

# Bildung als Betriebssystem der Digitalen Gesellschaft

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# Bildung und Digitalisierung

hochschulforum digitalisierung Ad Hoc-AG

- ▶ „Bildung für das digitale Zeitalter im Europäischen Kontext“

Wie verändert sich (Hochschul-)bildung durch die Digitalisierung?

# Das Digitale Zeitalter

- ▶ Jahrtausendelange Erfahrung
  - ▶ Freie Austausch von Gedanken
    - ▶ Wissensvermehrung durch Teilen

## Digitalisierung

- ▶ Speicherkosten streben gegen Null ( $+\varepsilon$ ).
- ▶ Kommunikationsgeschwindigkeit strebt gegen Lichtgeschwindigkeit ( $-\varepsilon$ ).

## Neuland

- ▶ Disruption
- ▶ Komplexität streng monoton steigend.

# H. G. Wells: World Brain (1938)

## World Brain

- ▶ Wells, H.G.
  - ▶ World Brain
    - ▶ London: Methuen & Co., Ltd.;
    - ▶ Garden City, NY: Doubleday, Doran & Co., Inc.
    - ▶ 1938.

## Wikipedia

- ▶ [https://en.wikipedia.org/wiki/World\\_Brain](https://en.wikipedia.org/wiki/World_Brain)

## Technik: Microfilm

*"A microfilm, coloured where necessary, occupying an inch or so of space and weighing little more than a letter, can be duplicated from the records and sent anywhere, and thrown enlarged upon the screen so that the student may study it in every detail. This in itself is a fact of tremendous significance."*

# Arthur C. Clark: Profiles of the Future (1962)

## Profiles of the Future

- ▶ Clarke, Arthur C.
  - ▶ Profiles of the Future;
    - ▶ an Inquiry into the Limits of the Possible.
    - ▶ New York: Harper & Row, 1962.

## Computernetze

1. World Libary
2. World Brain

## Alan Kay: Inventing the Future (1971)

*"The best way to predict the future is to invent it."*

- ▶ Objektorientierung

*"I'm sorry that I long ago coined the term "objects" for this topic because it gets many people to focus on the lesser idea. The big idea is "messaging"."*

- ▶ Graphische Oberflächen

- ▶ Notebooks

- ▶ . . . .

# Bildung als Betriebssystem

## Was ist ein Betriebssystem?

- ▶ Schnittstelle zur Hardware
- ▶ Schnittstelle zum User

## Was ist Bildung

- ▶ Schnittstelle zu wissenschaftlichen Resultaten.
- ▶ Schnittstelle zu Lernenden.



# Erfolgsgeschichte Betriebssysteme aus der Bildung

- ▶ GNU
  - ▶ Emacs
  - ▶ GNU/Linux
- ▶ MINIX
  - ▶ LINUX
- ▶ BSD
  - ▶ Free BSD

# GPL Lizenz

- ▶ Richard Stallman
- ▶ MIT

GPL Software bildet das Rückgrat der Digitalisierung.

# Minix

- ▶ Andrew S. Tanenbaum
- ▶ Vrije Universiteit Amsterdam

## Lehrbuchanhang

- ▶ Tanenbaum, A.S.: Operating Systems: Design and Implementation, Prentice Hall, 1987.

# Linux

- ▶ Linus Torwalds
- ▶ Univeristät Helsinki
- ▶ GPL

Linux ist Grundlage für Android Systeme.

# BSD

- ▶ Universität Berkeley
- ▶ Berkeley Software Distribution
- ▶ BSD Lizenz

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## New Minix 3 License

- ▶ What is the MINIX 3 license?

*The MINIX 3 license is a clone of the Berkeley (BSD) license. In plain English, it says you can do whatever you like with the system provided that (1) you agree not to sue us under any conditions, and (2) you keep the credit lines in the source, documentation, and publicity unless other arrangements have been made. Specifically, you are free to modify the source code, redistribute it, incorporate it into commercial products with only the above restrictions.*

# Minix Worlddomination

Intel Management Engine (ME): Ring -3

"Russische Hacker" (2017) : Intel nutzt ab ME11 Minix 3

- ▶ Minix 3 läuft auf mehr Computersystemen, als Windows und Mac zusammen.

# Hacker Ethik

- ▶ Der Zugang zu Computern und allem, was einem zeigen kann, wie diese Welt funktioniert, sollte unbegrenzt und vollständig sein.
- ▶ Alle Informationen müssen frei sein.
- ▶ Mißtraue Autoritäten – fördere Dezentralisierung.
- ▶ Beurteile einen Hacker nach dem, was er tut, und nicht nach üblichen Kriterien wie Aussehen, Alter, Herkunft, Spezies, Geschlecht oder gesellschaftliche Stellung.

## Hacker Ethik (Update)

- ▶ Man kann mit einem Computer Kunst und Schönheit schaffen.
- ▶ Computer können dein Leben zum Besseren verändern.

## Hacker Ethik (CCC)

- ▶ Mülle nicht in den Daten anderer Leute.
- ▶ Öffentliche Daten nützen, private Daten schützen.

# A Mathematician's Apology

- ▶ Hardy, G. H. (1940)
- ▶ A Mathematician's Apology

"The imputation is usually based on an incautious saying attributed to Gauss, to the effect that,

*if mathematics is the queen of the sciences, then the theory of numbers is, because of its supreme uselessness, the queen of mathematics*

– I have never been able to find an exact quotation."

## Apology: Theory of Numbers and Relativity

*"No one has yet discovered any warlike purpose to be served by the theory of numbers or relativity, and it seems unlikely that anyone will do so for many years."*

# Humboldt: Zweckfreie Wissenschaft

## Wilhelm v. Humboldt

*„Die zweckfreie Wissenschaft ist die nützlichste, da sie für unvorhergesehen Bedarfsfälle Lösungen beriet halte, die eine auf Praxis und Verwertbarkeit ausgerichtete Wissenschaft nie geahnt hätte.“*

# Nebenprodukte von Europäischer Grundlagenforschung

## CERN

- ▶ WWW
- ▶ Cloud Computing
- ▶ ...



Wir brauchen mehr Langzeitstudenten (d/m/w).

- ▶ *Verschulung und kurze Studienzeiten sind nicht geeignet,*
- ▶ *den Herausforderungen der Digitalisierung zu begegnen.*