

# Inklusive Medizin und **(Digitale)** Assistierende Technologie & Barrierefreiheit

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[https://en.m.wikipedia.org/wiki/File:Perros\\_Durmiendo.jpg](https://en.m.wikipedia.org/wiki/File:Perros_Durmiendo.jpg)



[https://wellcomeimages.org/indexplus/obf\\_images/10/9e/4b6d97463549403514e120830472.jpg](https://wellcomeimages.org/indexplus/obf_images/10/9e/4b6d97463549403514e120830472.jpg)



<http://www.domitall.com/wordpress/wp-content/uploads/2013/11/easy008.jpg>

## Ist das Inklusion?

Micro/Nano



<http://kk.org/thetechnium/dealing-with-ro/>

<https://www.geneticliteracyproject.org/2015/08/19/robot-exoskeletons-medical-applications-far-ahead-military-use/>



body/near/rehab/cyborg...

Artificial  
Intelligence

Macro/IoT/WoT



<http://www.computerwoche.de/>

<http://www.computerwoche.de/>



Accessible  
VR/AR/Tangible/3DPrint/Game

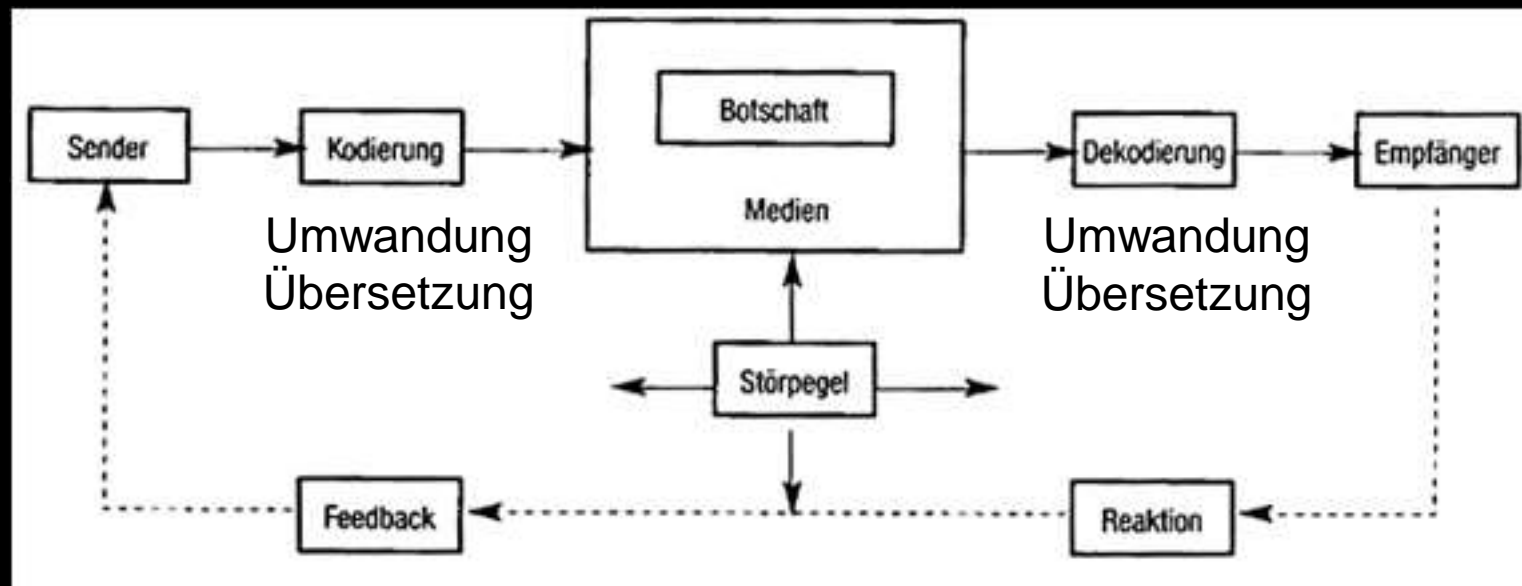
# Inklusion: Sozialer Prozess!



[https://www.who.int/phi/implementation/assistive\\_technology/phi\\_gate/en/](https://www.who.int/phi/implementation/assistive_technology/phi_gate/en/)

"Die Grenzen meiner Sprache  
sind die Grenzen meiner Welt."  
(Ludwig Wittgenstein)

# Semiotik & Kybernetik/Informationstheorie



Shannon/Weaver

[https://www.inst.at/trans/15Nr/01\\_2/bernsau15.htm](https://www.inst.at/trans/15Nr/01_2/bernsau15.htm)

Syntaktik  
Semantik  
Pragmatik

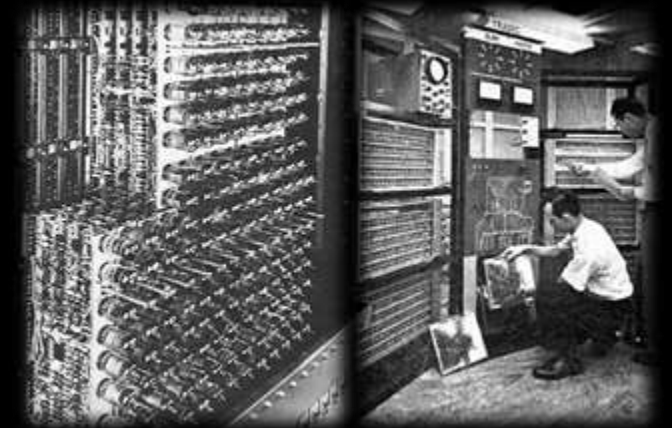
Präsentation / Perzeption  
Verstehen  
Anwenden / Interaktion / Kommunikation

„Übersetzung“  
Multimedialität  
Multimodalität

# START DER DIGITALISIERUNG: **DIE MASCHINE IST DIE SCHNITTSTELLE**

- Zeit-/ortsgebunden
- Expert:innen für Expert:innen
- Ausbildung/Selektion eines erlesenen Kreises

**→ Nutzer:innen passen sich dem System an**



## Bob Bemer, John McCarthy (60er)

**Trennung Interface und Anwendung → Interface eigene Entität**

Standard Keyboard Interface (scan-codes; später PS/2, USB)

(Cobol, ASCII, ESC, \, {}, [], ...)

”Computing” auf Basis digitaler Dokumente

**„Computing on Computing“**

**→ SPRACHBASIIERT**



## Joseph C.R. Licklider

**Informatiker  
& Psychologe**



Joseph C.R. Licklider:  
Graphical User Interfaces (GUI)  
“Human Computer Symbiosis”  
~1950

**Man-Computer Symbiosis:** “... the development of man-computer symbiosis by analysing some problems of **interaction between men and computing machines**, calling attention to applicable principles of man-machine engineering, and pointing out a few questions to which research answers are needed. The hope is that, in not too many years, human brains and computing machines will be **coupled together very tightly** and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today.”

**Vater der Mensch-Computer Interaktion / Human-Computer Interaction:  
„Sprache – Interaktion – Kommunikation“**



# SAGE: Semi Automatic Ground Environment Symbolisch/Ikonisch



"Symbolical Head, Illustrating the Natural Language of the Faculties." (Image from Wells, Samuel. *How to Read Character*. New York: Wells Publishing, 1870. p.36.)



Joseph C.R. Licklider:  
Graphical User Interfaces (GUI)  
"Human Computer Symbiosis"  
~1950

## Deiktisch



Carina Lüke, Ute Ritterfeld, Angela Grimminger, Ulf Liskowski and Katharina J. Rohlfing: Development of Pointing Gestures in Children With Typical and Delayed Language Acquisition, in: *Journal of Speech, Language, and Hearing*, Volume 60, Issue 11, November 2017, American Speech-Language-Hearing Association.



## Douglas C. Engelbart in the early 1960's

### Augmentation Research Center, Stanford Research Institute (SRI)

- "...I had the image of sitting at a big CRT screen with all kinds of **symbols**, new and different symbols, not restricted to our old ones. The computer could be manipulated, and you could be **operating all kinds of things to drive the computer** ... I also had a clear picture that one's colleagues could be sitting in other rooms with similar work stations, tied to the same computer complex, and could be sharing and working and **collaborating** very closely." (~50s)
- **oNLine System (NLS, `60s):**
  - Zwei Personen editieren das gleiche Dokument: Kooperation
  - 2D display Dokumenteditieren
  - Multiple Fenster, on-screen Telekonferenz
- **Anwendung Licklider's Ideen:** Leistbares SAGE / Interface-Technologie
  - Maus
  - Joystick
  - Lichtgriffel

→ **WIMP: Windows, Icons, Menus, Pointer**

**Deiktisch & Symbolisch**



## Alan Kay

- Perfektionierung von **WIMP**
- **WYSIWYG** – "What you see is what you get"
  - Betriebssystem
  - "Office": Text, Tabellenkalkulation, Präsentation
  - Email client
  - Vektor Graphik
  - Zeichnen
  - Multi-player networked video game
- Smalltalk, ethernet, laser printer, client-server network model
- **Dynabook** (1977): Konzept eines tragbaren/vernetzten Computers

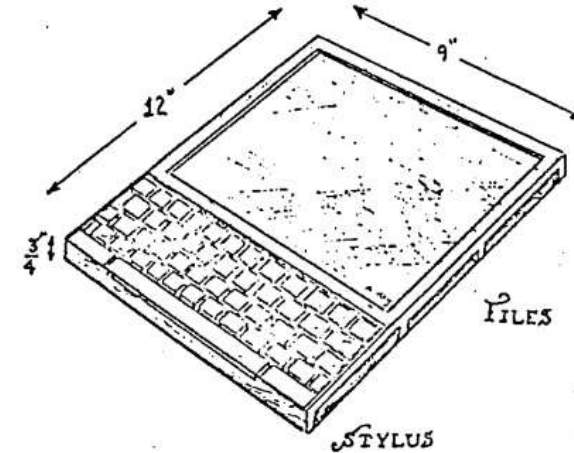
"We envision a device as *small and portable as possible* which could both take in and give out information in quantities approaching that of human sensory systems."

→ Apple „Newton“

### The DynaBook

"I wish to God these calculations were executed by steam!"  
Charles Babbage (age 19)  
ca. 1803

"The Analytical Engine weaves algebraic patterns, just as the Jacquard Loom weaves patterns in silk."  
-Ada Augusta  
Countess of Lovelace

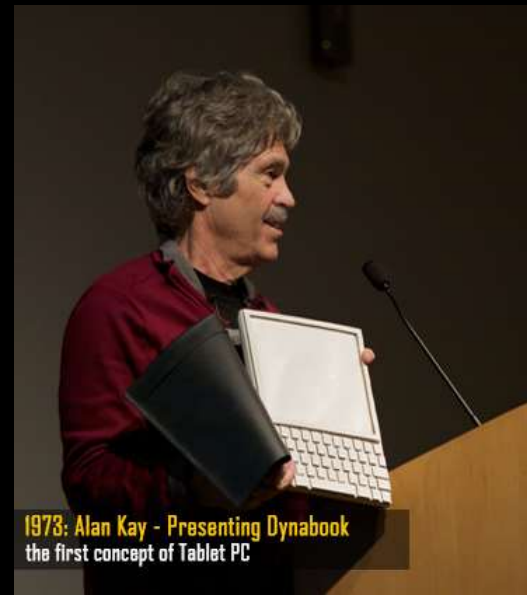


“Since the release of the Macintosh, companies like Apple, Microsoft, and now Google, have driven much of the engineering of user interfaces, **deviating little from the original visions inspired by Licklider, Engelbart, and Kay**, (...) but continuing to harvest basic research for new paradigms of interaction, including the rapid proliferation of capacitive touch screens in the early 2000's in smartphones.

One of the most remarkable things about this history is how **powerful one vision was to catalyze an entire world's experience with computers.**”

(A. J. Ko, E. Whitmire)

## Deiktisch & Symbolisch



1973: Alan Kay - Presenting Dynabook  
the first concept of Tablet PC



2010: Steve Job - Presenting Apple's iPad  
the "finishing" of Tablet PC

## Hier findet digitale Inklusion statt!



Alle 13 Minuten, 84 mal am Tag erinnert, 44 mal entsperrt,  
3h 15min pro Tag, 35 Tag im Jahr ...

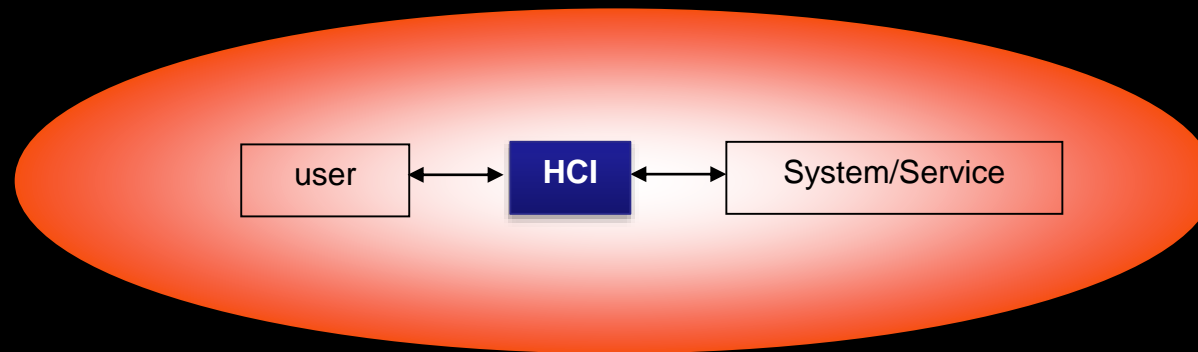
(<https://blog.rescuetime.com/screen-time-stats-2018/>)





# Human-Computer Interaction

## universelle Kultur(Sprach)-Technik



**einfach + stabil + universell + adaptiv**



## einfach



**Beschränkte Anzahl von Elementen → SYMBOLISCH/METAPHORISCH**  
**Beschränkte Anzahl von Aktionen → DEIKTISCH**  
**Unendliche Vielfalt der Anwendungen: „one click away“**



Fernbedienung



Vidorekorder



Schreibmaschine



Schaltzentrale



Heizungssteuerung

einfach + universell







Fernbedienung



Vidorekorder



Schreibmaschine



Schaltzentrale



Heizungssteuerung

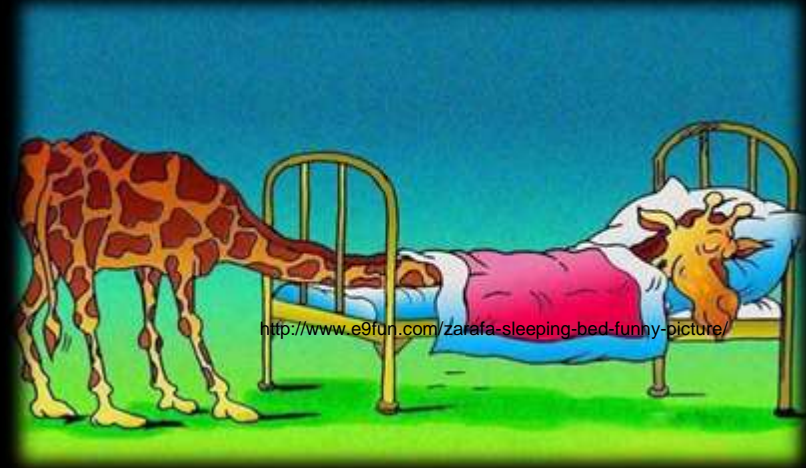
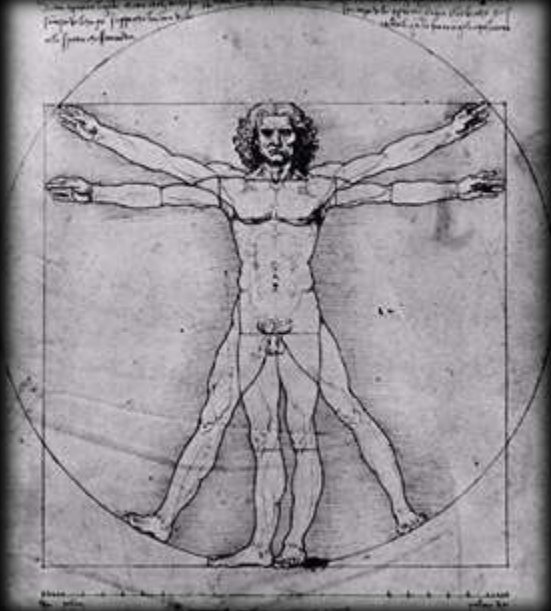
einfach + universell + **adaptiv / inklusiv** + stabil



The collage illustrates various human-computer interaction scenarios and assistive technologies. It includes a desktop computer monitor and keyboard, a person using a headset, a person using a specialized mouse, a person using a touch screen, a car's center console with a mobile phone mounted, a person using a specialized keyboard, a person using a specialized mouse, a person using a specialized keyboard, a person using a specialized mouse, a person using a specialized keyboard, a person using a specialized mouse, a person using a specialized keyboard, a person using a specialized mouse, a person using a specialized keyboard, a person using a specialized mouse.



“Science Finds,  
Industry Applies,  
Man Conforms.”  
Motto of World Exhibition 1933, Chicago



“People Propose,  
Science Studies,  
Technology Conforms.”

Donald A. Norman (1993), Things That Make Us Smart

# Disruptiv



(picture alliance / dpa / Arne Immanuel Bänsch)

***„Der Umgang mit neuen Technologien wird in die Tiefengrammatik des lebensweltlichen Hintergrundes eingreifen und paradigmatische Sichtweisen, ja Modelle der Weltauslegung verändern.“***

[J. Habermas: Texte und Kontexte, Suhrkamp 1991]

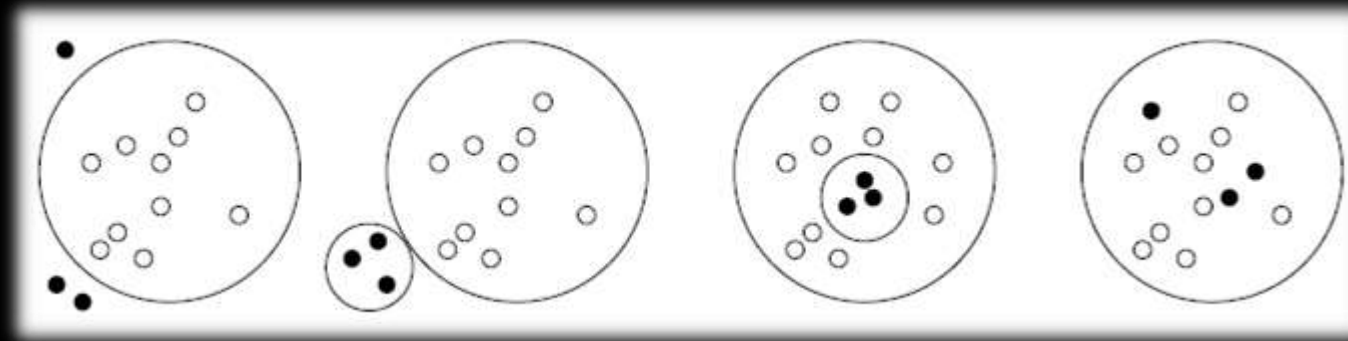
# Sozialer und Organisatorischer Wandel: **Disruptiv & Konstruktiv**

Ausgrenzung

Segregation

Integration

Inklusion



(Wolf, 2013)



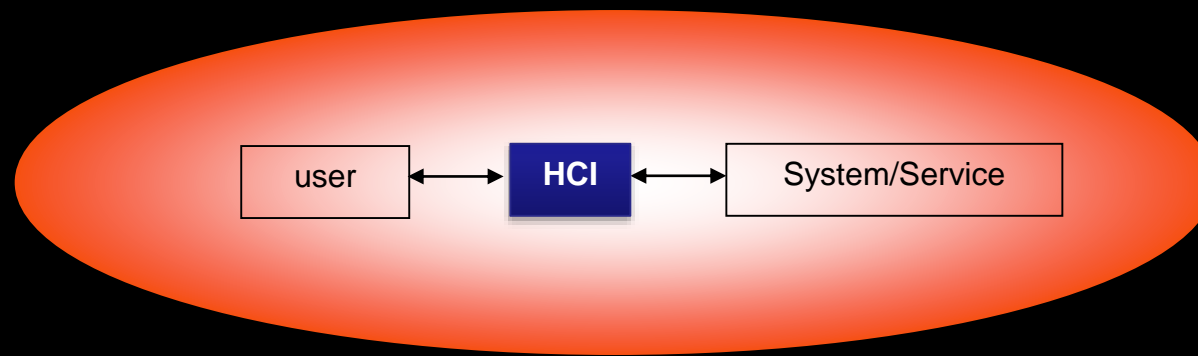
<http://www.watzlawickehrenring.at/paul-watzlawick.html>

*„... die Konzepte von  
normal und abnormal  
(behindert / nicht behindert)  
verlieren ihre Bedeutung  
als Eigenschaften von Individuen.“  
[Paul Watzlawick]*



# Human-Computer Interaction

## Universelle Kultur(Sprach)-Technik



**einfach + stabil + universell + adaptiv**

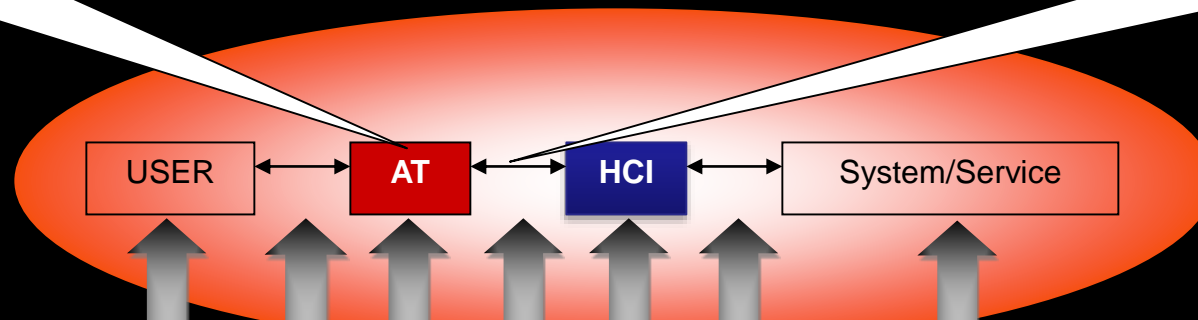
# Zugang zur digitalen Lebenswelt unabhängig und selbstbestimmt



Assistierende  
Technologie

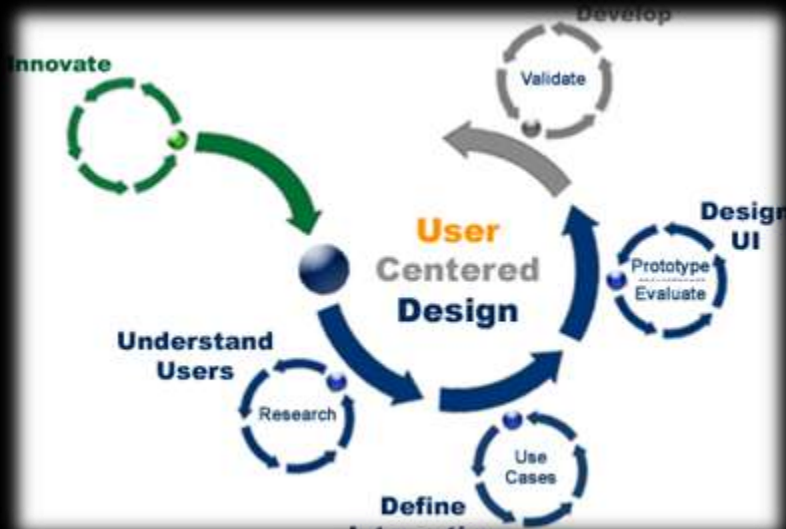
## Human-Computer Interaction Universelle Kultur(Sprach)-Technik

Digitale  
Barrierefreiheit



7 Domänen digitaler Inklusion

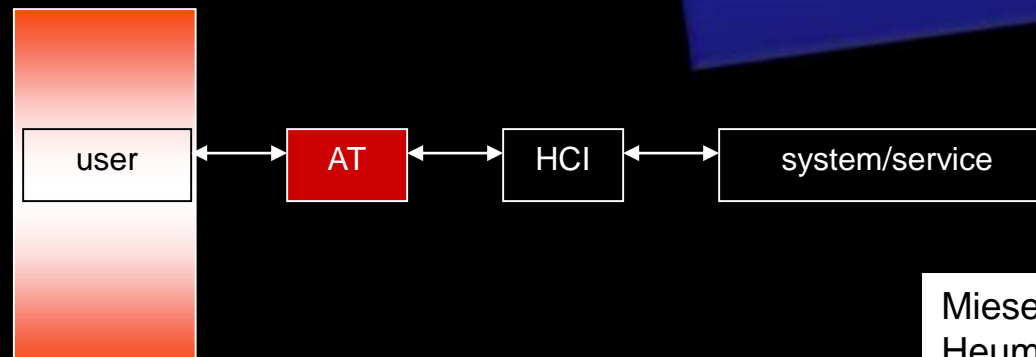
**einfach + stabil + universell + adaptiv**



[www.sapdesignguild.org/.../ucd\\_overview.asp](http://www.sapdesignguild.org/.../ucd_overview.asp)

**Methoden und Werkzeuge**

**IPAR-UCD**  
Inclusive Participatory Action Research For User Centred Design



## 1. Nutzer:innenbeteiligung & Selbst-in-die-Hand-Nehmen "Nothing about us without us!"

Miesenberger, K.; Edler, C.; Dirks, S.; Bühler, Ch.; Heumader, P.: User Centered Design and User Participation in Inclusive R&D, in: Computers Helping People with Special Needs, 17th International Conference ICCHP Lecco, Italy, Proceedings, Springer, Heidelberg, 2020.





WHO/ICF:  
1400+ Kategorien

**Methoden und Werkzeuge**

**Profile**



Nutzer\*innen

Umfeld



**2. Assessment, Profilbildung**

## “Von Listen von Produkten zu personalisierten Lösungen.”



e.g.  
Exoskeleton  
Wearables  
Mobility



e.g. content  
translation  
annotation  
adaptation



e.g. ambient  
hearing,  
sign language  
animation,  
translation

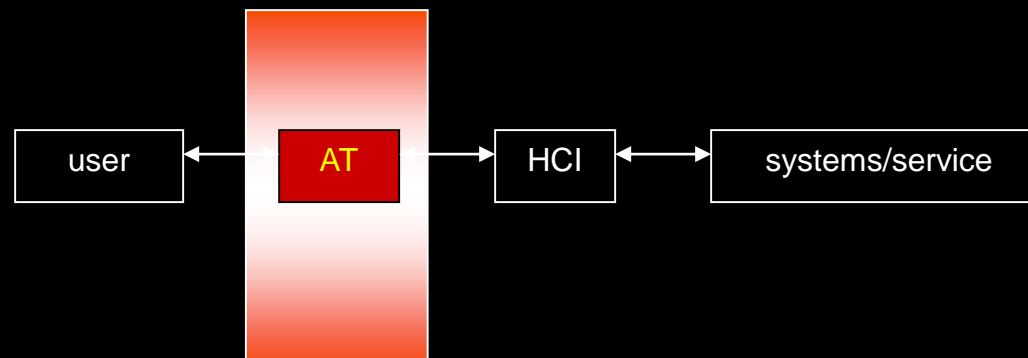


e.g.  
2D/3D  
mobility,  
smart home



e.g.  
Auto-adaptive  
symbol tables,  
silent speech

### AT Plattformen



**Personalisierung:**  
1) Sensorik  
2) Kodierung/Präsentation  
3) Aktorik

### 3. Persönliche Assistierende Technologie



# AsTeRICS with Enobio in Action



[astertics.eu](http://astertics.eu)



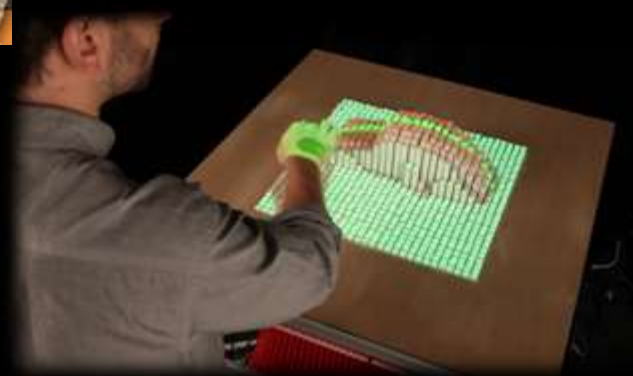
[easyreading.eu](http://easyreading.eu)



<https://simax.media/>



<https://suitceyes.eu/>



<https://vimeo.com/79179138>



how easy do you think lipreading is?  
let's give it a try

<https://www.youtube.com/watch?v=fa5QGremQf8>

<https://www.youtube.com/watch?v=aMPNjMVlr8A>

**WHO/ICF: 1400 Kategorien**



**Digitale (Software / Web / Dokumente / embedded / game / VR / AR/ ...) Barrierefreiheit  
ÄQUIVALENTE ALTERNATIVEN AUF BASIS FORMAL/HUMANER SPRACHKONZEPTE**

Umsetzung und Monitoring (EAA, WZA, BaFG)



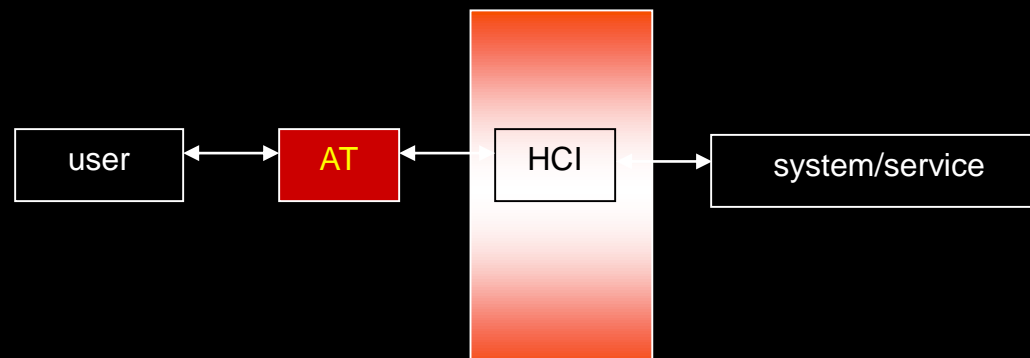
**4. Barrierefreiheit**

„a-modal“ / „a-medial“

**Chancen und Risiken!  
Proaktiv!**



„body no“ „tangible“ „earable“



**5) “Future / non-classical HCI” – barrierefrei!**

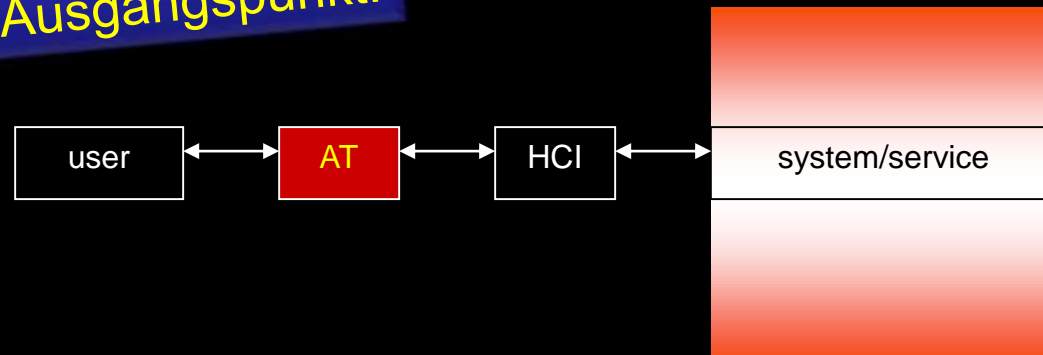
**“Die Probleme möchte ich überhaupt einmal haben!”**  
(Karl, ein Kollege mit kognitiver Behinderung)



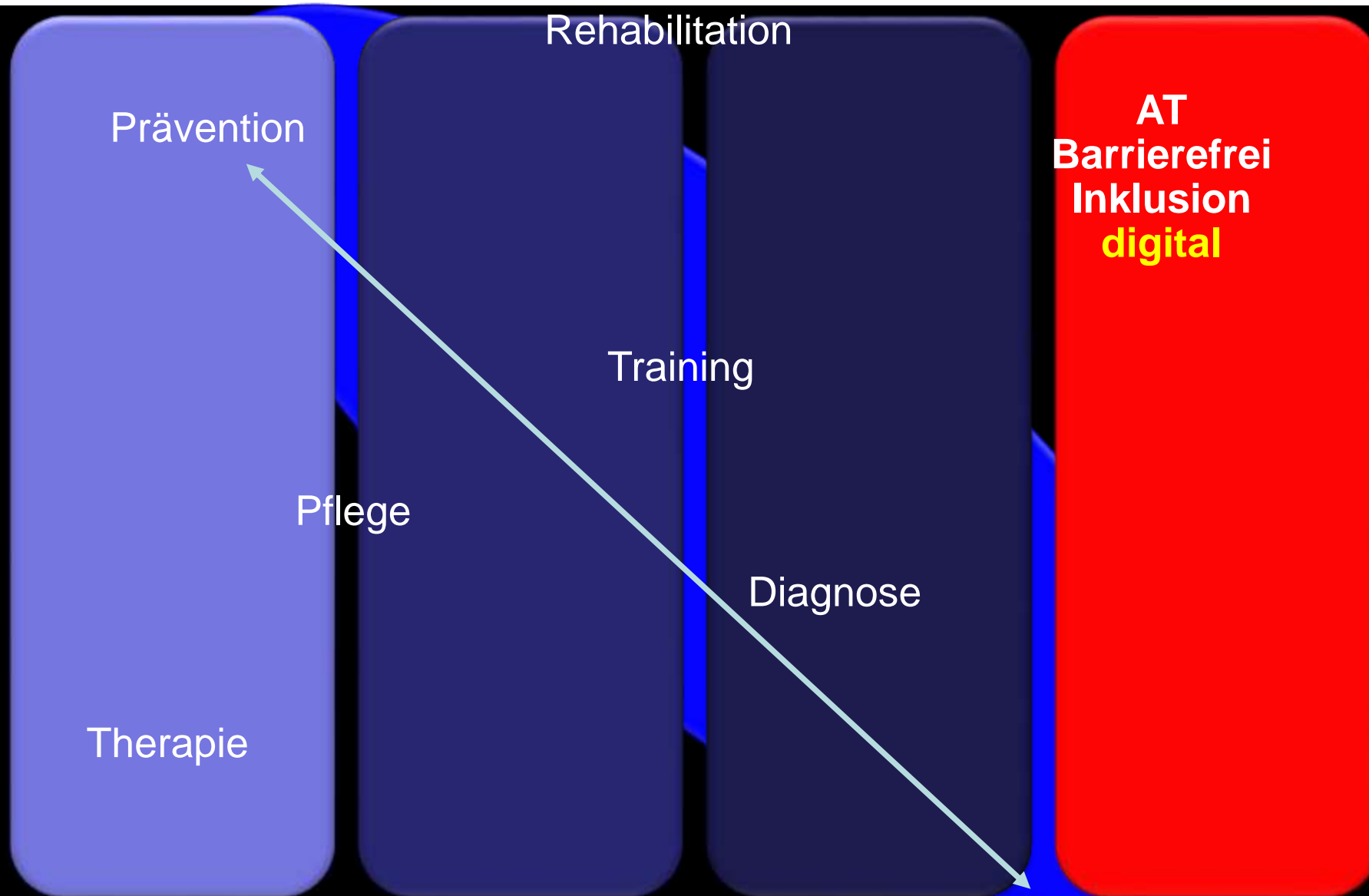
## 6. Standards: Interoperabilität



**Ergebnis und nicht Ausgangspunkt!**



## 7. Lebenswelt - Lebensqualität





# Easy Reading

„Bleib beim Original!“

[easyreading.eu](http://easyreading.eu)





<https://giphy.com/gifs/thisisgiphy-reaction-audience-26FxCOdhIvEQXbeH6>



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