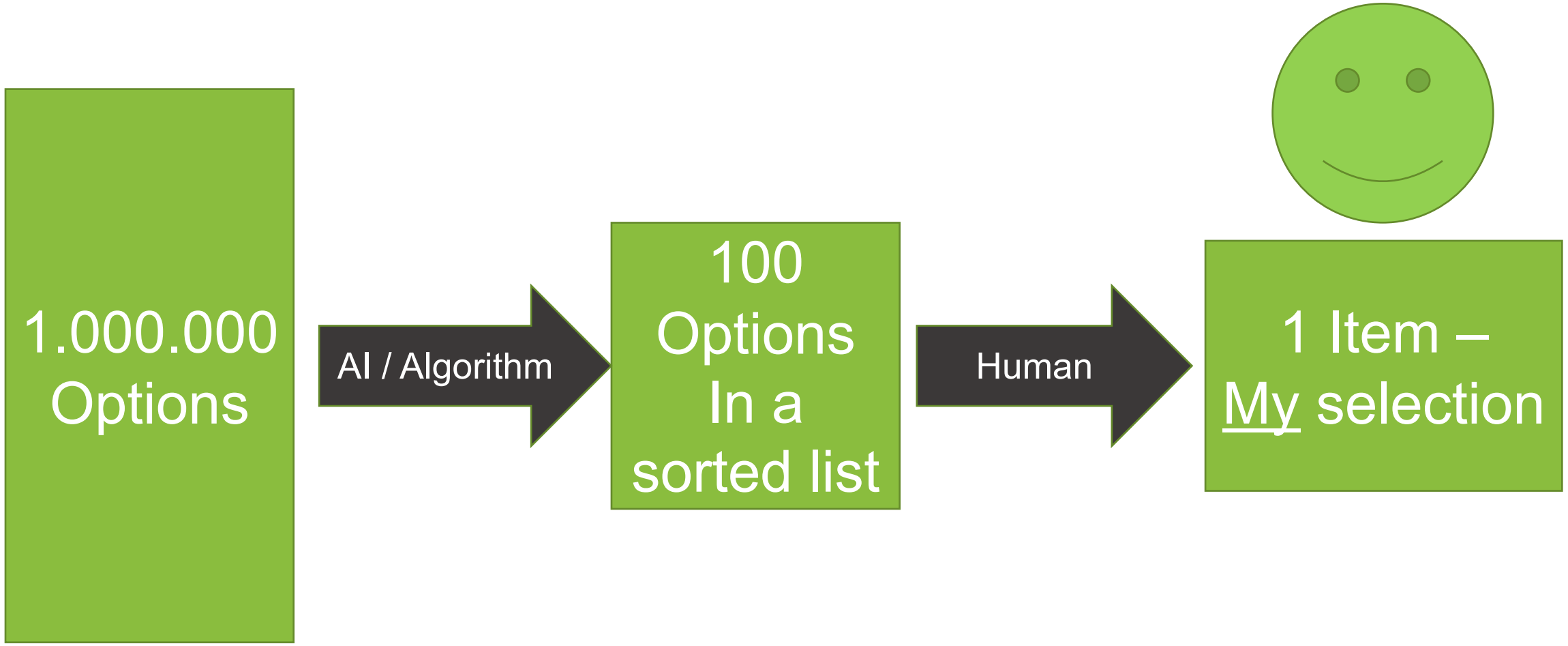
There is a dilemma: We cannot consider all options as this would take forever.

Is Human in the Loop the Solution?
Who makes the real decisions?



But it feels all real, I am in control!

Is Human in the Loop the Solution? How makes the real decisions?



Manipulate vs. Intelligent Assistance

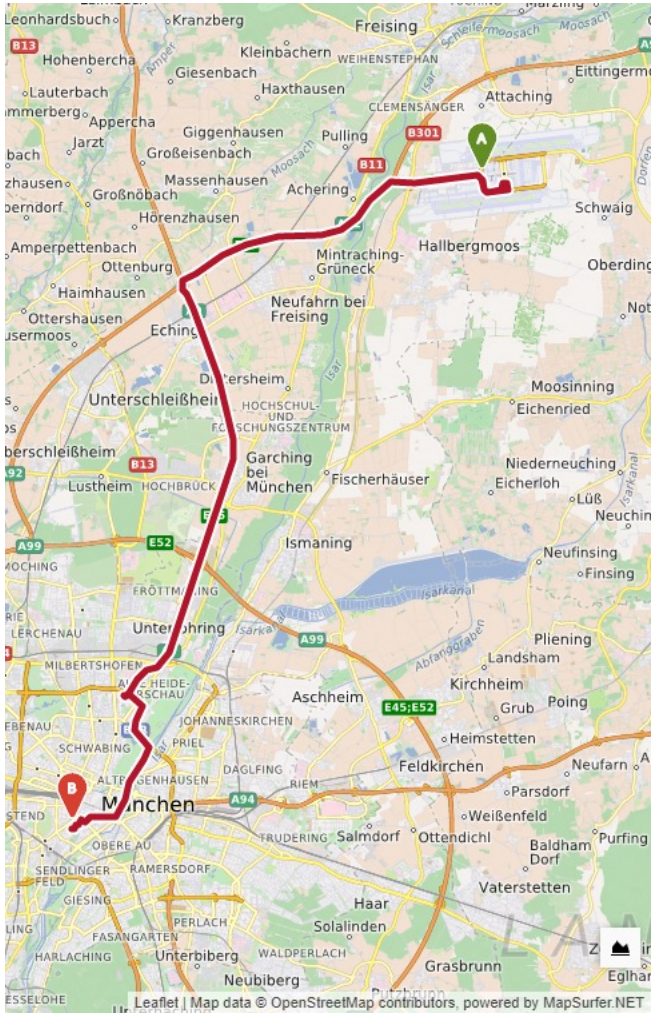
Manipulation is Easy (and it is not new)

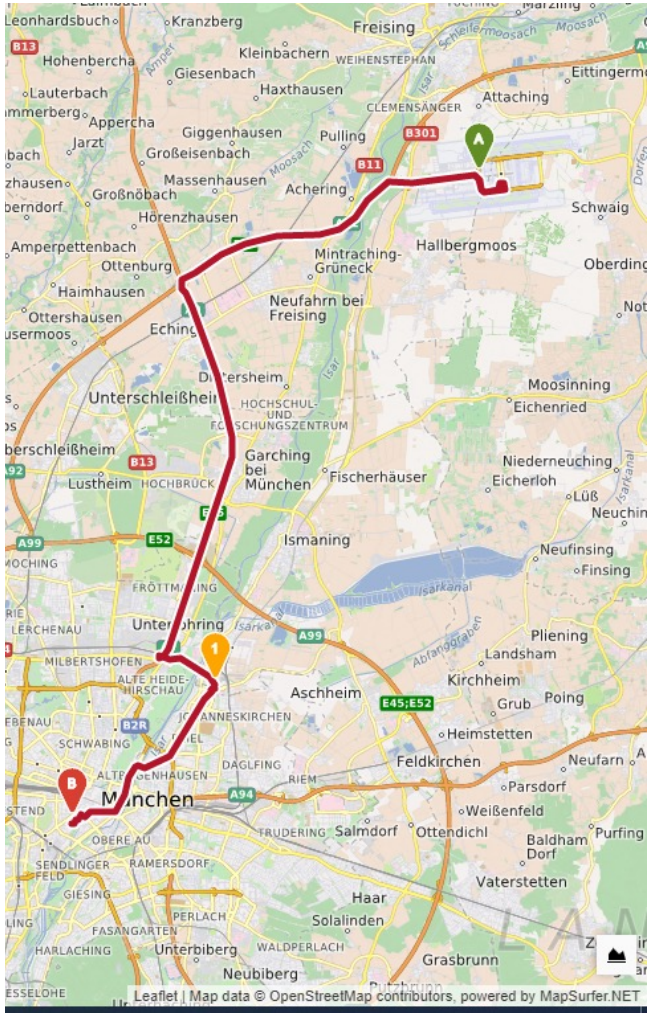
- Your get 4 items presented:
  - one that is out of your budget
  - one that has low user ratings
  - one that is not available until next week
  - one we want to sell you
- It is your choice!
  You will believe, that you made your choice
- However the system “manipulated” the decision
  - Pre-selection
  - presentation

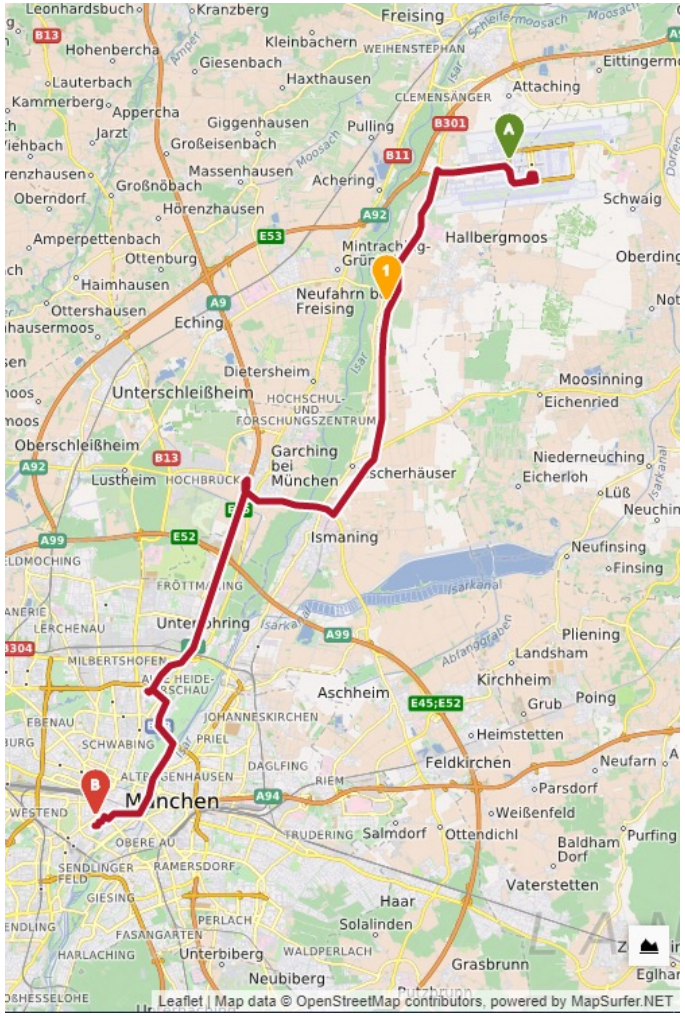
Manipulation or Intelligent Assistance?

- The interface of **how to present intelligent assistance** to the user is critical for success
- “Users don’t want to be told what to do, they want to choose”
  - Version 1:
    - “take the train at 12:17 from platform 6”
  - Version 2:
    - “which do you want to take? train at 12:17 from platform 6 (takes 45 minutes) or bus at 12:15 from platform 3 (takes 50 minutes, is unreliable)”
- Intelligent assistance is **not perfect** (and will not be for a long time), and **this can be hidden in the user interface**

A Dystopian vision: The route you drive







A Dystopian vision: What to eat?

A Dystopian vision: Fundamental life choices

- Whom to marry?

The (predictive) power of computing
Can we predict your future?

- Where you go next?
- What you will order?
- What you will watch?
- …
- The (life-)partner you choose?
- …

The (predictive) power of computing
Can we predict your future?

- Where you go next?
- What you will order?
- What you will watch?
- …
- The (life-)partner you choose?
- …

The (predictive) power of computing
Can we predict your future?

- Where you go next?
- What you will order?
- What you will watch?
- …
- The (life-)partner you choose?
- …

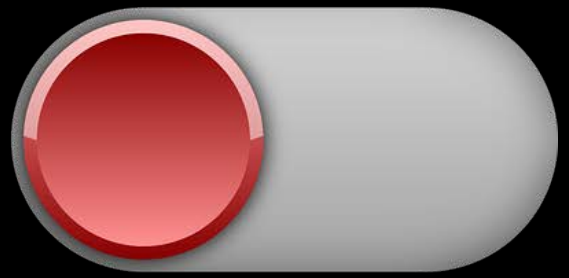
… for them - or at least nudge people to go into the right direction (the future you want)

Then End of Serendipity?
No Randomness anymore?

Who do you trust to decide …

- …what movies you watch? (and eventually like)
- …who you are sitting next to on the plane?
- …which way you walk?
- …who is in the same restaurant as you?
- …which flat you buy?
- …
- …whom you marry?

Don’t Autoplay your Life

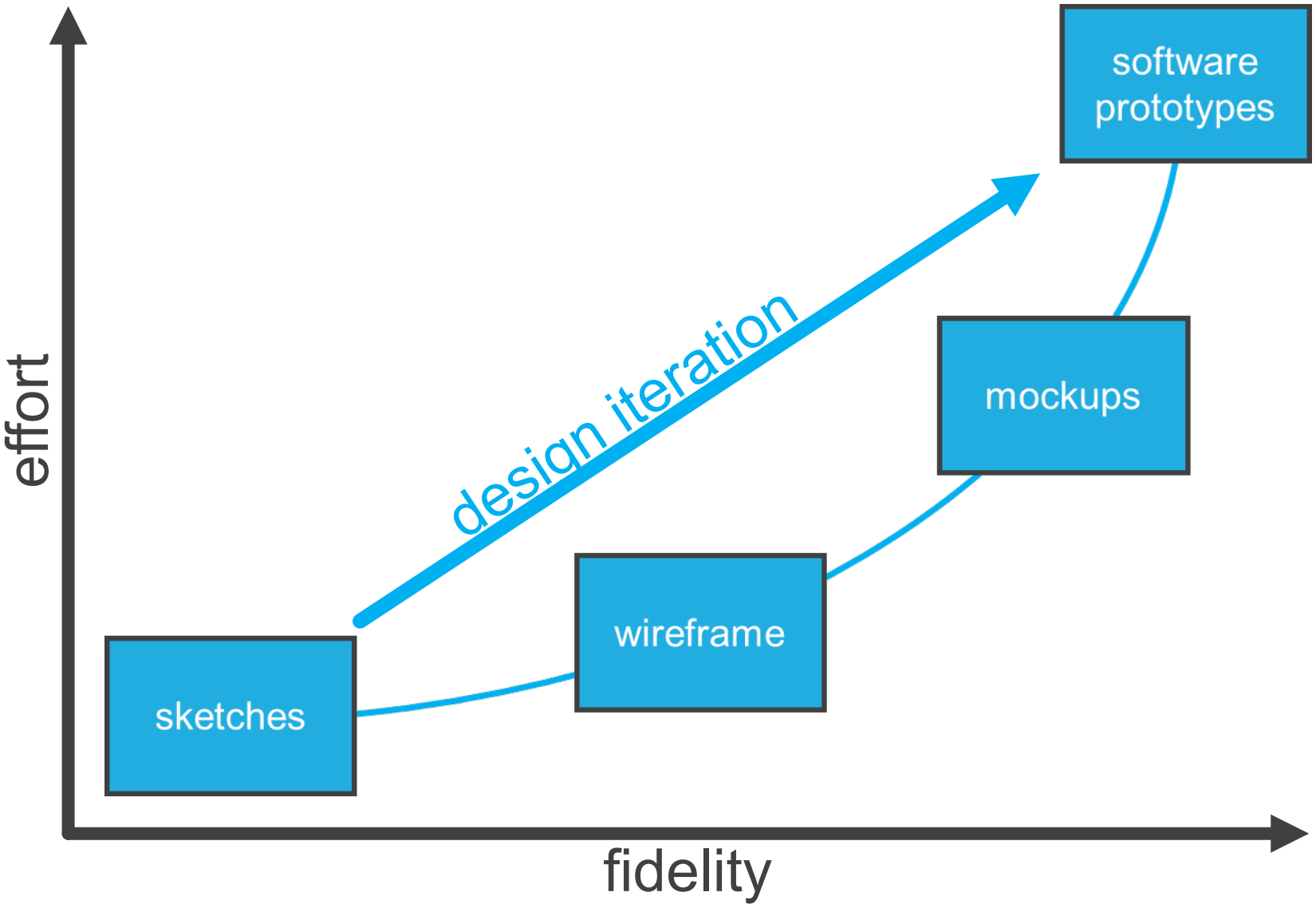


Off

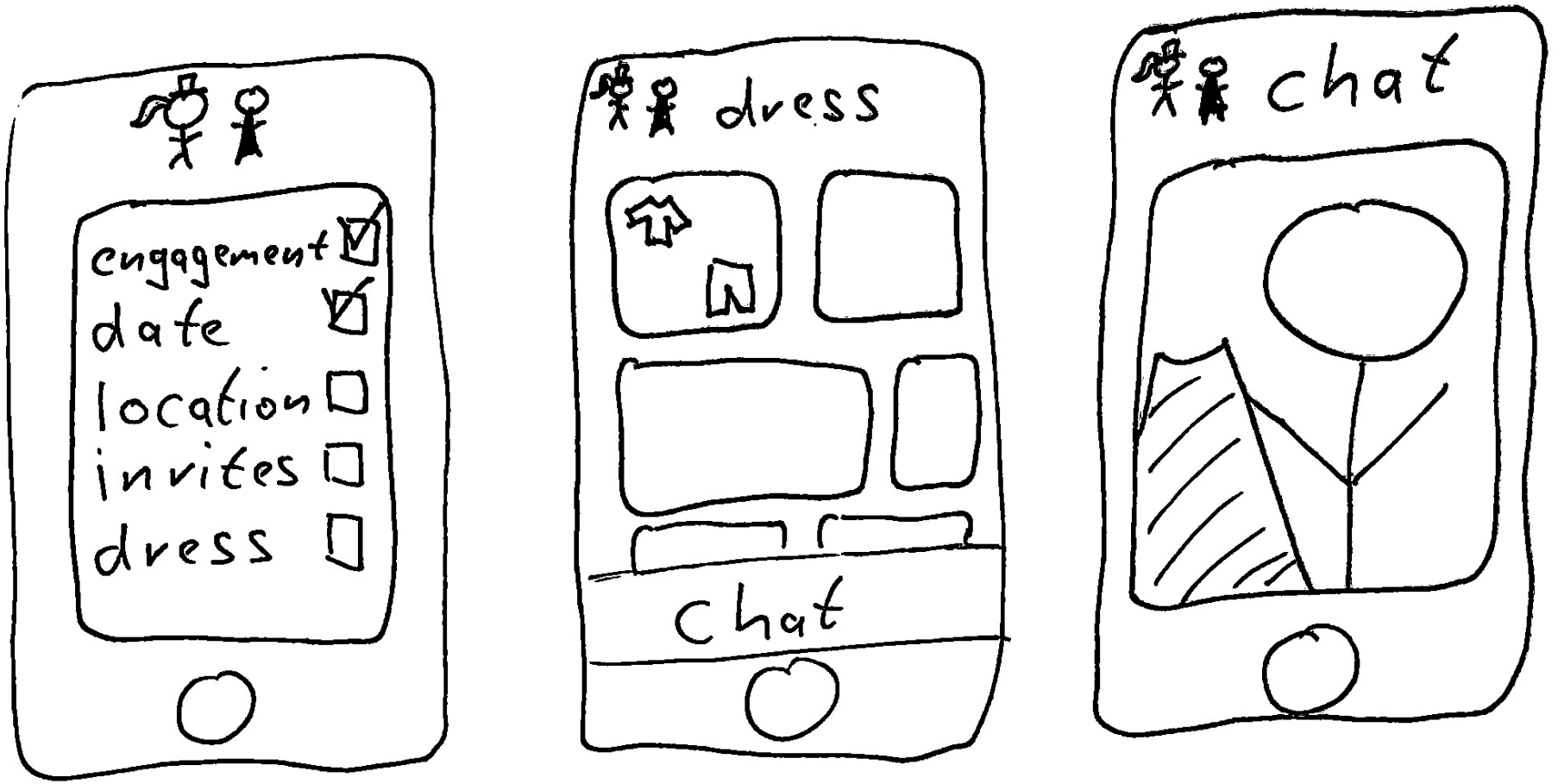
On

Implementing IUIs

Practical advice


effort
fidelity
design iteration
sketches
wireframe
mockups
software prototypes

Sketches



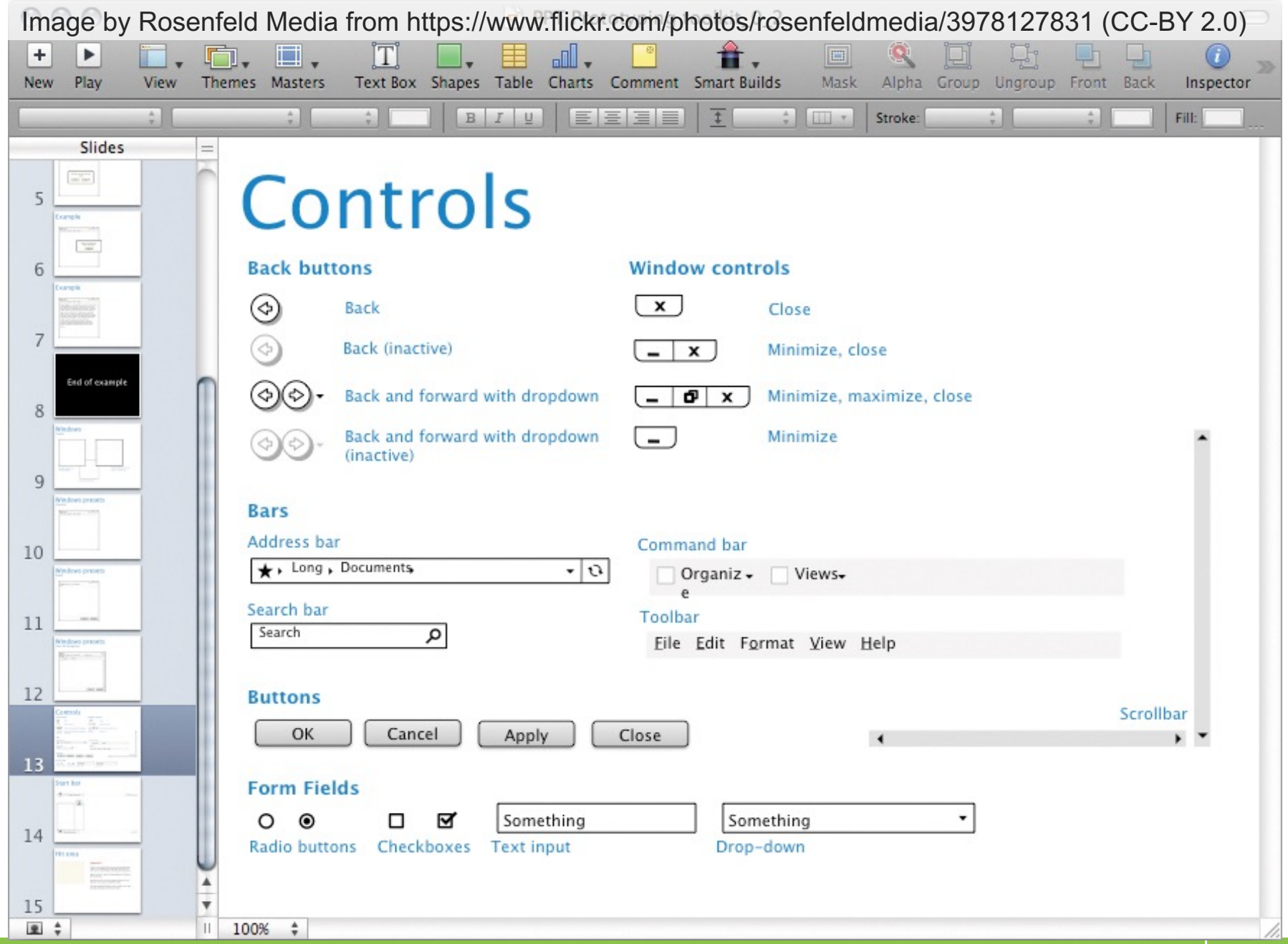
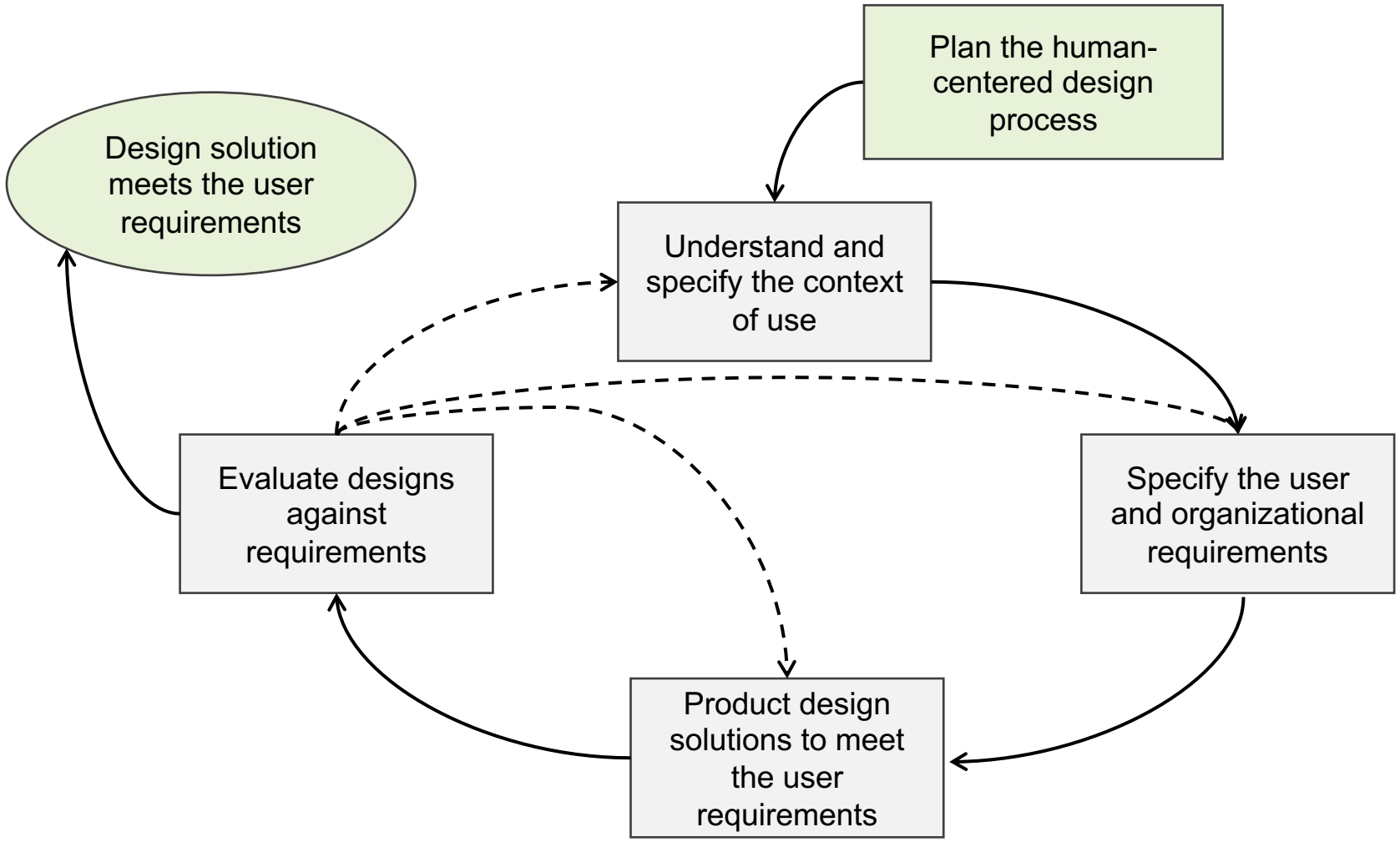


Image by Rosenfeld Media from https://www.flickr.com/photos/rosenfeldmedia/3978127831 (CC-BY 2.0)
New
Play
View
Themes
Masters
Text Box
Shapes
Table
Charts
Comment
Smart Builds
Mask
Alpha
Group
Ungroup
Front
Back
Inspector
Stroke:
Fill:
Slides
Controls
Back buttons
Back
Back (inactive)
Back and forward with dropdown
Back and forward with dropdown (inactive)
Window controls
Close
Minimize, close
Minimize, maximize, close
Minimize
Bars
Address bar
Long
Documents
Search bar
Search
Command bar
Organize
Views
Toolbar
File
Edit
Format
View
Help
Buttons
OK
Cancel
Apply
Close
Scrollbar
Form Fields
Radio buttons
Checkboxes
Something
Text input
Something
Drop-down
100%

ISO 9241-210 Human-Centered Design Process



ISO 9241-210:2019 (EN) Human-centered design for interactive systems

Prototyping IoT devices

How would you build a prototype?

In an hour?

In a day?

In a week?

Development is hard – not testing is harder

- Often unclear if a system is worth the development effort
- Especially true for systems requiring novel hardware or algorithms
- Learning if the system is useful and the functions users want requires the system

Wizard of Oz

- An invisible ‘wizard’ controlling parts of the functionality
- We only implement the easy parts but leave the hard part to the human operator
- Provides the user with the experience without extensive implementation effort for the prototype
- Typical areas
  - Speech recognition
  - Speech synthesis
  - Annotation
  - Reasoning
  - Computer vision

Implementing IUIs

Libraries, Python, web services, …

Build your own, e.g.:

- Web-based frontend
- Python backend (e.g. using ML libraries)

Pro:
Full flexibility, integrate own models or models from others etc.

Con:
More development work, computational costs

Pre-built, e.g.:

- External APIs, web-services
- Devkits, e.g. https://developers.google.com/ml-kit

Pro:
Faster prototyping

Con:
…if it fits your needs; API costs

Implementing IUIs

ML models

HCI & user-centred work is often iterative, uses prototyping

Training e.g. state-of-the-art text or image generator from scratch is costly (time + computation)

- Prototyping with pretrained models

  NLP e.g.: https://huggingface.co/

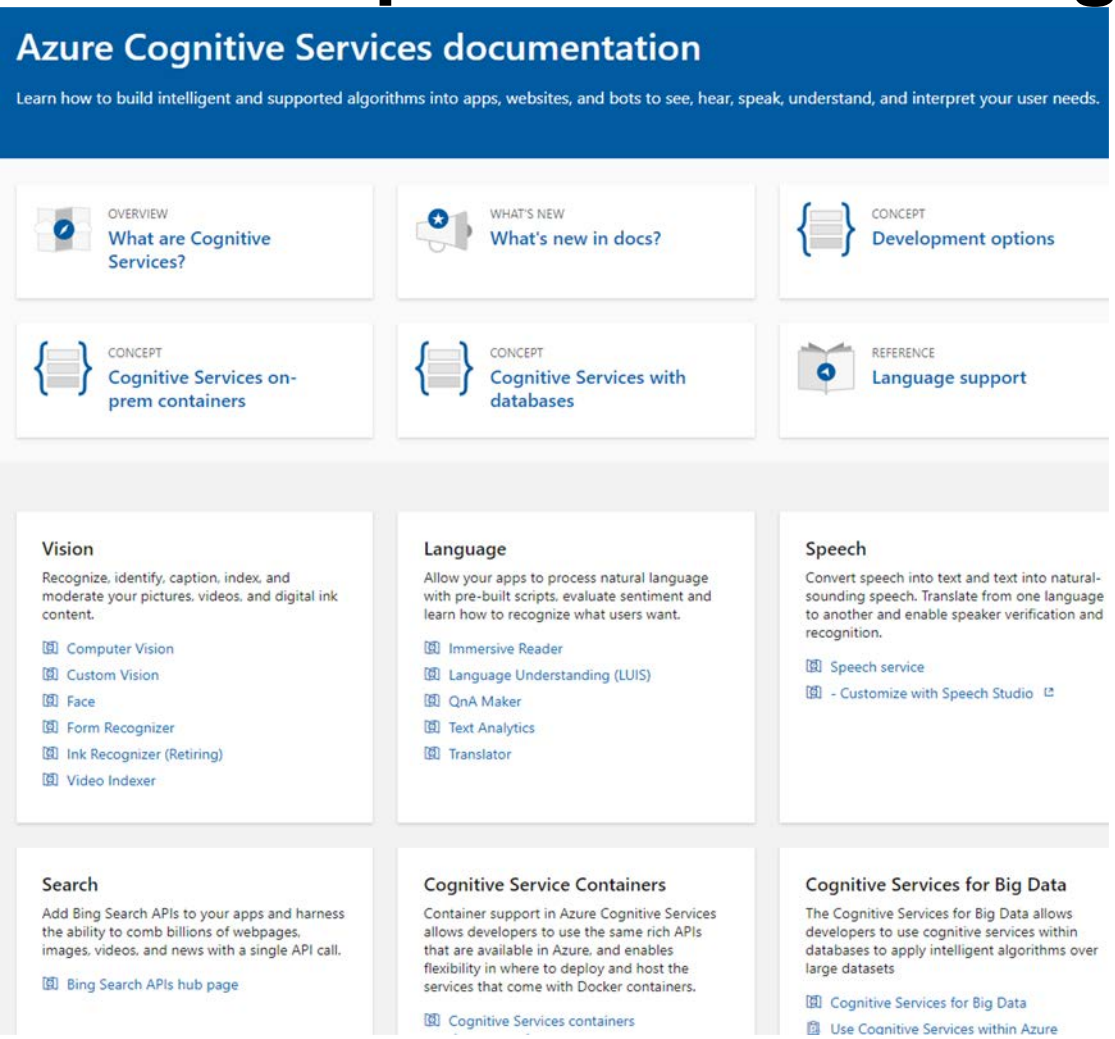
  Other models e.g.: https://www.tensorflow.org/resources/models-datasets

  Many (ML/AI) papers come with code/model releases (e.g. https://paperswithcode.com/)

Also: „Buying a time machine“ for IUI research
Models don‘t need to run on your target device

cf. Hudson and Mankoff 2014

Cloud Services
Example: Microsoft Cognitive Services



https://docs.microsoft.com/en-us/azure/cognitive-services/

Cloud Services from:

- IBM
- Google
- Amazon
- Microsoft
- … and many others

Why do people use them?

What is the risk?

Examples Text Analytics

Identification of the Language

Can tell what language the text is, e.g. English, German, Spanish,…

Relevant for understanding and translation

Example (Online) APIs:

- https://console.bluemix.net/apidocs/language-translator
- https://docs.microsoft.com/en-us/azure/cognitive-services/translator/
- https://cloud.google.com/translate/docs/basic/detecting-language
- https://pypi.org/project/langdetect/

To detect the language of the text:

```
>>> from langdetect import detect
>>> detect("War doesn't show who's right, just who's left.")
'en'
>>> detect("Ein, zwei, drei, vier")
'de'
```

To find out the probabilities for the top languages:

```
>>> from langdetect import detect_langs
>>> detect_langs("Otec matka syn.")
[sk:0.572770823327, pl:0.292872522702, cs:0.134356653968]
```

License

This lecture is partly based on the 2020 version IUI “Lecture 01: Introduction and Motiviation” by Daniel Buschek (University of Bayreuth), Andreas Butz (LMU Munich), Niels Henze (University of Regensburg), Sven Mayer (LMU Munich), and Albrecht Schmidt (LMU Munich),